Abstracts

EUROANAESTHESIA 2024

The European Anaesthesiology Congress
## ABSTRACT PRESENTATION PROGRAMME

Please note that all abstracts are presented as poster presentations: abstract presenters do not make a formal presentation of their abstract in a separate room, using audiovisual aids (except for the Best Abstract Prize Competition). Instead, two chairpersons will conduct, in front of each poster, a short discussion of each abstract with the presenter and the audience, for every abstract in that session. Poster presenters have been asked to stand by their poster at least 15 minutes before the start of the session and 15 minutes after, to address further questions.

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Call for abstracts

The ESAIC solicits the submission of abstracts for the Euroanaesthesia 2025 Congress
Lisbon, Portugal
25-27 May 2025

All abstracts must be submitted online via the Euroanaesthesia website

The submission system will be available to submitters as of November 2024

Submission Conditions

When submitting your abstract, you will be prompted to accept the submission conditions that will be made available on the Euroanaesthesia website at least one month before the submissions starts.
BAPC-01
Postoperative innate immune dysregulation, proteomic and monocyte epigenomic changes after colorectal surgery: a substudy of a multicenter randomized controlled trial

K. Albers-Warlé, L. Helder, Y. Negishi, L. Joosten, C. Keijzer, M. Warlé  
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2Radboudumc, Biology, Nijmegen, Netherlands,  
3Radboudumc, Internal Medicine, Nijmegen, Netherlands,  
4Radboudumc, Surgery, Nijmegen, Netherlands

Background and Goal of Study: More than a quarter of patients develop moderate to severe 30-day complications after colorectal surgery, predominantly infections. Monocyte epigenetic alterations leading to immune tolerance could explain postoperative increased susceptibility to infections. The aim of this study was to investigate the underlying mechanism of innate immune dysregulation and its role in infectious complications after colorectal surgery.

Materials and Methods: Damage associated molecular patterns (DAMPs) and ex vivo cytokine production capacity were measured in a substudy (n=100) to a randomized controlled trial in colorectal surgery patients, with additional subgroup proteomic (proximity extension assay; Olink) and epigenomic analyses. Monocytes of healthy volunteers were used to study the effect of High Mobility Group Box 1 (HMGB1) and Heat Shock Protein 70 (HSP70) on cytokine production capacity in vitro.

Results and Discussion: Plasma DAMPs (HMGB1, HSP70, nDNA and mtDNA) were increased after surgery. Comparing changes in the inflammatory proteome with epigenomic alterations in isolated monocytes revealed concurrent significant accessibility changes in inflammatory genes, including CXCL8 (IL-8), IL-6 and IFN-y.

A significant enrichment of interferon regulatory factors (IRFs) was found in loci exhibiting decreased accessibility, whereas enrichment of Activating Protein 1 (AP-1) family motifs was found in loci with increased accessibility.

Conclusion: This study reveals the major pre- to postoperative changes in inflammatory mediators and endorses the relevance of monocyte epigenetic alterations in postoperative immune dysregulation. Future studies should investigate the effects of anesthesia on the identified IRF and AP-1 pathways and explore how to identify patients that could benefit from personalized treatment to minimize postoperative immune dysregulation.

BAPC-02
Intra-abdominal hypertension as a risk factor for acute kidney injury in geriatric patients after emergency abdominal surgery

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1Zaporizhzhia State Medical and Pharmaceutical University, Anaesthesiology and Intensive Care, Zaporizhzhia, Ukraine

Background and Goal of Study: Acute kidney injury (AKI) is a common complication of emergency abdominal surgery. Intra-abdominal hypertension is an often underestimated risk factor that leads to impaired blood circulation in the abdominal cavity and AKI. But the values of intra-abdominal pressure (IAP) and abdominal perfusion pressure (APP), which are critical for the development of AKI in elderly patients after urgent abdominal surgery, are still not defined.

Goal of study: to evaluate the relationship between IAP and APP and the development of acute kidney injury in geriatric patients after emergency abdominal surgery.

Materials and Methods: A prospective single-center study included 66 patients older than 60 years who underwent surgery for peritonitis. Every day in the postoperative period, the presence and stage of AKI was determined according to the KDIGO criteria, IAP and APP were measured. IAP was measured through bladder pressure.

APP was defined as the difference between mean arterial pressure and IAP in mm Hg. Statistical processing was performed using the program „STATISTICA for Windows 13” (StatSoftInc., No. JPN 04382130ARC10J).

Results and Discussion: Among the examined patients, 48 developed AKI (73% frequency). The average values of IAP in patients with AKI and without AKI were 10.4 (7.4, 13.3) mm Hg and 6.7 (4.4, 9.6) mm Hg respectively (p=0.0001). APP in patients with AKI, respectively, was significantly lower than in patients without AKI: 72 (61.5, 83.7) mm Hg versus 85.6 (74.5, 94.4) mm Hg (p<0.0001).

According to the results of logistic regression analysis, a relationship between high IAP values and the development of acute kidney injury was revealed: the odds ratio (OR) was 3.4 with the value of the criterion $\chi^2=32.4$ (p<0.0001). The odds ratio between the reduction of APP and the development of AKI was 2.3 with the value of the criterion $\chi^2=13.4$ (p=0.0002).

ROC analysis showed that IAP >10.4 mm Hg is the threshold level for the development of AKI with a sensitivity of 46% and a specificity of 90.5%, with an area under the AUC curve of 0.74.
Background and Goal of Study: Risk prediction scores are used to guide clinical decision making and communication with patients and families. The validation of risk scores in new settings is an essential step prior to use of the tools in clinical practice. The primary objective of this study was to externally validate two patient-specific risk scores for 30-day in-hospital mortality using anesthesia records from the Multicenter Perioperative Outcomes Group (MPOG) anesthesia registry: the Pediatric Risk Assessment score (PRAm, Nasr et al. 2017) and the intrinsic surgical risk score (Nasr et al. 2019). The secondary objective was to recalibrate the scores using the MPOG data.

Results and Discussion: We retrospectively analyzed 3351 patient who had undergone emergent surgery between September 1, 2018 and September 1, 2023. The PII was defined as a mean arterial pressure (MAP) ≤60 mmHg or a need for vasopressor use at least once within 15 minutes after anesthesia induction. Multivariable logistic regression analysis was conducted to identify the risk factors for PIH.

Results and Discussion: PIH was found in 1160 out of the 3351 cases (34.6%). Independent risk factors for PIH were the rapid sequence intubation [odds ratio (OR) 1.3 (95% confidence interval (CI) 1.09 – 1.55) , p=0.004, hypertension [OR 1.45 (1.21 – 1.73), p<0.001], coronary artery disease [OR 1.84 (1.29 – 2.63), p=0.001], diabetes mellitus [OR 1.61 (1.12 – 2.31), p=0.009], recent myocardial infarction [OR 1.66 (1.04–2.65), p=0.03], concomitant beta-blockers [OR 2.06 (1.59 – 2.67), p<0.001], or angiotensin-converting enzyme inhibitors or angiotensin receptor blockers use [1.6 (1.16 – 2.23), p=0.005], and MAP before induction [OR 0.98 (0.98 – 0.99), p<0.001].

Conclusion(s): In patients undergoing emergent surgery pre-existing low MAP, rapid sequence intubation, concomitant hypertension, coronary artery disease, diabetes mellitus and recent myocardial infarction, as well as concomitant use of beta-blockers, angiotensin-converting enzyme inhibitors and angiotensin receptor blockers, are risk factors for development of hypotension after anesthesia induction.

References:


**BAPC-05**

The PAtient-Centred Outcomes and Resource Utilisation after non-cardiac Surgery-Spain (PACORUS-S) study: a cohort using administrative electronic data

N. Meza1,2,3, E. Popova1,4,5, J. Gorricho6, C. Forné Izquierdo7, G.A. Lurati Buse4, G. Urrutia4,5,2

1Universidad de Valparaíso, Interdisciplinary Centre for Health Studies (CIESAL), Viña del Mar, Chile, 2Universitat Autònoma de Barcelona, Department of Pediatrics, Obstetrics and Gynecology, Preventive Medicine and Public Health, Bellaterra, Spain, 3Iberoamerican Cochrane Centre, Cochrane Collaboration, Barcelona, Spain, 4Hospital de la Santa Creu i Sant Pau, Sant Pau Biomedical Research Institute (IIB-Sant Pau), Barcelona, Spain, 5Hospital de la Santa Creu i Sant Pau, Iberoamerican Cochrane Centre, Barcelona, Spain, 6Servicio Navarro de Salud-Osasunbidea, Servicio de Evaluación y Difusión de Resultados en Salud, Pamplona, Spain, 7University of Lleida, Basic Medical Sciences Department, Lleida, Spain, 8University Hospital of Düsseldorf, Heinrich Heine University Düsseldorf, Anesthesiology Department, Düsseldorf, Germany, 9Hospital de la Santa Creu i Sant Pau, Clinical Epidemiology Service, CIBER Epidemiología y Salud Pública (CIBERESP), Barcelona, Spain

**Background and Goal of Study:** In perioperative care, Days Alive and Out of Hospital (DAOH) has been proposed as an alternative and compelling patient-centered measure to assess the quality of care — comprehending functional status, morbimortality, among others. Indeed, DAOH has shown associations with preoperative comorbidity burden, surgical risk, and postoperative complications. We aim to validate DAOH at 30, 90, and 365 days after non-cardiac non-neurosurgical surgery concerning preoperative risk factors and postoperative complications in Spanish healthcare systems by analyzing the administrative electronic health registries (AEHR) of Regional Health Authorities in the Basque Country, Navarra, and Catalonia. We present our preliminary findings for the Navarr region so far.

**Materials and Methods:** A retrospective cohort study was conducted using the AEHR of the Navarra Health Service. The study focused on patients ≥50 years old who underwent a non-cardiac, non-neurosurgical inpatient surgery between 2015 and 2018. Patients were excluded if they had undergone ≥1 surgical procedure in the last 12 months before the date of their index procedure. We assessed the relationship of DAOH at 30, 90, and 365 days with preoperative risk, and type of surgery.

**Results and Discussion:** We analyzed the AEHR of 7,587 patients. Overall median (IQR) DAOH at 30, 90, and 365 days were 24 (20 to 28), 84 (60 to 88), and 356 (353 to 362), respectively. DAOH at 30, 90, and 365 days were associated with preoperative risk (see Table 1) and type of surgery (p<0.001 for each end-point).

<table>
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<th>All (n = 7587)</th>
<th>Charlson* &lt;2 (n = 5839)</th>
<th>Charlson* ≥2 (n = 1748)</th>
<th>p-value</th>
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<td>24.0 (20.0, 28.0)</td>
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<td>DAOH 90 days, Median (IQR)</td>
<td>84.0 (80.0, 88.0)</td>
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<td>82.0 (75.0, 87.0)</td>
<td>&lt;0.001</td>
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<td>DAOH 365 days, Median (IQR)</td>
<td>358 (353, 362)</td>
<td>358 (355, 363)</td>
<td>355 (335, 361)</td>
<td>&lt;0.001</td>
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*Charlson Comorbidity Index.

Table 1.

**Conclusion(s):** DAOH estimations from AEHR are feasible. DAOH at 30, 90, and 365 days is associated with preoperative risk. We expect to complete our data collection to perform multivariable analyses exploring the prediction performance of DAOH regarding preoperative risk, postoperative complications, resource utilisation, and other potential confounding variables.

**Acknowledgments:** This work is supported by the research grant number ‘PI12/01742’ from the Instituto de Salud Carlos III, Spain. Nicolás Meza is a PhD candidate at the Doctorate Program on Biomedical Research and Public Health, Universitat Autònoma de Barcelona, Barcelona, Spain.

**BAPC-06**

Machine learning algorithms predict the 28 day survival rate of sepsis-related encephalopathy patients: a retrospective study based on the MIMIC-IV database

X. Xie1,2, Y. Tang1,2, J. Weng1, Y. Han1,2, Y. Chen2, X. Wu2

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**Background and Goal of Study:** Exploring the main influencing factors and predictive indicators of 28 day survival rate in sepsis-associated encephalopathy (SAE) patients, constructing a machine learning algorithm (MLA) model to predict clinical outcomes in SAE patients and assist healthcare professionals in making medical decisions.

**Materials and Methods:** Retrospective analysis of clinical data from 9729 SAE patients in the MIMIC-IV database from 2008 to 2019. Patients were divided into survival group and death group 28 days after admission to the ICU. 70% of the cases were randomly selected as the training set for model establishment, and the remaining 30% of the data were used as the validation set. Using MLA to construct a predictive model, explore the relationship between vital signs, blood gas analysis, comorbidities, clinical scores, and 28 day survival of SAE patients within 24 hours of admission to the ICU, and draw receiver operating characteristic (ROC) curves.

**Results and Discussion:** The final queue includes 9729 SAE patients, with a total of 1363 (14.01%) patients dying within 28 days of admission to the ICU. Based on the logistic regression (LR), decision tree (DT), naive Bayes (NB), random forest (RF), nearest neighbor (KNN), gradient boosting (GB), and extreme gradient boosting (XGBoost) algorithms of MLA, a 28 day survival prediction model was constructed, and ROC curves were plotted with accuracy rates of 87.46% and 89.00%, respectively 83.81%, 90.44%, 85.87%, 91.26%, 90.24%, and AUC were 0.849, 0.651,
0.846, 0.903, 0.738, 0.907, and 0.895, respectively, indicating that the above MLA prediction models have good predictive ability for SAE patients in 28 days, especially the accuracy of the GB algorithm is the highest.

**Conclusion(s):** MLA can accurately predict the 28 day survival rate of SAE patients. Among the seven MLA models, the GB model performs the best in predicting the 28 day survival rate of SAE patients. Based on this, timely and effective prevention and treatment measures can improve the survival rate of SAE patients, improve medical quality and service efficiency, and therefore have clinical guidance significance.
Airway Management

**01AP01-01**

Apnoeic oxygenation during paediatric tracheal intubation: a systematic review and meta-analysis

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**Background and Goal of Study:** Tracheal intubation in children is associated with hypoxemia and adverse events, potentially leading to morbidity and mortality. Current research focuses on preventing desaturation during paediatric tracheal intubation by using supplemental oxygen (i.e., apnoeic oxygenation) with the possibility to increase the likelihood of successful first-attempt tracheal intubation.

**Materials and Methods:** We searched MEDLINE, Embase, Cochrane Library, CINAHL, ClinicalTrials.gov, ICTRP, Scopus and Web of Science from inception to 22 March 2023 for the search terms 1. „Apnoeic Oxygenation”, 2. „Intubation”, 3. „Children”. Our systematic review adheres to Cochrane methodology and includes current evidence to provide updated and clinically meaningful guidance.

**Results and Discussion:** Starting with 40,708 articles initially selected, 15 studies summarising 9,802 children were included (10 RCTs, 4 pre-post studies, 1 prospective observational study) published between 1988 and 2023. 8 RCTs were included for meta-analyses (n=1,070 children; 803 from operating theatres, 267 from neonatal intensive care units), 4 with low risk of bias and 4 with some concerns.

We found apnoeic oxygenation during tracheal intubation in children superior to standard of care in ensuring adequate peripheral oxygen saturation (risk ratio 0.24, 95%-CI: 0.17-0.33, p<0.01, I²=51%) with low certainty of evidence, and higher oxygen saturation (mean difference 3.64%, 95%-CI: 0.83%-6.45%, p=0.02, I²=63%) with high certainty of evidence.

Although the certainty of evidence is low apnoeic oxygenation might increase tracheal intubation first pass success rate, especially in neonates (risk ratio 1.27, 95%-CI: 1.03-1.57, p=0.04, I²=0%). However, the low incidence of adverse events and complications, such as severe bradycardia, favours the use of apnoeic oxygenation during pediatric airway management.

**Conclusion(s):** Apnoeic oxygenation during tracheal intubation in children decreases the risk of desaturation and might increase tracheal intubation first attempt success rate. This review highlights the importance of including apnoeic oxygenation as standard of care due to the lack of side effects and the evidenced benefits in pediatric airway management, particularly those at highest risk of desaturation. However, as included data were heterogeneous, more high-quality randomised controlled trials are needed with a well-defined core set of outcome variables.

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**01AP01-02**

A comparative evaluation of predictors of difficult airway in pediatric population using various bedside anthropometric parameters. A prospective observational study

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**Goal:** The aim of this study is to evaluate different bedside, simple, cheap, non-invasive anthropometric parameters to assess Difficult Laryngoscopy (DL) and Difficult Intubation (DI) in non-syndromic pediatric patients under 20 kg of weight.

The objective is to predict DL and DI using Frontal Plane Chin Distance (FPCD), ratio of FPCD by weight (FPCD/Wt), and ratio of Thyro-Mental Distance by weight (TMD/Wt).

**Materials and Methods:** This is a prospective, double blinded observational study. The study included pediatric patients undergoing elective surgery under general anaesthesia, and a total of 200 patients were enrolled.

Inclusion criteria were pediatric patients less than 20 kg, age under 7 years, excluded syndromic patients, congenital maxillofacial deformities, upper airway pathologies. FPCD measured with two rulers one along the nasal bridge parallel to the long axis of the face, other below the chin perpendicular to the first rucer, distance between the chin to the intersection of the two rulers is the FPCD.

TMD is measured from mentum to the thyroid notch with the neck extended and mouth closed. These parameters FPCD, FPCD/Wt, TMD/Wt were measured bedside, by an anesthesiologist who was not involved in intraoperative management of the patient. Intraoperatively, the patients were intubated using age appropriate Macintosh blade by an anesthesiologist who was blinded to the parameters measured and difficulty in laryngoscopy and intubation were graded.

Laryngoscopy classified as Easy - Cormack Lehane(CL) grade 1 and 2, and Difficult - CL grade was 3 and 4. Intubation as Easy if Intubation Difficulty Score was 5 or less than 5, Difficult if the score was more than 5.

**Results:** Statistically significant results were obtained for FPCD, FPCD/Wt, TMD/Wt (table below). Using ROC curve and AUC, optimal cutoff value, sensitivity, specificity and p-value FPCD/Wt is a better parameter in assessing DI and DL.

<table>
<thead>
<tr>
<th>FPCD</th>
<th>DIFFICULT LARYNGOSCOPY</th>
<th>P value</th>
<th>sensitivity</th>
<th>specificity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FPCD</td>
<td>0.001</td>
<td>75.2%</td>
<td>77.7%</td>
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</tr>
<tr>
<td>FPCD/Wt</td>
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<td>75%</td>
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<tr>
<td>TMD/Wt</td>
<td>0.005</td>
<td>69%</td>
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<td></td>
</tr>
</tbody>
</table>

---
Primary endpoint was the predictive capacity of the HEAVEN criteria for difficulties during airway management, assessed as a prognostic test and within prediction modelling.

**Results and Discussion:** This study included a total of 1,500 emergency patients, aged 56 [31-73] years median [IQR], BMI was 25 [22-29] kg/m², and ASA physical status classification n(%) was: ASA1: 177(12), ASA2: 388(26), ASA3: 422(28), ASA4: 437(29), ASA5: 76(5). No HEAVEN criteria were found in 46.0% of the patients, 39.9% had 1 criterion; 11.5% had 2 criteria, 3.2% had 3 or more criteria.

The specificity/ sensitivity of HEAVEN-criteria in patients with 1 criterion was 0.89 (95%-CI:0.80-0.94)/ 0.48 (95%-CI: 0.46-0.51), with 2 criteria was 0.46 (95%-CI:0.36-0.56)/ 0.87 (95%-CI:0.86-0.89) and with 3 or more criteria was 0.24 (95%-CI:0.16-0.34)/0.98 (95%-CI: 0.97-0.99).

As a prediction model, the cumulative HEAVEN criteria resulted in an AUROC of 0.81 (95%-CI:0.76-0.86). Adding the POGO to the HEAVEN criteria results in a higher AUROC of 0.90 (95%-CI:0.86-0.94).

**Conclusion(s):** Although very rare, the presence of 3 or more HEAVEN criteria strongly predicts difficulties during airway management for in-hospital RSI. For improved risk assessment to reveal possible difficulties during airway management, the superior predictive value of adding POGO suggests performing a nasal flexible endoscopy of the upper airway before the start of airway management.

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**01AP01-04**

**Functional residual capacity under apnoeic oxygenation with two different high-flow nasal cannulas in children: a single-centre prospective randomized controlled trial**

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**Background:** Apnoeic oxygenation in paediatric patients prolongs time to desaturation but little is known about generated pressure in the airway. The time to install the high-flow nasal cannulas after mask-ventilation might contribute on formation of atelectasis due to loss of positive pressure. This might be avoided with the Optiflow Switch™ cannula.

We aimed to investigate the changes in lung impedance as a surrogate for airway pressure in the airway leading to changes in functional residual capacity measured by electrical impedance tomography (EIT) under apnoeic oxygenation with different nasal cannulas.

**Methods:** After Ethics Committee approval and informed consent, this ongoing single-centre randomized controlled non-inferiority trial currently recruited 31 patients (ASA 1&2, 10-20kg, elective procedures) requiring general anaesthesia.

The primary outcome of this sub-analysis is the reduction in lung impedance normalized to tidal volume in relation to bodyweight (ml/kg) from start to end of apnoea measured with EIT under
nasal apneic oxygenation. Our null hypothesis postulates a reduction in normalized lung impedance of more than -35% (non-inferiority margin). Patients were randomized into the following two groups:

1. 2L/kg/min FiO2 1.0 with the conventional cannula (control group).
2. 2L/kg/min FiO2 1.0 with the switch cannula.

After standardized anaesthesia induction with neuromuscular blocking agent, all patients were left apnoeic for 5 minutes receiving oxygen according to the randomisation with continuous jaw thrust. After study termination, airway management was performed, and a standardized recruitment manoeuvre was applied. Changes in lung impedance during apnoea were continuously recorded, normalized to a tidal volume of 6-8ml/kg and used to estimate changes in lung volume.

Results: EIT-measurements were obtained in 31 patients (conventional cannula n=21, switch cannula n=10). Median [95%CI] normalized estimated reduction in lung volume in relation to bodyweight (ml/kg) was: conventional cannula 6.9ml/kg [5.5 to 8.3] and switch cannula 6.0ml/kg [3.1 to 7.6]. The median difference was 1.1 [-2.2 to 3.1], which was not within the non-inferiority margin.

Conclusions: This preliminary data show that a non-inferiority of intervention group compared to control group during apnoea in children couldn’t be shown when comparing changes in estimated lung volumes. The use of switch cannula might reduce the loss of lung volume.

**01AP01-05**

Apnea oxygenation using high-flow oxygen: effects on partial pressure of carbon dioxide in rigid bronchoscopy - a single-center retrospective study


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**Background and Goal of Study:** Ensuring patient safety during rigid bronchoscopy, challenged by inherent leakage, requires an effective ventilatory strategy. Although apneic oxygenation is an option, its limited use is due to potential complications related to carbon dioxide (CO₂) retention. Optiflow, enabling high-flow oxygen delivery, has renewed interest in apneic oxygenation, showing a reduced increase in CO₂. This study aims to observe changes in partial pressure of CO₂ (PaCO₂) with apneic oxygenation using Optiflow.

**Materials and Methods:** A retrospective study centered on patients undergoing rigid bronchoscopy between 2020 and 2022. The apneic period was defined as from the onset of apneic oxygenation (70L/min) to ventilation resumption post-procedure. PaCO₂ values were obtained, and arrhythmia occurrence reviewed. Continuous variables were expressed using mean and standard deviation, with regression analysis for PaCO₂ changes.

**Results and Discussion:** Apneic oxygenation was performed in 10 male patients (aged 65 ± 14 years, with a body mass index of 24.75 ± 4.18 kg/m²) with periodic arterial blood gas analysis. The apnea period lasted 2264 ± 82 sec (range: 1142 to 4049 sec), and PaCO₂ demonstrated a linear increase of 1.37 mmHg/min (p=0.000). Except for one case of atrial fibrillation, no desaturation events or other side effects were observed.

One case of atrial fibrillation occurred not during apneic oxygenation, but during the emergence. It remains unclear whether induced by apneic oxygenation or other factors such as advanced age (82 years old) or comorbidities (hypertension and coronary artery disease).

**01AP01-06**

Research of the cuffed and uncuffed endotracheal tubes use in neonates and children under 3 years old

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**Background and Goal of Study:** Does the choice of endotracheal tube affect the length of patient stay in the ICU? The aim of our study was to identify complications on mechanical ventilation using cuffed tubes and uncuffed tubes.

**Materials and Methods:** Single-center, prospective, randomized comparative study was carried out from January 2017 to December 2023. The study included 1250 patients aged from 0 to 3 years. Patients underwent radical correction of congenital heart disease, which one was the 1st level of complexity of surgical treatment according to the Aristotle Basic Complex Score. Exclusion criteria: gestational age less than 37 weeks, concomitant pulmonary pathology, tracheal intubation in anamnesis, high pulmonary hypertension, complicated perioperative period with prolonged lung ventilation. Intubation was performed using direct laryngoscopy.

All patients were randomized into two groups (independent sequential method). The 1st group: patients were intubated with cuffed tube, n=632 patients; the 2nd group: uncuffed tube, n=618 patients.
The groups are completely comparable in age (14.2±5.3; 12.7±4.7; months), weight (8±3.2; 7.2±7.2; kg), BSA (0.32±0.1;0.3±0.1; m²). The mechanical ventilation duration in operating room is also comparable: 250 ± 81 and 260 ± 85 (p < 0.04) min.

**Results and Discussion:** The post-intubation complications are consequence of direct laryngoscopy. They can be avoided with dimension of the diameter of the subglottic space using ultrasound and use tube of the appropriately selected diameter. Despite the same preoperative preparation, the rate of post-intubation complications in the uncuffed group was 12.8%, compared with 1.7% in the group of cuffed tubes (p<0.02).

The duration of lung ventilation in the postoperative period was different: 1st group - 9 hours (6;16) and 2nd- 12 hours (7;24) (p < 0.0001). It was associated with the atelectasis incidence: 0.9% and 5.8%, respectively (p<0.0004). The incidence of pneumonia in the groups was: 1.2% and 10.7%, respectively (p<0.003). At the same time, pneumonia development due to pulmonary atelectasis in the 2nd group was 96% (p<0.003).

**Conclusion(s):** The use of endotracheal tubes with a cuff provides tightness and better airways protection, at least from aspiration of oropharyngeal contents, than tubes without a cuff. The presence of tightness during mechanical ventilation using cuffed tubes explains the difference of the pulmonary atelectasis and pneumonia.

### 01AP01-07
**Eight years of airway management: a single-center, retrospective analysis in a University Hospital**

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**Background and Goal of Study:** Safe airway management is a cornerstone of any anaesthetic intervention, and difficult airway (DA) management remains a challenge. The aim of this study is to describe the evolution in airway management approach in our hospital, and to determine the effectiveness of different techniques in cases of DA.

**Materials and Methods:** We retrieved electronic records from all patients requiring airway management from 2014 to 2021. Patients were classified as anticipated DA, unanticipated DA, and normal airway, based on standardised criteria. The techniques used in each group were analysed, as well as their rate of success in cases of DA.

**Results and Discussion:** 74370 patients were analysed. 86.2% were classified as normal airway (64100 cases), 12.1% as anticipated DA (8992 cases), and unanticipated DA was registered in 1.7% (1278 cases).

Figure 1 shows the techniques used per year in each group. Figure 2 shows the global success rate of each technique in cases of anticipated and unanticipated DA. Differential analysis shows a progressive increase in the use of videolaryngoscope (VL) as the first-choice technique in anticipated DA, displacing the use of awake flexible bronchoscopy (FBS). In unanticipated DA, VL is the main rescue technique since the data recording started, but use of intubating stylet/bougie as a rescue tool remains high, although with a lower success rate. In addition, 2020 and 2021 show a sharp increase in the use of VL as a first-choice technique in patients without difficult airway predictors.

**Conclusion(s):** VL has become the main management technique for both anticipated and unanticipated DA, with a high success rate. Use of VL has recently increased as first-choice technique in unanticipated normal airway. Use of awake FBS in anticipated DA has greatly declined, but retains the highest success rate of all techniques.

### 01AP01-08
**New medicotechnical airway device counteracts respiratory arrest during target-controlled induction of propofol sedation**

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1Lund University, Department of Anaesthesiology and Intensive Care Medicine, Skåne University Hospital, Malmö, Sweden

**Background and Goal of Study:** Procedural sedation and analgesia (PSA) for uncomfortable or painful procedures may deteriorate airway patency, particularly at deeper levels of sedation. Airway occlusion requires immediate recognition and appropriate manual measures. No useful medicotechnical airway device (AD) for upper airway patency during PSA is available on the market. This randomized trial was designed to compare the duration of respiratory arrests between a new AD prototype and no device during induction of sedation by target-controlled infusion (TCI) of propofol.

**Materials and Methods:** Twelve adult voluntary study participants were included with informed consent in this randomized unpaired pilot investigation. Oxygen 15 L/min was supplied by oxymask. Sedation was induced by TCI with target tissue estimates of propofol. No useful medicotechnical airway device (AD) for upper airway patency during PSA is available on the market. This randomized trial was designed to compare the duration of respiratory arrests between a new AD prototype and no device during induction of sedation by target-controlled infusion (TCI) of propofol.

**Results and Discussion:** The use of VL as the main rescue technique since the data recording started, but use of intubating stylet/bougie as a rescue tool remains high, although with a lower success rate. In addition, 2020 and 2021 show a sharp increase in the use of VL as a first-choice technique in patients without difficult airway predictors.

**Conclusion(s):** VL has become the main management technique for both anticipated and unanticipated DA, with a high success rate. Use of VL has recently increased as first-choice technique in anticipated normal airway. Use of awake FBS in anticipated DA has greatly declined, but retains the highest success rate of all techniques.
Results and Discussion: Significantly shorter (median 4 (IQR 1-30) vs. 122 (98-137) s; \( P = 0.0131 \)) cumulative periods of respiratory arrest were found with than without the AD prototype during gradual induction of mild (Observer Assessment or Alertness/Sedation score 4) and moderate-to-deep (2-3) steady-state levels of sedation by TCI. These findings indicate that tolerable mechanical maintenance of airway patency might also counteract respiratory arrest during diagnostic or therapeutic clinical procedures carried out under PSA inside and outside hospitals.

Conclusion(s): This new AD prototype designed for upper airway patency during PSA was found to enable TCI-derived induction of propofol sedation with significantly shorter episodes of respiratory arrest compared with no device (standard procedure for PSA).

O1AP01-09
New medicotechnical device for airway patency during sedation enables capnometric monitoring during high-dose oxygenation

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2Department of Anaesthesiology and Intensive Care, Skåne University Hospital, Malmö, Sweden

Background and Goal of Study: All over the world procedural sedation and analgesia (PSA) is increasingly being used to enable and facilitate potentially uncomfortable medical procedures. Deeper sedation reduces upper airway patency. Respiratory arrest during sedation requires rapid and appropriate manual airway measures, since there is no useful airway device (AD) for PSA. This randomized crossover study was designed to evaluate, in awake spontaneously breathing adults, to what extent monitoring of expiratory concentrations of carbon dioxide (\( \text{CO}_2 \)) and oxygen is possible at various clinically relevant flow levels of oxygen supplied by a nasal cannula or by an AD for airway patency during PSA.

Materials and Methods: Endtidal concentrations of \( \text{CO}_2 \) and oxygen were monitored and recorded, according to a randomized crossover design, with a Dräger Zeus anaesthesia equipment during titrated supply of up to 4 L/min of oxygen by a nasal cannula, and of up to 15 L/min of oxygen by a new AD designed for upper airway patency (Stairway Medical, Limhamn, Sweden), in twelve spontaneously breathing awake healthy volunteers.

Results and Discussion: Capnography patterns and corresponding endtidal \( \text{CO}_2 \) levels were found to be slightly depressed at a maximum level of 4 L/min of oxygen supplied by the nasal cannula, and to be moderately depressed at a maximum level of 15 L/min of oxygen supplied by the AD. Median expiratory concentrations of oxygen at 23% and 53%, respectively, were achieved at the maximum oxygen flows by nasal cannula and AD.

Conclusion(s): Adequate capnometric recording patterns regardless of oxygen supply indicates that this new AD, designed to promote upper airway patency during sedation, enables continuous monitoring of spontaneous breathing also during high-dose supply of oxygen in future patients scheduled for diagnostic and therapeutic procedures under PSA.

O1AP01-10
A multidisciplinary approach in the treatment of high-risk head and neck lymphatic malformations (with compression of the upper respiratory tract)

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1Bogomolets National Medical University, Anaesthesiology and Intensive Care, Kyiv, Ukraine, 2Bogomolets National Medical University, Pediatric Surgery, Kyiv, Ukraine, 3National Childrens Specialized Hospital Okhmatdyt, Anaesthesiology, Kyiv, Ukraine, 4Bogomolets National Medical University, Medical, Kyiv, Ukraine

Background and Goal of Study: Protecting the airways is a key point in treatment of children with head and neck masses. The study aims to analyse the risk factors of difficult intubation and tracheostomy risk in children with head and neck lymphatic malformations (LM) using the de Serres staging system and based on different morbidity items using the Cologne Disease Score (CDS).

Materials and Methods: We performed the retrospective study of 87 children with head end neck LM. The type of malformation (microcystic, macrocystic, mixed), localisation features, scoring were analysed according to de Serres and CDS. The difference in CDS between the I-V de Serres stages performed using Kruskal-Wallis test. \( P \leq 0.05 \) was considered statistically significant

Results and Discussion: It was established that the main risk factors for respiratory disorders and difficult intubation were tongue lesions, bilateral lesions, predominance of the microcystic component, and age under 6 months. Children with large trans-spatial LM, involving the tongue and mouth floor, have high risk of airway obstruction. Tracheostomy was mandatory in 8.05% patients. However, all patients underwent tracheostomy prior to specific treatment initiation. Careful preoperative examination allowed to have full control in the case of complex intubation, which ensured the participation of a multidisciplinary team. Stages IV-V according to de Serres classification were associated with significantly worse CDS (4.33) than I-II (8.35) and III (6.14) (\( P < 0.005 \)). The microcystic form of LM is indicated by the authors as a significant factor in reducing CDS (Wiegand, 2023). Patients with low SM required long-term psychological support. The problem of anaesthesiological support is also the need for numerous interventions in children with LM (Plettendorf, 2023), which requires the participation of an experienced anaesthesiologist.

Conclusion(s): A multidisciplinary approach, preoperative planning, work of a psychologist with children and family members allows you to minimize stress from tracheostomy and ensure appropriate care for the child.

References:
Introduction: In the context of non-intubation and non-oxygenation, the accurate identification of the cricothyroid membrane through palpation or ultrasound is of vital importance. Although current recommendations advocate for the use of a sequential strategy, there remains uncertainty about whether it is superior to palpation alone in adult patients for identifying this anatomical site.

Method: A double-blind, randomized clinical trial with a 1:1 ratio and Bayesian analysis was conducted, comparing the sequential strategy of palpation plus ultrasound versus palpation alone to identify the cricothyroid membrane in hospitalized adult patients.

Results: A total of 256 patients were included. The success rate was 54% for the intervention group versus 34% for the control group, with a risk difference (RD) of 20% (8; 31) and a relative risk (RR) of 1.58 (1.19; 2.12). There were significant differences in detection time, lateral deviation, medial deviation, operator satisfaction, and perception of adherence to the sequential technique. No differences were found in patient satisfaction, and no adverse events were reported.

Conclusions: The randomized clinical trial EcoID 1 demonstrates that the sequential strategy of palpation and ultrasound is superior to palpation alone for detecting the cricothyroid membrane.

References:

Correlation between preoperative ultrasonographic airway assessment and ease of laryngoscopy in thyroidectomy patients: prospective observational study

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Background and Goal of Study: Ultrasound parameters could ease prediction of difficult airway in thyroidectomy patients along with clinical airway measurements. Assess the correlation between preoperative ultrasonographic airway assessment parameters like anterior neck soft tissue thickness at different levels to the Cormack–Lehane (CL) grade at direct laryngoscopy view in thyroid surgery patients.

Materials and Methods: Prospective observational study of correlation between ultrasonographic evaluation of anterior neck soft tissue thickness at the levels of hyoid, thyroid cartilage, cricoid cartilage and suprasternal level along with clinical airway parameters and ease of laryngoscopy (Cormack-Lehane [CL] grade) in thyroidectomy patients was conducted at Lourdes Hospital, Kochi, Kerala, on eighty subjects, during a period of one year from July 2019 to July 2020. Preoperatively along with regular airway assessment of patients ultrasound parameters are assessed and intraoperative CL grade assessed by another anesthetist blinded to ultrasound parameters.

Results and Discussion: The correlation analysis showed that anterior neck soft tissue thickness at the level of hyoid bone (r =0.415), cricoid cartilage (r =0.327), suprasternal level (r =0.456) have a positive correlation with the Cormack-Lehane grade and at the level of thyroid cartilage have negative correlation(r = -0.076). The corresponding p-values of tests show that anterior neck soft tissue thickness at the level of hyoid bone (p =0.001), cricoid cartilage (p =0.003) and suprasternal level (p =0.001) have statistically significant correlation in predicting increasing Cormack-Lehane grades in thyroidectomy patients.

Conclusion(s): Ultrasound can be used as a reliable tool to identify difficult airway in thyroidectomy patients. A combination of increase in values of ultrasound guided anterior neck soft tissue thickness at the level of hyoid bone more than 0.695cm, at cri-
coid level more than 0.775cm and at suprasternal level more than 1.11cm and a decrease in soft tissue thickness at vocal cord level less than 0.445cm correlates with difficult laryngoscopy in thyroideotomy patients.

References:

Acknowledgements: Dr. Shoba Philip (HOD Anaesthetics), Dr. K. A. Koshy (Consultant anaesthetist)

O1AP02-02

You-see and you-fail phenomenon is it real?

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Background and Goal of Study: The utilization of videolaryngoscopy in anaesthesia has introduced new uncertainties, such as the „can see - can’t intubate” scenario [1]. Our principal aim in this study is to ascertain the existence of the “you-see and you-fail” phenomenon [2].

Materials and Methods: We present a multi-center, prospective observational study including 119 patients that required tracheal intubation under general anaesthesia for elective surgery. For videolaryngoscopy a McGrath™ Mac blade was selected because there is evidence of its advantages over direct laryngoscopy [3].

Tracheal intubation success has been identified as a meaningful outcome. Glottic visualization obtained through videolaryngoscopy was assessed using the POGO scale (Percentage of Glottis Opening).

On the other hand, videolaryngoscope manufacturer’s instructions were considered to classify difficulty of tracheal intubation: GRADE 0 (No difficulty): no adjunct is needed for a MAC blade. GRADE 1 (Difficult videolaryngoscopy): adjunct is needed or a different type of blade (hyperangulated channelled or not). To establish the relationship between variables, Spearman’s coefficient and Cohen’s Kappa (range from -1 to +1) were used.

Results and Discussion: Many professionals manage the airway in their daily clinical practice (anaesthesiologists, emergency physicians, or intensivists) using videolaryngoscopes. These physicians have often encountered difficulties at times in achieving tracheal intubation despite obtaining a good glottic view (“can see can’t intubate” scenario).

There are different reasons for explaining this, the position of the camera for the videolaryngoscope, a monocular image, and skills required (eye-hand accurate coordination and practice). Therefore, we examined the correspondence between POGO and the difficulty of videolaryngoscopy to determine the potential presence of high difficulty in tube insertion despite adequate glottic view. We found correlation between variables (p< 0.001) but a concordance with a negative k index (-0.34), indicating no agreement.

Conclusion(s): This suggests that the „you-see and you-fail” phenomenon may manifest during videolaryngoscopy with MAC McGrath™ in our study.

<table>
<thead>
<tr>
<th>POGO</th>
<th>Easy VDL</th>
<th>Difficult VDL</th>
<th>Kappa Index</th>
<th>p-value</th>
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O1AP02-04

Prospective development and validation of a universal classification for paediatric videolaryngoscopic intubation – the PeDiAC score

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Background and Goal of Study: Although videolaryngoscopy is considered the go-to technique in paediatric tracheal intubation, a specific classification for videolaryngoscopic intubation in children lacks.

We aimed to develop and validate a multivariable prediction model to classify difficult videolaryngoscopic intubation in children, the ‘Paediatric Videolaryngoscopic Intubation and Difficult Airway Classification’ (PeDiAC), and to compare it with the Cormack-Lehane classification.

Materials and Methods: After IRB approval, 904 anaesthetics in 809 children <18 years were included in the prospective observational PeDiAC study (NCT04844723).

Within a universal videolaryngoscopy implementation program at a university children’s hospital, videolaryngoscopy was used first-line in all children over a study period of 16 months. Eligible intubation-related factors for the multivariable linear logistic regression model (PeDiAC model) were selected by 100-times repeated, 10-fold cross-validated LASSO regression. A simplified PeDiAC score was built (only one point per co-variable).

Results and Discussion: A difficult videolaryngoscopic intubation (primary outcome) was observed in 5.2%. Eight co-variables were selected by LASSO regression: vocal cords not visible, blood secretions, impaired epiglottis, direct epiglottis lifting, narrowed upper airway, enlarged arytenoids, angle dissonance, difficult tube placement.

Diagnostic performances of the PeDiAC model and PeDiAC score (0-8 points) were excellent (AUC 0.97 both [95%CI 0.95-0.99 and 0.96-0.99, respectively]; p =0.7) and the GiViTI calibration belt indicated good model calibration.

Two decision thresholds were determined from a utility-based perspective: ‘remarkable videolaryngoscopic intubation’ (1 point) and ‘difficult videolaryngoscopic intubation’ (≥2 points). The PeDiAC score showed a significantly better discrimination than the Cormack-Lehane classification (AUC 0.97 [0.96-0.99] vs 0.69 [0.62-0.76]; p <0.001).
Table. Multivariable linear logistic regression model (PeDiAC model) and PeDiAC score for the prediction of difficult videolaryngoscopic intubation.

**Conclusion:** The PeDiAC score, as a specific, tailor-made classification for paediatric videolaryngoscopic intubation, has excellent diagnostic performance and outperforms the Cormack–Lehane classification.

01AP02-05
Pre-LAR: a novel indicator for laryngeal adductor reflex during general anesthesia

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**Background and Goal of Study:** During recovery period of general anesthesia with laryngeal mask airway (LMA), the activation of the laryngeal adductor reflex (LAR) may lead to airway obstruction, laryngospasm, and initiation of the cough reflex. The specific mechanisms and manifestations of LAR recovery during anesthesia remain unclear.

Therefore, the goal of the study is to explore the manifestations of LAR recovery during anesthesia and investigate novel methods for monitoring LAR recovery.

**Materials and Methods:** Prospective series of 30 patients, aged 18 to 45 years, ASA physical status I to II were enrolled. All surgeries were elective with a duration of 0.5 to 2h, and general anesthesia using target-controlled infusion with a LMA was feasible. The status and responses of laryngeal subites (vocal folds, Peri-laryngeal muscles) were recorded via novel glottic real-time monitoring device.

**Results and Discussion:** All the status and responses of laryngeal subites during anesthesia recovery period of 30 patients were recorded. A unique phenomenon during recovery of LAR was observed of 27 patients (90%) which was named “pre-LAR”. “pre-LAR” refers to the visual observed laryngeal subites changes like movement of arytenoid cartilage, change of vocal process gap or glottic area etc.

Moreover, the occurrence of the pre-LAR phenomenon did not coincide with changes in airway pressure or end-tidal carbon dioxide waveform. Following the onset of the pre-LAR phenomenon, the median time for LAR was 5.5 minutes and there was excellent correlation between the time of occurrence of pre-LAR and LAR. The simple linear regression equation was: \( y = 0.8686x + 14.06 \), \( R^2 = 0.9003 \) which suggested that the pre-LAR may be considered a novel indicator for predicting the onset of LAR.

**Conclusion(s):** A kind of novel phenomenon named “pre-LAR” may serve as an indicator for predicting Laryngeal Adductor Reflex.

01AP02-06
Hyperangulated versus Macintosh videolaryngoscopy in adults with anticipated difficult airway management – a randomized controlled trial

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**Background and Goal of Study:** There is insufficient evidence if the blade geometry of videolaryngoscopes - either hyperangulated or Macintosh-style - has relevant implications on glottis visualisation, success rate and intubation time. We hypothesized that the use of hyperangulated videolaryngoscopes (HA-VL) would result in higher percentage of glottic opening (POGO) values (primary endpoint) compared with Macintosh videolaryngoscopes (MAC-VL) in patients with expected difficult airways.

**Materials and Methods:** After ethical approval, patients with expected difficult intubation scheduled for ENT or OMF surgery with orotracheal intubation between November 1, 2022 and July 31, 2023 were included in the single-centre, open-label, patient-blinded, randomized controlled BLADESHAPE trial (NCT05522049) and were randomly assigned 1:1 to either the HA-VL (C-MAC D-Blade™, Karl Storz) or MAC-VL (C-MAC™, Karl Storz) group.

**Results and Discussion:** 2540 patients were assessed for eligibility and 182 were enrolled. Only experienced consultant anaesthetists with a mean (± SD) professional experience of 12 ± 5 years participated. POGO values were significantly higher in the HA-VL group compared to the MAC-VL group (78.7 ± 23.6% vs. 47.0 ± 39.4%, p<0.001).

Table. Cohort characteristics and study outcome. Values are or number or mean (± standard deviation).

**Conclusion:** Excellent difference in POGO percentage of glottic opening. Fischer’s Exact Test, Mann-Whitney U, only for 149 patients with first attempt success.
The first attempt success rate was higher with HA-VL compared with MAC-VL (96.7% vs. 67.0%; p < 0.001). The best glottis view was achieved faster (after 8.7 ± 7.3 vs. 22.5 ± 27.4 seconds; p < 0.001) and the intubation time was shorter with HA-VL compared to MAC-VL (25.7 ± 27.6 vs. 49.1 ± 48.3 seconds, p < 0.001). However, the intubation time in one attempt did not differ between groups (22.3 ± 15.1 vs. 25.2 ± 16.8 seconds, p = 0.123).

**Conclusions:** Our findings demonstrate that HA-VL, when used by experienced airway-operators in patients with difficult airways, yield a superior glottis visualisation with higher first attempt and overall success rates compared with MAC-VL.


**O1AP02-07**

Assessment of ultrasound-guided superior laryngeal nerve block: an anatomical and radiological study

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**Background and Goal of Study:** Airway management is a crucial skill for every anaesthesiologist. Different regional anesthesia techniques have been described to offer proper management. However, these procedures are not routinely used. There are many clinical situations, such as the awake intubation in patients with predicted difficult airway, where they can provide excellent anesthetic conditions and a high level of safety and comfort for the patient.

There are various regional anesthesia techniques, among which superior laryngeal nerve (SLN) block is used to anesthetize the base of the tongue and supraglottic region, usually performed based on anatomical landmarks. The comfort and safety provided by this technique have been studied, and ultrasound-guided techniques have also been introduced. However, anatomical landmarks are variable and poorly defined. Our main objective is to introduce an ultrasound-guided technique in order to perform SLN block.

**Materials and Methods:** 3 human cadavers preserved through cryopreservation were obtained from the School of Medicine of the University of Barcelona, where ultrasound-guided blocks were performed, evaluating the distribution of the injected solution through computed tomography images and anatomical dissection.

**Results and Discussion:** An appropriate distribution of the injected solution at the intended site of the designed technique was observed, as confirmed by 6 anatomical dissections (bilaterally in each cadaver) performed after the block. There was no evidence of spreading of the injected solution to other relevant nervous structures, as the injected solution was limitedly distributed to anterior structures, confined by the virtual space between the thyrohyoid membrane and the THM.

It’s interesting to note that the clinical applicability of this block could extend beyond regional anesthesia for awake intubation to other settings, such as upper gastrointestinal endoscopic procedures, transesophageal echocardiography, as a supportive measure in laryngeal endoscopic surgery, and as an alternative approach to managing recurrent post-extubation laryngospasm.

**Conclusions:** The reported technique is able to perform a selective SLN block without an anatomical spreading to the vagus nerve or the cervical sympathetic chain. Clinical research is needed to confirm our anatomical and radiological results and be able to generalize them in daily practice.

**O1AP02-08**

Video laryngoscopy: the rise in modern airway management. A 9-year analysis

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**Background and Goal of Study:** Since the introduction of video laryngoscopy in the early 2000s, it has become a widely utilized tool in managing difficult airways. The use of videolaryngoscopy has been shown to significantly reduce failed intubations, and therefore hypoxia, compared to direct laryngoscopy.

**Materials and Methods:** After ethics approval (ethics number 253/19 S-SR), we analysed data of 120545 patients receiving endotracheal intubation from an anaesthesia patient data management system of a university hospital in Germany, with data ranging from July 2014 until March 2022. All video laryngoscopes used were hyperangulated. Fisher’s exact test and Wilcoxon test were used for group comparisons. Significance level was set at p<0.05.

**Results and Discussion:** The data shows that videolaryngoscopy usage has increased over the recorded years (Fig. 1). 11.6% of patients with a Mallampati score of 3 and 22.2% with a score of 4 required video-assistance. Patients with a normal mouth opening were intubated via direct-laryngoscopy in 95.8% of cases, whereas 32.7% of patients with limited mouth opening were intubated with video assistance. The mean Body Mass Index of patients receiving videolaryngoscopy was higher, suggesting that weight may also influence the intubation method. The data also shows that with 63% of all videolaryngoscopies, men had a higher probability of receiving video-

**Figure 1. Proportion of video-assisted laryngoscopy over the years in relation to the overall intubation.**
O1AP02-09
Measurement of esophageal pressures in patients ventilated with a laryngeal mask: its influence on aspiration

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Background and Goal: The lack of confidence in the use of the laryngeal mask (LM) arises from the possibility of air leaks involving gastric insufflation, regurgitation and pulmonary aspiration, and, secondly, from possible ventilation and oxygenation problems. The objective of this study is if knowing the oropharyngeal leak pressure (OLP) the patient could be adequately ventilated without causing an air leak, and in the event of a leak if the air is directed to the esophagus, increasing the risk of aspiration.

Materials and Methods: After approval by the ethics committee and signing the informed consent, 40 patients undergoing elective surgery and ventilated with a laryngeal mask were recruited. Once the OLP was measured, we try to ventilate the patients below it. In turn, during ventilation, esophageal pressure was measured to determine if it increased during ventilation and especially when the LM leaked. The patients were distributed into two groups according to their response to ventilation, those who could always be ventilated below the OLP and those in whom the LM leaked at some point.

Results and Discussion: In both groups there was a mean increase in esophageal pressure of 0.9cmH2O over baseline (5.6cmH2O). This pressure is insufficient to overcome the pressure of the lower esophageal sphincter and doesn't contribute to gastric insufflation. The OLP was higher in those patients who never achieved a leak: 3cmH2O vs 19.8cmH2O. No regurgitation or aspiration was observed in any patient. All patients were adequately ventilated and oxygenated when they were ventilated below their OLP. The literature supports these results, since in different studies comparing the laryngeal mask vs orotracheal intubation in abdominopelvic and laparoscopic surgery, no increase in the incidence of pulmonary aspiration is observed.

Conclusions: Ventilating patients below the OLP doesn't pose a risk of regurgitation and aspiration since, although there are patients in whom air enters the esophagus, it doesn't do so with sufficient pressure to produce gastric insufflation.

Conclusion(s): Tongue thickness and skin-hyoid bone distance measured under ultrasound guidance have shown predictive value for difficult airway. They can be used in predicting a difficult airway.

01AP02-11
New device for upper airway patency promotes spontaneous breathing in moderately-to-deeply sedated study participants

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Background and Goal of Study: Procedural sedation and analgesia (PSA) is used to enable various diagnostic or therapeutic clinical procedures, otherwise believed to be associated with considerable discomfort or anxiety. Moderate-to-deep PSA may induce respiratory arrest due to loss of upper airway patency, calling for rapid and appropriate manual airway measures to restore unrestricted spontaneous breathing. Today, there is no useful medicotechnical airway device (AD) for PSA on the global market. This randomized controlled crossover trial was designed to evaluate tidal volume changes during spontaneous breathing at moderate-to-deep levels of propofol sedation, versus standard biteblock.

Materials and Methods: Twelve healthy volunteer study participants were included with informed consents. Respiratory tidal volume levels were compared during spontaneous ventilation in the awake state, and at two levels of steady-state sedation, between the AD (Stairway Medical, Limhamn, Sweden) and biteblock (US Endoscopy, Mentor, Ohio, USA) connected to a Dräger Zeus anaesthesia equipment. The subjects were sedated by intravenous infusion of propofol with target tissue level estimates at 1.2 and 2.0 µg/L.

Results and Discussion: Mild (OAA/S 4) and moderate-to-deep (2-3) levels of sedation, according to the Observer’s Assessment of Alertness/Sedation (OAA/S) scale, were achieved. For technical reasons, inadequate study data was obtained at moderate-to-deep sedation in three participants. Tidal volumes in the remaining nine subjects were significantly (P = 0.015) higher with the AD prototype (median 0.28 (IQR 0.18-0.46) L) than with biteblock (0.21 (0.00-0.24) L). No other significant differences were found between the study interventions at any level of sedation. A study limitation is the low number of study participants, also being younger and healthier than average patients undergoing PSA. Methodological strengths include the paired randomized cross-over study design, well-defined inclusion and exclusion criteria minimizing risk of selection bias, and the even gender distribution between study participants.

Conclusion(s): This new AD prototype was found to enable spontaneous breathing with significantly higher tidal volumes than was standard biteblock at moderate-to-deep levels of propofol sedation. These findings address a way of reducing risks of respiratory arrest by mechanically promoting upper airway patency during PSA.

01AP03-02
Description of randomised clinical trials on intubation devices over the period 2000-2018

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Background and Goal of Study: Orotracheal intubation is a major challenge for ventilation and airway protection in patients. In order to optimise this step, numerous devices have been created and tested over the last 20 years, leading to adaptations of the decision-making algorithms for airway management published by scientific societies. The main objective of this study was to assess the description of randomized clinical trials (RCTs) involving these devices over the period 2000-2018.

Materials and Methods: A de novo systematic review was performed using the Cochrane CENTRAL, MEDLINE and EMBASE databases to identify RCTs comparing intubation devices. Two reviewers screened titles and abstracts and extracted data from the selected studies. Other types of study were excluded in order to avoid the bias inherent in studies with a lower level of evidence. Four time periods were determined a priori in order to track changes in the devices used: period 1 = 2000-2004, period 2 = 2005-2009, period 3 = 2010-2014 and period 4 = 2015-2018. Given the large number of devices, we chose to group them according to their type and angularity to facilitate description. The data collected concerned the general characteristics, the characteristics of the population and of the operators and the outcomes.

Results and Discussion: Of the 15837 titles and abstracts identified, 591 articles were analysed. The number of RCTs increased over 4 periods. Data describing the population were not always collected. Only 6.6% (n=39) of RCTs described whether patients were at risk of inhalation and 46.5% of RCTs (n=275) whether patients were at risk of difficult intubation. Experimental conditions were not consistently described. The use of curares was specified in only 81.4% (n=481) of the studies. The device being compared was also not adequately described, nor were its characteristics. The outcomes were multiple efficacy criteria, making it difficult to compare the devices. There was very little study of the morbidity inherent in the different devices.

Conclusion(s): The number of randomised clinical trials evaluating oro-tracheal intubation devices has increased over the last 20 years. However, their descriptions remain inadequate, both in terms of describing the population, the experimental conditions and the efficacy criteria. The lack of description of these variables raises the problem of the applicability of the data to current practice.
**01AP03-03**

**Evolution of orotracheal intubation time by device: a systematic review and meta-analysis from 2000 to 2018**

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**Background and Goal of Study:** A large number of devices designed to facilitate orotracheal intubation (OTI) have been created and evaluated in randomised clinical trials (RCTs) over the last 20 years. OTI time is the most frequently used outcome. Its relevance lies in its correlation with the risk of inhalation. The aim of this study was to describe the evolution of OTI time according to the devices used from 2000 to 2018.

**Materials and Methods:** A de novo systematic review was performed using the Cochrane CENTRAL, MEDLINE and EMBASE databases to identify RCTs comparing intubation devices according to the PRISMA guidelines. Four periods were defined: period 1 (P1) = 2000-2004, period 2 (P2) = 2005-2009, period 3 (P3) = 2010-2014 and period 4 (P4) = 2015-2018. The devices studied were grouped into 5 categories according to their type and angularity: direct laryngoscopy, fibroscopy, conventional video laryngoscopy (VDL), hyper-angular VDL, optical. The main outcome was the time to intubation in seconds, expressed as the mean (95% confidence interval).

**Results and Discussion:** 591 articles were analysed (76,623 patients). OTI time was reported in 391 studies (66.2%) and it was the most frequently reported outcome. The definitions of OTI time varied between the studies with no change between periods. Over the four periods, OTI time decreased with conventional videolaryngoscopy (P2:45.6 (26.8-46.5) to P4:34.8 (26.1-43)) and with optics P1: 49.9 (34.9-64.8) to P4: 36.9 (30.8-43.0), whereas no significant difference was observed with direct laryngoscopy from P2: 36.7 (26.8-46.5) to P4: 34.8 (26.2-13.5).

Additionally, OTI time gradually increased with fibroscopy, ranging from P2: 36.7 (26.8-46.5) to P4: 34.8 (26.2-13.5).

**Conclusion(s):** OTI time increased threefold from the first to the fourth period. This can be attributed to a loss of ability linked to the advances of videolaryngoscopes. The definition of OTI time varied when it was specified. Intubation durations for conventional laryngoscopy remained consistent across the 4 periods within the experimental context. It could be beneficial to reassess these durations in light of the current introduction of videolaryngoscopes in some anaesthesia centres, examining whether any skill loss is dependent on the chosen videolaryngoscope.

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**01AP03-04**

**Voice analysis as a method for preoperatively predicting a difficult airway based on machine learning algorithms**

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**Background and Goal of Study:** An unanticipated difficult airway is one of the greatest challenges faced by anesthesiologists. An adequate preoperative assessment of the airway is paramount in reducing the incidence of airway complications. Evaluation screening tests are based on anthropometric features of the patient. However, their benefit remains unclear. For this reason, our study proposes a new method for the prediction of a difficult airway using machine learning algorithms based on the voice.

**Materials and Methods:** Observational and multicenter study. N=594 patients were enrolled in Centro Medico Teknon and Institut Universitari Dexeus during 2019-2022. Ethics committee approval was obtained. Two studies included N=594 and N=313 for the Mallampati and Cormack studies, respectively. Adults ASA I-IV were included. Clinical features of the patient and the traditional predictive tests were collected.

Vocals “A, E, I, O, U” were recorded in normal, flexion and extension positions. Cormack grade was assessed by the anesthesiologist. Data was introduced into the classification algorithms using KNIME platform. ROC curve and other metrics were evaluated.

**Results and Discussion:** For the Mallampati study, the combination harmonics + descriptive data with different combinations of the vocals E, I normal position and O flexion position vs extension positions only analyzing Mallampati I and IV cases, achieved an AUC of 0.97.

In the Cormack study; first; harmonics + descriptive data + vocal A in all positions only analyzing Cormack I and IV cases secured an AUC of 0.91; and second, voice parameters (Shimmer, jitter and HNR) + descriptive data + different combinations of vocals such as I flexion position, O normal position and O vocal all positions, analyzing the Cormack I and IV cases, obtained an AUC of 0.90

**Conclusion(s):** Acoustic parameters of the voice together with the clinical features of the patients, when introduced into classification algorithms based on machine learning show promising signs of predicting a difficult intubation.

**References:**


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Use of three different supraglottic airway devices as a conduit for tracheal intubation: a comparative study

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Background and Goal of Study: The use of a Supraglottic Airway Device (SAD) as a conduit for tracheal intubation (TI) is a technique recommended during difficult airway management (1). The aim of our study was to evaluate three different SADs as a conduit for TI in patients undergoing elective surgery under general anesthesia. We compared first generation SAD with two different second generation SADs.

Materials and Methods: That was a prospective, randomized, comparative clinical study. We included 195 adult patients (ASA I-II) who were randomly allocated in three groups. In the 1st group an LMA Fastrach™ was used for TI while an Igel SGA and a LMA Protector™ SGA, guided by a flexible video-bronchoscope, were used for TI in the 2nd and the 3rd group respectively.

The primary outcome of the study was the time to successful TI after the SAD placement while secondary outcomes included time from SAD introduction to ventilation, total time and TI success rate.

Results and Discussion: There were statistically significant differences among the three SADs in time to TI (Fig 1B), as well as in time from introduction of the SAD to ventilation (Fig 1A), and in total time (Fig 1C). Time to TI was longer in Igel compared to both Fastrach™ (p<0.001) and Protector™ (p=0.03) and in Protector™ compared to Fastrach™ (p<0.001).

Time from introduction of the SAD to ventilation was longer in Fastrach™ and Protector™ compared to Igel (p<0.001), while total time was longer in Protector™ compared to both Fastrach™ and Igel (p<0.001) and in Igel compared to Fastrach™ (p<0.001).

TI success first pass rate was similar between the three SADs (96.9% Igel, 90.6% Protector™ and 95.3% Fastrach™ p=0.27).

Figure 1. Differences among the three SADs in time from intubation to ventilation (A), time to intubation (B) and in total time (C).

Conclusion(s): Second generation SADs (Igel & Protector™) showed longer time to TI compared to Fastrach™ when used as a conduit for video-bronchoscope assisted intubation. Time from introduction of the SAD to ventilation was shorter in Igel compared to both Protector™ and Fastrach™ while total time was longer in Protector™ compared to both other SADs. Further studies are needed in the field of SADs for more valid results.

01AP03-07 Predictive value of the ratio of ultrasonographic tongue root measurements to oropharyngeal structure measurements for difficult airway in the preoperative period

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Background and Goal of Study: Macroglossia is one of the factors that complicates airway safety, but its ratio to the oropharyngeal cavity, compared to tongue size alone, may be a more important factor in ensuring airway safety. Although it is known as a predictor of difficult airway, there is no measurement method that can objectively define macroglossia.

We aimed to determine the definition of macroglossia in difficult airway evaluation with numerical data by measuring the tongue root with ultrasonography and proportioning the tongue root measurements to the oropharyngeal structures.

Materials and Methods: Patients aged ≥18 years who would undergo endotracheal intubation under general anesthesia were included in the study. In the preoperative period, tongue root thickness, tongue root circumference and tongue root area were measured ultrasonographically. These measurements were proportioned from oropharyngeal structure measurements to mouth opening and neck circumference.

Difficult ventilation assessment was accepted as Han Ventilation Score III-IV and difficult intubation assessment as Intubation Difficulty Scale ≥5. Multivariate Logistic Regression Analysis was used to determine the risk factors predicting difficult airway. ROC Analysis was performed to evaluate the diagnostic performance of the identified independent risk factors. Cut off value was calculated using Youden's Index.

Results: The number of patients included in the study was 720. Difficult ventilation was 15.4% (111 patients), and difficult intubation was 11.5% (83 patients). According to Multivariate Logistic Regression Analysis based on ultrasonographic measurements and ratios to oropharyngeal structures, the independent risk factor predicting difficult ventilation was determined as the ratio of tongue base area to neck circumference (OR: 3.03, 95%CI: 1.28-7.18, p<0.01), and the independent risk factor predicting difficult intubation was tongue base thickness (OR: 2.71, 95%CI: 1.36-5.40, p<0.01).

Conclusion: While inspection of the tongue was not found to be significant in predicting difficult airway, we found that ultrasonographic tongue root measurements and their ratio to oropharyngeal structures were statistically significant for difficult ventilation and difficult intubation.

We believe that ultrasonography will be more meaningful in defining macroglossia and can be used to predict difficult airway.

01AP03-09 Tracheostomy management in adult burn patients - retrospective review from a tertiary burns centre in the UK

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Background and Goal of Study: Recently, there has been an ICU paradigm shift in tracheostomy procedures from surgical techniques to percutaneous, which is attributed to their comparable safety profile and lower resource investment. This work explores the types and timing of tracheostomies at the Burns Centre at the Queen Elizabeth Hospital Birmingham (QEHB), intending to identify areas requiring improvement or further research.

Materials and Methods: In a retrospective data review of all patients admitted to the tertiary burn centre at the QEHB between March 2016 and July 2023, patients who underwent a tracheostomy insertion (N=65) were identified. Their medical records were analysed and anonymised following data collection relating to their demographics, ICU stay and tracheostomy. Patients were split into four groups based on the total body surface area of the burn (TBSA) and the presence of inhalation injury.

Results and Discussion: Patients who underwent early tracheostomy had a shorter median ICU stay (23 days) and lower respiratory tract infection rates (0.4) versus late tracheostomy (31 days, 0.6). Median length of hospital stay was similar in both groups (68.5, 67.0 days).

Percutaneous tracheostomy was the primary technique (54% of patients) in patients with TBSA≤30%, whereas surgical tracheostomy was done for 77% of patients with TBSA>30%. The first group of patients received tracheostomies from anaesthesiologists and intensivists mainly (42% of patients). Burns surgeons did 44% tracheostomies in TBSA>30%.

Percutaneous tracheostomy, performed outside the operating theatre, reduces costs with similar or lower complication rates. Despite its increasing adoption in patients with TBSA≤30% without inhalation injury, surgical tracheostomy remains prevalent in inhalation injuries and TBSA>30% due to clear airway visualisation. Early tracheostomy is associated with a shorter ICU length of stay and lower respiratory infection rates, aligning with existing literature.

Conclusion: QEHB data supports the hypothesis that early tracheostomy is associated with reduced ICU stay and respiratory infection rates. It is noteworthy that many patients receive percutaneous tracheostomies from anaesthesiologists and intensivists. This insight is valuable for future trainees, emphasising the significance of expertise tracheostomy for their practice.
Effect of back up head elevated position on ease of tracheal intubation using hyper-angulated video-laryngoscope in patients with cervical spine immobilization

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Background and Goal of Study: A video laryngoscope with hyper-angulated blade (HA-VL), such as GlideScope or C-MAC with D-blade, is designed to provided improved laryngeal view when cervical motion is restricted. In this study, we compared the effect of neutral and back-up head elevated (BUHE) positions on the ease of tracheal intubation using HA-VL in patients with cervical spine immobilization by manual inline stabilization (MILS).

Material and Methods: Patients were randomly assigned into one of two groups (Neutral and BUHE group). A MILS was applied to simulate difficult airway by limited neck movement. Using the Glidescope, the laryngeal view was assessed in both the neutral and BUHE position (the position sequence was randomised). The patient was intubated only once, in second position. The primary outcome was the tracheal intubation time in the as-signed position.

The secondary outcome were intubation difficult scale (IDS), the ease of Glidescope blade insertion, the ease of tracheal tube (TT) insertion, and the laryngeal view assessed by the percentage of glottic opening (POGO) score.

Results and Discussion: 182 patients were screened, and 177 patients completed the study protocol. The trachea intubation time was significantly shorter in BUHE position (27.3s [23.4-34.4s]) than neutral position (31.5s [27-40.5s]) (P<0.001).

The median IDS score was significantly lower in the BUHE position (1 [0-1]) compared with the neutral position (2 [1-9]) (P<0.01).

The BUHE position made insertion of the Glidescope blade into the oropharynx easier, based on both the observer’s rating (P<0.001) and the intubator’s subjective assessment (P<0.001). The ease of TT placement was significantly improved; the proportion of patients requiring optimization manoeuvre(s) for TT insertion was higher in the neutral position (n=53; 59.6%) than in the BUHE position (n=30; 34.1%) (P = 0.001).

The mean POGO score improved significantly in the BUHE position (42.7 ± 35.8%) compared with the neutral position (26.5 ± 32%) (P <0.0001).

Conclusion: In patients with cervical spine immobilization by MILS, the BUHE position may be a better option for tracheal intubation using HA-VL.

Predictive factors of difficult intubation: is it still helpful using them with videolaryngoscopy?

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Background and Goal of Study: Unpredictable difficult laryngoscopy is still a challenge for anaesthesiologists and several parameters have been used as predictors of difficult intubation: we focused on the thyromental distance and the distance from the epidermis to the epiglottis (DSE) assessed with ultrasound. Nowadays, videolaryngoscopy is considered the main technique to facilitate tracheal intubation.

The goals of the study were explore if there is a correlation between DSE and thyromental distance and evaluate if the routine use of videolaryngoscopy could overcome the predictive factors of difficult intubation, in particular a thyromental distance < 6.5 cm and a DSE ≥ 2.5 cm.

Materials and Methods: 245 adult patients undergoing elective surgeries in E. Profili Hospital in Fabriano were recruited. Pre-operative evaluation was performed: DSE with a linear ultrasound transducer placed in the transverse plane at the level of thyrohyoid membrane and thyromental distance were measured for each patient.

All patients were routinely intubated with videolaryngoscope and visual findings have been graded according to the Fremantle Videolaryngoscope Scoring System.

Results and Discussion: 0.41% of patients had a thyromental distance ≤ 6 cm, 11.84% 6.0 - 6.5 cm and 87.75% ≥ 6.5 cm. 44.08% of patients showed a DSE ≥ 2.5 cm. In the group of patients with a thyromental distance < 6.5 cm, 56.67% had a DSE < 2.5 cm and 43.33% a DSE ≥ 2.5 cm.

Among the patients with DSE ≥ 2.5 cm, 12.04% had a thyromental distance < 6.5 cm; in this group, complete view of vocal cords was found in 61.4% of cases and partial view in 38.46%; orotracheal intubation was performed at first attempt in 92.31% of cases, in the others at second attempt; there was no case of impossible intubation.

Considering the totality of patients, regardless of DSE values and thyromental distance, complete view of the vocal cords was achieved in 80.82% of cases and orotracheal intubation was performed at the first attempt in 95.92% of cases.

Conclusion(s): There is no correlation between DSE and thyromental distance. Among patients with a difficult intubation predicted by the combination of DSE ≥ 2.5 cm and thyromental distance < 6.5 cm, routine use of videolaryngoscopy allowed orotracheal intubation in the nearly totality at the first attempt without any complications.

Further studies are required to assess whether routine use of videolaryngoscope can overcome predictive factors of difficult intubation.
Comparison of high-flow nasal cannula versus conventional oxygen therapy in obese patients undergoing sedation/analgesia in intragastric balloon therapy: preliminary data

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Background and Goal of Study: Anesthesia management in obese patients is crucial for effective airway management due to anatomical changes, critical oxygen desaturation, decreased functional residual capacity, and the increased need for oxygen consumption (1).

We hypothesize that high-flow nasal cannula (HFNC) oxygen therapy will be more effective and provide a longer period of apneic oxygenation compared to the conventional oxygen therapy (COT) with nasal cannula.

The primary objective of this preliminary study is to analyze the outcomes of HFNC in obese patients undergoing sedation/analgesia in intragastric balloon (IGB) therapy.

Materials and Methods: This study will be included 80 obese adult patients scheduled for IGB therapy. Patients were randomly assigned to two groups: HFNC (n=40) and COT (n=40). HFNC received 40 L/min of humidified oxygen with a FiO2 of 60-80%, while COT received 6 L/min of oxygen flow. Oxygen desaturation, as defined by the World Society of Intravenous Anesthesia with a SpO2 <90%, was categorized into moderate desaturation (75% ≤ SpO2 <90%, time <60 seconds) and severe desaturation (SpO2 <75% or 75% ≤ SpO2 <90%, time >60 seconds). The period of apneic oxygenation and perioperative airway interventions, including the jaw thrust maneuver, mask ventilation, and intubation if necessary, were recorded.

This preliminary study specifically focused on reporting the results of HFNC group.

Results and Discussion: In the preliminary analysis of HFNC with 24 patients, the average BMI of patients was 33.6. Among these patients, moderate desaturation was observed in five patients (20.8%), whereas severe desaturation occurred in only one patient. The period of apneic oxygenation of HFNC was 15.8±4.9 minutes. In perioperative period, jaw thrust maneuver was 25% and need for mask ventilation was 8%.

There was no need for intubation. Importantly, the procedure was never interrupted due to severe desaturation, and the surgeon satisfaction score was nearly excellent at 95.8%.

Conclusion(s): In this preliminary analysis, it was observed that in obese patients undergoing IGB therapy, the use of HFNC is anticipated to provide a longer period of apneic oxygenation, result in reduced desaturation, and contribute to an improved quality of recovery when compared to the COT.

Reference:

Influence of different non-invasive mechanical and jet ventilation techniques in conscious volunteers in minimising diaphragm motion for radiotherapy

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Background/Goal: To minimize respiratory motion for radiotherapy, non-invasive ventilation is being explored in conscious healthy volunteers and patients. The objective was to determine whether mechanical ventilation (NIMV) or jet ventilation (HFJV) would result in smallest right hemidiaphragm motion and assess volunteers' comfort during NIMV and HFJV.

Materials/Methods: We had ethics committee approval (NL.77351.018.21), trial registration (ICTRP, NL9841) and signed informed consent from 23 healthy volunteers.

First, they were trained for NIMV (Hamilton T1; Hamilton Medical AG, Bonaduz) at 60 min⁻¹ (NIMV60) and HFJV (Twinstream; Carl Reiner, Vienna) at 60, 150, 250 and 400 min⁻¹ (HFJV60, HFJV150, HFJV250 and HFJV400).

Secondly, ultrasound movies of 40 s (temporal resolution 23 Hz) were acquired in the sagittal plane twice for each ventilation frequency.

We determined overall diaphragm motion over 40 s. We tested for significant differences between overall motion during all frequencies (paired Wilcoxon’s tests (n=10); Holm-Bonferroni corrected p-value). Also, we assessed volunteers’ comfort through a questionnaire.

Results/Discussion: All volunteers tolerated well NIMV60 and HFJV up to 400 min⁻¹. Heart rate, blood pressure, SpO2 and end tidal PCO2 were within normal levels. The overall motion during

Figure 1. Boxplots showing overall diaphragm motion measured with ultrasound for all ventilation frequencies in the 23 healthy volunteers. Boxes: median value and lower and higher quartiles, whiskers: lowest and highest data point within 1.5 times the inter-quartile range.
NIMV was significantly smaller than HFJV (12.3 mm and 24.1 mm respectively; p<0.001). The median overall motion was 17.2 mm, 15.8 mm and 13.4 mm at HFJV, HFJV and HFJV (significant only between HFJV and HFJV). Ultrasound movies showed clearly that volunteers superimposed spontaneous breathing on top of HFJV and HFJV. Questionnaires revealed that all volunteers were comfortable (mean score 3 on a scale of 0 to 4; 4 = most comfortable), but 10 volunteers specifically commented that mechanical ventilation was more comfortable than jet ventilation. Conclusion: Mechanical ventilation at 60 min maximally reduced the overall motion of the right hemidiaphragm. Even jet ventilation was tolerable for all. Overall, jet ventilation is feasible in conscious subjects but mechanical ventilation is superior for respiratory motion management in radiotherapy.

**01AP04-04**

Strategic decision-making in airway management: insights from CART analysis of elective surgeries

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**Background and Goal of Study:** 2.3% of anaesthesia-related deaths are attributable to difficult or failed intubation (1). To avoid “cannot ventilate cannot oxygenate” situations, predicting a difficult airway before induction of anaesthesia and opting for the appropriate intubation strategy, either conventional laryngoscopy (CL), video laryngoscopy (VL) or fibreoptic intubation (FI), is crucial. The study aimed to classify patient groups for whom an anaesthesiologist performed a certain airway management strategy.

**Materials and Methods:** After ethical approval (253/19 S-SR), we used preoperative routine assessment data (pre-anaesthesia visit, patient core data, and planned surgical procedure) from patients undergoing elective, non-cardiac surgery with the need for endotracheal intubation between June 2014 and March 2022 at a German university hospital to build a Classification and Regression Tree (CART) analysis. We used the function ctree() from the R package “partykit” (R version 4.3.2) with default settings. The categories were CL, VL, and FI. Significance level was set to p < 0.05.

**Results and Discussion:** 36585 patients were included, of which 34721 (94.9%) received CL, 1743 (4.8%) VL and 121 (0.3%) FI. The analysis included 160 variables and revealed 11 end nodes. The decision to use VL was mainly influenced by cervical spine surgery and age > 44 years, FI by a limited mouth opening, especially < 2cm (Figure 1).

**Conclusion(s):** The CART approach of this retrospective analysis is used to visualise the different combinations of factors that lead to a decision, as airway evaluation is based on multiple factors rather than a single parameter. Following the literature (2), most patients can nowadays be intubated by CL or VL; however, with a low percentage, anaesthesiologists still decide to manage the airway with fibreoptic technique, as per German guidelines (3).

The small mouth opening, in particular, remains the domain of FI. Surprisingly, common screening tests, such as the Mallampati classification, did not have significant influence in our model.

**Figure 1:** Classification and Regression Tree: Each path from the root node to an end note represents a decision sequence for the respective intubation procedure.

**References:**
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**01AP04-09**

Ultrasound in the prediction of difficult airway in obese/overweight patients

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**Background and Goal of Study:** Predicting difficult airway (DA) is performed by physical examination. However, the incidence of difficult tracheal intubation ranges from 1.5% to 13%. Diagnosis of DA in obese patients may be underestimated due to the difficulty in anatomical assessment of the oropharynx and larynx, thus suffering up to 37% of airway-related complications. Our aim was to evaluate the ability of ultrasonography to improve the prediction of a DA in overweight/obese patients.

**Materials and Methods:** After obtaining Ethics Committee approval, a prospective observational study was conducted in patients older than 17 years with a BMI > 25 undergoing general anaesthesia between May and September 2023. After obtaining informed consent, predictors of difficult airway were analyzed and the following distances were measured by ultrasound: skin-hyoid, skin-epiglottis and skin-vocal cords. This information was then correlated with airway approach difficulty: face mask ventilation (HAN) and orotracheal intubation (Cormack-Lehane classification, C-L).

**Results and Discussion:** Fifty patients were included: 40% had BMI 25-30; 24% BMI 30-35; 12% BMI 35-40, and 20% BMI>40. 70% of patients showed some difficulty in ventilation with face mask (HAN=1). We detected a relationship between BMI and the ultrasound distance skin-vocal cords (p=0.005) and skin-hyoid (p=0.037), but not with skin-epiglottis (p=0.051). Patients classified as C-L showed more frequently skin-vocal cord distance > 2.8cm (50% vs 16.7%, p=0.037) and skin-hyoid distance > 1.28cm (62.7% vs 19.0%, p=0.010).
We found no relationship between C-L>I and skin-epiglottis distance (p=0.131). We also found no relationship between HAN>1 and skin-vocal cord (p=0.594), skin-hyoid (p=0.514) or skin-epiglottis (p=0.05) measurements. All patients with BMI > 40 showed C-L=1, although 45% met ultrasonographic criteria for DA.

Of the 22 patients with BMI <30 (not declared as DA by physical examination), 13.6% had an ultrasonographic skin-hyoid distance >1.28cm and 22.7% skin-epiglottis distance >2.7cm.

**Conclusion(s):** Ultrasonography is useful in predicting DA in overweight/obese patients. Skin-vocal cord and skin-hyoid distances are better related to DA than skin-epiglottis distance. Paradoxically, no ultrasonographic measures were related to difficult ventilation through face mask.

**O1AP05-01**

**Successful anesthetic management of a morbidly obese patient with airway narrowing due to tumor growth**

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**Background:** High-flow nasal oxygenation (HFNO) has the merit of prolonging safe apnea time in patients with airway difficulties. Even in morbidly obese patients, apnea of 5 minutes is considered possible with HFNO.¹

**Case Report:** A 57-year-old obese female (body-mass index: 36.9 kg/m²) with airway narrowing due to enlargement of a thyroid tumor complained of neck swelling and restricted lateral morbidity. She was diagnosed by needle biopsy as having multinodular goiter and scheduled for a total thyroidectomy under general anesthesia. In preoperative evaluation, she did not describe any respiratory symptoms apart from snoring. Her Mallampati score was 3 and neck extension was slightly restricted. Cervical computed tomography showed airway compression with modest narrowing from her multinodular goiter, which extended into the mediastinum. Invasive arterial pressure monitoring was started following standard monitoring. Her arterial partial pressure of oxygen (PaO₂) was 76.1 mmHg in room air at a 20-degree head-elevated position. Ten minutes of humidified 95% oxygen using HFNO (60 L/min) raised her PaO₂ to 456.4 mmHg. General anesthesia was induced by intravenous administration of remifentanil, remifentanil, and rocuronium under maintenance of a sniffing posture. HFNO was continued after her spontaneous breathing disappeared, and passive respiration was not conducted. After 5 minutes of apnea, tracheal intubation was successful on the first attempt using video laryngoscope guidance. The airway remained open until she was intubated, and PaO₂ was maintained over 108 mmHg. The tumor was resected without damaging the recurrent laryngeal nerves. Postoperatively, she was extubated and transferred to the intensive care unit. She did not complain of any breathing difficulties, and PaO₂ remained at 125 mmHg under a facemask (O₂ 6 L/min). Seven days after the operation, she was discharged without complications.

**Discussion:** This case featured two notable characteristics of difficult airways: morbid obesity and airway narrowing by tumor growth. We selected HFNO to avoid hypoxemia and for possible sudden airway collapse, leading to successful intubation with no adverse events.


**Learning Point:** HFNO is effective for preoxygenation even in morbidly obese patients with airway narrowing. The technique may contribute to greater patient satisfaction and safety over other measures.

**O1AP05-02**

**Use of the second-generation laryngeal mask airway during surgical tracheostomy**

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**Background:** The use of the laryngeal mask airway (LMA) during elective surgical tracheostomy is not widely studied. A single case series advocated use of first-generation flexible LMA for selected patients in elective tracheostomy.¹ We present a unique case report exhibiting the utility of the second-generation flexible LMA for surgical tracheostomy.

**Case Report:** A 62-year-old, 84kg man with stage Ivb right soft palate salivary gland cancer was listed for elective tracheostomy, wide resection of soft palate tumour, right inferior maxillectomy, neck dissection and reconstruction. MRI neck showed a 1.5x1.7cm right soft palate lesion invading the posterior hard palate. Nasoendoscopy showed a normal larynx, hypopharynx and base of tongue. Airway assessment revealed a mouth opening of 6cm, modified Mallampati grade 2 and a thyromental distance of 6cm. Following induction, a second-generation LMA (Genesis Airway Flexi-2G) was inserted. Its position confirmed with placement and performance tests.²

An armoured endotracheal tube was inserted through the subsequent tracheostomy and LMA removed. Surgery proceeded uneventfully.

**Discussion:** Advantages of the use of LMA compared to endotracheal intubation³ include: less haemodynamic disturbances, unimpeaded surgical field, lower risk of loss of airway or impaired gas exchange as eliminates need for ETT manipulation, decreased risk of contamination of tracheobronchial tree after ETT cuff deflation. The flexible LMA allows it to be positioned away from the surgical field. Advantages of the second-generation flexible LMA compared to the first-generation LMA include: higher seal pressures, gastric access port and bite block. Patients should have low aspiration risk, good chest compliance and absence of periglottic or hypopharyngeal pathology.³


**Learning Points:** Second-generation flexible LMA is an effective alternative to ETT in patients undergoing elective surgical tracheostomy. Placement and performance tests should be conducted when LMA is used in advanced procedures.
01AP05-03
Tracheal wall laceration following elective tracheostomy: a case report

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Background: Bilateral vocal fold paralysis is a known potential complication after thyroid surgery1, with tracheostomy being the last-resort option. We present a case involving a tracheal wall laceration, leading to imminent airway compromise, in a patient with bilateral vocal fold paralysis scheduled for elective tracheostomy.

Case Report: A 45-year-old female (ASA II) with iatrogenic bilateral vocal fold paralysis, as a result of a total thyroidectomy performed 2 years earlier, was scheduled for elective tracheostomy due to worsening dyspnea despite speech therapy and posterior cordectomy. Fiberoptic intubation was successfully performed with the patient awake, revealing a narrow glottic cleft. Anesthesia was induced and maintained with propofol, remifentanil, and rocuronium. The procedure was uneventful until the insertion of the tracheostomy cannula, at which point ventilation could no longer be resumed. Prompting fiberoptic examination through the tracheostoma revealed that the cannula was wedged within a mucosal recess, obstructing proper ventilation. Otorhachial intubation was performed, and pulmonology consultation was requested. A bronchoscopic examination revealed a dilation of the left postero-lateral tracheal wall, extending from just above the carina to approximately 5cm below the tracheostoma. At its lower end, a recess was identified, within which a perforation of the tracheal wall was observed. To minimize air leakage and secure both lungs ventilation, the orotracheal tube was exchanged for a double-lumen tube, and its placement was confirmed through fiberoptic assessment. CT scan revealed a medium volume pneumomediastinum, and a 12x13mm tracheal wall defect. After undergoing urgent surgical repair, the patient experienced complications in the postoperative period, including cervical subcutaneous emphysema and a right-sided pneumothorax. The patient was discharged after a 17-day hospitalization period.

Discussion: This case points out the importance of conducting thorough investigations for patients with persistent respiratory complaints due to mechanical obstruction. It also highlights the necessity for a multidisciplinary approach in managing complex airway complications.

Reference:

Learning points: A multidisciplinary approach and adaptability in addressing unforeseen airway challenges are mandatory.

01AP05-04
Intraoperative neuromonitoring for thyroid surgery and ventilation using Tritube®

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Background: Patients with stenosing airways present an anesthesiologic challenge. In those cases the Tritube® (Ventinova Medical, Einthoven, Netherlands) may serve as an alternative airway with flow controlled ventilation (FCV®).

For thyroid surgery standard neuromonitoring (1) had to be dispensed when using the Tritube. For the first time, we achieved to combine the Tritube® with electrodes for neuromonitoring providing a sufficient signal.

Case Report: In a 55-year-old male patient (ASA II, BMI 36.1, Mallampati IV) with struma nodosa permagna, a hemithyroidectomy was performed. The trachea appeared infrahyoidally displaced to the left with a profoundly reduced lumen of 6 mm. Initially the tracheal stenosis was fiberoptically probed and measured. Afterwards we splinted the airway with a guidewire (Glidewire Advantage®, 180cm, 0.89mm, Terumo, Leuven, Belgium). This wire was used to place the Tritube®, on to which the adhesive cut-to-size electrodes (Dragonfly 1-Channel, EMG Electrode for ET Tube 6-7mm) were attached at the level of the vocal cord. Using Medtronic NIM-Response 3.0 (Medtronic® Dublin, Ireland) and the Prass Standard probe Monopolar Stimulator REF 8225101 (Medtronic® Dublin, Ireland) we could derive a sufficient signal of the vagus nerve and the recurrent nerve. The postoperative examination confirmed all nerve structures to be intact.

Discussion: The use of the modified electrodes provided adequate neuromonitoring. However, it must be questioned whether the modified surface of the electrodes affected the quality of the signals.

If the validity of the signal can be confirmed in further studies, the Tritube® could become the means of choice for securing the airway in stenosing thyroid tumors as well as for transoral endoscopic access routes.
Reference:

Learning Points: This case showed for the first time neuromonitoring with the Tritube® by a modified application of the already existing electrodes. In the interest of patient safety, this improvisation should become a commercially available product.

01AP05-05
What about glottic stenosis? How to ventilate it with Flow-Controlled Ventilators. A case report

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Background: Patients with (sub)glottic stenosis candidates for surgery, may require smaller endotracheal tubes. Intraluminal airway narrowing hinders mechanical ventilation and anesthesiologists have few tools to manage it.

Case: 21-year-old patient with papillary thyroid carcinoma which invades trachea. CT scan, cervical tracheal stenosis with a transverse diameter of 37 mm. Vocal cords in median position. Proposed for tracheal resection. Medical history: BMI 36kg/m2, SAH and Asthma (salbutamol).

At operating room, the patient presented fair general status with inspiratory stridor at rest and sitting, and dyspnea with normal speech and bitonal voice. Due to known tracheal stenosis, we performed induction in spontaneous ventilation with Sevoflurane. After that, AuraGain® No 4 laryngeal mask was inserted, with high leaks and desaturation. Laringoscopy (POGO 100%) to insert Pediatric Frova®. According to the stenosis, two endotracheal tubes nº 4.5 were assembled. Difficulties in MV due to high pressures made it difficult to reach optimal tidal volume. We decided intrafield ventilation.

Discussion: High airway resistance involving high pressures threat ventilation. In this case, long and narrow tube difficulted optimal ventilation, and anesthesia machine wasn’t an effective tool to ensure ventilation. Manujet® and Ventrain® are optimal tools but not for long surgeries. The only appropriate option seems the flow ventilator (Evone®)(1) with FCV, that allows protective ventilation(2).

References:

Learning Points:
• Ventilation difficulties in tracheal stenosis must be expected to have a predefined plan.
• Anesthesia machines don’t ensure appropriate ventilation under narrow tubes.
• FCV seems the best option to ensure protective ventilation under those circumstances.

01AP05-06
The application of three-dimensional printing in the management of a difficult airway due to Treacher Collins syndrome

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Background: This case explores the application of three-dimensional (3D) printing technology in managing difficult airways. The goal is to demonstrate the utility of customized 3D airway models, derived from CT scans, in refining intubation techniques and improving preanesthetic planning. The study involves a 17-year-old patient diagnosed with Treacher Collins syndrome.

Materials and Methods: A customized 3D airway model was created from CT scans using the open-source software 3D Slicer and further processed with Meshmixer for 3D printing. The final model was printed using a stereolithography (SLA) 3D printer with Flexible 80 A resin.

Results and Discussion: We were able to identified potential challenges in intubating the patient, such as tube positioning difficulties in the right nasal cavity and concerns about tube size adequacy. Using the 3D printed model, these issues were addressed through simulation, allowing for the rehearsal and refinement of intubation procedures. The transparent model provided a clear view of the patient’s altered airway morphology, aiding in risk assessment and instrument sizing.
The actual intubation process, was successful, emphasizing the practicality of preanesthetic planning in challenging cases. The transparent nature of the model facilitates visualization of complex airway scenarios, allowing for ex vivo practice and serving as an educational tool. While acknowledging the model's limitations, including the inability to differentiate soft tissues after neuromuscular relaxant administration, the positive outcomes underscore the broader potential of 3D technology in anesthesia practice offering a safe and controlled environment for training.

Conclusion(s): The study concludes that 3D printing technology, applied to create customized airway models, is a valuable tool for managing difficult airways. The use of transparent, anatomically accurate models aids in preanesthetic planning, enhances practitioner proficiency, and contributes to patient safety during intubation. The positive results advocate for the wider adoption of 3D printing in anesthesia practice, particularly in complex airway scenarios.

01AP05-08
Use of tritube in performing tracheotomy: a clinical case

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Background: There are several options for anesthetic management of surgical tracheotomy. It can be performed under local anesthesia and sedation without securing the airway or it can be secured using different techniques. Tritube tracheal tube can be used in cases of difficult endotracheal passage. It is an ultra-thin tube (outer diameter of 4.4mm and an internal diameter of 2.5mm) with pneumatic cuff to isolate the airway. Evone continuous flow respirator (active inspiration and expiration) allows ventilation and oxygenation, reducing barotrauma.

Case Report: We present a 64-year-old patient with previous prolonged intubation and percutaneous tracheotomy for COVID who developed vocal cord paralysis. He required synchiae excision and posterior cordectomy, which resulted in tracheotomy closure. Afterwards, the patient returned due to stridor during exertion. The CT-scan showed, nodular thickening of the tracheal wall, along with vocal cord paralysis and synchiae. Surgical tracheotomy was indicated. After the anesthetic evaluation, due to technical difficulty, the patient's lack of cooperation, and synchiae obstructing the airway, it was decided to perform intubation with Tritube under general anesthesia while maintaining spontaneous breathing. After nebulization with 9 ml 5% lidocaine, the patient was induced using sevoflurane and remifentanil. Then, the vocal cords were visualized with a videolaryngoscope, allowing the Tritube to pass between the vocal cords. When the airway was secured, the patient was ventilated with the Evone ventilator in continuous flow mode and tracheotomy was performed uneventfully.

Discussion: We often encounter cases where airway protection and ventilation can be challenging due to diseases and patient characteristics. In these cases, we may have several options to secure the airway. One of them would be the use of small-caliber ETT. But we can find cases where the caliber of the tube is too large or the vision of the surgical field is difficult. The main advantages of the Tritube are its small diameter and the pneumatic cuff that isolates the airway allowing for a clear view of the field in laryngeal procedures.

References:

Learning Points: This case demonstrates successful anesthesia induction and intubation in a patient undergoing continuous enteral feeding, balancing the risks of aspiration against those of hypoglycemia. There's a need for further research to establish protocols for similar clinical scenarios.
Besides, we can achieve effective ventilation with the Evone. One limitation is that laser can’t be used in laryngeal interventions, since it isn’t resistant.

**Learning Points:** Tritube is an option to consider to secure the airway in cases of difficult airway.

### 01AP05-10

**Multiple unsuccessful attempts during intubation and the utilization of fiberoptic bronchoscope, video laryngoscope and bougie in patient with lacerated wound in the left cervical region**

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**Background:** Managing a difficult airway is especially challenging for anesthesiologists in urgent and life-threatening situations. Neck trauma poses a life-threatening risk when it involves the airway, with about 16% of deaths linked to intubation failures.1 In this article, we delineate the successful emergency tracheal intubation with the use of bougie, videolaryngoscope (VL) and Fiber optic bronchoscope (FOB) in a patient, when the FONA was not viable option.

**Case Report:** A 21-year-old male was brought to the ER with a laceration on the left side of the neck, inflicted by a cutter 9 days before admitted to the hospital. The patient was previously taken to another hospital for primary suturing, but 2 days before the hospital admission, the stitches came loose, and patient experienced dyspnea and vomiting of blood. The patient was tachypneic (25 bpm), tachycardiac (138 bpm), SpO2 was 100% on a simple mask at 7 lpm, and Hb level was 4.2.

Initially, we opted for combination of VL and FOB that’s inserted with ET 7.5 as the primary approach, with patient received Fentanyl (100 mcg) and Ketamine (50 mg). We found the larynx was distorted to upper right side due to hematoma from posterior left side of larynx and small glottic opening. Then on second attempt, we used VL and bougie, we managed to insert ETN no. 6.0 through the bougie due to the small glottic opening.

**Discussion:** The case involved challenging airway issues, ongoing bleeding, soft tissue swelling, deviated larynx and trachea. Difficult intubation predictors were observed, and FONA wasn’t feasible due to neck hematoma. This necessitated tracheal intubation, requiring supportive equipment such as a bougie, video laryngoscope (VL), and fiber optic bronchoscope (FOB). On assessment of the airway, the POGO score was 0%, CL 4 and there was an anatomical distortion on the laryngopharangeal due to the neck trauma.

**References:**


**Learning Points:** The handling of neck trauma can be intricate and often necessitates tight coordination between anesthesia and surgical teams. The fundamental principles of airway management in such cases involve early recognition of impending airway obstruction.

In instances where airway injury is suspected, effective methods to maintain airway stability includes the utilization of FOB, VL, and bougie, as FONA is not a viable option in this scenario.

### 01AP05-11

**Airway management with combined technique in the management of a schwannoma of the vagus nerve. A case report**

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**Background:** Schwannomas (aka. neurilemomas or neurinomas), are benign encapsulated tumors formed by Schwann cells. Most of these tumors are sporadic, usually appearing between the third and sixth decade, equally in both sexes. Use to be a painless, slow-growing laterocervical mass, without other neurological symptoms. Diagnosis usually requires imaging tests, and biopsy is usually not cost-effective. The definitive treatment would be surgical excision with nerve preservation.

**Case Report:** 62-year-old male, ASA II, no drug allergies, smoker, underwent scheduled surgery for resection of left vagal schwannoma. Airway examination: Mallampati I, Thyromental distance > 3 cm, mouth opening > 3 cm, adequate neck mobility. Balanced general anesthesia is performed for a left cervicotomy. Combined airway management: orotracheal intubation with videolaryngoscope Airtraq and flexible fibrobronchoscope with the patient asleep.

One anesthesiologist performs indirect laryngoscopy with the videolaryngoscope until the vocal cords are seen and a second anesthesiologist progresses with the fibrobronchoscope to the carina. At this point, the orotracheal tube is introduced. A 6x3 cm, hour-glass-shaped, cystic-looking lesion was identified in the left carotid space extending inferiorly from the torn foramen to the left level III-IV. The vagus nerve which stimulates at 3 mA is preserved. There was no intraoperative incidence. Eduction and extubation were uneventful.

**Discussion:** The most important thing when facing a case of possibly difficult airway is the correct planning. A careful and exhaustive study must be carried out before surgery and together with the rest of the surgical team, in order to know all the data of the patient and the disease.

We opted for an approach with the patient asleep because of good airway predictors and it was combined to ensure correct placement of the orotracheal tube with neuromonitoring of the recurrent nerve at the vocal cords. In addition, only the initial dose of neuromuscular relaxant should be used for intubation and proper monitoring with TOF should be performed to avoid any residual relaxation and if necessary perform the pharmacologic reversal.
Minding the gap: anaesthetic approach of a patient with achalasia and mandibular fracture

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Background: Achalasia predisposes for regurgitation and pulmonary aspiration. Cumulatively, facial trauma mandates a thoughtful approach as a predictable difficult airway. In the face of these concurrent problems, primary and rescue options are limited. We add to the literature a case of awake nasal fiberoptic intubation for a patient presenting with mandibular fracture and history of achalasia.

Case Report: An 18-year-old woman presented with a triple site mandibular fracture. She had a history of achalasia with progressive dysphagia, total regurgitation and weight loss. She was treated with botulinum toxin 8 days before this episode, but with persisting symptoms. Limited mouth opening and extreme anxiety were notorious. A fasting period of twelve hours was confirmed. She was proposed for surgical reduction and fixation of the fractures. Awake fiberoptic tracheal intubation was performed. Pre-oxygenation with facial mask, light sedation under nasal cannula, topical vasoconstriction and topicalisation were completed before intubation. Our procedure was conducted in a semi-seated position. An uneventful intubation was accomplished and TIVA was used for maintenance of anaesthesia. Surgical correction was completed in one hour, after which extubation was performed without marks.

Discussion: Although RSI is historically the cornerstone of the airway approach in patients with achalasia, the advantages associated with this ultra-short technique are lost when a nasal intubation is required. Awake intubation allows not only the maintenance of airway protective reflexes, but also preserves spontaneous breathing.

A fiberoptic procedure will enable the direct visualisation of all the anatomic structures and improve a first attempt technique, while being well tolerated by the patient after careful topicalisation. If needed on anxious patients, sedation with short action agents can be used.

Given that none approach is infallible, a mindful anaesthetic conduct must be in place. This would mean not only the definition of airway rescue, but also the documentation and concise management of pulmonary aspiration.

References:

Learning points: Awake intubation should be sought as an option in patients with achalasia and its advantages outweighed on an individual basis, as not all patients with achalasia may benefit from RSI.

Fatal post-laryngeal hematoma after 4 hours from the first assessment

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Background: We experienced fatal and progressive post-laryngeal hematoma after 4 hours from the first assessment in emergency room continuing even after the oro-tracheal intubation.

Case Report: The patient, an 85-year-old male with a height of 172 cm and weight of 60 kg, was brought to the emergency department after falling down the stairs at home, complaining of a head injury and lumbago.

The family reported he had a history of compression fractures and pleural effusion, both under follow-up with local physicians. Initial evaluation, conducted approximately 35 minutes after the event, revealed mild contusions to the head. Neurological examination and head computed tomography (CT) imaging showed no abnormalities. Confirming no apparent progressive symptom and sign was observed. The patient's head and lower back pain improved with a 50-mg diclofenac suppository, leading to discharge home.

Four hours after returning home, the patient lost consciousness and stopped breathing during assistance with urination by the families. Cardiopulmonary resuscitation was immediately initiated. He was re-transported back to the hospital, and after adrenaline administration, regaining a pulse, and endotracheal intubation, a CT scan revealed active bleeding from the oropharynx to the mediastinum (Figure). A hematoma causing airway obstruction was suspected, and airway narrowing persisted.

The patient was moved to the intensive care unit, where despite efforts to maintain blood pressure with transfusions and fluid administration, he died approximately 17 hours after the arrival.

Discussion: This case represents a sudden deterioration after discharge home, resulting in an unfortunate outcome. Despite obtaining a pulse and undergoing CT imaging after resuscitation, the
persistence of airway narrowing following intubation was entirely unexpected. While ventilation difficulty after intubation is rare, there have been several reports of such occurrences, highlighting the need for caution in these situations.


Learning Points: The airway patency should be re-evaluated even after the oro-trachal intubation.

O1AP06-04
Orotracheal intubation in predicted difficult airway: Treacher Collins syndrome

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Background: Treacher Collins syndrome (TCS) is a rare genetic disease characterized by abnormal craniofacial development: distinctive facial features, such as micrognathia, malformations of the cheekbones and eyes. These anomalies condition airway management and intubation.

Case Report: 1-month-old female (3.2 kg, 56 cm) diagnosed with TCS, with hypoplasia of the facial bones and retrognathia with a thyromental distance of 1 cm. She underwent surgery for pyloric stenosis.

After careful airway evaluation, difficult intubation equipment was prepared: pediatric curved laryngoscope, Miller blades of various sizes, pediatric McGrath and HugeMed videolaryngoscope, flexible pediatric fiberoptic bronchoscope, and supraglottic devices. Preoxygenation was performed for 5 minutes and atropine 0.01 mg/kg was administered to decrease secretions and prevent reflex bradycardia.

Induction was performed with propofol 3 mg/kg and fentanyl 1 mcg/kg.

Initially, mask ventilation seemed to be difficult due to a poor fit that improved after the insertion of an oropharyngeal airway and it was decided to relax with rocuronium 0.6 mg/kg.

After 2 minutes of ventilation, visualization was carried out with a HugeMed blade Nº 1 video laryngoscope, obtaining a Cormack-Lehane IV.

When performing an extreme BURP maneuver, a Cormack-Lehane III was achieved, making it possible to intubate with ETT No. 3.5 and a stylet. Extubation was carried out without incident.

Discussion: Most children with TCS have difficult viewing of the glottis with direct laryngoscopy and require specialized intubation techniques, but reports on airway management are limited.

Important features for anesthesia are bone hypoplasia, involving the maxillary, zygomatic, and mandibular bones, limited mouth opening, a high, curved palate, and severe abnormalities of the temporomandibular joint.

In our case, we opted for intubation using deep sedation and muscle relaxation after verifying the possibility of ventilation to avoid complications that could become catastrophic, such as a “no ventilation, no intubation”.

Reference:

Learning Points: Every pediatric anesthesiologist must be prepared for the possible complications that a case of difficult airway in children can present; especially in patients with anatomical malformations that pose a great challenge, such as TCS.

O1AP06-05
Extracorporeal membrane oxygenator as a bridge to bronchopleural fistula repair after esophagectomy: a case report and review of literature

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Background: Traqueo-bronchial fistulas are rare but complex diseases with a heterogeneous spectrum of underlying etiologies. Endoscopic management is the most common treatment¹, however, when there is a limitation to the technique, other therapeutic management must be considered. Extracorporeal membrane oxygenation (ECMO) is an adequate alternative when a surgical closure of bronchial fistula is attempted.

Case Report: We report the case of a 49-year-old patient who underwent total esophagectomy. Three days after discharge, he came back to hospital with dyspnea, fever and subcutaneous emphysema. A cervical CT scan revealed a dehiscent cervical wound and fiberoptic bronchoscope evidenced a fistula in the left main bronchus and a plasty with pectoral muscle had to be performed. In order to avoid mechanical ventilation that could be detrimental for fistula healing and due to the development of acute respiratory distress syndrome (ARDS), a selective intubation was performed, and an ECMO had to be placed. After two weeks of difficult respiratory weaning, it was necessary to place a left bronchial prosthesis, which improved the clinical status and allowed the discharge from our unit.

Discussion: Traqueo-bronchial fistula is a rare and potentially fatal complication of esophagectomy. Mechanical ventilation and fistula management must be individualized and aimed at reducing air leak². Efforts must be focused on reducing high airway positive pressures. In refractory cases, independent lung ventilation or ECMO should be considered². ECMO can provide a therapeutic bridge to lung-protective ventilation, and allow bronchial fistula healing in case of refractory respiratory failure. Surgical reconstructive procedures of bronchial fistula are reserved for patients with a treatment refractory fistula or a septic multiple organ failure.

References:

Learning Points: A traqueo-bronchial fistula is a rare and potentially fatal complication of esophagectomy. Isolation of the fistula and pulmonary separation is necessary during the surgical repair. However, airway management in patients with associated ARDS and sepsis is not well established.
Lingual traction and lateral decubitus position to facilitate awake fiberoptic-guided oral endotracheal intubation in an Ehler Danlos-Hypermobility type patient with occipitocervical fixation and severe anatomical airways limitations

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Background: Oral Endotracheal Intubation (OETI) in patients with Ehlers-Danlos-Hypermobility type (EDS-HT) with previous occipitocervical fixation is challenging. This case reports outlines an awake fiberoptic bronchoscope (FOB)-guided OETI facilitated by Lingual Traction Maneuver (LTM).

Case Report: 24 y.o female patient with EDS-HT scheduled for T2-T12 fixation had a history of cardiorespiratory arrest due to very difficult airway. She had previous occipitocervical fixation and limited mouth opening (Fig. 1). OETI was asked for ICU. Airway preparation: 5% lidocaine nebulization, regional blocks, and sedo-analgesia with dexmedetomidine & fentanyl. An awake FOB-guided OETI, in supine, facilitated by LTM was done in first-attempt (Fig. 2).

Patient underwent second surgical stage: A LTM along with left lateral decubitus improved airway patency and the FOB-guided OETI was achieved faster.

Discussion: Awake FOB-guided endotracheal intubations with regional and topical anesthesia were the safest options. Despite the patient's complex medical history, the LTM and body position-al adjustments lead to a successful airway management. During FOB-guided OETI, both maneuvers could enhance glottis visualization by putting the base of the tongue away avoiding pharyngeal collapse.

The LTM is supported by description of the glosso-epiglottic tendon which provides the central position maintenance and the retroversion of the epiglottis.

Reference:

Learning Points: The LTM & lateral decubitus can be of great help during awake FOB-guided endotracheal intubation in patients with very complex airway and occipitocervical fixation.
Awake videolaryngoscopy for airway management in a patient with airway trauma – case report

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Background: Cricothyroid injuries are rare, but potentially life-threatening, which can cause airway compromise and the need to guarantee its protection. This case reports our anesthetic approach to a patient admitted in the emergency room with a self-inflicted cervical injury.

Case Report: A 50-year-old patient with a psychiatric history was admitted to the emergency room with a self-inflicted anterior cervical injury with a knife, cutting the cricothyroid membrane and the right internal jugular vein, causing active hemorrhage with exposure of the airway.

With mechanical compression of the neck, he was hemodynamically stable and with good peripheral saturation, but upon decompression, he presented saturations of 70%.

It was then decided to approach it in the operating room with the patient awake using videolaryngoscopy (VL) with topical anesthesia with lidocaine through an epidural catheter introduced into the orotracheal tube using the “spray-as-you-go” (SAYGO) technique. This procedure was uneventful.

Discussion: Cricothyroid lesions make it difficult to approach a patient’s airway. The best option in this type of case is to perform orotracheal intubation assisted by fibroscopy with the patient awake and on spontaneous ventilation. However, this is a complex technique and very dependent on the operator’s experience (1).

In this case, it was decided to perform the intubation using VL using topical anesthesia with lidocaine through an epidural catheter introduced through the inside of the tube and with the syringe containing the anesthetic adapted to the proximal tip. This allowed a good airway anesthesia to be performed while progressing using the SAYGO technique, making this procedure less reactive for the patient, improving intubation conditions and ensuring a safer airway protection. However, more studies are needed to prove the validity of this technique (2).

References:

Learning Points:
1. The approach to airway trauma by awake VL with topical airway anesthesia is an effective and safe alternative for fibroscopy.
2. Topical airway anesthesia can be performed with the SAYGO technique in awake VL.

Airway management in a patient with hypopharyngeal carcinoma - Combination of awake coniotomy and subsequent flow-controlled ventilation (FCV®) via a Tritube® with 2,3mm ID

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Background: Airway management in patients with extended adenocarcinoma of the hypopharynx may be very challenging or even futile at times. Here we describe a patient who was managed by awake coniotomy using a 2mm ID cannula followed by transnasal insertion of a 2,3mm ID tube.

Case report: Following chemical burn our female patient underwent reconstruction of the esophagus by means of colon transplant. Years later she reported discomfort at swallowing and breathing.

Due to the size and location of the tumor, conventional intubation was not feasible. Hence, awake coniotomy was performed using a 2mm ID cannula (Cricath®, Fa. Ventinova Medical B.V., Eindhoven, The Netherlands).

To ensure adequate ventilation parameters using Ventrain® (Ventrain®, Fa. Ventinova Medical B.V.), Peak & PEEP pressures and capnography were recorded intermittently.

With the size of the tumor in mind, laser debulking was the surgical method employed. Ventilation during surgery was performed via the Tritube® and the respirator Evone® (Evone®; Fa. Ventinova Medical B.V.), Peak & PEEP pressures and capnography were recorded intermittently.

As a safety measure the Cricath® was left in place up to 2hrs after the end of the case. The patient reported no discomfort.

Discussion: Only few cases employing awake coniotomy and awake fiberoptic intubation with small bore devices have been reported so far (1).

Our case demonstrates the usefulness of having several methods for airway management at hand. The combination of Cricath® and Tritube® provided ventilation with small bore devices under a constrained anatomical situation.

For ventilation by Ventrain we consider Peak pressure and capnography as mandatory. Adequate protection from aspiration is of ultimate concern.
Reference:

Learning points: A 2mm ID small-bore coniotomy cannula enabled infraglottic flow-controlled ventilation and conversion by subsequent intubation with a 2.3mm ID tube provided both, a safe airway as well as optimized working conditions for surgeons. The Cricath® device could be left in place in the recovery area while the patient regained consciousness.

01AP06-09
The angle between the oral and laryngeal axis as a predictor of successful intubation of a toddler with an immobilized neck due to a giant pseudo-meningoencephalocele using a video laryngoscope

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Background: Physical examinations such as the Mallampati score, thyromental distance, sternal notch distance, and neck mobility are predictors of the potentially difficult direct laryngoscopy (DL). The predictor of difficult video laryngoscopy (VL) is not clear.

Case report: A two-year-old boy with a giant pseudo-meningoencephalocele due to a large skull defect presented for a surgical reduction of the head size. He was referred to our department for the assessment of his airway. He had undergone mask ventilation but had no history of tracheal intubation. His mouth opening was about 1.5 fingers. He had a short neck, and the cervical range of motion was severely limited. CT scan of the upper airway was obtained, and the measurements from the sagittal image made for the angle between the oral and laryngeal axis (α). Aligning the oral and laryngeal axes enough to visualize the glottis by DL was inconceivable. Because the deflection angle θ of the curve of a pediatric-size Airway Scope™ (AWS) Intlock™ blade and α were similar (77 and 76 degrees, respectively), we surmised that the visualization of the glottis would be possible. On the day of the surgery, general anesthesia was induced with sevoflurane, and a muscle relaxant was administered after mask ventilation was confirmed. The glottis was visualized without difficulty by AWS, as we expected, and the patient was intubated successfully.

Discussion: The introduction of VLs has improved glottic visualization and intubation success rate (1). However, the success rate is still not 100%, and the predictor of difficult VL has not been described. We demonstrated that the glottic visualization by VL is not complex when the angles α and θ are similar. The magnitude of difference between the two angles that makes VL problematic remains to be established.

Reference:

Learning points: Comparison between the angles α and θ is a useful indicator for predicting the difficulty of video laryngoscopy.

01AP06-10
Diagnosis and management of tracheal injury after orotracheal intubation – case report

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Background: Post-intubation tracheal ruptures (PiTR) occurs in approximately 1:20,000 intubations. Are rare cases are associated with female gender, short stature, difficult airway, underlying connective tissue disease. May be more frequent in female because pars membranosa is weaker in female than in male and tracheal diameters might be smaller in female and may lead to cuff overinflation.

Case report: A 53-year-old female patient, was admitted to the surgery department of Râdăuți Municipal Hospital with the diagnosis of acute lithiasis cholecystitis. Laparoscopic cholecystectomy was performed. Orototracheal intubation by direct laryngoscopy was performed without any difficulty and did not require the use of a stylet. Extubation was accomplished in the operating room. The patient was admitted to the ICU both due to the hospital's protocol and longer than expected surgical time. 24 hours later she was transferred to the surgery ward where she started complaining of neck discomfort. The clinical examination showed subcutaneous supraventricular and left cervical emphysema with SpO2 = 88% at room air.

Emergency cervicothoracic-abdominal-pelvic CT was performed. It showed pneumomediastinum, latero-cervical subcutaneous emphysema, without discontinuities at the level of the trachea and main bronchi. The patient was transferred to the Pneumothorax Hospital in Iasi for further investigations. Following the fibrobronchoscopic examination, a linear, vertical, tracheal lesion of approximately 25 mm was observed at the pars membranosa level of the trachea. Conservative treatment with antibiotic coverage was decided upon. The evolution was favorable, with complete remission of the emphysema and healing of the tracheal lesion. After 15 days she was discharged.

Discussion: In this case the patient was at increased risk of PiTR, but the most likely cause of the tracheal injury was overinflation of the ET cuff.

References:


Learning points: We emphasise the necessity for measurement of the cuff pressure using a manometer.

01AP06-11
Airway management with tracheal stents - Ventrain® system: report of two cases

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Background: Tracheal stents (SMA) have been gaining ground as a valid treatment in cases of neoplastic, not resectable stenosis. To facilitate their placement under general anesthesia, devices such as Ventrain® for apneic ventilation and oxygenation have increased their popularity. 3D Reconstruction of the patient’s airway allows anesthesiologists to plan the safest scenarios for our patients.

Case report:
Case 1: Female, 66 years. Thickened main carina and both main bronchi with signs of extrinsic compression and infiltration of neoplastic appearance.
Case 2: Male, 71 years, diagnosed with infiltrating squamous carcinoma, endotracheal mass located in the main carina area.

We introduced the Tritube or oxygenation probe and connected the dipositive VENTRAIN. Apneic oxygenation was performed by maintaining an inspiration:expiration ratio of 1:3. To improve the airway approach, we visualized the patient’s 3D images.

Discussion: The Ventrain® device can ensure oxygenation and ventilation through a small-bore transtracheal catheter when the airway is partly obstructed or completely closed (1). Furthermore, it provides the advantage of not needing the placement of an endotracheal tube, allowing oxygenation/ ventilation of the patient during the therapeutic or surgical intervention (2). To the best of our knowledge, this is the first case to combine Ventrain device’s use with a 3D reconstruction of the patient’s airway to design an anaesthetic plan.

References:
• (2)Grupo de trabajo de Patología de la Vía Aérea, Documento de consenso SECT sobre cirugía traequeal y laringotraqueal, Madrid: Editorial Médica Panamericana, 2016.

Learning points: The use of oxygenation-ventilation through Ventrain® system constitutes an effective alternative to maintain the patient’s oxygenation during periods of apnea for the intervention. The recreation of 3D images and videos allows us to plan a safer scenario for the control of the airway.

01AP07-01
Anesthesia management of tracheal debulking of a tumor causing near complete occlusion of the trachea

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Background: The definite treatment of tracheal tumor is rigid bronchoscopy and debulking, which is very challenging. Anesthetists particularly face multiple challenges such as difficulty in ventilation and maintaining oxygenation, difficulty in securing a definitive airway, protection of the distal airway from blood and tissue debris and sharing of airway with the surgeon.

Case Report: We present a case of anesthetic management in a 49-year-old male, a known case of lung adenocarcinoma on chemotherapy, who presented with grade 4 dyspnea in the emergency room of our hospital. Computed tomography scan of the thorax revealed an intratracheal tumor, just proximal to the carina with critical tracheal narrowing.

The patient was taken up for rigid bronchoscopy and debulking of the tumor as an emergency procedure. The patient was managed a high flow nasal oxygenation (HFNC) in a 45° propped up position, till surgeons prepared their equipment.

Induction of anesthesia was achieved with intravenous propofol and atracurium. Maintenance of anesthesia was achieved with intravenous propofol infusion and intermittent boluses of intrave-
nous fentanyl. Intraoperatively, oxygenation was maintained with intermittent positive pressure ventilation using manual ventilation through the side port of the rigid bronchoscope. Seepage of the distal airway with blood and tumor tissue was prevented by intermittent suctioning of the distal airway with a fiberoptic bronchoscope.

At the end of the procedure, we ventilated the patient with laryngeal mask airway until he was ready to be extubated. Thus, we were able to achieve an uneventful procedure, with the patient showing significant improvement in the immediate postoperative period.

Discussion: Different anesthetic approaches to maintain oxygenation during tracheal debulking have been employed, each having its own advantages and limitations. Some studies suggest maintaining a patient spontaneous breathing, while others prefer advocating relaxants for better airway control. While jet ventilation is recommended by a few authors, others advocate positive-pressure ventilation. Meticulous planning and good communication among the team is key to success.

Learning Points: Use of high flow nasal oxygen therapy is a very good option in patients with tracheal debulking, in both pre-induction and post-procedure period. Rigid bronchoscopy is a very important tool in airway management when lower airway obstruction is involved.

01AP07-02
Failure of awake intubation in a patient with undiagnosed supraglottic dysplasia

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Background: Awake fiberoptic intubation (AFOI) and awake videolaryngoscopy (VL) are advocated as the holy grail to tackle with difficult intubation. However, both may fail in cases of supraglottic anomalies.

Case report: We describe the case of a 44-year-old male who presented for an elective vitrectomy. This was a rescheduled case after previous failed intubation. The patient’s history was significant for intellectual disability and asthma. According to the information note, after induction of general anaesthesia, ventilation was adequate, but intubation with both direct laryngoscopy and VL failed (Cormack-Lehane Grade IV). Thus, the anaesthesiologist informed the relatives of the plan for AFOI, while an acquaintance meeting with the patient was performed.

Upon presentation at the operation room, standard monitoring was established and nebulized lidocaine 4% 2.5 ml was administered. The oropharynx, tonsillar pillars and base of the tongue were anaesthetized with a total of 12 sprays of lidocaine 10%. Target-Controlled Infusion of remifentanil was titrated to 2 ng.ml⁻¹ to achieve a Modified Ramsay Sedation Scale level 4. An initial attempt for AFOI was undertaken, but two anaesthesiologists could not achieve reliable view of the glottis. A further attempt using VL (C-MAC, Karl Storz, Germany) was made. The glottis was recognized (Cormack-Lehane Grade Ila) and an intubation bougie was directed into the trachea. However, neither a 7mm or a 6 mm tube could be advanced using the “railroad” technique.

The patient recovered uneventfully and an ENT evaluation was requested. Nasal endoscopy revealed severe supraglottic malformation and stenosis with an estimated glottis opening of 4mm. Based on these findings, a tracheostomy was advised to provide a secure airway. After a meeting with both ENT and ophthalmologists, the relatives were informed, the associated risks and benefits were analyzed and surgery was cancelled.

Discussion: AFOI should be considered whenever a difficult airway is suspected. Nevertheless, there are cases where even this technique is unsuccessful due to poor visualization of the larynx. In this case, VL proved useful, but aborting the attempt upon suspicion of anatomical abnormalities should be considered early to prevent trauma and edema. ENT evaluation may be useful in cases of high suspicion of such anomalies.

Learning points: AFOI and VL, although offering improved view, may both fail when congenital airway deformities coexist.

01AP07-03
Undiagnosed Wegener’s granulomatosis with severe pulmonary and airway involvement

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Background: Wegener’s granulomatosis (WG) is a necrotizing vasculitis predominantly affecting small and medium-sized vessels. It is a multisystemic disease most frequently affecting the upper and lower respiratory tract and kidneys. Subglottic stenosis occurs in approximately 10 to 20 percent of cases. Additionally, although less common, other forms of laryngeal involvement such as edema of the vocal cords can occur.

Case Report: A 61-year-old female patient underwent a flexible bronchoscopy under anaesthesia as part of the etiological study of suspected pneumonia. Computed tomography (CT) revealed irregular nodules, cavitations, wall thickening of the right main bronchus and some degree of subglottic and upper tracheal stenosis. The primary diagnostic hypotheses were pneumonia, lung cancer and granulomatous disease. On the day of the procedure, after routine non-invasive monitoring was established, general anaesthesia was induced with fentanyl and propofol. Difficult mask ventilation prompted the introduction of a supraglottic airway device. Ventilation remained challenging with high peak inspiratory pressures. To confirm the correct placement of the airway device, the flexible bronchoscope (FB) was advanced through the opening of the angle piece. Glottis visualization revealed severe edema and reduced vocal cords abduction. As the pulmonologist attempted to advance the FB rapid desaturation and slowing heart rate occurred. Immediate efforts were made to perform endotracheal intubation, but the patient progressed to asystole, leading to immediate initiation of cardiopulmonary resuscitation (CPR). After successful intubation and one cycle of CPR the patient returned to spontaneous circulation. Subsequently, the patient was admitted to the intensive care unit (ICU) and one day later the diagnosis of WG was established with the results of the autoimmune study.
Discussion: WG is a multisystemic disease with a predilection for the upper respiratory tract, lungs, and kidneys. Airway involvement may include segments of stenosis, intraluminal thickening, edema, ulceration, and hemorrhage. Endoscopic visualization of the airways remains an essential diagnostic procedure in the evaluation of this disease. In this case, the patient had an undiagnosed WG with severe pulmonary and airway involvement. The unexpected severe edema and reduced abduction of the vocal cords led to difficult airway management resulting in severe complications.

01AP07-04
Congenital aglossia - anticipated difficult airway and anesthesiologists quest to secure it

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Background: The congenital absence of the tongue, known as Aglossia congenita, is an exceptionally rare malformation. The anticipation of a difficult airway can be established through a mere clinical examination of the oral cavity.

Case Report: The case of congenital aglossia depicted above was referred from the Plastic Surgery department to the Department of Anesthesiology, AIIMS New Delhi for pre-anesthetic assessment, as the patient was scheduled for an MRI. A 2-year-old male, weighing 10 kg, presented with challenges in feeding, regurgitation of food from the nasal cavity, recurrent upper respiratory tract infections since birth, and difficulties in speech.

Clinical examination revealed retrognathia, cleft palate, the soft palate touching the floor of the mouth with malalignment of the uvula, absence of the tongue, edentulous condition, and a reduced oropharyngeal space.

Discussion: This case presents an anticipated difficult airway, marked by retrognathia and a grade 3 cleft palate, posing challenges for mask ventilation and nasal intubation. The narrowed space makes the use of a supraglottic airway device challenging. Consequently, the only viable options remaining are awake oral intubation and tracheostomy. However, performing these procedures in the pediatric age group is complicated, especially in peripheral setups like MRI suites where advanced airway equipment may be unavailable.

A similar case, documented by Mohamed Hegaz, involved tracheostomy in a neonate with an uncomplicated uvula, highlighting the rarity and complexity of such situations. In our approach, we proactively secured a smaller-than-usual endotracheal tube in the operating room to mitigate the need for surgical airway manipulation.

Learning Points: This case report highlights the challenge of establishing a definitive airway when backup plans for a difficult airway are limited.
**01AP07-05**

**Airway blocks in the management of predicted difficult airways**

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**Background:** In the approach to predicted difficult airways, awake tracheal intubation (ATI) may be necessary. To enhance patient tolerance, it is essential to adequately anesthetize the airway (AW). While topical administration of local anesthetics is commonly used for AW anesthesia, airway blocks (AWBs) are an excellent alternative. We present a case of a patient with a predicted difficult airway in which we successfully performed ATI using glossopharyngeal nerve, superior laryngeal nerve, and transtracheal blocks as an airway anesthesia strategy.

**Case Report:** A 75-year-old patient, ASA physical status IV, was scheduled for parotidectomy, left cervical lymph node dissection, and pedicled flap reconstruction for pre-auricular carcinoma with nodal metastases. Preoperative airway assessment revealed indicators of a difficult airway, including a short and wide neck, reduced cervical mobility, retrognathia, and Mallampati III classification. It was decided to perform orotracheal intubation using C-Mac videolaryngoscopy with the patient awake. Sedation-analgesia was accompanied by anatomically guided blockade of the glossopharyngeal nerve (intraoral approach), bilateral superior laryngeal nerve, and transtracheal blockade with the administration of 1 mL 2% lidocaine at each site. The patient tolerated the airway approach, remaining calm and cooperative without coughing, gag reflex, or hemodynamic changes. Orotracheal intubation was successfully performed.

The procedure proceeded without complications under intravenous general anesthesia. Upon discharge from the anesthesia care unit, the patient reported high satisfaction with the comfort during the airway approach.

**Discussion:** Our case exemplifies the findings a 2023 meta-analysis. By employing airway blocks, excellent conditions for awake orotracheal intubation assisted by videolaryngoscopy were achieved, ensuring successful airway management on the first attempt without hypertensive peaks or changes in heart rate.

**Reference:**

**Learning Points:** Airway blocks can be an advantageous alternative to topical airway anesthesia when awake tracheal intubation is indicated.

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**01AP07-06**

**Intraoperative pilot balloon repair: a case of unforeseen challenges**

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**Background:** Tearing down a pilot balloon on an endotracheal tube (ETT) during surgery poses critical risks to patients and healthcare workers’ safety, necessitating effective intraoperative interventions. We describe a case of a successful pilot balloon repair technique employed to ensure uninterrupted ventilation and patient stability before extubation.

**Case report:** An ASA IV, full-stomach 76-year-old patient, diagnosed with a subdural haematoma, was under TIVA for burr hole drainage. While removing the surgical drapes, the neurosurgeon accidentally tore the pilot balloon at the end of the procedure. As air leakage became audible, ventilation issues ensued, preventing the delivery of the preset tidal volume (~7 mL/kg), leading to hypercapnia (maxEtCO2=46 mmHg) and hypoxia (minSpO2 93%). Using the standard vein catheterisation technique, a 20G intravenous catheter was inserted into the remaining pilot line. After removing the needle, a 10 mL syringe was attached, and the cuff was successfully refilled with air. The emergence was uneventful, and the patient was extubated at the end of the procedure.

**Reference:**

**Learning points:** Temporary repair methods of a cut pilot balloon tubing on an ETT should be sought as a viable option to restore normal cuff pressure and minimize risks for both patients and healthcare workers.
Airway management in post caustic soda ingestion induced distorted airway in child: case report

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Background: Pediatric patients with history of oral burns and contractures due to accidental ingestion of corrosive agents can present as an unique challenge to anesthesiologists due to underlying functional and anatomical changes.

Case report: We report a 18 months child posted for oral contracture release and commissuroplasty. She accidentally ingested drain cleaner [caustic soda] 4 months back. Now presenting with limited mouth opening of 1.5cm, interincisor distance of 0.5cm, TMD of 3cm with no protrusion of tongue. Ketamine 40mg was given IM preoperatively. Induced with sevoflurane, fentanyl 10mcg and atropine 0.1mg, mask ventilation was adequate and child was kept in spontaneous breathing.

We intubated nasally using pediatric fiberoptic bronchoscope, while the tracheobronchial reflexes were intact, and oxygen was supplemented 6L/min orally using nasal cannula. After tube secured, cisatracurium 0.1mg/kg was given. The surgeons inserted the throat pack after the commissures were released. Intraoperatively child was maintained with remifentanil 0.05mcg/kg/min, nitrous oxide and sevoflurane.

At the end of the surgery, the throat pack was removed, the airway was visualized using pediatric glidescope. Reversed adequately, extubated when child awake, maintaining airway reflexes and having adequate respiratory efforts.

Discussion: Alkalis causes liquefactive necrosis, and is hydroscopic resulting in deeper tissue penetration and extensive burns, causing considerable perioral and intraoral scarring. Latest techniques for a difficult airway recommended awake intubation, Supraglottic airway, Flexible intubation scope and videolaryngoscope. Invasive airway techniques include surgical cricothyroidotomy if age-appropriate, surgical tracheostomy, rigid bronchoscopy and ECMO.

References:
1. Andrea Weigert, Ann Black, Caustic ingestion in children, Continuing Education in Anaesthesia Critical Care & Pain, Volume 5, Issue 1, February 2005, Pages 5–8

Learning points: Pediatric burns cases needs careful preoperative airway scar evaluation and meticulous planning. Muscle relaxants should be avoided until airway is secured. Direct laryngoscopy has a strong probability of failure. A surgeon should be on standby to step in if there is need for a surgical release or an emergency tracheotomy.

Can chest compressions actually aid visualization during significant airway bleeding?

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Background: Profuse bleeding can hinder not only visualization but also intubation of the bleeding airway, significantly complicating the management of the airway. Many techniques have been described for this challenging scenario; we describe an adjunctive rescue technique to facilitate intubation in dire circumstances.

Case report: 70-year-old male with oropharyngeal cancer presented postoperatively to the ED with acute hemorrhage from the oropharynx. Despite copious blood loss, saturations in the low 90s, and tachycardia, other vitals were stable. Upon arrival, anesthesiologist requested ENT personnel and a decision was made to go to the OR. Brief FOB to visualize the airway was attempted, given profuse bleeding FOB approach was not feasible. RSI with video laryngoscopy was initiated with surgical intervention as back if unable to secure airway.

Despite two suctions utilized, discerning recognizable airway anatomy was difficult due to the considerable blood in the oropharynx. As blind passage of a supraglottic airway could potentially worsen bleeding, anesthesiologist requested brief chest compressions to aid visualization. Chest compression derived recoil created a “sink-like hole” which facilitated endotracheal tube placement via blood aspirating into vocal cord area. Confirmation was made with ETCO2, chest rise, and FOB.

Discussion: When managing an unexpected emergent difficult airway, clinicians can exhaustively follow recommendations without successfully securing the airway. Examples include: supraglottic airway placement, oral-digital intubation, retrograde intubation, cricothyroidotomy. However, given the dynamic nature of these bleeding cases, de facto utilization may not ultimately be feasible for the aforementioned techniques.

Reference:

Learning points: Compression-induced visualization could be used as an adjunctive method to secure the airway in rapidly decompensating patients, when airway visualization is impaired by massive bleeding.
**O1AP07-09**  
Postintubation Tracheal Stenosis: a big challenge!

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**Background:** Postintubation tracheal stenosis (PITS) is rare but potentially fatal condition characterized for more than 50% narrowing of the trachea, leading to restricted airflow and compromised breathing.¹⁻³

**Case report:** A 59-year-old male with progressive dyspnea and persistent cough was intubated due to polypnea and stridor. The orotracheal tube's cuff was positioned halfway through the vocal cords, halted by tracheal stenosis. CT scan showed tracheal constriction above the carina, which was linked to a previous ICU admission six months earlier.

Flexible bronchoscopy (FB) was attempted through the tracheal tube but progression was not possible. A multidisciplinary team decided to perform rigid bronchoscopy (RB) using jet ventilation. RB revealed that in stenosis local, the tracheal diameter was of approximately 3 millimeters.

Mechanical dilation was performed, allowing successful intubation with a 7 caliber orotracheal tube (OTT). The patient was transferred to ICU awaiting surgical addressing of the stenotic tracheal rings, which was uneventful.

**Discussion:** The incidence of PITS has decreased due to technological improvements of cuffs but it is still the most frequent benign cause of tracheal constriction. FB did not provide visualization of the vocal cords nor progression of the 6.5 OTT in place, so the airway was not secure. We used jet ventilation for RB tracheal dilatation.

It was decided that surgical removal of the stenotic tracheal rings was the safest option because this patient had undergone previous conservative treatment.

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**O1AP07-10**  
Anesthesia using a laryngeal mask resulted in failure to access the jugular vein from a femoral approach, while contributing to a potentially serious complication

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**Background:** Choices made by anesthesiologists regarding airway management must take into consideration procedural characteristics. However, a given choice may turn out to be inappropriate, eventually leading to the failure of the procedure.

We report a case where a laryngeal mask airway (LMA) was the likely cause of procedure failure and complications, in an unprecedented context.

**Case report:** A 75-year-old male received general anesthesia for the embolization of a carotid cavernous fistula. Monitoring included cerebral oxygenation (NIRS) and processed EEG. The airway was secured with a size 4 I-Gel mask.

The neuroradiologists cannulated the right femoral artery and vein. The venous access was meant to provide an approach to the fistula from the venous side for the embolization. Heparin was administered.

However, internal jugular vein (IJV) catheterization from the femoral access was unsuccessful due to failure in angiographic location of the left brachiocephalic trunk. Direct ultrasound-guided left IJV cannulation was then attempted without success.

At this stage accidental common carotid artery (CCA) puncture occurred with hematoma formation. After protamine and local compression, the hematoma stabilized but the procedure had to be aborted.

Anesthesia recovery was uneventful. It was assumed that an abnormality of the venous circulation was present but neck CT angiogram later that day confirmed normal anatomy. This led to the hypothesis that the failing in catheterization of the IJV could be due to the presence of the laryngeal mask.

One month later endovascular embolization of the fistula from the venous side was successful under GA, this time with an endotracheal tube.

**Discussion:** This case suggests that the LMA caused a distortion in the venous circulation that prevented access to the IJV from the femoral access and a potentially serious complication. Stud-
ies have shown changes in neck vessel position, namely greater overlap between the CCA, IJV and muscle displacement\(^{1-3}\). However, these studies considered the direct access to IJV through a neck puncture.

**References:**

**Learning points:** To our knowledge the presence of an LMA being the cause of failure to progress a guidewire from the femoral vein to the IJV has never been reported. Had the anaesthetic team considered this perhaps the initial procedure would have been successful, and complications avoided.

O1AP07-11
Submental intubation for maxillofacial fracture - an excellent alternative to tracheostomy

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**Background:** A secure airway is an essential component of the operative management of maxillofacial fractures. Nasotracheal intubation is contraindicated due to associated Lefort I, II or III fractures. An orotracheal intubation is not possible in such cases since intraoperative maxillomandibular fixation is required to reestablish dental occlusion.

**Case report:** A 24-year-old man, ASA I, victim of a high impact car accident with cranial and facial trauma (bilateral type I/II Le Fort) and complex orbitomalar fractures, proposed for an open reduction and internal fixation. After ASA monitoring and adequate preoxygenation, general anesthesia was induced. Oral tracheal intubation was accomplished with a reinforced tube from the angle of submental insertion. In cooperation with the surgical team, a small submental incision was performed. Initially curved forceps were introduced into the incision, passing through the subcutaneous and muscular layers into the sublingual space in order to reach the mucosal layers, lateral to the sublingual ducts, avoiding the sublingual gland. The superior part of the orotracheal tube was then inserted through the previously created incision and emerged in the submental region. Surgery went uneventful for 2 hours and the endotracheal tube was placed in its initial position while the submental region was completely sutured. Emergence of anesthesia ensued uneventfully with awake extubation and the patient was transported to the PACU.

**Discussion:** Although tracheostomy is the most used technique, it is associated with more complications such as haemorrhage, surgical emphysema, laryngeal recurrent nerve injury, tracheal stenosis, tracheoesophageal fistula and dysphagia. Submental intubation has a lower complication rate and can be performed in patients with type II and III Le Fort fractures so, it was chosen, and a balanced general anaesthesia was associated. We conclude that midline submental intubation is a simple and useful technique with low morbidity. The access should be accomplished via a midline approach rather than lateral through the mylohyoid, an armored endotracheal tube utilized to prevent kinking, and the passage facilitated by use of wound dilators.

When postoperative mechanical ventilation is not required following maxillofacial trauma, this is an excellent alternative to tracheostomy.

**Learning points:** Submental intubation can be performed in patients with type II and III Le Fort fractures.

O1AP07-12
Challenging airway management for the anesthesiologist: cervical mass with airway compromise

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**Background:** Problems arising from pediatric airway management in the operating theatre (OR) continue to be an important cause of perioperative morbidity and mortality. Therefore, it is necessary to establish difficult airway management algorithms with simple strategies that are adapted to each hospital’s needs and resources.

**Case report:** Female aged 1 month, 5 kg, with no medical history. She was admitted to our centre due to a cervical mass compatible with lymphatic malformation. It was decided to perform an MRI and prior to this, the patient was transferred to the OR for exploration of the airway and intubation. A flexible bronchoscope 2.8 mm (Ambu\(^{\circledR}\)) was used. It revealed a partial collapse of the glottis. A tube (Portex\(^{\circledR}\)) without balloon no. 3.5 was placed. The procedure was performed with sevoflurane and fentanyl, maintaining spontaneous ventilation. After completing the MRI, she was transferred to the ICU intubated and a week later underwent surgery for resection of the mass.

**Discussion:** We can classify the pediatric difficult airway (DA) into three groups: unexpected DA, suspected DA and anticipated DA. The latter group includes congenital (genetic syndromes) or acquired (trauma, surgery, tumors or burns) anatomical malformations. Anatomical alterations can make both ventilation and intubation difficult. Therefore, multidisciplinary management is essential in order to reduce the risk of complications. It is important to plan each case individually and to select different alternatives for the management of DA. In our setting there are a variety of alternatives for early DA management: intubation through supraglottic devices, the use of optical instruments or videolaryngoscopes. Tracheal intubation with fibrobronchoscope remains the preferred device. This type of device is not only useful for securing the patient’s airway but also allows us to evaluate anatomical and functional anomalies of the airway while maintaining spontaneous breathing, as in the clinical case described above.

**Reference:**

**Learning points:**
- Anticipating DA problems in children and having a structured management algorithm make the difference between good and bad outcomes.
- Training and clinical simulation in emergency situations are indispensable to prepare the team responsible for the care of children.
02AP01-02
Conscious sedoanalgesia in ambulatory oral surgery with dexmedetomidine vs propofol

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Background and Goal of Study: Anxiety is a frequent symptom in patients undergoing ambulatory oral surgery. Fear of pain and noises can trigger a catecholaminergic discharge with hypertension and panic crisis in some cases, besides making surgery more difficult, lengthening surgical times, with higher risks and slower recovery. This is why more and more patients are requesting conscious sedation.

The aim of our study was to evaluate the antinoceptive efficacy of dexmedetomidine compared to propofol in a multimodal anaesthesia setting during ambulatory oral surgery.

Materials and Methods: Fifty-six patients scheduled for upper and lower all-on-six surgery and elevation of both maxillary sinuses were selected for the first time in a multicenter study. Two groups, A and B, were randomized. Patients in group A received dexmedetomidine with mean doses around 0.8-1.1ug/kg/min and those in group B received propofol around 20-70 mcg/kg/min. Both groups also received multimodal sedoanalgesia with midazolam at 0.03mg/kg, dexamethasone 0.1mg/kg, ketorolac 60mg, lidocaine 1mg/kg, magnesium sulfate 15g-3g and nolotil 2g.

Demographic data, hemodynamic parameters, as well as the level of sedation and agitation were collected. Both groups were compared for level of intravenous lidocaine as adjuvant in propofol-based sedation around 20-70 mcg/kg/min. Both groups received multimodal sedoanalgesia with midazolam at 0.03mg/kg, dexamethasone 0.1mg/kg, ketorolac 60mg, lidocaine 1mg/kg, magnesium sulfate 15g-3g and nolotil 2g.

Results and Discussion: Both groups were compared for level of sedation and complications, a statistically significant higher frequency was observed, in group B (n=29 (52%) with OAA/S scales of 4-5 compared to group A (n=27 (48%) (p=0.02) who maintained conscious sedation without the need to interrupt surgery for ventilatory support.

There were no statistically significant differences between groups when comparing hemodynamic parameters and agitation levels (p>0.05).

Conclusion(s): Sedation in ambulatory oral surgery should ensure patient safety, reduce anxiety by maintaining cooperation and facilitating the conditions of the procedure. Dexmedetomidine offers us a really useful clinical application, especially for sedation outside the operating room, since it is a drug that provides a tripod of sedation-analgesia-safety, not compromising the protective reflexes of the airway, nor producing respiratory depression, being a useful alternative for sedoanalgesia during ambulatory surgical procedures.

02AP01-04
Effect of different doses of intravenous lidocaine on clinical outcomes in patients undergoing colonoscopy under propofol-based procedural sedation

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Background and Goal of Study: The goal of our investigation is to test the effect of different doses of intravenous lidocaine, as adjuvant to propofol-based sedation for colonoscopy and to identify the optimal dose that reduces propofol demand and associated adverse events while improving post-procedure recovery and patient’s satisfaction.

Materials and Methods: This prospective randomized double-blind controlled clinical trial was carried out on 125 patients, scheduled for diagnostic and therapeutic colonoscopy under propofol-based procedural sedation. Patients were randomly assigned to receive 2mg/kg/h (group L1, n=42) respectively 4mg/kg/h (group L2, n=41) of 1% lidocaine and placebo (group C, n=42), as continuous intravenous infusion 30 minutes prior to the propofol sedation under standard monitoring.

The primary outcome was propofol consumption during procedural sedation. The occurrence of hypoxia and hypotension episodes, post-colonoscopy recovery interval and patient’s satisfaction were documented as secondary outcomes. Student's t test and Chi square test were used for data analysis and p<0.05 was considered statistically significant.

Results and Discussion: In groups L1 and L2, lidocaine infusion resulted in significant reduction of propofol consumption compared to placebo (p<0.05). Propofol induced hypoxia and hypertension episodes were significantly less common in lidocaine groups versus group C (p<0.05). Post-colonoscopy recovery intervals were significantly lower in groups L1, L2 compared to control (p<0.01).

Consequently, patient's satisfaction was rated as statistically higher in lidocaine groups compared to placebo (p<0.01). According to our data, there were no significant differences between L1 and L2 concerning propofol requirement, the incidence of cardiorespiratory adverse events, post-procedure recovery time and patient’s satisfaction (p=0.63).

Conclusion(s): Intravenous infusion of lidocaine prior to propofol-based sedation for colonoscopy statistically decreased propofol demand and the occurrence of side effects while significantly improving recovery and satisfaction compared to placebo.

According to our findings, 2mg/kg/h of lidocaine appeared equally efficient and safe as 4mg/kg/h. Hence, we propose 2mg/kg/h of intravenous lidocaine as adjuvant in propofol-based sedation for colonoscopy to be the appropriate dose to improve outcomes.
Background and Goal of Study: It is suggested that the use of NSAIDs is detrimental to tendon healing, especially in early stages. Therefore, alternative pain medication strategies are necessary to treat patients undergoing arthroscopic shoulder surgery with tendon repair. This study aimed to assess the analgesic efficacy of a combination of metamizole, paracetamol, and rescue tramadol and our current pain protocol (i.e., paracetamol/rescue tramadol) in the treatment of acute postoperative pain at home after ambulatory arthroscopic shoulder surgery with tendon repair.

Materials and Methods: In this in this double-blind, randomized controlled, superiority trial, 110 patients undergoing elective ambulatory arthroscopic shoulder surgery with tendon repair were randomized to receive either paracetamol (n=55) or paracetamol and metamizole (n=55) orally for four days between February 2021 and September 2022. Patients in the experimental group were instructed to take metamizole 1gr orally three times a day. All patients were treated with paracetamol 1gr orally four times a day and rescue tramadol 50 mg orally up to six times a day during the entire study period.

Results: In total, 106 patients were included in the final analysis because three patients of the control group and one patient in the experimental group were lost to follow-up. For the primary outcome, superiority of addition of metamizole to standard pain therapy to reduce postoperative pain at movement and at rest was evaluated using an 11-point Numeric Rating Scale (NRS) with 0 indicating no pain and 10 indicating worst pain imaginable, were recorded at the PACU and at postoperative day (POD) 1 to 4 and 7. Group differences were analyzed with a Student t-test or Mann Whitney U test. A p-value <0.05 is considered statistically significant.

Conclusion: In conclusion, addition of metamizole to standard pain therapy is clinically not in multimodal pain treatment at home after ambulatory surgery. Therefore, we cannot confirm the hypothesis that metamizole has additive or even synergistic analgesic effects combined with paracetamol and rescue tramadol.
02AP01-08
Anesthetic management of an adult patient with Cri du Chat syndrome and a profound intellectual disability for dental procedures under general anesthesia

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Background: Cri du Chat syndrome (CDCS) is a genetic disorder caused by a deletion in the short chain of chromosome 5 manifested by a characteristically high-pitched cry (cat cry). Anesthetic management for these patients is complicated due to laryngeal abnormalities, upper airway anomalies, and intellectual disabilities of varying severity.

Case Report: A 34-year-old male patient with Cri du Chat syndrome was scheduled for dental procedures under general anesthesia due to a profound intellectual disability and severe walking difficulties. Preoperative laboratory testing was normal.

Discussion: In CDCS, the main problems for the anesthesiologist are the inability to cooperate with the patient and potential intubation difficulties. Contrary to various medical methods used for the management of these patients (benzodiazepines or volatile anesthetics) before intubation, the parents’ recommended calming approach (songs and stereotypical phrases) proved effective in our case.

References:

Learning Points: Effective preoperative communication with parents provides valuable insights into calming strategies and proved successful in managing patient cooperation, and opiate avoidance contributes to faster and safer patient recovery, aligning with the goal of minimizing hospital stays for individuals with CDCS.

02AP01-09
Cardiorespiratory arrest during implantation of gastric balloon in a obese patient with obstructive sleep apnea

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Background: Intra-gastric balloons are now the most widely utilized endoscopic therapy for treatment of overweight and obesity. The simplicity of the intragastric balloon procedure may account for its widespread role in obesity treatment and its applicability to various degrees of obesity. Significant sleep apnea is present in almost 40% of obese people.(1)

Case Report: The balloon insertion procedure usually requires the application of sedation. We present the case of 27-year-old obese patient with a BMI of 55.6 kg/m² and a medical history of Obstructive Sleep Apnea (OSA) with long respiratory pauses over 10 seconds, who underwent gastric balloon insertion.

Discussion: In OSA, obstruction can occur throughout the upper airway; above, below, or at the level of uvula. There is an inverse relationship between obesity and pharyngeal area. The introduction of any foreign object into this space will further reduce this inspiratory space and will place in extreme difficulty the inspiration of any foreign object into this space. In OSA, obstruction can occur throughout the upper airway; above, below, or at the level of uvula. There is an inverse relationship between obesity and pharyngeal area. The introduction of any foreign object into this space will further reduce this inspiratory space and will place in extreme difficulty the inspiration of any foreign object into this space.

Reference:

Learning Points: Simple, but invasive procedures when sedation is applied, should never be underestimated, especially in patients assessed with a higher anesthetic risk.
02AP01-10
Anaesthetic management of a patient with Cornelia de Lange syndrome in an ambulatory surgery setting

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Background: Cornelia de Lange syndrome is a rare congenital syndrome accompanied by significant craniofacial, cardiovascular, gastrointestinal, and musculoskeletal anomalies with dysmorphic facial features. Direct laryngoscopy and tracheal intubation can be difficult due to micrognathia and short neck. Gastroesophageal reflux is present in about 2/3 of patients, increasing the risk of pulmonary aspiration.

Case Report: 27 year old male, 35 kg, presenting for ENT surgery as day surgery patient. Patient has severe anatomical deformations (microcephaly, cleft palate, micrognathia, protruding teeth, agenesis of the upper extremities), severe mental retardation, is non verbal and has gastroesophageal reflux. The airway cannot be assessed because the patient is unable to cooperate, but the presence of microcephaly, micrognathia and protruding teeth point to a potentially difficult tracheal intubation. The father is present for the preoperative assessment and accompanies also on the day of surgery.

Despite the risk of aspiration and given that the patient cannot cooperate in the placement of an IV access, sevoflurane is chosen for induction, followed by IV access insertion. IV cannulation proves difficult, despite the use of ultrasound, due to the severe anatomical abnormalities. After 3 attempts, IV access is secured and propofol and remifentanil infusions are started. We opted for not using neuromuscular blocking agents. First attempt at laryngoscopy using videolaryngoscope with a Macintosh blade proves unsuccessful (Cormack IV), second attempt with videolaryngoscope and a hyperangulated blade (Cormack II) resulted in a successful intubation. Surgery was uneventful and patient is extubated after the end of the procedure, taken to the PACU and discharged 2 hours after.

Discussion: Cornelia de Lange is a rare syndrome that can present with multiple challenges for the anesthesiologist. In this particular patient, risk of aspiration and a potentially difficult tracheal intubation were our biggest concerns.

Careful preparation of the whole team, involvement of the caretaker, thorough planning of anaesthesia technique, weighing risks and benefits, and preparation for a potentially difficult airway made it possible to anaesthetise this patient in an ambulatory setting without complications.

Learning points: Thorough planning and preparation make it possible to anaesthetise patients with Cornelia de Lange syndrome in an ambulatory setting.

02AP01-11
Anaesthesia for breast surgery: a case report

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Background: In modern perioperative care for breast cancer surgery, the integration of regional anesthetic techniques with general anesthesia has become commonplace. Techniques such as thoracic paravertebral blocks, interpectoral, pectoserratus and serratus anterior plane blocks are preferred for their efficacy. These approaches not only provide robust postoperative pain relief, but also contribute to opioid reduction, mitigating postoperative nausea and vomiting (PONV).

Case Report: An ASA III 70-year-old female patient underwent outpatient right breast tumorectomy and sentinel lymph node biopsy. She had a history of type 2 diabetes mellitus and depression, along with a past diagnosis of squamous cell carcinoma of the left parotid gland, complicated by sequelae of facial paralysis and osteoradionecrosis, requiring mandibulectomy.

The patient’s markedly restricted mouth opening posed a challenging airway. Preoperative assessment revealed no noteworthy abnormalities.

Premedication with midazolam and fentanyl was administered, followed by interpectoral and pectoserratus plane and parasternal blocks using 20 ml of 0.375% ropivacaine and 7 ml of 0.375% ropivacaine, respectively. Dexmedetomidine 4 mcg/ml, infused at 9 ml/h, was initiated for intraoperative sedation. The procedure proceeded uneventfully and the patient maintained hemodynamic stability during spontaneous ventilation.

Following surgery, the infusion was discontinued and the patient received paracetamol and ketorolac. She was transferred to the outpatient recovery unit, reported no pain, did not require opioids postoperatively and was discharged home on the same day.

Discussion: Day-case management is often suitable for most breast surgeries in appropriately selected patients. A comprehensive preoperative assessment is crucial. Anesthesiologists should recognize the potential benefits of incorporating regional anesthesia techniques in this type of surgery, especially in cases like this where we want to avoid invasive airway.

References:
1. BJA Educaion, 18(11), 342-348.

Learning Points: A comprehensive preoperative assessment is crucial for outpatient surgeries, ensuring same-day discharge. The use of dexmedetomidine minimizes postoperative opioids and tailored strategies optimize perioperative care. Anesthesiologists should recognize regional anesthesia benefits for improved outcomes, making day-case management feasible and efficient.
Ambulatory wound dressing - A case report of acute pain domiciliation

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Background: Wounds are a source of great pain and anxiety for patients. The physiological and psychological components of uncontrolled pain can limit the patient's quality of life and have a negative impact on the healing process. The role of the anesthesiologist in providing the best analgesic strategies in these cases is crucial. The use of continuous peripheral nerve blocks allows for improved analgesia with fewer side effects than traditional opioid-based technique.

Case report: We present the case of a 66-year-old woman with a history of obesity, severe obstructive sleep apnea, chronic respiratory insufficiency, hypertension, and atrial fibrillation, who was admitted in the dermatology ward for the etiological study of recent painful leg ulcers. The acute pain team was consulted because of insufficient pain management with conventional systemic analgesia at rest, greatly intensified during wound dressing. When we first observed the patient during wound dressing, she referred a pain intensity of 10/10 in the numeric rating scale, which greatly limited the wound care provided.

Therefore, we opted for a regional anesthesia strategy with three continuous peripheral nerve blocks (CPNB): a popliteal sciatic nerve catheter in each leg and a femoral nerve catheter on the right leg with the patient's consent after explanation of the related risks and benefits.

The placement was done by aseptic technique and guided by neurostimulation and ultrasound, without any acute intercurrences. The instituted analgesic regime was a basal infusion of Ropivacaine 0.2% at a 10ml/h rate plus boluses of Ropivacaine 0.375% 10 to 15 minutes before wound dressings. Analgesic success was achieved, and the patient was discharged home.

Ambulatory wound dressings were provided 3 times a week with the presence of an acute pain anesthesiologist. The efficacy and side effects were monitored by the acute pain team through scheduled phone interviews.

Complications of providing CPNB at home appear to occur rarely and include pain due to catheter dislodgement. In this case no complications were reported.

Discussion: In conclusion, this approach proved successful, highlighting the potential of CPNB for effective pain management in an ambulatory setting. In fact, ambulatory CPNB decreases hospitalization costs without compromising medical outcomes, and many patients also may prefer to recover in the comfort of their own home.

Learning points: Ambulatory acute pain care
03AP01-01
Post-operative neurological dysfunction and intracranial pressure estimated by ultrasound of the optic nerve sheath in patients undergoing laparoscopic abdominal surgery: a pilot study

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Background and Goal of Study: Laparoscopic surgery for colorectal cancer is less aggressive than open surgery in terms of morbidity, length of hospital stay, tumour recurrence and survival (1,2). To facilitate surgical access, a steep Trendelenburg position (TP) and pneumoperitoneum with CO2 are essential (2-5). Mostly significant changes in cerebral hemodynamic physiology leading to increases in intracranial pressure (ICP) and intraocular pressure have been described (6-8).

Postoperative complications such as visual impairment, headache, and confusion have been reported. (9-13). We designed a prospective observational study that evaluated the relationship between ultrasonographic measurement of optic nerve sheath diameter (ONSD) and short-term postoperative cognitive and visual function.

We explored the effect of the TP and CO2 insufflation on ONSD and evaluate possible correlations between these and postoperative cognitive decline, delayed anesthesia recovery or postoperative visual defects.

Materials and Methods: A total of 30 consecutive patients scheduled for elective general surgery were recruited. ONSD was measured at six time points as a non-invasive measure to evaluate the changes in ICP. The Mini-Mental State Examination (MMSE) and Snellen test were performed before surgery.

Results and Discussion: The mean right and left ONSD increased 0.7 mm. However, no significant correlation was found between ONSD and surgical time, awakening time or emergence from anesthesia time. There was no significant correlation between ONSD and MAP, Pplateau or etCO2 (p > 0.05). A decrease in visual acuity was evident, however, the relationship between this and ONSD measurement could not be demonstrated.

Post-operative cognitive dysfunction (decrease in the MMSE from 27 to 20), show an inversely significant relationship with the increase in ONDS (p = 0.02). This is probably related to individual patient factors however in our study due to the small sample size it is not evident.

Conclusion(s): Our results show an increase in ONSD during laparoscopic surgery, although not statistically significant (p = 0.037) in the postoperative period there is a decline in cognitive function and visual acuity, which is transient and self-limiting, but not statistically significant.

Therefore, our results suggest that steep TP doesn’t contribute to acute neurological complications in patients undergoing laparoscopic surgery and it’s a safe option.

03AP01-02
Postmortem purines of blood and cerebrospinal fluid after acute cerebral ischaemia

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Background and Goal of Study: Diagnostic and prognostic value of the intravital parameters of purine metabolism in acute cerebral pathology, including stroke, is studied in detail. It has been established that hypoxanthine, xanthine and uric acid are present in the brain, their content changes after ischemia, uric acid is the end product of purine degradation in the brain, xanthine oxidase is also present in the brain, catalyzes the oxidation of hypoxanthine to xanthine, and then to uric acid, and can be a source of free radicals, while its endogenous increased production, with the side synthesis of oxygen free radicals by xanthine oxidase, reflects the severity of ischemic and reperfusion damage.

Meanwhile, a study of postmortem biochemical processes may provide additional scientific information on the diagnostic value of the parameters of purine metabolism in neurointensive care. We investigate the postmortem parameters purine metabolism after fatal stroke.

Materials and Methods: In 50 adult ICU stroke patients, in the first 2 hours after the fact of biological death, the samples of cerebrospinal fluid and venous blood on the were performed spectrophotometric determination of the concentration of adenine, guanine, hypoxanthine, xanthine, uric acid, malondialdehyde (as a marker of free radical oxidation).

Results and Discussion: Postmortem CSF levels of uric acid and malondialdehyde significantly higher in male patients than in female; uric acid in CSF significantly lower in the presence of intravital arterial hypertension, heart failure, pneumonia. Pneumonia is also associated with a higher postmortem blood concentration of malondialdehyde, and multiple organ failure with a higher concentration of uric acid and malondialdehyde in CSF.

The ratio of the CSF concentrations of uric acid / xanthine higher in ischemic, than in hemorrhagic stroke. The ratio of the concentrations of uric acid / xanthine, xanthine / hypoxanthine, uric acid / hypoxanthine was significantly lower in the presence of pneumonia in patients with stroke.

Conclusion(s): Oxypurines significantly associated not only with gender, arterial hypertension or stroke type, but also such life-threatening conditions as pneumonia, heart and multiple organ failure.

Possibly, the mandatory inclusion of purines in the vital panel of monitored biochemical parameters will improve the results of neurointensive care.
**O3AP01-03**

Role of hippocampal endothelial cells metabolic reprogramming in Perioperative Neurocognitive Dysfunction

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**Background and goal of study:** Perioperative brain health and the effects of perioperative anesthesia and surgical operations on the debilitating brain are still the focus of research. Perioperative blood-brain barrier (BBB) damage and brain metabolism dysfunction are closely associated with cognitive impairment and may increase the risk of postoperative mortality. The endothelium is an important component of the BBB and plays an important role in maintaining homeostasis.

We aimed to explore the endothelial-specific changes in the hippocampus after anesthesia and surgical operations.

**Materials and Methods:** Sixteen-month-old C57BL/6 mice underwent unilateral nephrectomy under isoflurane anesthesia. Y maze and Fear Conditioning were assessed. The hippocampus endothelial cells were obtained through the Adult Brain Dissociation Kit and CD31 MicroBeads sorting. Then, endothelial cells were sent for RNA microsequencing and untargeted metabolomics.

Differentially expressed genes (DEGs), metabolites and functional pathways were analyzed. MetaboAnalyst 5.0 was used for Combined analysis.

**Results and Discussion:** There were 1298 DEGs in the endothelium of the hippocampus after isoflurane exposure and surgery, of which 1166 were upregulated and 132 were downregulated (P<0.05). 12 metabolites upregulated and 96 downregulated (P<0.05). The upregulated genes enrichment in pathways such as Focal adhesion, ECM-receptor interaction.

BUTANOATE METABOLISM and ALPHA_LINOLENIC ACID METABOLISM were significantly enriched in Gene set enrichment analysis (GSEA).

KEGG of the metabolites showed Aminoacyl-tRNA biosynthesis, Alanine, aspartate and glutamate metabolism, Butanoate metabolism pathways enriched. Combined analysis suggested that endothelial cells metabolic reprogramming.

**Conclusions:** Perioperative anesthesia and surgery cause changes in the transcriptome and metabolomics level of the hippocampal cerebrovascular endothelium.

The role of hub genes and metabolites in perioperative endothelial injury and Perioperative Neurocognitive Dysfunction deserves further investigation.

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**O3AP01-04**

The impact of age on the GE Entropy™ index: State and Response Entropy rise despite positive Burst Suppression Ratio in elderly patients

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**Background & Goal of Study:** EEG monitoring is commonly used for titrating the depth of general anesthesia. The algorithms underlying most of the commercial EEG indices remain elusive. In this study, we examined data recorded from the GE Entropy™ module and evaluated how patient age impacts State Entropy (SE) & Response Entropy (RE) in the presence of positive Burst Suppression Ratio (BSR).

**Materials & Methods:** In this retrospective, single-center study conducted at a university hospital, we analyzed SE, RE, & BSR data from 15,520 patients undergoing general anesthesia. We included patients aged 18 to 90 years. 8.12% of patients showed a BSR ≥ 5 during maintenance anesthesia, which we deemed clinically relevant. We calculated median SE & RE at BSR ≥ 5 per patient and evaluated the effect of increasing patient age by fitting a polynomial function. We calculated the Spearman’s rank correlation coefficient (rho) and confidence intervals, 95th and 5th percentiles.

**Results:** The polynomial fit for the age-dependent increase was 0.881 * age^2 + (-0.018) + (-0.006 * age^2), yielding a R² value of 0.926. We saw a strong positive correlation between increasing age and rising SE values at BSR ≥ 5 (rho = 0.754 [0.570, 0.877]). The maximum median SE value at BSR ≥ 5 observed was 30, which occurred in the 69-year-old age group (Fig.1A). Patients aged 50 and above show an increased likelihood of SE values falling within the manufacturer-recommended range for adequate anesthesia (SE 40—60) despite BSR values ≥ 5 (Fig.1B).

**Conclusion:**

- **Observation:** Elderly patients show higher median SE & RE index values under BSR ≥ 5 compared to younger patients.
- **Risk factor:** Elderly patients are more likely to exhibit BSR ≥ 5 even when within the recommended SE index range.
- **Perspective:** Our findings highlight the need for age-specific adjustments in processed EEG indices, as age appears to exert a substantial influence on EEG monitoring by producing contradictory EEG outputs.

![Figure 1: medians for SE & RE over all age groups with polynomial function when BSR ≥ 5 (A) and SE median & percentiles for BSR ≥ 5 as a function of age, with the "adequate" index range highlighted in dashed lines (B).](image-url)
**03AP01-05**
Mechanism research on the visual light stimulation reduced elderly mice postoperative cognitive dysfunction

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**Background and Goal of Study:** Postoperative cognitive dysfunction (POCD) is a common neurological complication in elderly patients postoperatively. The hippocampus is significantly affected by the development of POCD. Studies have found that the non-imaging positive modulation of light on the brain can improve mood, relieve pain, and improve memory. Visual light stimulation also improves cognitive impairment in Alzheimer’s disease patients and in animal models.

Based on the above research background, this study aims to investigate whether giving one 1 hour of visual light during surgery can reduce the occurrence of POCD by restoring the associated neuro rhythm in old mice, which is of important value for understanding POCD.

**Materials and Methods:** Male C57BL/6J mice were randomly divided into a control group (C group), anesthesia surgery group (A/S group), A/S + 40Hz visual light group, A/S + random light group, A/S + long light group with 12 to 15 mice in each group. Five groups of mice received Barnes maze training for 4 days before surgery. On day 5, the left nephrectomy was performed under isoflurane anesthesia for a total of 2 hours. After surgery, all mice will undergo the BM, OFT, NOR, and FC tests at different points to assess their cognitive, learning, and memory abilities postoperatively. Ten to twelve mice in each group were installed with electrical electrodes in their hippocampal brain region and prefrontal cortex to monitor EEG markers related to POCD.

**Results and Discussion:** On postoperative days, the time of the A/S + 40Hz visual light group found the target hole significantly less than other groups (P <0.001). OFT showed there were no significant differences in the five groups in the travel distance (P>0.05). In the NOR experiment, the exploration time of the new object in the A/S + 40Hz visual light groups was significantly longer than other groups (P <0.001). In the FC experiment, the freeze time of context-related and cue-tone was significantly longer in the C and A/S + 40Hz visual light groups (P <0.05).

Moreover, the A/S + 40Hz visual light group significantly reduced the burst suppression ratio (P <0.05), theta wave connectivity (P <0.05), restored alpha and gamma nerve rhythms (P <0.05), and increased EEG complexity (P <0.05).

**Conclusion(s):** Intraoperative 40Hz visual light stimulation for 1 hour can reduce POCD by reducing intraoperative burst suppression ratio and theta wave connectivity, restoring alpha and gamma rhythm, and increasing brain electrical complexity in old mice.

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**03AP01-06**
A new consciousness assessment score: the Full Intracranial Validity Evaluation score

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**Background and Goal of Study:** The reliability of different consciousness assessment scores in predicting length hospital stay, morbidity and mortality has been demonstrated. Glasgow coma score (GCS) is one of the oldest score, later the “Full Outline of Unresponsiveness” (FOUR) score was developed.

The FOUR score consists motor and eye responses, brainstem reflexes and respiration assessment. Optimization of brain perfusion pressure is an important parameter that determining survival of patients. Therefore, in the present study, the “Full Intracranial Validity Evaluation” (FIVE) score was developed by adding mean arterial pressure and gag reflex parameters to the FOUR Score (Figure 1).

**Materials and Methods:** This prospective observational study was performed, after ethical committee approval in total 223 adult patients who followed up in ICU after ischemic or hemorrhagic stroke, infra-supratentorial craniotomy, endoscopic, vascular, epilepsy, hydrocephalus surgery and neurovascular interventions (ClinicalTrials.gov: NCT06036732).

The primary aim of the present study is to investigate the correlation between the newly developed FIVE score and the length of ICU stay. The secondary aim is to evaluate the impact of the FIVE Score on the 6th month Modified Rankin Score (MRS) and mortality, as well as determine the correlation among GCS, FOUR and FIVE Scores.
Results and Discussion: The mean FIVE Score is proportional with the length of ICU stay ($r=0.740; p=0.001$) and the 6th month MRS ($r=-0.537; p=0.001$). The mean FIVE Scores were significantly lower in non-survivors compared to survivors in the ICU ($p=0.004$).

There was a strong and significant correlation among the GCS, FOUR and the FIVE Scores that determined at admission and discharge ($r=0.761, 0.914, 0.609, 1.000$ respectively, $p=0.001$).

Conclusion(s): The newly developed FIVE Score is a reliable indicator that demonstrates a strong correlation with the FOUR Score and GCS. It can be utilized to predict length of ICU stay, morbidity and mortality in critically ill patients.

O3AP01-07
Sleep fragmentation impaired metabolism performance in mice

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Background and Goal of Study: Sleep disruption is a critical aspect of overall health, impacting various physiological processes. Insufficient or disrupted sleep has been linked to an elevated risk of metabolic dysfunctions, including diabetes, obesity, and insulin resistance.

Sleep fragmentation (SF) is the most common sleep disorder pattern, and this study attempted to observe metabolic changes in mice with fragmented sleep.

Materials and Methods: The custom-made device was used to induce sleep disruption events. Briefly, automated intermittent tactile stimulation was employed by a near-silent motorized mechanical sweeper just above the floor of a standard laboratory mouse cage. In this mode, the sweeper required around 10 s to sweep the floor of the cage one way.

When it reached the end of the cage, a relay engaged the timer which paused for about 110 s before enabling the sweeper to move in the opposite direction. SF exposure under a 12-hour light cycle from 7:00 a.m.(light on) to 7:00 p.m.(light off) for 14 days (Fig. A), during which mice had ad libitum access to food and water.

Electroencephalogram (EEG) and electromyogram (EMG) was recorded to compare the sleep status between two groups. Body weight and food intake were measured every day at the same time during SF.

Fasting blood glucose levels were assessed over 14 days (on 0, 1, 3, 7, and 14 days post-SF). Intraperitoneal glucose tolerance tests (i.p.GTTs) and insulin tolerance tests (i.p.ITTs) were performed on mice.

Results and Discussion: There was no difference in the ratio of sleep phases (Wake, REM, NREM) within 24 h between two groups after 14-days SF (Fig. C), however, the status transition is increased in the SF group in contrast with the control mice (Fig. D).

Also, the SF mice showed an increase in food intake without affecting body weight (Fig. H-I). Compared to the control mice, SF mice exhibited insulin resistance and significant dysglycemia, including elevated plasma glucose levels and glucose intolerance (Fig. J-M).

Conclusion(s): Sleep fragmentation induced altered sleep pattern and impaired metabolism performance in mice.

O3AP01-08
Characteristics of immunity system in postoperative delirium patients by single-cell transcriptomic analysis

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Background and Goal of Study: Postoperative delirium (POD) is the most complication after cardiac surgery, and associated with increased mortality and decreased long term cognition ability. Our study aimed to explore the characteristics of immunity system in POD patients.

Materials and Methods: This prospective study included patients scheduled for selective on-pump cardiac surgeries, who were divided into Non-POD and POD group according to whether POD occurred within 30 days after surgery. Multi-channel spectral flow cytometry, single-cell sequencing and plasma cytokines measurement were performed to describe the feature of immunity system in POD patients before surgery and at 24 hours after surgery.
Results and Discussion: A total of 120 patients were included, and 12 were diagnosed as POD within 30 days after surgery. T cells and B cells were activated in POD patients before and after surgery, and the upregulation of related genes contributed to the activation of chemotaxis in GZMK+ CD8+ T cells and memory B cells, which was confirmed by the elevation of CCL3 and CXCL8 level in plasma and the increased expression of chemotaxis related ligands-receptors pairs (CCL16_CCR1 and CXCL13_CXCR5). The inflammation response was enhanced in CD4+ T cells, which was confirmed by the activation of many cytokines related pathways and increased plasma level of IL-17 and IL-4 in POD patients before and after surgery. In monocytes, antigen presentation process and complement response were enhanced in POD patients before and after surgery, which was confirmed by the increased relative abundance of HLA-DR and CD40, activation of gene sets related to antigen binding and complement activation, and increased expression of HLA-A_KIR3DL1 and C3_C3AR1.

Conclusion(s): Our results found the enhanced chemotaxis, inflammatory response, antigen presentation process and complement response in POD patients before and after surgery. This study comprehensively described the characteristics of immunity system in POD patients before and after surgery, and provided the theoretical basis for exploring prophylactic measures before surgery to prevent POD.

O3AP01-10
Sodium leak channel in the paraventricular thalamus modulates consciousness levels under sevoflurane anesthesia

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Background and Goal of Study: The paraventricular thalamus (PVT) is a critical brain region that implicated in sleep-wakefulness and general anesthesia; however, the underlying molecular mechanism is unknown.

We hypothesized that the paraventricular thalamus-nucleus accumbens (PVT-NAc) pathway serves as a critical regulator of consciousness states during sevoflurane anesthesia; and NALCN acts as a key molecular mediator of this pathway.

Materials and Methods: Chemogenetic and optogenetic manipulations, in vivo multiple-channel recording, combined with EEG recordings were used to investigate the role of PVT in the induction, and emergence from sevoflurane anesthesia. Virus-mediated knockdown or overexpression methods were used to determine the role of NALCN in the regulation of PVT activities during sevoflurane anesthesia.

Results and Discussion: The spikes of single cell in PVT were significantly inhibited under sevoflurane anesthesia and recovered during emergence. Optogenetic activation of PVT neurons significantly delayed the induction and promoted the emergence from sevoflurane anesthesia. Optogenetic activation of PVT neurons also increased sevoflurane MACs for LORR and/or RORR. Inversely, chemogenetic inhibition of PVT neurons accelerated the induction time and prolonged the emergence time from sevoflurane anesthesia. chemogenetic inhibition of PVT neurons accelerated the induction time and prolonged the emergence time from sevoflurane anesthesia. chemogenetic inhibition of PVT neurons also decreased sevoflurane MACs for LORR (1.49% ± 0.03% vs. 1.58% ± 0.07%, P < 0.05) and/or RORR (1.07 ± 0.13% vs. 1.19 ± 0.13%, P < 0.005). As expected, knockdown of NALCN in PVT decreased MAC for LORR (1.49% ± 0.05% vs. 1.60 ± 0.07%, P < 0.001) and accelerated the induction time (117 ± 17 s vs. 152 ± 32 s, P < 0.001); and also decreased MAC for RORR (0.97% ± 0.13% vs. 1.13 ± 0.10%, P < 0.01) and delayed the emergence from sevoflurane anesthesia (64 ± 19 s vs. 24 ± 14 s, P < 0.01), accompanied by an increase in EEG delta power and a decrease in EEG alpha power under sevoflurane.

At circuits level, knockdown of NALCN in PVT decreased the neuronal activity of NAc as indicated by the local field potential and the decreased spikes of single cell in NAc. Optical stimulation of PVT axonal terminals in NAc induced wakefulness transitions in EEG patterns, delayed induction and accelerated emergence from sevoflurane anesthesia.

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O3AP01-11
Comparing intraoperative opioid consumption in patients who received preemptive oral paracetamol versus no preemptive oral paracetamol in elective cranial surgery using propensity score matching

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Background and Goal of Study: Cranial surgery is associated with significant pain postoperatively due to inadequate perioperative pain control. Preemptive analgesia administered before surgery to reduce central sensitization, offers promise in opioid reduction. This study aims to assess the reductions in intraoperative opioid consumptions with oral paracetamol as preemptive analgesia in cranial surgery, addressing the lack of current evidences with oral preemptive paracetamol in cranial surgery.

Materials and Methods: This retrospective cohort study included 336 patients who underwent elective cranial surgery. The primary outcome was to compare intraoperative opioid consumptions in patients with preemptive oral paracetamol vs no preemptive oral paracetamol. A propensity score matching analysis was used to balance the covariates between the two groups. Outcome was analyzed using multi regression. P value of < 0.05 was considered statistically significant.

Results and Discussion: Out of 336 patients, 85 patients received preemptive oral paracetamol. After nearest neighboring matching in the ratio 1:2, the final analysis was done comparing 85 patients with preemptive oral paracetamol and 170 patients with no preemptive paracetamol.

Patients who received preemptive oral paracetamol had significantly less intraoperative opioid consumption of 5.4 mcg of fentanyl per hour (CI -9.9 to -0.91, p-value 0.019) as compared to patients with no preemptive paracetamol. A propensity score matching analysis was used to balance the covariates between the two groups. Outcome was analyzed using multi regression. P value of < 0.05 was considered statistically significant.

Conclusion(s): Preemptive oral paracetamol is associated with decreased intraoperative opioid consumption during elective cranial surgery.

O3AP02-01
Effect of a home-based prehabilitation intervention on objectively measured preoperative physical activity in elderly patients undergoing elective major cardiac and non-cardiac surgery. Preliminary data from a randomized controlled trial

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Background: Low functional capacity in patients undergoing major elective surgery is associated with postoperative complications. Prehabilitation aims to increase functional capacity by increasing preoperative physical activity. Data regarding the effectiveness of a home-based prehabilitation intervention to increase physical activity before surgery is limited.

We hypothesize that home-based prehabilitation leads to an increase in physical activity in patients undergoing major cardiac and non-cardiac surgery.

Materials and Methods: Patients were randomized to either standard of care or intervention (NCT04461301). The intervention group received a home-based prehabilitation intervention 2-4 weeks before surgery. As part of the intervention, patients were prescribed a walking regimen. Patients were followed-up by weekly telephone calls. To measure physical activity, euclidean norm minus one (ENMO, milli gravity [mg]) was extracted from accelerometry data (Axivity AX3) as the primary outcome. Baseline characteristics were tested by Wilcoxon test and a linear model for the primary outcome was performed to adjust for confounders.

Results and Discussion: 37 patients scheduled for cardiac and 62 for non-cardiac surgery were included (Table 1).

Home-based prehabilitation led to an increase in physical activity levels in patients undergoing non-cardiac surgery (mean difference 3.01 mg, p = 0.03) but not in patients undergoing cardiac surgery (Figure 1).

Patients undergoing cardiac surgery had higher activity levels compared to non-cardiac also when adjusted for age.

<table>
<thead>
<tr>
<th></th>
<th>Cardiac control (n=18)</th>
<th>prehab (n=19)</th>
<th>Non-cardiac control (n=31)</th>
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<td>11.3 (9.9, 13.2)</td>
<td>10.7 (9.7, 13.1)</td>
<td>10.7 (9.0, 12.1)</td>
</tr>
<tr>
<td>VE/VCO2 (slope)</td>
<td>39.0 (36.2, 41.7)</td>
<td>39.8 (35.8, 45.4)</td>
<td>42.1 (32.3, 47.0)</td>
<td>37.2 (35.0, 42.0)</td>
</tr>
<tr>
<td>METS</td>
<td>4.4 (3.9, 5.4)</td>
<td>4.0 (3.4, 4.9)</td>
<td>4.0 (3.6, 4.6)</td>
<td>3.9 (3.2, 4.7)</td>
</tr>
</tbody>
</table>

* age tested between surgical groups (p<0.031)

Table 1: Baseline characteristics assessed at preoperative visit, median (iqr)
**03AP02-02**

The effect of targeted hyperoxemia on brain immunohistochemistry after long-term, resuscitated porcine acute subdural hematoma plus hemorrhagic shock

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**Background and Goal of Study:** Epidemiological data suggest that mild hyperoxemia may be associated with improved outcome after traumatic brain injury (TBI) [1]. In long-term, resuscitated porcine acute subdural hematoma (ASDH) plus hemorrhagic shock (HS), targeted hyperoxemia coincided with improved neurological function [2]. However, since markers of brain tissue perfusion, oxygenation and metabolism did not differ [2], this post hoc study of the material available analysed the effect of targeted hyperoxemia on cerebral tissue markers of oxidative/nitrosative stress and blood brain barrier integrity.

**Materials and Methods:** This post-hoc analysis of a prospective, randomized investigation comprised 14 adult human-sized “BMW” pigs of either sex with reduced Willebrand factor activity and, thus, human-like coagulation [2]. After 2 hours of combined ASDH (injection of 0.1mL/kg autologous blood into the subdural space) and HS (passive removal of 30% of the calculated blood volumes while maintaining cerebral perfusion pressure (CPP) >50mmHg), animals received “TBI-targeted” resuscitation comprising re-transfusion of shed-blood, vasopressor support to maintain CPP at pre-shock levels, and hyperoxemia (200>PaO2<250mmHg) or normoxemia (80<PaO2<120mmHg) during the first 24 hours of up to 53 h of ICU care. Immediately post-mortem, bi-hemispheric (i.e., blood-injected and contra-lateral) pre-frontal cortex specimens from the base of the sulci underwent immunohistochemistry (% positive tissue staining) analysis for nitrotyrosine expression and extravascular albumin accumulation as markers of oxidative and nitrosative stress and blood-brain barrier integrity, respectively.

**Results and Discussion:** Neither nitrotyrosine expression nor extravascular albumin accumulation showed any significant inter-group difference, no matter the presence/absence of ASDH nor whether grey or white matter were analysed.

**Conclusion(s):** In this post-hoc analysis of long-term, resuscitated porcine ASDH+HS, expression of cerebral tissue markers of oxidative and nitrosative stress or blood-brain barrier integrity did not allow explaining differences in targeted hyperoxemia-related neurological function. Nevertheless, targeted hyperoxemia during resuscitation from combined ASDH+HS exerted no apparent deleterious effects.

**References:**
1. Alali et al, J Neurosurg 2019;132:537;
2. Datzmann et al, Front Immunol 2023;14:1123196

**Acknowledgements:** Supported by the CRC1149

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**03AP02-04**

Dynamic cerebral autoregulation quantified with wavelets analysis is preserved during augmented negative intrathoracic pressure and slow paced breathing in healthy subjects

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**Background and Goal of Study:** Dynamic cerebral autoregulation (dCA) describes the cerebral blood flow (CBF) response to spontaneous arterial blood pressure (ABP) variations. Resistance breathing augments the effects of the respiratory pump, enhancing venous return during hypovolemia. We quantified dCA based on spontaneous ABP variability in humans under a mild orthostatic challenge and investigated if resistance breathing and slow paced breathing improve CBF or alter CA.

**Materials and Methods:** Ten healthy volunteers positioned in semi-recumbent position at 30 and 60 degrees (30SR and 60SR), breathed first spontaneously, second with resistance, and finally in a paced rate of 6 breaths per minute. Blood velocities in the internal carotid artery (ICA) and aorta were measured (Doppler ultrasound).
The diameters of ICA and the rigid aortic ring were obtained. ICA blood flow and cardiac output (CO) were calculated. Finger ABP (Finometer), mean arterial blood pressure (MAP) and end tidal CO₂ (ETCO₂) were recorded. The ICA blood flow response was modelled by mixed-models regression analysis. The wavelet phase coherence and the synchronization index γ (SI) for the pair ABP–ICA velocity, in the 0.005-0.08 Hz frequency interval was calculated as a measure of dCA.

**Results and Discussion:** ETCO₂ and CO contributed to ICA blood flow variance, MAP did not ($R^2$: 0.9, $p<0.0001$). Positioning from 30SR to 60SR led to a 12% decrease in CO ($p=0.001$) and ICA blood flow ($p=0.04$); the subsequent resistance breathing restored CO (+12%) and ICA blood flow to baseline values. The median SI was low (<0.2, fig) at frequencies below 0.08Hz, indicating intact dCA. Wavelet analysis can be used to evaluate CA based on spontaneous ABP variability, avoiding induction of large ABP changes.

**Conclusion(s):** Resistance breathing restored CO and CBF. Effective dCA was found during resistance and slow breathing.


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**Preoperative olfactory dysfunction (OD) is associated with postoperative neurocognitive disorder (PND) after non-cardiac elective surgery in older “cognitively healthy” patients**

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**Background and Goal of Study:** Preoperative cognitive decline and frailty are known risk factors for developing PND. OD is connected to cognitive decline and may also serve as a biomarker for frailty.

The aim of this study was to explore whether preoperative OD is linked to the development of PND.

**Materials and Methods:** This prospective observational study included 140 patients aged 65+ scheduled for elective lower limb revascularization surgery or orthopedic procedures under general anesthesia, and with a preoperative MoCA-30 score >22. Olfactory function was examined with the Sniffin’ Sticks extended test which provides a composite olfactory TDI score (assessing Threshold, Discrimination, and Identification modalities) of 48 points. OD was defined as a TDI score ≤ the 25th percentile for age and sex. At 3 months postoperatively, patients received a telephone interview in which they performed the T-MoCA test and were asked about any change in subjective cognitive concerns (SCC).

We defined PND as ≥1 SCC and/or a decline of ≥1 standard deviation in the postoperative T-MoCA score. Statistical analyses were carried out with chi-square tests and multivariable binary logistic regression models.

**Results and Discussion:** 38 patients (27.1%) experienced PND at 3 months after surgery: 27 (19.3%) complained of ≥1 SCC, 7 (5.0%) had a decreased T-MoCA test compared to preoperative performance, and 4 (2.9%) patients suffered from both. In the patients with OD, 43.6% (17/39) developed PND, whereas they represented only 20.8% (21/101) in the group without OD ($p=0.007$).

Fig. 1 details the patients’ postoperative neurocognitive situation according to their preoperative olfactory function. In regression analysis, the higher the olfactory TDI score was, the lesser the odds of presenting PND, regardless of age, sex, depression, and level of education (OR 0.88, 95%CI 0.82-0.95, $p=0.001$).

**Conclusions:** In older patients, OD was independently associated with PND, primarily through the presence of SCC. Whether preoperative olfactory testing would be a way to assess cognitive reserve and, in some cases, to unveil brain frailty in apparently cognitively healthy individuals deserves attention.

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**The role of dexmedetomidine for neuroinflammatory response modulation in brain tumor surgery**

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**Background and Goal of Study:** To investigate the impact of dexmedetomidine (DEX) on hemodynamic performance and perioperative neuroinflammatory response in patients subjected to craniotomy for tumor excision.
Materials and Methods: Prospective, double-blind randomized controlled trial enrolling 54 adult patients scheduled for elective craniotomy for tumor excision. A standard anesthesia protocol based on total intravenous anesthesia was applied to all cases. Patients were allocated into two groups:

1. Group DEX received dexmedetomidine 1µg/kg for 10 min as a bolus and thereafter 0.7µg/kg/h (civ) and;
2. Group PBO received N/S 0.9% at the same infusion dose. Hemodynamic parameters recorded by the Clearsight System were registered at predefined time points: 5 min before intervention (T0), 15 (T10), 30 (T30), 60 (T60), 120 (T120), 180 (T180), and 240 (T240) min after DEX infusion was commenced.

Blood samples were also obtained at T0, 6, and 24 hours after surgery completion for cortisol and IL-6 determination.

Results and Discussion: No differences were recorded regarding patients’ demographic and intraoperative data. Intraoperative hemodynamic alterations (mean±SD) are presented in Table 1. Moreover, DEX administration attenuated the release of cortisol and IL-6 at 6 and 24 hours (p<0.05).

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Group</th>
<th>Time points</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>HR (b/min)</td>
<td>PBO</td>
<td>60±11</td>
<td>0.105</td>
</tr>
<tr>
<td></td>
<td>DEX</td>
<td>60±6</td>
<td>63±9</td>
</tr>
<tr>
<td>MAP (mmHg)</td>
<td>PBO</td>
<td>52±7*</td>
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<td>DEX</td>
<td>56±5</td>
<td>56±6*</td>
</tr>
<tr>
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<td>PBO</td>
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<td>0.000</td>
</tr>
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<td>10±10</td>
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<tr>
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<td>PBO</td>
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<tr>
<td></td>
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<td>3±2</td>
</tr>
<tr>
<td>SVV</td>
<td>PBO</td>
<td>10±3</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>DEX</td>
<td>10±3</td>
<td>10±2</td>
</tr>
<tr>
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<td>PBO</td>
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</tr>
<tr>
<td></td>
<td>DEX</td>
<td>2177</td>
<td></td>
</tr>
</tbody>
</table>

*p<0.05: Between-groups statistical significance in each setup

Table 1.

Conclusion(s): It seems that dexmedetomidine could serve as an attractive anesthetic adjuvant during brain tumor surgery, on the basis that it can both ensure intraoperative hemodynamic stability and attenuate postoperative neuroinflammatory response.

O3AP02-07
The effect of preoperative sleep quality on postoperative delirium in adult patients

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Background and Goal of Study: Delirium is a neurocognitive illness that has lately been connected to sleep difficulties. It is a stressful condition and is still not fully understood. A poor sleep burden and its progress were investigated in this study to determine their correlations with the risk of delirium following surgical procedures.

Materials and Methods: From August 1st to December 5th, 2023, 124 patients under non-cardiac general anesthesia (mean age 63.68 ± 8.81 years [SD]; range 46-82 years) reported their sleep characteristics. Sleep parameters included PSQI, sleep duration, sleep disruption, sleep latency, sleepiness-related daytime dysfunction, sleep efficiency, total sleep quality, and sleep medication use.

Seven component scores range from 0 (no difficulty) to 3 (high difficulty) on the PSQI. The component scores are added to get the global score, which is 0–21. Higher scores suggest poorer sleep.

A three-day median follow-up period was used to assess hospitalization records for new-onset delirium (n = 26). Around 124 persons, with a mean.

Results and Discussion: ANOVA models revealed that young (45-64 aggregate scores) and elderly (64-82 aggregate scores) with poor sleep burden had higher risk of delirium (18%; 95% confidence interval: 0.524–3.204, p<0.001) and 20.9% ([0.290–0.679], p<0.001, respectively).

These statistics were more convincing when limited to postoperative delirium and excluding dementia. In the experimental population, delirium was linked to more sleep.

People with a Pittsburgh Sleep Quality Index (PSQI) worsening of three scores, which means severe bad sleep quality load (score increase of two or more compared to no change), had a significantly higher risk of delirium, especially between 45 and 64 ([(1.338–(-) 0.011], p =.036), regardless of baseline sleep score and time lag.

Conclusion(s): Elevated delirium has been linked to inadequate sleep burden and a worsening trajectory; therefore, promoting healthy sleep for those who are generally more vulnerable may be especially important.

References:

Acknowledgements: We dedicate this study to caregivers.
Background and Goal of Study: Neuroinflammation is considered to play a role in the pathogenesis of neurocognitive complications after cardiac surgery, particularly in cardiopulmonary bypass (CPB) assisted procedures. Targeted temperature management (TTM) serves as a neuroprotective strategy, possibly through the activation of cold shock proteins. The aim of this study is to investigate the effects of mild compared with deep hypothermia on the neuroinflammatory response and cold shock protein expression after CPB in rats.

Materials and Methods: Wistar rats were subjected to 1 hr of mild (33°C) or deep (18°C) hypothermia during CPB or sham procedure. PET scan analyses using TSPO ligand [11C]PBR28 were performed on day 1 (short-term) or day 3 and 7 post-procedure (long-term) to assess neuroinflammation. Hippocampal and cortical samples were obtained at day 1 in the short-term group and at day 7 in the long-term group. mRNA expression of M1 and M2 microglia-associated cytokines was analyzed with RT-PCR. Cold shock protein RNA-binding motif 3 (RBM3) and tyrosine receptor kinase B (TrkB) receptor protein expression were determined using Western Blot and quantified. Statistical analyses were performed using ANOVA and Kruskal-Wallis test.

Results and Discussion: In both groups, target temperature was reached within an hour. Standard uptake values (SUV) of [11C]PBR28 in CPB rats at 1 day and 3 days were similar to that of sham animals. At 7 days after CPB the SUV was significantly higher in amygdala and hippocampal regions of the CPB 18°C group as compared to the CPB 33°C group. No differences were observed in the expression of M1 and M2 microglia-related cytokines between TTM 18°C and 33°C. RBM3 protein levels in cortex and hippocampus were significantly higher in CPB 33°C compared to CPB 18°C and sham 33°C, at day 1 and day 7, respectively.

Conclusion(s): TTM at 18°C increased the neuroinflammatory response in amygdala and hippocampus compared to TTM at 33°C in rats undergoing a CPB procedure. Additionally, TTM at 33°C induced increased expression of TrkB and RBM3 in cortex and hippocampus of rats on CPB compared to TTM at 18°C. Together, these data indicate that neuroinflammation is alleviated by TTM at 33°C, possibly by recruiting protective mechanisms through cold shock protein induction.

03AP02-09

Co-administration of dexmedetomidine with Total Intravenous Anaesthesia (TIVA) does not affect transcranial motor evoked potential monitoring during carotid endarterectomy

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Background and Goal of Study: Anaesthetics are known to interfere with Intraoperative Neurophysiological Monitoring (IONM). The effect of Dexmedetomidine is subject to controversy. While some authors have reported little or no effect of Dexmedetomidine on IONM, others have observed significant deterioration, mainly of motor evoked potentials (MEP).

Materials and Methods: Between October 2018 and September 2020, patients scheduled for CEA were randomized into two groups. Total intravenous anaesthesia (TIVA) was used in both the control (CG, n=23); and dexmedetomidine groups (DG, n=22). Patients in the DG received an intravenous bolus of dexmedetomidine (0.4 µg·kg⁻¹ over 10 min) before induction of anaesthesia, followed by a continuous intravenous infusion (0.4 µg·kg⁻¹·h⁻¹). Propofol-TCI was individually titrated to EEG-Endpoints. Before cross-clamping of the ICA, burst suppression was induced with propofol. Motor (MEP) as well as sensory (SEP) evoked potentials were monitored. For SEP, the median and posterior tibial nerves were bilaterally stimulated with monopolar needles. For MEP, anodal current electrical stimulation was performed in the scalp with corkscrew electrodes with a train of 5 stimuli, 0.5 msec pulse duration and 4.0 msec interstimulus interval. Recording was performed with pairs of monopolar needles, over the abductor pollicis brevis and tibialis anterior muscles.

Results and Discussion: Patients in the DG required about 35% lower concentrations of Propofol. At baseline, abductor pollicis brevis MEP stimulation thresholds (affected side; average, 95%CI) were 92 (78;106) mA in the DG, and 107 (76;138) mA in the CG respectively. Median nerve SEP amplitude (affected side; average, 95%CI) were 3.0 (2.2;3.8) µV in the DG, and 2.8 (1.9;3.7) µV in the CG. There were no differences between the groups or compared to the unaffected side. Over time, MEP stimulation thresholds increased for both the affected and unaffected side in both groups by 10-20%.

Conclusion(s): In the present study on patients undergoing CEA with TIVA, the co-administration of Dexmedetomidine did not appear to affect SEP amplitudes or MEP thresholds. Burst suppression appeared to moderately increase MEP stimulation thresholds, similarly in both the DG and CG. Multimodal anaesthesia may be used with IONM if steady-state concentrations of Dexmedetomidine are kept stable, and Propofol-TCI is individually titrated to EEG criteria.
**03AP02-10**

**Suxamethonium for emergency intubation in patients with intracranial hemorrhage - retrospective propensity score matched study**

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**Background and Goal of Study:** Suxamethonium is often the preferred choice for rapid sequence intubation, but its use in patients with intracranial lesions is controversial owing to potential risks of increased intracranial pressure. Despite these concerns, it remains widely used in many healthcare settings.

The aim of this research was to examine the link between suxamethonium usage in intracranial hemorrhage patients and the rates of in-hospital death.

**Materials and Methods:** The research focused on 5,931 adults who were hospitalized from 2008 to 2019 with a diagnosis of intracranial hemorrhage, retrieving data from public ICU records of a U.S. institution. In order to balance any inherent bias towards selecting suxamethonium for emergency intubations, researchers composing a matched patient cohort by a 1:2 ratio using propensity scores.

These scores considered factors including gender, age, number of comorbidities, hemorrhage type (intracerebral, subarachnoid, traumatic brain injury), and poor coma scores (GCS < 9).

The association between suxamethonium use and in-hospital mortality was determined using the Mantel-Haenszel odds ratio (MH-OR), and this findings was then compared with the random-effect OR, which was taking into account the type of hemorrhage.

**Results and Discussion:** In 5,931 participants, OR of suxamethonium for in-hospital mortality was 1.90 [1.20 to 2.95; P = 0.005]. After matching, 312 patients were ultimately analyzed, with 104 in the suxamethonium cohort and 208 in the matched cohort. The MH-OR for in-hospital mortality was 1.32 [0.77 to 2.25; P = 0.31]. The sensitivity analysis, using the random-effect OR (1.47 [0.52 to 4.15; P = 0.47]), supported the initial findings. High heterogeneity (I² = 58.4% [0.0 to 88.2%]) indicates the necessity of separately assessing the suxamethonium effect according to the hemorrhage type.

**Table.** MH-OR and random-effect OR of Suxamethonium for In-hospital Mortality

**Conclusion(s):** The findings suggest that the use of suxamethonium in emergency intubation for patients with intracranial hemorrhage is not significantly associated with in-hospital mortality.

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**03AP02-11**

**Overall and linked blood pressure variabilities in first 24-hour and mortality after spontaneous intracerebral hemorrhage: a retrospective study of 1,132 patients**

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¹Dongguk University Medical Center Ilsan Hospital, Anesthesiology, Goyang, Republic of Korea

**Background and Goal of Study:** Spontaneous intracerebral hemorrhage (ICH) is a devastating form of stroke that can result in high morbidity and mortality.

This study aims to establish the separate contribution of blood pressure variability (BPV) indexes, divided by overall and linked variability, to mortality after ICH by exploring the risk factors.

**Materials and Methods:** Patients with spontaneous ICH (n = 1,132) were identified with valid blood pressures (BP) in the first 24-hour systolic BP in the Medical Information Mart for Intensive Care IV database.

Information on the baseline characteristics of the patients, including age, sex, initial Glasgow Coma Scale (GCS) and NIHSS scores, ICH location, Charlson comorbidity index score, and diabetes with or without complications, were obtained.

The first 24-hour systolic BPs were recorded and utilized to estimate five indexes of BPV; range, standard deviation (SD), successive variation (SV), generalized BPV (GBPV), and functional SV (FSV).

**Results and Discussion:** Age; male sex; ICH in the brain stem, ventricle, or multiple locations; low GCS score (<9); high NIHSS score (>20); and diabetes with complications were associated with mortality. Mean systolic BP, SD, and GBPV were also associated with mortality.

In addition to the accountability of SD, in-hospital death increased with higher GBPV, with an odds ratio of 1.41 [95% CI: 1.10–1.81] for every +10 mmHg/h increase in GBPV. This result was reproducible by sensitivity analyses.

**Conclusion(s):** The study identified separate influences of SD and GBPV when affecting mortality after ICH, which may provide further insight into managing blood pressure early in ICH treatment.
03AP03-01
The role of PGC-1α in regulating the synaptic pruning via mitochondrial energy metabolism of microglia in postoperative cognitive dysfunction in aged mice

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Background and Goal of Study: Postoperative cognitive dysfunction (POCD) is a prevalent complication of the central nervous system that affects elderly patients following anesthesia and surgery. Activation and pathological response of microglia play a pivotal role in this condition. An energy deficit within the central nervous system may disrupt the function of neurons and glial cells.

At present, the mechanism through which microglial energy metabolism regulates synaptic pruning remains unclear. Therefore, we hypothesize that PGC-1α improves POCD by promoting mitochondrial energy metabolism in microglia to inhibit aberrant synaptic pruning.

Materials and Methods: We established a model of POCD in elderly mice using a combination of 1.5% isoflurane and partial hepatectomy. High-throughput RNA sequencing was utilized to ascertain the genes that displayed differential expression in the hippocampus. The protein expression levels of hippocampal SYN, PSD95, PGC-1α, NRF-1, TFAM, and COX IV were detected using Western blot. Immunofluorescence staining, Golgi staining, and electron microscopy were employed to evaluate the extent of synaptic pruning. The Morris water maze and Y-maze were employed for behavioral testing. Additionally, to validate our results, we utilized the PGC-1α-specific promoter ZLN005.

Results and Discussion: This study confirmed the significant downregulation of synaptic expression and energy metabolism biological processes of elderly POCD mice through RNA sequencing. Then, we determined that anesthesia and surgery significantly diminish the expression of hippocampal PGC-1α, its downstream molecules NRF-1 and TFAM proteins, and subsequently reduce mitochondrial energy metabolism in microglial cells of elderly mice. Furthermore, these procedures also facilitate the process of synaptic pruning, which can result in the impairment of synaptic structure and function. Importantly, our research has discovered that ZLN005, a specific promoter of PGC-1α, effectively counteracts the excessive synaptic pruning behavior of microglia, thereby improving POCD.

Conclusion(s): Our research demonstrates that PGC-1α serves as a direct molecular mechanism for synaptic pruning. This process is mediated by mitochondrial energy metabolic disorders in microglia, suggesting a potential new target for the prediction and treatment of POCD.

Acknowledgements: This work was supported by the National Natural Science Foundation of China (Grant nos. 82171186).

03AP03-02
The role of sevoflurane exposure on neuroinflammation: a systematic review and meta-analysis of in vivo and in vitro studies

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Background and Goal of Study: The induction of neuroinflammation by anesthetic drugs, particularly sevoflurane, is a subject of considerable interest due to its potential impact on neurocognitive functions following surgery. Existing studies, primarily conducted on animal models, indicate an immunomodulatory role of anesthetic agents, including sevoflurane, but their overall impact is unclear.

This systematic review and meta-analysis investigate the effect of sevoflurane on neuroinflammation, using in vivo and in vitro models.

Materials and Methods: We conducted an exhaustive search across multiple databases (PubMed/MEDLINE, Embase, Scopus, Web of Science) up to November 2, 2023, focusing on studies examining the inflammatory response following sevoflurane exposure compared to control conditions in experimental models of rodents and cell cultures derived from rodent central nervous system tissues.

The primary outcomes were levels of neuroinflammatory markers, namely interleukin (IL)-6, IL-1β, tumor necrosis factor (TNF)-α, reached at the time of maximal increase. Specific brain models (i.e. ischemia/reperfusion, vasospasm, ischemic-traumatic and developing brain), infectious brain models, and inflammatory settings (e.g. lipopolysaccharide, surgery) were excluded.

Outcomes were presented as standardized mean differences (SMD) with 95% confidence interval (CI).

Results and Discussion: Our analysis included 38 studies, revealing a significant elevation in levels of inflammatory biomarkers after exposure to sevoflurane compared to control. For IL-6, meta-analysis on in vitro and in vivo studies revealed an SMD of 4.62 (95% CI: 2.72, 6.53; p<0.00001, I²=34%) and of 4.54 (95% CI: 3.05, 6.04; p<0.00001, I²=B2) respectively. Regarding IL-1β, in vitro studies indicated an SMD of 3.41 (95% CI: 1.50, 5.32; p<0.00005, I²=6%), while in vivo models an SMD of 3.13 (95% CI 1.64, 4.61; p<0.0001, I²=85%). For TNF-α, in vitro re-
Critical and Perioperative Care, Rome, Italy, Cuore, Department of Basic Biotechnological Sciences, (CNRS)-Unité 1191 INSERM, Montpellier, France, (UMR) 5203 Centre National de la Recherche Scientifique of Functional Genomics, Unité Mixtes de Recherche, Montpellier, France, University Hospital, Department of Anesthesia & Critical Care Medicine, Montpellier, France, Department of Statistics, Montpellier, France, Neuroradiology, Montpellier, France, Department of Anesthesia & Critical Care Medicine, Montpellier, France.

Among 183 patients undergoing MT under GA, 49.7% of hemorrhagic complications occurred in 12.6% of patients. Multivariate analyses for each blood pressure threshold, adjusted for the identified confounders, showed no significant correlation between any specific threshold and favorable three-month neurological outcomes or the incidence of hemorrhagic complications.

**Conclusion(s):** Our findings suggest that within the parameters studied, specific intraoperative BP thresholds under GA during MT did not significantly correlate with three-month mRS outcomes or hemorrhagic complications. This indicates the need for individualized blood pressure management, taking into account the potential influence of GA on cerebral metabolism and its implications for setting blood pressure targets. Further research, especially randomized controlled trials, is crucial to refine these parameters for optimal patient outcomes.

**03AP03-03**

Association of different blood pressure thresholds with three-month neurological outcomes in anesthetized patients with fully recanalized mechanical thrombectomy

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**Background and Purpose:** The optimal management of blood pressure (BP) during Mechanical Thrombectomy (MT), especially under general anesthesia (GA), remains a subject of debate. This study aims to explore the association between different intraoperative BP thresholds and three-month neurological outcomes in patients undergoing fully recanalized MT under GA.

**Methods:** In this retrospective analysis, we included adult patients treated with MT under GA for large anterior circulation vessel occlusion stroke, recanalized with a Thrombolysis in cerebral infarction (TICI) score ≥ 2b. We examined BP thresholds, identified from an extensive literature review, during the pre- and post-recanalization phases. The primary outcome was three-month functional independence, measured by the modified Rankin Scale (mRS). Secondary outcomes included the incidence of intracranial hemorrhagic complications. Confounding factors, selected based on clinical pertinence, were incorporated into a multivariate model with backward selection, retaining only those variables demonstrating a multivariable p-value ≤ 0.10.

A multivariate analysis was conducted for each blood pressure threshold, incorporating these significantly retained confounding factors.

**Results:** Among 183 patients undergoing MT under GA, 49.7% achieved favorable neurological outcomes (mRS score 0-2) at three months. Hemorrhagic complications occurred in 12.6% of patients. Multivariate analyses for each blood pressure threshold, adjusted for the identified confounders, showed no significant correlation between any specific threshold and favorable three-month neurological outcomes or the incidence of hemorrhagic complications.

**Conclusion(s):** Sevoflurane exposure induces neuroinflammation on in vivo and in vitro models regardless of surgery, suggesting a potential role in the pathogenesis of postoperative cognitive disorders. This issue should be further explored also in human models.

**03AP03-04**

Regional cerebral blood flow is compromised during robotic surgery in Trendelenburg position, but not in surgery with beach chair position: an observational study using transcranial indocyanine green dye dilution

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**Background and Goal of Study:** Both surgery in Beach Chair with head-up (BC) or in Trendelenburg position with head-down tilt (HDT) represent rather extreme, albeit opposite challenges for the human cerebral circulation and the cardiovascular system in general. We aimed to investigate the effect of Beach Chair and Trendelenburg positioning during general anaesthesia on cerebral haemodynamics using a near-infrared spectroscopy (NIRS)-derived indocyanine green dye dilution method.

**Materials and Methods:** In patients undergoing surgery in BC or HDT position with general anaesthesia, continuous brain tissue oxygen saturation (SbtO2) as measured by near-infrared spectroscopy (NIRS), invasive arterial blood pressure (MAP) and cardiac index (CI) were continuously recorded. Cerebral blood flow (CBF) measurements were performed using an indocyanine green dilution method during supine position (baseline) and during BC or HDT. A Mann-Whitney-U test was performed to identify significant changes between baseline measurement and the timepoints.

**Results and Discussion:** 45 patients could be enrolled (29 BC and 16 BC). During HDT, MAP was increased, while CI remained unchanged and CBF was significantly decreased. Conversely, during BC, CBF and MAP did not change while CI increased significantly. SbtO2 was maintained in both HDT and BC patients and did not reflect changes observed in CBF.

**Conclusion(s):** HDT may result in a decrease in CBF which may be attributed to venous congestion and possibly even elevated intracranial pressure. BC positioning was not associated with an impairment in CBF. SbtO2 may not adequately represent changes in CBF.

**References:**
Background and Goal of Study: Appropriate strategy of mechanical ventilation minimizes the risk of secondary or additional injury to the brain and lungs. Automatic close-loop mode of mechanical ventilation compared to traditional modes can provide ventilated patients with monitoring parameters within safety limits and reduces the risk of ventilator induced lung injury. The aim of this study was to assess the ventilator parameters for patients with acute non-traumatic brain injury under adaptive support ventilation (ASV).

Materials and Methods: This prospective observational study was conducted in the intensive care unit of Republican Vilnius University Hospital. We included 10 patients ventilated at least 48 hours with ventilators Hamilton S1 using INTELLiVENT® mode applying automatic control of minute volume, positive end expiratory pressure, and FiO2. The patients were continuously monitored using Acrux DeepBreath software.

A total duration of mechanical ventilation for all patients was 1081 hours (for single patient from 53 to 191 hours) including a total 1216670 breath cycles. 255389 (20%) breath cycles were defined as abnormal due to artefacts related to nursing or therapeutic interventions or asynchronies between patient-ventilator and ASV. The part of all breath cycles were found out of safety limits for lung protection: Pmax >30cmH2O – 7.1%, Pinsp >15cmH2O – 98.3) % with FiO2 – 97 (96.1-98.3) %, mechanical power > 17 J/min – 52.7%.

Results and Discussion: Monitoring parameters from ventilators of all patients during ventilation time were maintain within optimal limits: Mve – 11.4 (10.24-12.8) l/min, VTe – 500 (485.4-600.9) ml, VT/IBW – 7 (6.6-8.2) ml/kg, Pmax – 16.5 (16.9-22.1) cmH2O, PEEP – 6.0 (5.5-6.7) cmH2O, respiratory rate – 23 (18.4-25.6), compliance – 67.5 (66.3-95.4) ml/cmH2O, RCexp – 0.71 (0.67-0.87) s, mechanical power – 10.3 (9.8-15.3) J/min. Blood gas exchange was optimal: PetCO2 – 34.5 (32.5-35.7) cmH2O, SpO2 – 97 (96.1-98.3) % with FiO2 = 38 (36-42) %. The part of all breath cycles were found out of safety limits for lung protection: Pmax >30cmH2O – 7.1%, Pinsp >15cmH2O – 24.5 %, mechanical power > 17 J/min – 52.7%.

Conclusion(s): The patients with non-traumatic acute brain injury ventilated using automatic ventilation mode (INTELLiVENT®-ASV) during all ventilation time had optimal gas exchange and majority of monitoring parameters were within safety limits for lung protection.
**Background and Goal of Study:** The understanding of the drug transporters at the blood-brain barrier (BBB) is vital for explaining therapy outcomes, drug side effects, and interactions. While ABC transporters are well-researched, the impact of DDIs on SLC transporters expressed at the blood barrier remains unexplored.

Additionally, the influence of genetic and environmental factors on BBB drug transporter polymorphisms, well-studied in the liver and kidneys, is unclear. This project aims to study drug and substance transport variability through the human BBB, factoring in genetic and environmental aspects, with significant implications for CNS-related conditions.

**Materials and Methods:** This project comprises three major parts:

1. An exploratory observational study in intensive care patients with medically indicated external liquor drainage to analyze CSF concentrations in relation to simultaneous blood samples. Genetic analysis will identify transporter polymorphisms.


3. In vitro studies in cell cultures with overexpressed BBB influx transporters to identify relevant transport systems, aiding in the interpretation of patient and volunteer observations.

**Results and Discussion:** For the first part, we’ve initiated an observational study in ICU and neurosurgical wards. We aim to collect CSF and blood samples from patients with medically indicated external CSF access devices. Drug concentrations in CSF and plasma will be correlated with clinical data and genetic variants of SLC transporters expressed at the blood barrier. We’ve recruited 52 patients, targeting 100.

In the second part, we’ll assess BBB influx transporter function in healthy volunteers using a predefined set of substrates. A lumbar puncture will follow drug administration, measuring CSF concentrations in relation to simultaneous blood samples. Genetic analysis will identify transporter polymorphisms.

The third part involves analyzing drug interactions in cell models of human brain endothelial cells and cell cultures overexpressing influx transporters at the human BBB. We’ll test about 100 drugs with approximately ten transporters.

**Conclusion(s):** This project investigates the interplay of drug transport mechanisms at the BBB. Our research underscores the potential significance of solute carriers. By analyzing drug interactions, genetic factors, and BBB transport systems in both patients and healthy volunteers, this project aims to uncover specific pathways for optimizing CNS drug treatment.
Conclusion: Superficial cervical plexus and scalp blocks seem to be an effective combination for treating post-operative pain for posterior fossa craniotomy or craniectomy in the first 36 hours after surgery.

Reference:

03AP03-10 Correlates of connected consciousness assessed by the isolated forearm technique during anaesthesia

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Background/Goal: Connected consciousness (CC) is defined as the awareness of one’s environment. During general anaesthesia, around 5% of patients experience CC after a noxious stimulus. The isolated forearm technique (IFT) consists of inflating a tourniquet on the arm before the injection of a neuromuscular blocker to allow voluntary hand movements. Using fMRI, we aimed to identify the correlates of CC in those who are responsive during anaesthesia.

Materials/Methods: Using the IFT, 26 healthy volunteers were placed under general anaesthesia using remifentanil [constant 1 ng.mL⁻¹ concentration] and propofol [stepwise increase until loss of responsiveness; 5.36(0.78)µg.mL⁻¹] target-controlled infusions, and rocuronium [0.6 mg.Kg⁻¹ single bolus after tourniquet inflation]. After laryngeal mask insertion, propofol was decreased following an up-and-down [1.85(1.17) µg.mL⁻¹]. A noxious stimulation prior to posing closed questions provoked responsiveness, yielding 10 responders and 16 non responders. Resting state fMRI sequences were acquired in four conditions: awake, unresponsiveness in all subjects, after stimulation, and recovery. We used a “dual regression” approach to investigate connectivity between number of resting-state networks (RSNs): default mode network (DMN), executive control network (ECN), thalamus (THAL), hippocampus (HPC), visual (VIS), and sensorimotor (SM), auditory (AUD).

Results/Discussion: After stimulation, pairwise comparisons showed increases in connectivity between the thalamus and DMN in responders compared to non-responders, whilst a decrease in connectivity between the thalamus and ECN. Therefore, conserved cognition in responders is likely underwritten by the thalamic anchoring of the anticorrelation between the DMN and ECN. There was also increased connectivity between SM and AUD, which could indicate the preservation of auditory function both in hearing the questions and providing a motor response, whilst the observed increased connectivity between DMN and HPC might drive responders’ conserved capacities for memory.

Conclusions: Connected consciousness during propofol anaesthesia is associated with thalamic anchoring of cortical RSNs.

03AP03-11 Urgent carotid endarterectomy in patients with acute ischemic stroke due to extracranial internal carotid artery occlusion can be a crucial factor for neurological improvement

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Background and Goal of Study: Acute occlusion of the extracranial internal carotid artery (ICA) is the underlying etiology in 4 to 15% of all ischemic strokes. The clinical presentation varies from asymptomatic occlusion to severe strokes. Carotid endarterectomy (CEA) plays an important role in the management of acute ischemic stroke and the time delay of surgery after the onset of the neurologic symptoms is still a subject of debate in many studies.

The goal of this study is to evaluate the safety and the efficiency of urgent CEA in patients with acute ischemic stroke due to extracranial ICA occlusion and the impact on the neurological improvement.

Materials and Methods: We performed a retrospective database review in all patients with acute ischemic stroke due to an acute occlusion of the extracranial ICA that underwent urgent CEA from April 2015 to October 2023. We evaluated the time interval...
between the onset of neurological symptoms and the start of the surgery and we made postoperative follow-up. The primary outcome was to estimate the safety of the urgent CEA.

The second outcome was to determine the severity of the neurological deficit on admission and at the time of discharge that was assessed using the National Institutes of Health Stroke Scale (NIHSS).

Results and Discussion: Thirteen patients had an ischemic stroke due to an acute occlusion of the extracranial ICA. Nine men and four women, average 68±9 years, underwent CEA in the first 6 hours after the symptoms onset. The average time between the onset of neurological symptoms and surgery was 3±1 hour, median 2 hours. 6 patients had CEA under general anesthesia and 7 patients were under regional anesthesia, cervical plexus block. The median NIHSS score on admission was 10.5 and at the time of discharge was 1. Eleven patients experienced significant improvement of their neurological status, 2 patients showed only a slight neurological improvement, none of them worsened after the operation.

Conclusion(s): Urgent CEA in the first 6 hours after the symptoms onset is a safe and feasible treatment option for patients with acute ischemic stroke due to an acute occlusion of the extracranial ICA in order to have good neurological outcomes and functional improvement. However, bigger studies are warranted.

03AP04-01
In-PACU postoperative delirium: incidence, risk factors and outcomes

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Background and Goal of Study: Postoperative delirium (POD) is frequently occurring after surgery. However, the incidence of early POD within the post-anesthesia care unit (PACU) remains inadequately explored.

The primary objective of this study was to delineate the incidence, specific risk factors and outcomes associated with the onset of early POD during the PACU stay in a French University hospital.

Materials and Methods: After ethical committee approval (CER-AR IRB 00010254 - 2023 – 115) we performed a monocentric retrospective observational study including all patients aged >18 admitted to the PACU in April 2023 at Beaujon Hospital, France. POD was evaluated in PACU 2 hours after admission or before discharge (whichever occurs first) using the French validated version of the 3-minute Diagnostic Assessment for Confusion Assessment Method for Delirium using the Confusion Assessment Method (3D-CAM).

Results and Discussion: Between 3 and 23 April 2023, 337 patients underwent scheduled or unscheduled surgery and were admitted to PACU. One-hundred-and-heighty-height patients had their data analyzed.

In-PACU POD occurred in 35 patients (19%). Age (64 [53-71] vs 51 [34-68] y.o., p=0.011), preexisting cognitive impairment (17% vs 1%, p<0.001) and comorbidities (66% vs 48%, p=0.055) are non-modifiable factors linked to in-PACU POD development. Type of anesthesia (general, locoregional or combined anesthesia) was not associated with in-PACU POD but type of surgery was (p<0.01), particularly neurosurgery. Length of surgery (120 [65 – 240] vs 60 [35 – 100] min, p<0.01), intraoperative morphinic molecule (p=0.021), and sustained low value of index EEG during anesthesia (90% vs 74%, p=0.047) were also linked to POD development.

In-PACU POD was associated with surgical complications during postoperative period (11% vs 5%, p=0.13) but did not affect length of stay or in-hospital mortality.

Conclusion(s): Enhancing the delineation of in-PACU POD characteristics holds the potential to refine our understanding of associated risk factors and consequently enhance the management strategies, ultimately contributing to improved morbidity and mortality outcomes. The absence of standardized protocols for detection and management within most centers underscores the need for further studies in this realm.

References:

03AP04-02
Outcomes of isolated Traumatic Brain Injury patients following emergency neurosurgery in a tertiary care centre

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Background and Goal of Study: Head injuries accounted for as high as 34% of traumatic deaths. This observational retrospective study aimed to assess factors that affected mortality and morbidity of isolated traumatic brain injury (TBI) patients after emergency neurosurgical operation.

Materials and Methods: This was a retrospective study conducted in a tertiary neurosurgical referral centre in Selangor, Malaysia. A total of 255 patients aged between 18 to 70 years old with acute isolated TBI were enrolled after excluding concomitant severe extra-cranial injury causing hemodynamic instability, repeated neurosurgical operations, inoperable cases and elective neurosurgery cases.

Data collected included the demographic profile, comorbidities, types of brain injury, Glasgow Coma Scale and pupillary abnormality prior intubation, clinical presentation, biochemical parameters on arrival to hospital, timeline of injury to operation, types of neurosurgical procedure performed, total packed cells transfusion in operation theatre, length of intensive care unit stay and hospital stay. Functional outcome at 6 months postoperative were recorded using the Glasgow Outcome Scale.

Results and Discussion: Mortality following isolated TBI was 38%, majority were males (80.4%). Subarachnoid haemorrhage demonstrated 3 times increased odds for death compared to subdural haemorrhage. Patients with GCS of 9 and above prior to intubation had significantly lower odds for mortality. Presence of pupillary abnormality and effaced basal cistern were significantly associated with mortality (p < 0.001).

For patients who required neurosurgical procedure, decompressive craniectomy showed statistically significant odds for morbidity, compared to craniotomy and evacuation of clot (p<0.005). Length of ICU stay was significantly associated with poor out-
Conclusion: Mortality for isolated TBI patients underwent emergency neurosurgical operation was independently affected by age, BMI, types of brain injury, effaced basal cistern, urea and lactate level while morbidity was independently affected by age, raised ICP and length of hospital stay.

Reference:

03AP04-03
Intracerebroventricular administration of all-trans retinoic acid (ATRA) does not influence brain tissue damage or neurological deficits 24 hours after experimental traumatic brain injury

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Background and Goal of Study: All-trans retinoic acid (ATRA) is a bioactive vitamin A metabolite and a potent modulator of growth and differentiation in the adult and developing brain. Our previous study examined the therapeutic value of repetitive, posttraumatic, systemic ATRA treatment in a clinically relevant model of traumatic brain injury (TBI) and found amelioration of acute consequences and long-lasting effects on brain tissue integrity after TBI, but no alleviation of neurological deficits (1).

The goal of this study was to investigate the effect of intracerebroventricular ATRA administration 24 hours post experimental traumatic brain injury, and to optimize ATRA treatment to enhance brain protective effects and improve outcomes.

Materials and Methods: Thus, we subjected 40 adult, male mice to the controlled cortical impact (CCI) model of TBI or sham procedure and administered 2 µg ATRA into the ipsilateral ventricle (ICV, intracerebroventricular injection) shortly before CCI. Animal experiments were performed in compliance with the institutional guidelines of the Johannes Gutenberg University, Mainz, Germany and approved by the animal Care and Ethics Committee of the Landesuntersuchungsamt Rheinland-Pfalz (protocol number 23 177-07/G 16-1-022).

All statistical analyses were performed using GraphPad Prism®. Parametric data for pairwise comparison was analyzed applying student’s t-test, whereas non-parametric data was evaluated using the Mann-Whitney-U test. Multiple groups with one variable were compared using 1-way ANOVA (post-hoc correction Holm-Sidak) or Kruskal-Wallis test with Dunn’s correction.

Results and Discussion: 24 hours post injury, neurological and motor deficits were not affected by ICV ATRA treatment and – contrary to our expectations – we found no differences in brain lesion size, reactive astroglisis or changes in gene expression markers (caspase3, BAX). Blood-brain barrier integrity was also not ameliorated by ICV ATRA treatment.

Conclusion: The singular localized application of ATRA to the injured brain, in our study, did not elicit significant neuroprotective effects, in contrast to the systemic, repetitive treatment. Further investigations are required to optimize ATRA treatment regimens to augment brain protective effects.

Reference:

03AP04-04
Investigation of agitation during awake craniotomy, and the relationship between the effect of catheter-related bladder discomfort (CRBD) and the preventive effect of lidocaine

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Background and Goal of Study: During awake craniotomy (AC), when the patient becomes agitation while awake phase, it becomes difficult to perform the surgery safely. The catheter-related bladder discomfort (CRBD) caused by insertion of a urethral catheter while awake phase can cause pain, uncontrollable body movements, and agitation.

Past reports suggested that CRBD may be alleviated by retrograde intravesical administration of lidocaine through a urinary catheter, but its usefulness in AC is unclear. We investigated the relationship between intraoperative agitation in AC and CRBD, and the effect of intravesical lidocaine administration on reducing CRBD.

Materials and Methods: Approval was obtained from the ethics committee of our hospital (approval number 2022-0287). We conducted a retrospective review of patients who underwent AC at our hospital from January 2018 to October 2022. Patients who underwent AC at our hospital (n=126) were divided into two groups according to the presence or absence of agitation during wakefulness (Sedation-Agitation Scale 5 or higher), and the frequency of CRBD and its relationship with the occurrence of agitation factors were investigated.

CRBD was defined as moderate or higher level (patient spontaneously complained of discomfort) on a 4-point scale.

Second, we compared patients who received intravesical administration of a mixture of 5 ml of 4% lidocaine and 20 ml of saline before awake phase (n = 26) and patients who did not receive treatment (n = 100), and compared the frequency of CRBD during awake phase. Fisher test, Mann-Whitney test, and binomial logistic regression analysis were used for statics, and P<0.05 was considered significant.

Results and Discussion: Agitation during Awake phase was observed in 15 patients (11.9%). There were significantly more male patients (P=0.01), and CRBD was more common (P=0.01). There was also a relationship between CRBD and restlessness during wakefulness (Odds Ratio:58.2 P<0.01).

Intravesical lidocaine significantly reduced the frequency of CRBD in male patients (P=0.03), but did not significantly reduce agitation events.

Conclusion(s): In AC, moderate or higher CRBD was associated with agitation. And intravesical lidocaine administration was also effective for CRBD in men while awake phase.
03AP04-05
Spectral differences of flurane and propofol anaesthesia: comparing processed indices with self-learning algorithms

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Background and Goal of Study: Processed EEG parameters, such as the spectral edge frequency (SEF) or the bispectral index (BIS), represented by the openibis algorithm, are commonly used for titrating patients with different anaesthetics to reach an adequate level of anaesthesia for surgery. [1]

While the differences in spectral patterns are known, the indices are based on a one-size-fits-all approach. With the help of the variational mode decomposition (VMD), we analyse the hypothesis that these differences can be found by automated algorithms.

Materials and Methods: We included a total of 157 patients from a previously published study, who underwent surgery under general anaesthesia, maintained either with flurane or propofol. We analysed frontal EEG recorded during general anaesthesia immediately before incision. The VMD is an automated iterative function that decomposes a signal into frequency and amplitude modulated intrinsic mode functions (IMF). [1]

We calculated the SEF, and the BIS and correlated them to the central frequencies derived from the VMD approach.

Results and Discussion: At clinically common dosages of anaesthetics and opioids, we found significantly higher openibis and SEF values in the propofol group (Figure 1).

Central Frequencies derived from the variational mode decomposition were significantly higher in the propofol group across IMF 1 to IMF 5.

Furthermore, there was significant positive correlation of center frequency and openibis values across IMF 1 to IMF 5 (Figure 2).

Conclusion: In this study we added evidence for spectral EEG differences between anaesthetic substances with conventional and new approaches, highlighting the need for leaving one-size-fits-all approaches and considering the intrinsic spectral differences in new monitoring devices.

References:
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2. 10.1109/TSP.2013.2288675

03AP04-06
The effect of neuromuscular blockade with rocuronium on spectral EEG parameters

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Background: Neuromuscular blocking agents (NMBAs) are one of the pillars of modern general anesthesia, yet their application comes with challenges. They decrease the electromyographic activity (EMG) which can lead to a decrease in processed indices like the BIS, complicating the assessment of adequate anesthesia [1, 2].

Unwanted intraoperative awareness is likelier when patients receive NMBAs [3].

Considering these risks, a thorough understanding of the NMBAs' fingerprint on anesthesia monitoring is needed. While the relationship between the BIS and NMBAs has been researched extensively, we intended to take a step further and look into how rocuronium, a non-depolarizing NMA, influenced spectral EEG parameters.

Methods: 8 female patients undergoing mastectomy received a rocuronium bolus (0.6 mg/kg) with time denoted during maintenance of propofol-remifentanil anesthesia. Changes in frequency bands of the electroencephalogram (EEG), recorded with the BIS, and in the time-domain parameter permutation entropy (PeEn) after rocuronium bolus were investigated.

We applied Wilcoxon's sign rank test to test for significance and calculated the area under the receiver operating characteristic (AUROC), a measure of effect size.

Results: 5 mins of stable anesthesia prior to rocuronium administration were chosen as the baseline, to which the 10 mins after administration were compared to. While we found no significant differences in delta and alpha power, we found consistent clinically relevant changes in theta and beta power (AUROC > 0.7 and < 0.3). PeEn showed clinically relevant changes 0-2 min and was significantly decreased 2-4 min as well as 6-8 min after rocuronium injection (p< 0.05).
**Conclusion:** Neuromuscular blockade increased EEG theta-band power and decreased beta band power, as well as PeEn and these more detailed results could help to improve EEG-based monitoring in the future.

**Reference:**

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**03AP04-07**
The dynamic range of the electroencephalogram spectral slope decreases with age

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**Background:** The demographic shift towards an aging population is likely to result in a greater number of surgical interventions requiring general anesthesia for a patient population with increased brain frailty. Intraoperative electroencephalographic (EEG) monitoring might be used to optimize and individualize the dosing of analgo-sedative medications. Age-related changes in neurophysiology are known to influence EEG signals. We investigated the degree to which the EEG spectral slope changes between different vigilance states (dynamic range) as a function of age using publicly available sleep data. The aim of this study was to obtain a better understanding of age-induced differences in brain dynamics and provide some insight into the adjustment of EEG signals based on age.

**Materials and Methods:** We analyzed 153 EEG recordings from 78 subjects (male=50%) in the age range 25–101 years. The data is open access at physionet.org. We extracted the EEG intervals corresponding to sleep stages N1 (light sleep) and N3 (deep sleep), calculated the power spectra using conventional methods, and applied the “fitting oscillations & one over f” algorithm to obtain the aperiodic component (spectral slope) of the EEG signature. For each subject, we determined the median dynamic range as the difference between the N3 and N1 aperiodic components. We found a reduced dynamic range between sleep stages in older subjects, indicating an age-related change in brain dynamics. Verification of these results in surgical patients may help to individualize the administration of anesthetic agents in patients across the age spectrum.

**Reference:** Kemp et al. IEEE-BME 47(9):1185-1194, 2000

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**03AP04-08**
Sensitivity of gamma-range auditory steady-state responses to awareness fluctuations during general anesthesia

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**Background and Goal of Study:** Previous studies found consistent attenuation of gamma-range responses to auditory stimulation during consciousness loss under general anesthesia. Our goal was to replicate and extend the assessment of 40-Hz auditory steady-state responses (ASSR) sensitivity to consciousness changes and exploring envelope following responses (EFR) to wide-band chirp-modulated stimulation across various frequencies, including both low-gamma and high-gamma frequencies.

**Materials and Methods:** We studied 26 patients undergoing propofol-remifentanil TIVA TCI. Auditory stimulation involved click-based 40-Hz and wide-band chirp-modulated protocols under three conditions: pre-anesthesia, anesthesia maintenance, and post-awakening. EEG data were recorded using a 64-channel amplifier system at 1024 Hz. Anesthetic agent concentrations and anesthesia depth were monitored with target-controlled infusion systems, and bispectral index (BIS). EEG analysis focused on inter-trial phase clustering (ITPC) from 7 fronto-central channels, using cluster-based nonparametric permutation testing on envelope curve data.

**Results and Discussion:** Under constant 40-Hz stimulation, we found a significant difference in grand average ITPC responses between averaged pre-and post-anesthesia conditions and anesthesia depth were monitored with target-controlled infusion systems, and bispectral index (BIS). EEG analysis focused on inter-trial phase clustering (ITPC) from 7 fronto-central channels, using cluster-based nonparametric permutation testing on envelope curve data.
sia (clusterstat = 64.28, p < 0.001). Notably, the significant difference between averaged responses before and after anesthesia and anesthesia conditions held only for low-gamma frequencies, with no significant difference in the high-gamma range. Despite sensitivity of 40-Hz ASSR and low-gamma EFR to consciousness loss, these measures appear insensitive to BIS and propofol concentration.

**Conclusion(s):** We confirmed consistent attenuation of 40-Hz ASSR responses during general anesthesia-induced consciousness loss. In wide-band stimulation, the most discriminative part of the EFR response was in the low-gamma range (28-50 Hz), emphasizing its selectivity for consciousness loss. However, no significant differences were found in BIS index or propofol concentration during deep anesthesia, indicating limited utility for anesthesia depth monitoring. This may be due to the marked reduction in ITPC parameter at the point of consciousness loss.

**O3AP04-09**
**Intraoperative regional cerebral oxygen saturation and entropy monitoring during carotid endarterectomy may predict postoperative cognitive impairment**

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**Background and Goal of Study:** Intraoperative depth of neuro-monitoring is a beneficial part of anesthesia for neurovascular interventions such as carotid artery endarterectomies. Methods using processed EEG signals are widely used. The Montreal Cognitive Assessment Test (MoCA) is a validated and sensitive tool for the detection of mild cognitive impairment, even in the peri-operative period.

In our prospective study state and response entropy and regional cerebral oximetry (using near infrared spectroscopy) were investigated in aspect of postoperative cognitive performance.

**Materials and Methods:** Patients were prospectively enrolled in Heart and Vascular Center, at Semmelweis University, Budapest, Hungary. The study was approved by the Ethical Committee of the university (SE RKEB: 17/2019), registered on clinicaltrials.gov (NCT03907943) and written informed consent will be obtained from all patients.

During the operation the investigators record intraarterial blood pressure, ECG, oxygen saturation, end-tidal carbon dioxide (etCO2) and the cerebral tissue oxygen saturation using a near-infrared cerebral oximeter (Invos Cerebral/Somatic Oximeter) and the activity of the brain using the GE Entropy Module. Cognitive performance was judged by using the MoCA test pre- and postoperatively. One standard deviation distance from the baseline score on MoCA was used as a cutoff to label decline, improvement, or no change.

**Results and Discussion:** Data from 76 patients were analyzed. There were 43 male patients (56.6%), and the average age ± standard deviation was 70.1 ± 7.5 years. The median changes in state entropy during carotid artery crossclamp were -2.9194, +0.5974, and -2.9194 in the decline, in the no difference, and in the improving MoCA group, respectively (p=0.009). Furthermore, the changes in ipsilateral regional oxygen saturation were -12.3698, -7.8773, and -6.2352 in the decline, in the no difference, and in the improving MoCaA group, respectively (p=0.009).

**Conclusion(s):** Even moderate regional cerebral desaturation could be paired with decreased postoperative cognitive performance. In patients with declining MoCA tests, a distinct reduction was observed in state and response entropy levels during carotid artery crossclamping.

**O3AP04-10**
**Differentiated sleep behavior in mice with intrinsic high and low anxiety establishes an animal model to investigate mechanistic relationships between preoperative anxiety and postoperative cognitive impairments**

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**Background and Goal of Study:** The mechanistic relationship between preoperative anxiety (POA) and postoperative cognitive impairments, including postoperative delirium (POD), remains unclear. Both are characterized by hyperactivity of the hypothalamo-pituitary-adrenal axis and alterations in glucocorticoid signaling, with potential mediation by the amygdala, hippocampus, and ventromedial prefrontal cortex.

Behaviorally, anxiety correlates with impaired sleep. Exploring these systemic mechanisms might define predictive parameters for POD in sleep/wake behavior and advance understanding of general anesthesia (GA)-related post-operative impacts.

**Materials and Methods:** Basal sleep/wake behavior was measured for 72 hours via chronically implanted EEG/EMG electrodes in freely behaving C57BL/6 mice (n=21, age: 12 weeks). All temporal and spectral parameter for wakefulness (WAKE), non-rapid eye movement sleep (NREMS) and REM sleep (REMS) were analyzed.

In experimental retrospective observation, all HA mice already showed a multitude of temporal sleep architecture changes (vigilance state transitions (peak AUC=.84[.64;1.0]), bout lengths (peak AUC=.04[0.0;15]), with an increased REMS component in the basal EEG (p=.039), together with a clear increase in intensity in the theta band (4-8Hz, peak power: 4.5% vs. 2.5%, AUC=.93[.82;1.0]), prior to FC.

**Results and Discussion:** A statistical separation of two behavioral phenotypes (high anxiety (HA) versus low anxiety (LA)) was demonstrated by the temporal quantification of so-called „freezing” during RET.

In experimental retrospective observation, all HA mice already showed a multitude of temporal sleep architecture changes (vigilance state transitions (peak AUC=.84[.64;1.0]), bout lengths (peak AUC=.04[0.0;15]), with an increased REMS component in the basal EEG (p=.039), together with a clear increase in intensity in the theta band (4-8Hz, peak power: 4.5% vs. 2.5%, AUC=.93[.82;1.0]), prior to FC.

**Conclusion(s):** The results allow a classification of naïve animals into HA mice and LA mice by purely predictive EEG parameter and establish an animal model (constructive validity and face validity!) of POA, based on their intrinsic predisposition to individual anxiety levels. In current experiments, we are testing potential cognitive impairments in predictive HA and LA animals after ex-
perimental GA exposure in the standardized Water-Cross-Maze test, thereby extending our POA animal model to a POA/POD animal model. This model will allow us to investigate GA-dependent physiological processes and morphological conditions systemically in vivo, that potentially lead to postoperative cognitive impairments.

03AP05-01
Assessment of seizure duration and utility of using SedLine® EEG tracing in veterans undergoing Electroconvulsive Therapy

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Background and Goal of Study: Electroconvulsive therapy (ECT) endures as a definitive treatment for refractory depression and catatonia, also effectively utilized to treat a number of other severe psychiatric disorders. GA is an essential component of the ECT procedure for various reasons. Monitoring anesthetic effects on the brain is desirable as anesthetic agents affect seizure duration and recovery. Perioperative anesthetic effects on consciousness can be assessed with brain function monitoring using raw electroencephalogram (EEG) traces and processed EEG indices. Objective: We examined the usefulness and utility of the SedLine® anesthetic effect monitor during ECT procedures. We hypothesized that the seizure duration as measured by the EEG tracing of the ECT machine is equivalent to the duration assessed by the SedLine® EEG tracing. A secondary objective was to describe the SedLine® patient state indices (PSI) at different phases of treatment.

Materials and Methods: Following IRB approval, we analyzed the data of the electronic medical records of 45 ECT treatments of 23 patients in an urban VA medical center between 07/01/2021 and 03/30/2022. We compared the seizure duration in seconds as measured either by the ECT machine EEG tracing or the SedLine® EEG tracing. We then collected SedLine® processed EEG indices at 4 different stages during the treatment. Appropriate comparative and observational statistical analyses were applied.

Results and Discussion: There was no significant difference in measured seizure duration between the two methods examined (p < 0.05). We observed a lag of the Sedline PSI value pre-stimulus and limited PSI utility during the course of ECT. We observed that the pre-stimulus PSI indicated an unnecessary deep levels of anesthetic effect in > 40% of treatments, which was consistent within individuals for each treatment.

Conclusion(s): The SedLine® EEG tracing can be an alternative to the machine EEG tracing for the determination of seizure duration. The SedLine® processed EEG indices are not consistently useful before and after ECT delivery. Anesthetic effect monitoring during ECT is feasible.

References:
1. Lisanby SH. ECT for Depression. NEJM. 2007;doi:10.1056/NEJMct075234

03AP05-02
Comparison of four processed EEG indices (BIS, qCON, SE, PSI) after ketamine bolus administration

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Background: Processed electroencephalogram indices (pEEGi) can help estimate the level of anesthesia. All commercially available monitors possess sources of error and inaccuracies, creating controversy around the use of pEEGi. Administration of ketamine during general anesthesia with propofol may increase pEEGi. This might mislead anesthesiologists to deepen anesthesia in already sufficiently anesthetized patients. The aim of this study was to investigate a hypothesized increase of the Bispectral Index (BIS, Medtronic), qCON (Fresenius Kabi), State Entropy (SE, GE Healthcare) and patient state index (PSI, Masimo) after a ketamine bolus.

Methods: Ketamine was administered by target-controlled infusion, aiming for an effect-site concentration (CeK) of 1µg/ml as per the Domino model, while maintaining constant propofol-rumifentanil concentrations and stable anesthetic phases. Unprocessed EEG and BIS trend data (n=13) recorded from frontal electrodes were replayed to the monitoring systems. pEEGi were extracted at the denoted CeK (1/min). Results were evaluated with nonparametric statistics.

Results: BIS (p=0.002), qCON (p=0.002) and SE (p<0.001) significantly increased as response to the ketamine bolus (FIGA), possibly due to faster EEG oscillations (FIGB). PSI showed a non-significant increase (p=0.553). pEEGi showed a different scaling when comparing pre-ketamine baselines (p=0.004; FIGC). There was no significant difference in the relative change
**Background/Goal of Study:** Lower intra-operative frontal $\alpha$ power has been associated with the occurrence of POD.$^1$ However, some practical questions still need to be answered. In this secondary analysis, we aimed to determine the most suitable perioperative timing to quantify $\alpha$ power to predict POD.

**Material/Methods:** Five 2-to-5-min 32-channel EEG recordings from 220 adult patients undergoing cardiac surgery under sevoflurane anaesthesia were collected (NCT03706989): preoperatively eyes-closed (T0), 30 minutes post-induction (T1), before aortic cannulation (T2), during CPB (T3) and after chest closure (T4). Patients were screened for POD using CAM-ICU, CAM and chart reviews until hospital discharge. Spectral analysis was performed with MATLAB$^®$ and focused on frontal mean $\alpha$ power (8-12 Hz) for this study. EEG data were converted into dB and expressed as means ± SD. Comparisons between patients with and without POD were performed by Student t-test. A univariate logistic regression analysis evaluated the effect of mean $\alpha$ power at each significant time-point on the occurrence of POD.

**Results/Discussion:** POD incidence was 29.5%. POD(+) patients were significantly older (P<0.001), had higher EuroSCORE II scores (P=0.001), longer CPB time (P=0.015) and longer hospital length of stay (P=0.006). Spectral analysis data are detailed in Table 1. Except for T0, POD(+) patients had significantly lower intra-operative mean $\alpha$ power, regardless of timing (T1-T4). Table 2 shows that $\alpha$ power measured at T1 (post-induction) was already a good predictable marker of POD.

**Conclusion:** Frontal $\alpha$ power under general anaesthesia was significantly lower throughout cardiac surgery in patients who experienced POD. According to our results, frontal $\alpha$ power could be quantified early during anaesthesia in order to initiate as soon as possible preventive strategies against POD whenever required.

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**Table 1 - Frontal mean $\alpha$ power, dB**

<table>
<thead>
<tr>
<th></th>
<th>POD(-) (n=155)</th>
<th>POD(+) (n=65)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preoperatively (T0)</td>
<td>-16.74 ± 4.42</td>
<td>-17.61 ± 4.21</td>
<td>0.178</td>
</tr>
<tr>
<td>Post-induction (T1)</td>
<td>-11.59 ± 3.37</td>
<td>-14.03 ± 4.61</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Before aortic cannulation (T2)</td>
<td>-12.48 ± 3.76</td>
<td>-14.67 ± 4.76</td>
<td>0.001</td>
</tr>
<tr>
<td>During CPB (T3)</td>
<td>-12.03 ± 3.85</td>
<td>-14.45 ± 4.86</td>
<td>0.001</td>
</tr>
<tr>
<td>After chest closure (T4)</td>
<td>-13.08 ± 4.03</td>
<td>-15.74 ± 4.77</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

**Table 2 - Dependent variable : POD**

<table>
<thead>
<tr>
<th>$\beta$ (± SE)</th>
<th>Odd Ratio (OR) 95% CI for OR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean $\alpha$ power, dB (T1)</td>
<td>-0.16 (± 0.04)</td>
</tr>
<tr>
<td>Mean $\alpha$ power, dB (T2)</td>
<td>-0.13 (± 0.04)</td>
</tr>
<tr>
<td>Mean $\alpha$ power, dB (T3)</td>
<td>-0.14 (± 0.04)</td>
</tr>
<tr>
<td>Mean $\alpha$ power, dB (T4)</td>
<td>-0.14 (± 0.04)</td>
</tr>
</tbody>
</table>

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**Reference:**
Khalifa C et al. Eur J Anaesthesiol (2023)
Results/Discussion: POD incidence was 29.5%. POD(+) patients were significantly older (P<0.001) and had a longer duration of CPB (P=0.015). They had significantly lower mean and maximum α power, regardless of aperiodic extraction. They had also significantly lower AE and BO values (Table 1).

Conclusions: Extraction of the aperiodic activity from EEG power spectrum did not affect the association between low intra-operative α oscillation power and POD occurrence. Lower values of aperiodic parameters in POD(+) patients have not been described previously and might open new perspectives in clinical research on postoperative neurocognitive disorders.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>POD(-) (n=155)</th>
<th>POD(+) (n=65)</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean α power, dB</td>
<td>-12.17 ± 3.62</td>
<td>-15.08 ± 5.69</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Maximum α power, dB</td>
<td>-9.25 ± 4.04</td>
<td>-12.07 ± 5.93</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Broadband offset, dB</td>
<td>-6.04 ± 3.98</td>
<td>-7.93 ± 4.18</td>
<td>0.002</td>
</tr>
<tr>
<td>Aperiodic exponent, μV²/Hz⁻¹</td>
<td>2.22 ± 0.30</td>
<td>2.12 ± 0.30</td>
<td>0.029</td>
</tr>
</tbody>
</table>

Table 1.

Reference:

03AP05-05
The concept of EEG-based attention monitoring for detection and prevention of brain dysfunction under anaesthesia

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Background: Postoperative brain dysfunction includes delirium, cognitive decline (POCD), and stroke. Current monitors offer partial value. Depth of anesthesia monitors may prevent delirium due to excessive anesthesia but seem less effective for other perioperative factors. NIRS does not identify strokes reliably.

We developed the Brain Reactivity Index (BRI) to assess dynamis in selective attention from a single EEG channel. A detailed discussion of why an index for selective attention might detect brain dysfunction, including stroke, delirium, and potentially POCD, could be found in 2-3.

We present here the ability to identify brain dysfunction under anesthesia, utilizing BRI to: identify acute stroke dynamics; identify POCD dynamics; and prevent POCD.

Methods: 1. Stroke study; EEG was recorded through the BIS monitor in 100 patients with acute ischemic stroke who underwent endovascular thrombectomy (EVT). NIHSS was used for neurological evaluation, before EVT, and about 24 hours post-EVT. 2. POCD monitoring study; 117 patients who underwent elective cardiac surgery. Montreal Cognitive Assessment (MoCA) test, was performed before and after surgery on discharge. Intraoperative EEG was recorded through the BIS monitor. 3. POCD Intervention study; 45 additional patients; When intraoperative BRI marker dropped, minor interventions were performed to restore it, such as increasing blood pressure, decreasing respiratory rate, or level of anesthesia.

Results: 1. BRI was low in patients with AIS under anesthesia (during EVT) compared to anesthetized control patients. BRI increased in recovered patients, p<0.012. BRI in patients with no brain dysfunction was significantly higher than those with cognitive decline, p<0.01. 3. Patients were divided to2 groups; The ‘Good BRI group’ included 1/3 of the patients who did not require intervention (BRI remained stable) and 1/3 for whom mild interventions were effective. In the remaining third of patients, the mild interventions failed to restore BRI (Low BRI group). The occurrence of POCD in the ‘good BRI’ group was significantly lower (10%) than in the ‘low BRI’ group (50%), p<0.01.

Conclusions: 1. A drop in BRI is associated with the evolvement of brain dysfunction. 2. Restoration of BRI level might prevent at least some dysfunction. 3. We call for collaborators in developing this approach.

Reference:

03AP05-06
EEG changes during anaesthesia in young children. A prospective observational cohort study

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Background and Goal of Study: Neurotoxicity is a controversial topic in paediatric anaesthesia. Monitoring patients brain status during general anaesthesia is a strategy to limit potential neurotoxic effects of anaesthetics. Quantitative parameters or single-number indices developed from electroencephalogram (EEG) do not relate directly to the underlying neurophysiology of the anaesthetics.

Characterising the structure of the EEG in relation to age would help establish the foundations for age-appropriate monitoring of brain states during anaesthesia in children. The aim of this prospective observational cohort study is to describe EEG brain activities and to examine age effect during low-dose sevoflurane/dexmedetomidine or standard sevoflurane anaesthesia in children stratified in three age groups: 0-12, 13-36, 37-60 months.

Materials and Methods: The study will involve 30 children less than 5 years. To date 22 were enrolled. After induction, EEG was recorded continuously. Data about BIS (Bispectral Index) and SEF (Spectral Edge Frequency) were also collected, every five minutes.

Results and Discussion: At 60 minutes from induction, patients in both groups showed a peak in the slow delta band. Patients in the low-dose sevoflurane group showed a mean lower power (108.132 ± 67.160 vs 179.928 ± 74.878), while patients in the standard sevoflurane group showed a second peak in the range of fast theta and alpha bands. Patients who received dexmedetomidine had an EEG pattern with spindles, typical of the streaks in the high alpha and low beta bands between 9 to 15 Hz.

There was no difference in BIS (60.2 vs 58.7) between the two groups, while SEF showed a slight difference (16.25 standard sevoflurane vs 19.16 low dose sevoflurane/dexmedetomidine).

Anaesthesia based low dose sevoflurane/dexmedetomidine is characterized by less cortical inhibition, with an EEG signature similar to non-rapid-eye movement sleep.
O3AP05-07  
Retrospective observational study: EEG analysis of suppression dynamic changes before the burst onset during anesthesia-induced burst suppression in humans

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Background and Goal of Study: Burst suppression (BS) is an electroencephalogram (EEG) pattern characterized by intervals of isoelectricity (suppression) alternated with high-voltage oscillatory activity (bursts). It can be pharmacologically induced with high doses of general anesthetics and it is an undesired state in the daily clinical setting since it has been associated with adverse neurocognitive outcomes, such as a higher incidence of postoperative delirium. This study aims to characterize the changes in EEG features that occur during the suppression window before the burst onset, and thus identify potential markers to better predict upcoming burst activity.

Materials and Methods: We used EEGs from a previously recorded dataset of 110 patients undergoing surgery. By visual inspection, we included 67 recordings with BS during maintenance. We considered suppression intervals of a minimum 2.5-second length and parcelled these in 0.5s windows. Analyses were conducted for absolute and relative power spectral density (PSD), aperiodic component, and permutation entropy. We used the area under the predictive measure receiver operator characteristics curve to test for separability between suppression intervals and the window before the burst onset (Preburst).

Results and Discussion: Regarding the changes observed in the Preburst window, the PSD analysis showed an absolute power increase in all frequencies, a relative power increase in slower frequencies (0.5-5Hz), and a relative power decrease in higher frequencies. The aperiodic component analysis of the absolute PSD showed an increase in its slope while the permutation entropy analysis showed a decrease in entropy, both suggesting the transition to a more organized neural activity.

Conclusion(s): This demonstrates that the 0.5-second Preburst window just before a burst onset contains relevant information for an upcoming burst, that can help predict burst activity. This could potentially serve to improve intraoperatively BS monitoring approaches.

O3AP05-08  
Diabetes insipidus associated with continuous infusion of dexmedetomidine during posterolateral thoracic microdiscectomy

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Background: Development of diabetes insipidus (DI) secondary to dexmedetomidine infusion intraoperatively has been rarely reported.

Case Report: A 34 year old lady with a history of diabetes mellitus type II and hypothyroidism was due to a posterolateral thoracic microdiscectomy. All standard monitoring was placed including BIS monitoring. Induction was achieved with TCI propofol as well as TCI remifentanyl administration. Surgical approach required one lung ventilation. Central venous catheter, arterial line and urine catheter were placed accordingly.

After lateral patient positioning a loading dose of dexmedetomidine 0.5mcg/kg was administered over 10min, followed by a continuous infusion rate of dexmedetomidine at 0.5mcg/kg/hr, ketamine at 0.5mg/kg/hr and lidocaine at 1mg/kg/hr. Urine output was suddenly increased to 500ml/hr after 3 hours.

Accordingly electrolytes and urine specific gravity were measured with values of sodium 145mmol/L and urine specific gravity 1.003. Plasma and urine osmolality were also measured to be 300mOsm/kg and 290mOsm/kg respectively. Because no other etiologic factors were identified, polyuria was considered to be related to dexmedetomidine infusion thus dexmedetomidine administration was ceased. Isotonic fluid for volume replacement were advocated with electrolyte monitoring and subsequently in a 3 hour period urine output was decreased with values of sodium, plasma and urine osmolality reverting to baseline. Patient was haemodynamically stable throughout the procedure.

Discussion: DI induced by dexmedetomidine has been sparsely reported in the literature before. Although mechanism may be either central or nephrogenic, it is imperative that anaesthesiologists can identify the syndrome occurrence especially when anaesthetic agents are involved and no other etiology as surgical manipulations maybe related.

Reference:  
Learning points: Suspicion of dexmedetomidine induced DI may lead to prompt swifter medication discontinuation and excessive fluid loss restoration.

O3AP05-09
The worst of both worlds: a case of severe TBI and ARDS

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Background: Oxygenation and normocapnia are cornerstone measures in the management of severe Traumatic Brain Injury (TBI). Even though the neuroprotective strategy needs to be tailored to the specific case, a simultaneous thoracic trauma can impose a much more challenging scenario.

Case report: A healthy 29-year-old male was admitted following a 5-metre fall with rapid neurologic deterioration from a Glasgow Coma Scale (GCS) 14 to a 6 and concomitant hypoxemia needing mechanical ventilation (MV). Initial investigation revealed exuberant cerebral oedema, right pulmonary contusion and emphysema. Intracranial Pressure (ICP) monitoring over the first 24 hours showed intracranial hypertension despite optimised medical management, ultimately leading to decompressive craniectomy.

Furthermore, with the MV, the otherwise unnoticed right pneumothorax came to light, needing drainage. On the one hand, with the blossoming of pulmonary contusions, lung protective ventilation was prioritised over normocapnia; on the other hand, ICP management became an even more difficult challenge and a miscellaneous approach was needed. ICP management included continuous optimised sedation, neuromuscular block, extraventricular drainage, therapeutic hypothermia and because of refractory hypoxaemia a period of pronation was needed.

A GCS 13 (M6) was attained at the 18th day of admission and extubation was successful. The patient was later discharged and is currently followed by the Intensive Care team in an ambulatory setting.

Discussion: Thoracic trauma has recently been associated with a poorer neurologic outcome after TBI, besides the well-established risk increase in morbimortality and duration of hospital stay. In the set of ARDS on a patient with severe TBI, medical strategies to overcome intracranial hypertensive are limited to those who maintain the integrity of the respiratory system and empower a protective ventilatory conduct. Hypothermia could stand as a rescue therapeutic measure in this setting.

References:

Learning points: Concomitant severe TBI and ARDS compel a thoughtful review of the medical compendium in order to prevent secondary lesions.

O3AP05-10
Continuous transthoracic echocardiography for detection of air embolism in pediatric neurosurgery: case report

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Background: Air embolism is a critical and potentially fatal condition. In neurosurgical procedures, especially in the sitting position, incidence rates are higher, with serious events occurring in 1-3% of cases. The severity depends on the volume of air embolized and the time of its detection. Transesophageal echocardiography (TEE) is an excellent diagnostic method for this condition, however it is not broadly available, specially for pediatric patients.

This report outlines the use of continuous Transthoracic echocardiography (TTE) in a pediatric neurosurgery with sitting position, facilitated by a 3D-printed transducer fixation support developed by the anesthesia department.

Case report: A previously healthy 7-year-old female patient, diagnosed with a cerebellar tumor underwent total lesion resection in a seated position. The procedure was performed under general anesthesia with a specially designed 3D-printed support fixed the echocardiogram transducer for continuous cardiac assessment in a four-chamber apical view.

Microbubble test confirmed good visualization of right chambers air passage. The TTE monitoring throughout the surgery showed no significant changes, proving useful for differential diagnosis in bradycardia episodes during brainstem manipulation.

After the procedure, the patient was sent to the ICU in a somnolent but responsive state, spontaneously ventilating with no oxygen support and hemodynamically stable.

Discussion: The sitting position’s association with higher air embolism incidence demonstrates the requirement of greater attention and careful monitoring.

While routine hemodynamic monitoring can detect larger emboli, it might miss its initial presentation, reducing the success of subsequent interventions. Currently, TEE is the gold standard for this diagnosis, but availability is its main limitations due to high cost, specific training and potential trauma.

This report presents a case with continuous TTE fixed in a 3D printed support that showed to be functional as an useful alternative.

Reference:

Learning points: Even though it requires further validation through additional studies, the application of TTE for continuous monitoring holds promise as a noninvasive and more widely available diagnostic method.
03AP05-11
A complex Cushing case: how to manage?

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Background: Cushing disease (CD) is caused by an ACTH secreting tumour resulting from a pituitary adenoma. It leads to cardiovascular disease, glucose intolerance, obesity, sleep apnea and a higher risk of infections and thromboembolic events. Primary treatment consists of transsphenoidal surgery.

Case report: A 63-year-old woman with CD due to a pituitary microadenoma was proposed for transsphenoidal hypophysectomy. Pre-anaesthetic evaluation revealed morbid obesity (MO; body mass index 53.7 Kg/m²) with a buffalo hump, heart failure, hypertension, atrial fibrillation, glucose intolerance, dyslipidemia and sleep apnea.

Functional capacity was unknown as the patient was wheelchair-bound, so an echocardiogram was performed. Besides MO with a short and large neck, there was no other stigmata of difficult airway. A multidisciplinary approach was taken to characterize and optimize comorbidities.

Surgery was performed under total intravenous anaesthesia. Manual ventilation and intubation were uneventful with adequate patient positioning and hydrocortisone was administered at the beginning.

Oxygenation and ventilation were challenging. Extubation was carefully performed under remifentanil perfusion.

Postanaesthetic care was assured in the neurocritical intensive care unit where hormonal replacement was undertaken. Three months later, the patient is well and still in remission.

Discussion: Prior to surgery, meticulous cardiovascular, endocrinologic, respiratory and airway evaluation and risk stratification are crucial to identify and address potential complications. A careful anaesthetic approach is essential and encloses airway management, positioning of an obese patient, hemodynamic stability and cortisol supplementation.

Management of volume overload, electrolyte imbalance and hyperglycaemia are also essential. The postoperative period is centered at the panhypopituitarism management, hemodynamic and respiratory stability and thromboprophylaxis management.

References:
DOI: 10.4103/2230-8210.86975
DOI: 10.1177/0194599813507236

Learning points: CD patients are a complex population with higher rates of morbimortality where a well-oiled and experienced multidisciplinary care throughout the perioperative period is essential to a favourable prognostic.

03AP06-01
A case report highlighting the limitations of the Bispectral Index (BIS) value and significance of the spectrogram and EEG in an elderly patient

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Background: EEG-based depth-of-anesthesia indices overlook age, potentially causing inaccuracies in elderly patients. Assessment of the EEG and spectrogram can address this issue, potentially resulting in better postoperative outcomes.

Case Report: A 78-year-old male patient with hypertension and dementia underwent right parietal GBM resection surgery. Anaesthesia was maintained with propofol and remifentanil, without neuromuscular blocker.

The remifentanil TCI (Minto model) was adjusted within a Cp range of 1.0-3.0 ng·mL⁻¹. The propofol TCI (Eleveld model) was guided by BIS, aiming for index values of 40-60. After induction, spectrogram showed decreased alpha power, gradually diminishing throughout surgery.

Multiple burst suppressions were observed on EEG while BIS values were high (50-60). Propofol was then titrated between 1.0-1.5 μg·mL⁻¹ during surgery based on BIS, EEG, and spectrogram. Despite administering very low doses of propofol and BIS values were between 40 to 60, patient experienced 19 minutes of burst suppression.Upon regaining consciousness, patient developed PND.

Discussion: Elderly patients with diminished cognitive function display lower alpha power and it shows correlation with higher probability for burst suppression.(1)

Burst suppression might indicate a profound level of anesthesia, potentially leading to PND. In elderly, BIS value might show higher readings even at anesthetic levels inducing unconsciousness, likely due to decreased EEG power in slow, delta, and alpha bands. This could predispose elderly patients to higher doses of anesthetic, potentially resulting in burst suppression and PND.

In our case, elevated BIS value necessitated increased anesthetics, prolonging suppression duration and contributing to unfavorable postoperative outcomes.

Reference:
Learning points: When customizing the anesthetics, it’s essential to analyze the EEG and spectrogram alongside BIS value, especially in elderly where index values might not be accurate.

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03AP06-02
Epidural blood patch as treatment for spontaneous intracranial hypotension syndrome in a hypocooagulated patient with previous thoracic vertebroplasty

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Background: Spontaneous Intracranial Hypotension (SIH) is a syndrome characterized by disabling orthostatic headache, resulting from a reduction in cerebrospinal fluid (CSF) volume due to CSF fistulas caused by a rupture of the arachnoid and/or dura mater[1].

We report a case of an anticoagulated woman with SIH due to a spontaneous cervical fistula and a history of thoracic vertebroplasty submitted for an epidural blood patch (EBP).

Case report: A 47-year-old woman was hospitalized due to a progressive intensity frontal orthostatic headache accompanied by nausea and vomiting. There was no history of trauma, recent surgical interventions or neurological deficits. Background information included a cerebral venous thrombosis (hypocoagulated with Warfarin) and osteoporotic dorsal fractures at levels D9-D12 (submitted to vertebroplasty). Cranial MRI revealed changes compatible with SIH. The spinal MRI showed a probable fistula located at level C6-C7.

The clinical condition persisted for 10 days despite conservative treatment (bed rest, hydration and oral caffeine). The persistence of the SIH, and a probable CSF leak at the cervical level, the risk/benefit of anticoagulation and previous vertebroplasty of D9-D12, led us to perform single shot EBP at the thoracic level

The epidural technique, at level T3-T4, was unsuccessful after two attempts. Given the difficulty of the thoracic approach, the EBP was performed at level L2-L3, with 20 ml of autologous blood, in the Trendelenburg position, 48h after the procedure. With 72 hours post-EBP complete resolution of orthostatic headache was achieved. The patient was discharged after 21 days of hospitalization without complications to date.

Discussion: In a patient with the aggravating factors of a previous vertebral surgical intervention, chronic anticoagulation and the impossibility of an epidural approach at the fistula level, EBP remains a viable technique, with a satisfactory and sustained result, when safety conditions are met.

Reference:
1. Liaquat MT, Jain S. Spontaneous Intracranial Hypotension. [Updated 2023 Jul 3]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan

Learning points: An association of BPE distal to the fistula and a prolonged Trendelenburg position was found to be an appropriate approach, despite the anatomical changes of the epidural space resulting from previous surgical intervention.

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03AP06-03
PRES in the ICU, a hidden reality?

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Background: Posterior reversible encephalopathy syndrome (PRES) is a rare disease whose real incidence in adult ICU patients as well as its pathophysiology, remains unknown. It usually presents as encephalopathy, seizures, headache, visual disturbances or status epilepticus; and a typical image pattern in brain MRI. (1)

Case report: We present the case of a 58-year-old female who was admitted for embolization of a paraophthalmic arteriovenous malformation under general anesthesia with no incidences. In the first post-surgical hours, she developed monoparesis in her left lower limb and progressive low consciousness, with no bleeding in the CT; and refractory status epilepticus confirmed with EEG. MRI showed posterior vasogenic edema (PRES/encephalopathy induced by contrast). She improved with antiepileptic drugs and methylprednisolone 10mg/kg/24h for 3 days, and she was discharged to ward without seizures and higher level of consciousness.

Discussion: Since first described in 1996, PRES has been linked with hypertensive conditions or certain drugs such as chemotherapy or immunosuppressive agents. However, as this case exemplifies, some other less frequent etiologies may be involved. The wide range of neurological symptoms plus the non-specific (but classic) pattern in MRI, makes it a very difficult condition to diagnose in critical care patients in whom physical exam is limited by sedative effects of some medications.

In conclusion, as we have seen in our daily practice, it may be a much more frequent cause of toxic-metabolic encephalopathy in ICU patients than we suspect. Our experience shows that even normotensive or shock patients may develop this syndrome in many different contexts such as sepsis or as in this case induced by contrast.

Therefore, we should consider it among the differential diagnoses when a patient presents with unusual neurological symptoms or delayed awaking once discarded other common causes. (2)

References:

Learning points: PRES is probably infra-diagnosed in the ICU setting, and must be considered in any patient with acute neurological symptoms in the context of a toxic-metabolic encephalopathy.
03AP06-04

Sinking brain saved by anesthesiologists crew

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Background: Sinking skin flap syndrome (SSFS) is one of the rarest complications of decompressive craniectomy. The conversion of the cranium from a “closed box” to an “open box” alters the barometric pressure, CSF and CBF, and may lead to SSFS.

Case Report: A 50-year-old male underwent bilateral frontoparietal craniectomy due to postoperative complications. After he recovered completely neurologically, physical therapy started. He was positioned sitting when bradycardia and rapid neurological decline occurred. His GCS went to 9 (E2/V2/M5). The CT showed compression of bifrontal underlying dura, brain tissue and frontal ventricular system. He was intubated and placed in the Trendelenburg position. In the next 2 days he was continuously in Trendelenburg’s position and his neurological status improved, reaching GCS 13 (E3/V4/M6). Emergency cranioplasty was performed.

Discussion: After craniectomy, a partially boneless cranium may be compressed by the higher atmospheric pressure, rising ICP to dangerous levels. Verticalization can precipitate the compressing effect. Paradoxically, supportive management with intravenous fluid infusion and Trendelenburg positioning is used as a bridge to definitive treatment with cranioplasty. Pathophysiology mainly relied on the pressure differences between the atmosphere and the brain and the changes in CSF flow dynamics. Diagnosis is made both clinically and radiologically - the most important is the shape of the craniectomy site which gets curved inside.

Learning Points: High clinical suspicion of SSFS prevents unnecessary testing and damage. Placing a patient in the Trendelenburg position with subsequent ICP’s increasing inhibits further neurological deterioration. Therefore, it should be further evaluated as a preventive measure in the management of patients who underwent craniectomy and show a declining of neurological status.

03AP06-05

Non-stop neuromonitoring, electroencephalogram with corkscrew electrodes vs. classic electrodes of a SEDLINE in neurosurgical neurological monitoring, a case report

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Background: Since the implementation of the neuromonitoring, there has been many problems to access a reliable way to control the anesthetic depth of the patient principally in the neurosurgical aspect, with the introduction of new neuromonitoring machines (BIS, SEDLINE, NOS) and new neurosurgical techniques; The sensors on these machines have experience a bunch of design problems, the principal source of this problem is the lack durability and mobility, when exposed to blood, water or even little movements, the glue gets loose and the sensors stop providing the information or worse they sense it all wrong.

In this case report, we compare this classic way vs. the corkscrew sensors attached to the electroencephalogram (ECG) module of the anaesthetic machine sensing without interruption the neurological state of the patient through a glioma removal.

Case Report: 61 years old masculine with high grade frontal glioma previously diagnosed by MRI, arrives to urgencies due to exacerbation of symptoms, characterized by nausea, vomit and intense holocranial cefalea, programmed for extraction surgery, during the anaesthesia monitoring the SEDLINE and an elec-
troencephalogram with corkscrew electrodes (Fp7,T7,T8) were placed, at the middle of the procedure the SEDLINE starts to mismatch its lecture of the brain waves in comparison with the ECG lecture, the procedure finished with no complications.

**Discussion:** The use of this ECG with corkscrew sensors is proven to resist blood, water and excess manipulation without losing its sensing precision, making it an ideal way to monitor the patient during a neurosurgery.

This case reports aim for the use of this technic as a support for the neurological monitoring, trying to solve a common problem for most of neuroanesthesiologist that is poorly described in the literature, this sensors are described in electrophysiology as a good option for monitoring transcranial motor evoked potential plus that they resist any external physical factors that can manipulate the ECG lecture results.

**Reference:**

**Learning Points:**
The most important in the neurological monitoring is the reliability of the information received.
The corkscrew sensor and ECG combo for neurological monitoring is a trustworthy method to never stop having a good monitoring of the neurosurgical patient.

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**03AP06-06**

**Intraoperative optic nerve ultrasonography: a non-invasive monitor for intracranial hypertension during steep Trendelenburg position and pneumoperitoneum in a high-risk patient**

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**Background:** The steep Trendelenburg position and pneumoperitoneum in robot-assisted laparoscopic surgery often lead to elevated intracranial pressure (1). Ultrasound measurement of the optic nerve sheath diameter (ONSD) presents an opportunity for real-time monitoring to avert complications in high-risk scenarios (2).

**Case Report:** A 56-year-old male patient with a medical history of a 6.6 x 2.5 cm cervical pseudomeningocele underwent robot-assisted laparoscopic radical prostatectomy. Real-time intraoperative monitoring of intracranial pressure (ICP) was implemented using optic nerve ultrasound.

Based on previous studies, we established an upper limit of 5 mm for the ONSD as an indicator of ICP exceeding 20 mmHg (3). When the ONSD reached 6 mm we started the treatment for ICP.

**Discussion:** Observational clinical trials have consistently linked intracranial hypertension to the steep Trendelenburg position and pneumoperitoneum required for robot-assisted laparoscopic surgeries. Although specific clinical impact data are lacking, we advocate for heightened monitoring in the presence of complication risks.

**References:**

**Learning points:** Intraoperative ultrasonographic measurement of the optic nerve sheath, serving as a non-invasive monitor for intracranial pressure, yields crucial information that can help prevent complications in high-risk patients.

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**03AP06-07**

**Case report on inadvertent injection of ionic contrast into intrathecal space and subsequent intensive care management**

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**Background:** Inadvertent administration of drugs into the intrathecal space can lead to complications, but there are no consensus guidelines for managing such cases. Ionic contrast medium (CM) is contraindicated intrathecally and can have neurotoxic effects.

The factors influencing CM toxicity include its ionic configuration, osmolarity, lipid solubility, dose, concentration, and duration of exposure. Mechanisms of toxicity are not fully understood, but ionic CM can disrupt transmission in the central nervous system.
Case report: A 49-year-old male received an unintentional intrathecal injection of ionic CM, experiencing immediate adverse effects including myoclonic jerks, severe pain, tonic-clonic seizures, and loss of consciousness. Prompt management involved attempted drug aspiration, airway control, sedation, intubation, and transfer to the Intensive Care Unit. Initial ICU management included lumbar drainage of cerebrospinal fluid (CSF) with normal saline replacement at a rate of 10ml/hour. The patient was positioned with the head up to prevent residual drug migration. Dexamethasone was administered, and imaging was performed until the contrast was completely absent from the intrathecal space. After 48 hours, the patient was extubated, discharged without neurological deficits, and remained asymptomatic at the three-month follow-up.

Learning: A policy was implemented to have two individuals, including a senior radiologist, check intrathecially administered drugs to prevent similar errors. A suggested safety protocol for erroneous intrathecal administration includes immediate aspiration if clinically suitable, lumbar drainage with intrathecal saline replacement, positional adjustment based on the drug’s baricity, systemic steroid administration, intensive care management and airway support.

References:

03AP06-08
Extracranial-intracranial cerebral bypass for aneurysmal rupture in post-partum woman: a case report

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Background: We present the first reported case of intra-extra-cranial cerebral bypass to treat a giant sylvian aneurysm rupture in a case of a post-partum woman. This lesion was not amenable to classic coiling/clipping and required a more complex surgical strategy.

Case Report: A 33-year-old woman with 35 weeks of pregnancy presented seizures and loss of consciousness at home with a Glasgow Coma Scale at 3/15. She was sedated and intubated, then transported to hospital by emergency unit. CT studies revealed subarachnoid hemorrhage Fischer IV due to a left Sylvian aneurysm rupture (21mm) causing transtentorial engagement and engagement of the cerebellar tonsils in the Foramen Magnum. Emergency C section was done then external ventricular drain-age was placed.

The shape of the aneurysm was not amenable to endovascular procedure. The cerebral bypass surgery procedure consisted in a temporal-sylvian artery bypass. Clipping and securing of the giant left sylvian aneurysm was processed. Osmotherapy along with controlled hypothermia were used to control intracranial pressure. Extracorporeal life support was placed for cardiogenic shock the day after cerebral bypass surgery. The patient died due to multiple organ failure.

Discussion: Complex aneurysms which cannot be treated by endovascular means or classic clipping, could be treated by Extra-Intracranial or Intra-Intracranial cerebral bypass prior clipping. (1) This is the first reported ruptured cerebral aneurysm treated by cerebral bypass and clipping in a post-partum woman. The rarity of data about these procedures and outcomes in pregnant patients makes management of aneurysms uncertain. The treatment strategy for ruptured aneurysms and timing of delivery remains controversial. It is necessary to compose a therapeutic strategy with the little current and expected data.

Reference:

Learning points: Ruptured cerebral aneurysm in pregnant woman is rare yielding the management difficult. Complex cerebral aneurysm, not treatable by coiling, could be treated by cerebral bypass surgery prior clipping. However, large series of cases would be required to prove safety and efficacy of these surgical strategy.

03AP06-09
Enhanced safety in awake craniotomy: high-flow nasal cannula therapy - a case series

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Background: Anesthesiologists face considerable challenges during awake craniotomies (AC), notably concerning airway obstruction. This complication becomes particularly demanding due to patient's positions and fixed skull, even in the absence of prior risk factors for a difficult airway. High-flow nasal cannula (HFNC), delivering humidified and heated oxygen at rates up to 60L/min, offers distinct advantages over conventional cannula by reducing nasopharyngeal resistance, minimizing anatomical dead space and potentially promoting alveolar recruitment through positive pressure generation.

Case Report: This report includes four cases of AC at our institution utilizing HFNC. Patient 1 (33y BMI 41), had a history of atypical bilateral pneumonia four months before the procedure and displayed multiple indicators of challenging airway and ventilation. Patient 2 (70y BMI 27) was classified as Mallampati III. Patient 3 (30y) did not present any criteria for difficult airway. Patient 4 (68y) was categorized as Mallampati III as well. In all patients, an Asleep-Awake-Asleep sequence was chosen, starting with general anesthesia using a laryngeal mask. Before dural membrane opening, patients were awakened and laryngeal masks were removed, initiating oxygen therapy via HFNC.
Cerebral mapping was performed without incident in all patients. During the resection phase, standard doses of propofol, remifentanil, and dexmedetomidine were reintroduced for sedation while maintaining HFNC oxygenation. Patients sustained adequate oxygenation as indicated by pulse oximetry, and blood gas analyses showed no significant hypercapnia. Remarkably, there was no observed exacerbation of cerebral edema hindering tumor resection, and surgeries concluded uneventfully.

**Discussion:** Using HFNC during AC confers significant advantages for patients encountering challenging airway or ventilation scenarios and those grappling with complex respiratory pathologies. Its application substantially bolsters patient safety, recommending its consideration for individuals exhibiting difficult airway, ventilation challenges, or respiratory disease during AC procedures.

**Learning Points:**
- Employing HFNC may enhance oxygenation in patients at risk of difficult airway management during AC.
- HFNCs may also enhance oxygenation in patients with pre-existing respiratory pathology.
- Implementing HFNC provides enhanced safety measures throughout the phases of cerebral mapping and deep sedation during AC.

**03AP06-10**

**It is not just a headache! A case of idiopathic intracranial hypertension in association with central venous sinus thrombosis in post-partum woman**

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**Background:** Idiopathic intracranial hypertension (IIH) is usually associated with elevated intracranial pressure (ICP) along with some neurologic manifestation. During the presentation of the patient with symptoms suggestive of elevated ICP, the patient should be treated as an emergency case of intracranial hypertension. In untreated cases of IIH, severe and sometimes irreversible conditions can occur.(1)

**Case Report:** A 31-year-old post-partum woman presented after 11 weeks post-partum in the emergency department with severe persistent headaches associated with diplopia for 2 weeks. Various investigations including CT brain, CT venogram, MRI were done along with lumbar puncture, which showed increased CSF outflow pressure.

The patient was diagnosed as a case of Idiopathic Intracranial Hypertension (IIH) and discharged on certain medications including painkillers and acetazolamide.

One week later she again presented in the emergency department with worsening vision and headache. An ophthalmology review was done which showed grade 5 papilloedema. The patient was assessed by the neurosurgery team which carried out stereotactic CT brain and surgical VP shunt placement was done for refractory intracranial hypertension.

After surgery, the patient had significant symptomatic relief but after 48 hours she again developed a severe headache on which a CT venogram was done that showed occlusive thrombosis in superior sagittal and transverse sinuses. Thrombectomy was done via endovascular approach by an interventional radiologist and anticoagulant medications were given during and after the procedure. The patient got significant symptomatic relief and was discharged after 18 days of hospital stay with a huge improvement.

**Discussion:** A multispecialty approach is effective to decrease morbidity and mortality for IIH and CVST. Timely diagnosis and prompt treatment can increase the success rate and decrease the risk of complications in the patients.

**Reference:**

**Learning Points:** A multispecialty approach is effective to decrease morbidity and mortality for IIH and CVST. Timely diagnosis and prompt treatment can increase the success rate and decrease the risk of complications.

**03AP06-12**

**Transcranial Doppler ultrasound as intraoperative monitoring during laparoscopy in patients with ventriculoperitoneal shunt: case report**

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**Background:** Laparoscopic surgeries offer well-known benefits, however, there are several complications associated with pneumoperitoneum in patients with ventriculoperitoneal (VP) shunts. This case study documents the use of cerebral ultrasound and transcranial Doppler (TCD) to monitor adverse events during laparoscopic surgery in a hydrocephalus patient with VP shunt.

**Case Report:** A 14-year-old male with myelomeningocele and hydrocephalus underwent a left laparoscopic total nephroureterectomy due to recurrent pyelonephritis, leading to the left kidney dysfunction. His medical history includes VP shunt implantation in the neonatal period, with the most recent device change in 2018. The patient did not exhibit cognitive or motor deficits.

Continuous TCD monitoring was initiated just after anesthetic induction, with data recorded throughout the procedure. Despite the installation of pneumoperitoneum, the patient maintained a stable estimated intracranial pressure (ICP) of 5-6mmHg. Fourth ventricle measurements remained within normal limits (24mm initially, reaching 27mm post-procedure), and the maximum intrabdominal pressure utilized was 15mmHg. The patient was extubated and transferred to the pediatric Intensive Care Unit in stable condition, subsequently discharged four days postoperatively without signs of increased ICP, valve dysfunction, or pneumocephalus.

**Discussion:** Intraoperative gas insufflation during laparoscopic surgeries poses risks for patients with VP shunt since it may lead to pneumocephalus. Prior studies support the idea that pneumoperitoneum can affect valve function and result in increased intracranial pressure. This case exemplifies the significance of intraoperative cerebral ultrasound and TCD to ensure VP shunt...
device competence throughout laparoscopic procedures, since it allows real-time insights that may enable prompt interventions if complications arose.

**References:**


**Learning points:** The use of TCD as a complementary monitoring in laparoscopic approaches for patients with VP shunt contributes to enhance patient safety and optimized surgical outcomes.
**Career and Wellbeing**

**O4AP01-01**

**Exploring the impact of 24-hour shifts on medical professionals: a study on physical activity and discrepancies between residents and physicians**

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**Background and Goal of Study:** Doctors perform 24-hour shifts, which can disrupt the circadian rhythm and emotional well-being. Strong evidence suggests that a sedentary lifestyle elevates the risk of cardiovascular disease. The study aims to confirm if the recommended minimum number of steps is accomplished during 24-hour shifts, understand physical strain on medical workers, and identify discrepancies between medical residents and physicians. Residents frequently express that their shifts are more demanding compared to those of seasoned colleagues.

**Materials and Methods:** Prospective cohort trial took place from July to September 2023. The intervention spanned 8 working days. Hospital procedure involves seven anesthesia staff per shift -five specialist physicians and two medical residents—a total of 56 doctors analyzed. Steps tracked post-24-hour shift via smartphone app. Project approved by hospital ethics committee. Quantitative data were summarized using mean, Kolmogorov-Smirnov, Mann-Whitney U, and Student t tests. Significance was set at α < 0.05. Analysis used SPSS v.24.

**Results and Discussion:** To our knowledge, this study is the first combined analysis of a daily shift step calculator. Junior doctors took an average of 9,243 steps, while consultants took a lower average of 4,630 steps per shift.

A recent meta-analysis indicates an inverse correlation between daily step count and mortality. Surpassing the recommended threshold of 3867 steps/day is associated with a favorable outcome for all-cause mortality, and both groups in our study exceeded this threshold.

To assess movement differences between residents and doctors during shifts, the two groups were compared. Gynaecology and Emergency showed notable outcomes (t-values:6.8 and 5.5, p<.00001). Critical Care also had significance (t-value:3.8, p=.00045). Results suggest junior doctors take significantly more steps during 24-hour on-call shifts compared to their peers.

**Conclusion(s):** Residents complain that their shifts are more demanding than senior colleagues. While we acknowledge that the isolated data of step count doesn't accurately reflect the complexity of the work, it can serve as an indicative measure of reality. Even though the results surpass step recommendations, our results may be used to promote awareness of the importance of physical activity, particularly in the easily activity of walking.

**References:**

1. https://doi.org/10.1016/S2468-2667(21)00302-9
2. 10.1093/eurjpc/zwad229

**O4AP01-02**

**Behind the mask of academic anesthesia: exploring why anesthesiologists in Belgium choose to pursue a career at a university hospital, or not**

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**Background and Goal of Study:** The Anesthesia departments of Belgian university hospitals are facing challenges in attracting and retaining skilled and ambitious professionals. This study aimed to identify the factors impacting Belgian anesthesiologist’s decisions to work in a university or non-university hospital.

**Materials and Methods:** We distributed mixed-method surveys in both Dutch and French to department heads of the 7 Belgian university hospitals, board-certified anesthesiologists working in university and non-university hospitals, and anesthesiologists in training. The quantitative data underwent analysis using Excel 365 through descriptive statistics, while qualitative data underwent categorization by two independent individuals, enabling the examination of differences between different groups.

**Results and Discussion:** 239 individuals participated in the survey: 5 department heads, 161 board-certified anesthesiologists, and 73 trainees. 56.8% were men, 43.2% women. 76.1% live in Flanders, 9.8% in Wallonia, 13.7% in Brussels, and 0.4% elsewhere. The average age was 41 years.

The net promoter score (NPS) for current job satisfaction was -19 for those working in university hospitals and +27 for those working in non-university hospitals. Regarding the likelihood of recommending a career in academic anesthesia, the NPS stands at -24 for university hospital employees, -87 for non-university hospital employees, and -73 for trainees.

The primary motivations for seeking employment at a university hospital include engaging in challenging clinical work, the opportunity to train future colleagues, personal growth, access to cutting-edge technology, and performing research. Conversely, those employed in non-university hospitals are primarily driven by factors such as work culture, work-life balance, remuneration packages, personal growth, and challenging clinical work in making their career choices.

Hygiene factors are the main reasons for not pursuing an academic career: a substantial salary disparity, toxic work culture, insufficient time for non-clinical activities like teaching and research, and the abundance of policies and rules that hinder organizational agility.

**Conclusion(s):** Job satisfaction among anesthesiologists in Belgian university hospitals is notably low, and pursuing a career in academic anesthesia rarely endorsed. Policymakers should prioritize addressing hygiene factors to proactively mitigate job dissatisfaction.
**O4AP01-03**
Quantification of the fatigue associated with wearing airborne personal protective equipment (PPE) during intensive treatment unit (ITU) nursing shifts

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**Background:** Airborne personal protective equipment (PPE) use increased during the COVID-19 pandemic to prevent disease transmission. Under laboratory conditions, wearing airborne PPE causes fatigue and impairs task performance.  
Fatigue is a psychophysiological condition characterised by decreased motor or cognitive performance and/or increased perception of fatigue. This randomised controlled crossover study aimed to quantify the fatigue associated with wearing airborne PPE during intensive treatment unit (ITU) nursing shifts.

**Methods:** 30 ITU nurses (25 female) participated during two 12-h shifts: once wearing airborne PPE (PPE) and once in standard attire (control). Nurses reported perceived fatigue (visual analogue scale) and exertion (Borg rating) at 10 timepoints. Grip strength and cognitive function (One-Touch-Stockings and Spatial Span tasks) were assessed before and after each shift. ECG (Mvesense HR+, Vantaa, FI) and activity (activPAL, Glasgow, UK) were recorded continuously. Baevsky stress index was derived from ECG recordings.

**Results:** Mean (SD) grip strength decreased 5.1% in the non-dominant hand after PPE shifts (p<0.009), but the dominant hand did not change (p=0.43). Cognitive function did not change on either shift (p>0.30). Stress index was greater on PPE shifts after 8 h wear-time (p<0.05). Participants took fewer steps on PPE shifts (mean difference 1171 (SD 2729); p<0.04).

**Conclusion:** Airborne PPE use increased nurses’ perception of fatigue and exertion, despite decreased activity. Motor performance decreased and stress increased on PPE shifts but cognitive function was unaffected. Adverse effects were evident after wearing PPE for 6 h. Strategies to mitigate the impact of wearing airborne PPE should be developed, including limiting wear-time.

**References:**

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**O4AP01-04**
Incidence of professional burnout among anesthesiologists during wartime in Ukraine

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**Background and Goal of Study:** Burnout syndrome (BOS) impacts health workers and has become a real public health issue. Data on prevalence of and risk factors for burnout among anesthesiologists are limited, especially during the wartime. As a result of the military actions, a reaction to the situation is implemented, in which the threat to the life of the doctor, his health, as well as the safety of colleagues and patients dominates. The aim of this study was to analyse the incidence of professional burnout among anesthesiologists in Kyiv, Ukraine, during wartime.

**Materials and Methods:** This survey is an observational study carried among anesthesiologists of three clinical and one military hospitals in Kyiv during wartime. BOS was assessed using the Maslach Burnout Inventory (MBI). The respondents filled out the paper questionnaire. A significance threshold of p<0.05 was retained.

**Results and Discussion:** Among the 160 distributed questionnaires, 140 (87.5%) completed questionnaires were returned and analyzed, among which 14.3% of respondents (20 people) are anesthesiologists in a military hospital. There were 71 men (50.7%) and 69 women (49.3%) aged 25 to 65 years. The results of the section “Burnout” were significantly higher in anesthesiologists from a military hospital compared to anesthesiologists from clinical hospitals (19.3±12.8 points versus 12.0±7.89 points, p=0.0008), while the results according to the sections Depersonalisation (12.3±6.65 points against 13.5±9.73 points, p=0.560) and Personal Accomplishment (36.6±7.40 points against 33.8±11.3 points, p=0.596) did not differ between groups. At the same time, according to the analysis of the “Burnout” section, severe burnout was observed by 25.8% more often in anesthesiologists from a military hospital compared to clinical hospitals (p=0.003).

Performing ANNOVA depending on work experience up to 10 years (n=75), from 10 to 20 years (n=44) and more than 20 years (n=15) did not reveal any influence on the results of the Burnout section (F=0.07, p=0.931), Depersonalisation (F=0.807, p=0.448) and Personal Accomplishment (F=2.36, p=0.098).

**Conclusion(s):** The prevalence of burnout syndrome among anesthesiologists in wartime is high and does not depend on work experience. However, a higher rate of high-level BOS was recorded in anesthesiologists providing care in a military hospital.
Incivility in the operating room: a highway to burnout?

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Background and Goal of Study: Workplace incivility affects nearly 70% healthcare workers. Various studies have associated workplace incivility with lower job satisfaction, higher stress and burnout indicators. Burnout itself is responsible of decreased physician health, quality of life, patient satisfaction and quality of care. Data is lacking in Morocco about this rising problem; therefore, it is not addressed. We hypothesize that the rate of workplace incivility experienced by the OR staff is high and that it is associated with higher burnout.

Materials and Methods: A 3 months survey of healthcare workers in Moroccan operating rooms (OR) collected in a 19 items-questionnaire demographic and professional information, experienced incivilities and affirmations from the Maslach Burnout Inventory (MBI) related to emotional exhaustion (EE), depersonalization (DP) and personal accomplishment (PA). We measured incivility and burnout rates then compared victims of incivility to non-victims using a χ² test.

Results and Discussion: 195 responders distributed as 90 females (46,2%), 104 males (53,3%), 147 physicians (75,4%) and 47 nurses (24,1%). 136 worked in the anesthesia (69,7%) and 58 in the surgical team (29,7%). 146 participants (74,9%) experienced incivility manifested as unpleasant facial expressions (67,2%), an inappropriate verbal tone (66,2%), hurtful words (53,3%), exclusion (21,5%).

A total of 121 responders (62,1%) presented with burnout. Victims of incivility were more frequently women (p=0.035) and had more burnout: EE 40,4% versus 15,2% (p=0.002) and DP - 63,0% versus 41,3% (p=0.009). Our study is the first one in Morocco to address incivilities in the OR and to show an association with burnout.

Our rates are consistent with the international data. An expected result was that women were more frequently victims of incivilities and of burnout. Major limitations were the small cohort, the over representation of the anesthesia team and the use of an adapted version of the MBI to avoid discouraging the responders from completing the survey, we chose 12 MBI affirmations that seemed the most relatable in our setting.

Furthermore, we did not center our work on incivility alone but strived to show the association to burnout which severity is widely admitted.

Conclusion(s): Incivility is as high as 74,5% in our operating rooms and is associated with burnout syndrome. Therefore, incivility should be addressed as a systemic workplace dysfunction.

Hyperthermia, Airborne Personal Protective equipment, wellbeing and performance quality in Intensive Treatment Unit nurses (HAPPY ITU)

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Background: Healthcare professionals frequently reported heat illness symptoms whilst wearing airborne personal protective equipment (PPE) during the COVID-19 pandemic. Heat illness is a spectrum of disease associated with core temperature >38°C which particularly affects the central nervous system. Laboratory studies demonstrate that PPE use can precipitate heat illness, but it is not known if these findings translate into clinical environments.

This randomised crossover study quantified the heat stress associated with airborne PPE use during intensive treatment unit (ITU) nursing shifts.

Methods: 30 ITU nurses (25 female) participated on two shifts: once wearing PPE and once in standard clinical attire (control). Core temperature was recorded with an intestinal pill telemetry system. Skin temperature, ECG and activity (% metabolic equivalent; MET) were recorded with wearables. Participants rated temperature sensation, thermal pleasantness and sweating with visual analogue scales (VAS). Mean body temperature is the volume-weighted average of core and skin temperature.

Results: The incidence of core temperature >38°C was 37% on PPE shifts and 21% on control shifts. Activity was less on PPE shifts (mean difference 2.6 (SD 4.8) %MET; p = 0.02). Nurses perceived their temperature to be warmer (p <0.001) and less pleasant (p <0.001) on PPE shifts. Heart rate (p <0.001) and sweating VAS were greater (p <0.001) on PPE shifts.

Conclusion: Airborne PPE use generates heat stress which may increase the risk of heat illness. Despite thermoregulation and decreased activity, nurses were unable to prevent their temperature rising on PPE shifts. Improving the design of airborne PPE should be prioritised to mitigate its impact on wearers.
O4AP01-08
Burnout and Impostor syndrome in anaesthesiology: results from a web-based survey of residents and chief-residents in Latin Switzerland

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Background and Goal of Study: Impostor syndrome (IS) is defined as the “Inability to internalize success and the tendency to attribute success to external causes such as luck, error or knowing the appropriate individuals”. A sense of fraudulence can rise from underestimated professional or personal accomplishments. This devaluation of self might lead to impaired well-being and consequences such as burnout. Female physicians and lack of experience in anaesthesiology are linked to increased IS feelings, whilst age and experience seems to be protective factors. No study has yet investigated the link between burnout and IS in anaesthesiology.

The goal of our study was to assess the prevalence and highlight socio-demographics predictive of IS and burnout in anaesthesiology residents and chief-residents.

Materials and Methods: A cross-sectional web-based survey study was conducted in residents and chief residents in anaesthesiology working in Latin Switzerland. The survey was administered via a specific secured web platform fully compliant with the European General Data Protection Regulation. Participation was voluntary and anonymous.

The survey consisted of a demographic questionnaire, the Clance impostor phenomenon scale (CIPS) and the Maslach Burnout inventory for medical personnel (MBI-HSS-MP). IS was defined as a CIPS score over 60. Descriptive statistics were generated to highlight demographic variables that were predictive of IS characteristics as well as the link between IS and burnout.

Results and Discussion: CIPS and MBI-HSS-MP were completed by 136 (42.8%) and 127 (39.9%) participants respectively. Of the 136 participants who completed the CIPS 55% were female and 45% male; 59% of the participants were Swiss nationals. The point of prevalence of impostor syndrome was 56% and 8% experienced intense impostor experiences. The IS scores were correlated with female gender (p=0.05) and Swiss nationality (p=0.028). The presence of IS was linked to an increased burnout presence as defined by the MBI-HSS-MP (p=0.04).

Conclusions: Female gender and Swiss-nationals’ residents and chief-residents are more inclined to experience impostor feelings. Impostor feelings are associated with increased risk of burnout in the studied population. Future research should aim at in-depth understanding of IS experience through qualitative methods. This could allow to build tailor-made interventions aimed at fostering an institutional culture that improves residents’ experience.

O4AP01-09
Reducing work-related screen time in healthcare workers during leisure time – an overview of the REDUCE SCREEN study

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Background and Goal of Study: Burnout in healthcare workers is common and associated with poor quality of life and patient care. Responding to emails and accessing electronic health records outside of traditional work hours increases stress levels and burnout symptoms. We tested a behavioral intervention to reduce screen time, especially work-related screen time, during leisure periods. We hypothesized that the REDUCE SCREEN tool would reduce overall stress levels in healthcare workers.

Materials and Methods: IRB approval was obtained. After informed consent, 815 healthcare workers adult healthcare workers who routinely accessed a work-related email application on their smartphones were enrolled. Before a weekend off, participants were randomized 1:1 to a behavioral intervention aimed at reducing their screen time versus no intervention. Participant stress was assessed using the Perceived Stress Scale (PSS-10), a 10-item self-report validated measure widely used to measure stress perception. Both groups received electronic reminders to complete the PSS-10 before and after their rest weekend. In addition, the intervention group received education regarding work-related disengagement during leisure time. The primary outcome was a change in PSS-10 scores from pre-to post-weekend off. A 10% reduction in stress levels was considered a clinically significant effect based on prior studies. Our a priori power calculation was based on a sample size of 194 per group providing 80% power to detect a difference of 10% change in PSS-10 score with the behavioral intervention. A secondary outcome was self-reported smartphone screen time during the weekend off.

Results and Discussion: Of the initial 815 healthcare workers surveyed, 520 (64%) completed both surveys and were included in the analysis. The largest age category of respondents was 25 to 34 (44%), and the majority identified as female (57%). Of the 142 physicians who responded, 25 (18%) were internists, 32 (23%) were family practitioners, 24 (17%) were pediatricians, and 19 (13%) were anesthesiologists. Most healthcare workers reported between 3 and 7 hours of average daily screen time.

Conclusion(s): Data analysis of this completed trial is ongoing, and the efficacy results will be reported at the meeting. If successful, similar population-level behavioral interventions could be systematically deployed by healthcare organizations to reduce stress.

Registered at ClinicalTrials.gov (NCT05106647)
Anesthesiologist burnout during full-scale war in Ukraine: university hospital experience

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Background and Goal of Study: Burnout is an occupational phenomenon pervasive in medicine, which affects quality of care and patient safety(1). Currently, anesthesiologists in Ukraine experience unprecedented levels of workplace stress in the post-pandemic era that is changing the healthcare landscape. In this study we sought to document the unfolding impact of burnout and associated risk factors in context of a full-scale war.

Materials and Methods: Data collection was performed with the help of the Maslach Burnout Inventory (MBI) survey with additional questions. We have surveyed 95 anesthesiologists. The BO rate was assessed across various categories including the ones specifically tailored to war realities. BO was defined as BO syndrome (all three BO subscales) or as high risk of BO (EE and/or DP).

Results and Discussion: The response rate was 70%. The overall prevalence of BO syndrome was 19 %, and 32% for high risk of BO. When comparing the “no BO” group with “high risk and BO syndrome”, we found no difference in seniority level, gender or age group, affiliation or ethical climate, academic commitments (P > 0.05) which stands in contrast to the previous surveys.

We have however observed a statistically significant difference across the following categories: lack of control over working conditions (active shelling or air raid frequency while on a shift), direct involvement in combat casualty care, staff shortage, deteriorating living/working conditions (power outage or rolling blackout), loss of a close person, exposure to chaotic environment (news fatigue) and pre-existing mental health condition (P > 0.001).

Conclusion(s): The prevalence of both BO syndrome and high risk of BO in anesthesiologist cohort has notably increased compared to pandemic era, which may reflect the unprecedented ongoing stress, both physical and mental. The associated risk factors for BO syndrome and high risk of BO were mostly war-related, direct or indirect, reflecting the reality of living in the age of the most documented war in history. At the same time higher prevalence means recognition and increased awareness of the problem which may pave the way to a healthier work culture in future.

Limitations of the study include a relatively small number of respondents that prevents from drawing conclusions in the context of a country/healthcare system. Further research is warranted across hospitals in Ukraine to determine the impact of BO.

Teamwork between surgeon and anesthesiologist - development of a uniform questionnaire to assess communicational discrepancies

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Background and Goal of Study: The relationship between surgeons and anesthesiologists is a long-lasting one, which may influence team’s dynamics. Communication and team situation awareness between medical professionals affect patients’ outcome[1]. The goal of our study is to identify discrepancies in the experience of communication by developing a uniform survey questionnaire.

Materials and Methods: There is no existent questionnaire to evaluate these discrepancies. Therefore our survey questionnaire comprises relevant questions from previous published data[2] as well as additional questions targeting further potential influencing factors. We aim to include surgeons and anesthesiologists from different experience levels and gender and compare the data descriptively.

Results and Discussion: We developed a questionnaire in order to evaluate teamwork, role allocation, self- and external perception of communication strategies as well as error- and conflict management in the operating room (OR). Potential influencing factors like gender, career level and specialty will be analysed. This questionnaire can be used in various hospitals. Gender influences non-technical skills in hospitals[3]. Interdisciplinary surveys analysing the perception of communication and impact on teamwork between different sexes within the OR are scarce.

The results of this survey from the LMU Hospital Munich can be used as an indicator to evaluate these differences and motivate hospitals to assess communicational discrepancies within their operating teams.

Conclusion(s): The results from our study will be applied to identify factors influencing communication between medical specialties. Communicational deficits can be targeted and teamwork between departments and genders can be improved.

References:
Remote Ischemic Preconditioning (RIPC) does not induce a lasting effect on intestinal microcirculation and mitochondrial function during hemorrhagic shock in rats

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Background: Intestinal integrity is crucial to maintain global homeostasis in critical illness, but seems to be affected during hemorrhage-reperfusion (HR). Regional microcirculation and mitochondrial function are promising targets for improving regional oxygen delivery. Since remote ischemic preconditioning (RIPC) induces potent tissue protection in experimental animal models with subsequent oxygen deprivation, the aim of this study is to characterize intestinal microcirculatory and mitochondrial alterations during HR and clarify the microcirculatory and mitochondrial late-onset effects of RIPC.

Materials and Methods: 40 male Wistar rats (approval: 81-02.04.2018.A308) were randomized into 4 experimental groups. Hemorrhage (H) was induced by arterial blood withdrawal (MAP: 40±5mmHg, 1h). Subsequently, the collected blood was retransfused (R) and animals were observed for 2h. Control animals were observed for 3h without H. RIPC or sham treatment was induced 24h prior by repetitive, atraumatic compressions of both hindlimbs (4 x 5 min ischemia + 5 min reperfusion). The intestinal microcirculation was evaluated by spectrophotometry, laser-Doppler flowmetry and incident-darkfield imaging. Mitochondrial function was measured by respirometry and malondialdehyde concentration (MDA) was determined as a marker for lipid peroxidation. Plasmatic D-lactate concentration was determined to estimate intestinal damage.

Statistics: Macro- and microvascular data: 2-way ANOVA + Bonferroni post-hoc correction. Mitochondrial data: Kruskall-Wallis test + Dunn´s correction. D-lactate concentration: 1-way ANOVA + Turkey test. Significant results were assumed for p≤0.05 vs. baseline values and between experimental groups.

Results: H decreased microvascular oxygenation as the primary endpoint and reduced indices of microvascular perfusion. R of the removed blood volume reversed this effect. HR did not affect mitochondrial function, MDA concentration and mitochondrial oxygen delivery. Prior RIPC had no effects on intestinal microcirculation and mitochondrial function and did not influence MDA- and D-lactate concentration.

Conclusion: RIPC has no long-lasting effect on microcirculatory and mitochondrial variables. The intestinal microvascular oxygenation is depleted during HR as a result of decreased microvascular perfusion, but can be sufficiently reversed by blood retransfusion. Mitochondrial failure seems to play a subordinated role during HR.
**05AP01-04**

**Traumaglobine study: time to obtain transcutaneous hemoglobin measurement in severe trauma resuscitation**

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**Background and Goal of Study:** Hemorrhagic shock is a significant cause of preventable death in severe trauma patients, necessitating rapid hemoglobin (Hb) assessment. This study evaluates the speed and efficacy of transcutaneous (SpHb) Hb measurement versus the traditional capillary method (HemoCue) in severe trauma resuscitation.

**Materials and Methods:** We analyzed data from patients treated for severe trauma at the Military Teaching Hospital Sainte Anne, Toulon-France, between January and June 2022. Hemoglobin was measured using SpHb, HemoCue, and complete blood count (CBC) in the laboratory. The study focused on the time to obtain Hb values and the correlation of SpHb with other methods.

**Results and Discussion:** Data from 138 severe trauma patients were analyzed. The median age was 43 years (28-60). The median time to obtain Hb by SpHb was 4.5 min (2.25-6.00). The median time for HemoCue was 9 min (7.00-10.25). This difference was significant (p=0.007).

While SpHb showed a strong correlation with HemoCue (R=0.88), its correlation with CBC was moderate (R=0.49). Despite its speed, SpHb readings were only available for 57% of patients. The faster Hb measurement through SpHb could be critical in making timely transfusion decisions in hemorrhagic shock cases. However, its limited availability compared to traditional methods raises practical concerns for consistent application in all trauma resuscitation scenarios. The discrepancy between SpHb’s efficiency and its applicability highlights the need for further optimization in diverse trauma settings.

**Conclusion(s):** Transcutaneous Hb measurement during resuscitation provides a faster Hb value than traditional decentralized biology methods (HemoCue). Furthermore, the correlation of the Hb value by SpHb compared to the reference method was considered acceptable.

In practice, this monitoring could reduce the decision-making time for transfusion indication in severe trauma patients in hemorrhagic shock, as any delay in transfusion has been shown to increase mortality. However, the transcutaneous Hb value was only available in 57% of severe trauma patients, whereas our care protocol planned for systematic monitoring.

Further studies are needed to determine if its use can be generalized during resuscitation of severe trauma patients, particularly those in hemorrhagic shock, to predict massive transfusion and reduce transfusion times.

**05AP01-05**

**Hemodiafiltration in combatants with tourniquet syndrome**

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**Background and Goal of Study:** The TSSS and RSS guidelines recommend the tourniquet application in life-threatening bleeding. In the modern war in Ukraine, the transportation of the wounded combatants is often delayed because the Russian invaders attack the evacuation brigades. We aimed to analyze the effectiveness of hemodiafiltration in combatants with tourniquet syndrome at the level of stabilization centre.

**Materials and Methods:** We analysed 11 cases of tourniquet syndrome among wounded combatants (mean age 38.4±10 years) who were transported to one stabilization facility where specialized anaesthesiologist and surgeon care is available.

**Results and Discussion:** The tourniquet was applied on 8 wounded on one limb, on three wounded on two limbs. In total, among 14 limbs, there were 4 upper and 10 lower limbs under the tourniquet. Duration of the tourniquet application was: up to 6 hours – 1 limb, 6-12 hours – 10 limbs, 12-24 hours – 3 limbs. The tourniquet conversion was carried out on 6 limbs.

Upon arrival at the stabilization point, all 11 wounded combatants had signs of acute kidney injury: anuria, urine of brown colour. The average serum potassium level was 7.5±0.83 mmol/L, with ECG signs of hyperkalaemia. The plasma creatinine-phospho-kinase (CPK) level in all patients was >50,000 U/L. The average plasma level of LDH was 2417±955 U/L; creatinine - 230±259 μmol/L; urea – 11.6±7.8 mmol/L; lactate – 11.4±1.6 mmol/L.

In all patients at the stabilization centre a 13 Fr dialysis catheter placed in the internal jugular vein under ultrasound control. Low-flow veno-venous hemodiafiltration was performed using an ST150 filter. The average duration of the procedure was 7.7±0.47 hours, the blood extraction rate was 300 ml/min; volume of ultrafiltration 100 ml/h.

All patients showed the positive effect of the procedure: 9 patients had no further need in vasopressors, and the dose of nor epinephrine was reduced in two other patients. Surgeons performed fasciotomy on 11 limbs, amputation on two limbs, a combination of these two operations on one limb.

After stabilization of the condition, all patients were transported to the next point of medical care facilities - to a specialized hospital.

**Conclusion(s):** Low-flow veno-venous hemodiafiltration at the stabilization centre allows the elimination of life-threatening manifestations of rhabdomyolysis and acute kidney injury in wounded combatants with tourniquet syndrome.
**05AP01-06**

**Tourniquet conversion in the wounded combatants**

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**Background and Goal of Study:** Tourniquet syndrome has become an actual problem in modern war. During delayed transportation of the wounded, the tourniquet conversion is recommended every 2 hours. We aimed to study the effect of tourniquet conversion on the severity of tourniquet syndrome.

**Materials and Methods:** We analysed 11 cases of tourniquet syndrome among wounded combatants who were transported to stabilization centre. All the wounded had severe mine-explosive injuries. Among the 11 wounded combatants, six (54.5%) died at further stages of medical care facilities.

**Results and Discussion:** A retrospective comparison of groups of non-survivors (n=6, mean age 32±7 years) and survivors (n=5, mean age 47±5 years) showed the following results. Three of the non-survivors had tourniquet syndrome on two limbs, the other three - on one limb. While among the survivors, all had a tourniquet syndrome of only one limb.

Duration of the tourniquet application: in the group of the non-survivors: 6-12 hours - 6 limbs, 12-24 hours - 3 limbs. In the group of survivors, the duration of the tourniquet application was up to 6 hours - 1 limb, 6-12 hours - 4 limbs.

Tourniquet conversion was performed only on one limb in the group of the non-survivors, and on all 5 limbs in the group of survivors.

Three amputations and 7 fasciotomies of limbs were performed at the stabilization centre in the non-survivors group. In the group of survivors, only fasciotomy was performed on all 5 limbs.

**Conclusion(s):** The timely conversion of the tourniquet contributes to the reduction of the need for limb amputations and better survival of the wounded combatants. Personnel providing first aid to the injured combatants must be trained in timely conversion of the tourniquet.

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**05AP01-07**

**Transplantation of viable allogeneic mitochondria protects kidney function in a mice model of hemorrhagic shock and rhabdomyolysis-induced acute renal injury**

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**Background and Goal of Study:** The development of acute kidney injury (AKI) is independently associated with high mortality rates after major trauma with hemorrhagic shock. Since mitochondrial dysfunction and induction of intrinsic apoptosis in renal tubular cells has been recognized as an important early subcellular change in AKI, this study proposed that the administration of freshly harvested viable mitochondria could ameliorate renal tubular injury in a mice model of 2-hit rhabdomyolysis-related AKI.

**Materials and Methods:** Acute hemorrhagic shock and rhabdomyolysis were induced subsequently in anesthetized mice by withdrawing 0.2 ml of whole blood and intramuscular injection of 50% glycerol solution (6 ml/kg). Mitochondria (100 mg) were freshly isolated from the soleus muscles of naïve mice. A mitochondria or placebo solution was randomly delivered into the tail vein of the experimental mice at 30 min after induction of AKI. 36h later, mice were euthanized, and blood samples and kidneys were collected for analysis.

**Results and Discussion:** An IVIS Spectrum imaging system showed that the expression of fluorescence-labelled allogeneic mitochondria following systemic administration were higher enhanced in the kidneys of mice with AKI. The elevated serum levels of urea nitrogen, creatinine and potassium following hemorrhagic shock and AKI were significantly decreased in mice received mitochondrial transplant. Protein expressions of endogenous antioxidant molecules in the kidney homogenates (Nfr-2, heme oxygenase-1 and superoxide dismutases) were significantly potentiated in mice with AKI. The BAX-to-Bcl-2 ratio and expression of cleaved caspase-3 were also reduced in the mitochondrial-transplanted animals, indicating the attenuation of mitochondrial-mediated apoptosis in the kidney tissues of AKI mice.

Histopathological examination confirmed that degrees of renal tubular injury and numbers of apoptotic cells were improved following mitochondrial transplant.

**Conclusion(s):** Transplantation of freshly isolated mitochondria augments endogenous antioxidant capacity and ameliorates mitochondrial apoptosis in the injured kidneys and preserves renal function after hemorrhagic shock and rhabdomyolysis-induced AKI. Allogenic mitochondrial transplant could be a potential and feasible therapeutic option for prevention and management of AKI secondary to major trauma.
05AP01-08
The comparison of viscoelastic measurements by ROTEM® Delta and ClotPro® in severe trauma patients

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Background and Goal of Study: In the treatment of trauma, understanding the dynamics of coagulation is crucial for effective patient management. This study aims to compare viscoelastic coagulation measurements using devices ROTEM® Delta and ClotPro® in severe trauma patients.

Materials and Methods: This prospective, single-arm, observational cohort study was conducted at a Level 1 trauma center within the University Hospital Brno, Czech Republic. Eligibility for study enrollment encompassed severely injured trauma patients who were admitted to the Emergency Department between November 2019 and October 2021. Measurements were performed using ROTEM® Delta devices (EXTEM, FIBTEM) and ClotPro® (EX-test, FIB-test).

Blood count and standard laboratory coagulation tests were also conducted. Subsequently, an analysis of these parameters was performed using Bland-Altman plots and the Intra-class correlation coefficient.

Results and Discussion: During the study period, 108 trauma patients were analyzed. Among these patients 83 (76.9%) were men and the mean age was 50 years. The median [IQR] of Injury Severity Score was 27 [20; 38] and 41 (38 %) patients required mechanical ventilation.

The intraclass Correlation Coefficient for clotting time (CT) of EXTEM and EX-test was 0.732, indicating moderate reliability. The intraclass Correlation Coefficient for maximum clot firmness (MCF) of EXTEM and EX-test was 0.762, corresponding to good reliability.

The intraclass Correlation Coefficient for MCF of FIBTEM and FIB-test was 0.371, demonstrating poor reliability. This finding contrasts with the results of the study by Núñez-Jurado, where a good correlation between these two devices was observed in cardiac surgery [1]. This discrepancy may be attributed to the coagulopathy commonly developed in severe trauma patients.

Conclusion: In the clinical setting for trauma patients, the assays FIBTEM and FIB-test are not interchangeable, and the agreement between EXTEM and EX-test assays is limited in monitored parameters.

Reference:

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05AP01-10
Flow-controlled ventilation (Ventrain) through a 14 French intubating introducer (Frova) is equally effective to maintain rescue oxygenation as positive pressure ventilation after class III hemorrhage and whole blood resuscitation

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Background and Goal of Study: Effective prehospital airway management is critical to maintain oxygenation after severe trauma hemorrhage. If the patient cannot be intubated and immediate surgical airway access is not an option, it is possible that the only access to the airway is an intubating introducer, which could pass a laryngeal obstruction where an endotracheal tube could not. In such situations, flow-controlled ventilation (FCV) could be a rescue ventilation option.

However, it is not known whether FCV with 21% oxygen through an intubating introducer would be sufficient to maintain oxygenation and ventilation after trauma hemorrhage, which is particularly important in prehospital and military tactical environments with limited oxygen supply.

We compared FCV with intubation and positive pressure ventilation (PPV) in three clinically relevant prehospital phases and hypothesized that FCV would be equally efficient and thus feasible as a prehospital rescue method.

Materials and Methods: 23 male swine, mean (SD) weight 58.3 (4.6) kg, were anesthetized with ketamine/midazolam and hemorrhaged to a mean (SD) 1249 (113) mL and allocated to FCV with 21% oxygen through a 14 French intubating introducer in a semi-occluded airway (n=11) or PPV with a Ppeak mean (SD) 14.8 (0.8) cm H2O, PEEP 0 cm H2O (ZEEP) and FiO2 21% (n=12).

Three prehospital phases were investigated: 15 min on scene without intervention, 30 min whole blood transfusion and 15 min after completion of transfusion.

Results and Discussion: Indexed oxygen delivery (DO2/I) did not differ (p=0.15), indexed oxygen consumption (VO2/I) did not differ (p=0.32), oxygen extraction rate (OER/I) did not differ (p=0.97) and arterial saturation (SaO2) did not differ (p=0.10). pO2 remained at >8.65 kPa in FCV. pCO2 increased in FCV at the end of observation, to mean (SD) 7.30 (0.63) from mean (SD) 6.99 (1.10) at start of intervention.

Intratracheal mean peak and mean pressures were lower in FCV at all times (p<0.0001). Lactate increased in PPV halfway through whole blood transfusion: mean (SD): FCV 3.08 (1.61) and PPV 4.79 (2.10) (p=0.03).

Conclusion(s): FCV and PPV were equally effective to maintain oxygen delivery after trauma hemorrhage and whole blood resuscitation. Sufficient SaO2, pO2 and pCO2 were maintained in FCV, indicating that prehospital FCV should be considered for further investigations as a rescue method when intubation or surgical airway access fail.
05AP01-11 Intramuscular administration of arginine vasopressin improves hemodynamics after porcine class III trauma hemorrhage and whole blood resuscitation

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Background and Goal of Study: Hemorrhagic shock is the leading cause of potentially survivable deaths in the battlefield and civilian settings. Arginine vasopressin (AVP) is released from the neurohypophysis in response to systemic hypotension and mediates hemodynamic effects primarily through vasoconstriction. AVP decreases substantially in a sustained state of shock and is associated with hypotension and a catecholamine refractory state. Low-dose AVP infusion during the resuscitation of trauma patients in hemorrhagic shock decreases blood product requirements, but it is not known if intramuscular administration improves hemodynamics after severe hemorrhage. We hypothesized that an intramuscular push-dose of AVP would improve hemodynamic stability.

Materials and Methods: 16 swine (median weight 57 kg) were exposed to a class III hemorrhage (median 31% of total blood volume) during 45 min, followed by a 45 min observation. The swine were then block randomized to 40 U AVP (n=7) or NaCl (n=9). Both groups were resuscitated with 500 mL of whole blood and observed for 120 minutes. Student's unpaired t-test and two-way analysis of variance were used for statistical analysis.

Results and Discussion: AVP increased systolic blood pressure (SAP) (mean increase 33.5 mm Hg in AVP vs. 7.5 mm Hg in NaCl (p=0.02), and mean blood pressure (MAP), mean increase 33.0 mm Hg in AVP vs. 3.2 mm Hg in NaCl (p=0.01), at completion of whole blood transfusion at 30 minutes. The effect was transient and did not persist after two hours (SAP p=0.13, MAP p=0.12). SvO2 (p=0.64) CO (p=0.47) and CVP (p=0.45) remained unchanged.

Conclusion(s): Intramuscular administration of AVP improved hemodynamics after porcine class III trauma hemorrhage during whole blood resuscitation and should be considered for continued research towards prehospital civilian and military applications, possibly with autoinjectors.

05AP02-01 Slow rewarming has favorable molecular effects in experimental rat models of hypothermic cardiac arrest

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Background and Goal of Study: Cardio-circulatory arrest leads to immediate interruption of the circulation and blood flow with rapid oxygen depletion and depression of organ function. Annually 300,000 cardiac arrests are encountered in Europe and similar number in USA, with a survival rate of 10-15%. While a considerable percentage of cardiac arrests are due to hypothermia, the concern about hypothermia is increasing as deep hypothermia is proposed for brain protection during cardiac surgeries. Over 800,000 coronary artery bypass surgeries or valvular surgeries are performed every year, with approximately 1000 cardiac surgeries of this type carried out every day only in the United States.

Although the protective effects of deep hypothermia have been a topic of extensive studies, the rate of rewarming after hypothermic cardiac arrest (HCA) has not been well addressed. We aimed at depicting the molecular effects of slow versus fast rewarming after hypothermic cardiac arrest on cardiomyocytes.

Materials and Methods: All work was carried out in compliance with the ethical standards and after obtaining the required approvals. Male Sprague Dawley rats (n=20) were anesthetized and cooled with cardiopulmonary bypass (CPB) to a core temperature of 19±1°C till asystole develops. Animals are maintained in cardiac arrest for 60 minutes. Afterwards they were randomized for either fast (45 minutes) or slow (90 minutes) rewarming to target temperature of 35°C using CPB. By the end of experiment, hearts were harvested. Frozen heart samples were used for bulk transcriptome analysis, RT-PCR and apoptosis assessment.

Results and Discussion: RNA sequencing showed slow rewarming protocol to be associated with the differential expression of more than 100 genes related to fatty acids oxidation, oxidative phosphorylation, inflammatory signaling, autophagy, calcium handling and apoptotic response. RT-PCR showed samples with slow rewarming to have a two-fold decrease in the autophagy protein ATG-9 and apoptosis signaling Fas-L, and a three-fold decrease in TNF-α compared to fast rewarming. Slow rewarming was associated with 75% decrease in TUNEL positive nuclei compared to fast rewarming.

Conclusion(s): These findings suggest that slow rewarming have cardio-protective effects after hypothermic cardiac arrest.
05AP02-02
High flow nasal oxygen use in cardiac arrest leads to a rapid increase in PaCO₂ in pigs

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Background and Goal of Study: During CPR, achieving tracheal intubation can be limited by availability of skilled personnel and the need to avoid excessive interruption of chest compressions. Current practice is to insert a supraglottic airway device (SAD) to enable continuous ventilation during CPR. High-Flow Nasal Oxygen (HFNO) has been used to provide apnoeic oxygenation during elective and emergency procedures. The physiological effect of HFNO during apnoea in cardiac arrest (CA) is unknown.

In this study, we compared the partial pressures of arterial CO₂ during CA in two groups of pigs, one with HFNO applied and a control group ventilated with a SAD.

Materials and Methods: N = 12 pigs were anaesthetised and a tracheostomy was sited. CA was induced with application of an AC current across the chest. After a 60 sec interval without intervention, a high-fidelity human airway model was applied to each animal’s tracheostomy, over which the intervention was applied. Pigs were randomised into two groups according to intended intervention: HFNO (FIO₂ 1.0, flow = 60 L/min) or SAD attached to a Waters’ circuit with manual ventilation. Mechanical chest compressions were provided at a rate of 100–120/min. During CA, arterial blood gases were taken every 5 min. After 20 min of CA, defibrillation was attempted with a maximum of 3 shocks. At the end of the experiment all pigs were humanely euthanised.

Results and Discussion: The mean PaCO₂ at baseline was 5.08 +/- 0.82 kPa in the SAD group and 5.22 +/- 1.02 in the HFNO group. After 20 minutes of cardiac arrest the mean PaCO₂ was 7.29 +/- 2.12 kPa in the SAD group and 16.9 +/- 3.95 kPa in the HFNO group (p = <0.05). The rapid accumulation of arterial CO₂ in the HFNO group is faster than expected from previous study of apnoea oxygenation in humans but concurrent with previous experiments in pigs. The PaO₂/FIO₂ (P/F) ratio at baseline was 49.3 ± 25.7 in the SAD group and 52.6 ± 11.3 in the HFNO group. After 20 minutes the P/F ratio in the SAD group was 21.1 ± 16.1 compared to 9.44 ± 4.17 in the HFNO group (p = 0.18).

Conclusion(s): We observed a rapid accumulation of arterial CO₂ during ventilation using HFNO during cardiac arrest and apnoea.

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05AP02-03
Incidence, diagnosis and treatment of traumatic carotid injury in patients with skull base fracture. Audit of our institution database

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Traumatic injury to the internal carotid artery is observed in 1-2% of cases of severe blunt head trauma, constituting 2-4% of all carotid dissections. The scarcity of studies that address the incidence of injuries to this artery in relation to blunt head trauma has generated a lack of consensus on the indication of CT angiography for diagnosis during the initial evaluation.

The purpose of this audit is to describe the incidence of injuries to the internal carotid artery in trauma patients with skull base fractures admitted to our center. The intention is to evaluate, in the future, the usefulness of CT angiography in this type of patient during the initial evaluation, with the aim of determining its profitability.

The audit research includes the key words: trauma patient and skull base fracture (including frontal, ethmoid, sphenoid, temporal, and occipital bones). The research was conducted using the records from our database at Parc Tauli University Hospital in Sabadell, covering the period from March 2014 to May 2023.

A total of 152 patients admitted to our hospital as polytraumatized patients and diagnosed with skull base fracture by tomography have been collected. The average age of these patients was 47 years, the majority being men (78.9%).

Within the total sample, severe traumatic brain injury (TBI) was observed in 143 cases, equivalent to 94%, with an average Trauma Severity Index (ISS) of 25.7 and a mortality rate of 23.7%. CT angiography was performed on 54 patients. From the global analysis, it was identified that 12 patients (100% were men) presented injuries to the internal carotid artery, representing 7.89% of the sample. All of them had severe TBI, with an average ISS of 36.1 and an average prehospital Glasgow Coma Scale (GCS) of 6. This group showed a mortality rate of 33.3%.

The data obtained show that the incidence of traumatic carotid injury is not negligible in patients with skull base fracture. However, these patients have been found to present elevated Injury Severity Indices (ISS), severe traumatic brain injury (TBI), and a considerable mortality rate.

In the future, it will be necessary to perform new subgroups analysis considering, among other aspects, the common characteristics of patients with injuries to the internal carotid artery. This will determine the usefulness of performing computed tomography angiography (CT angiography) in patients with skull base fractures.
05AP02-04
Post-cardiac-arrest-anaesthesia with midazolam in out-of-hospital post-resuscitation care: a propensity score analysis

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Background and Goal of Study: To date, there are only a few recommendations for the implementation of preclinical post-arrest anaesthesia. Therefore, the present study examines the characteristics and effects of post-arrest-anaesthesia with midazolam on target parameters of post-resuscitation-care.

Materials and Methods: Between 2019-2021, all emergency operations in Dresden, Gütersloh, and Lippe were assessed for adult patients with out-of-hospital-cardiac-arrest (OHCA), unconsciousness, and return-of-spontaneous-circulation (ROSC) to hospital admission.

Primary endpoint was the achievement of target parameters of post-resuscitation-care (systolic blood pressure≥100mmHg, etCO2:35-45mmHg, SpO2:94-98%) by the application of midazolam in the context of post-arrest-sedation, as well as additional narcotics used. Propensity-score-analysis was used for evaluation.

Results and Discussion: From 391,305 emergency operations, 2,298 OHCA (incidence 0.58%; 95%CI:0.54-0.63) with ROSC were observed until hospital admission in 706 patients (30.7%; w=34.3%; age=68±14 years).

Post-arrest-anaesthesia using midazolam was performed in 64% (n=309). Propensity-score-analysis showed that guideline-recommended oxygenation (midazolam total: odds ratio (OR): 1.958, 95%CI: 1.198-3.202; p=0.00074; midazolam mono: OR: 1.846; 95%CI: 0.940-3.626; p=0.0750; midazolam+analgesic: OR: 1.957; 95%CI: 1.184-3.233; p=0.0088; midazolam+relaxant: OR: 2.000; 95%CI: 1.363-3.52; p=0.0163; midazolam+analgesic+relaxant: OR:2.417; 95%CI: 1.233-4.736; p=0.0101) and ventilatory targets (midazolam total: OR: 1.720; 95%CI:1.051-2.816; p=0.0311; midazolam mono: OR: 1.846; 95%CI: 1.011-3.768; p=0.0461; midazolam+analgesic: OR: 1.708; 95%CI: 1.032-2.827; p=0.0372; midazolam+analgesic+relaxant: OR: 2.727; 95%CI: 1.367-5.442; p=0.0044) were achieved significantly more often than without anaesthesia, with no evidence of an increased chance of haemodynamic complications (midazolam total: OR: 1.303; 95%CI:0.828-2.051; p=0.2527; midazolam mono: OR: 1.647; 95%CI: 0.902-3.009; p=0.1046; midazolam+analgesic: OR: 1.162; 95%CI: 0.749-1.804; p=0.5027; midazolam+relaxant: OR: 1.444; 95%CI: 0.861-2.359; p=0.1419; midazolam+analgesic+relaxant: OR: 1.333; 95%CI: 0.724-2.457; p=0.3562).

Conclusion(s): Application of midazolam in combination with an analgesic allows early achievement of oxygenation and ventilation goals of post-resuscitation-care without evidence of adverse haemodynamic effects.

05AP02-05
Metronome use enhances the maintenance of a target compression rate in a manikin model of cardiopulmonary resuscitation

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Background and Goal of Study: Determine the influence of a metronome on the quality of chest compressions in an educational setting.

Materials and Methods: Manikin model, data from medical students during CPR classes. The students were randomized into three groups: no metronome (NM), metronome at 100 (M100), and metronome at 120 beats per minute (M120). Each student performed three cycles of 30 compressions, alternating with a second student and then returning to the first student, completing nine cycles (C1-C9).

Results and Discussion: The authors investigated 31,530 compressions from 1051 cycles of 128 students. The mean compression depth was 37.28 ± 7.72 mm, with no differences among the groups (p=0.44). The intragroup and intergroup rates comparisons are in Figure 1.

Three hundred sixty-five cycles (34.73%) had means out of the recommended range (100-120), with no influence between the groups (p=0.21). Three hundred cycles (28.54%) were above 120 CPM, with fewer occurrences in the M100 (p=0.002), and 65 cycles (6.18%) were below 100 CPM, with fewer occurrences in the M120 group (p=0.001), figure 2.
The students who repeated the three cycles increased the depth of compressions with a statistical gain only in M120 (p=0.02). The overall depth mean was higher in male students (41.4 ± 6.7 versus 35.13 ± 7.4, p=0.0001).

Conclusion(s): The overall depth needed improvement, particularly among female students. Our study showed a trend of increasing compression rates over time, which did not occur in M100, and the metronome at 120 BPM increased compression depth in the late stage. Future studies must investigate the effects of intermediate rates for the metronomes.

References:

05AP02-06
Intraoperative cardiac arrest and its 30-day mortality in a Brazilian quaternary university hospital: an 18-year observational study
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Background and Goal of Study: Cardiac arrest (CA) is a rare complication during the intraoperative period with the possibility of a catastrophic outcome. There are few studies in the world evaluating mortality up to 30 days after intraoperative CA. We aimed to evaluate the intraoperative CA and anesthesia-related cardiac arrest (ARCA) rates and its outcomes up to 30 postoperative days in a Brazilian university hospital.

Materials and Methods: After approval from the local IRB, a retrospective observational study was conducted from 2005 to 2022. The intraoperative CA and ARCA rates, death and survival up to 30 postoperative days were described over 18 years and into three periods (2005-2010; 2011-2016; 2017-2022) and were calculated in relation to age group, sex, ASA physical status, anesthetic technique, and surgical specialty. Causes of intraoperative ARCA and its outcome up to 30 days were identified. The X2 test was performed to identify differences between rates of dichotomous variables and Tukey’s proportion test with Bonferroni correction was applied. Logistic regression was performed to identify risk groups. All rates were expressed in absolute values per 10,000 anesthetics, followed by 95% confidence interval (95% CI).

Results and Discussion: In 154,178 anesthetics, the intraoperative CA rate was 19.2 (95% CI 16.5–21.9; n=297 CA) and of death rate up to 30 days was 16.1 (95% CI 13.9–18.2; n=248 deaths), with survival rate of 16.5%. The major risk groups of CA and death rates were age less than 1-year old, emergency, cardiac surgery, and general anesthesia (p < 0.001). Sixteen ARCA (1.0 per 10,000 anesthetics [95% CI 0.4–1.6]) and four anesthesia-related deaths (0.26 per 10,000 anesthetics [95% CI 0.0–0.5]) were identified, corresponding to 75% of survival. In 81% of ARCA and 100% of anesthesia-related deaths, the airway management was the primary cause. Despite an increase over time in the proportion of ASA ≥ III patients and surgical complexity, a statistical reduction of CA from the first to the second and third periods in addition to a non-statistical reduction of ARCA in the third period were observed. This suggests an increase in patient safety.

Conclusion(s): The study showed high intraoperative CA and death rates up to 30 postoperative days, mainly in less than 1-year old, patients with ASA ≥ III, emergency, and cardiac surgery. There were low ARCA and anesthesia-related deaths, and the majority due to airway management.

05AP02-07
Inhaled argon during cardiopulmonary resuscitation improves outcomes after arrest
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Background and Goal of Study: Survival to meaningful neurologic outcome after out-of-hospital cardiac arrest (CA) continues to occur at dismally low rates, <10%. Recently, inhaled noble gas therapy during cardiopulmonary resuscitation has demonstrated promising results. While noble gases are characterized by no chemical reactivity with other elements, they have demonstrated biological activity at varied enzyme and receptor sites. However, their key mechanism of action in CPR remains unknown.1 We aimed to determine the efficacy of inhaled argon on ameliorating the multiorgan dysfunction associated with prolonged cardiac arrest.

Materials and Methods: Eight male Sprague Dawley rats were utilized. Rats were intubated, mechanically ventilated, and anesthetized with isoflurane. 7.5 min of fibrillatory arrest was produced via esophageal pacing probe. CPR was initiated utilizing an automated chest compressor at a rate of 200/min with a controlled depth. Animals were randomly assigned to inhaled argon (70% with 30% O2) or control (70% N2 with 30% O2) Defibrillation and epinephrine were given, in a standardized fashion as necessary. If return of spontaneous circulation (ROSC) was achieved, epinephrine drip was titrated to maintain a mean arterial pressure (MAP) of 70 mmHg. Data was collected every 40 sec during CPR and at 15 min, 1 and 2 hr after ROSC. Data were analyzed using unpaired t-test. Significance set at p <.05, two-tailed.

Results and Discussion: There was no significant difference in rate of ROSC between groups, however time to achieve ROSC was significantly reduced in the argon group, 353 v. 1,101 seconds, p = 0.02. Furthermore, animals treated with argon had increased survival time, all lived until end experiment (120 min) v. control who died on average at 42 ± 8 minutes after ROSC, p = 0.01. Decreased epinephrine requirement to maintain mean arterial pressure at 70 mmHg was seen in argon group 12 ± 10 ul min-1 vs 66 ± 28 ul min-1 in the control group. There was no significant difference in peak lactate or other arterial blood gas markers.

Conclusion(s): Inhaled argon therapy remains a promising novel treatment after prolonged CA. While other animal models have suggested similar findings, this is the first description in a fibrillatory rat model. Continued evaluation of cardiac function, cerebral blood flow, and post-arrest mitochondrial function may help elucidate the mechanism of action of this new drug.
Diagnosis and treatment of carotid cavernous fistula in an intensive care unit patient after trauma

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Background: Carotid-cavernous fistulas (CCFs) are anomalous vascular connections that permit blood to circulate from the carotid artery into the cavernous sinus resulting in chemosis, proptosis orbital pain, visual loss, cranial nerve deficits and even intracerebral or subarachnoid hemorrhage. In this case, we presented the period of diagnosis and treatment of a challenging ICU patient with CCF.

Case Report: On the 28th day of his ICU stay, a 37-year-old male patient, who had been receiving mechanical ventilation, sedation, and inotropic support following a motorcycle accident, presented with redness, swelling, and excessive tearing in his left eye. Ophthalmology was consulted, and considering the prolonged ICU stay, an infection was suspected as the cause. Consequently, antibiotic eye drops and amphotericin B were initiated, albeit with no response. The eye swelling worsened, and proptosis became evident (Figure 1).

Three days later, following consultations with ophthalmology and ENT, an MRI angiography identified a CCF. The patient was referred to interventional radiology for endovascular intervention, where trans arterial embolization was performed. Subsequently, the edema in the patient’s eye gradually subsided, and his overall condition improved. Finally, he was discharged to the ward without complications on the 42nd day.

Discussion: CCFs which may present acutely or insidiously have been reported to occur with cranio-cerebral traumas. As in our case, critical trauma patients who are under the sedation and inotropes in ICU presenting orbital findings may not be initially considered as a CCF patient due to concomitant problems. Nevertheless, diligent evaluation and subsequent monitoring can lead to a precise diagnosis, thereby averting potential complications.

References:

Learning Points: If initial treatments for orbital findings like chemosis, redness and proptosis in ICU trauma patients do not improve the condition, CCF as a differential diagnosis should be kept in mind.

Disseminated intravascular coagulation after treatment with antithymocyte globulin for kidney transplant: a case report

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Background: Kidney transplantation is the healing therapeutic option for End-Stage Renal Disease. Advances in anesthetic combined with development of accurate immunosuppressive therapies have conditioned an expansion in the transplant inclusion criteria.

Case Report: A 50-year-old underwent kidney transplant, received thymoglobulin as prophylactic immunosuppressive therapy. In the 24-hour postoperative period the patient’s clinical condition deteriorated rapidly showing progressive anemia. The initial blood gas analysis revealed a pH of 7.16, hemoglobin of 5.4 g/dL, and lactate levels of 14 mmol/L. Hemorrhagic shock was suspected, prompting transfusion of blood products guided by ROTEM® and an urgent CT scan was discarded active bleeding and anastomosis leak. Initial laboratory tests revealed thrombocytopenia, prolonged prothrombin time, activated partial thromboplastin time, and elevated D-dimer. Clinical examination combined with these results met criteria for disseminated intravascular coagulation (DIC), which was possibly caused by thymoglobulin treatment. The patient required vasopressor support, anticoagulant-free renal replacement therapy, and transfusion support. In ICU, low Global End-Diastolic Volume Index values were noted, requiring fluid therapy guided by minimally invasive cardiac output monitoring. Restrictive transfusion support was administered despite persistent anemia and coagulopathy, and wide spectrum antibiotic were administered due to elevated procalcitonin levels. From the fourth day onwards, the patient improved clinically and analytically, with a progressive reduction in ventilatory and hemodynamic support, finally being discharged on the tenth day after the renal transplantation attempt.

Discussion: We have to keep in mind CID as a possible severe postoperative complication after kidney transplant.

References:
Learning Points:
• Thymoglobulin and its association with CID
• Massive elevation of procalcitonin plasma levels in the absence of infection with rATG

05AP02-11
Diagnosis of pulmonary thromboembolism during cardiorespiratory arrest with ultrasound

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Background: Pulmonary thromboembolism is a reversible cause of cardiorespiratory arrest, associated with high mortality, difficult to diagnose during cardiopulmonary resuscitation and with the possibility of intravenous and radiological treatment. Hemodynamically, there is an increase in right afterload, with a sudden drop in left preload and a decrease in cardiac output. In addition, there is an alteration of the V/Q ratio due to increased death space. The severity of pulmonary thromboembolism is established according to the speed of onset and the pulmonary arterial territory affected.

Case Report: A 75 year old man suffered in-hospital cardiorespiratory arrest at the end of the scheduled hemodialysis session. Background: Diabetes mellitus, hypertension, dyslipidemia, multifactorial chronic kidney disease in hospital hemodialysis program and amputation of right lower limb due to peripheral artery disease. Advanced cardiopulmonary resuscitation were started immediately, and echocardiography with a subxiphoid approach, where a mobile thrombus was observed in the right atrium that moved towards the right ventricle and pulmonary artery. Intravenous alteplase 100mg was administered and cardiopulmonary resuscitation was maintained for 120 minutes. Finally, spontaneous circulation was restored with moderate pulmonary hypertension estimated by ultrasound, right ventricular overload and global alteration of contractility.

Discussion: The use of echocardiography during cardiorespiratory arrest allows rapid diagnosis of potentially treatable causes of arrest such as cardiac tamponade, pulmonary thromboembolism, pneumothorax. A rapid approach is performed, with a subxiphoid plane, without interfering with chest compressions or airway management.

References:

Learning Points: The use of immediate echocardiography during cardiopulmonary resuscitation allows a rapid diagnosis of some of the reversible causes of arrest.
06AP01-01
Change characteristics of the High Frequency Variability Index (HFVI) in patients receiving ultrasound-guided peripheral nerve block

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Background and Goal of Study: The high-frequency variability index (HFVI), renamed from the analgesia nociception index which reflects the autonomic nerve activity related to the stress, is an objective measure of nociception. This study aimed to clarify the change characteristics of HFVI before and after peripheral nerve block (PNB), possibly contributing to the assessment of the efficacy of PNB before emergence from general anesthesia.

Materials and Methods: This study enrolled 30 patients who underwent elective upper-limb surgery. They received general anesthesia with propofol, remifentanil, and rocuronium. After the surgery, the median and maximum HFVI values were recorded during two periods: the 10-minute period before the PNB (T1 period), HFVImed1 and HFVImax1) and the 20-minute period after the PNB (T2 period, HFVImed2 and HFVImax2). Patients' pain levels were assessed, using the Numerical Rating Scale (NRS), at the following time points: upon leaving the operation room (N1) and after the analgesic effects of PNB had subsided (N2).

Differences between HFVImed1 and HFVImed2 and between HFVImax1 and HFVImax2 were evaluated using the Wilcoxon signed-rank test. The correlation between these differences and N2 was examined using Spearman's rank correlation coefficient. P-values of <0.01 were considered to be statistically significant in all tests.

Results and Discussion: We analyzed 28 cases with N1 = 0 in 30 cases. In cases with N2 ≥4, HFVImed2 was significantly higher than HFVImed1 (48.0 [43.3-64.5] vs. 61.0 [51.3-75.3], median [interquartile range, IQR]), and HFVImax2 was significantly higher than HFVImax1 (58.5 [51.8-74.8] vs. 76.0 [72.3-83.0]). However, in cases with N2 ≤3, no statistical difference was observed (HFVImed: 62.0 [48.0-76.3] vs. 62.0 [51.0-79.0], and HFVImax: 66.5 [62.3-83.5] vs. 75.0 [63.3-88.3]). Positive correlations were noted between N2 and the differences in “HFVImed2 – HFVImed1” and “HFVImax2 – HFVImax1” (correlation coefficient: r=0.57 and r=0.56, respectively).

These results suggest that the elevation in HFVI values reflects the severity of pain and the efficacy of PNB.

Conclusion(s): The elevation in HFVI values after PNB could be a valuable indicator for assessing the efficacy of PNB in patients expected to have postoperative pain levels of ≥4 on the NRS.

06AP01-02
The efficacy of the intracavitary electrocardiography for the correct catheterization of central venous access devices in the routine clinical practice in a tertiary hospital. An observational study

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Background and Goal of Study: Catheterization of the central venous access devices (CVADs) is widely used technique with potentially serious associated complications. Control of the correct placement of their tip is a current issue that must be carefully evaluated. One of the method that has shown efficacy is the Intracavitary electrocardiography (IC-ECG).

IC-ECG is a safe and inexpensive method, based on the use of the catheter tip as a “migratory intracavitary electrode”. It was implemented in our hospital in 2019. The aim of this study is to verify their efficacy.

Materials and Methods: A retrospective observational study was carried out in our tertiary center, reviewing data from 144 patients (72 CVAD inserted with IC-ECG and 72 without IC-ECG). The lower third of the superior vena cava was consider the correct placement of the tip, assessed with chest X-ray. No statistically significant clinical or demographic differences were found between groups.

In both groups, the correct placement of the tip was evaluated and whether it was necessary to perform the technique again due to malposition. For this purpose, the chest X-ray performed after cannulation as reviewed.

Results and Discussion: No statistically significant differences were found either between subsequent repositioning (IC-ECG 31% vs. without IC-ECG 35%; p = 0.59) or having to perform again the technique (IC-ECG 36% vs. without IC-ECG 64%; p = 0.059). One of the consequences of CVAD's malposition is to perform again the technique, because the catheter is not advanced enough. In this regard, if the IC-ECG is used to place CVADs performing a new puncture for relocation occurs in 34% of the cases compared to 64% observed without IC-ECG group. This difference may be clinically relevant due to the risks and complications associated with a second puncture.

Conclusions: The efficacy of the IC-ECG could not be verified in our study although its efficacy is well reported in other studies. Implementing a technique without a protocol can lead to a lack of effectiveness due to the variability of the staff. We are going to write a protocol to be implemented in our center. Following a CVAD cannulation protocol with IC-ECG we would get better results although further studies will be needed.

Reference:
06AP01-03
Continuous versus intermittent, noninvasive monitoring of vital signs in hospitalized, ward based adult patients: a systematic review and meta-analysis

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Background and Goal of Study: The current standard of ward care is intermittent manual monitoring of vital signs. Wearable, wireless devices that continuously record vital sign measurements have potential to aid early identification of clinical deterioration and avoid intensive care unit (ICU) admissions. This review aimed to compare continuous, noninvasive monitoring with intermittent monitoring of vital signs in identification of deterioration and prevention of complications for hospitalized, ward-based patients.

Materials and Methods: A systematic and comprehensive search was conducted using PubMed, MEDLINE, EMBASE and Cochrane database from January 1980 to September 2023. Studies comparing the use of continuous, noninvasive, vital signs monitoring against standard, intermittent vital sign monitoring for detecting deterioration and clinical outcomes in adult, hospitalized patients were included.

Tools were used to assess the risk of bias: the Cochrane risk of bias tool for randomized controlled trials and the Newcastle Ottawa Scale for non-randomized studies.

Results and Discussion: After removal of duplicates, 1610 studies were identified. Following screening by title and abstract, 73 articles with possible relevant outcome were selected and, based on a full text review, 21 deemed eligible for inclusion. Twelve additional articles meeting the inclusion criteria were identified outside the systematic review for a total of 33 articles included for analysis.

Trials with the following designs were considered eligible for inclusion: 6 randomized controlled trials, 15 prospective and retrospective cohort investigations and 12 before and after studies comparing continuous monitoring with intermittent monitoring in hospitalized, ward-based patients.

Main outcomes measures were ICU transfers, escalation calls, time critical treatment delivery, all clinical complications, length of stay and mortality.

Some studies showed that remote monitoring is capable of generating early warnings for patient deterioration. There was a trend towards reduced unplanned transfers to intensive care and escalation calls with continuous, noninvasive monitoring.

Conclusion(s): Based on the results obtained in this systematic review, continuous monitoring may contribute to early detection and potentially result in prevention of clinical complications. However, more prospective studies are required to support this concept.

06AP01-04
Measurement of released histamine in plasma stimulated by anesthetics using electrochemical biochip for pre-anesthetics screening test

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Background and Goal of Study: Systemic anaphylaxis is serious and potentially life-threatening but often under-recognized in the perioperative period. Prompt assessment and treatment are critical in severe anaphylaxis. The measurement of serum histamine and tryptase levels is valuable for diagnosing anaphylaxis. Our study aims to develop a gold nano-hemisphere biochip for detecting the concentration of histamine.

Materials and Methods: The biochips consisted the 3-electrode system with a screen-printed silver chloride(Ag/AgCl), carbon as a reference electrode a counter electrode and a nano-gold as a working electrode. The study was approved by the Institutional Review Board I&II of Taichung Veterans General Hospital (CF22169A#1).

Results and Discussion: In order to quantify the measured antigen impedance values into antigen concentrations, a histamine concentration-impedance standard curve was first established using histamine antibodies and standard antigen samples. As shown in figure 1, the impedance graphs for four different histamine concentrations (0.1, 0.5, 1, and 10 ng/ml) are displayed. The difference in impedance values from the measurements was plotted in figure 2 as the histamine impedance-concentration standard curve. The R2 value for the histamine impedance-concentration standard curve was 0.9565, indicating excellent linearity.

Figure 1.

Figure 2.
Conclusion(s): This study utilizes a biochip developed through electrochemical impedance spectroscopy analysis, which can provide the most real-time, cheap, and highly sensitive detection of histamine concentrations, aiding in the diagnosis of anaphylaxis immediately.

**06AP01-06**

How much does the peripherally inserted central venous catheter tip move when the upper extremity changes position? A retrospective cross-sectional study

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**Background and Goal of Study:** Peripherally inserted central venous catheters (PICC) are the catheters of choice when a venous infusion needs to be secured. However, there have been few studies on catheter tip malpositioning due to upper limb movement. In particular, PICC are inserted with the abduction of the upper limb, but the tip position needs to be confirmed because the daily life of the patient is with the adduction. In this study, we compared whether the catheter tip moves depending on the position of the catheter by using a chest X-ray at the end of the procedure.

**Materials and Methods:** After Institutional Ethics Committee approval, 50 patients were included in this study. Retrospective data were collected from the anesthetic record and the Hospital Information System. All patients met all of the following criteria: 1) PICC insertion was performed between January 2022 and December 2023, 2) Two chest X-rays were taken after insertion to confirm the position, one in the upper extremity rotated position (abduction), and the other in the internal rotation position attached to the trunk (adduction), and 3) The patient was at least 18 years old.

The tip position measured with abduction and adduction is compared. The measurement is based on the tracheal bifurcation and the distance traveled is calculated.

Statistics were performed with a corresponding t-test, with p < 0.05 as the significance level.

**Results and Discussion:** In all cases, no insertion problems occurred. The average patient was 56 years old (159 cm, 57 kg). The insertion length was 36+/−3.4 cm. 48% of the cases were inserted through the right upper limb. The tip position was 2.7+/−27 mm centrally from the tracheal bifurcation during insertion (abduction) and 17.9+/−31 mm in the internal rotation position with the upper limb in contact with the trunk (adduction). The tip position was statistically significantly shifted (p=0.000000001). The distance moved with the upper extremity position change was 15+/−15 mm. It was confirmed that the tip position of the catheter changed with upper extremity movement.

This study indicates that even if the catheter is in the correct position at the time of insertion, malpositioning may still occur. It is important to check the tip position periodically and to use the catheter with the possibility of malpositioning.

**Conclusion:** PICC inserted through the upper limb moves after insertion depending on the position. The average distance of movement was 15 mm.

**06AP01-07**

An automated routine laboratory method for screening and quantification of direct oral anticoagulants (DOACs) in a single run using preparation module (CLAM) coupled liquid chromatography - tandem mass spectrometry (LC-MS/MS)


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**Background and Goal of Study:** Measuring DOAC levels is of high interest perioperatively and imminent in acute care. Presently, DOAC levels are assessed indirectly via anti-Xa or anti-IIa activities or insufficiently via thromboplastin time, ecarin clotting time or activated partial thromboplastin time. A point of care method was recently taken off the market (ClotPro®, Haemonetics GmbH, Munich, Germany). LC-MS/MS is a system for simultaneous measurement of multiple drugs and established in therapeutic drug monitoring.

Due to the complex instrument handling it is not available for 24/7 routine in clinical laboratories. We introduce the coupling with a preparation module that allows the use of LC-MS/MS as a routine assay for DOACs.

**Materials and Methods:** Routine blood samples from DOAC patients identified during premedication were investigated using a LCMS-8050® (Shimadzu Corporation, Kyoto, Japan) coupled with an automated preparation system (CLAM-2030®, Shimadzu Corporation, Kyoto, Japan). Laboratory personnel was blinded for the type of DOAC. Protein precipitation and filtration was performed by the CLAM module. Filtrate was automatically transferred to the LC-MS/MS system.

Injection and chromatographic separation was performed with a sharp linear gradient on a fused core column at 45°C. Target compounds were automatically identified using retention time, as well as occurrence and ratio of quantifier and qualifier. Deuterated internal standards were used for quantification. As a reference, DOAC levels were assessed using chromogenic tests (HemosIL DTI assay & HemosIL Anti-Xa assay, Werfen GmbH, Munich, Germany) on ACL TOP 750 system (Werfen GmbH, Munich, Germany).

**Results and Discussion:** Plasma samples of 56 patients were included. Screening results corresponded with patients’ DOAC medication. Correlation between the methods was high: Apixaban r=0.984, y=1.019x−1.354; Rivaroxaban r=0.986, y=1.063x−1.663; Dabigatran r=0.988, y=0.856x−0.362.

Precision of calibrations (range 10-500 ng/ml) and controls was within the manufacturer’s limit of 20%. Running times including sample preparation were six minutes in median.

**Conclusion(s):** Our results confirm the suitability of the CLAM-LC-MS/MS System as a screening and quantification method for DOAC levels in perioperative and acute care patients. The use as a 24/7 routine method could lead to a significant reduction in turnaround times and facilitate immediate clinical decision making.
06AP01-08
In vitro performance of a novel charcoal capturing device with desflurane

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Background and Goal of Study: The use of a capturing device is becoming a requirement for the continued use of desflurane in the EU according to an EU proposal. We tested the efficacy with which one charcoal filter (CONTRAFluran, CF) – workstation (Aisys) combination with passive gas scavenging captured desflurane under in vitro conditions resembling clinical practice without the confounding factor of patient uptake.

Materials and Methods: Desflurane in O₂/air was administered via an Aisys workstation into a 2 L reservoir bag. CO₂ (160 mL/min) was insufflated into the tip of the reservoir bag. First, to confirm all vaporized desflurane reached the CF, the amount of desflurane collected in a Douglas bag attached to the machine exhaust was compared to the vaporized amount during 15 min runs with the following fresh gas flow (FGF)/vaporizer setting combinations: (L/min/%) 0.3/0.5/0.8, 0.5/1.0/1.5, 1.0/1.5/3, 1.5/3/6, 2.0/2.0/4, 3.0/1.5/6, 4.0/1.0/6, 5.0/0.5/6, and 6.0/0.3/6.
Next, to determine a possible effect of CO₂ administration on CF weight changes, CF weight gain was measured with the same FGF ran over 1 hour but without desflurane. Finally, the ratio of CF weight gain / vaporizer weight loss (= efficacy, expressed in %) was determined for the same 15 min runs with desflurane settings described above. All experiments were (arbitrarily) repeated five times.

Results and Discussion: The amount of desflurane leaving the vaporizer did not differ from the amount in the Douglas bag (P = 0.130): amount of desflurane in Douglas bag (g) = vaporizer loss (g) * 1.065 - 0.5754 (r² = 0.99919). When CO₂/O₂ and air were delivered without desflurane, the capturing device lost weight, especially with FGF ≥ 1 L/min.
Finally, taking into account the results of the previous experiment, efficacy was found to range from almost 100% in the 0.3 to 2 L/min range and from 95 - 93% in the 3 - 6 L/min range.

Conclusion(s): The combination of charcoal based capturing device (CONTRAFluran) installed on the Aisys workstation with passive scavenging captures100-93% of vaporized desflurane over a 0.3 - 6 L/min FGF range under in vitro conditions that mimic clinical conditions. Defining the place of charcoal filters requires both a careful consideration of which parts of the vaporized agent can be reasonably expected to be captured as well as a complete full life cycle analysis of the charcoal and inhaled agent combined.

06AP01-09
Conox responsiveness index to noxious stimuli (qNOX) sensitivity to total morphine equivalent (TME) in opioid naïve and opioid tolerant patients

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Background and Goal of Study: The opioid abuse epidemic is a concerning topic for the society and a challenging setting for anesthesiologists and intensivists. The goal of this study is to verify if the qNOX can assist guiding intraoperative analgesia management for opioid naïve (ON) and opioid tolerant (OT) patients.

Materials and Methods: This study was carried out at the University of Vermont Medical Center after IRB approval under the scope of “Observational study of qNOX performance on patients with a known history of opioid”. A total of 60 patients were recruited (34 ON; 26 OT), all signed informed consent. A patient is considered OT if there is a history of usage of opioids of more than 20 morphine milligram equivalents within 14 days prior surgery. The total morphine equivalent (TME) was quantified according to the table below:

<table>
<thead>
<tr>
<th>Opioid</th>
<th>Codeine</th>
<th>Hydrocodone</th>
<th>Hydrocodone (1-20 mg/day)</th>
<th>Methadone (21-40 mg/day)</th>
<th>Methadone (41-60 mg/day)</th>
<th>Methadone (≥60 mg/day)</th>
<th>Morphine (µg)</th>
<th>Oxycodone (21-40 mg/day)</th>
<th>Oxy- morphine (≥60 mg/day)</th>
<th>Fentanyl (µg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conv.</td>
<td>0.15</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td>8</td>
<td>10</td>
<td>12</td>
<td>1</td>
<td>1.5</td>
<td>3</td>
</tr>
</tbody>
</table>

The depth of anaesthesia monitoring was done through processed EEG using a Conox monitor (Fresenius Kabi AG, Germany). The qNOX value was averaged along the surgery for all patients and intraoperative fentanyl was included in the TME using the following CF (0.1(µg dose)/length surgery (h)).

Regression analysis was carried out under the hypothesis that the qNOX would predict the TME differently depending on the group (ON; OT).
Results and Discussion: TME was significantly higher (p-val <0.05) in the OT group, while the median qNOX was 36 and 35 in ON and OT groups respectively. The qNOX predicted TME using an exponential regression, achieving an R² of 0.82 and 0.81 for ON and OT respectively. The difference in the regression curve suggests that to achieve the same qNOX value, the OT patients need a higher TME.

Conclusions: The individual opioid need is highly variable among ON and OT patients. An analgesia monitoring tool, such as the qNOX, is needed to optimize titration and can help guiding administration of opioids in OT patients.

06AP01-11 Nociception-guided remifentanil–desflurane anaesthesia in bariatric surgery

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Background and Goal of Study: Several factors have improved the quality of anaesthesia in recent decades. However, monitoring of nociception is not currently part of standard clinical practice. The Nociception Level Index (NOL Index) is a multi-parameter monitor recently classified as Class II by the Food and Drug Administration and therefore indicated for use in clinical practice as a reliable measure of moderate and intense noxious stimulation. The aim of our study was to determine whether titration of remifentanil using the NOL index reduces remifentanil consumption in bariatric laparoscopic surgery.

Materials and Methods: We performed a case-control observational study in bariatric laparoscopic surgery (sleeve gastrectomy and gastric bypass) under remifentanil titrated by target controlled infusion and desflurane. In the control group (24 patients) standard monitoring was used, whereas in the other group we added the nociception level index. In the control group, the target of remifentanil was modified based on clinical signs (blood pressure and heart rate). In the nociception level-guided group (33 patients), the remifentanil concentration was decreased in steps of 0.5 - 1 ng/ml if the index values were below 10 or increased if the values were above 25 for at least 2 minutes. Desflurane was titrated to bispectral index values between 45 and 60. The primary outcome of the study was remifentanil consumption.

Results and Discussion: Compared with routine practice, remifentanil consumption in nociception level-guided patients was reduced from (mean ± SD) 0.15 ± 0.07 to 0.06 ± 0.03 µg/kg/min (p < 0.001).

Conclusions: As reported in the literature, nociception level-guided anaesthesia during bariatric laparoscopic surgery resulted in reduced remifentanil consumption. In our experience the reduction was 40%.

Reference:

06AP01-12 Retrospective evaluation of initial identification of implanted cardiac pacemakers versus defibrillators

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Background and Goal of Study: The implantation of pacemakers (PM) and implanted cardiac defibrillators (ICD) have steadily increased and present a unique challenge in the perioperative period. Correct device identification is paramount for optimal patient safety, and accuracy respective of different staffing groups must be examined.

Materials and Methods: Retrospective data from 515 records from 328 patients with a cardiac implanted electrical device (CIED) who underwent surgical preoperative evaluation in the Anesthesia Assessment Center (AAC) at an academic hospital was evaluated. The frequency of correct and incorrect device identification was compared among physicians (MD or DO), advanced practice providers (APP), and registered nurses (RN).

Results and Discussion: The majority of devices (75.7%) were identified correctly by physicians, APP (which included certified registered nurse anesthetists, advanced practice nurses, and physician assistants), and RNs in the AAC. Pacemakers were more likely to be identified correctly compared to defibrillators (87.3% vs. 41.5%, p value <0.0001). APPs were more likely to identify CIEDs correctly (p value = 0.0283).

Conclusions: We correctly hypothesized the identification of CIEDs would vary amongst the different staffing groups. Our results demonstrate that there remains confusion regarding identification of pacemakers and defibrillators, and further education to all staff is warranted.

References:
Usability of a WeChat applet-based national remote emergency system for malignant hyperthermia in China

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Background and Goal of Study: Malignant hyperthermia (MH) is a rare anesthetic emergency with a high mortality rate in China. A WeChat applet-based National Remote Emergency System for MH (MH-NRES) was developed to assist anesthesiologists to make rapid diagnosis, initiate dantrolene mobilization from other hospitals, execute effective treatment, and provide gene diagnostic services and MH database construction.

The objectives of this study were to evaluate the usability and practical application of the MH-NRES.

Materials and Methods: The cumulative number of users, the number of user growth, visitors and page views per day were collected via the back-end system. Suspected MH cases managed with the assistant of the system were collected through the MH database.

Results and Discussion: The cumulative number of users has been 13,057 after the system launched for public use since July 2022 with a daily user growth of 16 (IQR 11-24). The mean number of visitors was 27(19-35), and the page views was 166(107-247) per day. The module that users visit most often was the Dantrolene Mobilization (31.15%) (Fig 1), followed by the MH Treatment (20.92%), then the Instruction on Dantrolene Use (18.68%). According to MH database, a total of 8 suspected MH cases were collected (Fig 2).

The mortality rate of 12.5% was much lower than that of 53.4% reported in the period from 2015 to 2020 in Mainland China. Among 4 patients who treated with dantrolene, 3 acquired the drugs mobilized by the MH-NRES.

Conclusions: Data obtained from the usability study suggest this system might be a useful tool for anesthesiologists’ management of MH crises, especially for the role of Dantrolene Mobilization. Future feedback from clinical scenarios are needed for further evaluation of this system.

Authors’ contributions: HY and LT contributed equally.

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Ten years of on-line education in anesthesiology: echocardiography for Latin America

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Background: Echocardiography is a versatile tool for anesthesiologists. There is a lack of availability in Latin America. For those reasons starting in 2011, the Chilean Society of Anesthesiology has sponsored an online program with pre-recorded echocardiography lessons, bibliography, and forums.

Methods: An observational, descriptive, and transversal study was carried out, analyzing this online course from 2011 to 2020 led by certified Chilean echocardiographers. In 2021, a survey was emailed to formal students graduated of the program. The survey included multiple-choice questions such as quality, validity, and perceived limitations of the learned content and if the students were still doing Echocardiography.

A categorical scale was showed to participants to grade each topic. The database was then analyzed and percentile results for each question were presented and sorted into categories as similar content was identified.

Results: From 210 students emailed, 176 answers were collected. The main responders were from Chile, Argentina, and Uruguay. Perceived quality of the learned topics was good, as 58% of all the students gave 5 out of 5 points in terms of content utility. None gave 0 points and 97.7% of students considered the contents currently up to date.

Conclusions: There was a high satisfaction index and good perceived quality from the students. Echocardiography basics can be taught remotely due to the image-based technique using au-
06AP02-04
Collaborating with technology: examining the frequency of CHATGPT use in anesthesiology and intensive care journal publications

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Background and Goal of Study: Artificial intelligence (AI)-based linguistic models such as ChatGPT have revolutionized academic life by producing written content for various applications. It has reduced data analysis and literature review time with providing grammatical corrections. The increasing use of these technologies has resulted in debates over academic integrity and ethics. This resulted in the development of content detectors powered by AI, tools to evaluate the authenticity of texts. The aim of this study is to evaluate the usage frequency of AI tools in papers published in anesthesiology and intensive care journals by using AI-powered plagiarism detectors.

Materials and Methods: The study examined 1268 articles from 85 journals in the field of “Anesthesiology” and “Anesthesiology and Intensive Care” using the Web of Science database. Journals’ last issue articles were collected between April 18th and May 18th, 2023, and their English abstracts were investigated using two online AI plagiarism detection tools: Copyleaks and ZeroGPT. The acquired journals were examined based on their Journal Impact Factor ratings, total citation counts, country of publication, index type, and publication frequency. The article type, the writers’ place of residence, and the abstracts’ word count were recorded.

Results and Discussion: Among the articles, 72.2% were published in SICI and SCI-indexed journals. 9.4% were case reports, 15% were reviews, 68.8% were original articles. The average AI usage was 25.1% ± 27.5 and 10.5% ± 15.9, according to ZeroGPT and Copyleaks. 213 articles (16.8%) had less than 1% usage of AI crosschecking in both detectors, named “human written”. The remaining 1055 articles (83.2%) had a usage rate equal to or more than 1% for at least one of the detectors named ‘AI-assisted’.

A strong positive correlation was seen between the length of abstracts and the amount of AI assistance. Native English authors used AI tools less than others (p < 0.0001). If the journal was published in English, there was more need for AI assistance (p < 0.01). Abstracts in the SCI-indexed journals exhibited a greater degree of AI help (p < 0.0001).

Conclusion(s): The use of AI tools has increased in the academy. There is a higher incidence of AI use among authors whose native language is not English. Authors tend to use more AI assistance when submitting to a high-impact journals. AI detector tools should be widely used in journals in the near future.

06AP02-05
Evaluation of the efficacy of telemedicine for pre-anaesthetic check-up in paediatric patients undergoing elective surgery

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Background and Goal of Study: Pre-anaesthetic consultation (PAC) in person often involves a separate trip to the clinic. Telemedicine provides an opportunity to expand the connection of the anaesthesiologist with parents/guardians beyond the operating room. We hypothesized that the use of telemedicine in PAC will be as effective method as conventional patient evaluation conducted in clinics for children planned for elective surgery.

Materials and Methods: Following institutional ethics committee approval, randomised comparative pilot study was conducted on 70 children (3-12 years), 35 in each group with Parents/Guardians having access to any of the smart devices and were able to read and write. Children or guardians with Auditory impairment, inability to speak local language and psychological disorder were excluded.

In Group T (Telemedicine), anaesthesiologist (A1) visited patients via recorded video calls for future reference with senior consultant. PAC reevaluation was done via telemedicine, if needed. Group C (conventional), patients visited clinic. Assessment by Anaesthesiologist (A2) was done on the day of admission. Number of visits/video calls required to get preliminary anaesthesia clearance, delay in surgery, duration of PAC, rate of cancellation of surgery, the concordance of PAC and airway examination finding of visiting anaesthesiologist (A2) (On the day of admission) using concordance scale with preliminary PAC by (A1) and parents/ guardian satisfaction was recorded.

Statistical evaluation was done using SPSS 25.0, unpaired t test and chi square test.

Results and Discussion: Mean duration of primary PAC in Group T was 19.20 ± 4.95 min and in Group C which was 16.27 ± 4.7 min (p = 0.098). The difference between 2 groups was due to poor internet connectivity and time required for comprehension.

Rate of cancellation/delay of surgery was insignificant (p = 0.824) amongst both the groups. None of the patient in both the groups were cancelled due to inadequate PAC.

The Airway concordance between A1 and A2 was 53.3% (Gp T) and 86.7% (Gp C) (p = 0.046).

Conclusion: Telemedicine provides an easier and cost effective method without negotiating with the quality of PAC.
Leveraging multi agents to mitigate cognitive bias in clinical decision-making

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Background: Human cognitive biases poses challenges in health-care decision-making, contributing significantly to errors. Despite ongoing efforts to address them, complete elimination remains difficult. Advancements in artificial intelligence, particularly large language models (LLMs), show promise as tools to reduce these biases. Multi-agent LLM, involved five agents replicating a comprehensive clinical decision-making scenarios through interactions among multiple agents. This study aims to assess the potential of multi-agent LLMs in identifying prevalent cognitive biases in clinical contexts and determining whether diagnostic accuracy improves through discussions facilitated by this multi-agent approach.

Methods: GPT 3.5 through action programming interface calls to OpenAI was used for responses. Five clinical scenarios demonstrating various cognitive biases were chosen. AutoGen, a multi-agent LLM, involved five agents replicating a comprehensive clinical decision-making process (Figure 1). A simulated medical student presents the case, JR1 provides an initial diagnosis, JR2 critically assesses it, a virtual senior physician guides the conversation and highlights potential biases, and a recorder agent summarizes the final diagnoses. The agents' final diagnoses were then compared to actual scenario outcomes.

Results: In all scenarios, JR1's initial diagnoses resembled those of experienced clinicians but were later proven inaccurate. Subsequent discussions among AutoGen's agents uncovered biases like anchoring and confirmation biases, crucial in refining assessments and resulting in accurate final diagnoses in most cases. In one case, however, LLM's reliance on presented information and training data limitations resulted in a misdiagnosis. The results highlight the effectiveness of multi-agent LLMs in correcting cognitive biases and improving diagnostic accuracy. Although it should complement rather than replace human expertise, particularly in complex cases.

Conclusion: Multi-agent LLMs shows promise for reducing cognitive biases in clinical decision making and can contribute to clinical reasoning and medical education. However, continuous critical evaluation and refinement are essential.

Impact of tele-support on Emergency Medical Technicians' gaze behavior in simulated cardiac arrest

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Background and Goal of Study: This study analyzed the impact of tele-support on Emergency Medical Technicians (EMTS) gaze behavior in a simulated out-of-hospital cardiac arrest (OHCA).

Materials and Methods: 43 teams (two EMTS and one study team member) performed two scenarios of OHCA in a randomized order (with and without support), while wearing eye-tracking glasses. Tele-support was provided using Corpus Mission. The primary outcome analyzed differences of dwell time in areas of interest (AOI). Furthermore, performance of ALS and cognitive load of the participants using NASA Task Load Index were evaluated.

Results and Discussion: In this study tele-support did not lead to significant different dwell times in the AOIs. Interestingly, without support seven teams did not consider reversible causes (table 1). Team leaders with support first had a moderate level of cognitive load, which remained stable for the second scenario (54 versus 53). Team leaders, who started first scenario without support, had a decrease of cognitive load for the second scenario with support (48 versus 41). The results of this study support previous findings of potentials of telemedicine for EMTs.

Table 1: Mean time to first event(s).

<table>
<thead>
<tr>
<th></th>
<th>Team leaders with tele support (n=38)</th>
<th>Team leaders without tele support (n=39)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start of CPR</td>
<td>18.28s</td>
<td>18.45s</td>
</tr>
<tr>
<td>Adrenaline administration</td>
<td>364.52s</td>
<td>369.92s</td>
</tr>
<tr>
<td>Defibrillation</td>
<td>69.44s</td>
<td>71.71s</td>
</tr>
<tr>
<td>Ventilation</td>
<td>111.53s</td>
<td>100.02s</td>
</tr>
<tr>
<td>Placing of laryngeal tube</td>
<td>168.24s</td>
<td>179.01s*</td>
</tr>
<tr>
<td>Examination of reversible causes</td>
<td>423.72s†</td>
<td>446.79s‡</td>
</tr>
</tbody>
</table>

* 2 teams did not place LT
† 1 team did not examine reversible causes
‡ 7 teams did not examine reversible causes

Table 2: Mean dwell time per AOI (%).

<table>
<thead>
<tr>
<th></th>
<th>Team leaders with tele support (n=40)</th>
<th>Team leaders without tele support (n=40)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment</td>
<td>33.80%</td>
<td>31.09%</td>
</tr>
<tr>
<td>Manikin</td>
<td>35.26%</td>
<td>34.26%</td>
</tr>
<tr>
<td>Monitor</td>
<td>19.44%</td>
<td>20.48%</td>
</tr>
<tr>
<td>Team members</td>
<td>5.21%</td>
<td>7.11%</td>
</tr>
<tr>
<td>Other</td>
<td>6.23%</td>
<td>7.05%</td>
</tr>
</tbody>
</table>

Conclusion(s): Tele-support did not influence gaze behaviour of EMTs in simulated OHCA.


Acknowledgements: This study was funded by the Medical Scientific Fund of the Mayor of the City of Vienna.
**06AP02-08**

Digitization and artificial intelligence (AI) in pre-hospital emergency medicine (PHEM) in Germany from the provider's point of view - an online-survey on the present state and future prospects

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¹University Medical Center Göttingen, Department of Anaesthesiology, Göttingen, Germany, ²University Medical Center Göttingen, Emergency Department, Göttingen, Germany

**Background and Goal of Study:** Digitization and AI keep on transforming medicine, including PHEM. In the research project CONNECT_ED (Development of an intelligent collaboration service for AI-based cooperation between rescue service and emergency department) an online survey was conducted to explore the current use of AI-based solutions and digital support systems in PHEM and healthcare professionals' attitudes towards them.

**Materials and Methods:** PHEM healthcare professionals were invited to an anonymous survey available online from 23.06.-15.12.2023. Results until 10.12.2023 were included here. Demographic data, respondents' personal use of and attitudes towards key technologies, including digital devices and AI were gathered. Specific questions addressed digital documentation and device interoperability. A fictitious scenario depicting use of AI was used to question the participants' attitude towards AI-based innovations (Fig.1).

**Results and Discussion:** 615 individuals completed the survey (fem=19.7% [121]). Most were aged 18-35 years (47.3%), followed by the age group 36-60 (28.2%) and a small fraction >60 years (1.5%). 27.3% were physicians and 69.1% paramedics. 53% (328) had >10 years of work experience. All respondents used smart devices like phones and 78.9% used AI-linked applications (privately or professionally). Respondents came from 249 postal code regions in Germany. Of these, 70.1% used digital documentation and 54.2% integrated device data directly. 26.1% were able to transfer data into the emergency department's system.

**Conclusion(s):** Our results highlight a demand for increased digitization in PHEM. The results reflect the willingness of the PHEM community to include digital technologies and AI applications. This openness towards technological innovation is an important requirement for the implementation of advanced, AI-driven systems that may have the potential to enhance safety, efficiency and intersectoral collaboration in emergency medicine.

**Acknowledgement:** The project CONNECT_ED is funded by the Federal Ministry of Education and Research (Grant No. 16SV8977).

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**06AP02-09**

Validation of the SWIFT-machine-learning model for prediction of spO2 using publicly available databases

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**Background and Goal of Study:** The utilization of machine-learning models to predict these events holds the potential to significantly enhance their management, particularly in the intensive care unit (ICU). Various approaches, such as the SpO2 Waveform ICU Forecasting Technique (SWIFT), have been developed to address this challenge. Despite their promise, these tools lack external validation beyond the original data sources on which they were created.

This study aims to explore the performance implications of applying the SWIFT model to external databases, with a focus on observing any changes in its efficacy.

**Materials and Methods:** The SWIFT model was trained utilizing the eICU Collaborative Research Database (eICU-CRD), and its validation was conducted on data from the Medical Information Mart for Intensive Care IV (MIMIC-IV) and Amsterdam University Medical Centers Database (UMCdb). The evaluation of SWIFT-5, predicting spO2-changes 5 minutes in the future, and SWIFT-30, predicting in a 30 minute window, was performed for both ventilated and non-ventilated populations.

**Results and Discussion:** Across all datasets, high specificity and negative predictive values (NPV) were consistently observed, underscoring their crucial role in instilling confidence in clinical alarm applications of this particular approach. While SWIFT demonstrated commendable performance on the eICU-CRD data, its efficacy diminished when applied to the MIMIC-IV dataset, particularly in the case of SWIFT-30. However, the validation on the UMCdb dataset indicated promising results, showcasing comparable performance to the eICU-CRD, especially concerning ventilated patients.

**Table. Confusion matrix analysis for prediction of spO2 <94% using SWIFT-5**

<table>
<thead>
<tr>
<th></th>
<th>eICU-CRD</th>
<th>Non-ventilated</th>
<th>Ventilated</th>
<th>MIMIC-IV</th>
<th>Non-ventilated</th>
<th>Ventilated</th>
<th>UMCdb</th>
<th>Non-ventilated</th>
<th>Ventilated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity</td>
<td>0.95</td>
<td>0.95</td>
<td>0.85</td>
<td>0.80</td>
<td>0.90</td>
<td>0.87</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specificity</td>
<td>0.99</td>
<td>0.99</td>
<td>0.98</td>
<td>0.99</td>
<td>0.99</td>
<td>0.99</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PPV</td>
<td>0.90</td>
<td>0.87</td>
<td>0.84</td>
<td>0.77</td>
<td>0.82</td>
<td>0.83</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NPV</td>
<td>0.99</td>
<td>0.99</td>
<td>0.99</td>
<td>0.99</td>
<td>0.99</td>
<td>0.99</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Conclusion(s):** This study exemplifies the necessary step of verifying generalization of machine-learning models outside of their training domain. Future approaches should include this step in order to verify this property. Furthermore, upcoming methods should integrate measures to improve the flexibility and transparency of machine-learning results, aiming to render them more comprehensible in practical applications for human understanding.
06AP02-11
Virtual reality as a tool for distraction in the perioperative period for anxiolysis in adolescents with pectus deformity: a randomized control trial

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Background and Goal of Study: Surgery for pectus deformity is minimally invasive, however, the postoperative discomfort can be significant due to the reconstruction of the thorax' anatomy, and patients tend to be anxious in the perioperative period. Virtual reality (VR) is a non-invasive, non-pharmacological modality that may reduce anxiety in the pediatric population. We aimed to assess if immersive VR as a distraction tool could lower anxiety associated with pectus repair surgery in adolescents.

Materials and Methods: In this single-center, randomized-controlled study, 34 patients aged 14-18 were enrolled in 2022-2023. Patients were scheduled for elective surgery with general anesthesia and were randomly allocated to VR (n=18) or control (n=16) group. Heart rate, blood pressure, oxygen saturation, and respiratory rate were recorded and Strait-Trait Anxiety Inventory (STAI) test was filled out upon admission to the hospital, on arrival at the operating room and in the morning after the surgery. All patients received midazolam as premedication. Patients assigned to the VR group received a VR headset and underwent audiovisual distraction for a minimum of 1 hour before the surgery and optionally after the procedure. The main outcome was the STAI-S score – measures the state of anxiety - in the operating room. Data is in median [IQR].

Results and Discussion: Mean patient age was 16 and 79% were male. Vital parameters measured on admission and in the operating room were similar in the control and VR group. We did not find a difference between the STAI-S scores measured in the control and VR group on admission (39 [34; 47] and 41 [34; 48]); in the operating room (43 [33; 50] and 42 [36 and 50]); and in the postoperative morning (35 [28; 42] and 39 [37; 45], respectively). Multiple linear regression analysis revealed that only STAI-S score measured on admission was a significant predictor of the STAI-S score in the operating room (p=0.014); the use of VR was not associated with the outcome (p=0.591), when controlling for sex, daily screen time and videogame use, and overall anxiety traits.

Conclusion(s): Although VR was proven useful in anxiolysis in previous studies in the pediatric setting, this study could not detect a change in anxiety with the use of VR in the perioperative period of pectus repair surgeries in adolescents. It is conceivable that the midazolam administered as premedication neutralized the effect of VR.

06AP02-12
Pupillometry in the prediction of neuropathic pain after major thoracic surgery. A preliminary report

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1Medical School, National and Kapodistrian University of Athens, Evangelismos General Hospital, Department of Anesthesiology, Athens, Greece, 2Medical School, National and Kapodistrian University of Athens, Evangelismos General Hospital, First Department of Critical Care Medicine and Pulmonary Services, Athens, Greece, 3Aretaeion University Hospital, National and Kapodistrian University of Athens, Department of Anesthesiology, Athens, Greece

Background and Goal of Study: Quantitative pupillometry is used in anesthesiology and pain medicine, providing insights into pain processing and guiding personalized pain management. The aim of this observational study was to evaluate the utility of pupillometry for postoperative neuropathic pain prediction following thoracotomy.

Materials and Methods: Patients >18 years old scheduled for major thoracic surgery were included in the study. Pupillometry measurements using the NPi-200 pupillometer were taken one day before and post-surgery in PACU. Among parameters evaluated were contraction velocity (CV), maximum contraction velocity (MCV), contraction % change (CH%) and dilation velocity (DV). Ambient light was measured with a commercial luxometer. Mean values from both eyes were analyzed for the various pupillometry parameters. General anesthesia was administered following a consistent protocol for all patients. Total intraoperative and PACU opioid dose was calculated using iv morphine equivalents. Eleven-point NRS at PACU, DN4 questionnaire and NRS scale at one-month post-surgery were used for pain assessment.

Results and Discussion: Of the 20 participants (10 males; mean age 68.05), one was lost to follow-up. Of the remaining 19, 11 had mild or no pain at incision site (NRS≤3) and 8 reported moderate/severe pain (NRS≥4) at one-month post-surgery. Seven patients

Figure. Scatter plot diagram of DN4 score at one month versus PACU MCV, as provided by pupillometry, depicting a significant correlation (r=0.731, p=0.001).
had a score of ≥4 in the DN4 questionnaire, suggestive of neuropathic pain. Strong correlations between DN4 score at one-month post-surgery and PACU pupillometry parameters were demonstrated (r=0.497, p=0.043 for DV, r=0.654, p=0.003 for CV, r=0.731, p=0.001 for MCV, r=0.657, p=0.003 for CHHb) (figure). No significant differences were found in intraoperative or PACU opioid dose between patients with and without neuropathic pain at one-month post-surgery. 

**Conclusion:** Immediate postoperative pupillometry measurements are associated with the presence of postoperative neuropathic pain at one-month following thoracotomy. This finding warrants further investigation.

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**06AP03-01**  
**Comparison of pressure support ventilation performance in anesthetic machines: a study using a spontaneous breathing lung model**

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¹International University of Health and Welfare, Mita Hospital, Anesthesiology, Tokyo, Japan

**Background and Goal of Study:** In recent years, pressure support ventilation (PSV) has been widely mounted in anesthetic machines, but its performance has not been extensively studied because of a lack of quantitative research using lung models that simulate spontaneous breathing. This study aimed to compare the performance of PSV function among three different anesthetic machines in default settings, using lung models that replicate spontaneous breathing. We measured the pressure support (PS) values required to achieve the set tidal volume for 2 settings.

**Materials and Methods:** Three anesthesia machines from Dräger (DEU) were compared: 1. Fabius GS premium, 2. Atlan A300, and 3. Perseus A500.

To simulate spontaneous breathing in the lung model, an artificial lung (TTL, Michigan Instruments, USA) was created by connecting its two test lungs. One side of the test lung (drive lung) was connected to the ventilator (NKV-550, Nihon Kohden, USA) setting 500 ml of tidal volume, while devices (1) to (3) were connected to the other, simulating spontaneous breathing. To simulate the effects of residual muscle relaxant effects of anesthetic agents, we adjusted spontaneous tidal volumes at 50 and 250 ml using a leak device connected to the drive lung (Figure).

The PS value of each anesthesia machine was measured in each setting when the tidal volume of the spontaneously breathing lung reached 500 ml setting in the drive lung.

**Results and Discussion:** In, Fabius GS premium, Atlan A300 and Perseus A500, the required pressure values at leak volumes of 450 and 250 ml were 14 and 13, 18 and 17, 24 and 20 cmH₂O respectively. Comparison to the other machines, the termination of PSV delayed and the inspiratory time prolonged in Fabius GS premium.

**Conclusion:** The study concluded that Fabius GS premium achieved the lowest PS values in all settings of leak volumes among the three anesthetic machines. However, the lower PS values in Fabius GS premium did not necessarily imply its superiority, as the other machines offered more adjustable settings and mode selections. Further validation and investigation may be necessary to determine patient-specific settings for each device.

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**06AP03-02**  
**Reduction of aerosol generation during non-invasive ventilation**

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¹Tel Aviv Sourasky Medical Center, Department of Anesthesia, Pain Management and Critical Care, Tel Aviv, Israel

**Background and Goal of Study:** Environmental spread of pathogen-containing respiratory droplets during Non-Invasive Ventilation (NIV) may infect nearby patients and staff, often requiring respiratory precautions during their care¹². 

**Materials and Methods:** A single-center, prospective, open-label study evaluating the Lumena NIV mask (Inspir Labs, Kfar Saba, Israel), a novel mask composed of a standard nose-mouth interface surrounded by a second layer, with the space between the two negatively pressurized to minimize air leak. Patients requiring NIV who met inclusion criteria and provided informed consent underwent three 30-minute NIV sessions during a 24-hour period: with a standard NIV mask and with the study mask with and without negative pressure applied. Following inhalation of 5 ml 0.9% NaCl, the air concentration of particles 0.3, 0.5, 1 and 2.5 microns (a range consistent with airborne transmission) was measured 1 meter from the patient's head. Vital signs, clinical status, and blood gas analysis were monitored as safety outcomes.

**Results and Discussion:** The first 12 patients who completed the study are included in this interim analysis (median age 72 years; 9 [75%] male). A significant reduction in the concentration of particles 0.3, 0.5 and 1.0 micron was observed with the use of the study mask with negative pressure applied compared to the conventional (control) mask (One-sided t-test P=0.001, P=0.006, P=0.045, respectfully), with the greatest reduction observed for 0.3 and 0.5 micron particles (Figure 1). No significant between-group differences in safety outcomes were observed.

**Conclusion(s):** In this interim analysis, a reduction in the number of particles 0.3, 0.5 and 1.0 micron was observed using the study mask compared to a conventional NIV mask. Further studies are needed to validate these results and evaluate the effect of using the Lumena mask on cross contamination rates.

**References:**
1. BMJ 2022;378:e065903
2. BTS Guidance: https://t.ly/am0IC

**Acknowledgements:** Funded by Inspir Labs Ltd.
Comparison of two endotracheal tube introducers: flexible tip bougie versus total control introducer for video assisted endotracheal intubation by novices in a mannequin

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¹Sengkang General Hospital, Department of Anaesthesiology, Singapore, Singapore

Background: Bougies are often used to improve intubation success rates. New introducers with articulating tips aim to enhance bougie function. This study aims to evaluate two ETT introducers—flexible tip bougie (FTB) and total control introducer (TCI) when used in video assisted ETT intubation by novices.

Materials and Methods: 7 medical student volunteers participated as novice intubators. Each student was shown a video demonstrating the use of both introducers then randomly assigned to use either the FTB or TCI first.

In each attempt, students were given 3 minutes to use an introducer and a videolaryngoscope (Glidescope Spectrum LoPro S3 blade) to intubate the mannequin (Laerdal Airway Management Trainer) with a Portex 7.5 mm ETT. A successful intubation attempt was defined as insertion of ETT through the cords with ventilation demonstrating bilateral lung inflation. Unsuccessful intubation was defined as no lung inflation or more than 3 tries at ETT insertion.

The time taken for the FTB or TCI to be pass through the vocal cords, and time taken to ventilation was recorded. Participants were surveyed using a Likert scale to evaluate the ease of inserting introducer through cords, ease of sliding ETT over introducer.

Results and Discussion: Prior to this study, the average number of patients and mannequins intubated by the students was 1.86 and 3.29 respectively. TCI usage had higher success rates of 7 novices evaluated the FTB as being “more difficult to handle”, as the “area used to control the tip is small and hard to press”, “unable to tell if the tip is moving up or down”, “control is slippery”, “grooves on the control too fine”. The TCI was “easier to handle” allowing “greater control over navigation”.

Conclusion: Compared to the FTB, the TCI had a higher first pass success rate with an overall shorter duration needed for novices to intubate the mannequin. This is attributed to greater control enabling successful and faster insertion of the TCI.

Table. Intubation Success Rates

<table>
<thead>
<tr>
<th></th>
<th>TCI Insertion</th>
<th>TCI Intubation</th>
<th>FTB Insertion</th>
<th>FTB Intubation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Success rate</td>
<td>100% (47.8)</td>
<td>85.7% (99.7)</td>
<td>71.4% (107.5)</td>
<td>28.6% (149.2)</td>
</tr>
</tbody>
</table>

On a scale of 1 to 5, with 5 being the easiest, participants graded the ease of inserting TCI through cords 4.29 compared to that of FTB 2.

The ease of sliding ETT over TCI 3.71, compared to FTB 3.6 out of 7 novices evaluated the FTB as being “more difficult to handle”, as the “area used to control the tip is small and hard to press”, “unable to tell if the tip is moving up or down”, “control is slippery”, “grooves on the control too fine”. The TCI was “easier to handle” allowing “greater control over navigation”.

Conclusion: Compared to the FTB, the TCI had a higher first pass success rate with an overall shorter duration needed for novices to intubate the mannequin. This is attributed to greater control enabling successful and faster insertion of the TCI.
**Conclusion(s):** PAC on EEG may be correlated with anaesthetic depth under TIVA with propofol when subanaesthetic ketamine is used as an adjunct. Further analysis of PAC on EEG might provide new insight into the evaluation of anesthetic depth.

**References:**

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**06AP03-05**

**Comparative evaluation of aerosol generation with Proseal Laryngeal Mask Airway and endotracheal tube in adult patients**

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**Background and Goal of Study:** Intubation and extubation are aerosol generating procedure. We quantitatively assessed the aerosol generation during general anaesthesia (GA) using Proseal laryngeal mask airway (PLMA) and Endotracheal tube (ETT) hypothesising that aerosol generation by PLMA is more than ETT.

**Materials and Methods:** 50 Adults (>18yrs ASA I & II) undergoing surgery under GA (25 each group) were included (following ethics committee approval) to evaluate and compare aerosol concentration generated using PLMA and ETT at different time intervals and time taken for aerosols to settle to baseline after securing & removal of airway using ETT (T1&T2) or PLMA (T3&T4) respectively. A transparent intubation box was used to create a sealed environment.

Handheld particle counter was used for aerosol particle sizes of 0.3μm, 0.5μm, and 10μm. Measurement were taken in OR (baseline value) (A1), patient breathing room air (A2), on bag and mask (A3), after ETT OR PLMA insertion (A4), Baseline at reversal (BLR) (A5), spontaneous breathing after GA (A6) and following removal of airway device (A7). Statistical analysis was performed using SPSS 25.0, unpaired t test and Mann-Whitney U test.

**Results and Discussion:** ETT Gp: A2 results were statistically insignificant. At A3, aerosol of size 0.3 μm (23987.53 P <0.009), 0.5μm (23987.52 p <0.001) and 10 μm (132.32 p <0.008). At A4, 0.3μm (31101.44, p=0.165) and 10μm (211.52, p=0.263). At A6&A7 0.3μm 0.5μm &10μm were lower than A1 but statistically insignificant.

PLMA Gp, At A3, 0.5μm aerosol was statistically significant. At A6, 0.5μm (mean =17061.28, p=0.157) and 10μm (36376, p=0.025) concentration are higher than BLR and 10μm was statistically significant. At A7, concentration of 0.5 μm (17293.92, p=0.044) and 10μm aerosol (283.48, p<0.002) were higher than BLR and statistically significant. Literature search did not reveal studies on comparing aerosol generation of ETT & supraglottic devices. T1/T3 was 60.2/73 seconds(p=0.456) and T2/T4 was 58.9/94.4 secs(p<0.008) respectively.

**Conclusion(s):** Aerosol generation and time taken for aerosol to settle to baseline was higher& longer with group PLMA.

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**06AP03-08**

**In vitro testing of CloudGuard™, Avanos Medical Microcuff®, Shiley Evac with Taperguard™ and Mallinckrodt Hi-Lo ETT for air and fluid leaks during normal ventilation, lung recruitment and mucus aspiration in a tracheal model**

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¹AZ Sint Jan Brugge, Anesthesiology, Brugge, Belgium,
²Medical Technology for Life bv, Anesthesia, Aalst, Belgium

**Background and Goal of Study:** Several cuff designs exist for endotracheal tubes (ETT) to improve seal performance. However none is totally leak free and subglottis intermittent aspiration is essential on the ICU to reduce post operative pulmonary complications. Limited amount of air leak might cause environmental problems to capture the wasted inhalation gases on charcoal absorbers. A new ETT with a cuff in the shape of two opposite cups with a small balloon in between to stabilise its position is compared to other ETT.

**Materials and Methods:** 4 ETT of 7.5 mm ID are inserted in an imitation trachea of 20 mm diameter connected to a test long of 2 liter. The cuff is inflated at the recommended 25 mbar with an automatic cuff pressure controller and the ETT are connected to a ventilator in volume controlled mode (VCV) with TV 300 ml, I/E 0.5, PEEP 0 or 5 mbar. No gel is added on the cuff. A TSI flow meter is connected between ventilator and ETT for accurate measurement of the difference between inspiration and expiration volume during one minute and during lung recruitment (LRM).

Methylene bleu is injected above the cuff during VCV with PEEP 0 and automatic cuff pressure controller and the ETT are connected to a ventilator in volume controlled mode (VCV) with TV 300 ml, I/E 0.5, PEEP 0 or 5 mbar. No gel is added on the cuff. A TSI flow meter is connected between ventilator and ETT for accurate measurement of the difference between inspiration and expiration volume during one minute and during lung recruitment (LRM).

Leaks are measured during VCV, LRM with a pressure hold of 40 mbar for 10 sec and open aspiration of mucus using a suction catheter with diameter half size off the ID of the ETT at a pressure of -100 mbar.

**Results and Discussion:**

<table>
<thead>
<tr>
<th>ETT / inset</th>
<th>CloudGuard fluid leak m/min</th>
<th>CloudGuard fluid leak PEEP 5 / PEEP 0</th>
<th>Microcuff fluid leak PEEP 5 / PEEP 0</th>
<th>Microcuff fluid leak PEEP 5 / PEEP 0</th>
<th>Taperguard fluid leak PEEP 0</th>
<th>Taperguard fluid leak PEEP 0</th>
<th>Hi LO Mallinckrodt fluid leak PEEP 0</th>
<th>Hi LO Mallinckrodt fluid leak PEEP 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>VCV</td>
<td>13 ml/min</td>
<td>-/-</td>
<td>50 ml/min</td>
<td>-/-</td>
<td>565 ml/min</td>
<td>-/-</td>
<td>132 ml/min</td>
<td>-/-</td>
</tr>
<tr>
<td>LRM 10 sec</td>
<td>79 ml</td>
<td>231 ml</td>
<td>521 ml</td>
<td>273 ml</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Aspiration
-100 cm H2O
with 1/2 ID
size

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</tbody>
</table>
Conclusion(s): Air leak is an existing problem even at a low PEEP of 5 mbar being lowest in the Microcuff and CloudGuard. Fluids are leaking when PEEP is zero in most ETT. Gel application and higher PEEP might reduce fluid leaks but mucus aspiration frequently needed on an ICU is always increasing the leak of air and fluids in all ETT but minimal in the CloudGuard ETT, requiring now clinical evaluations.

Reference:
Respir Care 2015;60:1113-9; Respir Care 2017;62:102-12

Acknowledgements: Medical Technology For Life bv

06AP03-09
Actual oxygen usage in anesthesia machine equipped with volume reflector: simulation study - actual oxygen usage for driving as well as ventilation is measured

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Background and Goal of Study: Low-flow anesthesia using a low fresh gas flow (FGF) is sometimes selected because it reduces the consumption of inhaled anesthetics and oxygen. For ventilation, many anesthetic machines have several ventilation mechanics; bellows, electronic pistons, turbines, and reflectors. And some of the systems use oxygen (O2) to drive the anesthesia ventilator.

In this study, we focused on volume reflectors (VRs) and measured the actual O2 consumption of anesthesia machines equipped with VRs (Flow-i, GETINGE, Sweden) under various settings.

Materials and Methods: A flow meter was connected between the central gas line and the anesthesia machine (Flow-i, GETINGE) to measure the gas consumption. The ventilator was set to the following settings and the FGF was varied (oxygen concentration 21%, PEEP 5 cmH2O, respiratory rate 12/min, and tidal volume 500 mL per cycle). The minute ventilation rate was set to 2.0, 4.0, 6.0, and 10 L/min, and the O2 and air consumption were measured at each of these settings.

Results and Discussion: The results are shown in the figure.

Figure.

As an example, when the MV was set at 6 L/min and the FGF was changed to 2.0, 4.0, 6.0, and 10 L/min, the O2 consumption for driving was 4.84, 4.97, 3.37, and 1.63 L/min, respectively, while the air consumption for ventilation was 1.42, 3.21, 4.94, and 5.25 L/min, respectively.

Discussion and Summary: The VR on Flow-i is driven by O2 so by setting the inhalation air to 21%, the amount of air used for ventilation as FGF and the amount of O2 used to drive the VR can be assumed to be the amount of gas used for ventilation and the amount of gas used to drive the VR, respectively. When low-flow anesthesia was used, the actual O2 use was markedly higher than the set FGF value.

When anesthesia was performed in a semi-closed circuit in an anesthesia machine equipped with VR, it was found that there was a discrepancy between the set O2 usage and the actual usage.

Conclusion: In summary, it is important to fully understand the circuit mechanism for the anesthesia machine used.

06AP03-10
Nociception control with NOL Index in laparoscopic adrenalectomy for pheochromocytoma: a case report

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Background: During surgical resection of the adrenal gland in the context of pheochromocytoma, there is a risk of catecholamine release and massive activation of the autonomic nervous system, and complicates the monitoring of nociception through variations in blood pressure and heart rate. From an anesthetic standpoint, it is essential to be able to differentiate the painful and adrenergic stimulus for the correct intraoperative approach.

We present a patient with pheochromocytoma undergoing laparoscopic adrenalectomy where nociception was monitored using the NOL® index (Nociception Level Index, Medasense).

Case report: A 39-year-old man was scheduled for laparoscopic left adrenalectomy after diagnosis of pheochromocytoma in the context of hypertensive crisis, weight loss and a sense of imminent death. Blood pressure was optimally controlled with calcium antagonists and alpha agonists during the two weeks prior to surgery. Intraoperatively, general anesthesia was performed with target control infusion “TCI” of propofol and remifentanil, with blood pressure control with Vigileo-Flotrac system, anesthetic depth monitoring by bispectral index (BIS), neuromuscular blockade with train of four (TOF) and nociception with NOL monitor. Remifentanil perfusion was adjusted to maintain NOL values between 10 and 25 points, and propofol perfusion was adjusted to maintain BIS values between 45 and 55. The surgery was performed without anesthetic complications. At the end, total remifentanil consumption was 0.0365 mcgr/kg/min. During postoperative surveillance, the patient remained stable and pain was controlled with paracetamol, NSAIDs and local anesthetic perfusion by epidural catheter, with no need for opioid rescue.

Discussion: Monitoring nociception provides greater safety for the patient, allowing adjustment of the opioid dose in an objective manner rather than relying on proxy variables. The NOL index is useful and more accurate for adjusting opioid use during surgery, reducing side effects, and discerning between possible causes of hemodynamic changes, especially in surgeries such as pheochromocytoma with intense intraoperative hemodynamic lability.

Learning points: Pheochromocytoma, laparoscopic adrenalectomy, nociception, NOL index, remifentanil, patient safety.
06AP03-11
Cardiac arrest monitored by near-infrared spectroscopy during a correction of congenital diaphragmatic hernia

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Background: Congenital diaphragmatic hernia (CDH) and esophageal atresia with tracheoesophageal fistula (EA/TEF) are challenging conditions for anesthetic management. Near-infrared Spectroscopy (NIRS) may be an extra monitoring on these patients.

Case Report: A 6-day-old female with CDH and EA/TEF with surgery plan of CDH repair. The patient was further monitored with EEG and NIRS. Anesthesia was maintained with sevoflurane, fentanyl, and dexmedetomidine, titrated accordingly with EEG. Right after incision, it was noted a gastric distension and worsening of ventilation followed by an abrupt drop in cerebral oximetry and, then, cardiac arrest. She was resuscitated for 6 minutes before ROSC. Surgeons proceed with ligation of the gastric cardia. At the end of surgery, the ligation was relieved and it was noted another significant drop in the cerebral oximetry and a new cardiac arrest for 5 minutes that only resolved with a new ligation. The patient was sent to the NICU intubated and sedated and with vasoactive drugs titrated. The ligation of the cardia was left in place for a further second approach for correcting the EA/TEF after stabilization.

Discussion: The positive pressure of conventional mechanical ventilation might have been enough to pass air towards the fistula into the stomach. It raised the abdominal pressure worsening hemodynamic and ventilation. These in combination might have been the cause of cardiac arrest in both situations. NIRS was a little bit ahead than other monitors indicating an imminent cardiac arrest, but it was not interpreted on time. The rapid ligation made by surgery was fundamental to restore circulation. The rapid identification of pitfalls by surgeons and anesthesia providers made possible ROSC. We documented two episodes of severe drop in cerebral oxygenation before cardiac arrest.

References:
BROWN RA, BÖSENBERG AT. Evolving management of congenital diaphragmatic hernia. Pediatric Anesthesia. 2007

Learning Points:
• NIRS may be a potential new resource for monitoring critically ill patients.
• Cardia ligation may be lifesaving on CDH + EA/ TEF patients on cardiac arrest.

06AP03-12
Monitoring of nociception in a low anterior resection managed with opioid-free analgesia

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Background: Opioid-free anesthesia (OFA) gains prominence for superior analgesia, illustrated in a rectum carcinoma case with RAUB, emphasizing synergistic benefits with advanced nociception monitoring (NoL).

Case Report: We present the anesthetic management of a laparoscopic low anterior resection (LAUR) for upper rectal neoplasia. The anesthetic plan involved opioid-free anesthesia with pre-infusion of magnesium sulfate, ketamine, dexmedetomidine, lidocaine, epidural infusion, anesthetic depth and NoL.

Discussion: OFA is increasingly preferred for its advantages in pain control, minimized side effects, and accelerated recovery, particularly in intricate procedures like ultra-low anterior resection for rectal tumors. OFA, incorporating multimodal techniques such as epidural anesthesia and personalized analgesics, offers a comprehensive approach. This strategy may contribute to improved immune function and reduced stress in cancer treatment, requiring personalized implementation and collaboration with the multidisciplinary team. NoL monitor, coupled with OFA, optimizes perioperative care, providing significant benefits in pain management, recovery, and potential oncological outcomes.

Further research is vital for a comprehensive understanding, guiding specific recommendations and protocols for long-term implications. The integration of both practices forms an effective strategy for an enhanced patient experience and overall outcomes, particularly in surgeries like the one proposed.

References:

Learning Points:
• NoL index excels in assessing nociception during general anesthesia effectively.
• Opioid-free anesthesia plans for general surgery emerge as a valid strategy, offering multiple patient benefits.
**07AP01-01**

**Influence of propofol and sevoflurane on maximum muscular strength, speed of contraction and relaxation in the absence of neuromuscular blocking agents in humans: a prospective, assessor-blinded pilot study**

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**Background & Goal of Study:** Halogenated anesthetics potentiate the block induced by neuromuscular blocking agents (NMBA).¹ Even in the absence of NMBA, volatile anesthetics can impair neuromuscular function.² Propofol has also been shown to affect airway closing pressure, possibly by a dose-dependant reduction in genioglossus muscle activation.³ We hypothetized that anesthetic agents, even in the absence of NMBA, have a postoperative influence on voluntary muscular contraction, maximum muscular contraction speed and maximum muscular relaxation speed and that this influence is different between propofol and sevoflurane.

**Materials and Methods:** After IRB approval, registration (NTC05615025) and written informed consent 48 patients scheduled for surgery without use of NMBA were included and randomized to either a propofol TIVA anesthesia or a sevoflurane main delayed anaesthesia. 8 patients were excluded leaving 20 patients randomized to either propofol or sevoflurane. Maximum force, maximum contraction speed and maximum relaxation speed were measured (averaging 4 measurements) preoperatively, and postoperatively after reaching a Chung score ≥ 9. Measurements were done using the Isometric Thumb Force (ITF) device described previously.⁴,⁵ Preop and postop values, as well as difference between groups were analysed using a non-parametric test, with correction for multiple comparisons.

**Results:**

<table>
<thead>
<tr>
<th></th>
<th>Propofol (N=20)</th>
<th>Sevoflurane (N=20)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Preoperative</td>
<td>Postoperative</td>
</tr>
<tr>
<td>Maximum force (N)</td>
<td>45 (33 — 64)</td>
<td>45 (35 — 57)</td>
</tr>
</tbody>
</table>

All values are median [Q1 — Q3], comparisons between groups are NS

There are no statistically significant differences, neither in the intragroup analysis (pre versus postoperative values in each group), neither in the intergroup analysis (propofol versus sevoflurane).

**Conclusion:** In the setting of this pilot study, neither propofol, nor sevoflurane, had a significant effect on postoperative maximum muscular force, muscular contraction speed or muscular relaxation speed in the absence of NMBA.

**References:**
2. Anesthesiology 1996; 84:663-671;
3. Anesthesiology 2016; 125:525-534;

**Acknowledgements:** "Fondation pour l’Anesthésie et la Réanimation" provided the equipment (VISUAL-ITF®)

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**07AP01-02**

**Effects of intraperitoneal magnesium sulfate on perioperative inflammatory response in rats with pneumoperitoneum**

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**Background and Goal of Study:** Laparoscopy, while minimally invasive, leads to local and systemic inflammatory responses due to pneumoperitoneum creation. Recent literature features various studies describing the anti-inflammatory effects of magnesium and showing the relationship between magnesium deficiency and inflammation.

We aimed to investigate the anti-inflammatory effect of peroperative magnesium sulfate (MgSO₄) use.

**Materials and Methods:** We used 36 male Sprague-Dawley rats, divided equally into four groups: Control Group (CG), Pneumoperitoneum Group (PG), Magnesium Group 1 (MG250), and Magnesium Group 2 (MG500). PG, MG250, and MG500 underwent pneumoperitoneum for 60 minutes at an IAP of 12 mmHg. MG250 and MG500 received 250 mg/kg and 500 mg/kg of i.p. MgSO₄, respectively at the start of pneumoperitoneum creation. Recent literature features various studies describing the anti-inflammatory effects of magnesium and showing the relationship between magnesium deficiency and inflammation.

We aimed to investigate the anti-inflammatory effect of peroperative magnesium sulfate (MgSO₄) use.

**Materials and Methods:** We used 36 male Sprague-Dawley rats, divided equally into four groups: Control Group (CG), Pneumoperitoneum Group (PG), Magnesium Group 1 (MG250), and Magnesium Group 2 (MG500). PG, MG250, and MG500 underwent pneumoperitoneum for 60 minutes at an IAP of 12 mmHg. MG250 and MG500 received 250 mg/kg and 500 mg/kg of i.p. MgSO₄, respectively at the start of pneumoperitoneum creation, while PG received an equivalent volume of 0.9% saline.

No additional procedures were performed on CG. Serum and peritoneal tissue samples were collected from all groups at the end of the procedure. Tissue samples were histopathologically examined for inflammatory cell infiltration, congestion, and cell edema to assess the local inflammatory response. Systemic inflammation was evaluated by measuring tumor necrosis factor-alpha (TNF-α), interleukin-1 (IL-1), interleukin-10 (IL-10), and myeloperoxidase (MPO) levels in serum samples. Using SPSS, the Shapiro-Wilk and Levene tests assessed normality and variance homogeneity of continuous variables. The Kruskal-Wallis test, followed by the Dunn-Bonferroni test for significant differences, evaluated biochemical and histopathology scores between groups. Statistical significance was set at p<0.05.

**Results and Discussion:** Comparisons between the CG and PG revealed that pneumoperitoneum amplified the local inflammatory response. Regarding systemic markers, only myeloperoxidase MPO levels were higher in PG compared to CG. In MG250, both
histopathological examinations and MPO levels showed a lower inflammatory response compared to PG. However, no significant differences were observed locally or systemically between MG500 and PG.

**Conclusion(s):** Intraperitoneal administration of magnesium sulfate during the perioperative period can have an anti-inflammatory effect when administered in appropriate doses. However, to gain a better understanding of MgSO4’s local and systemic anti-inflammatory efficacy, further investigations involving varied dosages are warranted.

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**07AP01-03**

Comparing the hemodynamic effects of high- and low-opioid anesthesia: a secondary analysis of a randomized controlled trial

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**Background and Goal of Study:** Induction of general anesthesia by a combined administration of hypnotics and opioids may induce hypotension. A longstanding debate exists whether an ‘optimal’ ratio of these drugs exists, resulting in minimal haemodynamic perturbations. In this study we evaluated the immediate haemodynamic changes after induction of general anesthesia using different equipotent dose combinations of propofol and remifentanil according to the Bouillon isobole.

**Materials and Methods:** This is a secondary analysis of an RCT wherein four groups (A-D) of patients received four different propofol-remifentanil concentrations that are equipotent for reaching tolerance of laryngoscopy.

In group A, a relatively high dose of propofol (TCI effect site concentration (CE) 8.6 µg/ml) and low dose of remifentanil (CE 1.0ng/ml) was administered, this ratio was gradually changed until it was reversed in group D.

Mean and systolic arterial blood pressure (MAP, SAP) were compared at different timepoints (Tbaseline, Tintubation, T nadir). Tintubation was the fictive moment of intubation, 180 seconds after the induction medication bolus. T nadir was the moment with the lowest MAP or SAP. Delta MAP, SAP and vectors between timepoints were calculated.

The incidence of hypotension (MAP < 65 mmHg) was compared. Bispectral index (BIS) values were compared.

**Results and Discussion:** Data from 76 patients were used. There were no significant differences between groups in MAP or SAP at any timepoint (fig.1). Notably, at Tintubation and T nadir, BIS was lowest in group A and highest in group D. All groups differed significantly (p <0.001) from one another.

Assuming drug equipotency with an equal anaesthetic effect, the clinical relevance of this finding remains undetermined.

**Conclusion(s):** Induction of general anesthesia with different equipotent combinations of propofol and remifentanil did not result in clinically relevant differences regarding arterial blood pressure.
Results and Discussion:

**Concordance with POISE-3 recommendations (All surgeries)**

<table>
<thead>
<tr>
<th></th>
<th>Before POISE-3</th>
<th>After POISE-3</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concordance</td>
<td>8/280 (3%)</td>
<td>120/203 (60%)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>P value</td>
<td>&lt; 0.001</td>
<td>&lt; 0.001</td>
<td>0.0215</td>
</tr>
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</table>

Overall use of TXA in non-cardiac surgery increased significantly, doubling after the publication of the POISE-3 trial. The increase was most important in digestive and vascular surgery. However, in our institution TXA is still used in only 1 out of 4 patients who could benefit from its use. More educational initiatives need to be done in order to promote the use of TXA in non-cardiac surgery.

**Conclusion(s):** In our institution, the publication of the POISE-3 results doubled the use of TXA in non-cardiac surgery from 12% to 24%, however the overall use remains low.

**Reference:**

## 07AP01-05

**One extended-releasing formulation of ropivacaine based on self-assembling peptide for long-acting analgesia**

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**Background and Goal of Study:** Local anaesthetics (LAs) have provided a popular choice for the management of postoperative pain due to their fast onset, low toxicity and non-addictiveness.¹ To meet the need of long-acting analgesia for treating postoperative pain, slow-releasing formulations of LAs have been extensively investigated. However, challenges still remain in obtaining such formulations in a facile and cost-effective way.

**Materials and Methods:** Thioflavine (ThT)-binding test, pyrene fluorescence and atomic force microscopy (AFM) were applied to characterise self-assembling peptide AG. In a top-down strategy, AG nanosheets were further used to encapsulate ropivacaine base (RB). The morphology of RB@AG particles was observed under scanning electron microscope (SEM) and the releasing profile of drug particles in vitro was studied using the dialysis method. In addition, the analgesia efficacy of ropivacaine formulations was evaluated in rat sciatic nerve block (SNB) model.

**Results and Discussion:** ThT binding fluorescence spectrum of 5 mM AG showed a peak at 495 nm, indicating that AG had the ability of self-assembly. Pyrene fluorescence and AFM image suggested that AG assembled to nanosheets with a large number of hydrophobic regions. AG nanosheets could encapsulate RB in a soft-coating manner to form milky suspension. Under SEM, micro-particles were observed. Compared with 1% ropivacaine hydrochloride (RH) used in clinic, 4% RB@AG formulation exhibited an even slower release profile and generated significantly longer nerve block duration of more than 20 hours in SNB model.

**Conclusion(s):** This study provided a safe carrier to load hydrophobic LAs base and a facile strategy to prepare LA extended-releasing formulation with long-acting nerve block.

**Reference:**
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¹Far-Eastern Memorial Hospital, Department of Anesthesiology, New Taipei City, Taiwan

## 07AP01-06

**A comparison of effect of sugammadex versus neostigmine on coagulation parameters: a systematic review and meta-analysis**

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**Background and Goal of Study:** Sugammadex has been used to reverse the effects of neuromuscular blocking agents, such as rocuronium and vecuronium. The benefits of Sugammadex on reducing post-operative pulmonary complications also shows by previous meta-analyses. The primary aim of this study is to investigate that in adult patients, who undergo general anesthesia (P), the use of Sugammadex (I) compared with neostigmine (C) could lead to PT and aPTT prolongations (O).

**Materials and Methods:** The composition of this study was according to the Cochrane Handbook for Systematic Review of Interventions. A comprehensive literature search was conducted using two electronic databases, PubMed and Cochrane Central Register of Controlled Trials. The use of search strings was “Sugammadex” and “(Coagulation profile) OR (prothrombin time) OR (activated partial thromboplastin time)” with MeSH term searching aid. We included all the RCTs, which compared the effects of Sugammadex 2 mcg/kg versus neostigmine on PT and aPTT prolongations. Data extraction, data synthesis, and the assessment of risk of bias were performed by the author, Cheng-Ying Chang, Chia-Hao Ho, and the results were discussed with the author, Cheng-Wei Lu.
Results and Discussion: 3 articles, following our inclusion criteria and containing enough statistical data, were included in the final analysis. In the pooling analysis of 3 selected studies, the result showed no significant difference neither in PT (MD, 0.46 sec; 95% CI, -0.12 to 1.05; n = 230; p = 0.12; I² = 66%) nor in aPTT (MD, -0.38 sec; 95% CI, -1.59 to 0.82; n = 230; p = 0.53; I² = 0%). Our analysis shows that Sugammadex administration does not prolong the coagulation profile, such as PT and aPTT, compared with neostigmine. Previous study reveals that Sugammadex would produce transient (less than one hour) and slight prolongations in PT and aPTT. In our analysis, the time of coagulation profile assessment ranges from 30 minutes to 120 minutes, which means the Sugammadex would not affect PT and aPTT for a long time.

Conclusions: Our analysis revealed that Sugammadex compared with neostigmine would not lead to prolongations of PT and aPTT.

07AP01-07
Psychomotor Responses to Independent Visual, Auditory and Tactile Electrical stimuli during Sevoflurane sedation (PRIVATES)

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Background: Patient-controlled sedation (PCS) has potential benefits over clinician-controlled sedation, including dose minimisation and improved patient satisfaction. During PCS, the recipient presses a button to self-administer the sedative drug. For a drug to be administered safely by PCS, the ability to press a button must be obtunded before any adverse effects occur. This study aimed to establish the end tidal sevoflurane dose that obtunds the ability to press a button, and to find out how this dose relates to the onset of any adverse effects.

Methods: 15 healthy participants (10 male) undertook a sevoflurane dose escalation protocol, starting at 0 kPa and increasing in 0.2 kPa increments until a protocol endpoint occurred. At each dose, Richmond Agitation-Sedation Scale (RASS), and button-press reaction time to auditory, visual and tactile electrical stimuli were recorded. After each electrical stimulus, sensation-pain visual analogue scale (VAS) was reported. Protocol endpoints included airway, respiratory or cardiovascular compromise; excitation-disinhibition (RASS >2); and sedation >3 hours. Recall was assessed following recovery. Doses are median (range).

Results: The dose at which participants were unable to press a button was 1.0(0.4-1.8)kPa. The protocol-endpoint dose was 1.6(1.2-2.2)kPa. The endpoint was sedation >3 h for 9(60%) participants, excitation-disinhibition >3 hours for 5(33%) participants, and myoclonus for 1(7%) participant. The dose at which excitation-disinhibition occurred was 1.2(1.2-1.8)kPa. The dose difference between the inability to press a button and the protocol endpoint was 0.8(0.0-1.4)kPa. Recall was absent at 1.0(0.6-1.8)kPa. Reaction times were slower than baseline at doses ≥0.6kPa (p<0.05).

Conclusion: No adverse effects were observed at doses <1.2 kPa. Sedation and analgesia were observed at doses ≥0.4 kPa. Sevoflurane PCS is potentially safe and effective at doses ≤1.0 kPa.


Acknowledgements: Intersurgical Ltd for funding

07AP01-08
The potency of etomidate in vitro is increased by NMDA receptor antagonists

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Background and Goal of Study: The role of N-methyl-d-aspartate (NMDA) receptors in general anesthesia is still poorly understood [1]. Recent experiments conducted by our group on rodent hippocampal cultures grown on a microelectrode arrays (MEA)
showed increased potency of etomidate to reduce the firing frequency of neurons in artificial cerebrospinal fluid (ACSF) containing magnesium (Mg^2+) compared to magnesium-free condition. We hypothesized that antagonists of the NMDA receptor can change the potency of etomidate in vitro.

**Materials and Methods:** Primary cultures of rat hippocampal neurons were grown on MEA. The growth medium was then replaced by magnesium-free ACSF. After 10 minutes, recordings of control activity were performed, followed by application of an NMDA receptor antagonist (10µM) alone or in combination with different concentrations of etomidate (0.1; 1; 5 or 10 µM). Paired t-test or Wilcoxon signed rank test was performed to compare the level of activity. Extracellular action potentials (spikes) were recorded with MCRack (v. 3.9.1), detected and counted with the SpAnNer software (v. 3.6.).

**Results and Discussion:** The NMDA receptor antagonist D-AP5 significantly reduced the number of spikes/min to 72.5±10.5% of baseline (N=9, p=0.03). Memantine [2] caused no change (101±19%, N=12, p=0.37) whereas dextromethorphan (DXM) [3] significantly reduced the number of spikes/min to 135±14.31% (N=10, p=0.03). Memantine [2] caused no change in the presence of D-AP5, memantine or DXM, respectively.

**Conclusion(s):** These results suggest that clinically used NMDA receptor antagonists can increase the sensitivity of neuronal networks to etomidate. More experiments are necessary to explore the clinical importance of these findings.

**References:**

**07AP01-09**
Comparison of the effects of propofol and remimazolam as total intravenous anaesthesia on somatosensory and motor evoked potentials during cervical spine surgery: a prospective double-blind randomised controlled trial

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**Background and Goal of Study:** The use of an anaesthetic agent with little effect on evoked potentials is essential in intraoperative neurophysiological monitoring (IONM). We aimed to compare the effects of remimazolam, a newly developed benzodiazepine, and propofol on IONM during total intravenous anaesthesia (TIVA) combined with remifentanil.

**Materials and Methods:** In this prospective, double-blind, randomised controlled trial, 64 patients requiring IONM during a cervical spine surgery were assigned to either the propofol (group P: 33) or remimazolam (group R: 31) group. Preoperative (preop) latencies of somatosensory evoked potential (SEP; N20 for the median nerve, P37 for the tibial nerve) were measured. During surgery, both SEP latencies and amplitudes and motor evoked potential (MEP) amplitudes were measured at the following time intervals in sequence: T1, 30 min after anaesthetic induction; T2, 30 min after surgical incision; T3, after laminectomy or disectomy; T4, immediately after plate insertion or fixation of pedicle screws; and T5, before surgical wound closure. Linear mixed models were applied to continuous outcomes such as SEPs and MEPs. Our primary outcome was the between-group difference in changes in the N20 latency measured before and after anaesthesia.

**Results and Discussion:** The amount of change in SEP latencies at T1 compared to that preoperatively was comparable between groups P and R. This suggests that remimazolam administration itself might have no influence on SEP latencies in any muscle group due to anaesthesia. Furthermore, there was no significant group-by-time interaction effect in SEP latency or amplitude and MEP amplitude during operation except in the right abductor pollicis brevis.

**Conclusions:** TIVA with remimazolam and remifentanil for a cervical spine surgery yields stable IONM, comparable to those of observed in the conventional TIVA with propofol and remifentanil. Remimazolam can be used as an alternative to propofol for evoked potential monitoring.
**07AP01-10**
**Remimazolam as anesthesia adjunct for brief gynecological surgeries: fast recovery time, hemodynamic stability, low propofol consumption**

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1Lithuanian University of Health Sciences, Department of Anesthesiology, Medical Academy, Kaunas, Lithuania

**Background and Goal of Study:** Remimazolam is a novel ultra-short-acting benzodiazepine. Although it has been studied as a sole agent for anesthesia induction and maintenance, studies assessing its use in combination with other anesthetics remain scarce.

The aim of the study was to investigate the characteristics of intravenous anesthesia regimen using remifentanil, propofol and remimazolam as an adjunct during brief gynecological surgeries.

**Materials and Methods:** Twenty-four adult patients that underwent brief gynecological surgery (hysteroscopy, hysteroscopic abrasion or polypectomy, diathermoconization of the cervix) from October 2023 to December 2023 were included. All of them underwent general intravenous anesthesia according to the following scheme: continuous remifentanil infusion at rate of 0.2 µg/kg/min for the first 10 min followed by continuous infusion at rate of 0.1 µg/kg/min for the remaining time; for induction – IV remimazolam at a dose of 5 mg over 1 min followed by IV propofol titrated at 10 mg every 10 sec until loss of consciousness; for maintenance – IV remimazolam bolus doses of 5 mg as needed, if ineffective, adding a bolus of propofol until effect is achieved. Retrospective statistical analysis of intraoperative and postoperative periods evaluating doses of anesthetics needed, recovery time and the incidence of adverse effects was done.

**Results and Discussion:** Median [range] patient age was 39.5 [25.0 – 83.0] years, BMI 23.61 [17.58 – 42.94] kg/m², duration of surgery 30 [30 – 50] min. The patients were classed as ASA I, II or III, 45.8 %, 45.8 % and 8.3 %, respectively. Time to eye opening in response to patient’s name was 1.5 [0.5 – 4.0] min, time to full consciousness determined as obeying commands 5 [3 – 9] min, total remifentanil consumption 3.05 [1.53 – 8.47] µg/kg, total remimazolam consumption 0.15 [0.03 – 0.29] mg/kg, total propofol consumption 0.98 [0.48 – 2.97] mg/kg. Incidence of hypotension (MAP <65 mmHg) intraoperatively and postoperatively was 4.2 % in both cases. There were no clinically significant bradycardia (<40 bpm) or any other adverse effects. Majority of patients (83.3 %) required manual ventilation during anesthesia.

**Conclusions:** Intravenous anesthesia regimen using remimazolam as an adjunct is characterized by fast recovery time, hemodynamic stability and low propofol consumption. With this in mind, it is a safe choice for brief gynecological procedures, ensuring high patient throughput in day case surgery.

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**07AP01-11**
**Efficacy and safety of ciprofol for sedation in outpatient gynecological procedures: a phase III multicenter randomized trial**

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**Background and Goal of Study:** Ciprofol is a compound similar to propofol in chemical structure and hypnotic effect. As a novel anesthetic agent, ciprofol was not inferior to propofol for sedation or anesthesia in previous studies. Herein we evaluated the efficacy and safety of ciprofol for sedation in outpatient gynecological procedures.

**Materials and Methods:** This phase III multicenter randomized controlled trial with a non-inferiority design was conducted in nine tertiary hospitals. We enrolled 135 women aged 18-65 years who were scheduled for outpatient gynecological procedures. Patients were randomly assigned (2:1) to receive either ciprofol (0.4 mg/kg for induction and 0.2 mg/kg for maintenance) or propofol (2.0 mg/kg for induction and 1.0 mg/kg for maintenance) sedation. Patients and investigators for data collection and outcome assessment were blinded to study group assignments.

The primary outcome was the success rate of sedation, defined as completion of procedure without remedial anesthetics. The non-inferiority margin was set at -8%.

Secondary outcomes included time to successful induction, time to full awake, time to meet discharge criteria, and satisfaction with sedation assessed by patients and doctors. We also monitored occurrence of adverse events and injection pain.

**Results and Discussion:** A total of 135 patients were enrolled; 134 patients (90 patients received ciprofol sedation and 44 patients propofol sedation) were included in final intention-to-treat analysis.

The success rates were both 100% in the two groups (rate difference, 0.0%; 95% CI, -4.1% to 8.0%), i.e., ciprofol was non-inferior to propofol. When compared with propofol sedation, patients given ciprofol had longer time to successful induction (median difference [MD], 2 sec; 95% CI, 1 to 7; P<0.01), and required more time to reach full awake (MD, 2.3 min; 95% CI, 1.4 to 3.1; P<0.01) and discharge criteria (MD, 2.3 min; 95% CI, 1.5 to 3.2; P<0.01). Fewer patients in the ciprofol group were dissatisfied with sedation (relative risk, 0.21; 95% CI, 0.06 to 0.77; P=0.02). Patients given ciprofol sedation had lower incidences of treat-emergent adverse events (34.4% [31/90] vs. 79.5% [35/44]; P<0.01) and injection pain (6.7% [6/90] vs. 61.4% [27/44]; P<0.01).

**Conclusion(s):** Ciprofol for sedation in ambulatory gynecological procedures was non-inferior to propofol, with less adverse events and injection pain.
Astrocytes modulate a specific paraventricular thalamus-prefrontal cortex projection to enhance consciousness recovery from anesthesia

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Background and Goal of Study: Current anesthetic theory is mostly based on the effects of general anesthetics on neurons and/or neuronal circuits. Previous studies have proved that astrocytes may also be a key neural substrate that regulates consciousness levels under general anesthesia; while the exact modulatory mechanism and/or the molecular target in astrocytes is still unknown.

We therefore studied the ability of the commonly used volatile anesthetic sevoflurane to inhibit Kir4.1-like potassium conductance in astrocytes to maintain neuronal activity in the PVT and promote recovery of consciousness from sevoflurane anesthesia in mice.

Materials and Methods: In this study, we established animal models to test if activating astrocytes of paraventricular thalamus (PVT) and/or knocking down PVT astrocytic Kir4.1 promoted the consciousness recovery from sevoflurane anesthesia, and EEG recordings were recorded to indicated consciousness levels.

By patch-clamp recordings, we recorded electrophysiological characteristics of astrocytes and neurons of PVT after activating astrocytes of PVT and/or knocking down PVT astrocytic Kir4.1. By single-cell RNA sequencing of PVT, we distinguished different neuronal subtypes. Then, by electrophysiological recordings we distinguished which subtype of neurons was mainly modulated by astrocytic Kir4.1.

Results and Discussion: We found that activating astrocytes of paraventricular thalamus (PVT) and/or knocking down PVT astrocytic Kir4.1 promoted the consciousness recovery from sevoflurane anesthesia.

Materials and Methods: Online survey was conducted via email among anesthesiologists practicing in Brussels area (BELGIUM) about practices and beliefs related to the use of etomidate for anesthesia induction in healthy patients (ASA I-II patients). Then, we conducted a belgium, single-center, prospective, randomized, controlled, double-blinded study.

We enrolled eighteen healthy adult patients (ASA score I-II), scheduled to undergo minor-to-moderate cervico-facial/stomatological and reconstructive surgeries. Patients were randomized into two groups: general anesthesia induction with 0.2 or 0.3 mg/kg of etomidate. We evaluated the onset of general anesthesia (clinically and time for BIS<60), the duration spent within an „adequate” depth of general anesthesia (BIS between 40-60), and the presence of excessive depth of anesthesia (time spent with a flat EEG). Hemodynamic parameters and the occurrence of injection pain or myoclonus were also recorded.

Results and Discussion: More than half the anesthesiologists considered the use of etomidate to be ineffective. All patients showed sufficient depth of anesthesia (BIS between 40 and 60) without occurrence of an isoelectric electroencephalographic tracing, following etomidate administration. Time to onset of loss of contact, loss of ciliary reflex and BIS below 60, as well as hemodynamic parameters and occurrence of side effects, were similar between the two groups. The duration of the hypnotic effect was longer in patients receiving 0.3 mg/kg etomidate.
07AP02-03  
Comparing the safety and efficacy of propofol, ciprofol, and remimazolam in general anesthesia: a systematic review and network meta-analysis  
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Background and Goal of Study: The study compared Propofol, Ciprofol, and Remimazolam for anesthesia induction, filling the gap of no direct Ciprofol-Remimazolam comparison.

Materials and Methods: We systematically searched PubMed, Embase, Web of Science, and the Cochrane Central Register of Controlled Trials up to March 26th, 2023. Two reviewers independently screened abstracts and full texts. Data extraction covered participants, interventions, and outcomes, while bias risk was assessed independently. Bayesian network meta-analysis using random effects models provided odds ratios, mean differences, and 95% confidence intervals. Evidence certainty was evaluated through the GRADE.

The primary outcome of this study was the occurrence of treatment-emergent adverse events (TEAEs), encompassing injection pain, hypotension, postoperative nausea and vomiting (PONV), and bradycardia.

Secondary outcomes included the success rate of general anesthesia, time to loss of consciousness (LOC), anesthetic depth after induction, and time to full awareness.

Results and Discussion: In this network meta-analysis of 1,760 patients across 13 trials, remimazolam displayed the lowest likelihood of treatment-emergent adverse events (OR = 0.32, 95% CI: 0.13 to 0.71). It exhibited lower risks of hypotension, injection pain, and bradycardia (OR = 0.26, 95% CI: 0.10 to 0.52; OR = 0.00, 95% CI: 0.00 to 0.01; OR = 0.02, 95% CI: 0.00 to 0.20). The certainty of evidence for these outcomes was high or moderate.

There were no significant differences in anesthesia success, depth, or full alertness times between ciprofol, remimazolam, and propofol. However, remimazolam required a longer time to loss of consciousness during induction compared to the other agents (MD = 19.12 s, 95% CI: 3.69 to 30.89).

Figure 1: The network meta-analysis results sorted by GRADE certainty and effect, comparing ciprofol or remimazolam vs. propofol for each outcome: (A) Primary outcome, and (B) Secondary outcomes.

Conclusion(s): Remimazolam showed safer outcomes compared to ciprofol and propofol, but further high-quality research is needed for more conclusive results.

07AP02-04  
Adverse events due to under- and overdosing in 1976 patients undergoing total intravenous anaesthesia for major ambulatory surgery  
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¹Hospital Clinic de Barcelona, Anaesthesiology Department, Barcelona, Spain

Background and Goal of Study: Many challenges persist in anesthetic dosing. Intraoperative adverse events (AEs) derived from under- and overdosing can impact perioperative outcomes. While numerous reports address specific AEs, a comprehensive overview of the overall incidence of AEs is still lacking. This study aims to analyze the incidence of such events during total intravenous anesthesia.

Materials and Methods: We prospectively analysed a database of 1976 adult ASA I-II patients undergoing total intravenous anaesthesia for gynaecologic and urologic ambulatory surgery from October 2013 to October 2023. Patients with complications unrelated to anaesthetic dosing (e.g., major bleeding, allergic reaction) were excluded.

Propofol and remifentanil were administered via target-controlled infusion. Standard measures included monitoring through multi-parameter and BIS monitors, and intraoperative event recording. Demographic and intraoperative data from all devices were synchronized by an automatic recording system (Vital Recorder). Only AEs lasting ≥2 minutes, occurring after induction and before emergence, were considered.

AEs related to underdosing included BIS >60, movement, hypertension, tachycardia, and rocuronium use. AEs related to overdosing included BIS <40, burst suppression >5, hypotension, bradycardia, and ephedrine or atropine administration. AEs were analysed according to their incidence and association with other variables.

Results and Discussion: Predicted median plasma concentration of propofol and remifentanil were 2.9 µg/mL and 2.7 ng/mL, respectively. 95.9% of patients presented ≥1 event related to overdose, 64.3% related to underdose and 61.2% to both. Most AEs occurred during maintenance (55.4%) and after induction before starting surgery (31.9%).

Most common AEs were BIS <40 (73.5% of patients), movement (56.3%), burst suppression (30.5%), bradycardia (28.5%) and hypotension (28.3%). The BIS <40 event lasted on average 48.5% of the total procedure time.

Burst suppression >5 event lasted on average 10.3% of total procedural time and was not associated with either age or propofol concentration. Hypotension occurred for at least 20 minutes in 15% of patients (average duration 4.7 minutes).

When burst suppression occurred, 42.6% of the patients simultaneously presented hypotension. Similarly, the opposite situation occurred in 46.7% of the patients.

Conclusion(s): AEs are frequent, most of them related to anaesthetic overdose. Although the data were limited to a single centre, this analysis provides an overall sense of the incidence of AEs. Since AEs can contribute significantly to adverse outcomes, it is crucial to investigate ways to prevent their occurrence.
07AP02-07
Evaluation of DNA damage of different sevoflurane concentrations in mice

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Background and Goal of Study: Sevoflurane stands out among the most commonly used modern inhalational anesthetics. Despite the efficacy of sevoflurane over decades of clinical use, there is concern about its possible toxicity. There are controversial findings about the possibility of genotoxicity (DNA damage) of anesthesia maintained with sevoflurane in surgical patients. Therefore, the goal of this novel study was to assess genotoxicity of different concentrations of sevoflurane in mice monitoring their vital signs. Thus, we hypothesized that a high concentration of sevoflurane can induce DNA damage.

Materials and Methods: After approval from the ERB, 25 Swiss male mice (8-week-old with similar body weight) were allocated into 5 groups, as follows: negative control (without sevoflurane exposure); positive control (treated with an injection of ethyl methane sulfonate-EMS to induce DNA damage); and three groups of sevoflurane concentrations (3%=1.1 MAC, 4.5% and 6%) for a 2h-exposure. Exposed animals were induced with sevoflurane (7%) and maintained with the specific concentrations of sevoflurane in 40% O₂ by a low-flow anesthesia system using a facemask on a warming pad without surgical procedure; we monitored O₂ saturation, and respiratory-RR and heart rates-HR. We followed the international guidelines for testing chemical in vivo by the comet assay, which is a sensitive tool to measure DNA damage. Thus, after 2h-exposure, blood and liver cells were collected for assessment of the comet assay. DNA damage was blindly analyzed by a software and 150 nucleoids/mice were evaluated. ANOVA followed by Holm-Sidak or Tukey tests were applied.

Results and Discussion: There was no significant difference among exposed groups regarding O₂ saturation; the 6% exposed group presented higher HR and lower RR than the other groups (p<0.05). There were no statistical differences among negative control and exposed groups or among exposed groups regarding DNA damage in both blood and liver cells; mice treated with EMS (positive control) presented higher DNA damage levels in blood and liver cells than negative control and exposed groups (p<0.05). Despite alterations of HR and RR in the highest exposed group, no induction of DNA damage was observed.

Conclusion: Our pilot study suggests that sevoflurane is not genotoxic even whether used in a high-concentration (2.2 MAC) in a single exposure in mice, showing its safety on molecular level.

Acknowledgement: FAPESP (2022/10697-8)

07AP02-09
Mitigating renal toxicity: evaluating the efficacy of HIPEC with cisplatin and sodium thiosulphate

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Background and Goal of Study: Cytoreductive surgery combined with hyperthermic intraperitoneal chemotherapy (HIPEC) has shown advantages in the treatment of peritoneal metastases. Among the drugs commonly used for intraperitoneal infusion, cisplatin (CDDP) stands out. However, a major drawback is its potential to induce renal toxicity and acute renal failure, which can progress to chronic renal failure. Sodium thiosulphate (ST) appears to be a successful drug in preventing the renal toxicity associated with the use of CDDP in HIPEC.

Our aim was to verify the absence of renal damage in patients treated with our hospital's protocol combining CDDP and ST.

Materials and Methods: This retrospective study evaluated markers of renal function in all patients who underwent HIPEC with CDDP and ST in our hospital (period January 2022-December 2023). Patients received an ST infusion at the end of the procedure. Kidney damage was characterised according to the KDIGO (Kidney Disease: Improving Global Outcomes) criteria. AKI was diagnosed by an absolute increase in sCr of at least 0.3 mg/dL within 48 hours or a 50% increase in sCr from baseline within 7 days. Measurements were also taken of urea and glomerular filtration.

Measurements of these parameters were recorded 24 hours prior to the surgery, during the surgery, 24 hours and 48 hours following the surgery and one month post-surgery.

Results and Discussion: None of the 10 patients (0%) developed renal dysfunction. Demographic variables, indications and laboratory values prior to HIPEC were similar in both groups. In addition, the use of CDDP dosage during the HIPEC procedure was similar. There were no notable variations in alterations to urea and filtration rate.

<table>
<thead>
<tr>
<th>PATIENT</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>PREVIOUS</td>
<td>0.43</td>
<td>0.99</td>
<td>0.76</td>
<td>0.64</td>
<td>0.83</td>
<td>0.70</td>
<td>0.65</td>
<td>0.80</td>
<td>0.79</td>
<td>0.94</td>
</tr>
<tr>
<td>INTRA</td>
<td>0.66</td>
<td>0.67</td>
<td>0.60</td>
<td>0.49</td>
<td>0.58</td>
<td>0.53</td>
<td>0.50</td>
<td>0.56</td>
<td>0.69</td>
<td>0.84</td>
</tr>
<tr>
<td>24H</td>
<td>0.50</td>
<td>0.74</td>
<td>0.85</td>
<td>0.48</td>
<td>0.59</td>
<td>0.62</td>
<td>0.51</td>
<td>0.57</td>
<td>0.68</td>
<td>0.83</td>
</tr>
<tr>
<td>48H</td>
<td>0.43</td>
<td>0.53</td>
<td>0.72</td>
<td>0.44</td>
<td>0.58</td>
<td>0.51</td>
<td>0.48</td>
<td>0.57</td>
<td>0.71</td>
<td>0.81</td>
</tr>
<tr>
<td>1 MONTH</td>
<td>0.48</td>
<td>0.76</td>
<td>0.66</td>
<td>0.68</td>
<td>0.62</td>
<td>0.49</td>
<td>0.70</td>
<td>0.83</td>
<td>0.83</td>
<td>0.95</td>
</tr>
</tbody>
</table>

Conclusion(s): ST appears to be a successful drug in preventing the renal toxicity associated with the use of CDDP in HIPEC. Further studies are needed to confirm and support these observations.

References:
1. DOI: 10.1080/02656736.2020.1846793
2. DOI: 10.1080/02656736.2020.1795277
3. DOI: 10.1245/s10434-022-12661-3
07AP02-10
Microcrystals manipulated by drug molecule assembly: a carrier-free ropivacaine formulation for long-acting postoperative analgesia

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**Background and Goal of Study:** To extend the duration of local anesthetics to meet the clinical requirement of postoperative analgesia, slow-releasing systems based on carrier materials have been extensively investigated. However, the use of carrier materials has set extra challenges impeding the translation from bench to bedside.

**Materials and Methods:** Inspired by a combination of ropivacaine hydrochloride (RH) and methylprednisolone sodium succinate (MP) used in the clinic, we developed a carrier-free long-acting ropivacaine formulation by using MP as a dual-functional adjuvant. The self-assembled structures were observed by transmission electron microscopy, and the particle size and XRD characteristics of the crystals were measured. Also, the nerve blockade effect of the suspension was evaluated in a rat sciatic nerve block model.

**Results and Discussion:** Firstly, MP could self-assemble and absorb RH to form nanoparticles. Then by increasing pH, these nanoparticles could induce the formation of homogeneous microcrystals, which could slow release ropivacaine in an appropriate rate and generate long-acting analgesia in animal models. Furthermore, MP also effectively inhibited inflammation caused by ropivacaine.

**Conclusion(s):** Combining the two advantages, clinical outcome of the formulation was proven in a prospective randomized controlled study, providing a promising long-acting ropivacaine formulations with clinical availability.

07AP02-11
Lidocaine and Neuromonitoring in Thyroid Surgery (IOLANT study). Results of prospective randomized double-blind placebo controlled trial

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**Background and Goal of Study:** The purpose of the study was to test the hypothesis that alkalinized lidocaine in the cuff of endotracheal tube improves quality of recovery (QoR) after anesthesia in compare to placebo. Intraoperative neuromonitoring (IONM) parameters were also investigated.

**Materials and Methods:** A prospective randomized double-blind and placebo-controlled trial (NCT04574947) conducted between January 2021 and June 2023. Inclusion criteria were:
1. Planned thyroid surgery with IONM,
2. Age >45 years,
3. Signed informed consent.
Exclusion criteria were:
1. Emergency surgery,
2. Redo surgery,
3. Contraindications for lidocaine,
4. Pregnancy,
5. Enrolment to another RCT within the last 30 days.

Patients were randomly assigned into one of 3 groups (see diagram below). Primary outcome was QoR 40 questionnaire score during the first postoperative day. Secondary outcomes were (1) latency and (2) amplitude of recurrent laryngeal nerve (RLN) during laryngeal IONM. Sample size was set at 231 patients. Interim statistical analysis was planned at 50% of enrollment.

**Results and Discussion:** After enrollment of 110 patients interim statistical analysis was performed and data monitoring board recommended preliminary terminate the study due to futility. The primary end point, QoR 40 scores were not different between studied groups (see table below).

<table>
<thead>
<tr>
<th>Group</th>
<th>QoR-40 Score 24 h after surgery (mean ± sd)</th>
<th>Intergroup mean differences and 95% confidence interval range</th>
<th>Intergroup differences, p-value, Mann-Whitney U test</th>
<th>Conditional power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Topical lidocaine</td>
<td>185 ± 10.98 ± 14.346</td>
<td>0.108 (-0.016; 0.233)</td>
<td>p = 0.278</td>
<td>94.8%</td>
</tr>
<tr>
<td>Placebo</td>
<td>185 ± 11.449</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lidocaine iv</td>
<td>186 ± 0.59 ± 13.591</td>
<td>1.53 (0.52; 2.54)</td>
<td>p = 0.193</td>
<td>90.3%</td>
</tr>
<tr>
<td>Placebo</td>
<td>185 ± 11.449</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Lidocaine in topical and intravenous groups didn’t impair IONM during surgery (see table below).

<table>
<thead>
<tr>
<th>Group</th>
<th>RLN amplitude before surgery, mV (median [Q1-Q3])</th>
<th>RLN latency before surgery, ms (median [Q1-Q3])</th>
<th>RLN amplitude after surgery, mV (median [Q1-Q3])</th>
<th>RLN latency after surgery, ms (median [Q1-Q3])</th>
<th>RLN amplitude change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Placebo</td>
<td>1.47 (1.1-1.99)</td>
<td>4.83 (3.74-6.43)</td>
<td>1.16 (1.03-1.62)</td>
<td>3.8 (3.4-6.55)</td>
<td>-21%</td>
</tr>
<tr>
<td>Topical lidocaine</td>
<td>1.5 (0.91-2.33)</td>
<td>4.25 (3.95-6.13)</td>
<td>1.53 (1.22-2.0)</td>
<td>5.5 (4.25-7.35)</td>
<td>+2%</td>
</tr>
<tr>
<td>Lidocaine iv</td>
<td>1.25 (0.96-1.7)</td>
<td>5.6 (3.9-6.5)</td>
<td>1.22 (0.96-1.7)</td>
<td>4.43 (3.8-6.5)</td>
<td>-2.4%</td>
</tr>
</tbody>
</table>

**Conclusions:** The topical intracuff alkalinized lidocaine and intravenous lidocaine do not improve postoperative QoR 40 score in compare to placebo. An intravenous and topical lidocaine do not affect characteristics of IONM in thyroid surgery.
07AP02-12
The endothelial-independent effect of desmopressin, in vitro, on platelet function

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Background and Goal of Study: Desmopressin (DDAVP), an analogue of antidiuretic hormone, has been shown to increase plasma levels of von Willebrand factor and enhance platelet function through interaction with the vascular endothelium. This mechanism of action has been exploited in the management of bleeding patients with Haemophilia A and von Willebrand's disease (vWD). In vitro evidence suggests that an alternative mechanism of action may also exist.

To determine the effect of DDAVP on platelet function, in vitro, in samples from healthy volunteers.

Materials and Methods: We analysed blood samples in 20 healthy volunteers with normal baseline coagulation studies. Two sets of 4.5ml blood in 3.2% (0.105M) sodium citrate buffered tubes were drawn per participant. The control set was tested using the Platelet Function Analyzer-200® (Siemens Healthcare Diagnostics) and TEG® 6s (Haemonetics®). DDAVP (Ferring Pharmaceutical; South Africa) 5micoctrolitres (4micrograms/millilitre IV ampoule) was added to the remaining citrate tubes, which were then subjected to the same PFA-200 and TEG®6s tests within 4 hours of blood sampling.

Results and Discussion: DDAVP increased the TEG® 6s MA in test (mean 57.2mm 3.56mm) versus control samples (mean 56.645mm 3.78mm); a statistically significant increase of 0.55 (95% CI, 0.046-1.06) mm, p=0.034. It also decreased the k-time in test (mean 1.49min 0.26) versus control samples (mean 1.61min0.25); a statistically significant decrease of 0.11 (95% CI, 0.019-0.21) min, p=0.0204. There was no difference between the means in the clotting times in the Col/EPI or Col/ADP PFA-200 test group versus control.

The results contrast current literature which suggest that DDAVP has no effect on platelet function independent of the endothelium. The TEG® 6s MA is a product of the composite contributions of platelets and fibrinogen to clot formation and their interaction. The results cannot differentiate whether the enhanced effect on clot formation is due to a direct interaction with the platelets or an indirect effect on the platelets mediated through increased fibrin production or possibly another mechanism.

Conclusion(s): DDAVP influences platelet function independent of the endothelium which was previously thought to be a necessity in its mechanism of action on enhancing primary haemostasis.

07AP03-01
Mechanism of age-dependent different sensitivity of propofol and identification of propofol antagonists using zebrafish

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Background and Goal of Study: Propofol is frequently used as an anesthetic drug in the field of anesthesiology which is known to bind with GABA<sub>A</sub> receptors. Required amounts of propofol are different between children and adults, and to date, there is no antagonist to propofol. Zebrafish is useful to administrate drugs easily in different developmental stages.

The purpose of this study is to clarify the mechanism of different sensitivity of propofol between young and adult fish, and to find out antagonists to propofol.

Materials and Methods: Zebrafish were cultured in fish water containing 5μM propofol, and measured the time required for appearing the propofol effect.

We also analyzed the gene expression of GABA<sub>A</sub> receptors in the brains of young (2 months post fertilization, mpf) and adult (8 mpf) zebrafish.

Furthermore, we screened 15 GABA<sub>A</sub> receptor-related drugs to find out candidate drugs that have an antagonistic effect to propofol. Adult fish are cultured in fish water contained propofol and each 15 drug and the time to appear to the anesthetic effect was measured.

Results and Discussion: When propofol was administered to young and adult zebrafish, propofol was more effective in the adult as observed in humans. Gene expression of GABA<sub>A</sub> receptors in the brain was higher in adult fish than those in young fish. This result suggests that the higher expression of GABA<sub>A</sub> receptors may be responsible for more sensitive anesthetic effects in adult fish.

To find out drugs that have an antagonistic effect on propofol, we screened 15 drugs related to GABA<sub>A</sub> receptors. We identified one candidate drug to reduce the effects of propofol, which induced significantly longer time to appear the anesthetic effect of propofol.

Conclusion: Our findings suggested that the different sensitivity for propofol between young and adult fish might be related to the gene expression level of GABA<sub>A</sub> receptors in the brain. We identified a candidate drug to reduce anesthetic effect of propofol.
07AP03-02
The effect of low-dose ketamine on electroencephalographic (EEG) density spectral array monitoring during general anesthesia

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Background and Goal of Study: Perioperative low dose ketamine has been used to reduce postoperative pain, improve pain control, and decrease opioid consumption. In addition, electroencephalographic density spectral array (DSA) monitoring has been proposed to provide real-time EEG information in patients undergoing general anesthesia. The primary aim of this study was to evaluate the effect of low-dose ketamine on the processed EEG and DSA signals during anesthesia.

Materials and Methods: The study included 40 ASA physical status I-II patients, scheduled for elective gynecological surgery. In the operating room, EEG monitoring with the SEDline monitor was started, and EEG data were continuously collected. The pain/analgesia evaluation was performed using with Analgesia Nociception Index (ANI) during surgery. Anesthesia was maintained with desflurane and alfentanil immediately after anesthesia induction. Fifteen minutes after induction of anesthesia, participants in the ketamine group received a 0.3 mg·kg−1 bolus of intravenous ketamine over 60 seconds followed by a 50 µg·kg−1·hr−1 infusion until the end of surgery. Participants in the control group received an equivalent volume of normal saline. The anesthetic technique was standardized, and the postoperative assessments included verbal rating scales (VAS) for pain, IV morphine usage, and quality of recovery assessment.

Results and Discussion: The ketamine group exhibited significantly higher Patient State Index (PSi) values at 10, 20, and 30 minutes after the ketamine administration compared to that in the control group. The EEG findings revealed that significant reductions were noted in the relative power of delta, theta, and alpha frequency bands, as well as significant increases in the relative power of beta and gamma frequency bands at 10 minutes after ketamine administration. Only relative power of the alpha frequency band decreased at 20 and 30 minutes after ketamine administration. However, there were no significant differences in the intraoperative alfentanil and postoperative morphine consumptions, VAS scores, and the incidence of postoperative nausea and vomiting between groups.

Conclusion(s): Our study demonstrates low-dose ketamine changed the EEG patterns and PSI values of desflurane anesthesia. The ketamine-induced changes offer valuable insights into its impact on brain activity, serving as crucial information for clinical anesthesiologists.

07AP03-03
Influence of remifentanil on the relationship between Bispectral index and estimated effect-site concentration of propofol

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Background and Goal of Study: Bispectral index (BIS) changed well correlated with estimated effect-site concentration (Ce) of propofol (Fig. 1a) with some exceptional cases. In our previous study, BIS showed plateau pattern (Fig. 1b) in about 17% of the cases when Ce of propofol was gradually increased until burst and suppression (BS) was observed. Amplitudes of EEG in those cases were rather small. On the other hand, remifentanil made the EEG amplitude smaller. Then, we investigated the influence of remifentanil on the relationship between BIS and estimated Ce of propofol at induction.

Materials and Methods: After approval of our local ethical committee and obtained written informed consent, we enrolled 90 participants (ASA-PS I or II) who were scheduled elective surgery. Participants were randomly assigned into 3 groups; maintained Ce of remifentanil 0 ng/mL (Remi0), 1 ng/mL (Remi1) or 2 ng/mL (Remi2). We recorded raw EEG data as well as BIS on a computer. We also recorded how we administered propofol. After obtained equilibrium of remifentanil, we administered propofol using a target-controlled infusion pump compatible with Diprifusor in manner that Ce of propofol was increased about 0.3 mg/mL/min until BS was observed.

Results and Discussion: 3 cases (every one case in each group) were excluded due to data lost. Plateau pattern was observed 3 (Remi0), 4 (Remi1), 3 (Remi2) cases, respectively. There seemed no influence of remifentanil on emergence of plateau pattern. Amplitude of EEG was smaller in these 10 cases.

Conclusion(s): At least 2 ng/mL of remifentanil had no effect on the emergence of BIS plateau pattern during propofol anesthesia.
07AP03-04
Cannabidiol modulated neuroprotection in a model of attenuated hippocampal synaptic plasticity and neuronal function

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Background: Burdening treatments targeting brain tissue, including radiotherapy, do not only affect the target region itself, but also harm healthy surrounding tissue. Therefore, the demand for neuroprotective drugs, shielding healthy tissue while not attenuating treatment effects, is high. As one of the most sensitive regions, the hippocampus has received widespread attention over the last decades. It is established, that detrimental effects on the hippocampus stem from a decrease in neurogenesis and an upsurge in neuroinflammation. As a possible solution, it has been suggested that the use of potent anti-inflammatory drugs, such as cannabidiol (CBD) may alleviate the decline in cognitive function by intervening with the inflammatory response.

Materials: Adult mice are treated for 4 weeks daily with CBD. After 2 weeks the animals receive a part brain radiotherapy (PBRT) with either 16 Gy or Sham (0 Gy) to one hemisphere of the brain. Afterwards the brain tissue is harvested and processed to perform long-term-potentiation (LTP) recordings. Additionally, the spine density/morphology and microglia polarization are measured.

Results: PBRT resulted in the inhibition of LTP in the irradiated hemisphere, while the non-irradiated hemisphere remained unaffected. However, the pre-administration of CBD (20 mg/kg) rescued LTP. Moreover, the irradiated hemispheres showed a reduction in dendritic spine density. This reduction was not observed in the group receiving CBD along with PBRT. Additionally, the irradiated hemispheres without medication displayed an increase in pro-inflammatory (M1) microglia expression. Conversely, in the CBD-treated group, the irradiated hemisphere showed an elevated expression of anti-inflammatory (M2) microglia compared to the non-irradiated hemisphere.

Discussion: In this study, we postulate that the impairment of LTP induced by PBRT is attributable to increased neuroinflammation and decreased spine density. CBD treatment has demonstrated its potential in ameliorating these deleterious effects. However, the specific molecular pathway of CBD remains to be elucidated and requires further investigation.

Conclusion: In this study CBD has shown substantial effects with regard to neuronal protection and conservation of synaptic plasticity. Considering the involvement of the hippocampus in learning/memory, this might constitute a promising pharmacological avenue to pursue, including neuroanaesthesia, neurointensive care and chronic pain management.

07AP03-05
Effects of aminophylline bolus on recovery time and estimated concentration at the effector site of propofol during total intravenous anaesthesia with target controlled infusion with Schnider and Eleveld model

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Background: Aminophylline reverses propofol effects, and shortens the recovery time from general anaesthesia by increasing the neuronal excitability. We compared the duration until the return of eye-opening (REO) and return of responsiveness (ROR) with or without an aminophylline bolus (4mg/kg) at the end of surgery as well as the Bispectral Index (BIS) values and the propofol effect-site concentration (CeP) delivered with total intravenous anesthesia (TIVA) with target-controlled infusion (TCI).

Materials and Methods: The local Ethical Committee approved this prospective observational study (681/CE Marca). All procedures were by the 1964 Helsinki Declaration. We recruited 48 breast-surgery scheduled female patients with propofol and remifentanil TIVA-TCI. Patient assignment to either the pharmacokinetic/pharmacodynamic (PK/PD) Schnider or Eleveld model and the decision to deliver aminophylline were randomized. We used student-t test to compare continuous variables between the aminophylline and not-aminophylline groups. Categorical data were compared using a χ2 test. Statistical significance was set at p-values <0.05.

Results: 24 patients received aminophylline, and 24 did not. In each group, in 12 patients was adopted the Schnider PK/PD propofol model, and 12 Eleveld PK/PD. There were no differences among demographic variables for CeP and BIS at loss of responsiveness, during anesthesia maintenance, for the anesthesia duration and cumulative propofol dose. Patients who received aminophylline reached REO (7 [IQR 4-10] vs 11 [IQR 9-12], min, p=0.01) and ROR (8 [IQR 5-10] vs 11 [IQR 9-12] min, p=0.01) significantly faster, with significantly lower BIS at REO (68 [IQR 60-75] vs 75 [IQR 72-79], p=0.01). CeP were significantly higher in the aminophylline group at REO and ROR for both models: Schnider model: REO: 1.05 [IQR 0.79-1.30] μg/ml vs. 0.62 [IQR 0.58-0.70] μg/ml, p=0.005; ROR: 0.85 [0.69-1.14] μg/ml vs 0.52 [0.44-0.6] μg/ml, p=0.005; Eleveld model: REO: 1.99 [1.64-2.66] μg/ml vs. 1.50 [1.29-1.71] μg/ml, p<0.001; ROR: 1.65 [1.52-2.25] μg/ml vs. 1.40 [1.19-1.60] μg/ml, p=0.05. Patients in the aminophylline group had a significantly higher time difference between REO and ROR (70 [IQR 0-175] vs 10 [IQR 9-11] s, p=0.005).

Conclusion: We found that aminophylline shortens the anesthesia emergence duration to REO and ROR, contributing in accelerating the return of consciousness. Both events occurred at higher CeP and were further apart in time with aminophylline.
07AP03-06
The opioid system partially modulates propofol-induced hypotension in humans

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Background and Goal of Study: Propofol-induced hypotension (PIH) is multifactorial. We demonstrated in a rat model that naloxone can partially prevent PIH.

It is known that propofol doesn't act on opioid receptors, but the central opioid system can produce cardiovascular regulation of non-opioid drugs. We investigated naloxone on prevention of PIH in humans.

Materials and Methods: Open and randomized human study of 40 adults ASA1-2, divided into 5 groups for general anesthesia. They were monitored every 7 minutes: SBP; DBP; MAP; HR; CVP; BIS; oximetry; capnography; cardiography; arterial and venous blood gases (start and end).

Three groups of propofol (n=8; each) were premedicated with intravenous (IV) saline (PC; control) or naloxone IV 1 or 3μg/kg (PN1;PN3), 2 minutes before propofol IV (2.5mg/kg). Two control groups of naloxone (NC1;NC3; n=8,every) were prepared with naloxone IV (1 or 3μg/kg), but they did not receive propofol. ANOVA (*p<0.05).

Results and Discussion: Naloxone didn't modify its 2 groups (NC1;NC3). Propofol reduced SBP/DBP/MAP in its 3 groups, regardless of CVP and HR, despite baroreflex inhibition. PIH showed 2 phases (PC group): a rapid initial reduction in MAP (2min) followed by slow and delayed reduction in MAP over the next 3 minutes (*p<0.05). Late slow phase had opioid modulation (PN1;PN3), which was partially inhibited by naloxone in a dose-dependent way (Fig.1). This MAP recovery was independent of HR, CVP and propofol hypnosis (Fig.2).

Figure 1 (Left): Recovery of PIH by naloxone. Note the biphasic decay rates of MAP in the PC group.
Figure 2 (Right): Naloxone doesn't modify the hypnotic effect of propofol.

Subtitles: NC1/NC3 = Naloxone controls (1 or 3mcg/Kg); PC = propofol control; PN1/PN3 = Propofol-naloxone (1 or 3mcg/Kg); P = Propofol (2.5mg/kg); S/N = Saline/Naloxone premedication; MAP = Mean Arterial Pressure; BIS = Bispectral Index; (**δ = p<0.05).

Conclusions: PIH is biphasic and multifactorial, being late intensified by opioid modulation. Both hypnotics and cardiovascular depression should participate in the 2 phases of PIH.

References:

07AP03-07
Assessing patient safety after PECS II plane block for resynchronization therapy

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Background and Goal of Study: Cardiac implantable electronic devices (CIED) are a frequent treatment indication for patients with heart failure. Even if the device implantation is considered a minor procedure, the patient's comfort is an important issue. PECS II is an anesthetic technique that has been proven to be efficient in patients undergoing thoracic wall surgery. However, the pharmacokinetics of the anesthetics used periprocedural can be altered in heart failure.

We conducted a pilot study in order to evaluate benefits, periprocedural comfort, post-procedural analgesia and safety of regional anesthesia for CIED implantation.

Materials and Methods: Five patients admitted for cardiac resynchronization therapy (CRT) were assessed. The regional anesthetic technique required two administrations of a mixture in equal parts of ropivacaine 0.5% with lidocaine 1%, 2 ml/kg body weight, initially in the interfascial plane of major and minor pectoral muscle, and a secondary administration between the minor pectoral and seratus anterior muscle.

The procedure was carried out under ultrasonographic guidance. The patient's comfort during the anesthetic procedure, as well as during the CRT implantation procedure was evaluated using Numerical Rating Scale (NRS).

Anesthesia related events such as anaphylaxis, toxicity and hemodynamic instability were monitored as well. Pharmacokinetics of ropivacaine was assessed by LC-MS from blood samples collected 1, 6 and 12 hours after the drug administration.

Results and Discussion: The procedure proved to be safe, and guaranteed adequate anesthesia and analgesia throughout the CRT device implantation and afterwards. Patient satisfaction registered values ranged between 1-2 points on NRS during the anesthesiology procedure with an increase to 3 when the device pocket was created. No analgesic medication was necessary for up to 12 hours after CRT and anesthesia-related events were not recorded. Ropivacaine concentrations ranged from 0.83 to 1.01ng/ml.

Conclusion(s): Interpectoral and serratus plane block proved beneficial in providing effective anesthesia and analgesia for patients undergoing cardiac device implantation. The plasmatic concentrations of ropivacaine were safe during and after the procedure and maintained the patient's hemodynamic stability.

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**07AP03-09**  
Effect of high concentration of sevoflurane on the development of malignant hyperthermia and rhabdomyolysis in a mouse model

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**Background and Goal of Study:** Malignant hyperthermia (MH) is triggered by volatile anesthetics and is associated with a mutation in the ryanodine receptor type 1 (RYR1) gene. MH causes rhabdomyolysis, leading to fatal arrhythmia due to hyperkalemia and lactic acidosis. The impact of volatile anesthetic concentrations on MH development remains unknown, and the association between rhabdomyolysis and MH pathology is unclear. We hypothesized high concentration of volatile anesthetics might accelerate the onset and progression of MH.

The study aimed to investigate the difference in the clinical course of MH based on sevoflurane concentration and the severity of rhabdomyolysis caused by MH.

**Materials and Methods:** We used MH model mice with a mutation in RYR1. Mice were sedated and intubated. Oxygen and sevoflurane were administered, with two groups receiving different sevoflurane concentrations: 2 MAC (5%) and 1 MAC (2.5%). Outcome measures included time to MH onset, time at maximum temperature, maximum temperature, time at maximum heart rate, maximum heart rate and time to asystole. We defined MH onset when temperature increased by more than 0.5 degrees in 15 minutes. Mann-Whitney U test was used for analysis, considering p-values less than 0.05 as significant.

For the second experiment, mice were sedated, intubated and given 2 MAC of sevoflurane. Arterial blood samples were obtained after 30 minutes for blood gas analysis, measuring pH, levels of oxygen and carbon dioxide, electrolytes and lactate.

**Results and Discussion:** Analysis included 5 mice in the 2 MAC group and 6 in the 1 MAC group, all male and experiencing MH onset. The 2 MAC group showed a faster onset of MH than the 1 MAC group (4[4-4] minutes vs. 6[5-3] minutes, presented as median, first quartile and third quartile, p=0.03). In addition, the 2 MAC group showed lower heart rate than the 1 MAC group (480[480-510] beats/min vs. 600[570-630] beats/min, p=0.007). Blood tests revealed decreased oxygen, increased carbon dioxide, and severe hyperkalemia and lactic acidosis in all mice.

The study suggests high concentration of sevoflurane may expedite MH onset. Blood gas data indicate severe rhabdomyolysis, which may be linked to this clinical course.

**Conclusion:** Administration of 2 MAC of sevoflurane resulted in a faster onset of MH and lower heart rate than 1 MAC, and caused severe hyperkalemia and lactic acidosis. Further study is needed to reveal the association between volatile anesthetics and MH.

**07AP03-11**  
Gender differences and other factors influencing anaesthesia

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**Background and Goal of Study:** Of the known differences in the effect of narcosis drugs, gender differences are the least understood. The objective of this study is to quantify them and to look if they are independent of other factors such as height and weight.

**Materials and Methods:** 876 patients were assessed under very homogeneous narcosis conditions. The narcosis was maintained by propofol and remifentanil and the depth of narcosis was EEG-controlled. The analysis was done using the Student's t-test as well as by the multifactorial method MANOVA. Gender differences in “propofol dosage” and “time to awakening” were assessed in relation to gender and other known variables as age, weight, height, BMI, and duration of surgery.

**Results and Discussion:** The t-test showed significant differences in propofol dosage and time to awakening in relation to gender, but also to other variables like duration of surgery, age, BMI, height, and weight.

A multivariate analysis was then carried out using the MANOVA program to identify those variables that had a statistically significant influence independently of the others. The MANOVA showed that the variables “duration of surgery”, “age”, “BMI”, and “height” have independent statistical significance. The “gender” variable shows a trend towards women needing more anesthetics and nevertheless waking up more quickly. However, statistical significance is not yet achieved in the number of cases.

**Conclusion(s):** It was shown that there are gender-specific differences in anesthetic dosage and time to awakening. However, these differences are smaller than the independently statistically significant differences “age”, “BMI” and “height”, on which the “gender differences” partly depend.

**07AP04-01**  
Evaluating the effects of intravenous norepinephrine infusion on plasma melatonin concentrations in healthy volunteers: a comparative analysis between awake and general anaesthesia states

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**Background and Goal of Study:** During general anaesthesia (GA), hypotension is often managed with norepinephrine (NE). NE not only raises blood pressure but is also thought to enhance melatonin synthesis through its beta adrenoceptor interaction at the pineal gland. Melatonin (M) offers anxiolytic and analgesic effects and enhanced synthesis might therefore prove beneficial in the perioperative setting. This study aims to investigate how NE infusion affects plasma M levels in healthy volunteers, both while awake (AW) and under GA.
Materials and Methods: In this study, 36 healthy volunteers, stratified by age (18-34, 35-50, 51-70) and gender (1:1), received a stepwise intravenous NE infusion, both AW and under propofol and remifentanil GA. Arterial blood was sampled for M and NE plasma concentrations, with M’s detection threshold (DT) at 8 pg.ml⁻¹. A linear mixed-effects model (LMM) was used to analyse the relation between the NE and M plasma concentration in both states.

Results: Baseline M concentrations (median [Q1-Q3]) were highly variable between patients, AW 18.6 pg.ml⁻¹ [10.4-26.2] and GA 9.6 [8.0-16.7], respectively. Four volunteers had undetectable M levels during the whole study. M concentrations at NE infusion rate of 0.20 mcg kg⁻¹ min⁻¹ were higher compared to baseline AW concentration in both AW (p=0.02) and GA phase (p<0.0001) (see fig. 1). M concentrations were comparable during GA and AW (p=0.059). LMM showed a highly significant association between measured plasma NE and M concentrations (p<0.0001). Assuming other factors are constant, M concentrations increase by approximately 0.503 pg.ml⁻¹ for each unit increase in NE concentration (nmol/L).

Figure 1: Plasma Melatonin Concentrations During Norepinephrine Infusion: Boxplots and Spaghetti Plots for Awake and Anaesthetised Volunteers

Conclusions: NE administration appears to stimulate M production in most healthy volunteers. GA might modify this effect. This might have potential beneficial effects on sleep, and postoperative morbidity, but further research is required to investigate this possibility.

Reference:

07AP04-02 Examining the emotional impact of paracetamol and ibuprofen: insights from a placebo-controlled study

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Background and Goal of Study: Extensive research has explored the effects of paracetamol and ibuprofen on emotional responses, yet questions persist about their replicability, underlying mechanisms, and dosage relationships.

Materials and Methods: In this double-blinded, placebo-controlled study, we examined emotional effects of a single dose of paracetamol (1000 mg) and ibuprofen (800 mg) and a 2-week paracetamol treatment (1000 mg b.i.d.). Emotional and physical responses were assessed using standardized psychological tests (Hurt Feeling Scales, Emotional Scenarios, PANAS) and a Cold Pressor test. Ethical approval was obtained from the Institute’s Ethical Review Board and the German Federal Institute for Drugs and Medical Devices.

Results and Discussion: A single 1000 mg dose of paracetamol moderately reduced physical pain according to the Cold Pressor test. However, it did not significantly reduce psychic hurt feelings or empathy for physical or emotional pain compared to the placebo. After 8 and 14 days of paracetamol treatment, there was a slight reduction in the hurt feeling score compared to the placebo, but the effect size was small (Cohen’s d of -0.3) and lacked statistical significance. Ibuprofen (800 mg) did not significantly affect hurt feelings or empathy.

Furthermore, gender-related effects were observed in the psychological test results. Females consistently had higher hurt feeling scores than males. Paracetamol’s emotional blunting effects were more pronounced in females, while its impact on pain threshold and tolerance was mainly seen in males. In contrast, ibuprofen exhibited analgesic effects primarily in females. These sex differences were unrelated to pharmacokinetic variations. Maximum blood concentrations and the area under the curve (AUC) of paracetamol were significantly higher in females, but no significant correlation emerged between blood concentrations and emotional or physical pain.

Conclusions: This study highlights minor and nonsignificant emotional effects of paracetamol, particularly noticeable after 1 and 2 weeks of treatment. Potential explanations involve intricate mechanisms like transcriptional modifications, accumulation of central nervous system active metabolites, or prolonged modulation of neuronal connectivity.

Further research is needed to comprehensively understand these observed phenomena.
07AP04-03
Remimazolam dosing optimization for sedation in hip and knee arthroplasty – can Patient State Index be used as a sedation assessment tool?

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Background and Goal of Study: The recent registration of Remimazolam by the European Medicines Agency has introduced a promising option for rapid onset and offset of sedation. However, there is a gap in research concerning the utilization of Remimazolam during arthroplasty procedures and the application of the Patient State Index (PSi) to monitor sedation with Remimazolam. This study aimed to address these gaps with the following objectives:

1. To identify the optimal dosing regimen utilizing a 0.04 mg/kg intravenous bolus, aiming to maintain the Modified Observer’s Assessment of Alertness/Sedation Scale (MOAA/S) within the specified range of 2-3; and,
2. To investigate the potential of PSi as a reliable indicator for assessing current patient sedation levels during Remimazolam administration.

Materials and Methods: Thirteen patients who fulfilled inclusion criteria were selected for the study (Figure 1). Continuous electroencephalography monitoring was performed by Masimo SedLine. Remimazolam 0.04 mg/kg was administered every 2 minutes until the MOAA/S score was ≤ 3. The primary endpoint was sedation success rate with Remimazolam monotherapy, and the secondary endpoints included induction time, Remimazolam dose, and Patient State Index dynamics.

Results and Discussion: The sedation success rate with Remimazolam monotherapy was 85%. The Remimazolam induction dose was 0.040 (0.038–0.042) mg/kg, and the induction time in 95% of boluses was 2 minutes. The time from the end of Remimazolam administration to awakening was 16 (12–19) minutes. There were no significant respiratory or circulatory effects requiring intervention during sedation. PSI showed a prediction probability (P(k)) of MOAA/S score of 0.82.

Conclusions: Remimazolam can attain ideal levels of sedation without notable respiratory or circulatory adverse effects. The research offers recommendations for the proper remimazolam dosage to achieve moderate sedation during arthroplasty. The Patient State index is a trustworthy indicator for sedation level assessment when using Remimazolam.

07AP04-04
Effects of the sodium glucose co-transporter 2 inhibitor empagliflozin on cardiovascular injury during the perioperative period: a translational approach

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Background and Goal of Study: Empagliflozin (EMPA) has profound cardiovascular benefits in patients with chronic heart failure, but little is known about its acute effect on surgery related cardiovascular dysfunction. We aimed to investigate whether short-term treatment with EMPA prevent acute cardiovascular injury and systemic inflammatory reaction induced by cardiac surgery, as measured by biomarkers.

Materials and Methods: This project is a translational sub-analysis using samples from 50 patients from the MERCURI study (Trial NL9561), with 25 patients randomized to the EMPA group and 25 patients to the control group. Patients in the intervention group receive 10 mg/d EMPA consecutively from 3 days preoperatively to 2 days after surgery.

The epidemiological characters of the patients were collected on the day of screening. Blood was collected before and one day after cardiac surgery. Plasma Troponin I, N-terminal pro-hormone of brain natriuretic peptide (NT-pro-BNP), C-reactive protein, interleukin (IL)-6 and IL-8 were measured using ELISA (Figure 1).

Results and Discussion: Patients in the EMPA and control group did not have apparent differences in their epidemiological characters and heart disease history. Before surgery, plasma levels of Troponin I, NT-pro-BNP, CRP, IL-6 and IL-8 did not differ between the EMPA group and Control group.

Cardiac surgery increased Troponin I, CRP and IL-6 secretions of patients in both groups, however EMPA treatment had no significant effect on these changes [pg/ml, ΔTroponin I, EMPA: 2793.0 (1834.0–7043.0) vs Control: 3593.0 (1165.0–5736.0), ΔCRP, EMPA: 37276369.0 (15403619.0–90210645.0) vs Control: 2769663.0 (10922393.0–88123877.0), ΔIL-6, EMPA: 8.2 (0.7-18.0) vs Control: 5.7 (0.3–12.7), P>0.05]. NT-pro-BNP and IL-8 of patients were not significantly altered by the operation procedures (P>0.05), and EMPA did not influence the change of NT-pro-BNP and IL-8 after surgery (P>0.05).

Conclusion(s): The current data show that EMPA treatment during the perioperative period does not prevent the acute myocardial injury and inflammatory reaction induced by cardiac surgery.

Figure 1. Patient inclusion criteria and patient selection.
07AP04-05
The immunomodulatory effect of sugammadex in vitro and after total hip arthroplasty

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Background and Goal of Study: Postoperative immunosuppression is a well-known phenomenon associated with infectious complications that greatly impair recovery after surgery. Perioperative immune dysregulation is likely induced by surgical damage and anesthetics, but remains far from comprehensively characterized. To counteract this state, the effects of individual drugs on immune function need to be explored. Sugammadex, a cyclodextrin that encapsulates rocuronium, also binds steroids and fatty acids. These molecules may modulate activity of nicotinic acetylcholine receptors, which are present on several immune cells. This study combines in vitro experiments with a surgical pilot study to investigate the effect of sugammadex on postoperative innate immune function.

Materials and Methods: First, isolated peripheral blood mononuclear cells from healthy donors were exposed to sugammadex and rocuronium before stimulation with E. Coli lipopolysaccharides (LPS). Afterwards, cytokine production capacity was quantified (TNF, IL-1β, IL-6). Second, 20 adult patients undergoing total hip arthroplasty received sugammadex (8 mg/kg) or placebo at the end of surgery. Ex vivo cytokine production capacity was quantified after whole blood stimulation with LPS. Groups were compared using Mann Whitney-U test and differences over time using Friedman test including Dunn’s post hoc test. Bonferroni correction was applied.

Results and Discussion: The in vitro experiment showed that rocuronium dose dependently suppresses cytokine production capacity of TNF and IL-1β. Higher doses of sugammadex (100 and 1000 μg/ml; 100μg/ml is the approximate plasma concentration reached upon 8 mg/kg sugammadex) restored suppression of TNF and IL-1β. There was no effect on IL-6 production. In the pilot study, no differences in ex vivo cytokine production capacity were found between groups at the end of surgery or on postoperative day 1.

Conclusion(s): Sugammadex preserved cytokine production capacity of TNF and IL-1β in vitro. The subsequent human pilot study revealed no postoperative immunomodulatory effects regarding cytokine production capacity for sugammadex in the clinically used dosing range.

07AP04-06
Evaluation of synergistic effects in combined anesthesia with propofol and remimazolam: a pilot retrospective observational study

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Background and Goal of Study: Inhalation anesthetics and intravenous anesthetics have been reported to exhibit an additive effect. Conversely, barbiturates and propofol have been reported to demonstrate a synergistic effect. Although the novel intravenous anesthetic remimazolam is clinically used, there has been no verification of its potential synergistic effect when combined with propofol. The purpose of this research is to retrospectively examine cases involving the combination of propofol and remimazolam, aiming to assess the synergistic effects of this combined anesthesia.

Materials and Methods: The study included patients who underwent spinal surgery and were managed under total intravenous anesthesia (TIVA). The patients were divided into three groups: the R group, which used only remimazolam as the intravenous anesthetic; the P group, which used only propofol; and the RP group, which combined both remimazolam and propofol. Exclusion criteria consisted of the concurrent use of inhalation anesthetics and postoperative artificial ventilation management. The average drug administration rates during anesthesia management were examined for both the remimazolam and propofol groups. These results were then used to estimate the necessary dosage for individual anesthesia maintenance. Subsequently, the remimazolam and propofol dosages in the RP group were investigated, and the Combined Index was calculated based on the required dosages for individual management.

Results and Discussion: A total of 411 cases were investigated, with 79 in the R group, 265 in the P group, and 67 in the RP group. No significant differences were observed in height and weight. The R group showed a significantly higher average age compared to both the P and RP groups.

Conclusion(s): A retrospective observational study of patients undergoing spinal surgery under total intravenous anesthesia indicates the potential synergistic effect of combining remimazolam and propofol.
07AP04-07
Hypnotic agents effect on upper esophageal sphincter

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Background and Goal of Study: Upper esophageal sphincter (UES) contributes to protect airway from aspiration. Because of its peculiarities, few studies have focused on it, and many of them present limitations: premedication which can bias the results, unreliable old manometric technique, patients’ age limited to 65 years old.

Our objective was to measure the isolated effect of hypnotic agents on UES and the potential association between level of awareness and functionality of the sphincter.

Materials and Methods: 25 patients aged 39-84 years old to be undergoing general anesthesia were included. They were randomly allocated in 3 groups depending on the hypnotic agents received: propofol, etomidate or thiopental. Solid-state high resolution manometry probe was introduced using no sedation, and upper esophageal sphincter pressure was continually registered as well as entropy and hemodynamics.

For each participant, basal and posthypnotic agent measurements were compared using Statistical software IBM SPSS Statistics v2. Wilcoxon and Mann Whitney tests were employed.

Results and Discussion: Median UES pressure descended from 42.15 mmHg [34.13; 52.48] to 18.50 mmHg [12.00; 31.53] using propofol; and from 33.60 [27.35; 53.95] to 27 [22.50; 31.95] mmHg using etomidate; being both decrements statistically significant (p<0.05). Thiopental lowered mean UES pressure from 48.30 [9.49] to 17 [10.95] mmHg. The scarce number of participants in this group limited statistical comparisons. No statistically significant differences were found between propofol and etomidate (p 0.347).

However, taking the percentage of UES pressure decline as a magnitude of the hypnotic agent effect, propofol group showed a median UES pressure descent of 57.80% [22.39;69.36] compared to 21.73% [8,13;40,57] for etomidate. This could have implications on airway safety. Hypnosis monitoring might not be suitable to estimate the functional state of the upper esophageal sphincter since no statistically significant association (p 0.628) was found between them.

Conclusion(s): Propofol and etomidate cause a statistically significant decrease in UES pressure, interfering in airway protection. However, it has been noted etomidate effect to be of lesser magnitude than propofol. Further studies including a higher number of patients could achieve a statistically significant difference between them. No association has been found between entropy and UES sphincter descents caused by hypnotics.

07AP04-08
Dose-dependent protective effect of poloxamer 188 against hypoxia-reoxygenation in human induced pluripotent stem cell derived cardiomyocytes

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Background: Poloxamer 188 (P188), a triblock copolymer, protects against ischemia/reperfusion injury. The precise mechanisms remain incompletely understood. We used human induced pluripotent stem cell (hiPSCs) derived cardiomyocytes (CM) to study the mechanism by which P188 increases viability of cardiovascular tissue after hypoxia/ reoxygenation.

Methods and Goal of the Study: hiPSC-CM were cultured in RPMI 1640 basal medium supplemented with B27 and insulin and subjected to hypoxia (1% oxygen) at 37°C for 28 hours. Cardiomyocyte function (Sony Imaging system), adenosine triphosphate (ATP) level (cell titer glo assay), and cell viability (calcein-AMP staining) were determined at the end of the reoxygenation period. One-Way ANOVA & Dunn's post hoc test were utilized for statistical analysis (*P <0.05 vs. untreated control group).

Results: Administration of P188 increased hiPSC-CM systolic and diastolic function at concentrations of 10^-12 M and higher. Similarly, cellular ATP content was 1.7-fold increased after administration of P188. Live/dead ratio was increased dose dependently from 0.94±0.26 (48% viability) to 12.56±1.91 (92% viability, mean±SEM) with a maximum at a concentration of 10^-8 M.

Conclusion: Our data demonstrate the protective effect of P188 for the first time in hiPSC-CM demonstrating the suitability of hiPSC-CM as a clinically relevant platform for testing protective strategies against hypoxia reoxygenation. Further studies are required to understand the underlying mechanism.

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07AP04-09
Amide local anesthetics are able to alter pro-inflammatory signaling pathways in the skin and might facilitate wound healing – an in vitro study with human keratinocytes

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Introduction: Rejection of allogenic tissue transplants is a common phenomenon involving several inflammatory pathways including the activation of mitogen-activated protein kinases (MAPK) and the secretion of pro-inflammatory cytokines. Local anesthetics (LA) are not only used frequently in clinical practice, but have also been demonstrated to exert strong anti-inflammatory/beneficial effects in different experimental models in vitro.
and in vivo. Hypothetically, these beneficial effects should also be observed in the skin, e. g. after tissue transplantation. However, the influence of LA on the inflammatory response of the skin has not been examined yet.

**Methods:** The secretion and secretion of inflammatory markers and proteins were induced in immortalized human keratinocytes (HaCat) by tumor necrosis factor-α (TNF) and Interferon-γ (IFN). Lidocaine (LC) and RC in clinically relevant concentrations were added to analyze their effects. Treated HaCat cells were assessed using ELISA, Western Blot, Resazurin-based viability assay (RVA) and scratch wound healing assay.

**Results:** TNF/IFN induced an inflammatory state in HaCat that could be modulated by LA. In RVA, the combination of TNF and IFN significantly reduced cell metabolism or cell number, which could not be attenuated by LA. In the scratch assay, we detected a decreased cell migration in presence of TNF/IFN. However, this effect was ameliorated by administration of RC/LC. LA did not influence the secretion of Interleukin (IL)-1β, IL-8 or IL-6. LC reduced the expression of phosphorylated MAPKs ERK and p38, while RC did not seem to influence the TNF/IFN-induced rise in these inflammatory proteins.

**Conclusion:** LA are able to alter inflammatory states of keratinocytes on the intracellular level but not their paracrine function regarding the secretion of ILs, which might be due to the fact that that a modulation of the paracrine function might require an interaction with lymphocytes.

However, the effect of the LA as observed in the scratch assay indicates a potentially beneficial effect on wound healing. Evaluating the MAPK signaling pathway, we were able to demonstrate that LC reduced the expression of phosphorylated ERK and p38, which might provide a first insight into a potential mechanism, by which the LA might be able to exert their effects.

We anticipate our project to be a starting point for further research on the effects of LA on inflammation of the skin, e. g. after allograft transplantation.

### 07AP04-10
**The effect of obesity on the effective dose of ciprofol during painless gastroscopy**

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**Background and Goal of Study:** Administration of ciprofol induction based on the total body weight can result in an exaggerated physiologic reaction as well as delayed awakening from anesthesia in the obese patient. This study aimed to explore obesity could decrease the effective dose of ciprofol during painless gastroscopy.

**Materials and Methods:** Patients were allocated into normal group, overweight group and obesity group according to the BMI. The Dixon sequential method was employed to determine the 50% effective dose (ED₅₀) and the 95% effective dose (ED₉₅) of ciprofol during the painless gastroscopy. After alfentanil 5 ug/kg injected intravenously, ciprofol was intravenously administrated. The initial dose of ciprofol was set at 0.4 mg/kg with a dose gradient of 0.04 mg/kg. The dose of ciprofol was increased or decreased according to the positive/ negative response. The positive response was defined as: body movement, cough, swallowing, Modified Observer’s Assessment of Alertness/Sedation Scale (MOAA/S scale) more than 1 score after 3 minutes of ciprofol injection. The former patient who exhibited a positive reaction conduct the starting point and eight crossovers were considered sufficient to accomplish the study. ED₅₀ and ED₉₅ of ciprofol were calculated using probit regression analysis and comparison them between groups was assessed using the u-test.

**Results and Discussion:** The ED₅₀ and ED₉₅ of ciprofol induction dose for the normal group were 0.213 (0.184,0.242) and 0.267 (0.239,0.435) mg/kg, the overweight group were 0.189 (0.165,0.210) and 0.230 (0.210,0.338) mg/kg, the obesity group were 0.155 (0.134,0.178) and 0.200 (0.178,0.309) mg/kg. The ED₅₀ and ED₉₅ were significantly decreased in the obesity group compared to the normal and overweight group (P<0.05). The effective dose of ciprofol during painless gastroscopy decreased with increasing BMI.

**Conclusion(s):** Obesity could decrease the effective dose of ciprofol during the painless gastroscopy. Obesity patients require a lower weight-based dose of ciprofol for induction during painless gastroscopy.

### 07AP04-11
**Intrathecal morphine - a survey of the Portuguese reality**

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**Background and Goal of Study:** Intrathecal administration of morphine is a technique frequently used in anaesthesiology. However, the doses used and drugs co-administered vary significantly. With this survey, we intended to investigate the use of this technique by anaesthesiologists in Portugal.

**Materials and Methods:** A survey was designed to assess the frequency of use of intrathecal morphine (ITM), adverse effects (AE), post-operative need for surveillance, drugs co-administered intrathecally, and the definition of combined anaesthesia. Clinical cases of different surgical fields were presented with hypothetical answers regarding the dosing of ITM. The questions were transferred to a Google Forms survey and proposed to anaesthesiology specialists and residents of multiple hospitals in Portugal.

**Results and Discussion:** Between May and July 2023, we had 101 answers. 59.4% were specialists. Most of the respondents used ITM at least monthly (60.4%), mainly in obstetrics, general
surgery, urology, and orthopaedics. Pruritus (83.9%), and PONV (75.3%) were the most commonly reported AE. Only 18.3% have observed respiratory depression. 64.6% would administer ITM without confirmation of intensive/intermediate care after surgery. 54.5% considered general anaesthesia with sole administration of intrathecal morphine a combined anaesthesia.

In obstetrics, ITM 50-100mcg (47.5%) and 101-150mcg (39.6%) were mostly chosen for a C-section with spinal anaesthesia. Half of the population would co-administer ITM with another opioid (sufentanil), while the other half would administer ITM as the only intrathecal opioid.

In all cases, the most voted option was “I wouldn’t do ITM”, although fixed doses of ITM ≤150mcg and doses per weight of ≤2mcg/kg and 2-4mcg/kg were also most commonly chosen.

**Conclusion(s):** There are differences regarding definitions, post-operative care standards, and dosing of ITM for different procedures. Age appears to be a factor in abandoning the use of ITM and dosing is mainly guided by dose range rather than by dose per weight.

**07AP04-12**

High and similar intrapulmonary penetration of ceftazidime/avibactam and ceftolozane/tazobactam administered by continuous infusion in critically ill patients with nosocomial pneumonia: a randomized pharmacokinetic trial

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**Background and Goal of Study:** Optimal antimicrobial drug exposure in the lung is required for successful treatment outcomes for nosocomial pneumonia (NN). There is no data about the intrapulmonary pharmacokinetics (PK) of ceftazidime/avibactam (CTZ) and ceftolozane/tazobactam (CFT) when administered by continuous infusion (CI).

The aim of this study was to evaluate the PK of these new betalactams administered by CI in the plasma and epithelial lining fluid (ELF) in critically ill patients with NN.

**Materials and Methods:** Twenty patients (15 (75%) male, median (IQR) age 76 (8)) were enrolled in a prospective, randomized, PK trial. Ten patients received CTZ and ten CFT, both at the same exposure in the lung is required for successful treatment outcomes

**Results and Discussion:** Demographic, clinical, and PK characteristics are shown in Table 1. Plasma CTZ and CFT concentrations after the LD are shown in Figure 1. No statistical differences between concentrations of both antibiotics were found at any time point measured. The median (IQR) ELF penetration ratio was 36.8 (16.9-44.8) in the CTZ group and 47.0 (34.1-82.7) in the CFT group (p =0.1208).

**Conclusion:** Continuous infusion allowed high lung penetration of CTZ and CFT, whose ELF concentrations were above 4 times the MIC for all susceptible strains, without differences between both drugs. These preliminary findings will be confirmed at the end of the trial.

**07AP05-01**

Improvement of dyspnea and drooling after re-administration of flumazenil for antagonizing remimazolam in a patient with spinocerebellar ataxia type 6

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**Background:** Remimazolam is an ultrashort-acting benzodiazepine, and its action is reversed by flumazenil. Although their active durations are comparable, re-sedation after antagonizing remimazolam with flumazenil has been reported [1]. However, there has been no report of symptoms other than re-sleeping.

**Case Report:** A 57-year-old woman with spinocerebellar ataxia type 6 was scheduled to undergo total abdominal hysterectomy with bilateral adnexectomy for uterine cancer. Physical examination showed dysarthria and ataxia of the trunk and extremities. Laboratory investigation indicated normal liver function. In the operating room, an epidural catheter was inserted between the 10th and 11th thoracic vertebrae.
Anesthesia was induced with remimazolam (12 mg/kg/h) and was maintained with remimazolam (1 mg/kg/h) and remifentanil (0.1–0.2 μg/kg/min), with maintenance of bispectral index values at 45–63. Patient-controlled epidural analgesia infusion of 0.2% levobupivacaine was initiated during surgery. The surgery was completed uneventfully in 190 min. An adequate dose of sugammadex (2 mg/kg) was administered and complete reversal of rocuronium was verified. She was extubated after administration of flumazenil (0.5 mg). She was well awake and was admitted to the intensive care unit. After 60 min, she presented dyspnea and drooling. Her respiratory rate was 18 breaths/min and oxygen saturation was 98% while she was breathing oxygen through a face mask at a rate of 5 L/min.

After re-administration of flumazenil (0.5 mg), these symptoms improved instantly. She did not present those symptoms again and was discharged on postoperative day 9 without any other complications.

**Discussion:** Since dyspnea and drooling improved immediately after re-administration of flumazenil, these symptoms might be due to recurrence of remimazolam effects. Remimazolam has relatively high potency at alpha 5 subunit-containing gamma-aminobutyric acid type A receptors [2], which mediates the effects of muscle relaxation [3]. Dyspnea and drooling are possible symptoms caused by muscle weakness and might have been caused by the effects of muscle relaxation with remimazolam in this patient.

**References:**

**Learning points:** Recurrence of remimazolam effects should be considered even when atypical symptoms such as dyspnea and drooling occur after reversal of remimazolam with flumazenil.

**07AP05-02**
Coma after droperidol administration. A case report

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**Background:** Every year, around 32,000 patients throughout Switzerland are hospitalised due to an adverse drug reaction. This corresponds to 2.3% of all hospitalisations, although there is a large number of unreported cases. If adverse drug reactions occur in hospital, the in-hospital death rate is 2.2%[1,2]. In addition to dexamethasone and 5-HT3 antagonists, D2 antagonists are a cornerstone of the treatment of PONV prophylaxis. One of the frequently used D2 antagonists is droperidol, with high affinity for D2 receptors and a slightly lower affinity for α1-adrenergic receptors. The half-life of droperidol is 134 ± 13 minutes in adults and may be prolonged in geriatric patients. Droperidol is metabolised in the liver by the enzymes CYP 1A2 and 3A4/5 and in small quantities by CYP 2C19.

**Case Report:** A 32-year-old female patient (ASA II) with a history of asthma, hypothyroidism and smoker (40 p/y) who was scheduled for discectomy of A5-A6 disc herniation. After induction of anesthesia and intubation the patient presented intraoperative bronchospasm and hypoxemia. Initial management of bronchospasm included elevation of the FiO2, initiation of sevoflurane administration, administration of intravenous magnesium, ketamine, 10 puffs of salbutamol and bronchial aspiration. However the bronchospasm did not resolve and the patient was radially treated with 8 more puffs and nebulised salbutamol yet with no improvement of neither oxygen saturation nor breath sounds. Meanwhile an arterial line and a central venous catheter were placed. In order to exclude pneumothorax a chest X-ray was performed, which revealed that the endotracheal tube was misplaced in the carina. The bronchospasm resolved following the correction of the endotracheal tube and the ABGs showed an oxygenation index of 268. During the operation metabolic acidosis with a continuous elevation of lactate level was observed and the potential causes were examined. We concluded that the lactic acidosis was salbutamol induced after excluding other potential causes.

**References:**

**Learning points:** This case report shows that also rare adverse side effects must be expected especially when several substance classes are combined with each other in everyday practice.

**07AP05-04**
Salbutamol-induced lactic acidosis after treating intraoperative bronchospasm

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**Background:** Inhaled b2-adrenergic agonists belong to the first line treatment of intraoperative bronchospasm and are worldwide prescribed to patients with bronchial obstruction. Lactic acidosis due to beta-adrenoceptors is a rare clinical presentation while the mechanism of action is not clearly understood. An increase of glycolysis pathway leads to pyruvate escalation which is unable to enter Krebs cycle leading to an elevation of lactates.

**Case report:** We describe the case of a 40 year old woman (ASA II) with a history of asthma, hypothyroidism and smoker (40 p/y) who was scheduled for discectomy of A5-A6 disc herniation. After induction of anesthesia and intubation the patient presented bronchospasm and hypoxemia. Initial management of bronchospasm included elevation of the FiO2, initiation of sevoflurane administration, administration of intravenous magnesium, ketamine, 10 puffs of salbutamol and bronchial aspiration. However the bronchospasm did not resolve and the patient was radically treated with 8 more puffs and nebulised salbutamol yet with no improvement of neither oxygen saturation nor breath sounds. Meanwhile an arterial line and a central venous catheter were placed. In order to exclude pneumothorax a chest X-ray was performed, which revealed that the endotracheal tube was misplaced in the carina. The bronchospasm resolved following the correction of the endotracheal tube and the ABGs showed an oxygenation index of 268. During the operation metabolic acidosis with a continuous elevation of lactate level was observed and the potential causes were examined. We concluded that the lactic acidosis was salbutamol induced after excluding other potential causes.
Opioid free anesthesia & analgesia (OFAA) in extreme incapacitating obesity

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Background: OFAA can be an alternative technique for bariatric laparoscopic surgery. In patients with severe morbid obesity, opioids side effects can be a major problem.

Case report: 45 y.o woman, ASA IV, IMC: 99/kg/m², Pickwick syndrome and chronic heart failure, underwent laparoscopic gastric bypass (Fig 1). OFA was performed with propofol, lidocaine, ketamine, Dexmedetomidine and rocuronium (Table 1). Monitoring: Standard, IBP, Bis, and NMB. Multimodal analgesia, dexamethasone and MgSO4 were used. When Surgery ended, sugammadex and ondansetron was used. OR-extubation. ICU-admission. J. Santaliestra - bypass (Fig1). OFA was performed with propofol, lidocaine, ket

Discussion: A thorough understanding of the mechanisms of lactatemia is required in order to diagnose and treat rare though demanding clinical problems.


Learning points: B2 agonist administration should be considered in differential diagnosis of lactic acidosis.

Table 1. Type of Weights used to calculate the doses of drugs for OFA:

<table>
<thead>
<tr>
<th>Drug</th>
<th>Weights to calculate dose (bolus&amp;infusion)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propofol</td>
<td>ABW 1.5mg&amp;0.5mg/kg/h</td>
</tr>
<tr>
<td>Ketamine</td>
<td>ABW 0.3mg/kg&amp;0.2mg/kg/h</td>
</tr>
<tr>
<td>Lidocaine</td>
<td>ABW 1.5mg/kg&amp;2.0mg/kg/h</td>
</tr>
<tr>
<td>Dexmedetomidine</td>
<td>TBW 0.3mg/kg/h</td>
</tr>
<tr>
<td>Rocuronium</td>
<td>TBW 0.6mg/kg&amp;0.3mg/kg/h</td>
</tr>
<tr>
<td>Sugammadex</td>
<td>ABW 3.0mg/kg</td>
</tr>
<tr>
<td>MgSO4</td>
<td>ABW 4.0mg/kg</td>
</tr>
</tbody>
</table>

ADW:adjusted body weight;TBW:total body weight;IBW:ideal body weight

Table 1. Type of Weights used to calculate the doses of drugs for OFA:

Discussion: OFAA indications for bariatric surgery requires more evidence. However, this case shows that it's feasible in extreme obesity. Obesity is a metabolic disease characterized by a chronic inflammation state. Obese are susceptible to intense perioperative nociceptive processes. Studies have shown pro-inflammatory and pro-glutaminergic effects of opioids at microglia, astrocytes and neurons.

The potential benefits of OFAA are its systemic anti-inflammatory effect, anti-glutaminergic and anti-hyperalgesia action, modulation of neuroendocrine response to surgery and reduction of opioids side effects.


Learning points: OFA technique is feasible to manage extreme obese. OFAA can minimize opioid uses, reduces ventilatory and gastrointestinal complications keeping a suitable pain control.

Fig. 1
We administered NSAIs and Tramadol in the operating room. In the Recovery Unit and the admission ward, he remains with good pain control with NSAIDs and Levobupivacaine 0.25% 15ml through the ESP catheter every 6 hours, without morphine rescues, assessing pain on the visual analogue scale with a maximum of 3.

**Discussion:** For OFA management we decided to use a multimodal anesthesia approach relying on locoregional anesthesia techniques such as the ESP catheter blocking dorsal and ventral branches of the spinal cord from T2 to T9 and the BRILMA block the lateral and anterior cutaneous branches of the 1st to 6th intercostal nerves. Locoregional anesthesia with adjuvants and conventional analgesics avoids the use of opioids in a patient in whom using them may involve the use of higher doses or relapse in consumption. To all this we add a minimally invasive surgical technique with faster recovery and fewer complications derived from a more extensive and painful approach.

**Reference:**
Houston, We Have a Problem!: The Role of the Anesthesiologist in the Current Opioid Epidemic. Yaster,M; Benzon, H.T.; Anderson, T.A Anesthesia & Analgesia.125(5):1429-1431 November 2017

**Learning Points:** The use of locoregional anesthesia allows us to save opioids, an approach we must take into account and know how to manage in some patients, including opioid addicts

**07AP05-07**
Unintentional infusion of insulin into the epidural space during labor

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**Background:** Inadvertent injection of drugs in the epidural space has potential for serious morbidity and it is probably underestimated and underreported.

**Case Report:** A 39-years-old female with no medical history presented for delivery. Epidural catheter was requested and correctly placed. Continuous epidural infusion was chosen for labor analgesia. Six hours after the parturient complain about inefficient analgesia. A syringe swap with insulin was identified. The incidence of erroneous epidural administration is probably underestimated. A large variety of drugs were shown to have been inadvertently applied epidurally.

**Discussion:** The authors described the accidental epidural administration of 25 U of insulin, during labor analgesia. Despite the risk of potentially neurotoxic additives in the insulin preparation, the patient had no neurological sequelae. Safety measures and protocols are being developed to prevent erroneous drug administration related to the preparation, administration and labelling of drugs.

However, human vigilance is one of the most important factors reducing the number of inadvertent drug administrations.

**Reference:**

**Learning Points:** This case highlights the problem of wrong-route drug administration and the urgent need to adopt route-specific connections.
Fennel – not as good as your health may think

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Background: The consumption of food supplements and herbal medicines has been increasing worldwide (1). Some dietary supplements may affect platelet function and increase perioperative bleeding risk (2).

Case Report: A 54-year-old woman was brought to the Emergency Department due to acute vaginal bleeding six days after a vaginal hysterectomy. She was hypotensive with a normal heart rate and acute anaemia. Vaginal packing was performed and fluid resuscitation and tranexamic acid were started. Despite normal aPTT, TP, and platelet count, diffuse bleeding continued. The Transfusion Medicine Department was contacted to perform a ROTEM® platelet analysis, revealing platelet aggregation dysfunction similar to aspirin. The patient asserted not having used any antiplatelet drugs nor had a history of postoperative bleeding. The administration of one platelet pool concentrate and a unit of packed red blood cells ceased the bleeding. ROTEM® platelet normalised.

In the end, the patient disclosed that she had started a dietary supplement for constipation, containing Senna (Cassia angustifolia), Cascara-sagrada (Rhamnus purshiana), Fennel (Foeniculum vulgare), and Rhubarb (Rheum palmatum). She was discharged after three days. Food supplement was suspended from that point on and two months later her ROTEM® platelet was normal.

Discussion: The timing of bleeding and vaginal examination are compatible with the peeling of surgical scabs, which, in the absence of adequate platelet function, might have caused an abundant haemorrhage. Local compression with vaginal packing and platelet transfusion were successful in stopping the haemorrhage, obviating surgical exploration. A plausible explanation for this haemorrhage was the food supplement intake containing fennel. Several studies have demonstrated this substance's inhibitory activity on platelet aggregation (3).

Two months after and upon supplement suspension, the ROTEM® platelet revealed no dysfunction, which further supports this hypothesis.

References:
1. PMID: 35978741
2. PMID: 26949700
3. PMID: 17709257

Learning Points: Fennel, a substance present in several dietary supplements, has been shown to inhibit platelet aggregation and might increase the risk of perioperative bleeding. ROTEM® platelet plays a vital role in the assessment and management of perioperative bleeding. Optimising hemostasis could eliminate the need for surgical intervention in cases of postoperative bleeding.
**07AP06-03**

**A case of anaphylactic shock due to rocuronium developed 49 minutes after the start of administration**

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**Background:** Anaphylaxis is a condition that causes life-threatening adverse events. It usually develops within 30 minutes of administration of the causing agent, but it may occur immediately after administration.

We report a case in which the causing agent in a patient who went into anaphylactic shock immediately after contrast media and heparin administration was rocuronium, which had been used continuously for 49 minutes since the induction of anesthesia.

**Case Report:** An 81-year-old female patient with no previous surgical history was scheduled for transcatheter aortic valve implantation/replacement for very severe aortic stenosis. There was no apparent history of drug allergy and no preoperative ventricular hypokinesis.

Anesthesia was induced and maintained with remimazolam, rocuronium, and remifentanil in combination with noradrenaline. At the time of 49 minutes of anesthesia induction, systolic blood pressure (SBP) suddenly dropped to the 60 mmHg range immediately after angiography with iomeprol and administration of heparin sodium.

Despite increased noradrenaline and repeated administration of phenylephrine and ephedrine, SBP fell to 25 mmHg. Transesophageal echocardiography showed no hypokinesis in ventricular wall motion. Since skin flushing was observed in addition to circulatory collapse, the patient was judged to be in anaphylactic shock due to contrast media or sodium heparin, and epinephrine was administered.

A prick test was performed later to detect the causing agent, and rocuronium was identified as that of the type I allergy. Blood histamine and tryptase levels at the time of the anaphylactic shock increased up to 40.2 ng/mL (upper normal limit: 1.23 ng/mL) and 12.3 mcg/L (upper normal limit: 5.7 mcg/L), respectively.

**Discussion:** This case developed anaphylactic shock 49 minutes after the first dose and during continuous administration of rocuronium. Although anaphylactic reactions often occur promptly after exposure to a causing agent, as in this case, they can also occur late after the start of administration. Therefore, all agents used up to the onset of anaphylactic symptoms should be treated as suspected drugs.

**Reference:**

**Learning Points:**
- Some anaphylaxis may develop more than 30 minutes after exposure to the causing agent.
- All drugs administered prior to the onset of the anaphylaxis should be considered to be causing agents, regardless of when they were applied.

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**07AP06-04**

**Delayed diagnosis of anaphylactic reaction after alteplase administration in an acute ischaemic stroke**

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**Background:** A study of ischaemic stroke patients who receive alteplase indicated that the incidence of anaphylaxis may be as high as 1.9%, suggesting the importance of this event. We report a case of a delayed diagnosis of anaphylaxis after alteplase administration.

**Case report:** 69 yo female admitted to the ER with an acute ischemic stroke, approximately 120 minutes after the onset of facial and right-sided hemiparesis. Previously autonomous, her medical history included arterial hypertension treated with enalapril, insulin-treated Diabetes Mellitus, and cerebrovascular disease with two previous ischemic strokes treated with thrombolysis. No known allergies.

As the initial clinical assessment took place in a level two hospital, thrombolysis with alteplase was initiated. Due to the lack of clinical improvement, the patient was transferred to a level one hospital for endovascular thrombectomy.

Upon arrival at the ER, she exhibited mild edema on the lower lip. After questioning the transport team it was reported that it was already present before leaving the first hospital. No other drugs were administered. Edema progressed in the CT room and on the arrival at the angiography room, where the anaesthetic team was, also tongue edema, stridor and bronchospasm were observed.

Anaphylaxis was suspected, adrenaline IM, hydrocortisone IV and clemastine IV were given, with symptoms improvement. But due to the risk of upper airway obstruction and no easy access to the airway during the procedure, orotracheal intubation and general anesthesia were performed using videolaryngoscopy. No further complications were observed.

Patient was then transferred to ICU with invasive mechanical ventilation to monitor the evolution of anaphylaxis. Patient died after 7 days due to the stroke. The case was reported to the National Authority for Medicines and Health Products (Infarmed®).

**Discussion:** Anaphylaxis was attributed to alteplase. It is a rare but life-threatening complication of alteplase treatment in ischemic stroke, requiring prompt recognition and intervention, even in patients who have done it before without complications. An earlier diagnosis might eventually have avoided the need for intubation and ICU admission.

**Reference:**

**Learning points:** Alteplase treatment can cause life-threatening anaphylaxis, demanding swift recognition and intervention.
07AP06-05
Measuring once is silver, measuring twice is gold. The hidden hazards of neuromuscular blockade monitoring in patients with hemiparesis

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Background: Upper motor neuron (UMN) lesions cause acetylcholine receptor increase in affected muscles, affecting Train of Four (TOF) monitoring accuracy1. This case report discusses a postoperative complication due to residual muscle relaxation after TOF assessment in a paretic limb.

Case Report: An 81-year-old male, with extensive cardiovascular history but no liver or kidney impairment, presented with headache and progressive left-sided hemiparesis due to a right-sided subdural hematoma. Planned for burr hole craniostomy (BHC), his preoperative state deteriorated, becoming semi-conscious. Total intravenous anaesthesia was performed and 30mg rocuronium administered to facilitate intubation. The procedure, lasting 45 minutes, was uneventful. Postoperatively, the TOF ratio at the left (paretic) hand was 1.0. After sedation waned and responsiveness returned, exubation was performed. However, his condition rapidly worsened, with a decline in consciousness and progressive respiratory and hemodynamic instability, ultimately resulting in a condition resembling cardiogenic shock.

Blood gas analysis showed an acute respiratory acidosis, primarily attributed to hypoventilation from residual muscle relaxation. Subsequent TOF assessment showed a persistent 1.0 ratio in the left hand, but only 2 twitches in the right. (see fig 1)2.

Presumably, the combination of pre-existing heart disease and acidosis were responsible for his clinical situation. Administration of sugammadex, respiratory and hemodynamic support led to his complete recovery.

Discussion: After UMN injury, neuromuscular junctions (NJ) in the affected muscles adapt by upregulating acetylcholine receptors. This upregulation can cause resistance to non-depolarizing muscle relaxants in these muscles. While extensively documented, the phenomenon's effects on neuromuscular blockade monitoring are not widely recognized by clinicians.

Learning Points: Standard dosages of muscle relaxants and neuromuscular blockade monitoring in patients with UMN injury may be unreliable due to altered NJ responses.

References:

07AP06-06
Local anaesthetic systemic toxicity after local infiltration with xylocaine

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Background: LAST is a rare yet life-threatening complication of local infiltration. This case report is noteworthy because LAST may occur without the supervision of anesthesiologists and other medical specialists should be equally alerted.

Case Report: A 19 years-old patient received subcutaneously xylocaine 2% at the double of the maximum permissible dose, from the orthopedic surgeon, for removal of internal fixation device. Ten minutes later, the anaesthesia team was called for help due to patient having been suddenly unresponsive with vital signs SpO2 86%, BP 138/83, HR 118bpm.

At the operation room, we found the patient doing jerking movements, with body stiffness, horizontal nystagmus and loss of consciousness. Vital signs had deteriorated to SpO2 67%, BP 159/78, HR 124 bpm. The patient was immediately manually ventilated. Since clinical signs originated from CNS (seizure) and CVS (tachycardia) we considered LAST as the most possible explanation.

Intralipid emulsion 20% 1.5ml/kg was administered bolus followed by iv infusion 15ml/kg/h. Seizure was terminated but BP remained high (169/70) and HR 135bpm, so we proceed with a second bolus dose. After that, the patient became responsive, however, complained for nausea, dry mouth, backache and vomited once. All the aforementioned adverse events are attributed to Intralipid emulsion. After vital signs normalization, the patient was transported to high dependency unit for observation.

Discussion: If left untreated, LAST can rapidly lead to cardiac arrest. Consequently, all health providers and especially those using local anaesthetics should be familiar with its recognition and treatment. A multidisciplinary simulation of LAST could be of great value for patients’ safety.

References:

Learning Points: Thorough knowledge of LAST and high suspicion of it after local infiltration can be lifesaving. Anaesthesiologists’ Societies should take action for the vigilance of the rest medical specialties in LAST.
Resistance to muscle relaxation after supramaximal dose of rocuronium – a case report

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Background: Resistance or attenuation to the effects of rocuronium and other neuromuscular blocking agents (NMBA) have been previously reported and include delayed onset of relaxation, incomplete paralysis under recommended doses, or unusually rapid recovery from neuromuscular block (1). These conditions have been associated with denervation injury, burns, lengthy immobilization, infections, and chronic use of certain drugs.

In this report, we describe the case of a young male without any previous medication, chronic disease, or any known predisposing factor for NMBA resistance, who failed to attain muscle relaxation despite very high doses of rocuronium.

Case report: A 31-year-old man required emergent laparotomy under general anaesthesia for an obstructive tumour causing a 9-cm colon dilation. His past medical history was uneventful, in particular he has never had surgery or general anaesthesia. He reported regular physical activity, no chronic illnesses or medications.

Anaesthesia induction included propofol, sufentanil and suxamethonium. Upon surgical incision, the patient received further sufentanil and rocuronium. Despite several boluses of rocuronium, muscle relaxation was ineffective with persisting 4 twitches at the train-of-four (TOF) monitoring.

After placing another intravenous catheter, using a vial of rocuronium from a different batch and another TOF monitor at the orbicularis muscle, paralysis was not reached after 130 mg of rocuronium (2 mg.kg⁻¹) over 60 minutes. At this stage, we administered atracurium 30 mg and the TOF monitoring reached zero twitches within 3 minutes.

Discussion: This report presents a case of complete resistance to rocuronium in a patient without any known predisposing factors. All efforts were made to make sure that the therapeutic failure was not due to drug degradation, wrong preparation, or ineffective route of administration. The abdominal wall tension did not permit the surgery to be performed with rocuronium, but paralysis was swiftly attained with atracurium.

We hypothesise that receptor polymorphism, a highly inflammatory condition or a paraneoplastic syndrome might have caused the drug failure. Genetic testing is warranted.

Reference:

Learning points: In cases of NMBA effect failure, the anaesthetist may change of drug class as we describe in our case.
08AP01-01
Standard operating procedure as a valuable tool to increase adherence to lung protective ventilation among anaesthesiologists

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Background and Goal of Study: It is well known, that adherence to the lung protective ventilation concept lowers the incidence of perioperative pulmonary complications. Even though, the adherence is reported only to be around 15% worldwide. Therefore we conducted a prospective interventional clinical Pre – Post study to assess the impact of a mandatory educational program and a standardized operating procedure (SOP) on improving anaesthesiologists’ adherence to lung protective ventilation (LPV) during general anaesthesia.

Materials and Methods: First, we assessed the current adherence level of anaesthesiologists to LPV concept (Group A - before SOP, Group B - after SOP). Thereafter, started the mandatory educational program, which was enhanced by the introduction of the SOP for LPV during general anaesthesia. When the program finished, our team assessed the new adherence level to the LPV concept. The adherence level for every single LPV recommendation was evaluated separately.

Results: A total of 164 patients were enrolled (Group A 82, Group B 82) in the study. The total number of recruitment manoeuvres delivered was significantly higher in Group B than in Group A (Group A 11, Group B 35 p<0.001). The mean positive end-expiratory pressure (PEEP) was likewise significantly higher in Group B than in Group A (Group A 6.56 ± 1.88 mbar, Group B 7.82 ± 2.10 mbar p<0.001). Also, the number of cases with an abided level of PEEP as recommended was significantly higher in Group B than in Group A (Group A 22, Group B 49 p<0.001). There was no significant difference between the groups in plateau and driving pressure, tidal volume and breathing frequency.

Conclusions: A mandatory educational program focused on LPV during general anaesthesia enhanced by an SOP may be a successful tool for increasing adherence to the LPV concept during general anaesthesia among anaesthesiologists.

08AP01-02
Streamlining the implementation and outcomes reporting of perioperative temperature management

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Background and Goal of Study: Unintended patient hypothermia (<36°C core temperature) has been associated with a higher rate of surgical site infection, intraoperative blood loss, myocardial ischemia, and prolonged length of hospital stay when compared to normothermic patients.1 Despite guidelines for patient temperature monitoring and patient warming, hospitals still face challenges in implementing an effective protocol.2,3

Materials and Methods: A group of cross-functional leaders met at an in-person and virtual meeting held June 1-2, 2023, in Glasgow, Scotland, to discuss their experiences for patient warming protocol implementation. Best practices, challenges encountered, and outcomes reporting processes were compiled from presentations and discussions.

Results and Discussion: Several crucial elements were identified for streamlining and implementing effective patient temperature monitoring and patient warming protocols. Core temperature should be monitored throughout the patient’s journey on the day of surgery, including pre-operative, peri-operative, and post-operative times. Maintaining normothermia requires that the team work together throughout the patient journey, though a leadership position is required to help enforce the protocol. Feedback opportunities are required to pinpoint what is and is not working for protocol implementation.

A training plan is important for all teams involved. Quality control and continuous monitoring of key performance indicators are required with regularly feedback provided to the team.

Conclusion(s): Maintaining patient normothermia throughout the surgical journey can help reduce post-surgical complications and length of stay. However, implementing patient warming protocols is often challenging. Panel members recommended core temperature monitoring throughout the patient’s surgical journey, increased training for all teams involved in patient care during surgery, quality control measures to ensure accuracy of temperature measurement and patient warming protocol implementation, and frequent feedback reporting from and to the team to examine and improve patient outcomes.

References:
08AP01-03
Advancing high-quality standardised National Obstetric Anaesthesia Training (NOAT) for anaesthesiology residents in Romania through faculty mentoring in simulation-based curriculum design and modalities

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Background and Goal of Study: The distinctive nature of obstetric anesthesia (OA) demands well-trained residents. A revision of curricular domains, learning objectives, skills and simulation modalities for applied knowledge, technical, social and cognitive skills (1), is required in Romania.

Materials and Methods: A group from European Society of Anaesthesiology and Intensive Care (ESAIC), Society in Europe for Simulation Applied to Medicine (SESAM) and Romanian Society of Anaesthesiology and Intensive Care (SRATI) set out to develop a National Obstetric Anaesthesia Training (NOAT) programme. A 2-day Train the Trainer (TTT) course for Faculty from 5 university-affiliated simulation centers was conducted in Targu Mureş, Romania.

The delegates were trained using clinical skills and simulation modalities and conducting debrief. They were asked to rank post course feedback questionnaires on an ascending 1-5 Likert scale. Wilcoxon matched-pairs signed rank test was used to compare pre-post scores (significant if p<0.05).

Results and Discussion: There were 23 delegates, 18 were specialists and 5 senior residents. Feedback was collected from 21/23 delegates. Mean scores for satisfaction, acquisition of new concepts, relevance and approach to teaching, were excellent. There was a significant improvement in pre-post emergency response skills (p<0.05).

There was a statistically significant boost in self-assessed confidence and knowledge in relation to teaching OA skills, conducting simulations and debrief (Table).

<table>
<thead>
<tr>
<th>Before training</th>
<th>After training</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>The number of methods for adult education I feel confident to use is</td>
<td>Mean ±SD</td>
<td>Variation coefficient</td>
</tr>
<tr>
<td>Knowledge on adult education is</td>
<td>3.19±1.29</td>
<td>40.41%</td>
</tr>
<tr>
<td>Confidence teaching NOAT skills like the ones practiced on the course is</td>
<td>3.00±1.30</td>
<td>43.46%</td>
</tr>
<tr>
<td>Confidence in conducting a NOAT full-scale simulation with integration of cognitive and social skills is</td>
<td>3.00±1.30</td>
<td>43.46%</td>
</tr>
<tr>
<td>Confidence in conducting a debriefing is</td>
<td>2.62±1.32</td>
<td>50.48%</td>
</tr>
</tbody>
</table>

Table. Pre-post confidence scores (1=lowest, 5=highest).

Conclusion: NOAT TTT led to enhanced self-assessed skills and confidence, and significantly improved the understanding of integrated simulation modalities. It also led to a refined OA curriculum. NOAT will be conducted to 3rd year residents aiming for comprehensive and uniform training.

Reference:

08AP01-04
Effects of multidisciplinary in situ simulation training on clinical endovascular thrombectomy treatment and anaesthetic management in acute ischaemic stroke

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Background and Goal of Study: Anaesthetic management in endovascular thrombectomy (EVT) procedures for stroke patients should ensure effective extraction of thrombus while maintaining haemodynamic and respiratory stability. Our hospital implemented EVT simulation sessions, which were designed and led by non-anaesthesia professionals. Our aim was to evaluate the impact of EVT simulation on clinical time to reperfusion, anaesthetic management and patient outcomes.

Materials and Methods: Pre-post interventional study at Stavanger University Hospital, Norway, between May 2016 to November 2021. EVT simulation was implemented in November 2017. We completed 6-20 sessions yearly, involving all professions of the clinical team as participants.

Concurrently, an evidence-based EVT protocol revision was introduced, increasing systolic blood pressure (SBP) thresholds and reducing SpO2 thresholds. The primary anaesthetic method was conscious sedation.

The primary outcome was time from groin puncture to reperfusion. Variables for anaesthetic management included cumulative time of SBP or SpO2 outside thresholds within procedure time, adherence to suggested anaesthetics, and conversion rate.

Data were extracted from the anaesthesia electronic record and stroke registries. To test for differences, Mann-Whitney U and Chi Squared tests were used.

Results and Discussion: 200 stroke patients treated with EVT were included. Outcomes are presented in Table 1. Time to reperfusion improved significantly. However, we did not observe any noteworthy improvement in the modified Rankin Score (mRS). We observed an increase of SBP outside established thresholds, while incidence of hypoxia decreased. The conversion rate was high and adherence to anaesthetics in protocol was low.
The changes observed in SBP and SpO2 might be a result of the protocol revision. Yet, we found no clear effect of EVT simulation training on anaesthetic management. In a subgroup analysis, 28 (58%) patients pre- and 50 (33%) postintervention maintained SBP within thresholds >= 75% of the procedure time. Among these patients, those in the postintervention group showed a higher rate of functional independence (mRS 0-2) compared to the patients in the preintervention group, 54.8% vs 29.6%; p=0.04, respectively. This indicates that achieving the revised SBP thresholds could contribute to better functional outcomes.

**Conclusion(s):** EVT simulation training improved time from groin puncture to reperfusion, but not anaesthetic management or patient outcome. Future research should explore the effect of engaging anaesthesia professionals in designing and leading such simulation training.

**Acknowledgements:** CGF has an unconditional PhD grant from Laerdal Foundation

### Table 1. Outcome measures.

<table>
<thead>
<tr>
<th></th>
<th>Pre-intervention</th>
<th>Post-intervention</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of patients</td>
<td>48</td>
<td>152</td>
<td></td>
</tr>
<tr>
<td>Groin puncture - reperfusion (min)</td>
<td>71.00 (50.5-99.5)</td>
<td>55.0 (37.5-83.0)</td>
<td>0.01</td>
</tr>
<tr>
<td>Successful reperfusion (TICI 2b-3)</td>
<td>37 (77.1)</td>
<td>127 (84.0)</td>
<td>0.27</td>
</tr>
<tr>
<td>Systolic BP outside threshold (% of procedure time)</td>
<td>17.2 (8.0-37.7)</td>
<td>36.3 (20.2-54.2)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Hypoxia (% of procedure time)</td>
<td>16.2 (4.8-44.0)</td>
<td>7.3 (1.3-21.1)</td>
<td>0.002</td>
</tr>
<tr>
<td>Conversion from sedation to general anaesthesia</td>
<td>8 (16.7)</td>
<td>19 (12.9)</td>
<td>0.46</td>
</tr>
<tr>
<td>Compliance with recommended anaesthetics, sedation</td>
<td>18 (43.9)</td>
<td>49 (43.0)</td>
<td>0.92</td>
</tr>
<tr>
<td>mRS 0-2</td>
<td>18 (38.3)</td>
<td>61 (41.2)</td>
<td>0.72</td>
</tr>
<tr>
<td>mRS 5-6</td>
<td>12 (25.5)</td>
<td>35 (23.6)</td>
<td>0.79</td>
</tr>
</tbody>
</table>

Numbers are reported as numbers (percentages) for categorical variables and medians (quartiles) for continuous variables. mRS, Modified Rankin Scale. TICI, thrombolysis in cerebral infarction.

**08AP01-05**

**Anesthesia resident’s assessment. A pilot study of a new direct observation tool**

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**Background and Goal of Study:** Assessing residents’ performance is a challenging evolving issue. Summative assessments are universally used but with known limitations. Progressively gaining popularity, formative assessments conduct evaluation while the learning process is taking place. Ideally, it should be accompanied by feedback temporally proximate to the assessment event.

The Vall d’Hebron University Hospital (Barcelona) has 46 anesthesiology residents (ARs). Traditionally, the evaluation process is carried out through a 360 peer review. For further monitoring of residents’ progress and improving the objectivity of rotation evaluations a new Structured Direct Observation Assessment Tool (SDOAT) was devised to be applied by staff anesthesiologists (SAs) on residents during their everyday operating theatre activities.

The SDOAT consist of ten questions evaluating six core competencies including technical and non-technical skills and behaviour competencies.

A pilot study was conducted to determine if the objective of the new tool was achieved through a satisfaction survey to all participants.

**Materials and Methods:** A total of 6 ARs and 27 SAs participated in the study.

SAs evaluated residents’ competencies daily during a month-long rotation (October 2023) by completing an online Likert scale survey with five options. Moreover, the evaluators gave verbal feedback on the positive aspects and those to improve at the end of each day. In the middle and at the end of the month, residents and their mentors received a report on their term’s performance. Finally, residents and evaluators responded to a satisfaction survey.

**Results and Discussion:** 24 SAs and all ARs responded to the survey. 100% of the ARs strongly agree or agree that they have been able to detect points of improvement from the use of the SDOAT. Regarding objectivity when evaluating rotation, 96% of SAs and 83% of AR reported strongly agreeing or agreeing that the SDOAT was more objective compared to the traditionally used method. 100% of the ARs reported a positive global feeling about the SDOAT, and 100% of the SAs considered that the SDOAT should be applied throughout all formative period.

**Conclusion(s):** The SDOAT could be a useful online real-time instrument for evaluating AR rotations compared to the traditional method.

**08AP01-06**

**Innovations to improve one lung isolation training in thoracic anestesia**

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**Background:** Flexible bronchoscopy (FB) and device positioning for one-lung isolation (OLI) require specific technical competencies. Training to acquire and maintain such skills remains a challenge in thoracic anesthesiology (TA), but recent innovative developments in simulation have opened new horizons.

**Goal of Study:** This narrative review examines the latest developments in training modalities with the use of emergent techniques such as virtual reality (VR), virtual airway endoscopy or preoperative 3D printing of airways. It aims to summarize the current state of the art and to improve the knowledge of existing and future applications of 3D VR for training in the clinical and daily practice of OLI for TA.

**Materials and Methods:** A literature search was performed using Pubmed and Google Scholar databases for articles published in English between 2013 and 2023 with keywords related to TA, OLI, fibroscopy and FB, simulation, training and VR. The initial search
retrieved a substantial number of articles unrelated to this literature survey. We also searched reference lists from selected articles to identify additional relevant studies for this review.

Results and Discussion: Studies investigate procedural simulation in planning, training and teaching OLI management with various levels of complexity. In low-fidelity simulation, with an inanimate model into which a real fibroscope is inserted, the recent development of 3D model printing enables customized planning and training for difficult or special cases in OLI management. High fidelity VR simulators, consisting of a flexible proxy scope associated to a robotic interface and a computer, have improved the teaching experience through enhanced realism, haptic and metric feedback, and have become ultra-portable.

Recently, dedicated scenarios have been added for specific training in the management of OLI and FB, allowing advanced teaching experiences, such as anatomical identification or assessment of correct placement and control of lung isolation devices.

Personalized preoperative planning, associated to preoperative individualized realistic simulation training and real time FB guidance, will be the next step to improve patient care and safety in TA.

Conclusion(s): Simulators, from low to high-fidelity, play a critical role in the acquisition of skills for complex procedures such as OLI. Technical advances and the introduction of dedicated educational programs offer an exciting future for anesthesia training.

08AP01-07
Defining and stress testing metrics for midline placement

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Background and Goal of Study: Vascular access is the most common in-hospital invasive procedure. Despite being an essential competency, a recent meta-analysis of 18,972 midline catheters placement across 5 countries reported 12.5% failure rate. Proficiency based Progression (PbP) based on unambiguously defined metrics appears to improve performance in both simulation and clinical settings and might result in superior patient outcome. We aimed to define and stress test metrics for PbP training in midline placement.

Materials and Methods: This work was deemed to be a service improvement project by the Leeds Teaching Hospitals NHS Trust. An anesthetist, who is experienced in proficiency-based progression training, has introduced four experts in midline placement to PbP training methodology. Experts and two novices were filmed inserting midlines. Trust procedures for consent for filming to PbP training methodology. Experts and two novices were filmed inserting midlines. Trust procedures for consent for filming were followed.

Two face-to-face meetings (2 hours each) were facilitated in which the experts defined, and stress tested the metrics for midline placement. Four videos of experts and novices performing midline placement were used to aid task analysis and deconstruction process. Errors were described as critical (will result in actual patient harm) and non-critical (deviation from optimal performance but will not result in patient harm).

Results and Discussion: Start and end points for the procedure were identified as operator entering the room and leaving the room with midline inserted respectively. Seven procedural phases with 50 metrics were described in detail. 31 errors were described of which 12 are critical and the rest are non-critical (Tables 1 & 2). Defined metrics and errors were stress tested with the aid of two other videos. Experts scored metrics and errors individually using scoring sheets in a binary fashion (occurring or not occurring). Any discrepancy in their scoring was discussed in detail and metrics were modified accordingly.

Dilatation and catheter placement

• Remove tourniquet once the wire is inside the vein
• Small skin incision around the wire.
• Advance the dilator in the direction of the guidewire and initial cannulation
• Holding the split sheath with one hand and taking out the dilator and guidewire by the other hand
• 2 person verbal confirmation of visualization of the guidewire and introducer out of the patient
• Introduction of Midline and removal of split sheath

Table 1: Sample of defined metrics

• Pulling the wire through the needle (critical)
• Replacing the dilator with the wire inside (critical)
• Not confirming the guidewire inside the vein before dilatation (critical)
• Losing the distal end of the guidewire (critical)
• Not accounting for 2 guidewires during midline insertion and at disposal (critical)
• Keep pushing the dilator despite bouncing back.

Table 2: Sample of defined errors

Conclusion(s): In this study, we defined and stress tested metrics for midline placement.

Acknowledgements: Thanks to M. Chandra, J. Higson, R. North, M. Mannion.

08AP01-08
The effectiveness of Peyton’s four step approach to teach resuscitation skills: a randomized controlled trial

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Background and Goal of Study: Sudden cardiac arrest (SCA) is one of the leading causes of mortality worldwide. Providing high-quality cardiopulmonary resuscitation (CPR) significantly improves survival rates and is even equivalent to more advanced therapeutic options. Therefore, it is of great significance to convey resuscitation skills in Advanced Cardiac Life Support (ACLS) trainings with the maximum of learning gain.

As the best approach to teach and train technical skills is yet to be identified, our study aimed to explore the effectiveness of one didactic method, the “Four-Step Teaching Approach” of Peyton, in comparison to a conventional teaching method.

The endpoints of our study were CPR performance (technical- and non-technical skills), student motivation, and the subjective learning gain.

Materials and Methods: In a prospective randomized study design, we integrated the four-step approach of Peyton into high-fidelity simulation trainings (Advanced Cardiac Life Support) of 2nd year medical undergraduates. N = 147 undergraduates were allocated to the control- and n = 127 to the intervention group. Non-technical skills of the team were assessed with the Ger-
man-adapted “Anesthesiology Students’ Non-technical skills” (AS-NTS) checklist. The technical skills were assessed with a validated and adapted scoring system, as well as with manikin (simulators) data. The undergraduates completed pre- and post-simulation questionnaires—the German-translated Situation Motivation Scale (SIMS) and Comparative Self-Assessment (CSA)—to gauge motivation and subjective learning gains.

Results and Discussion: Our results revealed that the group trained with Peyton’s approach demonstrated a notably higher quality of cardiopulmonary resuscitation: NTS of the intervention group were on a statistically significantly higher level compared to the control group, t(150) = 1.69, p = .092. Also technical skills were significantly better in the intervention group t(142) = -1.994, p = .048, with a main effect regarding the No-Flow Time p < .001. The subjective learning gain of the intervention group was also higher t(283.551) = 3.159, p < .001. Both groups reported similar gain of autonomous motivation.

Conclusion(s): Peyton’s approach outperforms standard instructions in teaching advanced cardiac life support to medical students, resulting in higher quality of CPR, increased motivation, boosted self-confidence, and improved subjective learning gains.

08AP01-09
Anesthesiology Students’ Technical Skills (AS-TS): development and validation of a cardiopulmonary resuscitation skills scoring
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Background and Goal of Study: High-quality cardiopulmonary resuscitation (CPR) is critical in improving survival rates following cardiac arrest. Therefore, many undergraduate simulation-based curricula have implemented the training of CPR skills. To ensure training efficacy, the quality of CPR needs to be assessed and reflected. The provided feedback should be based on a standardized assessment.

Therefore, the aim of this study was to develop and validate a new scoring system designed to comprehensively assess CPR performance during ALS simulation training.

Materials and Methods: In a mixed-method approach, first, an expert group with vast experience in medical (simulation) education identified in a semi-structured discussion, key determinants of CPR skills that need to be conveyed during ALS simulation-based training. A following comprehensive literature research was conducted and the results were matched to those of the preceding step (quantitative analysis, expert group). A first draft of a scoring system was developed. In a modified-Delphi approach the step was modified, until consensus was reached. The scoring system was then applied during ALS simulation training of 2nd and 3rd year medical undergraduates, assessing a total of n = 40 emergency scenarios. The endpoints were reliability (intra-class correlation), feasibility and usability of the AS-TS.

Results and Discussion: AS-TS is composed of eight skill dimensions with twenty-five items, to which a total of 270 penalty points can be matched. A total of N = 10 medical educators who had applied AS-TS during simulation training confirmed its feasibility and usability. Furthermore, they concluded all relevant CPR skills to be covered. The interrater-reliability (ICC) reached only fair levels of agreement (Cohen’s Kappa 0.34).

Table. Anesthesiology students technical skills score for ALS simulation settings (AS-TS).

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Course</th>
<th>Scenario</th>
<th>Faculty Number</th>
<th>Penalty points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recognition of cardiac arrest</td>
<td>Check for responsiveness</td>
<td>0</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Check pulse</td>
<td>0</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Check breathing</td>
<td>0</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Chest compressions</td>
<td>Correct hand position (lower 1/3 of the sternum)</td>
<td>0</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Depth of chest compressions (10cm)</td>
<td>0</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Frequency of chest compressions (100-120/min)</td>
<td>0</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Full chest wall recoil (&gt;60% correct)</td>
<td>0</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Compression–ventilation ratio of 30:2 until intubation</td>
<td>0</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Ventilation</td>
<td>Visible chest rise during bag-mask ventilation</td>
<td>0</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No-flow time for bag-mask ventilation* (5 sec.)</td>
<td>0</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Assessment of rhythm</td>
<td>Immediate assessment of rhythm* (5 sec.)</td>
<td>0</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Correct interpretation of rhythm</td>
<td>0</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Time-critical rhythm: Defibrillation in accordance with guidelines*</td>
<td>0</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Defibrillation as soon as possible* (3 sec.)</td>
<td>0</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Immediate continuation of chest compressions after defibrillation*</td>
<td>0</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Shock after each rhythm analysis if rhythm is persistently non-optimal</td>
<td>0</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Guideline-compliant administration of medications (Adrenaline + Amiodarone/ Urocoline after 35 shocks)</td>
<td>0</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>If non-shockable rhythm:</td>
<td>Administration of adrenaline as soon as possible</td>
<td>0</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Airway management</td>
<td>Securing the airway by tracheal intubation</td>
<td>0</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No-flow time while securing the airway* (7 sec.)</td>
<td>0</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Continuous chest compressions under ventilation after securing the airway</td>
<td>0</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>No-flow time</td>
<td>From onset of cardiac arrest until start of first chest compression</td>
<td>0</td>
<td>20</td>
<td></td>
</tr>
</tbody>
</table>

No-flow time in total: up to 25 seconds: 0, up to 45 seconds: 5, up to 60 seconds: 10, > 60 seconds: 20

Conclusion(s): We present a newly developed scoring system, assessing the quality of CPR during simulation-based training which has the great potential to standardize and optimize post-simulation feedback.
**08AP01-10**  
Proficiency based progression training: transferring a novel approach to training for labour epidural analgesia in a tertiary referral centre

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**Background and Goal of Study:** Lumber epidural analgesia remains the golden standard for pain relief in labour. Despite the importance and the widespread use of lumbar epidurals, the epidural failure rate was reported to be as high as 23%. Proficiency based Progression (PnP) training based on unambiguously defined metrics appears to improve performance in various technical and non-technical skills. Our group has developed and implemented PnP training for labour epidural catheter placement for novices and demonstrated 53% reduction in epidural failure rate. The aim of the current study is to examine for the feasibility, implementation steps and associated resources to transfer similar PnP training for labour epidural catheter placement to tertiary teaching hospital.

**Materials and Methods:** With institutional ethical approval, a prospective observational study is being carried out at ST James University Hospital (SJUH). All trainees in anaesthesiology scheduled to commence training in obstetric anaesthesia at SJUH during 2023 and 2024 will be invited to participate. Trainees will be provided with theoretical materials 2 weeks before the training session and MCQ exam with 80% pass mark.

Trainees will be trained using the pre-validated metrics on 1:1 basis with one of the experts. Each trainee will be allowed to perform a start to finish procedure on a manikin without interruption and this will be marked with an independent expert.

Only trainees who can demonstrate the predefined proficiency benchmark, would pass to the clinical phase. All subsequent attempts of epidural catheter placement will be followed up by an independent investigator.

**Results and Discussion:** This study is still recruiting. We have successfully trained three novices who have performed 17 epidurals to date. Trainees’ baseline characteristics are comparable. The epidural failure rate was 11.7% (2/17), and there was difficulty to place epidural catheter due to patient factors in 17.6% of cases (3/17). Supervisor was present in 82% of cases. However, the proportion of senior takeover was 11.7% (2/17).

**Conclusion(s):** We acknowledge that these results are preliminary, and it is early to draw up a conclusion. However, it coincides with the previous studies which were done by our group (almost 50% reduction in epidural failure rate). The ultimate goal of our study is to test for the feasibility of transferring PbP to a tertiary referral centre.

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**08AP01-11**  
The creation of shared mental models in simulation training enhances the quality of resuscitation

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**Background and Goal of Study:** Early training of resuscitation skills, covering both technical and non-technical, is crucial for medical undergraduates. While simulation-based training (SBT) has been acknowledged for effectively teaching technical skills (TS), non-technical skills (NTS) were in the past undervalued. Our study hypothesizes that integrating shared mental models (SMM) among team members during a simulation training could effectively enhance NTS positively, impacting both the quality of cardiopulmonary resuscitation and the educational motivation of students.

**Materials and Methods:** In this prospective randomized trial, third-year medical students participating in two Advanced Life Support (ALS) trainings, were allocated randomly to the intervention (n = 72) or the control group (n = 74). After the first training, the intervention group participated in a semi-structured group discussion, in which the building of SMM were targeted. The group discussion mainly focused on key information about CPR measures and effective teamwork strategies. In contrast, the control group received standard feedback without a group discussion. CPR quality, TS and NTS, student motivation, and learning gains were assessed via standardized questionnaires and checklists prior/post each training session.

**Results and Discussion:** Statistically, there was no significant difference in TS between the intervention and control group. Intracohort analysis showed a significant improvement in technical skills for the control group (t (64) = 2.635, p= .011), which was not detected for the intervention group (t (75) = 1.434, p = .056). In contrast, the NTS of the intervention group improved significantly (t(139) = -1.201, p = .232). Both groups reported significantly higher levels of motivation at the post-training assessment, compared to the pre-training levels. The subjective learning gains did not show a significant difference between the two groups t (131) = -1.026, p = .307. As the intervention covered mainly NTS, the absent improvement of TS is explicable, as well as the advanced hands-on time of the control group explains the improved TS.

**Conclusion(s):** The creation of SMM within a rapid response team enhances NTS. While our structured trainings elevated students’ self-motivation, the precise role of mental modeling in this remains uncertain, needing further investigation. Hands-on time should not be restricted for interventions targeting NTS.
08AP02-01
Teaching Combat Casualty Care to the Ukrainian Army, a reaffirmation of the benefit of low fidelity simulation in medical education

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Aims: Develop a sustainable teaching programme to enhance the immediate combat casualty care skills of members within the Ukrainian Army.

Methods: Amidst the Russo-Ukrainian War, Medics4Ukraine (M4U), a charitable organisation, has delivered medical aid training across various war-affected regions. Grounded in the Tactical Combat Casualty Care (TCCC) guidelines, the training is administered by voluntary clinicians possessing expertise in combat or trauma casualty care, the focus being on the provision of care for the most common preventable causes of death on the battlefield, namely: major haemorrhage, airway obstruction and tension pneumothorax.

The focus of the June 2023 mission involved blending brief theoretical sessions with an emphasis on short, simulated scenarios. These scenarios ranged from individual or paired participants practicing singular clinical skills, such as wound packing for a gunshot to the groin, to larger multi-disciplinary groups engaging in comprehensive algorithm assessments.

Results: During the June 2023 mission to the heavily bombarded city of Kherson, five clinicians (comprising two doctors and three paramedics) conducted training for two distinct groups. One group consisted of military personnel with no prior medical training, while the other comprised clinicians from a paediatric centre tasked with treating adult trauma cases. Feedback from this mission highlighted the success of a low-fidelity scenario-based education approach.

Despite resource constraints, the mission prioritised succinct theoretical sessions and focused simulated scenarios, resulting in heightened levels of immersion and rapid skill acquisition. Evidencing the merit that remains with low fidelity simulation.

Conclusion: There exists a prevailing preference for high-fidelity simulations in medical education, despite evidence pointing to their non-superiority over low-fidelity counterparts.

The conflation of ‘fidelity’ and ‘immersion’ contributes to this misconception. The effectiveness of low-fidelity simulation in our recent mission can be attributed to the identification of student-centred learning outcomes, aligning sessions with specific student needs, and the establishment of a “fictional contract” with the goal of encouraging students to suspend disbelief and perform as in a real-life scenario.

Acknowledging and addressing constraints before scenarios facilitate smoother learner engagement, and immersive simulation experience.

08AP02-02
Impact of fellowship training on clinical research productivity in an academic anesthesiology department

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Background and Goal of Study: Targeting the hiring and development of fellowship trained anesthesiologists within an academic anesthesiology department is one strategy to enhance research.1 The hypothesis of the study is that fellowship training will result in a higher academic research productivity as determined by the h-index.

Additionally, the study aims to analyze the impact of fellowship training on the number of publications, number of publications per total years in practice and years in practice at our institution.

Materials and Methods: The subjects were active anesthesiologists from September 1st, 2021 to August 31st, 2022 at the MD Anderson Cancer Center. All study variables were obtained through the faculty’s individual curriculum vitae (CVs), the public Scopus website, and departmental databases.

The study groups were fellowship trained anesthesiologists (FTA) and non-fellowship trained (NFTA) anesthesiologists. A fellowship was defined as an ACGME and non-ACGME training program lasting for one year, with exclusion of research fellowships. Statistical analysis was performed on categorical and continuous variables.

Results and Discussion: A total of 78 anesthesiologists were included in this analysis. Comparing FTA (n=38) and NFTA (n=40), there were no statistical differences in the h index (p=0.94) and mean number of publications (p=0.329).

Statistically significant differences were found in the number of publications per year in practice (p=0.039) and the number of publications per year at our institution (p=0.009).

<table>
<thead>
<tr>
<th>Table 1. Variables by Fellowship Training Status</th>
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<tbody>
<tr>
<td>Variable</td>
</tr>
<tr>
<td>Years in practice</td>
</tr>
<tr>
<td>N of years at MD Anderson Cancer Center</td>
</tr>
<tr>
<td>N of A of publication</td>
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<td>N of A of publication</td>
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<td>h Index</td>
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<td>h Index</td>
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<tr>
<td>Publication per year in Practice</td>
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<td>Publication per year in Practice</td>
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<td>Publication per year in practice at MDAC</td>
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<td>Publication per year in practice at MDAC</td>
</tr>
</tbody>
</table>

Conclusion(s): In this single institution study, academic anesthesiologists with fellowship training did not have a significantly different h-index or number of publications than anesthesiologists without fellowship training. Analyses did show that FTAs had a higher number of publications per total years of practice and in years in practice at our institution.

Reference:
Background and Goal of Study: Ultrasound guided regional anaesthesia (USGRA) is considered the gold standard in performing regional anaesthesia (RA) as it improves outcomes and reduces complications. However, it has a steep learning curve. Current pre-patient USGRA training takes place on homemade phantom models, which have limited fidelity and degrade easily. Thus, trainees are ill equipped prior to USGRA on patients. This increases risks of nerve injury and patient discomfort during procedures. We sought solutions to address these educational needs in our centre.

Materials and Methods: A quantitative survey was conducted amongst juniors ranging from no experience to 5 years of experience. The intention was to identify barriers to learning USGRA in our institution. Responses to questions crafted based on published education methods were recorded on a 5 point Likert scale.

A quantitative survey was conducted to further probe barriers to education and elicit open feedback. Ethics approval was not obtained as no human or animal testing is required.

Results and Discussion: We received a total of 21 responses. 16 trainees (76%) had less than 3 years of training in residency. 9 trainees (42%) were not confident of performing an unsupervised block (of any sort). 16 trainees (76%) felt that developing skills on a real patient was a challenge, citing hand-eye coordination and needle tip identification as most challenging (14 trainees, 67%). The majority felt that hands-on workshops on healthy volunteers and watching training videos were the most useful in improving skills (19 trainees, 90%). 12 trainees (57%) felt that didactic teaching was not useful. The responses suggest that more can be done in the pre-patient phase of USGRA training to give trainees confidence in needle manipulation.

Limitations include our inability to perform blocks on volunteers, and current commercial phantom models are expensive and limited to a few procedures.

Conclusion(s): Our results indicate that there is a need in our institution to improve the delivery of our USGRA training. Due to high service load and case mix, trainee USGRA education tends towards commonly performed PNBS. To improve access to training, we propose enhancing their training by restructuring curriculum, incorporating high fidelity 3D models and integrating didactic teaching with a cost effective PNB trainer. A competency based assessment will be incorporated to assess independence of practice.

Reference:
A novel web-based work place assessment tool to support competency-based medical education during anesthesia residency - insights from the first year of experience

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Background and Goal of Study: As anesthesia residency programs shift towards competency-based medical education (CBME), focus is drawn over to competencies, manual and „soft“ skills as well as professionalism and bedside teaching.¹

Obstacles for implementing CBME includes -among others, lack of trainee and assessor engagement in the process of workplace assessment (WPA) and time constraints of the clinical environment.²

We present a one-year experience in implementing a web-based WPA tool aimed to support CBME implementation into anesthesiology residency program.

Materials and Methods: The web-based tool was developed using the Shamaym® platform.³

The tool includes resident short self-report assessment, attending anesthesiologist assessment, and resident free text report on lessons learned during. Data were used for feedback the residents.

Results and Discussion: During one-year period 29 junior residents filled in 4,342 self-assessments and 2143 free text lessons. Thirty-one attending anesthesiologists filled in 2,974 assessments and resident free text report on lessons learned during. The compliance was 98.8% and 97.8% among residents and attendings respectively.

In order to compare residents and faculty perceptions of clinical teaching, we analyzed data from the assessments. According to the residents, a discussion was conducted with the attending before anesthesia in 371/381 (93.4%) working days, anesthesia plan was discussed in 374/392 (95.4%), during anesthesia they were allowed to perform manual tasks according to their level of training in 381/388 (98.2%), and there was a debriefing discussion 217/375 (57.9%).

For the same questions the attending physicians reported an incidence of 269/284 (94.7%) (NS), 270/282 (95.7%)(NS), 281/285 (98.6%)(NS), 171/265 (64.5%)(NS), respectively.

Conclusions: According to this preliminary study, using web-based user-friendly tool and department leadership can result in high compliance by both residents and attending anesthesiologists.

Furthermore- there are no significant differences between residents and attending anesthesiologist regarding the perception of the clinical educational process.

References:
3. https://www.shamaym.com

Large language models implementation in anesthesiology board exams

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Background and Goal of Study: The release of chatgpt in November 2022, and similar large language models, is transforming society, medicine and medical education. The introduction of LLMs into medical board exams, either by trainees or examiners, is inevitable to our understanding. LLMs can answer tests and perhaps also compose them. therefore, we set out to inquire LLMs capabilities and limitations, using an Israeli written board exam in anesthesiology as a test case. In the literature, LLMs score in medical tests, at the student and residency level vary considerably, ranging from 44% to 90%, sometimes outperforming and sometimes underperforming humans.

Materials and Methods: 150 multiple choice questions were introduced without an orientation prompt (“imagine you are an anesthesiologist trying to take an exam”) or a specific primer (an anesthesiology textbook for example) both in hebrew and in english to ChatGPT 3.5/4 and google Bard. Answers were compared to the formal correct answers by anesthesiology testing committee.

Results and Discussion: Compared with a score of 62.9% correct answers by human subjects, chatgpt 3.5 outperformed, with 68.9% and 73.6% correct answers when solved in hebrew and english, respectively. chatgpt4 fared slightly worse with 66.6% correct answers, and Google Bard yielded only 51.2% correct answers. On many instances the LLM won't generate a solution, in some, the solution is simply wrong. Test language, choice of LLM, incorportation of figures all affect the correct answers rate. Future inquiry should focus on LLMs trained on scientific/medical datasets, and should tease out potential human factors within the MCQs.

Conclusion: LLMs ability to take board exams in anesthesiology is comparable or superior to residents. The proper use of LLM in the examination life cycle, should be addressed by our professional society.

References:
**08AP02-08**
The effect of simulation-based training on nurse anesthetist trainees

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¹Taipei Veterans General Hospital, Anesthesiology, Taipei, Taiwan

Background and Goal of Study: In Taiwan, Licensed nurses must undergo anesthesia training before officially becoming nurse anesthetists. Scenario-based simulation teaching can train anesthesia healthcare workers to respond to emergencies. The study aims to understand the difference in performance between the licensed nurses who undergo anesthesia training programs (NA-0) after simulation-based training and nurse anesthetists with one year of anesthesia experience (NA-1).

Materials and Methods: This study compares checklist scoring and questionnaire survey methods in research, using the Delphi method to create a consensus-based checklist for specific situational assessments. It involved two groups, NA-0 and NA-1, each with 12 participants. The NA-0 group received high-fidelity simulation-based training in addition to the standard curriculum, covering basic techniques and eight critical anesthesia events.

In contrast, the NA-1 group did not receive this simulation training. Both groups were then tested through scenario-based simulation exams, focusing on drug allergy and major bleeding.

Results and Discussion: This study used a t-test to compare the performance of two groups in completing assessment checklists for drug allergy and major bleeding scenarios. The NA-0 and NA-1 groups showed average checklist completions of 17.5 vs. 19.08 and 18.92 vs. 20.75 items, respectively, in these scenarios. However, statistical analysis revealed no significant difference between the groups' performances (p-values: 0.2380 for drug allergy, 0.0821 for major bleeding).

A post-exam questionnaire showed that the NA-1 group scored higher than the NA-0 group in self-confidence, clinical knowledge, and overall score (86.42 vs. 77.15, p < 0.05). The findings indicate that after simulation-based training, anesthesia trainees' ability to manage critical events like drug allergy and major bleeding is comparable to that of junior nurse anesthetists.

Conclusion(s): The study demonstrates that high-fidelity simulation-based training effectively enhances the clinical skills of both novice and experienced nurse anesthetists in managing clinical emergencies.

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**08AP02-09**
Assessing the examiner workload during three types of structured oral examination for the European Diploma in Anaesthesiology and Intensive Care

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Background and Study Goal: The European Diploma in Anaesthesiology and Intensive Care (EDAIC) comprises Part I, a multiple-choice questions assessment, and Part II, a Structured Oral Examination (SOE) with four 25-min sessions. In response to the SARS-CoV-2 pandemic, three SOE formats — fully online, hybrid, and face-to-face — were introduced while maintaining consistent assessment methods. Despite widespread use, no research has explored examiner taskload, especially across these three formats.

This study aims to compare individual examiner workloads for online, hybrid, and face-to-face SOE during Part II EDAIC.

Materials and Methods: During the 2023 examination year, examiner workload was measured using the NASA TLX tool at the end of each examination day for online, hybrid, and face-to-face formats.

The NASA TLX assesses subjective mental workload across six dimensions (temporal, mental, physical demands, performance, frustration and efforts). The final score ranges from 0 (min) to 100 (max). Results were compared, and examiners' related factors influencing workload were explored.

Results and Discussion: Among 220 measurements for 148 unique examiners, 38(17%) were face-to-face, 73(33%) hybrid, and 109 (50%) online. Median workload was 59 [IQR 50.25 to 70], with face-to-face examinations exhibiting the highest score (62 [IQR 50-71.25]), followed by online (61 [52-70.5]), and hybrid (57 [47.5-66.5]), statistically different for hybrid vs face-to-face. Multivariable analysis revealed higher NASA TLX scores associated with >2 hours spent by examiner on questions preparation, holding dual paediatrics or non-clinical specialisation. Hybrid but not online examination mode contributed to workload reduction. Subjective workload measurement is important for equitable comparisons in different operational settings, guiding decision-making related to organization and resource allocation.

Conclusion(s): Part II EDAIC SOE generates high examiner's workload (>50), particularly during face-to-face examinations. Factors such as question preparation time and dual specialisation influence examiner's workload.
Understanding subjective workload may aid managerial decision-making for organisation and resource allocation, ensuring examination quality.

References:
Byrne, BJA, 2010; 105 (6):767-771.

O8AP02-10
The effects of a flipped classroom approach on the learning dimensions of anaesthesiology undergraduates

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Background and Goal of Study: Significant changes in medical education over the past decades have affected the design and content of curricula, including teaching approaches. Next to traditional simulation-based trainings, seminars and lectures targeting perioperative medicine have been implemented in many medical curricula and hereby, the teaching responsibilities of anaesthesiology departments have grown. Herein lies the need to constantly adapt teaching methods and instructional designs.

The aim of our study was to analyze the effect of a flipped learning approach on students’ motivation, subjective- and factual learning gain.

Materials and Methods: This randomized controlled study was conducted during a mandatory anaesthesiology module (4th year undergraduates) which is composed of an introductory seminar, followed by bedside teachings in the operation theatre.

N = 68 undergraduates were allocated to the intervention- and n = 62 undergraduates to the control group. During the introductory seminar, the intervention group was provided with a flipped learning diary, which consisted of a set of videos, covering the learning objectives.

To facilitate learner-centered environment, all the teaching activities of the flipped learning approach were designed based on instructional scaffolding.

After the last bedside teaching, the undergraduates completed a written examination. Comparative self-assessment (CSA) forms and the Situational Motivational Scale were used to assess the subjective learning gain as well as the motivational changes.

Results and Discussion: Both groups reported significant higher levels of autonomous motivation (p < 0.001). There was no statistical difference in autonomous motivation between the study groups, t(102.247) = 1.552.

The subjective learning gain also improved in both study groups (p < 0.01) significantly. The factual knowledge gain, reflected by the written exam, was significantly higher in the intervention group (t(132) = 3.140, p = 0.002).

The intervention might have not targeted the motivational dimension of learning sufficiently, hence a broader introduction to the concept of flipped learning would be useful.

Conclusion(s): The flipped learning approach is a didactic concept which targets the student-centered learning approach. Its implementation in teachings of anaesthesiology is beneficial regarding factual knowledge gain, further research needs to analyse its impact on the motivational dimension of learning.

O8AP02-11
Implementation of educational telerounding program during the ongoing conflict in Ukraine: a pilot study

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Background and Goal of Study: We developed a program of weekly ICU telerounding sessions with collaborating clinicians during the ongoing conflict in Ukraine to provide spaced reinforcement and encourage adherence to best daily trauma critical care practices offered through our multimodal, knowledge-sharing platform.

Materials and Methods: Weekly educational telerounding sessions with interprofessional faculty. A tele-health video platform (video platform (TeladocTM) or a video conferencing platform (ZoomTM), and a private group chat in a messaging app with videocall features (ViberTM). The Checklist for Early Recognition and Treatment of Acute Illness and Injury (CERTAIN) rounding checklist was used to guide clinical case presentations. A Google DocsTM summary of recommendations was posted in the group chat after each session.

The Ukrainian ICU team provided feedback through semi-structured interviews.

Results and Discussion: Weekly, one-hour long sessions were conducted between February and July 2023. Educational telerounding sessions using video platforms are flexible, accessible tools to bridge barriers of distance, language and help to reinforce adherence to critical care processes. The CERTAIN standardized approach was positively received, adopted by our Ukrainian partner hospital.

Conclusion(s): Conducting educational telerounding sessions using readily available video communication platforms during an ongoing armed conflict is feasible. Additional research is needed to clarify the most effective solutions to current implementation barriers.

References:
1.Rovati L et al. Implementation of a Multimodal Knowledge-Exchange Platform to Provide Trauma Critical Care Education During the Ongoing Conflict in Ukraine. JAMA Network Open. 2023;6(2):e230050
08AP03-01 Monitor interaction pattern comparison between anesthesiologists at varying levels of experience: artificial intelligence-aided operating room footage analysis

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Background and Goal of Study: As monitoring plays a crucial role in anesthesia, it is vital to evaluate how anesthesiology residents interact with monitors during training. Past studies used obtrusive head-mounted devices which proved unsuitable for long-term data collection in operating rooms (OR). Moreover, existing studies lack detailed correlations between monitor interactions, anesthesia tasks, and provider expertise.

Our study introduces a novel approach: using Artificial Intelligence to analyze video footage from unobtrusive camera systems in the OR to define patterns of behaviors among providers of varying levels of experience.

Materials and Methods: We placed 2 webcams on the patient's vital signs monitor (PM) and the ventilator monitor (VM). We developed AI algorithms to detect the gaze direction of the provider, a separate camera system was used to record the anesthetic process which was then labeled by an anesthesiologist for specific tasks involved in the anesthetic process.

We cross-referenced data regarding the induction phase from both systems and compared the patterns of monitor interactions of two groups: residents <12 months into residency (Novice), and those with >12 months of experience (Advanced).

Results and Discussion: Using our platform, we analyzed 15 procedures, 9 of which were performed by novice providers and 6 by advanced. For each monitor, we measured 3 parameters for interaction: gaze frequency (glances per 5 min intervals), glance duration, and percentage of time spent monitoring throughout the induction. For correlation with airway management, we measured the percentage of time spent monitoring throughout the task.

We used the unpaired two-sample t-Test for comparison between the two groups regarding each parameter. We found that the advanced providers glanced less frequently at PM (11.67 times vs 20 times, P<0.05), no difference was found for glance duration; monitoring time was lower in the Advanced group (23% vs 28%, P<0.05); for VM we had similar findings regarding glance frequency (22 times vs 29 times, P<0.05), no significant difference was found for the other parameters. During airway management, Advanced providers interacted less with monitors (38% vs 40%, P<0.05).

Conclusion(s): Monitor interactions can be measured using unobtrusive platforms, assessment of these interactions and linking them to tasks along the anesthetic process could offer a novel way to assess anesthesiology residents' advancement in training.

08AP03-02 Enhancing meta-analysis interpretation in anesthesia literature: a trial sequential analysis perspective

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Background and Goal of Study: While meta-analysis is a cornerstone in evidence-based medicine, accurate interpretation of its results remains challenging.

This study addresses common pitfalls such as Type 1 errors (false positives), Type 2 errors (false negatives), and the effective power to detect clinically significant findings within recent anesthesia literature, employing Trial Sequential Analysis (TSA).

Materials and Methods: We systematically reviewed publications in the Cochrane Database of Systematic Reviews within the „Pain and Anesthesia“ domain, covering peri-anesthetic/peri-operative care, post-anesthetic/intensive care units, and drugs in anesthesia and intensive care. Inclusion criteria comprised systematic reviews published between January 1, 2012, and December 31, 2022, with at least three studies and binary outcomes.

TSA was applied to determine the required sample size (RIS) and to classify results into ‘Effect,’ ‘Inconclusive,’ or ‘Futile’ categories using TSA software (CTU.dk, Version 0.9.5.10 Beta).

Results and Discussion: Of the 222 Cochrane systematic reviews assessed, 126 met the inclusion criteria, encompassing 1300 meta-analyses subjected to batch-TSA.

Figure 1 provides a comprehensive summary of all results. Notably, 85.9% (1117) of the included analyses were underpowered. Moreover, 62.8% (135) of the statistically significant analyses (215) were at risk of Type 1 error, while 63.9% (576) of the non-significant analyses (902) were at risk of Type 2 error.

Conclusion(s): This study underscores a prevalent issue in recent anesthesia meta-analyses, highlighting widespread underpowered analyses. Consequently, interpreting the outcomes of such meta-analyses requires caution due to the substantial risk of Type 1 or Type 2 errors.

References:
Limitation of therapeutic effort in a postsurgical intensive care unit

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Background and Goal of Study: Limitation of Therapeutic Effort (LTE) includes both withholding and withdrawal of life-sustaining measures, as the effect of their execution is not expected to outweigh the benefits of not implementing them. We aimed to describe the characteristics that lead to LTE in post-operative intensive care unit patients (ICU) and to evaluate the type of LTE most frequently used and patients’ evolution.

Materials and Methods: After the approval of the Ethics Committee, a retrospective observational study was carried out by reviewing medical records of patients admitted to the ICU during 2021 and 2022 in whom LTE was applied. Patients without whole information and those in whom LET was not well defined were excluded. Following data were recorded: brain death, withdrawal or withholding: non-cardiopulmonary resuscitation (CPR), non-otracheal intubation (OTI), no tracheostomy, non-renal replacement (RRT), or no vasoactive support. The type of LTE and who made the decision, the final outcome and whether comfort measures were applied were also recorded.

Results and Discussion: During study period LTE was applied to 106 patients in 2055 admissions (5.1%). After exclusion criteria, data from 80 patients were analysed: 91.2% urgently. Mostly were men, elderly, with multiple comorbidities and poor survival according to Charlson index. LTE was proposed by doctors in 31.2%, by family in 6.3%, and jointly in 62.5%. Mean time between admission to ICU and LTE was 10 ± 13 days. In 83.8%, LTE applied was withholding: non-CPR 83.8%, no tracheostomy 70%, non-OTI 27.5%, non-RRT 55%, and no vasoactives 36.2%. Withdrawal was applied in 13.8%; 2.5% were brain dead. In patients in whom LTE established the non tracheostomy, decision to LET was earlier (7 ± 7 vs 18 ± 20 days, p<0.0001). In patients with a non-OTI order, LET was decided earlier (5 ± 4 vs 12 ± 15 days, p=0.028) and time-to-death was longer (6 ± 9 vs 2 ± 4 days, p=0.025). Patients in whom LTE limited vasoactive support had a longer hospitalization time after discharge from the ICU (5 ± 8 vs 1 ± 5 days, p=0.007).

One year after admission, 6.3% were alive; 93.7% died during their hospital stay (72.5% in the ICU). All patients who died in the unit received comfort measures.

Conclusions: Decision to LTE was adopted mainly together by doctors and family. The most widespread measure was therapeutic withholding: non-CPR as the most common, followed by no tracheostomy, non-RRT and no vasoactives.

Three-dimensional printing in medical education: a structured review

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Background and Goal of Study: Models produced by three-dimensional (3D) printing are increasingly being used in medical education. While printing a 3D model is relatively simple, designing the model requires skill, time, and effort, which are often beyond the capabilities of individual centers, especially if they are not part of a large academic institution. We conducted a systematic review to see if articles published on 3D printing in medical education contained the stereolithography file (STL), allowing their models to be reproduced by anyone with access to a 3D printer.

Materials and Methods: We searched PubMed, Embase, and Google Scholar from 01/01/2000-31/12/2021 for 3D printing and medical education. Articles were then screened by title and abstract before being included for full-text review. Our primary outcome was the availability of STL files associated with the corresponding article.

Results and Discussion: A total of 420 articles met the inclusion criteria, 57% of the articles were open-access. The STL files were available in the published paper in 15 publications (4%) and as an additional file in 32 publications (8%). We were able to obtain an STL from a further 16 publications by emailing the author directly. 37 contact authors replied that they were unable to share the STL and 51 contact authors supplied details that were incorrect at the time of emailing (06/2023). The remaining authors did not reply to our request to share the STL.

Despite the proposed potential benefits of using 3D-printed models in medical education, there appears to be a reluctance to share the STL files which form an integral part of model reproduction. This limits the reproducibility and application of published research. Furthermore deprives those who could benefit most from this technology.

Conclusion(s): Sharing of STL files should be treated as a standard requirement for work discussing the educational benefits of 3D printing unless there are clear commercial or contractual reasons not to.

First German translation and validation of the “Satisfaction with simulation experience” scale (SSE) for the evaluation of the learning experience via simulation

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Background and Goal of Study: Training in simulation with the use of “mannequins” is increasingly widespread within medical education. However, so far, there are no tools which measure the degree of student satisfaction after clinical training through simulation available in German.
This study aims to provide a first translation and validation in German of the Satisfaction with simulation experience” (SSE) scale, a means already validated in several languages(1).

**Materials and Methods:** After obtaining the author's consent, the SSE was subjected to forward and backward translation. The content validity was assessed by 18 experts in medical education and simulation by calculating the Content Validity Index by Item and by Scale (I-CVI and S-CVI); the face validity was tested on four medical students experienced in medical simulation. Subsequently, in order to evaluate the reliability by calculating the reliability coefficient (r) and Cronbach's α the SSE was administered to 138 medical students with test retest after seven days.

**Results and Discussion:** The author approved the final version of the SSE translated into German: I-CVI values >0.78 and S-CVI was 0.91. r is 0.747 and the α of the scale is 0.895. These results are similar to those of previous translations of the SSE into other languages(2).

**Conclusion(s):** The I-CVI and S-CVI values that were detected are deemed satisfactory, affirming the validity of SSE-GER content. The test-retest analysis demonstrated optimal reliability, and the α value was considered acceptable, with adequate deviation from the original (0.776). Despite these satisfactory findings, it is important to note that this represents an initial validation, and further studies with larger samples are required.

**References:**
1. Tracy Levet-Jones u. a., „The SCALE - The Development and Psychometric Testing of the Satisfaction with Simulation Experience Scale“, *Nurse Education Today* 31, Nr. 7 (Oktober 2011): 705–10

**Acknowledgements:** We would like to acknowledge Tracy Levet-Jones as the author of the original SSE who authorized the adaptation of the instrument for the German context.

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**08AP03-06**

**Education by multimodal telemedical knowledge exchange platform during military conflict in Ukraine**

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**Background and Goal of Study:** Today, all Ukrainian doctors and medical associations are standing united to face the horrific consequences of war and growing anxiety in society. Recognizing the acute need for additional resources, our group developed a multimodal knowledge-sharing platform to provide trauma, critical care, and disaster medicine education and clinical support for clinicians working in Ukraine during the ongoing conflict. Using the Checklist for Early Recognition and Treatment of Acute Illness and Injury (CERTAIN) program, a multimodal trauma critical care knowledge exchange platform was created for clinicians practicing in these institutions.

**Materials and Methods:** Within 2 months of the beginning of the Ukrainian conflict, a group of international trauma and critical care experts in collaboration with the Shupyk National Healthcare University in Kyiv, Ukraine, created a multimodal knowledge-sharing platform for clinicians caring for critically ill patients. The main tele-education intervention consisted of a series of case discussions and webinars on established approaches to battlefield trauma and critical care, held by a mixed faculty of expert intensivists, surgeons, emergency physicians, and anesthesiologists from the United States, United Kingdom, and Ukraine. A secure messaging service was used to connect clinicians participating in this initiative, enabling them to ask general clinical questions and exchange educational material via a private chat group on an on-demand, asynchronous basis.

**Results and Discussion:** Since the program launch, 906 participants have joined the messaging group, and 16 tele-education sessions have been delivered, with more than 5000 total views. The CERTAIN website has had about 5000 visits, mainly from Ukraine and the United States. Of the about hundred completed postsession surveys about 90% of respondents rated the course content excellent or very good, and 99% recommended it to others.

**Conclusion(s):** This study found that a multimodal intervention to provide education and clinical support for the care of critically ill trauma patients in response to the conflict in Ukraine was feasible, inexpensive, and associated with a high degree of clinician engagement and satisfaction. This approach can be used as a model for the development of further education and quality improvement interventions in remote and austere environments during global emergencies and disasters.

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**08AP03-07**

**SiTPeDiA - Simulation and training in Paediatric Anesthesia - enovated educational project**

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**Background and Goal of Study:** Simulation-based education (SBE) can provide immersive, experiential learning that allows participants to develop knowledge, skills, and attitudes without harm to patients. Despite its importance in education and patient safety, simulation-based education and training (SBET) is only partially or poorly implemented in many countries, including most European countries. A group of paediatric anaesthesiologists with simulation programme knowledge decided to start a paediatric simulation course, SiTPeDiA, for anaesthesiologists who wanted to consolidate, refresh and share knowledge in paediatric anaesthesia.

**Materials and Methods:** Development of a simulation course, divided by six clinical scenarios sessions, related to emergencies or anaesthesia procedures outside operating room, and three practical discussion sessions. In the discussion sessions, the main topics were sedation in neonate and children, difficult airway management, ultrasound guided access in neonate and chil-
dren and some problem based learning clinical cases. To evaluate satisfaction of the participants we included pre and post course online surveys, to assess levels of confidence, experience and satisfaction. Results and Discussion: There were three editions of the course, with sixteen participants each, composed by trainees and specialists in anaesthesiology with previous contact with paediatric patients. The responses indicated that the majority of participants felt more confident in the management of paediatric anaesthesia emergencies after attending the course and all of the participants felt that the course met or exceeded their needs and expectations. Conclusion(s): The main objective of this course was to improve confidence in paediatric anaesthesia. It is encouraging to see motivation of the participants that want to improve their experience using simulation. We suggest inclusion of this course in anaesthesia training programs, namely, long life education programs for consultants with less experience in paediatric patients.

Reference:

08AP03-08 Diabetic, bariatric and awaiting anaesthetics. A pre-operative prescribing simulation focused on bariatric and diabetic patients to satiate a gap in undergraduate medical school curricula

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Background: In Europe, 59% of the adult population have obesity predisposing them to Type 2 Diabetes Mellitus[1]. Final year medical students will frequently encounter these patients as newly qualified doctors. However, education focused on pre-operative antidiabetic medication management and intravenous (IV) fluid prescription in the nil-by-mouth diabetic and bariatric patient population is often minimal. Therefore, a case-based simulation was devised to mitigate for the lack of education in a niche that has significant clinical importance. Methods: A pre-simulation quiz assessed final year medical student understanding of pre-operative antidiabetic medication management and appropriate pre-operative prescription in this patient cohort. They were then presented with fictional pre-operative diabetic and bariatric patient cases and were expected to independently decide the pharmacological management, locate the correct local prescribing guidance and handwrite the prescription on the appropriate drug chart. Some didactic teaching was provided on the management of regular antidiabetic medications in the pre-operative period. A post-simulation quiz re-assessed understanding of the topics covered during the session. Results: On completion of the simulation, all the final year medical students (n=13) felt better prepared to pharmacologically manage these patients during the pre-operative period: their confidence to prescribe pre-operative IV fluids for bariatric patients significantly increased by 50% (p<0.005) following simulation completion.

In addition, their confidence to prescribe Variable Rate Insulin Infusions (VRII) in this patient population significantly increased by 44% (p<0.005). Quiz scores increased for correct selection of pre-operative IV fluids by 65% and pre-operative antidiabetic medication management by 63%. All students were able to locate local protocols following simulation completion. The data suggests that this simulation not only increases the confidence of medical students but improves their decision making and management plan formulation for pre-operative bariatric and diabetic patients. Conclusion: This low-cost, sustainable simulation may attenuate a gap in undergraduate medical education though more data is required to comment on scalability to larger student cohorts. Overall, improving pre-operative prescribing confidence in final year medical students can potentially improve future patient safety. References:
1. World Health Organisation

08AP03-09 Trainee satisfaction with a simulation program in the education curriculum of a university hospital center in Portugal: a survey

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Background and Goal of Study: Simulation is a recognized tool for technical and non-technical skills acquisition in Anesthesiology, including essential technical gestures and management of critical events and rare clinical situations in a realistic and safe environment. The Anesthesiology Department at Centro Hospitalar Universitário de São João provides a simulation training program as part of the 5-year long education curriculum of anesthesiology residents. The goal of this work was to assess the trainees’ perception of simulation learning and its impact on the acquisition and retention of skills. Materials and Methods: We performed a cross-sectional study through a questionnaire sent by email to the residents, on a voluntary basis, assuring anonymity. After providing their informed consent, this included questions relating to experience in simulation and main learning points on a 5 point Likert scale. Statistical analysis was performed using SPSS Statistics software. Descriptive statistics are represented as median and interquartile range (IQR) because data was non-normally distributed. Results and Discussion: Trainee response rate was 32/36 (89%). The median residency year of the respondents was 3rd and the median number of simulation sessions during training was 2.5 (IQR 2-3). The results of the remaining survey are summarized in the table below. Conclusion: According to our results, in agreement with current literature, trainees recognize this simulation program as an added value in the acquisition of both technical and non-technical skills in Anesthesiology.
<table>
<thead>
<tr>
<th>Question</th>
<th>Likert points out of 5 (median, IQR)</th>
<th>Proportion of respondents that fully agree (5 points, %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simulation-based learning (SBL) is a useful strategy</td>
<td>5 (4-5)</td>
<td>84</td>
</tr>
<tr>
<td>SBL provided an immersive environment</td>
<td>4 (4-5)</td>
<td>31</td>
</tr>
<tr>
<td>I felt safe in the simulation environment</td>
<td>5 (4-5)</td>
<td>66</td>
</tr>
<tr>
<td>I found it hard to treat the mannikin as a real patient</td>
<td>3 (3-4)</td>
<td>6</td>
</tr>
<tr>
<td>Debriefing was constructive</td>
<td>5 (4-5)</td>
<td>62</td>
</tr>
<tr>
<td>SBL helped me to retain knowledge</td>
<td>5 (4-5)</td>
<td>62</td>
</tr>
<tr>
<td>Debriefing allowed me to assess my performance</td>
<td>5 (4-5)</td>
<td>56</td>
</tr>
<tr>
<td>SBL improved my communication skills</td>
<td>5 (4-5)</td>
<td>38</td>
</tr>
<tr>
<td>SBL improved my clinical thinking skills and decision-making</td>
<td>4 (4-5)</td>
<td>47</td>
</tr>
<tr>
<td>SBL should be mandatory in Anesthesiology training programmes</td>
<td>5 (4-5)</td>
<td>74</td>
</tr>
</tbody>
</table>

**Discussion:** We must ensure patient oxygenation and have alternative plans to secure the airway if we expect a difficult airway. A FOB plus rigid videolaryngoscope have proved to be complementary devices, optimizing those situations where each device would fail separately and facilitating successful tracheal intubation in difficult airway situations.

**Learning points:** combination of a flexible fibrobronchoscope and rigid videolaryngoscope in the same clinical setting is complementary, optimizing situations where each device may fail separately, and facilitating successful intubation in difficult airway situations.

**08AP03-10**

**Use of the combined approach for left vocal cord medialisation thyroplasty surgery in patients with known difficult airways**

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**Background:** Vocal cord paralysis is a common disorder, and in many cases the cause is unknown. The most common surgical treatment consists of repositioning the vocal cord by inserting a structural implant or stitches to reposition the laryngeal cartilages and bring the vocal cords closer together.

We present the case of a patient with glottic insufficiency secondary to partially compensated left vocal cord (LVC) palsy scheduled for thyroplasty.

**Case report:** 56-year-old female patient with no allergies, with a history of maxillofacial surgery 12 years ago on the mandibular joint with reduced mouth opening and limitation of neck extension. LVC paralysis with poor RVC compensation with dysphonia for 2 years after lumbar back surgery.

Total thyroidectomy 1 month ago with difficult intubation with Macintosh resolved with fibrobronchoscope. Scheduled for surgery due to left vocal cord paralysis with no clear cause.

Following the application of standard monitors, pre-oxygenation with a facemask (HAN 1), Airtraq was inserted, allowing visualization of the glottis.

After manoeuvres to optimizing visualization and centering the glottis, a fiberoptic bronchoscope was inserted through an endotracheal tube (ETT) mounted in the guiding channel. FOB was used as a guide for intubation, and Airtraq allowed visualization of ETT advancement through the cords.
10AP01-01
The reliability of carotid artery Doppler ultrasonography indices in predicting fluid responsiveness in geriatric patients

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Background & Goal of Study: The reliability of corrected carotid flow time (cFT) in predicting fluid responsiveness has been demonstrated in studies involving invasive cardiac output (CO) measurements. However, there is currently no literature data evaluating the reliability and predictive value of carotid artery Doppler ultrasonography indices in elderly. We aimed to determine the reliability of carotid artery Doppler ultrasonography indices following a fluid challenge.

Materials & Methods: This prospective, observational study was approved by our Institutional Review Board. NCT06087250. We included patients aged ≥65, classified as ASA I-III, requiring invasive arterial blood pressure monitoring. Excluded patients were with severe renal and cardiovascular diseases, fasting periods exceeding 8 h, sepsis.

Following induction CO was measured using the Most Care® device. Measurements of common carotid artery diameter, carotid velocity time integral and common carotid artery flow time (FT) were recorded before and after a fluid challenge: 6ml/kg crystalloid iv infusion over 30 min. cFT and carotid blood flow (BF) were subsequently calculated. Patients were categorized into responders (RG) and non-responders (NRG). A 10% increase in CO defined as fluid responder.

Results & Discussion: The study comprised 22 non-responders and 18 responders. A significant change in carotid diameter (0.45 mm, 6.5%, p=0.03) was observed in RG. The % change of carotid diameter was significantly higher in RG compared to NRG (6.5% vs 0.65%, p=0.04). The % change of BF was notably higher in RG compared to NRG (30.04% vs 9.72%, p=0.02).

Before fluid challenge, FT was significantly longer in NRG than RG (315 ms vs 285 ms, p=0.02), but after fluid challenge, these measurements became comparable. The % change of cFT was higher in RG (15.38% vs 7.49%, p=0.02). Notably the change of cFT exhibited similarities among groups.

ROC analysis demonstrated an area under the curve of 0.682 (95% CI: 0.509, 0.855, p=0.039) for carotid diameter, 0.710 (95% CI: 0.547, 0.872, p=0.011) for BF and 0.706 (95% CI: 0.540, 0.872, p=0.016) for FT.

Conclusion: The stiffening of aged cardiovascular structures may influence dynamic markers of fluid responsiveness. Despite the demonstrated effectiveness of cFT in predicting fluid responsiveness in general population, this study highlights the limited reliability of evaluated carotid Doppler ultrasonography indices for predicting fluid responsiveness in geriatric population.

10AP01-02
Machine Learning Models for Accurate Prediction of Post Cardiopulmonary Bypass Fibrinogen Levels in Patients with Acute Type A Aortic Dissection: A Retrospective Analysis

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Background and Goal of Study: Patients undergoing cardiopulmonary bypass (CPB) for acute type A aortic dissection (AAAD) face significant postoperative bleeding risks due to low fibrinogen levels. Accurate prediction of fibrinogen levels after CPB is essential for optimizing blood transfusion strategies. This study aims to assess the efficacy of machine learning models in forecasting fibrinogen levels post-CPB in AAAD patients.

Methods: The study was conducted at the National Cardiovascular Center from August 2014 to October 2023 and included emergency surgery patients for AAAD with successful CPB weaning. Five machine learning models with 5-fold cross-validation (linear regression, random forest, support vector regression, K-nearest neighbor, and decision tree) were employed to predict log-transformed post-CPB fibrinogen levels.

Two model sets were used: feature set 1 included preoperative data (age, sex, weight, and preoperative fibrinogen levels) as explanatory variables, and feature set 2 added CPB data (CPB time, fresh frozen plasma volume from CPB, and minimum core body temperature (CBT)). The models’ accuracy was evaluated using the mean values of Root Mean Squared Error (RMSE), Mean Absolute Percentage Error (MAPE), and Coefficient of Determination (R²). Data analysis and model building were performed using the scikit-learn library in Python.

Results and Discussion: A total of 287 patients were analyzed in this retrospective study. Patient demographics revealed a median age of 72 (interquartile range (IQR): 59-79) years, with 61.8% (n=176) undergoing total aortic arch replacement. The median minimum CBT was 24.9 (IQR: 23.8-25.9) °C, and the median CPB duration was 253 (IQR: 212-296) minutes.

Fibrinogen levels decreased from a preoperative median of 253 (IQR: 203-321) mg/dl to 153 (IQR: 102-173) mg/dl after CPB. Using feature set 1, the random forest model showed the highest prediction accuracy, with RMSE of 0.21, MAPE of 3.4%, and R² of 72.9%. Applying feature set 2, the random forest model improved its performance, achieving an RMSE of 0.20, MAPE of 3.2%, and R² of 76.7%.

Conclusion: This study demonstrates machine learning’s potential, especially random forest models, for precise post-CPB fibrinogen prediction in AAAD patients using preoperative data alone. These findings emphasize the crucial role of preoperative assessment in transfusion and hemostatic decisions in AAAD surgery.
10AP01-03  
Assessment of postoperative segmental body water distribution and optimal intraoperative fluid balance in laparoscopic surgery using bioelectrical impedance analysis

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Background: A unique surgical position is applied during laparoscopic surgery and fluid shift to each body segment after surgery depends on this position. We examined the body water distribution after laparoscopic surgery using bioelectrical impedance analysis (BIA). Additionally, we hypothesized that postoperative changes of ratio of extracellular water (ECW) to total body water (TBW) reflected intraoperative fluid management.

Materials: We enrolled 50 patients undergoing laparoscopic surgery for stomach, colon, kidney, prostate, and adrenal gland in this retrospective study. We used the InBody S10 (Inbody CO, Seoul, Korea) to measure BIA parameters before anesthetic induction and after postoperative extubation (post-pre changes).

Method 1: The participants were divided into four groups, with head-down-25 group comprising eight patients undergoing robotic assisted radical prostatectomy at a 25-degree head down with legs raised; the head-down lithotomy group of 12 undergoing laparoscopic colectomy at a 15-degree head down with lithotomy; supine group of 12 undergoing laparoscopic gastrectomy at supine with legs spread; nephrectomy group of 15 undergoing laparoscopic nephrectomy at lateral decubitus. The incidence of PRBC transfusion in the cohort was 39%.

Results: The body water in the upper limbs and trunk in the head down-25 group and in the lower limbs in the nephrectomy group remarkably increased post-surgery (Fig 1a-c). Intraoperative fluid balance (infusion-blood loss-urine output) positively correlated with d E/T (Fig 2). We obtained the cut-off value for intraoperative fluid balance for zero of d E/T using the ROC curve (AUC 0.75, cut-off value 1140 ml).

Conclusions: The BIA numerically elucidated the postoperative segmental body water distribution. The ECW/TBW ratio may indicate the environment surrounding the cells such as edema or hypovolemia caused by inappropriate intraoperative infusion.

10AP01-04  
Prediction of transfusion needs before lung transplantation: a retrospective monocenter study

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Background and Goal of Study: Lung transplantation is associated with a high risk of transfusion, which can alter the patient's outcome after surgery. While on the waiting list, measures can be implemented to optimize the patient's erythrocyte mass and reduce perioperative exposure to labile blood products. However, there is no risk-assessment tool to identify the patients most at risk of transfusion who could benefit most from advanced perioperative optimization measures.

The aim of this study was to develop a predictive score for packed red blood cell (PRBC) transfusion during lung transplantation.

Materials and Methods: This monocenter, retrospective study was conducted at the CHU UCL Namur, a tertiary hospital in Belgium. Adult patients operated for lung transplantation between January 1, 2010 and January 1, 2020 were included. Combined heart-lung transplantation, pediatric patients, Jehovah's Witness patients and emergent retransplantsations were excluded. Variables predictive of transfusion risk identified in the literature were combined to develop a score predictive of PRBC transfusion during surgery.

Results and Discussion: 252 lung transplantations were included. The incidence of PRBC transfusion in the cohort was 39%. The final model included five variables readily available at the preoperative evaluation (Figure 1): preoperative hemoglobin level, presence of pulmonary arterial hypertension, previous thoracic surgery (pleurodesis, pleurectomy, and redo transplantation being the most at risk), two vs. one lung transplantation, and indication for transplantation. The model adequately predicted the risk of PRBC transfusion (c-statistic 0.78).

Predicted probability (in percentage) of transfusion given by the multivariable model for convenient levels of the predictors: PP, pleurodesis/pleurectomy; LT, lung transplantation; SLT, single-lung transplantation; COPD, chronic obstructive pulmonary disease; PH, pulmonary hypertension.
Conclusion(s): We propose here a simple predictive model based on readily available preoperative data to adequately stratify patients according to their transfusion risk. This model should be externally and prospectively validated.

10AP01-05 Evaluation of the third pillar of Patient Blood Management in hospital transfusion practice after implementing a PBM program

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Background and Goal of Study: Patient Blood Management (PBM) is a three-pillar approach to optimize patients who may need blood transfusions and improve clinical outcomes. The third PBM pillar focuses on improving the patient’s condition to allow more restrictive transfusion strategies. This study assessed the trends in three indicators of the third PBM pillar (Single Unit Transfusions or SUT, pre-transfusion Haemoglobin or pre-Hb, and transfusions with Hb higher than 8 g/dL) in hospital transfusion after implementing a PBM program.

Materials and Methods: Data were extracted from the Maturity Assessment Model for Patient Blood Management (MAPBM) project (1), which included several surgical procedures and gastrointestinal bleeding (GIB) in Spanish hospitals. Ethical approval was obtained. Data from a tertiary-level hospital between 2014 and 2021 were selected. The results were expressed as means and percentages. The coefficient of variation by type of procedure was assessed using Spearman’s ρ.

Results and Discussion: 12,701 patients were included (hip arthroplasty 8%, knee arthroplasty 20.2%, colorectal surgery 6.6%, heart valve surgery 17.5%, hip fractures 19.7% and GIB 25.9%). There was minimal variability between types of procedure for pre-transfusion Hb (<10%), but significant variability in SUT (20-50%) and transfusions with Hb > 8 g/dL (0-76%), suggesting that some procedures have implemented more PBM recommendations than others. The three indicators improved (Figure 1. A) and correlated strongly between themselves (ρ 0.95, p <0.01). The decrease in transfusion rates and number of RBC units per patient (Figure 1. B) correlated strongly and significantly with the reduction in pre-transfusion Hb (ρ 0.79, ρ 0.83 respectively), the reduction in transfusions with Hb > 8 g/dl (ρ 0.83, ρ 0.9) and increase in SUT (ρ 0.83, ρ -0.83).

Conclusions: Despite the variability of these indicators, there was an overall improvement and correlation with a decrease in RBC transfusion. Each of these three indicators seems equally valid to evaluate the third pillar of PBM.

References:

10AP01-06 Efficacy and safety of desmopressin on bleeding and transfusion in cardiac surgery with cardiopulmonary bypass: a systematic review and meta-analysis

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Background and Goal of Study: Bleeding and transfusion in cardiac surgery represent a major source of complications. Both surgery and cardiopulmonary bypass induce coagulopathy, including platelet dysfunction. Desmopressin has been studied to reduce bleeding and transfusion requirements with conflicting results. The aim of this study was to systematically evaluate the available evidence on the efficacy and safety of desmopressin in cardiac surgery with cardiopulmonary bypass.

Materials and Methods: We searched the Embase, Medline, Cochrane CENTRAL, Web of Science and ClinicalTrials.gov. databases on February 22,2023 for prospective studies comparing Desmopressin with placebo in cardiac surgery with cardiopulmonary bypass. We performed a meta-analysis with bleeding at 24h as the primary outcome and with the amount and incidence of transfusion of blood products as secondary outcomes. Safety outcomes included re-exploration rate, thromboembolic events, and mortality.

Results and Discussion: 36 included studies represented a total of 2594 patients. Bleeding at 24 hours was reduced in the desmopressin group by a weighted mean difference of 94.21 ml (95%
Conclusion(s): Our meta-analysis demonstrates that desmopressin reduces blood loss and the amount of red blood cell transfusion after cardiac surgery. This result should be interpreted carefully considering the considerable heterogeneity between studies. Further well-designed studies are needed to determine any possible benefits of desmopressin.

References:

10AP01-07
Tranexamic acid in cardiac surgery in PBM programs, 5 years of experience

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Background and Goal of Study: Acid Tranexamic (TXA) is a simple and inexpensive antifibrinolytic, that inhibits the formation of plasmin. Its use has been demonstrated useful in order to reduce perioperative bleeding, reduce postoperative blood loss and red cell transfusion in different surgery scenarios and it is widely recommended in cardiac surgery (1).

So, it has been become more frequent as strategy of PBM (patient blood management) program. Our objective was to evaluate its implementation in our center in cardiac valve surgery from 2017 to 2021, to assess its effectiveness in the transfusion rate, mortality and total hospital stay.

Materials and Methods: We used the data collected in our centre from 2017 to 2021 included in a multi-centre, observational, non-interventional study for the follow up of the PBM programs that was systematically reported since 2017. Statistical analysis was only descriptive. The study was approved by the ethical committee of the hospital.

Results and Discussion: Data of 1224 patients were collected in these 5 years. There was observed an increment in the use of TXA, from a 32% to a 90% in the last five years period. Transfusion rate has drop from 57% to 44.1%. And there was a tendency of less readmission and mortality.

Conclusions: The use of TXA in valvular cardiac surgery is recommended as routine practice in PBM guidelines. Our centre has reached the 90% application of TXA in these patients with a reduction of the transfusion rate and without increment in complications or mortality.

Reference:

10AP01-08
Development of an automated fluid infusion management system to prevent hypotension during general anaesthesia: a randomized clinical trial

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Background and Goal of Study: Intraoperative hypotension leads to postoperative complications. Immediate treatment is necessary, but is often difficult for an anaesthesiologist. In this study, we evaluated the efficacy and safety of an automated fluid infusion management system to prevent hypotension during general anaesthesia.

Materials and Methods: After institutional review board approval, 79 patients scheduled for elective surgery were randomly assigned to automatic versus manual administration of fluid infusion groups.

After estimated continuous cardiac output (Nihon Kohden, Tokyo, Japan) calibration, a regression line (effective arterial elastance) was obtained using estimated stroke volume index (esSVI) and mean blood pressure (MBP), the esSVI threshold value of 65 mmHg (esSVI<sub>65</sub>) was calculated.

In both groups, a bolus of 100 µg phenylephrine was automatically administered if MBP was less than 65 mmHg and esSVI<sub>65</sub> was calculated.

If esSVI was higher than esSVI<sub>65</sub>, the infusion was reduced to 2 mL/kg/h. In the manual group, the infusion rate of Ringer’s solution was independently adjusted by the anaesthesiologist.
For efficacy, the primary endpoint was the proportion of time that MBP was maintained above 65 mmHg. We verified the non-inferiority of the automatic versus the manual group using the Student's t-test with a non-inferiority margin of 5%, and Fisher's exact test.

**Results and Discussion:** The full analysis set comprised 71 patients (automatic group, n=36; manual group, n=35). The intention-to-treat set used to evaluate safety endpoints (adverse events) comprised 79 patients (automatic group, n=39; manual group, n=40). The proportion of time that MBP was maintained above 65 mmHg (mean ± standard deviation) was 82.0 ± 12.7% in the automatic group and 80.0 ± 15.7% in the manual group. The lower limit of the 97.5% one-sided confidence interval for the difference between the two groups was 2.03%, indicating the non-inferiority of the automatic group vs. the manual group (p = 0.02). Adverse events during the intraoperative and 48-h postoperative periods occurred for 36 (92.3%) and 31 (77.5%) patients in the automatic and manual groups, respectively, with no significant difference between the two groups (p = 0.114).

**Conclusion:** Our novel automated fluid infusion system shows efficacy and safety for the prevention of intraoperative hypotension.

**10AP01-09**
Improving outcomes in adult cardiac surgery through algorithm-based bleeding management: a retrospective study

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**Background and Goal of Study:** Current guidelines advocate utilizing point-of-care (POC) monitoring and an algorithm-based approach to manage bleeding in adult cardiac surgery. However, in low-income countries, the unavailability of POC monitoring and the limitations of standard coagulation tests (SCTs) hinder the rapid identification of the cause of bleeding. This study aims to prove that implementing an algorithm-based approach, without POC, can reduce the use of blood products and improve outcomes.

**Materials and Methods:** We conducted a retrospective single-center study, at Medpark International Hospital, comparing bleeding management before and after the implementation of an algorithm among adult patients undergoing scheduled on-pump cardiac surgery. Data were collected from two distinct periods for one year: Group 1 (G1) in 2012 and Group 2 (G2) in 2019. Key components of our algorithm included judicious use of antifibrinolytics, restrictive transfusion of red blood cells (RBC) (hemoglobin level < 8 g/dL), and targeted transfusion of fresh frozen plasma (FFP) (INR > 1.5), cryoprecipitate (Cryo) (fibrogen < 1.5 g/L) and platelets (PLT) in bleeding situation, departing from an empiric approach. Of 476 patients, 313 were included (116 in G1 and 197 in G2). Standard statistical tests (Fisher’s-exact and Mann-Whitney U tests) were employed for data analysis, with significance threshold set at P < 0.05.

**Results and Discussion:** In G2, despite older patient age (63, IQR 58-67 vs 55, IQR 47-56, P < 0.001) and a higher Euroscore II (2.25 IQR, 1.38-3.39 vs 1.76, IQR 1.06-2.86, P < 0.001), there was a significantly lower transfusion rate (30.9% vs 90.5%, P < 0.001). In G2, all blood product transfusions in the first 24 perioperative hours were significantly lower (RBC: 28.4% vs 56.9%, P < 0.001; FFP: 5.6% vs 68.1%, P < 0.01, PLT: 0.5% vs 9.5%, P < 0.001 and Cryo: 11.1% vs 32.8%, P < 0.001).

Postoperative outcomes in G2 were superior: lower inotropes use (18.3% vs 56.9%, P < 0.001), less vasoplesia events (4.57% vs 11.21%, P = 0.038), hypoxemia (6.6% vs 25.9%, P < 0.001) and pneumonia (3.1% vs 8.6%, P = 0.036) and shorter mechanical ventilation duration (7h, IQR 5-13 vs 12h, IQR 7-18, P < 0.001).

Respectively, fewer days in the ICU (2, IQR 1-3 vs 3, IQR 2-3, P < 0.001) and hospital length of stay (8, IQR 7-9 vs 10, IQR 8-12 P < 0.001).

**Conclusion(s):** The implementation of an algorithm-based approach in adult cardiac surgery, even in the absence of POC, can significantly reduce allogenic blood product usage, leading to better patient outcomes.

**10AP01-10**
Development and implementation of a patient blood management program at major heart surgery at a hospital in third level

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**Background and Goal of Study:** The term Patient Blood Management (PBM) can be defined as the set of clinical practices whose purpose is the correct management of the patient to improve hemoglobin, reduce bleeding and minimize the use of blood products and, therefore, their adverse effects. The purpose of this work is the analysis and results of the implementation of a PBM program in a Major Cardiac Surgery Service in a Tertiary Hospital with high surgical complexity and high bleeding rate.

**Materials and Methods:** Quasi-experimental study (before and after), longitudinal and prospective, to assess the results of the implementation of the PBM program. The study included 292 patients divided into three groups: Control group (162), retrospective to determine the scope of the problem and areas for improvement; Pilot group (GP) with 66 patients, prospective after the development of a clinical guideline for perioperative management and a third prospective intervention group (IG) of 64 to assess results and adherence.

**Results and Discussion:** With the establishment of the PBM program, the use of GC vs GI blood products has been reduced (OR 0.31, with IC95 0.13-0.73, p = 0.007), which represented a decrease of 2.56 units of concentrated red blood cells and 2.5 less plasma per patient.

We also observed a decrease in clinical complications with a shorter hospital stay, with a reduction of 3.6 days in the IG compared to the CG (CI95: -8.1 to 0.9, p = 0.18), and lower mortality, 10.7 vs 7.81%, in the IG (p = 0.36, NS). The implementation of the protocol achieved savings that, according to the economic ap-
proximation, amount to €174.31/person. (taking into account exclusively the cost of blood components saved significantly) at €2,442.14/pt (including the reduction in days of admission

Conclusion(s): The PBM program established and the changes it entailed had very good adherence by the entire multidisciplinary team of the Cardiac Surgery program. Along with the decrease in the use of blood products, an improvement in the results has been observed, the main ones being a lower number of clinical complications, a decrease in hospital stay and a trend towards lower mortality. The increase in expenses due to the implementation of the program is minimized and overcompensated by the savings in the use of blood products and fewer days of hospital stay.

10AP01-11
Impact of transfusion on morbidity and mortality, corrected according to the EuroSCORE II scale, in patients undergoing elective cardiac surgery at the Clínica Universidad de Navarra (CUN)

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Background and Goal of Study: Perioperative transfusion is associated with increased morbidity and mortality in elective cardiac surgery.

The main objective is to assess the impact of transfusion on morbidity and mortality corrected by EuroSCORE II.

EuroSCORE is a probabilistic model that estimates the probability of in-hospital mortality in patients undergoing cardiac surgery. The model has been updated in recent years.

Materials and Methods: We performed a retrospective analysis of 52 patients undergoing elective cardiac surgery at CUN in 2021.

We made a descriptive study of the patients and subsequently a multivariate analysis to describe the differences in morbidity and mortality according to the number of red cell concentrates (CH) received in the perioperative period. The cohort of patients was divided into 2 groups: those who received 0 to 9 CH (group 1) and ≥10 CH (group 2). To see whether transfusion modified mortality, EuroSCORE II was used.

Results and Discussion: We found a statistically significant association between receiving a higher number of CH and increased mortality (p = 0.001).

A subgroup analysis was performed. No differences were found between groups.

No statistical association was found between mortality and belonging to group 2 in low-risk EuroSCORE II patients (p = 1).

In the moderate-risk EuroSCORE II group, increased mortality (p = 0.033) was observed in group 2 patients.

Comparative analysis was not possible in the high-risk EuroSCORE II group since we did not have any high-risk patients belonging to group 1.

We found a greater need for prolonged mechanical ventilation (p=0.023), use of vasoactive agents (p=0.016) and acute renal failure (p<0.001) in group 2. No increase in postoperative infection or prolonged hospital stay was detected.

Conclusion(s): We detected a statistically significant association between receiving ≥10 CH and higher morbidity and mortality. This result was striking in moderate-risk EuroSCORE II patients. Patients who received less CH had lower morbidity and mortality. Subsequent larger studies are needed to confirm our conclusions.

10AP01-12
Perioperative goal-directed fluid therapy in obese patients undergoing opioids free anesthesia during sleeve gastrectomy

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Background and Goal of Study: Goal-directed fluid therapy (GDFT) is a strategy that aims to optimize dose and timing of fluids, inotropes, and vasopressors, through monitoring of cardiac output and other basic hemodynamic parameters, in order to assure an adequate tissue perfusion and oxygen delivery.

The goal of our study is to evaluate the outcome, in terms of days of post-operative hospitalization days, in obese patients during OFA.

Materials and Methods: This is an observational retrospective study that included 40 patients, 20 treated with GDFT in OFA, the others weren’t treated with GDFT in OFA, between May 2023 and September 2023. The inclusion criteria are age above 18 y.o., patients in election regimen, ASA II-III. The exclusion criteria are age below 18y.o, ASA IV-V, absolute contraindications to drugs used in OFA.

Results and Discussion: Balanced general anesthesia with induction and maintenance based on short-acting drugs (with monitoring using BIS) was performed according to ERABS protocol.

Evaluation of cardiac output: the parameters that guide us in our “perioperative Goal-Direct Therapy” are SV, SVV and MAP, monitored using a low invasive system offered by the EV1000TM platform connected to the ClearSight sensor. The fluid used included ringer acetate.

The drugs used are the following:
Induction: SMgO 30-40 mg/kg of IBW intravenously over a period of 15 minutes; Lidocaine 1-2 mg/kg IBW for intravenous use in 10 minutes; Propofol 1% 2-3 mg/kg IBW; Rocuronium (Esmeron®) 0.6-1 mg/kg IBW.

Maintenance: Desfluorane MAC 0.6-1 (6-7%); Lidocaine 1mg/kg/h up to 1.5mg/kg/h based on the depth of the anesthetic plane (assessed with BIS); MgSO 30-40mg/kg/h IBW by intravenous route.

Awakening/Post-operative analgesia: Paracetamol 15mg/kg iv; NSAIDs; Ondasetron 8 mg iv; Sugammadex 2-4 mg/kg IV; Infiltration of trocar insertion sites with Mepivacaine 2%.

Conclusion(s): In accordance to ERABS protocols, PGDT was usefully implemented in order to achieve an adequate management in the fluids therapy in bariatric patients, using the EV1000 as a monitoring device. The days of postoperative hospitalization were maximum 3 in patients using PGDT, while in patients with no use of PGDT were 4 up to 10 days.
**Background and Goal of Study:** COVID-19 has been endemic worldwide in different forms due to spike protein mutations. Wild-type strain-derived spike protein can enhance platelet activity via receptors on platelets. However, there are few reports on this behavior for the omicron variant-derived spike protein, which is the current dominant epidemic strain. We hypothesized that spike protein from the omicron variant (B.1.1.529) would also enhance platelet activity.

**Materials and Methods:** This study was approved by the Ethics Committee. Blood was collected from healthy subjects with prior written consent and divided into 4 groups: control (4 µg/ml serum albumin), wild-type strain (W, 2 µg/ml wild-type spike protein, omicron (O, 2 µg/ml B.1.1.529 spike protein), and positive control (20 µM adrenaline). Spike protein binding to platelets, platelet aggregability, and P-selectin expression were measured. Assuming a standard deviation difference to be clinically significant at a power of 0.80 and alpha level of 0.05, we estimated that 10 subjects would be needed. Comparisons between the W and O groups were performed by Wilcoxon matched pairs signed rank test, with significance defined as p<0.05. As this was a preliminary pilot study, the effect of multiple comparisons was not considered.

**Results and Discussion:** Ten venous blood samples were obtained. Spike protein binding to platelets was significantly increased in groups W and O compared to the control, and was significantly greater in group W compared to group O (p=0.04). The platelet aggregation rate and P-selectin expression under agonist stimulation were also significantly increased in either or both groups W and O compared to the control, but with no significant difference between groups W and O. Platelet count did not differ significantly from the control in group W or O.

**Conclusions:** Spike protein binding to platelets was significantly stronger in the wild-type strain than in the omicron variant. Platelet aggregation rate and P-selectin expression under agonist stimulation increased in both strains, but did not differ significantly between the two strains.
10AP02-03
The effects of the Trendelenburg position and pneumoperitoneum on perfusion index and pleth variability index in urological robotic surgery

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Background and Goal of Study: This study aims to explore the impact of the steep Trendelenburg position and pneumoperitoneum on the ‘Perfusion Index’ (PI) and ‘Pleth Variability Index’ (PVI) in patients undergoing robot-assisted laparoscopic radical prostatectomy (RALRP) under general anesthesia. While these techniques are commonly employed to enhance surgical visibility in RALRP, their effects on hemodynamic parameters, specifically PI and PVI, have been inadequately studied.

Materials and Methods: Following approval from the Hospital Ethics Committee (E.222840/280) and obtaining written consent from 55 patients scheduled for RALRP, the study involved monitoring PI and PVI using a finger probe. Measurements were conducted at various procedural stages, including pre-induction, post-induction, after adopting the Trendelenburg position, after pneumoperitoneum, and at subsequent intervals. Hemodynamic, respiratory parameters, and intraabdominal pressure were concurrently recorded.

Results and Discussion: A significant increase in PI was observed after general anesthesia induction (p<0.005), whereas PVI values remained unchanged. Pneumoperitoneum induced an increase in PI and a decrease in PVI values (p=0.001), while the Trendelenburg position alone did not significantly affect PI and PVI. Combining pneumoperitoneum with the Trendelenburg position resulted in a significant increase in PI (p<0.05) but did not alter PVI significantly compared to pneumoperitoneum alone. In contrast, compared to the Trendelenburg position alone, PVI showed a significant increase (p<0.05). No significant changes in PI and PVI values were noted after CO2 desufflation, and after extubation, values remained consistent with the baseline.

Conclusion(s): The study concludes that increased intraabdominal pressure alone diminishes the reliability of dynamic parameter measurements like PI and PVI, indicative of fluid responsiveness. However, the counteractive impact of the Trendelenburg position, in contrast to pneumoperitoneum, on peripheral perfusion over time suggests a decreasing influence of pneumoperitoneum. Combining the steep Trendelenburg position with pneumoperitoneum may provide valuable insights for monitoring peripheral perfusion and fluid responsiveness in patients undergoing RALRP. Nevertheless, the authors recommend further investigation with larger patient cohorts and extended study durations to validate these findings.

10AP02-04
Impact between intraoperative fluid therapy using balanced crystalloids and normal saline during kidney transplantation: a meta-analysis

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Background: Kidney transplantation necessitates precise fluid management. The debate between Normal Saline (NS) and Balanced Crystalloid (BC) revolves around biochemical differences impacting outcomes like delayed graft function (DGF) and serum electrolytes.

Methods: A systematic review and meta-analysis of 11 qualifying randomized controlled trials were conducted following Cochrane Collaboration methodology. PubMed, Embase, and Cochrane databases were searched until Sep. 23rd, 2023, with specific inclusion criteria.

Results and Discussion: BC demonstrated reduced odds for DGF (OR 0.69, 95% CI 0.54–0.89, p = 0.004) without significant differences in serum creatinine or potassium levels. NS exhibited lower pH and bicarbonate but higher sodium and chloride postoperatively.

This study’s larger population size highlights potential DGF benefits with BC, aligning with recent trials. BC challenges concerns about potassium levels and offers a more favorable metabolic profile.
Conclusion: BC emerges as a preferable option for renal transplant patients, impacting postoperative parameters and early graft function, challenging notions about potassium-containing fluids.

10AP02-05
ROTEM testing in non-trauma patients who require massive blood transfusion – a retrospective cohort study

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Background and Objectives: Critical bleeding causes a rapid depletion of fibrinogen and subsequent coagulopathy that can affect morbidity and mortality, but the significance of rotational thromboelastography (ROTEM) in guiding transfusion is not well-understood. Massive bleeding algorithms assist with timely and efficacious transfusion of red blood cells, fresh frozen plasma, and platelets but do not yet guide fibrinogen replacement. This retrospective cohort study analyses the use of ROTEM testing in non-trauma patients requiring massive transfusion at the Royal Melbourne Hospital between August 2020 and July 2023, and whether abnormal ROTEM results impact cryoprecipitate or fibrinogen concentrate transfusion and associated clinical outcomes.

Methods: Blood bank paper records of non-trauma adult patients requiring massive transfusion of blood products, and their corresponding electronic medical records, were extracted. All available data was included, with the primary outcome (fibrinogen administration) and secondary outcomes (ROTEM frequency, timing and abnormality, blood product administration, patient laboratory and clinical outcomes) expressed using summary statistics as either number (percentage) or median (interquartile range). Where possible, analyses of the impact of blood product administration on patient laboratory and clinical outcomes was undertaken.

Results and Discussion: 149 non-trauma massive blood transfusion events were identified. The prevalence of ROTEM testing was high (n=120, 80.5%), of which 70 (59.3%) had an abnormal FIBTEM A5. The median number of red cell unit transfusion was 7 units (IQR 5-12); 8 (5.5-13) units in those with ROTEM testing vs 6 (4-7) in those without. 107/149 (71.8%) of patients received fibrinogen, including 96/120 (80.0%) vs 11/29 (37.9%) with and without ROTEM results, respectively (p<0.001). The median fibrinogen transfusion was higher in the ROTEM group (7.8 vs 3.9g, p=0.024). Patients had a median hospital admission duration of 14 days (IQR 7-31). 135 (90.6%) of the massive transfusion events required an intensive care unit admission; and in-hospital mortality was 48 (32.2%).

Conclusions: ROTEM testing is conducted frequently in non-trauma patients who receive massive transfusion, and is associated with an increased use of fibrinogen containing blood products compared with ratio-driven protocols. Effects of ROTEM guided massive transfusion on clinical outcomes require further exploration in larger cohorts.

10AP02-06
Management of heparin resistance in patients with advanced heart failure after open heart surgery

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Background and Goal of Study: Heparin resistance is strongly associated with low antithrombin levels (AT III). In patients with advanced heart failure, fluid overload can be fatal. Therefore, avoiding FFP as an additional fluid is an important consideration in the treatment of heparin resistance. The benefit of AT supplementation in heart failure over a longer duration of UFH therapy is unclear, particularly in patients who require unusually high doses of intravenous unfractionated heparin (UFH) to achieve the desired therapeutic goal.

The aim of the study is the evaluation of the therapy of antithrombin deficiency.

Materials and Methods: Patients with advanced heart failure who underwent open heart surgery and required therapy with UFH for more than 24 hours were recruited for the study. AT III was measured every 24 hours in the intensive care unit. An AT III value of less than 60 was corrected by the administration of 1000 IU of antithrombin (patients had not received FFP).

Results and Discussion: Between September and December, 287 patients were admitted to the intensive care unit (ICU) after open heart surgery. 32 required continuous heparin infusion. AT III levels were measured every day in the ICU. After 24 hours 3.2% of patients required antithrombin, after 48 hours 14% and 27% after 72 hours of constant UFH infusion.

Initial dose of heparin 3-5 IU/kg/hour, with target APTT 45-60 seconds. At 48 hours – 2 patients required heparin greater than 20 IU/kg/hour with an AT III of 58. At 72 hours in ICU - 6 patients (18.75%) had an AT III below 60 (mean 48.6±13).

In patients with acquired ATIII deficiency, the administration of antithrombin concentrates 1000 IU was considered. This strategy made it possible to reduce the UFH dose to 12.23±3.02 IU/kg/hour and to achieve an APTT of 50.9±15.6 seconds. No immediate reaction was observed (anaphylaxis, acute venous thrombosis, ischaemic stroke).

Conclusion(s): The additional administration of antithrombin is a reliable and safe method to cure heparin resistance. It may be beneficial for patients with advanced right ventricular failure and helps to prevent fluid overload.
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**10AP02-07**

**Comparison of ROTEM® Delta and ROTEM® Sigma in patients undergoing thoracic aortic surgery: a prospective observational cohort study**

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**Background and Goal of Study:** Thromboelastometry (ROTEM®) plays a key role in many transfusion algorithms. ROTEM® Sigma, the fully automated successor of ROTEM® Delta, eliminates manual pipetting. Compatibility with current ROTEM®-based algorithms, reliant on Delta cut-off values, remains uncertain. This prospective observational study aims to compare the two devices in patients undergoing thoracic aortic surgery.

**Materials and Methods:** Three ROTEM® measurements in duplicate (one Delta, one Sigma) per patient were conducted, with baseline, heparinised, and post-protamine samples. The primary outcome was the percentage of patients who would have received a different haemostatic intervention after protamine reversal, based on the institutional ROTEM®-guided transfusion algorithm (‘algorithm deviation’, based on A10 EXTEM, A10 FIBTEM, CT EXTEM, CT INTEM and CT HEPTEM). Deviations were assessed for clinical relevance by a group of sixteen cardiac anaesthesiologists. Secondary outcomes were differences in numerical values assessed by Passing-Bablok Regressions, Bland Altman plots and correlations with conventional coagulation tests.

**Results and Discussion:** In 102 patients with matched post-protamine ROTEM® measurements, 42 algorithm deviations were found, 21 of which deemed clinically relevant (21% algorithm deviation). Sixteen of the clinically relevant deviations concerned the administration of fresh frozen plasma (FFP) or prothrombin complex concentrate (PCC), with Delta advising more liberal administration than Sigma. Guidance on protamine, fibrinogen concentrate, and platelet administration did not significantly differ between the devices. All ROTEM® variables examined passed the criteria for equivalence as tested by Passing-Bablok Regressions and Bland-Altman plots, except A10 FIBTEM at baseline and A10 EXTEM in heparinised and post protamine samples, however, the bias found in these variables did not result in clinical consequenc-es. Correlations with conventional coagulation tests were similar or better for Sigma compared to Delta.

**Conclusion(s):** ROTEM® Sigma can be used with existing ROTEM-guided transfusion algorithms in cardiothoracic surgery with the exception of the advice for FFP / PCC. Results of the EXTEM assays, especially CT EXTEM, should be interpreted in the context of device-specific reference values.

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**10AP02-08**

**Postoperative edema and glycocalyx shedding in patients undergoing abdominoplasty; RCT liberal vs restrictive fluid management**

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**Background and Goal of Study:** We compared the effect of liberal vs. restrictive fluid management on postoperative edema, clinical outcomes and glycocalyx shedding products during abdominoplasty.

**Materials and Methods:** 51 patients (ASA 1-2), randomized to: Liberal group: Initial 500ml of Ringer’s lactate (RL), followed by 8ml/kg/h during surgery. Vasopressors was used to keep MBP > 60 mmHg.

Restrictive group: 200ml of RL on induction, then 2ml/kg/h + nor-adrenaline drip to keep MBP > 60 mmHg.

Fluid overload was estimated by total body water (TBW), sonographic pulmonary edema and peripheral edema. TBW and cardiac index (CI) were measured by bioimpedance (NICaS). Post-operative outcome was estimated by POMS (Jammer I. Eur J Anaesth, 2015). Blood was sampled at baseline and 2h after surgery.

**Results and Discussion:** The liberal group received more fluids and produced more urine (Table 1). There was a rise in lactate and a drop in hemoglobin in both groups but no change in creatinine and syndecan-1. Peripheral edema was observed in 4 out of 20 patients in the liberal vs none in the restrictive group. No pulmonary congestion was observed and POMS was zero in both groups postoperatively. TBW changes correlated with fluid balance (Figure 1).

**Conclusion:** The liberal fluid management resulted in a higher increase of TBW, however no side effects and signs of glycocalyx shedding were observed.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Liberal (n=25)</th>
<th>Restrictive (n=26)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV Fluids (mL)</td>
<td>3669 ± 1698</td>
<td>1512 ± 591</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Urine output (mL)</td>
<td>564 ± 397</td>
<td>322 ± 244</td>
<td>0.021</td>
</tr>
<tr>
<td>Lactate (mmol/L)</td>
<td>2.00 ± 1.07</td>
<td>2.38 ± 1.05</td>
<td>0.021</td>
</tr>
<tr>
<td>Creatinine (µmol/L)</td>
<td>63 ± 9.5</td>
<td>62 ± 8.2</td>
<td>0.298</td>
</tr>
<tr>
<td>Hemoglobin (g/dL)</td>
<td>12.9 ± 1.5</td>
<td>11.3 ± 1.5</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Synecadan-1 (ng/ml)</td>
<td>28.9 ± 16.8</td>
<td>31.4 ± 14.5</td>
<td>0.391</td>
</tr>
<tr>
<td>TBW (kg)</td>
<td>33.6 ± 4.6</td>
<td>35.8 ± 6.3</td>
<td>0.001</td>
</tr>
<tr>
<td>CI (L/min/m²)</td>
<td>2.78 ± 0.61</td>
<td>2.72 ± 0.77</td>
<td>0.706</td>
</tr>
</tbody>
</table>

Table 1. Variables in liberal and restrictive groups at baseline and two hours after surgery. Values are mean ± SD. P-values refer to two-tailed Student’s t-tests, paired or independent as appropriate. BL – Baseline.
10AP02-09

Inter- and intra-rater reliability of ROTEM sigma in cardiac surgery

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Background and Goal of Study: In cardiothoracic surgery, optimization of coagulation management strategies using viscoelastic hemostatic assays (VHA) can reduce the risk on major bleeding and minimize the need to transfuse. Rotational thromboelastometry (ROTEM) VHA, is used to guide coagulation treatment during different stages of surgery, and has shown to improve patient outcome. However, the reliability of ROTEM interpretation by clinicians has not yet been studied. This study sought to assess the inter-, and intra-rater reliability of chosen interventions following ROTEM data interpretation.

Materials and Methods: We prospectively collected four arterial blood samples from 90 elective cardiac surgery patients: before induction (VHA1), after aortic declamping (VHA2), post-coagulation correction (VHA3), and within two hours of ICU admission (VHA ICU). Eight independent experts, employing ROTEM analyses on a day-to-day basis, rated all patients, and received ROTEM data and clinical information. Ten patients were duplicated to allow intra-rater reliability assessment, without the experts’ knowing. Experts selected interventions based on each VHA, allowing zero, one or multiple from eleven options. The inter- and intra-rater reliability was assessed by computing the Phi correlation coefficient. Phi correlation coefficients were assessed poor if below 0.75, good if exceeding 0.75 and excellent above 0.9.

Results and Discussion: The inter-rater reliability showed an overall Phi correlation coefficient of 0.69 in selected interventions. The intra-rater reliability showed a Phi correlation of 0.9. These results might be affected by heterogeneity of experts in terms of years of experience, education and country. Differences in selected intervention must be further explored and might contribute to guideline adaptations and ultimately optimize coagulation management during cardiac surgery.

Conclusion(s): The selection of coagulation management strategy based on ROTEM sigma interpretation in cardiac surgery has a low reliability between raters. The reliability within the experts is higher, suggesting that the raters are consistent in coagulation management support.

10AP02-10

Outcomes of perioperative anticoagulant management: impact of adherence to national consensus guidelines

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Background and Goal of Study: The REQXAA study (1) highlighted the persistent inadequacy in implementing current recommendations for perinterventional anticoagulant management among real-world patients. Besides, deviation from national consensus guidelines (2) was correlated with an elevated risk of both thrombotic and haemorrhagic events. We present a subanalysis focused on the anticoagulant management.

Materials and Methods: REQXAA is an observational, prospective registry of adult patients on antithrombotic treatment and scheduled for an invasive intervention. The primary endpoint was defined as the incidence of adverse events (thrombotic and/or hemorrhagic) within a 30-day follow-up period. This subanalysis specifically includes patients on vitamin k antagonists (VKA) or direct oral anticoagulants (DOACs).

The association between variables was evaluated using the chi-square test, considering significance at p < 0.05.

Results and Discussion: REQXAA registry analysed 213 patients (51,2% VKA and 48,8% DOAC). A summary of thrombotic and haemorrhagic risks is outlined in table:

<table>
<thead>
<tr>
<th>Hemorrhagic risk</th>
<th>VKA</th>
<th>DOAC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>69 (63,9%)</td>
<td>50 (48%)</td>
</tr>
<tr>
<td>Moderate</td>
<td>27 (25%)</td>
<td>42 (40,4%)</td>
</tr>
<tr>
<td>High</td>
<td>12 (11,1%)</td>
<td>12 (11,5%)</td>
</tr>
<tr>
<td>Thrombotic risk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>61 (75%)</td>
<td>58 (55,8%)</td>
</tr>
<tr>
<td>Moderate</td>
<td>16 (14,8%)</td>
<td>39 (37,5%)</td>
</tr>
<tr>
<td>High</td>
<td>11 (10,2%)</td>
<td>7 (6,7%)</td>
</tr>
</tbody>
</table>

The management was considered an alternative approach for 55 patients (52,9%) on DOACs and 57 (52,3%) on VKAs. Adverse events observed, based on consensus adherence, were as follows:

Figure 1. Correlation between change in TBW and fluid balance.
ADVERSE EVENT | FOLLOWING CONSENSUS | ALTERNATIVE
---|---|---
Major bleeding | 4 (7.7%) | 2 (4.1%) | 7 (12.28%) | 2 (3.6%)
Minor bleeding | 2 (4.5%) | 0 | 1 (2%) | 4 (8%)
Ischaemic event | 0 | 0 | 1 (1.81%) | 1 (1.75%)

Inappropriate use of bridging therapy was noted in 41 (47.7%) under DOAC and 8 (19.5%) under VKA. Though adverse events are infrequent, there's a trend towards statistical significance when compared with appropriated treatment (p = 0.087)

**Conclusion:** The results underscore a low adherence to the scientific societies recommendations. Additionally, the observed alternative management appears to potentially heighten the occurrence of adverse events.

**References:**
1. DOI: https://doi.org/10.1016/j.rec.2023.03.003
2. DOI: https://doi.org/10.1016/j.rec.2018.01.029

**Acknowledgement:** Patients and REQXAA study group.

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**10AP02-11**

The efficacy and safety of human plasma-derived antithrombin in heparin-resistant cardiac surgery patients: a double-blind, placebo-controlled, multicentre study (ATN-108)

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**Background and Goal of Study:** Antithrombin concentrate, a therapeutic option for treating heparin resistance in patients undergoing cardiac surgery with cardiopulmonary bypass (CPB), is approved in the US for congenital antithrombin deficiency but not for acquired cases.

The ATN-108 study aims to evaluate the efficacy of two doses of antithrombin concentrate (Atenativ, Octapharma) versus placebo, in restoring and maintaining heparin responsiveness in adult patients undergoing cardiac surgery necessitating CPB.

**Materials and Methods:** ATN-108 is an ongoing, prospective, double-blind, placebo-controlled, three-arm, multicentre Phase 3 study. Eligible patients are those aged 18–85 years exhibiting heparin-resistance (pre-CPB Hemochron activated clotting time [ACT] ≤480 s during 5 min following 500 U/kg unfractionated heparin) and scheduled for cardiac surgery with CPB.

Exclusion criteria include patients who have received antiagulant therapies (i.e., warfarin, direct oral anticoagulants, ticlopidine, prasugrel, clopidogrel, ticagrelor or a glycoprotein IIb/IIIa antagonist) directly prior to the study, and patients with pre-existing coagulopathy or renal insufficiency (serum creatinine level >1.5 mg/dL).

Patients will be randomized 2:2:1:1 to receive either 15 IU/kg or 30 IU/kg Atenativ, or saline (0.3 mL/kg or 0.6 mL/kg). The need for further pre-CPB therapy to restore heparin responsiveness (i.e., for patients who do not achieve a Hemochron ACT measurement of ≤480 s within 2–10 min after infusion of Atenativ or placebo) will be analysed.

The primary endpoint is the proportion of patients requiring no further therapy containing antithrombin for restoring pre-CPB heparin responsiveness after administration of Atenativ or placebo, and for maintaining it during CPB. Secondary endpoints include the amounts of further therapy containing antithrombin needed to restore pre-CPB heparin responsiveness (and to maintain it during CPB) after administration of Atenativ or placebo, and the incidence of adverse events in each study group.

**Results and Discussion:** ATN-108 is planned to start in Q2 2024 and will be conducted across ~20 sites in Europe and the United States. Target enrolment is ~120 patients, assuming 5% dropout rate. Anticipated completion is in Q3 2026.

**Conclusion(s):** Results could confirm the efficacy and safety of antithrombin concentrate in restoring and maintaining heparin responsiveness in patients undergoing CPB.

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**10AP03-02**

Fluid stewardship awareness among critical care practitioners: a cross-sectional study

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**Background and Goal of Study:** Fluid therapy (FT) in Intensive Care Units (ICU) involves fluid administration, deresuscitation, and de-escalation. Despite recommendations from major guidelines, fluid stewardship awareness among healthcare providers (HCP) is lacking and contributes to an increase in morbidity, mortality, and healthcare expenses. We explored the knowledge and variability of different FT practices among HCPs in managing critically ill patients.

**Materials and Methods:** This is a multi-unit, cross-sectional study performed from October to November 2023 in a tertiary hospital. Doctors and nurses with varying experiences were invited to fill out different questionnaires related to their knowledge of fluid stewardship (Fig. 1).

**Results and Discussion:** A total of 60 doctors and 149 nurses voluntarily participated in this study. The nurses (98.7%) were well-versed in administering infusions to patients, and doctors agreed that the nurses played a pivotal role in determining the initial FT. Both groups were aware of the existence of local FT policy (69.6% doctors and 73.4% nurses).

Interestingly, only 33.33% of doctors and 6.29% of nurses were aware of the daily necessary maintenance fluid, with a significant lack of electrolyte requirements knowledge. It is worrisome as half of the nurses will initiate infusion without a doctor’s prescription despite limited knowledge in FT.
Regardless of its poor accuracy, blood pressure was chosen as the key parameter to suggest fluid responsiveness, followed by the passive leg-raising test. Two-thirds of the doctor’s group preferred balanced crystalloid solutions for fluid bolus and maintenance (63.16% and 59.65%, respectively). Normal saline is the common type of fluid administered. Nevertheless, less than half of the HCPs are aware of its content despite referring to lab values when selecting a solvent for medication.

**Conclusion(s):** This study highlighted significant knowledge gaps in FT practices among HCPs. Didactic learning as well as the implementation of standardized protocols is essential to improve patient outcomes.

**10AP03-03**
Quality Improvement (QI) project: to increase the usage of intraoperative cell salvage for major surgeries and reduce allogenic blood transfusion in Singapore General Hospital (SGH)

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**Background:** Blood is a precious limited resource. Major surgeries often require allogenic blood transfusion, which is associated with increased postoperative complications and prolonged hospital stay. Intraoperative cell salvage (ICS) is the process of collecting, processing and returning blood to the patient in a sterile manner during the surgery. It reduces allogenic blood transfusion required, allows better resource allocation and improves postoperative outcomes. A QI project was embarked from 2022 to 2023 in SGH to improve ICS usage in major surgeries and reduce allogenic blood transfusion.

**Methods:** A multidisciplinary team incorporating haematologists, anaesthesiologists, surgeons and nurses was formed. Root cause analysis was performed to investigate the reasons for low ICS usage. Fishbone diagram, key driver diagram, Plan-Do-Study cycles were used. Cell salvage usage guidelines were established for standardization. A cell salvage service was implemented. Baseline data was collected to identify operations with significant blood loss that will benefit from ICS usage. ICS usage and amount of intraoperative allogenic blood transfusion was monitored for 6 months after implementation. A cost avoidance analysis of having a cell salvage service instead of relying on external vendor, and a multi-disciplinary team to drive the implementation, increase ICS usage from 6.3 to 27.3% in 6 months.

**Results:** ICS usage increased from 6.3% to 27.3% after 6 months of PDSA 1. 51% surgeries with ICS did not require allogenic blood. Allogenic blood requirements reduced from 0.5 to 0.42 packs per surgery. Annual cost avoidance of S$1,035,156 was estimated. There were no clinical adverse events.

**Conclusion:** ICS is an integral part of patient blood management. The establishment of a cell salvage service with standardized protocol and a multi-disciplinary team to drive the implementation, increase ICS usage from 6.3 to 27.3% in 6 months.

**10AP03-04**
Guyton's hemodynamics during treatment of major hemorrhage with Ringer solution, 5% albumin, and 20% albumin. A single center randomized controlled trial

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**Background and Goals:** Volume loading with crystalloid fluid is the conventional treatment of major hemorrhage. We challenged whether a standardized amount of 5% or 20% albumin could be a viable option and we performed Guyton’s parameters analyzes through our results.

**Method:** In this single-center randomized controlled trial, fluid replacement therapy to combat hypovolemia during hemorrhage was allocated in 42 patients to be either 5% albumin (12 mL/kg) or 20% albumin (3 mL/kg) over 30 min, both completed by a Ringer-lactate replacing blood loss in a 1:1 ratio, or Ringer-lactate alone to replace blood loss in a 3:1 ratio. Measurements of blood hemoglobin were used to estimate the effectiveness of each fluid to expand the blood volume. Hemodynamics were monitored via esophagus Doppler, arterial and central venous cannulation and used to derive Guyton’s physiological parameters.

**Results and Discussion:** The median hemorrhage was 848 mL. A regression equation showed that Ringer-lactate expanded the plasma volume by 0.18 times the infused volume while the power of 5% and 20% albumin was 0.74 and 2.09, respectively. The Ringer only fluid program resulted in slight hypovolemia (mean, -313 mL) and increased the pulse pressure variation (PPV). The
5% and 20% albumin programs were more effective in filling the vascular system; this was evidenced by blood volume changes of only +63 mL and +44 mL respectively, long-lasting plasma volume expansion (median half time of 5.5 h and 4.8 h respectively), increased the mean circulatory filling pressures (Pmsa), unchanged or decreased PPV and an increase of the central venous pressure. The 20% albumin increased the systemic vascular resistance and the resistance to venous return, which might be due to increased plasma viscosity.

Conclusion: The power to expand the plasma volume was 4 and almost 12 times greater for 5% albumin and 20% albumin than for Ringer-lactate, and the duration was longer. The clinical efficacy of albumin during major hemorrhage was quite similar to previous studies with no hemorrhage. Guyton's parameter confirm the hemodynamic findings but also shows an interesting increase of the systemic vascular resistance.

10AP03-05
Ferric carboxymaltose with or without phosphate substitution for the treatment of iron deficiency or iron deficiency anemia before elective surgery – The DeIFICIT trial

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Background and Goal of Study: Iron deficiency anemia is treated predominantly with intravenous iron formulations like ferric carboxymaltose in the perioperative setting. Recent evidence suggests ferric carboxymaltose may induce a FGF23 mediated hypophosphatemia1. We conducted a confirmatory trial to determine if oral phosphate supplementation, when used with ferric carboxymaltose for preoperative iron deficiency anemia treatment, maintains better serum phosphate levels compared to placebo.

Materials and Methods: In this single-center, prospective, randomized, double-blind trial, 92 adult patients scheduled for elective major abdominal or thoracic surgery were enrolled. These patients either had isolated iron deficiency (hemoglobin (Hb) > 130 g/L with plasma ferritin < 100 ng/mL or transferrin saturation (TSAT) < 20%) or iron deficiency anemia (Hb 100-130 g/L with plasma ferritin < 100 ng/mL or TSAT < 20%). Participants received preoperatively a single intravenous dose of ferric carboxymaltose (20 mg/kg, max. 1000 mg) and were then randomly assigned to receive either phosphate or placebo, administered orally three times a day corresponding to an 18 mmol dose of daily phosphate supplementation. The primary endpoint was the minimum phosphate concentration during follow-up visits. Key secondary efficacy endpoint was mean perioperative hemoglobin concentration assessing the non-inferiority of additional phosphate supplementation. The trial is registered at ClinicalTrials.gov (NCT05098249).

Results: We enrolled 46 patients in each group with comparable demographics. Minimal phosphate concentration was 0.49 ± 0.21 mmol/L in the treatment group and 0.42 ± 0.17 mmol/L in the placebo group (p=0.12). Non-inferiority of mean hemoglobin could be demonstrated with a mean Hb of 109.8 ± 15.9 g/L in the treatment vs. 113.0 ± 13.0 g/L in the placebo group, one-sided t-test p=0.023. Other secondary outcomes, such as rescue medication use, core muscle strength, and MOCA test scores, were comparable between both groups.

Conclusion(s): Oral phosphate supplementation did not provide greater stability of serum phosphate levels, however, its use was not detrimental to the treatment of iron deficiency anemia with ferric carboxymaltose.

Reference:

10AP03-07
Global transfusion practices in septic ICU patients: insights from the InPUT-study sub-analysis

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Background and Goal of Study: Critically ill patients with sepsis or septic shock often require blood products (red blood cells (RBC), platelets, or plasma) to manage anemia, thrombocytopenia, or coagulopathy. Recent randomized controlled trials suggest that a restrictive RBC transfusion strategy (Hemoglobin (Hb) <7g/dL) is generally safe for ICU (Intensive Care Unit) patients, including those with sepsis. However, the efficacy of less restrictive approaches, especially for septic shock, is debated. The optimal Optimal Platelet and plasma transfusion strategies in septic ICU
patients remain unclear, with limited guidance available. A global overview of transfusion practices in septic ICU patients could shed light on current standards and practices.

**Materials and Methods:** This abstract details a sub-study of the InPUT study, an international prospective cohort study on ICU transfusion practices. Data were collected from March 2019 to October 2022 across 182 ICUs in 27 countries, focusing on RBC, platelet, and plasma transfusions in septic ICU patients. The study aimed to determine the frequency of these transfusions in patients with sepsis.

**Results and Discussion:** Among 752 septic ICU patients, 303 (40.3%) received blood products. RBC transfusions were given to 257 patients (34.2%), with a median of 2 [1–5] units per patient. The median Hb level at which centers opted for RBC transfusion was 8 [7–9] g/dL. The primary reasons for RBC transfusions were low Hb (52% of 1062 events), hemodynamic instability (18%), and active bleeding (15%). Platelet transfusions were given to 77 septic patients (10.2%), with a median of 5 [2–6] units per patient. Of 372 platelet transfusion events, the most common reasons were active bleeding (37%) and prophylactic administration (35%). The median threshold for platelet transfusion was 50 [30–50] X10⁹/L. Plasma transfusions were administered to 106 patients (14.1%), with a median of 3 [2–5] units per patient. The predominant reasons for plasma transfusions were active bleeding (39% of 460 events) and prophylactic administration (27%).

**Conclusion(s):** A substantial proportion of septic ICU patients globally receive blood product transfusions. RBC transfusions are primarily for low Hb, while platelet and plasma transfusions are mostly for active bleeding.

These findings highlight the importance of transfusions in managing sepsis in ICU settings and the need for continued research to refine transfusion strategies.

10AP03-08

**Challenges in optimizing preoperative anaemia in radical cystectomy**

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**Background and Goal of Study:** Radical cystectomy (RC) is a major surgery with high morbidity and mortality. Preoperative anaemia is related to poorer outcomes so its optimization is imperative. Patient blood management (PBM) is a multimodal approach to address this issue.

Patients undergoing RC have specific characteristics that make anaemia optimization a real challenge, such as neoadjuvant chemotherapy (CT) causing bone marrow suppression (BMS), urinary bleeding, renal impairment and short time of optimization (cancer surgery).

Our aim is to audit the use of PBM in patients with preoperative anaemia scheduled for RC in our hospital

**Materials and Methods:** We performed an observational study including anaemic patients with Haemoglobin (Hb) < 12 g/dL scheduled for elective RC between July 2018-November 2023. Demographic data (gender, age, ASA, preoperative Hb) and neoadjuvant CT rate was collected.

The primary outcomes were preoperative ferric carboximaltose infusion of 1 g (FCMI), subcutaneous erythropoietin administration of 40000 units (scEPO), preoperative transfusion rate and intraoperative prophylactic tranexamic acid (pTXA) administration (1 g).

Secondary outcomes were timing of FCMI before surgery, timing of CT cessation before surgery, intraoperative bleeding, transfusion rate (TR), intraoperative treatment with TXA rate and postoperative Hb (g/dL).

**Results and Discussion:** 61% of patients scheduled for RC were anaemic prior to surgery. 73% were males, median age was 68.1±9.1 years. 42.3% were ASA II, 50% ASA III and 7.6% ASA IV. Mean Hb was 10.5±1.7 g/dl and 63% of them had received preoperative CT.

Preoperative transfusion rate was 18% while preoperative FCMI was 57.7% and preoperative scEPO administration was uncommon (6%). Intraoperative pTXA rate was only 7.7%. Timing of FCMI before surgery was 19.5±21.0 days and Timing of CT cessation before surgery was 33.0±25.3 days. Intraoperative bleeding was 446.1±271.0 ml and intraoperative and postoperative TR 48%.

**Conclusion(s):** Our incidence of TR is high, as in other studies. Preoperative FCMI was our main strategy of PBM. Preoperative timing between CT cessation and surgery may not be enough to recover from BMS. scEPO is still not a treatment of choice in oncological patients. Use of pTXA is controversial and not widely used in our hospital yet. Current trials about pTXA in RC will provide more knowledge and might change our routine practice.

**References:**


10AP03-09

**How are we proceeding with critical care patients thromboprophylaxis? ThromboDay pilot study**

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**Background and Goal of Study:** Last ESA guidelines on periperaoperative venous thromboembolism (VTE) prophylaxis1, presently undergoing revision, recommend pharmacological prophylaxis with low molecular weight heparin (LMWH) (Grade 1B). For patients at a high risk of bleeding intermittent pneumatic compression (IPC) associated with graduated compression stockings (GCS) is suggested (Grade 2C). Furthermore, a combined mechanical and pharmacological prophylaxis is suggested for selected patients at very high-risk for VTE (Grade 2B).2 However, within the complex landscape of critically ill patients, the risk of VTE may be underestimated. Thus, there is lack of understanding regarding VTE thromboprophylaxis practices in patients admitted to the Intensive Care Units (ICUs).
We aim is to gather current data on real-world practices in four national ICUs, serving as a pilot study for an European Thromboday.

Materials and Methods: Data were concurrently collected in the four ICUs. The thrombotic risk was assessed using Caprini Test, with consideration for any increase in bleeding risk. Descriptive analysis was conducted, presenting categorical variables as frequencies and percentages and quantitative variables as median (interquartile range).

Results and Discussion: A total of 85 patients were admitted (49 male/36 female), with an average stay of 3 days [1-8]. Medical causes accounted for 42.4% of admissions, while the remainder were surgical. The median Caprini test score was 10 [7,12], indicating moderate risk in 3 patients, high in 33 and highest risk in 51. LMWH was used in 68.2% of cases. When heparin was avoided (due to an increased bleeding risk in 81.5% of cases), IPC was used only in 44.4%. GCS were seldom used alone. Combined LMWH and IPC was observed in 27% of patients, with 43.48% of them being at the highest bleeding risk.

Conclusion: Considerably variation exists in the implementation of thromboprophylaxis among registered centres. The notably low utilization of IPC, both in patients contraindicated for LMWH and in those at high risk of bleeding, is noteworthy. Further evidence is necessary to establish the role of IPC in venous thromboprophylaxis.

References:
1. Eur J Anaesthesiol 2018; 35: 142-6

10AP03-11
Selection of the optimal method of thromboprophylaxis for patients undergoing gastric sleeve resection

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Background and Goal of Study: Patients with morbid obesity (MO) have a very high risk of intra- and postoperative venous thromboembolism (VTE).

Materials and Methods: 63 patients with a BMI > 35 who underwent gastric sleeve resection participated in the study. All patients were divided into 3 groups, depending on the type of surgery:
1. group (n=23) received combined therapy with Enoxiparin sodium 0.4 ml subcutaneously every 12 hours and pentoxifylline 100 mg every 12 hours two days before surgery.
2. group (n=37) received monotherapy Enoxiparin sodium 0.4 ml subcutaneously every 12 hours two days before surgery.
3. group (n=3) - patients who underwent gastric sleeve resection and did not receive specific prophylactic therapy.

The study of the hemostasis system was carried out by the method of low-frequency piezoelectric thromboelastography (LPTEG) immediately after hospitalization and 1, 3, 5 days after the operation.

Results and Discussion: The following blood coagulation constants were checked - Contact Coagulation Intensity (CCI), Coagulation Drive Intensity (ICD), maximum clot density (MA) and fibrinolytic activity - Clot retraction and lysis index (ICRL). - Intensity of Contact Coagulation (ICC), Intensity of Coagulation (ICD), Maximum Clot Density (MA) and Fibrinolytic Activity - Index of Clot Retraction and Lysis (IRCL). In all groups before therapy, the ICC increased by 24.22%, the ICD was higher than the norm by 37.54%, the MA increased by 74.52%, the ICRL by 92.12% above the norm.

In group 1, on the 5th day, there was a decrease in ICC by 13.2% compared to the norm.

In group 2, a decrease in ICC by 13.2% compared to the norm;

Coagulation indicators and fibrinolysis were within normal limits.

In group 3, ICC increased by 15.33%, ICD increased by 17.66%, MA increased by 24%, and IRCL increased by 22.2% compared to the data at admission.

At the end of the study, patients of group 1 and group 2 had no VTE, patients of group 3 had 1 episode of thromboembolism of small branches of the pulmonary artery. Among the patients of group 1, there was one episode of postoperative bleeding.

Conclusion(s): For the prevention of VTE during gastric sleeve resection, a combination of anticoagulants and antiplatelet agents is more effective than monotherapy with anticoagulants.
10AP03-12
The use of a test with double local hypoxia of the upper limb in patients with atherosclerosis of brachiocephalic vessels

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Background and Goal of Study: Atherosclerotic lesions of the carotid arteries are an important risk factor for cardiovascular diseases, including ischemic strokes, which is most often found in the later stages.

Materials and Methods: The reaction of the hemostasis system was studied in healthy volunteers (n = 20) and patients with atherosclerosis of the carotid arteries (ACA) (n = 10) for conducting a functional test in the form of determining the response on double local hypoxia (DLH) of the upper limb using low-frequency piezoelectric thromboelastography (NPTEG). The purpose of this test is to assess the response of the hemostasis system (HS) to creation in one area of the vascular bed of the Virkhov triad of thrombus formation.

To study the HS, DLH of the upper limb is used as a test-stimulus, which is achieved by the method of occlusion of the arterial and venous vessels of the upper limb for about 5–6 min with an interval of 20–25 min. Indicators of the HS before and after the test.

Results and Discussion: After using DLH, 2 types of HS response can be distinguished in healthy volunteers: compensated, subcompensated and decompensated in a patients with ACA. In patients with ACA, HS is characterized by pronounced changes in hemocoagulation potential in all its components. When comparing the results, the following data were obtained: a statistically significant (p < 0.05) increase in the thrombin activity constant by 14.25%; an increase in the ICD index by 16.43%; ICP by 25.73%, increase in maximum MA clot density by 9.53%.

Conclusion(s): The test with DLH of the upper limb can be used as a test-stimulus for patients with ACA in order to assess the reserve capabilities of the HS. When conducting an ischemic test in patients with ACA, a compensated and decompensated type of reaction to the test was determined DLH of the upper limb.

10AP04-01
Transurethral resection of the bladder complicated with a transurethral resection syndrome in a patient under general anesthesia

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Background: Transurethral resection syndrome (TURS) is a rare and dangerous condition caused by the systemic absorption of irrigation fluid used in transurethral procedures.1 TURS usually develops during surgery and the use of locoregional anesthesia allows an early diagnosis through the detection of symptoms like nausea, altered mental status, or pulmonary edema. The detection of TURS in a patient under general anesthesia is usually difficult, as most signs are hemodynamic and electrolytic.2

Case report: We report a case of a 73-year-old male patient with a history of urothelial carcinoma of the bladder who presented to the Emergency Room with hematuria and anemia. He was proposed for a radical resection of the bladder and placed under anesthesia using combined epidural-general anesthesia. Two and a half hours after the start of surgery, pelvic invasion of the tumor was detected and bladder resection was deemed not viable. Transurethral resection of the bladder (TURB) with hemostatic intent was initiated using a monopolar device and Purisole® irrigation fluid. Within 60 minutes, the patient presented an elevated blood pressure, abdominal distention, and a decrease in temperature. A perforation of the bladder was suspected. An arterial blood gas analysis showed mild hypoxemia. Given the signs, we assumed TURS and initiated furosemide and fluid restriction. An open bladder repair and drainage of about 6 liters of intrabdominal fluid was performed. The patient was transferred to the ICU for observation and improved hemodynamically within 24 hours.

Discussion: This report aims to increase awareness of the signs of TURS in patients under general anesthesia. Factors such as hydrostatic pressure, bladder distention, multiple opened vascular beds, or visceral perforations increase the amount of fluid absorbed and can cause hypervolemia, hyponatremia, and hypomobility.

References:

Learning points: The diagnosis of TURS in a patient under general anesthesia is difficult and depends on the understanding of its physiopathology and consequent hemodynamic and electrolytic changes.

10AP04-02
Acute central bilateral pulmonary thromboembolism in a polytrauma victim: a case report

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Background: Surgical patients have an increased risk of developing venous thromboembolism, especially during the perioperative period. The incidence of pulmonary thromboembolism (PTE) is higher in major orthopedic procedures than in general surgery, ranging from 0.7 to 30%.1 PTE is life-threatening condition and is the leading cause of preventable death in hospitalized patients.1,2

Case Report: Female, 79-year-old, with a medical history of arterial hypertension, dyslipidemia, and hypothyroidism, ASA II. Polytrauma victim, resulting in a fracture of the right femoral shaft, proposed for osteosyntheses of the fracture. The anesthetic plan included a femoral nerve block and a subarachnoid spinal block. Monitoring included the ASA standard. The patient was hemodynamically stable. Ultrasound-guided femoral nerve block was performed without complications. After being placed in the lateral position, she suddenly developed retrosternal chest discomfort, dizziness, tinnitus, profuse sweating, arterial hypotension, and ST depression. There was also progressive desaturation of up to 80%, which responded poorly to oxygen therapy.
Cardiac evaluation excluded acute cardiac events. Due to persistent hypoxemia, a computed tomography pulmonary angiogram (CTPA) was performed, which revealed acute central bilateral PTE with right ventricular overload, intermediate to high risk (PESI IV). The patient was stable, so the multidisciplinary team decided to initiate therapeutic anticoagulation with enoxaparin and clinical monitoring.

After one week of hospitalization, the patient underwent surgery without complications. She was discharged without further complications, with prolonged anticoagulation therapy.

**Discussion:** Acute PTE is a life-threatening event that requires rapid recognition and a multidisciplinary approach. Anticoagulation should be initiated immediately. Reperfusion treatment should be performed if the patient is unstable. Therapeutic anticoagulation for ≥3 months is recommended. In patients requiring orthopedic surgery, thromboprophylaxis is mandatory to prevent thromboembolic complications.2,3

**References:**
1. Porres-Aguilar et al. (2020) - Int. J. Angiology, 29(3)
2. Kim et al. (2020) - J. Thorac. Disease, 12(3)

**Learning Points:** The importance of prompt recognition and multidisciplinary management of acute PTE. The role of thromboprophylaxis in preventing potentially life-threatening thromboembolic complications.

**10AP04-03**

**Hermansky-Pudlak syndrome: anesthetic management of a rare disease**

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**Background:** Hermansky-Pudlak syndrome (HPS) is a rare autosomal recessive disease with a prevalence of 1-9/1,000,000 and characterized by oculocutaneous albinism, bleeding diathesis due to platelet dysfunction, pulmonary fibrosis and cardiovascular pathologies. Bleeding history including easy bruising, epistaxis, prolonged bleeding during menstrues usually accompany. Although the progression of the disease starts early in life some symptoms can be seen as late as 30s. After obtaining patient's approval, we aim to perform anesthetic management of a patient with HPS.

**Case Report:** A 16-year-old girl with type 2 HPS was scheduled for scoliosis surgery. She had a history of repair of patent ductus arteriosus and aortic coarctation. She didn't have a prominent bleeding event in her medical history. She was on Tevagrastim for scoliosis surgery. She had a history of repair of patent ductus arteriosus and aortic coarctation. She didn't have a prominent bleeding event in her medical history. She was on Tevagrastim 300mcg. A complete blood count test revealed neutropenia, coagulation parameters were in normal range, chest x-ray was taken. Pediatric pulmonology and hematology consultations were done. Epinephrine and ADP thrombocyte function test have been performed, both test results were higher than normal values. After premedication, anesthesia was induced with propofol and fentanyl, and maintained with propofol and remifentanil iv infusions. After the first incision for T2-L3 nailing, an abundant bleeding started, hemoglobin value dropped to 6g/dL. IV fluid replacement, desmopressin, tranexamic acid iv were given immediately. Tranexamic acid infusion 20mg/h and noradrenaline infusion 0.3mcg/kg/h were started. The procedure lasted 4 and a half hours, 3 units of erythrocyte suspension and fresh frozen plasma, 2 units of pooled platelet and 2500 ml crystalloid were given, 3000ml of bleeding was recorded. After the procedure the patient was transferred to pediatric intensive care unit. There she was followed intubated for 3 days and noradrenalin infusion was stopped on postoperative day 2. She was discharged to the surgical ward on postoperative day 7 and no complications were recorded on her follow-up.

**Discussion:** Anesthetic management of a case with HPS has some major challenges. Preoperative consultations should be made and necessary precautions regarding bleeding diathesis and pulmonary risks should be taken. We didn't have ventilation difficulties in our case however we had abundant bleeding and needed massive transfusion. Platelet replacement is considered the most important approach while use of desmopressin and tranexamic acid is still controversial.

**10AP04-05**

**Hemipelvectomy: challenges for the anesthesiologist**

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**Background:** Hemipelvectomy is a major uncommon orthopaedic surgery that beyond the technique itself, has a challenging anesthetic management. Massive bleeding, fluid loss, as well as pain control are some of the key points we should focus on.

**Case report:** We present the case of a 43-year-old man diagnosed with a mixed germ cell testicular tumour who underwent a radical left orchietomy. After that, multiple metastases were found at different levels. Pelvic metastasis progressed despite RT eventually requiring surgery. A multimodal GA was performed by administering intrathecal morphine before induction. Basic monitoring, CVP and invasive BP were implemented. Tranexamic acid was administered, and a rapid-infusion device as well as hemoderivatives were readily available inside the operating room. A near zero balance strategy was followed. Thromboelastography and Hct levels showed no significant derangements. Noradrenaline and fluid bolus were required to maintain adequate BP. The patient was transferred to the ICU after the procedure. No transfusions were required.

**Discussion:** Metastatic tumours surgery poses a significant risk of bleeding but can also induce a hypercoagulable state. Fluid warmer and air force blanket guided by T monitoring must always be in mind to avoid cold-induced hypercoagulopathy. Tranexamic acid has shown effectiveness in reducing blood loss without increasing thrombosis risk. Monitoring IBP, adequate IV access and rapid-infusion devices are crucial for an effective response to major bleeding. Effective communication with the surgical team is vital for understanding critical steps and crisis preparedness. Lower extremity procedures benefit from a combination of regional anaesthesia and GA. Neuraxial anaesthesia is more effective than IV opioids for pain control during and after surgery. Epidural's vasodilation complicates BP management, making intrathecal morphine a preferred alternative.
Portugal's surgical success. Approach and planning for difficult scenarios is necessary to ensure standardization of patient's perioperative safety. A multidisciplinary approach and planning for difficult scenarios is necessary to ensure standardization of patient's perioperative safety.

TAR Syndrome’s systemic effects may jeopardize remaining the leading cause of death in these patients. Dysmorphisms such as micrognatia and cleft palate make planning for a difficult airway scenario paramount. Cardiac septal defects are also common and mandate evaluation. Finally, limb abnormalities make IV cannulation and monitoring methods cumbersome.

Thrombocytopenia-Associated Radiopathy (TAR) Syndrome presents several conditions the anesthesiologist must manage. A platelet deficit explains hemorrhage in patients without previous coagulation disorders which may go unnoticed as it is not routinely assessed in the preoperative study.

In conclusion, once structural causes of bleeding have been ruled out, the study of coagulation must be addressed comprehensively, including F-XIII itself.

10AP04-06
Rarity in anaesthesia: perioperative approach to TAR syndrome in subdural haematoma drainage

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Background: Thrombocytopenia-Associated Radiopathy (TAR) Syndrome is a rare disorder combining low platelet count, along with musculoskeletal and organ anomalies. The perioperative management of these patients is complex and requires multidisciplinary assessment.

Case Report: A 50 y.o female with TAR Syndrome presented with a subdural haematoma from cranial trauma and was scheduled for surgical drainage. Assessment revealed a platelet count of 25,000/μL, radial agenesis and micrognatia with prominent front teeth. Prior pathology included Bipolar Disorder and hypothyroidism. The patient was evaluated by neurosurgery, anaesthesiology and haematology. A unit of platelets was infused, increasing the count to 31,000/μL, with another six units reserved. Intraoperatively, two IV lines were secured despite the anatomic anomalies. Thrombocytopenia made central venous access placement less optimal. Three platelet units were infused and blood was sampled for thromboelastogram (ROTEM) analysis, showing favorable platelet function. General anaesthesia included IV Propofol and Fentanyl, and Sevoflurane was chosen. A difficult airway was planned for. Manual hand-bag ventilation and intubation by videolaryngoscopy were both successful.

Intraoperative analgesia included 1g Tranexamic acid and 2g Mg2+-sulfide. After an uneventful stay, she was discharged. A laparoscopic appendectomy was performed and after being discharged to the hospital ward, he presented hemoperitoneum with hypovolemic shock that led to his admission to the Resuscitation Unit after revision surgery, in which it was not possible to diagnose a bleeding point.

In the following days, due to repeated episodes of bleeding, two imaging tests were performed (CTs with contrast), due to progressive clinical deterioration and anemia. Two more surgical interventions were performed, again without a diagnosis of bleeding point. The results of the viscoelastic test (Quanta) did not show any alteration.

Hematology was consulted and a diagnosis of acquired factor XIII deficiency (levels of 30% of the normal value) was made, so 4500 IU of F-XIII was administered on three different occasions until the bleeding stopped.

References:

Learning points: In conclusion, once structural causes of bleeding have been ruled out, the study of coagulation must be addressed comprehensively, including F-XIII itself.

10AP04-07
Postoperative hemorrhagic shock in patient with acquired factor XIII deficit. About a case


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Background: The etiology of hemorrhagic shock in critically ill patients is multiple and is associated with high morbidity and mortality. The origin of the bleeding is not always related to a previous coagulation alteration and can occur in patients with no medical or hematological history of interest. Among the possible causes of persistent postoperative hemorrhage in patients without previous coagulation disorders is the acquired deficiency of factor XIII, which may go unnoticed as it is not routinely assessed in the preoperative study.

Case report: We present the case of a 35-year-old man with acquired factor XIII deficiency, who after undergoing surgery for acute appendicitis presented successive episodes of life-threatening hemoperitoneum.

Discussion: A 35-year-old male diagnosed with acute appendicitis. On admission, the results of the preoperative study were within the normal range. A laparoscopic appendectomy was performed and after being discharged to the hospital ward, he presented hemoperitoneum with hypovolemic shock that led to his admission to the Resuscitation Unit after revision surgery, in which it was not possible to diagnose a bleeding point.

In the following days, due to repeated episodes of bleeding, two imaging tests were performed (CTs with contrast), due to progressive clinical deterioration and anemia. Two more surgical interventions were performed, again without a diagnosis of bleeding point. The results of the viscoelastic test (Quanta) did not show any alteration.

Hematology was consulted and a diagnosis of acquired factor XIII deficiency (levels of 30% of the normal value) was made, so 4500 IU of F-XIII was administered on three different occasions until the bleeding stopped.

References:

Learning points: In conclusion, once structural causes of bleeding have been ruled out, the study of coagulation must be addressed comprehensively, including F-XIII itself.
10AP04-08
Severe hemophilia A patient undergoing primary hip arthroplasty secondary to hemophilic arthropathy: case report

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Background: Hemophilia A is an autosomal recessive disorder linked to the X chromosome, which causes a deficit of production of factor VIII. Classified as serious when there is <1% activity of this factor, it manifests clinically with spontaneous bleeding. Bleeding from joints and muscles are more common in adults, causing chronic osteoarthrosis1.

Case report: A 55 year-old, male diagnosed with severe hemophilia A, using exogenous factor VIII irregularly, scheduled to primary hip arthroplasty, due to hemophilic arthropathy. At admission: Hemoglobin 15.8 g/dL, Platelets 227,000/μL, PT 0.98, PTT 50.8. Intravenous (IV) factor VIII (3000 IU) was infused one hour before surgery to assess responsiveness to exogenous factor VIII. New PTT: 38.1s.

Hemodynamically stable patient, under basic monitoring, underwent central venous access puncture + invasive blood pressure guided by sonoanatomy. Pre-oxygenation with oxygen 100% 10L/min, posed thermal blanket 40ºc. IV infusion: Cefazolin, Tranexamic acid, Dexamethasone, Propofol in target control infusion(TCI), Fentanyl and Cisatracurium.

Patient intubated and connected to mechanical ventilation. Anesthetic maintenance: Remifentanil 0.15mcg/kg/min + target Propofol TCI 3.2 mcg/ml. Suprainguinal fascia iliaca block was performed guided by sonoanatomy with Levobupivacaine 0.25% (40ml). Surgery lasted 125 minutes and estimated bleeding was 900mL.

Post-operatively Hb dropped to 7.1 g/dL. It was decided to maintain IV infusion of exogenous factor VIII 25 ui/kg, 8/8th until the 3rd post operatory day (POD), then 25ui/Kg 12/12h until the 7th POD. The patient was hemodynamically stable, even with a drop in Hb, and wasn’t necessary packed red blood cells transfusion. He continued to use IV iron in the postoperative period and was discharged from hospital 10 days after the surgery, with Hb 8.1g/dL.

Discussion: Approximately half of patients with severe hemophilia A will develop hemophilic arthropathy, therefore being possible candidates for hip arthroplasty, considered a surgery with a high potential for bleeding.

Reference:

Learning points: Understanding the pathophysiology of the disease, as well as managing the use of exogenous factor VIII in the perioperative period, can directly impact the reduction of unnecessary transfusions of blood components, as well as improving the prognosis of these patients.

10AP04-09
A clinical case of the development of massive blood loss in the postoperative period during chest reconstruction in a child

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Background: In the perioperative period, one of the possible, but very rarely complications of surgery for chest deformity is heart injury. Our case illustrates the development of massive blood loss in the postoperative period and the effective treatment of this clinical situation with the help of timely surgical intervention, autotransfusion and diagnostics of the coagulation system point-of-care testing.

Case report: A 12-year-old-male, ASA II, was operated on for funnel-shaped chest deformity - Nuss procedure. The patient underwent anesthesia - general endotracheal intravenous anesthesia in combination with epidural anesthesia.

1 hour after the end of surgery, exabtuation and full awakening. 2 hours after the transfer, the patient’s condition deteriorated: blood pressure - 70/40 mmHg, Ps - 149 bpm, SpO2 - 80%. FAST - hemothorax - the patient was urgently transported to the operating room.

Revision sternotomy, suturing of the damage to the ascending tract of the right ventricle, and open reconstruction of the funnel-shaped deformation of the thoracic cage were performed. During the surgical intervention, the volume of blood loss was 4894 ml. Transfusion volume 4624 ml: erythrocyte mass - 657 ml, autologous blood 1210 ml (Hct - 78%), fresh frozen plasma - 2100 ml, platelet concentrate - 320 ml, cryoprecipitate - 337 ml. During the operative intervention in ROTEM, we did not notice any coagulation disorders.

On the 2nd day of the postoperative period, the patient showed signs of hyperfibrinolysis, which was successfully controlled by administration of a loading dose of tranexamic acid of 15 mg/kg and maintenance therapy at a dose of 3 mg/kg/hour.

Discussion: With the development of massive bleeding, it is important to perform a laboratory test point-of-care testing and use cell salvage to reduce the use of allogenic transfusion. One of the reasons for the development of hyperfibrinolysis is massive bleeding and massive transfusion therapy, therefore it is important to control the dynamics of the fibrinolytic system, especially in the postoperative period.

Learning points: It is important to carry out goal-oriented transfusion therapy taking into account the results of ROTEM and the clinical situation in the perioperative period in patients with massive bleeding. Also monitor the fibrinolytic system in patients after massive bleeding in the postoperative period for early detection of hyperfibrinolysis.
10AP04-10
Direct oral anticoagulant monitoring: a necessity or a whim? A clinical case study

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Background: One of the primary advantages of direct oral anticoagulants (DOACs) is that they don't require routine monitoring. However, in certain situations such as massive bleeding, renal insufficiency, or the need for urgent intervention, specific monitoring may be required. The availability of plasma levels for DOACs isn't present in many hospitals 24/7. Alternatives like viscoelastic tests (RVV), diluted thrombin time, or urine reagent strips have been proposed as Point-of-Care (POC) options for urgent monitoring of these drugs.

Case report: A 90-year-old male presented with left-sided chest pain after a fall earlier that morning. His medical history included moderate aortic stenosis, recurrent ischemic stroke with sequelae, atrial fibrillation (anticoagulated with apixaban), and an atrioventricular block for which he had a pacemaker. A left-sided pleural effusion compatible with haemothorax was observed on thoracic CT scan.

Hemodynamic monitoring was initiated, RVV was conducted, and 1000 IU of prothrombin complex was administered. Due to the patient's comorbidities, a conservative approach was chosen with pleural drainage, evacuating 2,300 ml of blood.

The patient had a favourable progression during their unit stay, requiring vasopressors and blood transfusion initially, followed by gradual improvement with amines withdrawal. The patient remained euvolemic with adequate oxygenation and ventilation. Analytical values evolved as follows:

<table>
<thead>
<tr>
<th></th>
<th>Day 0</th>
<th>Day 1</th>
<th>Day 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creatinine clearance (ml/min)</td>
<td>76</td>
<td>57</td>
<td>53</td>
</tr>
<tr>
<td>RVV (seconds)</td>
<td>253</td>
<td>150</td>
<td>-</td>
</tr>
<tr>
<td>Plasmatic levels (ng/ml)</td>
<td>-</td>
<td>194</td>
<td>63.7</td>
</tr>
</tbody>
</table>

Discussion: In our setting, we lack reversal agents for DOACs (such as andexanet), hence we continue using haemostatics like prothrombin complex concentrate. Dosing practices in literature differ from those used in clinical practice, warranting further evidence in this field.

In this case, either RVV or plasma level measurement played a crucial role in delaying the reintroduction of thromboprophylaxis until the late second day, despite the apparent haemostatic competence displayed.

Learning points:
• Monitoring plasma levels of DOACs and their temporal evolution are invaluable for optimizing the anti-/procoagulant medication management.
• Point-of-Care systems like RVV can greatly assist in emergency situations for an accurate assessment of the patient's haemostatic competence.

10AP04-11
Acquired factor XIII deficiency in two patients with bleeding events after major abdominal surgery

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Background: Blood products transfusion during postoperative care increases morbidity. Postoperative bleeding events with normal coagulation and viscoelastic test may be due to acquired coagulation factor XIII (FXIII) deficiency (FXIII activity <70%).

Case report: We report two cases of acquired factor XIII deficiency with bleeding events in patients admitted to post-surgical intensive care unit.

Case 1: A 61-year-old woman underwent ovarian cancer surgery, presented postoperative hemorrhagic shock requiring blood product transfusion and reintervention for bleeding control. Anemia requiring persistent red blood cell transfusion for 48 hours was present, despite normal coagulation and viscoelastic test. Factor XIII activity was 43%.

Case 2: A 60-year-old man diagnosed with ampulloma underwent cephalic duodenopancreatectomy. Late hemorrhagic shock occurred requiring blood product transfusion and reintervention. Postoperative bleeding continued requiring blood transfusion despite normal coagulation test. Factor XIII activity was 54%. Post surgery abdominal complications, multiorgan failure and finally exitus occurred.

Discussion: Acquired FXIII deficiency is associated to situations of maintained hyper consumption during surgical stress, or low synthesis. FXIII has a long half-life, its late recovery produces FXIII deficiency with unstable clots and increase postoperative bleeding. No coagulation laboratory or viscoelastic test can reflect FXIII activity, requiring a high suspicion and specific laboratory test for its diagnosis. FXIII deficiency is associated with increase in morbidity and mortality. ESAIC guidelines suggest monitoring FXIII in persistent bleeding in critical ill, however, there is low awareness and no evidence to define the optimal timing to monitor, neither the optimal level of FXIII to ensure clot stability.

References:

Learning points:
• FXIII deficiency is underdiagnosed in the postoperative setting.
• An early monitoring of FXIII in patients with high risk of FXIII deficiency is essential to treat coagulopathy.
• An individualized management could decrease morbidity by reducing blood product transfusion and UCI stay.
• Studies are needed to clarify the optimal timing for monitoring FXIII.
Intraoperative change in QT duration of ECG and its clinical implication in major non-cardiac surgery

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Background and Goal of Study: It is well known that heart rate-corrected QT interval (QTc) is prolonged during surgery, and further, recent studies have shown that QTc prolongation is frequently observed also after surgery.¹² However, less is known regarding the details of how QTc changes during surgery, main causes of the prolongation, or its clinical significance.

Therefore, in this study, we investigated the intraoperative changes of QTc duration and their correlation with postoperative outcomes in major non-cardiac surgery.

Methods: This was a retrospective cohort analysis in patients aged 18 years and older who underwent major non-cardiac surgery with sevoflurane or desflurane between June and August 2023 at our institution: craniotomy, thoracic surgery, abdominal surgery, or major orthopedic surgery (hip and spine surgery),³ a surgery time of which was 2 hours or longer.

Intraoperative electrocardiography, anesthesia records, and electronic medical records were analyzed. QT duration was measured at lead II of intraoperative electrocardiography, and QTc was calculated using the square root of RR interval. Data were presented as median [interquartile range], and p < 0.05 was considered statistically significant.

Results and Discussion: The number of patients analyzed in this study was 113 patients, and intraoperative QTc duration significantly changed in the population (p < 0.00001): 433 [424-455] ms upon entry to the operating room, 453 [436-470] ms just before surgery, 474 [453-495] ms at the end of surgery, and 468 [454-486] ms after extubation.

At the time after extubation, 37 patients (33%) exhibited markedly prolonged QTc (> 480 ms). We divided the patients into two groups by QTc > or ≤ 480 ms after extubation, which showed that the QTc prolonged group had significantly longer surgical durations (p=0.03), and the number of open upper abdominal surgery was significantly greater in the prolonged group (p=0.04).

By using age, gender, type of surgery, and QTc > 480 ms as explanatory variables, the Cox regression analysis identified age (hazard ratio 0.98, p=0.04), and QTc > 480 ms (hazard ratio 0.56, p=0.02) as significant factors for the longer hospital stay.

Conclusions: In major non-cardiac surgery, intraoperative QTc duration significantly prolonged, and the prolongation might be correlated with surgical stress. Our data suggested that QTc > 480 ms after extubation could predict postoperative outcomes.

References:

Assessment of cardiac output using the PiCCO method and the indirect Fick’s method in hemodynamically unstable patients with sepsis

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Background and Goal of Study: Cardiac output (CO) is an indicator in the treatment of patients in critical condition[1]. There are many methods for assessment CO, both invasive and non-invasive. All methods have their advantages and disadvantages, but the perfect method has not been found. The PiCCO method is widely used for fluid resuscitation in patients with sepsis in different countries and also in our hospital[2]. We decided to compare CO calculated by the indirect Fick’s method and determined by the PiCCO method in patients with sepsis.

Materials and Methods: A pilot observational study was conducted on the basis of Shalimov National Scientific Center of Surgery and Transplantation. 12 results of CO measurement by the PiCCO method and CO calculation by the indirect Fick’s method in three patients with sepsis were analyzed.

All patients received an infusion of norepinephrine in the dosage 0.15-1.5 µg/kg/h. We analyzed the results using the Excel descriptive statistics method, and also evaluated correlation in Excel.

Results and Discussion: The correlation coefficient of CO for both methods r = 0.96, which is a high correlation of the results. However, absolute values difference varied from 1.7% to 19.9%, which can be an acceptable error in condition of limited resources.

Correlation coefficient for CI is r = 0.98, and for stroke volume index - r = 0.98, which is also demonstrated high connection. Correlation coefficient for Stroke volume - r = 0.64 - a moderate connection.

Variation in cardiac index and stroke volume were within wide ranges (from 0.25% to 27% and from 1% to 33%, respectively).

Conclusion(s): Cardiac output calculated by Fick’s method in patients with sepsis and septic shock can be an alternative to CO determined by the PiCCO method in limited resources environment.
References:

Acknowledgements: There is no conflict of interest

11AP01-03
A predictive model for the magnitude of blood pressure increase based on its rate of increase during laparoscopic pheochromocytoma resection

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Background and Goal of Study: Anaesthetic management of pheochromocytoma resection often faces significant challenges due to drastic hemodynamic fluctuations. We hypothesized that the rate of blood pressure increase is a factor in predicting the magnitude of blood pressure increase and aimed to construct a predictive model for it.

Materials and Methods: We retrospectively analyzed laparoscopic resections of pheochromocytoma performed at Nagoya University Hospital (Nagoya, Aichi, Japan) from October 2019 to September 2022. We defined the rate of blood pressure increase as the change in mean arterial blood pressure (mABP) per minute (ΔmABP/min) during intervals of continuous mABP rise. For each interval of mABP increase from the start of invasive arterial pressure measurement until tumor resection, we calculated both ΔmABP/min and the magnitude of mABP increase. The former was used as the explanatory variable (x [mmHg/min]) and the latter as the dependent variable (y [mmHg]) in a simple linear regression analysis.

Cases with unknown tumor resection times were excluded. We used vital signs data recorded every 30 seconds in Fortec ORSYS (Koninklijke Philips NV) anaesthesia records and performed statistical analysis using EZR (Saitama Medical Center, Jichi Medical University, Saitama, Japan) software.

Results and Discussion: Over the four years, there were 18 cases of laparoscopic pheochromocytoma resection, with one excluded due to unknown tumor resection time. The included 17 cases ranged in age from 10 to 74 years (41.5±16.9). Nine cases were adrenaline-predominant, six were noradrenaline-predominant, and two of unknown type.

A total of 1,312 intervals of blood pressure increase were analyzed. Simple linear regression analysis resulted in the equation y = 1.052 x + 0.184, with an adjusted R-squared of 0.617 and a p-value less than 0.001.

This study established a model equation that predicts blood pressure increase from its rate of increase using a simple linear regression in laparoscopic pheochromocytoma resection.

Conclusion: The findings from this study suggest that monitoring the rate of blood pressure increase during laparoscopic pheochromocytoma resection could be a valuable tool for facilitating more timely antihypertensive interventions.

Further research is required to determine if these results apply to other surgical anaesthesias and to establish a more accurate predictive model.

11AP01-04
Defining post induction blood pressure instability with an automated classification model

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Background and Goal of Study: Post induction hypotension (PIH) may be associated with an increase of morbidity and mortality. Its incidence shows a wide distribution as it is affected by a chosen definition of hypotension, based on absolute or relative thresholds. In this study, we propose a more comprehensive method to assess clinically relevant PIH, incorporating the magnitude and the speed of blood pressure changes, based on visual blood pressure patterns and aimed to develop an automated classification model, able to classify these types of patients.

Materials and Methods: This prospective study included 375 adult elective non-cardiac surgery patients. Non-invasive blood pressure was measured between 5 minutes before up to 15 minutes after the first induction agent.

To classify patients with clinical relevant PIH, fifteen experts labelled patient data as either a crasher or a non-crasher, based on the raw blood pressure (BP) tracing and averaged systolic, mean, and diastolic arterial BP (SAP, MAP, and DAP, respectively). Inter correlation coefficient and intra-class correlation were computed to check for consistency between experts.

Next, using parameters based on SAP, MAP, and DAP, such as mean, maximum, minimum, and their corresponding timestamp, a classification model was trained and tested.

Results and Discussion: Experts showed good inter-rater agreement of 0.92 (95% CI: 0.89-0.94). In total 78 patients were classified as crashers and 279 as non-crashers. Crashers were significantly older (7 years, p<0.001), with a higher prevalence of COPD (10 vs 4%, p=0.036). Before induction, crashers yielded a higher SAP (11 mmHg, p<0.001) compared to non-crashers.

The random forest classifier model showed excellent performance with an AUROC of 0.96, and a sensitivity of 0.84 and specificity of 0.94.

Conclusion(s): The introduced method to assess PIH allows for the distinction between patients who show clinically relevant hypotension from patients who do not. This classification method will pave the way for future research concerning PIH, and its prevention.
11AP01-05
Effectiveness of cardiopulmonary bypass method with blood delivery via femoral artery cannulation for paediatric aortic arch repair

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Background and Goal of Study: We developed a cardiopulmonary bypass (CPB) method with blood delivery via femoral artery cannulation for paediatric aortic arch repair (Norwood operation, etc.) (1-3). This study aimed to investigate the effectiveness of this method.

Materials and Methods: Paediatric aortic arch repairs conducted from March 2012 to March 2018 at the German Paediatric Heart Centre were included. The study investigated changes in lactate levels in blood gas analysis during CPB by retrospectively reviewing the CPB records. The first comparison was between a group that underwent lower body circulatory arrest (Group A, N=41) and a group that received additional retrograde aortic perfusion via the femoral artery cannulation (Group F, N=18), both operated by the same surgeon. The second comparison was between a group that received additional antegrade descending aortic perfusion (Group D, N=15) and the Group F (N=18) operated by two different surgeons. The Welch t-test was used to compare the two groups, with a p-value < 0.05 considered statistically significant. This study was approved by the Ethics Committee of Niigata University; registration number: 2021-0208.

Results and Discussion: Minimum body temperature during CPB was as follows: Group A 13.2±19.7℃, Group F 16.0±28.4℃, and Group D 24.4±32.0℃, respectively. In the comparison between Groups A and F, there were no significant differences in lactate levels at the start of CPB (p=0.964), aortic clamp time duration (p=0.647), CPB duration (p=0.375), or urine output (p=0.480). However, the increase in lactate level during CPB was significantly lower in Group F (p=0.033). In the comparison between Groups D and F, there was no significant difference in lactate levels at the start of CPB (p=0.908). While aortic clamp time duration (p<0.001) and CPB duration (p<0.001) were significantly longer in Group F, there was no significant difference in the increase in lactate levels during CPB (p=0.807), and urine output were more in Group F (p=0.028).

Conclusion: This study indicated that the CPB method with blood delivery via femoral artery cannulation could be an effective alternative to antegrade descending aortic perfusion for paediatric aortic arch repair.

References:

11AP01-06
Predicting postoperative delirium by the section-by-section analysis of EEG during aortic arch surgery

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Background and Goal of Study: Several intraoperative encephalographic (EEG) features have emerged to predict postoperative delirium (POD), but have not undergone systematic evaluation in the context of significant cerebral hemodynamic alterations during major surgery.

We aimed to develop a thorough statistical characterization of potential neural correlates of POD throughout intraoperative trajectory in aortic surgery involving cardiopulmonary bypass (CPB) and hypothermic total circulatory arrest (TCA).

Materials and Methods: We conducted a retrospective analysis of data from 233 patients, incorporating intraoperative EEG information obtained through the Sedline monitor. The POD was routinely assessed over the initial 3 days using the CAM-ICU. Clinical parameters and prefrontal EEG parameters including power and phase lag index (PLI) over the 5 frequency bands and burst-suppression ratio (BSR) were independently assessed across 5 specific trajectories:
1. From induction to CPB-on
2. From CPB-on to TCA-on
3. During TCA
4. From TCA-off to CPB-off
5. After CPB-off.

We propose sectional models specific to each of the 5 trajectories. Logistic regression and the area under receiver operating characteristic curve with the Akaike information criterion were used to assess predictability of factors and models, respectively.

Results and Discussion: The POD occurred in 89 patients (39%). Five sectional models incorporating clinical, haemodynamic, and EEG parameters within each trajectory exhibited superior predictability in comparison to the null model and the comprehensive model (Table 1).

The EEG parameters that served as independent predictors in each sectional model were as follows: 1) b PLI 2) BSR, d PLI, g power 3) d PLI, g power 4) dPLI, d power, g power 5) BSR, b PLI.

<table>
<thead>
<tr>
<th>Table 1. Predictive power of proposed models and EEG parameters as significant predictors for postoperative delirium.</th>
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<tbody>
<tr>
<td>Model</td>
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<tr>
<td>AUC (Area Under the Curve)</td>
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<tr>
<td>Sensitivity (Se)</td>
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<tr>
<td>Specificity (Sp)</td>
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<tr>
<td>Brier Score (BS)</td>
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<tr>
<td>PLI</td>
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<tr>
<td>G power</td>
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<tr>
<td>D power</td>
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<td>DPLI</td>
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<td>BSR</td>
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</table>

Conclusion(s): The trajectory-specific models demonstrated enhanced predictive power compared to global assessments, emphasizing the need for nuanced approaches in understanding neural dynamics associated with POD. The identified independent predictors offer valuable insights for refining risk assessment and perioperative management strategies in this surgical context.
**11AP01-08**

**Effect of shear stress on circulating immune cells regarding the pathogenesis of calcific aortic valve disease**

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**Background:** Calcific aortic valve stenosis (AVS) is considered to be an active inflammatory disease and the most frequent cardiac valve disorder causing severe cardiac outflow obstructions. Due to AVS progression circulating immune cells experience high laminar shear stress, which is known to influence immune cell response (Baratchi et al. 2020). This study aims to analyse if defined laminar shear stress subjected in dyn/cm² to circulating cell has an effect on behaviour of immune cells.

**Methods:** From patients with severe AVS circulating monocytes were isolated using MACS-method. For in vitro shear stress experiments THP1 cells were subjected to defined shear stress over 12 hours. Afterwards qRT-PCR was carried out for the semiquantitative measurement of gene expression.

**Results:** For the first time, we could show in THP1 cells a shear stress level dependent activation on gene expression level for Serpine and ICAM, while VCAM were significantly upregulated even under low shear stress conditions (Fig. 1A). These in vitro results are mirrored by the adhesion molecule expression pattern of monocytes isolated from patients suffering from chronic cardiac disease. ICAM and VCAM expression are significantly upregulated in patients with AVS compared to healthy and CAD patients.

**Fig. 1: Shear stress induces the activation of myeloid cells.**

qRT-PCR was used to detect the mRNA expression of adhesion molecules. A: In vitro experiment using THP-1 cells in a microfluid shear stress system: 4 independent experiments were performed for each shear stress group for 12 hours. B: circulating monocytes of healthy individuals, patients suffering from AVS, CAD or a combination of both. Data is represented with mean ±standard deviation, n=10-16 for each group. Mann-Whitney-Test.

* =p<0,05, ** = p<0,01, *** = p<0,001

**Conclusion:** These results underline the importance of shear stress for immune cell activation in AVS development. Further research is needed for identification of downstream signalling pathways of the implicated mechanosensors.

**Reference:**

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**11AP01-09**

**Comparison of procedural sedation with propofol and dexmedetomidine during transcatheter aortic valve implantation using the transfemoral approach**

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**Background and Goal of Study:** Surgical valve replacement is the gold standard for treatment of severe aortic stenosis. In recent years, transcatheter aortic valve implantation (TAVI) proved to be a comparable method for a large group of patients. The majority of TAVI procedures is now done under procedural sedation with propofol. Recently, the use of dexmedetomidine for procedural sedation has been increasing. Prospective studies in other fields of surgery have shown an association between the use of dexmedetomidine and a lower incidence of postoperative cognitive decline and postoperative delirium.

In accordance with the trend towards minimally invasive treatment approaches in the elderly, who are the majority of candidates for TAVI, our research aimed to determine whether dexmedetomidine is a better choice of sedative agent than propofol for patients undergoing TAVI.

**Materials and Methods:** The study enrolled 78 patients who underwent TAVR under procedural sedation between January 2019 and June 2021. Seventy-one patients randomized into the propofol group (n = 34) and dexmedetomidine group (n = 37) were included in the final analysis.

Patients in the propofol group received sedation with propofol (continuous intravenous infusion of 0.5 – 2.5 mg/kg/h), while patients in the dexmedetomidine group received sedation with dexmedetomidine (loading dose of 0.5 mcg/kg over 10 minutes followed by continuous intravenous infusion of 0.2 – 1.0 mcg/kg/h). Mini-Mental State Examination (MMSE) was performed before and 48 hours after TAVR to test for early postoperative cognitive decline and Confusion Assessment Method for Intensive Care Unit was used to test for postoperative delirium.

**Results and Discussion:** The MMSE after the procedure revealed significantly lower incidence of early postoperative cognitive decline (p = 0.005) and thus better cognitive outcomes in the dexmedetomidine group. The occurrence of postoperative delirium was not significantly different between groups.

**Conclusion(s):** The results of our study show that dexmedetomidine is a better choice of sedative for controlled sedation during TAVI than propofol. A major advantage of dexmedetomidine is its association with a lower incidence of early postoperative cognitive decline in the TAVI patient population.
11AP01-10
Anesthetic management of patients with left ventricular assist device support presenting for non-cardiac surgery - a single center experience

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Background and Goal of Study: As the population of left ventricular assist device (LVAD) recipients in need of non-cardiac surgeries continues to grow, the availability of cardiac anesthesiologists has become increasingly limited. Our primary objective is to review non-cardiac surgeries in patients with HeartMate III LVADs at our institution, with a particular focus on the role of the anesthesiologist. Our aim is to share our experience, describe patient characteristics, anesthesia management and outcomes, and identify opportunities for improvement in this specialized care setting.

Materials and Methods: A retrospective chart review was conducted for all LVAD-supported patients who underwent non-cardiac surgery at our institution between 2017 and 2022. Patient demographics, Anticoagulation status, surgical characteristics, anesthetic management, Blood products therapy and 30-day mortality were assessed.

Results and Discussion: A total of 23 patients were identified, with 17 (73.9%) males, and the median age was 61 [53.5, 67.5] years. Cardiac anesthesiologists were present in 9 (39.1%) cases. Elective surgeries were more common (73.9%), with intermediate risk surgeries accounting for 52.2% of cases. General anesthesia was performed for 18 cases (78.3%), and the median duration was 40 [24.6,35.5] minutes. A single patient required reoperation because of bleeding, and two cases (8.7%) experienced 30-day mortality.

Conclusion(s): The magnitude of NCS for patients with LVAD is growing, but evidence and guidelines regarding the anesthetic management of these patients are lack. In this single center experience, we have found it necessary to involve non-cardiac anesthesiologists in some cases. This approach was shown to be safe at a high volume LVAD center. Based on the presented experience, any type of induction and maintenance drugs can be used as long as the hemodynamic goals are kept. By sharing our experience, we hope to contribute to an evolving discussion on the optimal approach to non-cardiac surgeries in LVAD-supported patients, ultimately improving these unique patient population outcomes and safety.

11AP01-11
Effect of implementing the hypotension prediction index after structured training on the incidence and duration of intraoperative hypotension in patients undergoing major abdominal surgery

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Background and Goal of Study: Intraoperative hypotension (IOH) is a commonly observed phenomenon during major abdominal surgery. The severity and duration of IOH have been identified as crucial factors in the development of these complications. The current study investigates the effect of structured proctoring and hypotension prediction index (HPI) teaching together with the implementation of a HPI guided monitoring on the incidence and duration of IOH in adult patients undergoing major abdominal surgical procedures who are monitored with an invasive arterial line.

Materials and Methods: This before-after study included retrospective analysis of prospectively gathered anonymized data, and was conducted in six Spanish centers during 2021-2022. The primary outcome measure was the time-weighted average of mean arterial pressure < 65 mmHg (MAP) during surgery (TWA MAP 65 mmHg).

The secondary outcome measures included incidence of hypotensive episodes, total time with hypotension, and percentage of time spent in hypotension during surgery

Results and Discussion: A total of 607 patients were analyzed, 270 in the pre-proctoring group vs 337 in the post-proctoring group. The median TWA MAP 65 mmHg was 0.09 mm Hg (interquartile range (IQR), 0.00-0.31 mm Hg) post-proctoring group vs 0.37 mm Hg (IQR, 0.08-1.01 mm Hg) in the pre-proctoring group, for a median difference of 0.19 mmHg (95% CI, 0.13-0.27 mm Hg; P < .001), whereas the median TWA MAP <55 mmHg was 0.00 mm Hg (IQR, 0.00-0.01 mm Hg) post-proctoring group vs 0.00 mm Hg (IQR, 0.00-0.07 mm Hg) in the pre-proctoring group, 0 mmHg (95% CI, 0.0-0.02 mm Hg, P < .001).

Conclusion(s): The implementation of an intraoperative HPI-guided hemodynamic management after a structured program in hemodynamic training based on the intraoperative use of the Hemodynamic Prediction Index decreases the incidence, duration, and severity of intraoperative hypotension in high-risk patients.

References:
Factors influencing hypoxemia requiring extracorporeal membrane oxygenation during one-lung ventilation for minimally-invasive cardiac surgery after cardiopulmonary bypass: retrospective cohort study

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Background and Goal of Study: Minimally-invasive cardiac surgery (MICS) requiring one-lung ventilation (OLV) in combination with supine position or slightly elevated hemithorax risks hypoxemia. If a patient cannot tolerate OLV after cardiopulmonary bypass (CPB) despite various improvement strategies, extracorporeal membrane oxygenation (ECMO) may be selected. This retrospective study examines the factors influencing hypoxemia requiring ECMO during OLV for MICS after CPB.

Materials and Methods: We retrospectively collected the data of 133 patients who underwent MICS between January 2018 and March 2020 in our hospital. Explanatory variable data were age, gender, body surface area, SpO2 on admission, a history of heart failure (3.4, 1.15-10.0, p<0.05), previous sternotomy (3.61, 1.04-12.5), smoking history (0.32, 0.11-0.93), atrial fibrillation (2.19, 0.90-5.32), and ePA (8.47, 2.34-30.7).

Stepwise selection using multivariable logistic regression analysis suggested factors were male (0.36, 0.12-1.06, p=0.064), history of heart failure (3.4, 1.15-10.0, p<0.05), previous sternotomy (3.28, 0.70-15.5, p=0.133), and ePA (6.2, 1.57-24.4, p<0.05). Area under the curve was 0.816 [95%CI 0.71-0.922].

Conclusion(s): Our results indicate that patients with history of heart failure and patients with ePA > 31.8 mmHg are likely to require ECMO during OLV for MICS after CPB.
**11AP02-04**

**Norepinephrine infusion rate is associated with an increase in bispectral index in healthy volunteers under general anesthesia**

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**Background and Goal of Study:** It has been suggested that ephedrine and norepinephrine (NE) have arousal effects. Ephedrine has been shown to increase the bispectral index (BIS), but this has not been assessed for NE, while this is a frequently used vasopressor during general anesthesia (GA). Therefore, we assessed the effect of NE on BIS in healthy volunteers under GA.

**Materials and Methods:** Thirty-six healthy volunteers, from 18 to 70 years old, received GA using target-controlled infusion of propofol and remifentanil (propofol Eleveld model, target at the age-adjusted Ce50, i.e. 50% drug effect, and remifentanil Eleveld model at 4 ng ml⁻¹).

A NE step-up dosing scheme was performed (0 to 0.20 mcg kg⁻¹ min⁻¹) and each step lasted 15 minutes to reach steady state. BIS values and steady-state propofol and remifentanil plasma concentrations were measured at each step.

**Results and Discussion:** BIS values (median [IQR]) were as follows: 32 [26-36], 34 [27-39], 39 [34-42], 43 [37-49] and 49 [43-53] at NE infusion rates of 0.04, 0.08, 0.12, 0.16 and 0.20 mcg kg⁻¹ min⁻¹, respectively (Fig 1).

Linear mixed-effect modelling showed a significant association between NE infusion rate and BIS (p<0.0001). MAP was tested separately due to collinearity and excluded due worse model fit (AIC of 1079 vs. 1002, respectively). Steady-state propofol and remifentanil plasma concentrations showed a decrease with increasing NE infusion rates (p<0.001 for both, Figure 1).

**Conclusion(s):** NE appears to influence the pharmacokinetics of propofol and remifentanil, causing dose-related decreases in their measured concentrations.

It remains to be determined whether increases in BIS values seen are also the result of direct or indirect effects of NE on the brain, i.e. whether there is also a pharmacodynamic interaction between NE and propofol and remifentanil.

**References:**

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**11AP02-05**

**Long term maintenance effect of esmolol on the structure of the aorta in a hypertensive vascular animal model**

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**Background and Goal of Study:** Vascular remodelling contributes to end-organ damage in hypertension. Regression of vascular remodelling is an objective of therapy aimed at reducing the mortality and morbidity associated with arterial hypertension. Our research group has previously discovered the short-term effect of esmolol on aortic remodelling regression in an experimental model of hypertension (1). However, the maintenance of this effect over a longer, free of treatment period of time is still unknown.

**Materials and Methods:** Forty-eight male adult SHR (Spontaneously Hypertensive Rat) were randomly divided into two groups: those who received esmolol for 48h (SHR-E), and those who received placebo (saline) (SHR).

After treatment, each group was randomly divided into three sub-groups: those studied just after 48h of treatment (SHR-48h and SHRE-48h), after 7 days of stopping the treatment (SHR-7d and SHRE-7d), and after a full month (SHR-1m, SHRE-1m).

**Results and Discussion:** Blood pressure (BP) and heart rate (HR) were measured with the tail-cuff method. Segments of thoracic aorta were collected for a histological analysis using orcein staining (to analyze the structure of the thoracic aorta) and the argyrophilic nucleolar organizer region (AgNOR) technique (to study cellular activity). T-student of repeated measures was used, considering p < 0.05 as statistically significant. The study was approved by the Ethic Committee on Animal Investigation of our institution.

**Conclusion:** 48h treatment with esmolol produces an early regression of aortic remodelling (outward hypertrophic remodeling) that persists at least for a month after finishing the treatment.

**Reference:**
11AP02-06
Human model of acute myocardial hypoxia: echocardiographic study
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Background and Goal of the Study: Hypoxia is defined as a deficiency of oxygen at tissue level, which implies a decrease in tissue oxygen pressure. Due to the inverse relationship between altitude and barometric pressure, individuals involved in flight activities are at latent risk of exposure to low oxygen concentrations, which can lead to hypoxia. Aircrews are regularly subjected to simulated hypoxic conditions to recognize the symptoms of hypoxia. Echocardiography is a tool that allows the heart to be studied non-invasively, so in this human physiological model of acute hypoxia, healthy individuals are studied with echocardiography to assess the effects of acute hypoxia on the myocardium.

Material and Methods: Healthy volunteers were prospectively studied. Subjects remained seated and were monitored with pulse oximetry. A baseline assessment was performed by TTE with tissue Doppler to estimate systolic function with s’ and diastolic function with a’ and e’, CO by measuring the time integral of velocity and pulmonary artery systolic pressure (PSAP). These parameters were repeated at 25,000 ft and the third TTE assessment was performed at 25,000 ft without oxygen and with oxygen saturation below 80%.

Statistical analysis: This was a pre- and post-test study. Data were analysed to assess normal distribution. Paired samples t-test was used. A p < 0.05 was considered statistically significant.

Results and Discussion: Fifty-two healthy volunteers were included, with a mean age of 34.71±10.3 years, a weight of 74.89±10.22 kg and a height of 171.71±6.21m. When cardiac function was assessed, both heart rate and pulmonary artery systolic pressure increased in response to acute hypoxia, but no changes were observed in left ventricular function or cardiac output, which remained normal during all three echocardiographic assessment times. Acute hypoxia decreased right ventricular function, with a decrease in s’, e’ and a’ values.

Conclusions: The data suggest that acute hypoxia decreases right ventricular function in the individuals studied, with impaired systolic and diastolic function as assessed by tissue Doppler. However, the overall trend was towards preservation of LV and RV function. These results can be extrapolated to clinical situations such as acute myocardial ischaemia, pulmonary embolism and events that generate and events that generate myocardial hypoxia, where preservation of RV function should be considered first.

11AP02-07
Exploring cognitive changes in high-risk cardiothoracic patients receiving dexmedetomidine and evaluating the correlation between different cognitive tools
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Background and Goal of Study: Traditionally, the focus in managing cardiothoracic patients has been more on physiological outcomes, but there is growing recognition of the need to assess the outcome in cognitive function. One of the perplexing complications in cardiothoracic surgery patients is postoperative cognitive dysfunction (POCD). Mini-Mental State Examination (MMSE) has been widely accepted clinically, nevertheless, the evaluation of cognitive function postoperatively remains challenging. This study aims to investigate the cognitive changes among high-risk patients, and establish a standardized approach to post-surgery cognitive assessment.

Materials and Methods: This is a survey study on high-risk cardiothoracic surgery patients who received dexmedetomidine as the adjunct anaesthesia agent. Cognitive assessments were done using MMSE, Trail Making Test, Digit Span, Digit Symbol Substitution Test and Clock Drawing Test (CDT) at 1-day before surgery, at discharge, and during 6 weeks follow-up. Patients who has postoperative MMSE score reduced by more than 2.5 were considered as having a cognitive decline. Score differences between timepoints and POCD groups were analyzed using ANOVA and T-test. Correlation and regression analysis were used to clarify the consistency of the tools towards MMSE.

Results and Discussion: A total of 188 patients completed the survey, with POCD prevalence of 20.2% and 6.9% at discharge and 6 weeks follow-up respectively. All cognitive scores pre- and postoperatively show a significant difference (p<0.05). Comparison between POCD and non-POCD groups revealed that scores in all tools postoperatively significantly differed, except for CDT at 6 weeks follow-up (p=0.126). All tests show a significant moderate correlation with MMSE. Particularly noteworthy is the identification of a 2.5-point reduction in MMSE scores as a meaningful indicator of cognitive decline postoperatively. This reduction serves as a practical threshold for identifying patients at risk for cognitive changes, facilitating early intervention and personalized postoperative care strategies.

Conclusion(s): The observed low occurrence of POCD and strong association to the 2.5 MMSE score decline contribute to refining strategies for assessing cognitive changes after surgery, enhancing the precision of identifying and addressing cognitive changes in surgical populations.
**11AP02-09**

The effect of intravenous milrinone administration on right ventricular systolic performance during cardiac surgery: a pilot study

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**Background and Goal of Study:** We investigated the changes in RV free wall longitudinal strain by transesophageal echocardiography (TEE) to estimate RV performance after intravenous milrinone administration during cardiac surgery.

**Materials and Methods:** The present study was performed as prospective observational design. Propofol and remifentanil for target-controlled infusion was applied for anesthesia with comparable dosages in all patients.

After induction of anesthesia, intravenous milrinone was administered for loading dose (50 mcg/kg) and followed 0.5 mcg/kg/min. TEE evaluation was performed to measure RV free wall longitudinal strain (RVFWLS), and left ventricular global strain during cardiac surgery.

The changes in hemodynamic parameters including pulmonary artery pressure (PAP) were also measured. Friedman test was performed to analyse the changes in echocardiographic and hemodynamic parameters.

**Results and Discussion:** In total, 11 patients were included in final analysis. RVFWLS and RV global longitudinal strain improved after milrinone administration ($P = 0.032$) (Figure 1). RVFWLS at 10 min after milrinone administration was significantly lower than that of pre-administration ($P = 0.049$) (Figure 1). Mean PAP also decreased according to time change ($P = 0.012$). Mean PAP at 15 min after milrinone administration was significantly lower than that of pre-administration ($P = 0.030$). The changes in left ventricle global strain was not significantly changed according to time ($P = 0.458$).

**Conclusion(s):** The measurement of RV longitudinal strain could be good choice to estimate RV performance after milrinone administration during cardiac surgery.

**Reference:**

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**11AP02-10**

Efficacy and safety of aprotinin in cardiac surgery: a comparison between two dose regimens (eNAPaR)

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**Background and Goal of Study:** Withdrawing in the early 2000s, aprotinin marketing authorization was reinstated by the European Medicine Agency with a restrictive indication (isolation coronary artery bypass grafting, CABG) and pending a safety registry (NAPA) intended to record the pattern of use of aprotinin and assess patient safety(1). Despite a ¾ off-label use, it was completed without any safety signal(2).

Two different dose regimens were used: full-dose (FD) and half-dose (HD) aprotinin. The objective was to compare both efficacy and safety of each dose regimen in cardiac surgery with cardiopulmonary bypass (CS-CPB).

**Materials and Methods:** Between Feb. 2016 and Aug. 2022, 6,730 adult patients received aprotinin across nine European countries and were included in the registry.

To reduce biases and to well balance the probability of receiving each aprotinin dose regimen, we built a propensity score (PS) based on preoperative patients’ characteristics: gender, age, BMI, redo surgery, severe renal impairment, active endocarditis, anti-platelet /anticoagulant agents, emergency surgery, and procedure type (on/off-label).

Then, we performed a regression on the PS-Inverse Probability of Treatment Weighting (IPTW) cohort to analyze the outcomes. The primary outcome was the rate of reoperation for bleeding or tamponade. Three safety outcomes were also investigated: in-hospital mortality, major adverse cardiovascular and cerebral events (MACCE) and renal injury.

**Results and Discussion:** Among the 6,730 patients, 5,359 had a full set of data allowing building the PS. Reoperation was significantly reduced in FD vs. HD aprotinin, whereas renal injury was slightly increased (Table 1). No difference was found on both mortality and MACCE.

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Table 1

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Whole cohort</th>
<th>HD aprotinin</th>
<th>FD aprotinin</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reoperation</td>
<td>203(5,359)</td>
<td>(2.8%)</td>
<td>(4.4%)</td>
<td>(2.6%)</td>
</tr>
<tr>
<td>Mortality</td>
<td>130(5,359)</td>
<td>(4.1%)</td>
<td>(4.1%)</td>
<td>(3.8%)</td>
</tr>
<tr>
<td>MACCE</td>
<td>15(5,359)</td>
<td>(3.2%)</td>
<td>(3.7%)</td>
<td>(3.5%)</td>
</tr>
<tr>
<td>KI0G0 0</td>
<td>3,733(5,322)</td>
<td>(22.5%)</td>
<td>(22.5%)</td>
<td>(22.5%)</td>
</tr>
<tr>
<td>KI0G0 1</td>
<td>2960(5,322)</td>
<td>(15.7%)</td>
<td>(15.7%)</td>
<td>(15.8%)</td>
</tr>
<tr>
<td>KI0G0 2</td>
<td>245(5,322)</td>
<td>(4.0%)</td>
<td>(3.7%)</td>
<td>(4.3%)</td>
</tr>
<tr>
<td>KI0G0 3</td>
<td>915(5,322)</td>
<td>(17.1%)</td>
<td>(17.1%)</td>
<td>(17.2%)</td>
</tr>
</tbody>
</table>
Conclusion(s): In CS-CPB, the FD regimen of aprotinin was associated with a decrease in postoperative reoperation for bleeding at the expense of a slight increase in renal injury without any other safety risk. A large multicenter randomized trial is mandatory to consolidate these results.

References:
1. NAPaR, EU PAS 11384

Acknowledgements: Nordic Pharma’s funding

11AP02-11
Initial NT-pro-BNP level in patients with infective endocarditis: does it matter in early postoperative period?

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Background: N-Terminal-pro-hormone B-type Natriuretic Peptide (NT-pro-BNP) can be used not only as a marker of acute heart failure, but also provide a wide range of predictive information in patients with infective endocarditis (IE).

Goal of Study: Was to evaluate the effect of baseline NT-proBNP values on early postoperative period.

Materials and Methods: Single center retrospective cohort study enrolled clinical data of patients with active IE, who underwent surgery from 2019 to 2021. All patients underwent surgery under moderate hypothermic cardiopulmonary bypass (30°C) using cardioplectic crystalloid solution. Data describing preoperative cardiac function, serum creatinine, hemoglobin, procalcitonin, troponin, NT-pro-BNP were collected. In early postoperative period duration of therapy with dobutamine and norepinephrine, duration of mechanical ventilation and length of intensive care unit (ICU) stay were assessed.

Statistical analysis was made using χ² and Student-t tests, p<0,05 was considered statistically significant. Results were presented as mean (standard deviation) and percent of cases to appropriate.

Results: Clinical data of 100 patients were analyzed. IE was defined according to the modified Duke criteria. The mean age of patients was 47.9±0.8 years. According to the initial level of NT-pro-BNP patients were divided into 4 groups: Group 1 (N = 23) - < 300 pg/ml; Group 2 (N = 21) - 301-1500 pg/ml; Group 3 (N = 31) - 1501-6500 pg/ml; Group 4 (N = 25) - > 6500 pg/ml. Patients with higher values of NT-proBNP presented signs of acute heart failure (end-diastolic index (p<0,05), end-systolic index (p<0,001); were characterised with acute kidney injury (serum creatinine (p<0,01), anaemia (erythrocytes (p<0,01)).

There was no statistical difference in levels of procalcitonin and troponin between groups. In early postoperative period initial high levels of NT-proBNP also correlated with prolonged mechanical ventilation (p=0,002), dobutamine (p=0,002) and norepinephrine (p=0,089) infusion and lengthy ICU stay (p=0,092).

Conclusion: Thus, the research we conducted highlights a strong relationship between initial NT-pro-BNP values and the intensity of inotropic and vasopressor therapy, and the ICU length of stay in surgical treatment of IE.

11AP03-01
Implications of genetic variants in corticosteroid signalling on clinical outcomes after cardiac surgery: an exploratory post hoc analysis of the Dexamethasone for Cardiac Surgery (DECS) trial

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Background and Goal of Study: The Dexamethasone for Cardiac Surgery (DECS) Trial found intraoperative high-dose dexamethasone did not reduce major adverse events after cardiac surgery, but reduced postoperative infection and length of stay. We conducted a post hoc analysis of DECS to evaluate the effect of genetic variants in corticosteroid signalling on outcomes after cardiac surgery.

Materials and Methods: This is a retrospective case-control genetic association study of 1244 patients from the DECS Trial, who enrolled in a follow-up study at 1.5 to 4 years after randomisation and underwent genotyping to identify single nucleotide polymorphisms (SNPs) of the glucocorticoid receptor (GR), a GR molecular co-chaperone and the mineralocorticoid receptor (MR). Cases and controls were defined by the composite primary outcome of myocardial infarction, stroke, renal failure and respiratory failure within 30 days. Logistic regression analysis was used to assess each SNP with association with the primary outcome and interaction with dexamethasone.

Results and Discussion: Baseline characteristics of patients in this study were comparable to those in the original DECS Trial. The MR SNP rs2070951 was excluded due to violation of the Hardy-Weinberg equilibrium. There was no association between the remaining SNPs and the primary outcome. An interaction effect was observed between the GR SNP rs41423247 and dexamethasone, but it was not significant after Bonferroni correction.

<table>
<thead>
<tr>
<th>SNP</th>
<th>Dominant Allele</th>
<th>Non-Dominant Allele</th>
<th>OR (95% CI)</th>
<th>p-value</th>
<th>OR (95% CI)</th>
<th>p-value</th>
<th>OR (95% CI)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>rs6195</td>
<td>A</td>
<td>G</td>
<td>0.689 (0.154-3.048)</td>
<td>0.62</td>
<td>0.794 (1.05-8.011)</td>
<td>0.823</td>
<td>0.910 (0.11-7.605)</td>
<td>0.935</td>
</tr>
<tr>
<td>rs6198</td>
<td>A</td>
<td>G</td>
<td>1.219 (0.523-2.839)</td>
<td>0.67</td>
<td>0.951 (0.337-2.68)</td>
<td>0.924</td>
<td>0.686 (0.195-2.431)</td>
<td>0.561</td>
</tr>
<tr>
<td>rs10052957</td>
<td>C</td>
<td>G</td>
<td>0.472 (0.196-1.136)</td>
<td>0.094</td>
<td>0.443 (0.198-0.988)</td>
<td>0.407</td>
<td>3.6 (1.025-12.639)</td>
<td>0.046</td>
</tr>
<tr>
<td>rs6199</td>
<td>A</td>
<td>G</td>
<td>1.113 (0.513-2.416)</td>
<td>0.786</td>
<td>0.999 (0.461-2.165)</td>
<td>0.998</td>
<td>0.493 (0.146-1.68)</td>
<td>0.253</td>
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<tr>
<td>rs6199</td>
<td>A</td>
<td>G</td>
<td>0.999 (0.105-1.005)</td>
<td>0.069</td>
<td>0.862 (0.082-2.841)</td>
<td>0.726</td>
<td>8.0 (2.5-24.714)</td>
<td>0.017</td>
</tr>
<tr>
<td>rs1360780</td>
<td>C</td>
<td>T</td>
<td>0.638 (0.287-1.419)</td>
<td>0.271</td>
<td>0.691 (0.137-1.503)</td>
<td>0.351</td>
<td>1.211 (0.364-4.029)</td>
<td>0.755</td>
</tr>
<tr>
<td>rs3800373T</td>
<td>T</td>
<td>G</td>
<td>0.624 (0.284-1.38)</td>
<td>0.241</td>
<td>0.752 (0.367-1.709)</td>
<td>0.552</td>
<td>0.871 (0.281-2.902)</td>
<td>0.822</td>
</tr>
<tr>
<td>rs522</td>
<td>A</td>
<td>G</td>
<td>1.053 (0.415-2.689)</td>
<td>0.914</td>
<td>0.409 (0.115-1.916)</td>
<td>0.292</td>
<td>1.703 (0.371-8.246)</td>
<td>0.478</td>
</tr>
</tbody>
</table>

Table 1: The effects and interactions between corticosteroid receptor single nucleotide polymorphisms (SNPs) and high-dose intraoperative dexamethasone on the composite primary outcome of myocardial infarction, stroke, renal failure and respiratory failure within 30 days after cardiac surgery. GR = glucocorticoid receptor; FKBP5 = a GR molecular co-chaperone; MR = mineralocorticoid receptor; OR = odds ratio; CI = confidence interval.
Conclusion: The corticosteroid receptor SNPs examined did not affect the incidence of major adverse events after cardiac surgery nor modulate the effect of high-dose intraoperative dexamethasone. However, potential effects may be confounded by survivorship bias and limited number of SNPs examined. A prospective genome-wide association study may be warranted.

References:
1. Dieleman, JM et al. DOI: 10.1001/jama.2012.14144
2. Kok, L et al. DOI: 10.1016/j.jpsychires.2018.05.015

11AP03-02
Characterization of intraoperative hemodynamic instability in patients undergoing general anesthesia

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Background and Goal of Study: Intraoperative hypotension (IOH) has been associated with increased postoperative morbidity and mortality, emphasizing the importance of maintaining hemodynamic stability during general anesthesia. The Hypotension Prediction Index (HPI) is a recently developed tool obtained from the arterial pressure waveform for predicting the likelihood of hypotension and reflecting the level of hemodynamic instability (HI). We tested the hypothesis that intraoperative HI results from different pathophysiological mechanisms in a cohort of patients undergoing elective major abdominal surgery using well-defined hemodynamic patterns based on known parameters of preload-dependency (stroke volume variation, SVV), left ventricular contractility (arterial dP/dtmax) and arterial system (Eadyn, dynamic arterial elastance).

Materials and Methods: Retrospective observational cohort study, we analyzed anonymized prospectively collected in patients who underwent general anesthesia and required intraoperative monitoring with the Hemosphere monitoring system and HPI software in six Spanish centers during 2022.

We defined five patterns of HI using a decision-making algorithm based on cardiovascular pathophysiology: absolute and relative hypovolemia, vasoplegia, and myocardial depression with and without vasoplegia.

Results and Discussion: After analyzing 2038 hours of hemodynamic monitoring from 393 patients, 1946 episodes of HI were identified. (Table 1) Vasoplegia was the most common type of HI, accounting for 50.1% HI episodes (Figure 1). Absolute and relative hypovolemia were the next most frequent types, contributing 30.7% and 15.5% of the HI episodes. (Figure 2,3)

Conclusions: We identified five distinct patterns of hemodynamic instability based on the evaluation of hemodynamic parameters underlying arterial hypotension during general anesthesia for patients undergoing major abdominal surgery. Vasoplegia was found to be the most frequent type.
**11AP03-03**

Transport resources for donation and heart transplantation after circulatory death using normothermic regional perfusion. Canary Islands experience

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**Background:** Heart transplantation from controlled donation after the circulatory determination of cardiac death (CDCD) allows for growth of heart donors. According to studies with good outcomes, reference heart hospitals (RHHs) usually transfer donor patients to their own hospitals for CDCD, but there is poor literature concerning transportation of hearts outside RHHs. The Canary Islands is an ultraperipheral region that introduced a CDCD program in which organ extraction (OE) was done directly in regional hospitals, taking on the extra time for the transportation of hearts.

We present our experience on how to transport hearts with the least compromise to the organ as possible.

**Methods:** Potential CDCD candidates were identified across the region under the Transplant National Organization’s consent. Subsequently, life support was withdrawn in the operating room. OE was carried out in regional hospitals with extracorporeal membrane oxygenation (ECMO) for easy availability in centres, and normothermic regional perfusion according to Spanish CDCD protocol.

A multidisciplinary team from the RHH was then dispatched. ECMO was reduced to 1 litre, cardiac function assessed at 45 minutes maximum after starting resuscitation. If accepted, the heart was transferred by vehicle or helicopter to RHH for implantation.

**Results:** From November 2021 up to the time of this writing, 7 patients’ hearts (70% men, age 55±9.2) have been transplanted after CDCD outside our hospital (3 from our island, 4 regional, 80% men, ages 44.8±7.8). All donor hearts were successfully resuscitated and weaned from ECMO with little inotropic support (maximum norepinephrine 0.25 mcg/kg/min, dobutamine 5 mcg/kg/min doses). Blood transfusion was done with haemoglobin under 8 gr/dL (3.6±1.4 blood bags).

Echocardiography was done to evaluate biventricular cardiac function and valvulopathies. Important durations were: functional warm ischemia time (14.2±2.05min), cold ischemia time (165±29.6min), recipient cardiopulmonary bypass time (113.9±30.5 min) and average time to transport by helicopter (38.5±8.2 min) and vehicle (19.6±4.4 min). Survival has been 100%, asymptomatic. Only 1 patient required an intra-aortic balloon pump.

**Conclusion:** It is suggested distant CDCD has excellent outcomes in our heart transplantation program. The prolonged cold ischemic time was a problem which was minimized using regional helicopter or vehicle.

**Reference:**


**11AP03-04**

Acute normovolemic hemodilution (ANH) to reduce allogeneic red blood cell (RBC) transfusion in patients undergoing coronary artery bypass grafting (CABG)

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**Background and Goal of Study:** Patients undergoing cardiac surgery consume >50% of blood transfusions and that transfusions may increase the morbidity and mortality. Evidence in blood saving techniques has increased the use of acute normovolemic hemodilution in high risk settings.

The aim was to see the incidence of allogeneic red blood cell units (RBCu) transfused in ANH patients.

**Materials and Methods:** Data were collected prospectively from 50 patients undergoing cardiac surgery on cardiopulmonary bypass over a 6-month period. All patients between 35-70 years with ASA status III and IV scheduled to undergo elective CABG requiring general Anesthesia were recruited in this study. Patients were assessed before procedure in the ward by checking hemoglobin (Hb) and hematocrit (Hct). These patients were reassessed intraoperatively and at 24 hours postoperatively.

Other data collected included postoperative complications, duration of stay in CICU, and length of hospital stay. The assessments were made by primary investigator on Predesigned data collection form.

**Results and Discussion:** The present 50 ANH patients showed overall incidence 44% (22/50) of allogeneic blood transfusions perioperatively. Seven patients received allogeneic blood in the cardiac intensive care unit (7/50, 14%) while 12 patients received allogeneic blood intraoperatively (12/50, 24%) and 3 patients received intraoperatively and postoperatively (3/50, 6%).

AKI affected Ten (66%) patients who received allogeneic transfusions. Twelve patients (24%) who were transfused intraoperatively and three patients who received allogeneic transfusions both intraoperatively and postoperatively had longer hospital stays in the CICU and ward.

**Conclusion(s):** We have found positive findings as per previous findings mahori et al that reported 44% incidence of allogeneic transfusion in ANH patients. The high incidence of acute kidney injury complication was found in patients who had exposure of allogeneic transfusion intraoperatively on pump and High CPB timings in ANH patients.

Still large randomized and observational studies are required for better understanding and local applicability of ANH in cardiac surgery patients.
11AP03-05
Perioperative complications associated with non-cardiac surgery for adult patients with Fontan physiology: retrospective single center study

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Background and Goal of Study: Fontan physiology is classified according to ventricular morphology; single right ventricular (SRV) and single left ventricular (SLV). There was a difference in long-term survival or prevalence for heart failure between SRV and SLV. There are few studies on perioperative complications of non-cardiac surgery for adult Fontan patients. The primary aim of this study was to examine the perioperative complications associated with non-cardiac surgery for adult patients with Fontan physiology. A secondary aim was to compare perioperative conditions among SRV and SLV patients.

Materials and Methods: Medical records in adult patients with Fontan physiology undergone non-cardiac surgery between December 2013 and September 2023 were reviewed. Postoperative complications were followed-up within 90 days after surgery. Statistical analysis included descriptive statistics and logistic regression.

Results and Discussion: 38 cases for 30 patients were analyzed (SRV; 17 cases for 12 patients, SLV; 21 cases for 18 patients). Intraoperative hypotension (mean blood pressure <55 mmHg) was observed in 18 cases. The prevalence of postoperative complications was 35% (17 cases) and the most common postoperative complication was congestion (29%, 11 cases).

SRV patients showed a tendency to have more postoperative complications (odds ratio [OR]: 2.86, 95%CI [0.76, 10.75], p=0.079) and to be treated with additional diuretics administratively postoperatively (OR: 3.78, 95%CI [1.15, 12.06], P=0.035).

There was no statistical difference in postoperative mortality, morbidity or hospital days, incidence of intraoperative hypotension or perioperative administration of inotropes in both groups. The less durability for hemodynamic changes of SRV due to less strain rate and abnormal contraction pattern might result in the difference in the prevalence of postoperative complications, which may affect the long-term survival and incidence of heart failure.

According to our data, it might be better to modify perioperative management for non-cardiac surgery cases with Fontan physiology according to ventricle morphology.

Conclusions: SRV might be a risk factor for postoperative complications and need for postoperative treatment with diuretics.

References:
1. Erikssen G et al. Open Heart 2018;5:e000902

11AP03-06
Continuous non-invasive hemodynamic in cirrhotic patients. Friend or foe?

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Background: Haemodynamic parameters monitoring is an essential element of clinical practice. Recently, there has been a rapid development in non-invasive hemodynamic monitoring technologies. Even though they are often described as the gold standard, the invasive methods are complex procedures and have perioperative risk like for example: local haemorrhage in patients with coagulation disturbances.

The ClearSight system allows continuous blood pressure monitoring and obtaining advanced hemodynamic parameters from a non-invasive finger cuff.

In our study, we aimed to identify if this type of monitoring is comparable with minimally invasive monitoring in cirrhotic patients in consideration with coagulation disturbances related to liver dysfunction and catheter infection that represent a risk for the cirrhotic patient.

We compared the accuracy of haemodynamic parameters validated by the ClearSight system with those obtained with Vigileo monitor in cirrhotic patients admitted to the ICU, with vasoactive support.

Materials and Methods: The study was prospective and comparative. We included patients with liver cirrhosis, who required continuous monitoring of hemodynamic parameters, with vasoactive support, mechanically ventilation in ICU, 18-80 years; ASA I-III.

We performed measurements for 48 hours at fixed intervals (every 6 hours) in a group of patients who benefited from both hemodynamic monitoring by Vigileo monitor and continuous monitoring by non-invasive techniques of hemodynamic parameters obtained with ClearSight.

Normality tests were performed and comparison of the mean values using T-tests for independent variables were performed. Data was interpreted using IBM spss v26.0 software.

Results: Preliminary data, from 12 patients, showed statistically significant differences (p<0.01) between the two groups, at 7 out of the 8 monitored parameters. There were no statistically significant differences between SVV in study group.

Our results on continuous non-invasive monitoring might be related to increased doses of vasoactive support, especially norepinephrine over 0.25mcg/kcg/min.

Conclusion: In our preliminary study, continuous non-invasive hemodynamic monitoring were significantly different from minimally invasive measuring in cirrhotic patients. Higher doses of noradrenaline may be a reason for these discrepancies. Larger study groups are necessary for a more accurate conclusion.
11AP03-07
Relationship between incidence of burst suppression on electroencephalography and the duration of hypotension from rapid ventricular pacing in transcatheter aortic valve replacement

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Background and Goal of Study: Rapid ventricular pacing (RVP) is commonly used in transcatheter aortic valve replacement (TAVR) to reduce cardiac output during the procedure temporarily. This decrease in cardiac output due to RVP leads to hypotension, cerebral blood flow reduction, and possibly burst suppression (BS) on electroencephalography (EEG). The present study investigated the incidence of BS after RVP and analyzed the relationship between the duration of hypotension from RVP and BS incidence.

Materials and Methods: Patients who underwent TAVR under general anaesthesia at our institution between October 2019 and March 2023 were included in this retrospective study. Anaesthesia was maintained with inhaled (sevoflurane or desflurane) or intravenous (propofol or remimazolam) agents and continuous infusion of remifentanil. We extracted prefrontal EEG readings from a bispectral index (BIS) monitor and analyzed the data from 20 sec before RVP to 100 sec after RVP. BS was defined as a visually recognized suppression of > 1 sec that was followed by oscillatory activity. Suppression was judged as an EEG amplitude within 10 μV. The duration of hypotension induced by RVP was defined as the period when systolic blood pressure was < 60 mmHg after RVP. We determined the duration of hypotension due to RVP inducing BS in 50% of patients (RVPBS50), using the logistic regression analysis.

Results and Discussion: Of the 89 patients enrolled in this study, 12 were excluded for insufficient EEG findings from intraoperative electrical noise or no use of a BIS monitor. We ultimately analyzed 77 patients (46 female and 31 male; mean ± standard deviation, 84 ± 4 years; height, 150 ± 9 cm; body weight, 52 ± 10 kg). The duration of hypotension from RVP was 35 ± 21 (range, 12–141) sec. BS was observed in 27 patients after RVP. RVPBS50 was 38 sec (95% confidence interval, 30–48 sec). As the duration of hypotension due to RVP increased from 20 sec, the probability of BS rose steeply (Figure).

Conclusion(s): BS was more likely to occur at an RVP duration greater than 38 sec. Reducing the duration of hypotension due to RVP to less than 20 sec might help prevent BS.

11AP03-08
The Hypotension Prediction Index and concurrent mean arterial pressure are comparable in predicting intraoperative hypotension: an observational study in non-cardiac surgery patients

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Background and Goal of Study: The Hypotension Prediction Index (HPI) emerged as a novel machine learning based tool to predict intraoperative hypotension. Its strong correlation with mean arterial pressure (MAP) has raised the question of whether HPI and MAP derived alarms are functionally equivalent. To address this, the alarms and predictive capabilities of HPI and three MAP based methods were compared.

Materials and Methods: A prospective observational study was conducted on 100 patients undergoing moderate- to high-risk elective non-cardiac surgery. The HPI monitor was used alongside standard intraoperative monitoring, HPI and MAP data were acquired at 20s rate during the surgical period. Hypotension was defined as MAP<65 mmHg for at least 1 minute. The default HPI alarm (>85) was compared to various concurrent MAP thresholds (65-80 mmHg), as percent agreement in time. Additionally, the performance of HPI in predicting hypotension within five minutes was compared to concurrent MAP, linearly extrapolated (lep)MAP and delta (∆)MAP using receiver operating characteristic and precision recall curves.

Results and Discussion: In total 68.583 datapoints were analyzed; 231 hypotensive events were detected among 62 patients. A MAP threshold of 73 mmHg demonstrated the highest percent agreement (97%) with the default HPI alarm. The performance curves for HPI and concurrent MAP are mostly coinciding with similar area under the curves (AUC), both outperforming lepMAP and ∆MAP (Figure 1). The default HPI alarm has a sensitivity of 72.4% and positive predictive value of 31.9%, which closely matches a MAP threshold of 72 mmHg (72.6% and 32.9%, respectively).

Conclusion(s): The HPI and concurrent MAP proved to be highly comparable in predicting intraoperative hypotension, suggesting that the machine learning algorithm could be replaced by a MAP alarm threshold set at 72 or 73 mmHg. This study highlights the potential of MAP as a viable alternative to HPI, with simpler implementation and potentially enhanced...
11AP03-09
Assessing fluid responsiveness: a comparative study on the predictive utility of pulse pressure variation and stroke volume variation in supine and prone position

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2“Georgios Gennimatas” General Hospital of Athens, Department of Neurosurgery, Athens, Greece,  
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Background and Goal of Study: Pulse Pressure Variation (PPV) and Stroke Volume Variation (SVV) are deemed unreliable in low tidal volume (VT) ventilation [<8ml/kg Predicted Body Weight (PBW)]. We performed VT Challenge to patients undergoing spinal surgery and ventilated with 6ml/kg PBW, to assess the predictive value of PPV and SVV changes (ΔPPV,ΔSVV) for fluid responsiveness in both supine and prone positions.

Materials and Methods: 23 patients were included. All of them had a radial arterial catheter inserted and connected to the Hemosphere advanced monitoring platform (Edwards Lifesciences). Four sets of measurements were conducted at different timings. Initially, a VT Challenge was performed, altering VT from 6 to 8 ml PBW for 1 minute. Subsequently, a minifluid challenge (MFC) was administered, infusing 100ml of crystalloid over 1 minute. Confirmation of fluid responsiveness was based on a cardiac output increase of ≥5%.

Results and Discussion: In the study, 23 patients (56.5% women, mean age 63.8 years, SD=13.9 years) were included, with 78.3% having a BMI >25 kg/m². Fluid responsiveness was detected in 61% (1st supine), 48% (prone), and 35% (last supine) using the MFC.

Receiver operating characteristic curves were used to assess the predictive value of ΔPPV and ΔSVV for fluid responsiveness. In the first supine position ΔPPV and ΔSVV revealed statistically significant prognostic values (AUC=0.79, 95% CI:0.61-0.98, and AUC=0.83, 95% CI:0.66-0.99, with optimal cut-offs 2.5 and 1.5, sensitivity 71.4% and 85.7%, specificity 77.8% and 55.6%). The prognostic value of these indexes was similar (p>0.05).

In prone positions, only ΔPPV% showed statistically significant prognostic value (AUC=0.76, 95% CI:0.55-0.96 and AUC=0.78, 95% CI:0.59-0.97, with optimal cut-offs 15.5 and 19.8, sensitivity 72.7% and 81.8%, specificity 58.3% and 66.7%). In the final supine position, ΔPPV and ΔPPV% had statistically significant prognostic value (AUC=0.76, 95% CI:0.54-0.99 and AUC=0.76, 95% CI:0.54-0.98, with optimal cut-offs 1.5 and 15.7, sensitivity 75.0% and 87.5%, specificity 66.7% and 73.3%). The prognostic value of these indexes was similar (p>0.05).

Conclusion(s): In our study, alterations in PPV following a VT challenge were found to have superior predictive value compared to SVV for fluid responsiveness across all measurement sets and positions. The specificity was notably higher in the supine position compared to the prone position.

11AP03-10
Low tidal volume mechanical ventilation vs No ventilation during cardiopulmonary bypass in cardiac surgery

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Background and Goal of Study: It is common practice in on-pump cardiac surgery to stop mechanical ventilation when cardiopulmonary bypass (CPB) is started or to continue with a low tidal volume. The aim of this study was to investigate whether patients ventilated with low tidal volumes had a lower percentage of postoperative pulmonary complications (PPCs) compared to patients who were not ventilated during CPB.

Materials and Methods: An observational study of cardiac surgery patients over a period of 14 months. Only patients who underwent coronary artery bypass graft surgery were included in the study. Patients with lung diseases and those with an ejection fraction < 30% were excluded from the study. The first group (Group V) consisted of patients who were ventilated during CPB (tidal volume 3 ml/kg predicted body weight, PEEP 5 cm H₂O, respiratory rate 10-12/min, FiO₂ 0.6-0.7). The second group (Group NV) consisted of patients who were not ventilated during CPB.

Results and Discussion: A total of 499 patients were included in the study. Of these, 398 were ventilated, while 101 patients were not ventilated during CPB. The groups did not differ in baseline characteristics, comorbidities, or intraoperative data. PPCs were equally prevalent (V 16%, NV 17.8%) (Table 1).

<table>
<thead>
<tr>
<th>Primary outcomes</th>
<th>Group V (n=398)</th>
<th>Group NV (n=101)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prolonged ventilation, n (%)</td>
<td>23 (5.8)</td>
<td>6 (5.9)</td>
<td>1.000</td>
</tr>
<tr>
<td>Pleural effusion, n (%)</td>
<td>19 (4.8)</td>
<td>6 (5.9)</td>
<td>0.613</td>
</tr>
<tr>
<td>Pneumonia, n (%)</td>
<td>8 (2)</td>
<td>2 (2)</td>
<td>1.000</td>
</tr>
<tr>
<td>Pneumothorax, n (%)</td>
<td>7 (1.8)</td>
<td>2 (2)</td>
<td>1.000</td>
</tr>
<tr>
<td>Respiratory failure, n (%)</td>
<td>3 (0.8)</td>
<td>2 (2)</td>
<td>0.267</td>
</tr>
<tr>
<td>Reintubation, n (%)</td>
<td>3 (0.8)</td>
<td>0</td>
<td>0.877</td>
</tr>
<tr>
<td>Bronchospasm, n (%)</td>
<td>0</td>
<td>0</td>
<td>-</td>
</tr>
</tbody>
</table>

*Table 1. Postoperative pulmonary complications*

Duration of mechanical ventilation after surgery, intensive care unit (ICU) stay, and in-hospital mortality did not differ significantly between groups (Table 2).

<table>
<thead>
<tr>
<th>Secondary outcomes</th>
<th>Group V</th>
<th>Group NV</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICU intubation time (h), median (IQR)</td>
<td>10.0 (8.0-12.0)</td>
<td>10.0 (8.0-12.0)</td>
<td>0.896</td>
</tr>
<tr>
<td>ICU length of stay (days), median (IQR)</td>
<td>1.0 (0.9-1.1)</td>
<td>1.0 (0.9-1.1)</td>
<td>0.405</td>
</tr>
<tr>
<td>In-hospital mortality, n (%)</td>
<td>11 (2.8)</td>
<td>1 (1.0)</td>
<td>0.474</td>
</tr>
</tbody>
</table>

*Table 2. Secondary outcomes*
Conclusion(s): Pulmonary complications after cardiac surgery are still common. The experience at our clinic has shown that the choice of strategy for mechanical ventilation during cardiopulmonary bypass does not affect pulmonary complications.

Reference:

11AP03-11
Personalised blood pressure management during major non-cardiac surgery and postoperative neurocognitive disorders: a randomised trial

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Background and Goal of Study: Postoperative neurocognitive disorders – including delayed neurocognitive recovery and delirium – are common and associated with long-term cognitive decline and death. The pathophysiology of postoperative neurocognitive disorders is multifactorial but presumably includes inadequate brain perfusion. It remains unknown whether there is a causal relationship between intraoperative hypotension and postoperative neurocognitive disorders.

We thus tested the hypothesis that personalised – compared to routine – intraoperative blood pressure management reduces the incidence of postoperative neurocognitive disorders in patients having major non-cardiac surgery.

Materials and Methods: In this single-centre trial, 328 elective major non-cardiac surgery patients were randomised to personalised or routine blood pressure management.

In patients assigned to personalised blood pressure management, clinicians were asked to maintain intraoperative mean arterial pressure above preoperative baseline mean arterial pressure from automated 24-hour blood pressure monitoring.

In patients assigned to routine blood pressure management, clinicians strove to maintain mean arterial pressure above 65 mmHg. The primary outcome was the incidence of neurocognitive disorders (composite of delayed neurocognitive recovery and delirium) between postoperative days 3 and 7.

Results and Discussion: We enrolled 368 patients but excluded 40 before randomisation. We randomised 328 patients, 166 (51%) to personalised and 162 (49%) to routine blood pressure management.

Neurocognitive disorders between postoperative days 3 and 7 occurred in 18 of 147 patients (12%) assigned to personalised and 21 of 145 patients (14%) assigned to routine blood pressure management (OR=0.84, 95%-CI: 0.40 – 1.75, p=0.522).

Delayed neurocognitive recovery occurred in 17 of 146 (12%) personalised and 17 of 145 (12%) routine blood pressure management patients (OR=0.99, 95%-CI: 0.45 – 2.17, p=0.983).

Delirium occurred in 2 of 157 (1%) personalised and 4 of 158 (3%) routine blood pressure management patients (OR=0.50, 95%-CI: 0.04 – 3.53, p=0.684).

Conclusion: Personalised intraoperative blood pressure management maintaining preoperative baseline mean arterial pressure from automated 24-hour blood pressure monitoring did not reduce the incidence of neurocognitive disorders between postoperative days 3 and 7 compared to routine blood pressure management in patients having major non-cardiac surgery.

11AP04-01
Diastolic and not systolic or mean Intraoperative Hypotension is most associated with Perioperative Myocardial Injury as determined by an explanatory machine learning model

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Background and Goal of Study: Intraoperative hypotension (IOH) and tachycardia are associated with perioperative myocardial injury (PMI), which is associated with postoperative mortality. This prospective, cohort study aimed to investigate what thresholds for IOH or tachycardia best predict PMI in patients undergoing vascular surgery.

Materials and Methods: This study is a single centre, high-sensitivity cardiac troponin T was measured immediately preoperatively and at 4, 24, and 48 hours after onset of surgery. Absolute and relative thresholds were used to define intraoperative systolic, mean and diastolic arterial hypotension, measured by invasive arterial pressure monitoring and heart rate registered every 15 seconds. Both conventional statistics and explanatory ML models were used to predict PMI. Clinical utility and transparency were prioritised over maximising the performance of the ML model.

Results and Discussion: In all, 498 patients were included in the study of which 99 patients (20%) had perioperative myocardial injury. Significant associations were found between IOH and PMI.
using both absolute and relative thresholds for systolic, mean and diastolic arterial pressure (DAP). The best predictive threshold for an association between IOH and PMI using ML decision tree model was an absolute DAP < 44 mmHg. No association was found between tachycardia and perioperative myocardial injury.

**Conclusion(s):** Using an explanatory ML model, we found that an absolute IOH threshold based on diastolic and not systolic or mean arterial pressure showed the best association with PMI.

11AP04-02
**ARISCAT and LAS VEGUS risk scores for predicting postoperative pulmonary complications after cardiac surgery**

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**Background and Goal of Study:** Postoperative pulmonary complications (PPCs) could lead to morbidity, mortality, and prolong hospital stay. Different risk scoring systems are used to predict the identification of patients at risk of developing PPCs.

The main objective is to compare the diagnostic accuracies of ARISCAT and LAS VEGUS risk scores in prediction of PPCs taking pulmonary complication as gold standard in cardiac surgery.

**Materials and Methods:** It is a prospective study with consecutive sampling technique. A total of 181 patients were included.

Quantitative data is presented as simple descriptive statistics giving mean and standard deviation and qualitative variables are presented as frequency and percentages. Sensitivity, specificity, positive and negative predictive values, and diagnostic accuracies are also calculated.

**Results and Discussion:** Total 181 post cardiac surgery patients were analyzed. Their Mean age, duration of surgery, height, weight, and BMI in our study was 51.3 ± 10.61 years, 7.89 ± 3.21 hours, 28.42 ± 3.74 kg/m², 153.4 ± 10.85 cm and 69.9 ± 6.87 kg. 127 (70.2%) were male and 54 (29.8%) were female.

Sensitivity, specificity, positive predictive value, negative predictive value, and diagnostic accuracy of ARISCAT score ≥ 27 and LAS VEGUS score ≥ 8 for the prediction of PPCs. There was (94.9%, 4.65%, 76.1%, 22.9% and 73.4%) and (97.1%, 4.65%, 76.5%, 33.3% and 75.1%) respectively.

**Conclusion(s):** Both ARISCAT and LAS VEGUS are effective risk scoring tools with good sensitivity for the prediction of PPC after cardiac surgery with acceptable accuracy. Both scoring systems could be useful for identifying individual patients at high risk, and appropriate to use as screening tools to predict PPC in patients after cardiac surgery.

11AP04-03
**Evaluation of the effectiveness of various anesthesia methods during endotracheal intubation in elderly patients with coronary heart disease**

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**Background:** Coronary artery bypass grafting (CABG) is the most commonly performed cardiac surgery procedure worldwide (e.g., approximately 37% of all cardiac surgeries in the United States (900 000 procedures in 2022) were CABG procedures (340 000 procedures)) [1]. Arterial hypotension during the induction of anesthesia in elderly patients remains a topical issue.

**Goal of Study:** Determine the effectiveness of the Propofol/Ketamine combination to stabilize hemodynamic parameters during the induction of anesthesia in elderly patients with coronary heart disease.

**Materials and Methods:** A cohort prospective randomized study of 60 patients with ASA III and IV who underwent off-pump CABG surgery. The mean age of the patients was 66.8±5.3 years.

Patients were divided into 2 groups based on the type of induction agent: 1st group - propofol 1.5 mg/kg; Group 2 - a combination of propofol/ketamine (1.5 mg/kg; 0.5 mg/kg).

Analgesia: Fentanyl 2.0 μg/kg.

Relaxation: Plicpcuronium bromide 0.1 mg/kg.

Hemodynamic changes were assessed by recording the mean arterial pressure (MAP), heart rate (HR), ejection fraction (EF), cardiac index (CI), and systemic vascular resistance index (SVRI) at the following stages:
1. Upon the patient's arrival in the operating room;
2. Prior to tracheal intubation;
3. Immediately after tracheal intubation;
4. 25 minutes after intubation.

**Results and Discussion:** Statistically significant difference in MAP was observed at stages (2) by 11.9% (74.9 mmHg; 85.04 mmHg; p<0.000), (3) by 8.3% (89.01 mmHg; p<0.0000), 97.03 mmHg; p<0.000), (4) by 15.3% (76.82 mmHg; 90.67 mmHg; p<0.0000).

A statistically significant difference was also found EF on (3) by 6.2% (49.45; 52.72); on (4) by 13.6% (44.98; 52.04; p=0.0062).

Regarding HR, a significant difference was observed only at stage (4) by 6.8% (70.83; 76.03; p=0.0071). The difference in CI at stages (3) by 9.9% (2.45; 2.72; p=0.0167) and (4) by 21.5% (2.04; 2.6; p=0.0000). SVRI at stage (2) also showed a statistically significant difference between groups by 12.2% (2853; 3250; p=0.01).

**Conclusion(s):** The use of the Propofol/Ketamine drug combination reduces the likelihood of fluctuations in MAP, CI, EF, and SVRI parameters during the induction of anesthesia and, thus, increases the safety of intubation in elderly patients with coronary artery disease.

**Reference:**
11AP04-04
The use of angiotensin-converting enzyme Inhibitor and angiotensin receptor blockers and AKI after cardiac surgery: a prospective multicenter cohort study

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Background and Goal of Study: The aim of this study was two-fold:
a. to determine whether maintaining or discontinuing ACEIs and ARB therapy preoperatively is associated with an increased incidence of Acute Kidney Injury (AKI) after cardiac surgery, and;
b. to determine whether the use of ACEI or ARB is associated with an increased risk of AKI, compared to non-ACEI or ARB users.

Materials and Methods: This is a multicentre prospective cohort study involving 14 British and Spanish hospitals. This study was approved by each local ethics committee. Inclusion criteria were all consecutive patients aged 18 years or older, with a Cleveland score ≥4, undergoing cardiac surgery from July to December 2017. We recruited a total of 249 consecutive patients undergoing Cardiac Surgery. They were divided into 3 different groups:
(a) patients not having treatment of ACEI or ARB, the maintenance of ACEI or ARB until the day before surgery, and
(b) patients withholding ACEI or ARB more than 24 hours before surgery.

Results and Discussion: Patients on ACEIs or ARB regardless of the time of discontinuation, had an increased risk of moderate to severe AKI, compared to non-ACEI or ARB users (adjusted OR 2.95 CI 1.2-4, p=0.02) (Figure 1).

Reference:

11AP04-05
Spectral analysis of central venous pressure waveform

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Background and Goal of Study: Depending on only the value of central venous pressure (CVP) has limitations for assessing intravascular volume status. Its dynamic changes that go with heartbeat have not been considered as a tool to assess intravascular volume status. We evaluated its dynamic changes in patients who were dehydrated and subsequently rehydrated.

Materials and Methods: Fifty-nine patients undergoing living donor hepatectomy were enrolled in this observational study. After anesthesia induction, CVP waveforms were recorded at 100 Hz from a catheter, the tip of which was placed at the lower 1/3 of the superior vena cava.

Fluid administration was minimized, and diuresis was promoted with furosemide (urine output >2 ml/kg/hour) until the liver graft was procured, after which 500 ml of 5% hydroxyethyl starch was administered for 25 mins.

The spectral power of CVP corresponding to heart rate (HR power) was calculated using Fast Fourier transform at 4 time points (T0: during 5 min before furosemide administration; T1: between 30 and 35 min after surgical incision; T2: during 5 min before liver graft procurement [dehydration]; T3: between 25 and 30 min after volume replacement [rehydration]).

Results and Discussion: The median HR power at T0 significantly decreased at T2 from 12.7 to 3.8 mmHg2/Hz. Compared to T2, the median HR power significantly increased at T3 from 3.8 to 14.2 mmHg2/Hz. HR power consistently changes with the changes in intravascular volume status.

Conclusion(s): Dynamic changes in CVP, which go with heartbeat, reflect intravascular volume status.
11AP04-06
Effect of dexmedetomidine on the shedding of the endothelial glycocalyx in cardiopulmonary bypass model of rat

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Background and Goal of Study: Cardiopulmonary Bypass (CPB) is commonly employed in cardiac surgery to provide temporary circulatory support, but its effects on the glycocalyx, a crucial endothelial layer, have raised concerns. This study investigates the impact of CPB on endothelial glycocalyx degradation in a rat model and explores the potential protective effects of dexmedetomidine.

Materials and Methods: Anesthetized Sprague–Dawley rats were randomly assigned to three groups: a DEX group treated with dexmedetomidine (5 μg/kg/h) and 0.9% saline infused continuously at 10 ml/kg/h during CPB; a CPB group given 0.9% saline during CPB; and a SHAM group given 0.9% saline alone without CPB. Glycocalyx degradation was assessed through measurements of syndecan-1 using ELISA and glycocalyx thickness via electron microscopy. We also assessed systemic inflammation by ELISA.

Results and Discussion: After one hour of CPB, syndecan-1 concentration and glycocalyx thickness were comparable across all three groups, with no significant differences. Post-CPB measurements of IL-6 and TNF-α concentrations exhibited similar results among the three groups. However, IL-10 demonstrated a significant decrease in both the DEX and CPB groups compared to the SHAM group.

Conclusion(s): One hour of simple CPB did not elicit statistically significant changes in the endothelial glycocalyx.

References:

11AP04-07
The effect of COVID-19 on postoperative complications and treatment outcomes in patients undergoing cardiac surgery – single center experience

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Background and Goal of Study: The impact on human health of the COVID-19 pandemic continues to be felt around the world. In studies on the long-term health consequences of COVID-19, it is stated that both 6 and 12 months later, people continue to feel weakness and remain unable to continue working. The aim of our study was to identify the effect of COVID infection on the postoperative period and outcomes in cardiac surgery patients. The study included two stages.

Materials and Methods: Stage I. A prospective observational study of 116 cardiac surgical patients operated in the period 2020–2021, divided into groups: COVID – 36 patients, non-COVID – 80 patients. The structure of organ dysfunction, duration of artificial lung ventilation, and hospital mortality were studied. Stage II. A prospective observational study. Cardiac surgery patients (N=1204) operated in the period 2021-2022. COVID – 313 patients, non-COVID – 891. Comparative evaluation of indicators, similar to stage I.

Results and Discussion: Patients of both groups were comparable in age, risk of cardiac surgery, duration of CPB and period of myocardial anoxia at study stages I and II. At stage I, it was found that COVID-19 infection during 5±3.5 months acts as a risk factor for the development of postoperative low cardiac output syndrome (OR 7.70; 95% CI 1.06 – 91.79), acute respiratory distress syndrome (ARDS) (OR 9.88; 95% CI 1.06 – 91.79) and is associated with an increase in the duration of ventilation. Six times higher mortality in the COVID group was not confirmed by statistical significance (p > 0.05).

At stage II, it was found that in patients operated 9±3.5 months after COVID-19 infection, the incidence of ARDS (OR 4.81; 95% CI 1.14 – 20.23) and the duration of postoperative ventilation prevail. Mortality and hospitalization time in both groups were comparable.

Conclusion(s): COVID-19 infection has a negative effect on the course of the postoperative period in cardiac surgery patients, which weakens 9±3.5 months after the COVID-19 disease.
**11AP04-08**  
**Intraprocedural and postprocedural survival following transcatheter aortic valve implantation in hemodynamically unstable patients**  

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**Background and Goal of Study:** In elderly patients with severe or critical aortic stenosis (AS), transcatheter aortic valve implantation (TAVI) has emerged as a preferred and less invasive alternative to surgical valve replacement. While most candidates for TAVI are hemodynamically stable prior to the procedure, in some patients with AS left ventricular function and hemodynamic status decline rapidly and progressively, mandating hemodynamic support with inotropic drugs and/or mechanical assistance devices. Emergent TAVI (EM TAVI) may be done as a life-saving measure in such critical circumstances. The present study examines short and mid-term survival of patients undergoing elective (EL TAVI) vs emergent TAVI (EM TAVI) at a high-volume cardiovascular center.

**Materials and Methods:** 48 EM TAVI procedures performed between 2012 and 2022 using self-expanding valves were included in this retrospective analysis. Matching (1:1 ratio) was used to select a comparison EL TAVI group from a data base of 1206 TAVI procedures. Clinical and echocardiographic endpoints, short- and long-term all-cause mortality (ACM) and cardiovascular mortality (CVM) data were obtained. Subgroup analyses were completed according to pre-procedure ejection fraction and presence or absence of comorbidities.

**Results and Discussion:** Intraprocedural mortality outcomes of EM TAVI vs EL TAVI were comparable [0% vs. 2.1%, p = 0.315]. All-cause mortality was significantly higher in the EM-TAVI group at 30 days [18.8% vs. 2.1%, p = 0.008], 6 months [33.3% vs. 8.3%, p = 0.003], 12 months [41.7% vs. 12.5%, p < 0.001], and 24 months [45.8% vs. 27.1%, p = 0.006].

**Conclusion(s):** Analyzing a group (48) of EM TAVI procedures out of 1206 TAVIs done at a single, high-volume institution, and comparing them to a similarly sized matched group of EL-TAVI patients, intraprocedural mortality is similar, but short- and medium term survival are significantly and adversely affected by pre-procedural hemodynamic instability. While EM-TAVI is often without alternative, and while it can be done successfully, this procedure is not a panacea.

Comorbidities, in particular left ventricular dysfunction, will continue to adversely affect all-cause and cardiovascular mortality in critically ill patients successfully undergoing emergent TAVI.

**11AP04-09**  
**Use of advanced hemodynamic monitoring with HPI system in patients undergoing cytoreduction surgery for peritoneal carcinomatosis**  

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**Background and Goal of Study:** Intraoperative hypotension (IOH) is usually present during an anesthetic procedure. This phenomenon is associated with increased morbidity and mortality, especially affecting organs such as the brain, heart and kidney. The use of machine learning algorithms is a great help in handling these situations. The HPI monitor (Hypotension Prediction Index) uses this technology, which has meant a great advance not only in terms of hemodynamic monitoring, but also in the prediction of HIO, allowing us to anticipate its management.

In this study, we analyze the hemodynamic impact of the use of this technology in patients undergoing cytoreduction surgery for peritoneal carcinomatosis.

**Materials and Methods:** This is a prospective observational analytical study in patients undergoing cytoreduction surgery in which the HPI predictive algorithm will be applied, and will be compared with a retrospective cohort monitored with the FloTrac system and management of hypotensive events at the discretion of the anesthesiologist.

**Results and Discussion:** A lower incidence of IOH was observed in the HPI group compared to the control group, this difference being not statistically significant (50% compared to 62.5% in the control group, p=0.365), as well as a shorter duration of the same. (32.8 ± 18.4 vs 29.4 ± 14.3; p=0.401). There are also differences regarding the need for amines, although this is not statistically significant either.

**Conclusion(s):** The implementation of the HPI system manages to reduce the incidence of hypotensive events and their duration during the intraoperative period, despite of the lack of statistically significance, probably due to the small sample.
11AP04-10
Pre-existing arterial stiffness as a predictor of hypotension during induction of anaesthesia in elderly patients undergoing elective major surgery – prospective cohort study

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Background and Goal of Study: Increased arterial stiffness may be a main manifestation of arterial ageing. Presently, carotid-femoral pulse wave velocity (CfPWV) is the ‘gold standard’ for the measurement of arterial stiffness.¹

The main aim is to establish whether elevated arterial stiffness in elderly patients assessed during preoperative evaluation correlates with hypotension during induction of anaesthesia in elective major surgery.

Materials and Methods: This is a Single-centre, Prospective, observational cohort study. After obtaining institutional and ethics committee approval a total of 100 patients were divided into two study groups like High stiffness group (Group I=60) and the Normal stiffness group (Group II=40) based on CfPWV values. Age greater than 50 years with ASA grades I and II were included in the study groups. CfPWV was measured using a periscope device in the preoperative area.

A Receiver operator curve (ROC) curve was used to determine the cut-off value of Cf-PWV for predicting hypotension during induction of anaesthesia. Fisher exact test was used to compare the incidence of hypotension between both groups.

Results and Discussion: Out of 60 patients in the High stiffness group (Group I), 52 patients had encountered hypotension and 8 patients had no episodes of hypotension. It has a p-value of <0.001 which was statistically highly significant between the two groups. Mean c-IPWV values in group I (1610 ± 354 cm/sec) were higher than group II (947 ± 170 cm/sec).

A cut-off value of c-IPWV was 1259 cm/sec with 70.59% sensitivity and 81.25 % specificity with an AUC of 0.805, showing a good association for predicting hypotension.

Mori moto et al.¹ measured c-IPWV and b-aPWV using ABI (ankle brachial index) from volume plethysmographic apparatus and their mean b-aPWV was about 1736 cm/sec and median was about 1606 cm/sec which was similar to our study with mean b-aPWV was about 1721 cm/sec.

Conclusion(s): Increased arterial stiffness is associated with more incidence of hypotension during induction than normal stiffness.

References:

11AP04-11
Common carotid artery flow response to anesthesia, lateral decubitus position, one-lung ventilation, lung recruitment manoeuvre and artificial pneumothorax during thoracic surgery

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Background and Goal of Study: Intraoperative hemodynamic instability is associated with postoperative complications and mortality. Specific surgical and anaesthetic considerations of thoracic surgery confer a high risk of hemodynamic instability. This risk is even higher in patients with poor cardiorespiratory reserve or exhausted compensatory mechanisms. In recent years carotid ultrasound has emerged as a non-invasive tool for assessing volume status and fluid responsiveness. However, there is still a limited understanding of the mechanisms underpinning hemodynamic instability, especially dynamic relationship between carotid flow time and cardiac output, which has been studied mostly in spontaneously breathing patients.

Our study aimed to fill in the gaps by closely monitoring intraoperative change in carotid artery corrected flow and its correlation with SV, CO and MAP.

Materials and Methods: In a prospective observational study of 20 patients, common carotid artery ultrasound was performed at six intraoperative timepoints: awake (baseline), after anesthesia induction, after lateral decubitus position, after start of OLV, at the end of LRM and start of artificial pneumothorax. Peak systolic velocity (PSV) and carotid corrected flow time (cFT) were obtained each time with the use of portable ultrasound device. We have also recorded pulse contour SV, CO and MAP.

Results and Discussion: We observed carotid cFT decrease on induction, LRM and artificial pneumothorax (250 to 345 to 230 to 195 ml/min; 360 to 349 to 301 to 245 ms) in close association with SV and CO (3.2 to 2.1, 2.0, 1.9). In contrast, PSV has increased during artificial pneumothorax (120 cm/sec) and remained steadily unchanged. MAP decreased on anesthesia, LRM and artificial pneumothorax (108 to 71, 64). Multivariate regression analysis showed that the fall in cFT was due to reduction in CO and we found strong correlation (p<0.05).

Conclusion(s): Our findings imply that decrease in carotid flow time (cFT) is regulated by cardiac output and is most pronounced during LRM and artificial pneumothorax. Further studies need to determine the trending potential of cFT for CO to individualize hemodynamic management.
Background and Goal of Study: Recirculation is a common problem in venovenous extracorporeal membrane oxygenation (VV ECMO) and might limit the effect of ECMO treatment due to less efficient blood oxygenation and/or unfavorable ECMO and ventilator settings. Cannula position and configuration, as well as ECMO flow and cardiac output affect recirculation. The impact of hypovolemia and positive end expiratory pressure (PEEP) on recirculation is unclear, despite clinical importance. The aim of this study was to investigate how hypovolemia, PEEP, cannula position, ECMO flow and autotransfusion affect recirculation in venovenous ECMO.

Materials and Methods: In anesthetized and mechanically ventilated pigs on VV ECMO, we investigated how recirculation, patient hemodynamics and ECMO circuit pressures were affected by PEEP (5 cmH₂O vs 15 cmH₂O), ECMO flow (3.5 L/min vs 5.0 L/min), cannula distance (10-14 cm vs 20-26 cm intravascular distance), hypovolemia (1000 mL blood loss) and autotransfusion (1000 mL blood transfusion). Statistical comparisons were made using the Wilcoxon signed rank test with p ≤ 0.05 considered significant.

Results and Discussion: Recirculation increased during hypovolemia with median change of the recirculation fraction (ΔRF) 42.5%, high PEEP (median ΔRF 28% and 5% with long and short cannula distance, respectively), high ECMO circuit flow (median ΔRF 50% and 30% with long and short cannula distance, respectively) and short intravascular cannula distance (median ΔRF 18%). Recirculation decreased after autotransfusion (median ΔRF −44.5%). Hypovolemia and high ECMO flow induced increasingly negative drainage pressure. During high PEEP and short ECMO cannula tip distance, drainage pressure was unaltered or less negative. Hypovolemia and high PEEP induced variations in hemodynamics, whereas high ECMO flow and short intravascular cannula distance induced only small hemodynamic changes.

Conclusion: In the present animal study, hypovolemia and PEEP, in addition to ECMO circuit flow and short ECMO cannula distance, increased recirculation during VV ECMO. Patient hemodynamics and ECMO circuit pressures may help identify recirculation etiology. The findings are interesting for further clinical studies.
Orthotopic heart transplantation in conditions of donor organ shortage: changes in logistics and tactical approaches

**Background and Goal of Study:** The generally accepted gold standard for the treatment of end-stage heart failure (HF) is the operation of orthotopic heart transplantation (HT). To date about 500 patients in need of a heart transplant are registered on the “Waiting List” in Ukraine. Military actions on the territory of Ukraine have only aggravated this problem. In this regard, we expanded the acceptance criteria for a donor heart. In our study, we analyzed the experience of heart transplantation from marginal donors.

**Materials and Methods:** The work is based on the results of a retrospective study of patients who underwent HT in the period from 2021 to 2023. The age of the donors was 42 ± 13 years. Among the donors, there were 24 (55.8%) men and 19 (44.2%) women. All donors (43 patients) received inotropic support: norepinephrine 0.91±0.43 μg/kg/min (43 donors (100%)), dobutamine 5.28±2.45 μg/kg/min (19 donors (44.2%)), dopamine 3.38±1.58 μg/kg/min (14 donors (32.6%). From 43 donors, 22 donors (51.2%) received combined inotropic support. The average donor/recipient weight ratio was 0.62±0.07.

The average distance between donor and recipient was 392±55 km. In order to reduce ischemic time and in connection with the closure of the airspace over our country, transplantations were carried out at the site of heart collection with the departure of a mobile transplant team and the recipient.

**Results and Discussion:** Acute graft dysfunction was observed in a total of 11 patients (25.6%), requiring the use of veno-arterial ECMO. 5 patients (11.6%) died in the perioperative period. At the same time, 3 (7.0%) patients died as a result of acute graft dysfunction, 1 patient (2.3%) experienced catecholamine graft necrosis, another 1 patient (2.3%) experienced a significant decrease in the pumping function of the graft without effect from inotropic support and mechanical support (ECMO, IABP). 8 patients (18.6%) required high doses of adrenomimetics in the early postoperative period.

**Conclusion(s):** The logistical technique of performing transplantation at the donor site made it possible to reduce the ischemia time of the transplant to 95±15 minutes, which was one of the main components of the success of recipient survival (88.4% of cases), despite the use of marginal hearts. Preventive use of ECMO at the end of perfusion is, from our point of view, a mandatory stage of intensive care for HT and a donor/recipient weight ratio <0.7.

Dexmedetomidine for reduction of atrial fibrillation after cardiac surgery – a randomized controlled trial

**Background and Goal of Study:** Atrial fibrillation is the most common arrhythmia in the postoperative period of the cardiac surgery, and is associated with increased morbidity and mortality. The aim of this study was to determine whether dexmedetomidine versus propofol reduces new-onset atrial fibrillation in patients undergoing cardiac surgery, and analyze their effect, length of stay in the intensive care unit (ICU), and total hospital stay.

**Materials and Methods:** This was a prospective, randomized, single-blinded, controlled clinical trial. A total of 120 patients undergoing open heart surgery were included in the study and were randomized in a 1:1 ratio into two groups of 60 patients. The first group of patients, upon arrival to the ICU, were sedated with continuous dexmedetomidine infusion at doses 0.2-0.7 μg/kg/h. The second group of patients were sedated with continuous propofol infusion in doses 1-2 mg/kg/h. Descriptive statistics, the t-test, Mann-Whitney test, and the chi-square test were used. Statistical significance for all of the tests was set at the p value of <0.05.

**Results and Discussion:** There were no significant differences in age and gender distribution and other baseline characteristics between the groups. Both groups had similar preoperative hemoglobin levels, heart rates, and left ventricular ejection fractions. The incidence of atrial fibrillation was 16 (26.7%) in the dexmedetomidine group, and 20 (33.3%) in the propofol group. That difference was not significant (p = 0.426).

There was a significant positive correlation between the new-onset atrial fibrillation and the ICU length of stay (r = 0.378; p = 0.001). A large controlled trial - DECADE, that included 798 patients, also did not prove that dexmedetomidine infusion decrease atrial fibrillation in patients after cardiac surgery.

**Conclusion(s):** Postoperative sedation with dexmedetomidine in comparison to propofol did not decrease postoperative atrial fibrillation in patients recovering from cardiac surgery.

**Reference:**
Background: Brugada syndrome (BrS) is a genetic disorder linked to a malfunction of a cardiac sodium channel with an increased risk of ventricular tachyarrhythmias and sudden cardiac death. We hypothesised that some anaesthetic drugs previously classified as preferably avoidable are safe to be used in standard doses during different anaesthetic procedures.

Methods: A retrospective study from 2006 to 2023 of all patients diagnosed with BrS who underwent different types of anaesthesia at our institution was conducted. Statistical analysis was performed with RStudio 2022.07.2.

Results / Discussion: We analysed 652 patients with BrS, among whom 116 individuals (18%) underwent 188 procedures, including 32 regional anaesthesia (17%), 59 sedations with spontaneous breathing (31%), 90 general anaesthesia (48%) and 7 combined anaesthesia (4%) of all surgical specialties. Median age was 54.5 years, predominantly ASA II. 40% were performed ambulatorily and 13% emergently.

In 60 procedures (62%) under general anaesthesia, propofol was administered at induction and hypnosis was maintained with TIVA in 33 (34%) of the cases. For patients receiving sedation, TIVA using propofol and remifentanil was used in 31 (52,5%) of the cases. As per regional anaesthesia, spinal was performed in 14 procedures, epidural in 13, and peripheral nerve blocks in 14 procedures. The most used drug was bupivacaine, followed by levobupivacaine and mepivacaine.

Intraoperatively, two patients suffered from ventricular tachycardia (one received propofol for induction and the other did not, both maintained with halogenated), in the context of ICD replacement. One died postoperatively. Postoperative ICU admission was reported in 12% of the procedures and length of stay had a median of 4,5 days [1-5].

None of the complications were statistically associated with the use of propofol (intraoperative complications p-value = 0,58, postoperative complications p-value = 0,63) neither ICU admission p-value = 0,53). No postoperative complications were reported in the locoregional anaesthesia group.

Propofol was more frequently used after 2010 compared to prior that date (p= 0,04).

Conclusion: To our knowledge, this is one of the largest cohort of perioperative approach of patients with BrS. According to our daily clinical practice, common anaesthetic drugs at standard doses appear to be safe for BrS patients. Prospective studies to further understand the electrophysiologic effects of anaesthesia drugs are needed.
11AP05-07
The effects of TIVA and VIMA on QTc interval in cardiovascular anesthesia: a cross-sectional study

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Background and Goal of Study: Long QT syndrome (LQTS) is a syndrome characterized by prolonged QT interval that can lead to serious ventricular arrhythmias such as torsades de pointes (TdP). Prolongation of the QT interval during general anesthesia with volatile anesthetics has long been noted. Even with propofol, changes in the QT interval may also be prolonged, shortened, or unchanged.

In this study, we focused on the lack of literature on the use of inhaled anesthetics alone and changes in QT interval during anesthesia induction and maintenance in previous studies. As we use Volatile Induction and Maintenance of Anesthesia (VIMA) with inhaled anesthesia (sevoflurane) alone and Total Intravenous Anesthesia (TIVA) with intravenous anesthesia alone when performing cardiovascular anesthesia, The changes in corrected QT (QTc) interval for these techniques were compared.

Materials and Methods: After obtaining approval from the hospital's ethics committee, Patients undergoing anesthesia management for scheduled cardiovascular surgery at our institution between April and November 2023 were included. Inclusion criteria were limited to those anesthetized solely with sevoflurane or propofol from just prior to induction until pre-operative time-out. All data were extracted from 20 consecutive anesthesia records from each group and analyzed using the t-test.

Results and Discussion: A comparison of the TIVA and VIMA groups in patients undergoing cardiovascular anesthesia showed a significant prolongation of QTc interval in the VIMA group (from 431ms to 482, p=0.0002). This indicates that induction and maintenance with sevoflurane alone in patients undergoing cardiovascular anesthesia produces a prolongation of the QTc interval similar to previous studies.

There was no obvious prolongation of QTc interval in the TIVA group. One of the strengths of this study is that it evaluated even critically ill patients who underwent cardiovascular surgery.

Conclusion: The study demonstrates that VIMA with sevoflurane significantly prolongs the QTc interval in cardiovascular anesthesia, underscoring the need for careful anesthetic agent selection in patients with concerns for prolonged QT interval.

11AP05-08
Cerebral oximetry as a predictive factor for neurological outcome after aortic surgery

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Background and Goal of Study: Cardiac surgery is associated with a high level of neurological complications. In recent years, several studies have demonstrated a significant correlation between the level of cerebral oximetry and postoperative neurological complications, postoperative delirium (POD).

Aim of our study was to evaluate the association between the level of cerebral oximetry and postoperative delirium in patients after aorta surgery.

Materials and Methods: Data from the prospective observational study were compared with data from the control group, which were collected retrospectively. Patients over 18 years of age who underwent aortic surgery were recruited to the study. All patients signed a consent form for data collection.

Standard monitoring: invasive blood pressure, ECG. Pulse oximetry, measurement of CO2, arterial blood gases, cerebral oximetry.

Results and Discussion: 36 aortic operations were performed in the period September 2023 – December 2023. The data of patients hospitalized due to aneurism of aorta n the same year was collected retrospectively (n=40). Anaesthesia management was in accordance with institutional standards.

<table>
<thead>
<tr>
<th>Mean ±</th>
<th>Cerebral oximetry group (n=36)</th>
<th>Control group (n=40)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>53.21 ±9.6</td>
<td>56.12 ±12.3</td>
</tr>
<tr>
<td>BMI</td>
<td>31.2 ±3.4</td>
<td>32.5 ±2.9</td>
</tr>
<tr>
<td>CPB time</td>
<td>72.26 ±33.8</td>
<td>81.1 ±25.2</td>
</tr>
<tr>
<td>Minimal body Temperature</td>
<td>34C</td>
<td>33C</td>
</tr>
<tr>
<td>Delirium</td>
<td>10 (27%)</td>
<td>16 (40%)</td>
</tr>
</tbody>
</table>

According to retrospective data, delirium was observed in 40% of patients in the control group after aortic surgery. In the cerebral oximetry group, signs of delirium were found in 27% of patients. The initial level of cerebral oximetry had not decreased to more than 20%. To compensate for the low level of cerebral oximetry during CPB, MAP was 65-75 mmHg.

Conclusion(s): Cerebral oximetry during aortic surgery may be beneficial for patients and help to avoid neurological complications.

Reference:

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11AP05-09
Post-anesthesia care unit hypotension in low-risk patients recovering from non-cardiac surgery: a prospective observational study

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Background and Goal of Study: In patients having surgery with general anesthesia, hypotension is common and associated with organ injury. Hypotension can not only occur during surgery, but also after surgery. However, the incidence, duration, and severity of post anesthesia care unit (PACU) hypotension is largely unknown.

We therefore aimed to evaluate the incidence, duration, and severity of PACU hypotension in low-risk patients recovering from non-cardiac surgery using blinded continuous non-invasive arterial pressure monitoring with a finger-sensor.

Materials and Methods: This study was a pre-specified observational add-on study of the single-center randomized DETECT trial conducted between April 2021 and October 2021 at the University Medical Center Hamburg-Eppendorf, Hamburg, Germany.

We performed blinded continuous arterial pressure monitoring with non-invasive finger-sensors (ClearSight system; Edwards Lifesciences, Irvine, CA, USA) in patients recovering from non-cardiac surgery in the PACU. We defined PACU hypotension as a mean arterial pressure (MAP) <65 mmHg.

Results and Discussion: We included 100 patients in this study, and all were included in the analysis. We monitored arterial pressure continuously using finger-sensors for a total of 116 hours with a median (25th percentile, 75th percentile) monitoring time of 64 (44 to 91) minutes per patient.

Only three patients (3%) had PACU hypotension defined as a MAP <65 mmHg for at least one consecutive minute. These three patients had 4, 4, and 2 cumulative minutes of PACU hypotension; areas under a MAP of 65 mmHg of 17, 9, and 9 mmHg x minute; and time-weighted averages MAP less than 65 mmHg of 0.54, 0.29, and 0.21 mmHg. Eight patients (8%) had a MAP <70 mmHg and thirty-two patients (32%) had a MAP <80 mmHg for at least one consecutive minute.

The median volume of crystalloid fluid that patients were given during their PACU treatment was 200 (100 to 400) ml. None was given colloids or a vasopressor in the PACU. Three patients were given nifedipine for hypertension, and 5 were given clonidine.

Conclusion: In low-risk patients recovering from non-cardiac surgery, the incidence of PACU hypotension was very low and the few episodes of PACU hypotension were short and of modest severity.

Acknowledgements: This study was supported by Edwards Lifesciences, which provided the EV1000 monitoring system and finger-cuff sensors for the DETECT trial.

11AP05-10
Systemic hemodynamics, cardiac mechanics and signaling pathways induced by extracorporeal membrane oxygenation in a cardiogenic shock model

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Background and Goal of Study: Venoarterial extracorporeal membrane oxygenation (VA-ECMO) is increasingly being used in patients suffering from refractory cardiogenic shock (CS). But VA-ECMO may be responsible for intracardiac hemodynamic changes, including left ventricular overload and dysfunction. The present study evaluated the effect of instituting ECMO support on the trajectory of myocardial injury signaling.

Materials and Methods: We tested the hypothesis that the use of VA-ECMO in a CS sheep model could restore systemic hemodynamics while altering cardiac biomechanics, modulating cellular signaling pathways, cardiomyocyte apoptosis, and affecting infarct size. The CS was induced through alcoholization of the LAD coronary artery. CS was defined as a reduction in mean arterial pressure and cardiac output ≥ 30%, accompanied by a lactate level ≥ 2.5 mmol·L⁻¹.

After 60 min, cannulas were percutaneously inserted and the blood flow was initiated at 25% of baseline cardiac output for 30 min and incrementally increased to 50%, 75%, and 100% of the baseline rate. For histological analysis, tissue specimens were compared to specimens from sham animals and from CS animals (but without ECMO).

Results and Discussion: VA-ECMO restored systemic perfusion but induced a significant and blood flow-dependent increase in left ventricular preload and afterload (LVESV, LVEDV).
Conclusions: VA-ECMO did not affect infarct size but significantly decreased p38-MAPK phosphorylation and cardiac myocyte apoptosis in the border zone.

11AP05-11
External validation of the GEDRCC-elective scale for acute kidney injury after elective cardiac surgery

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Background and Goal of Study: AKI is a frequent complication after cardiac surgery and it is independently associated with an early increase in mortality. Cardiac surgery patients are particularly susceptible to it. Early detection is important but difficult and the use of markers such as glomerular filtration rate leads to delay in diagnosis and management. Preoperative risk factors can be used to detect patients at high risk.

This is why several predictive models have been developed. The GEDRCC2 group performed a validation of the Thakar scale and Demirjian's Calculator, confirming that neither work well in elective surgery. They developed and internally validated a new predictive model based on information easy to obtain in the preoperative visit. Significant independent risk factors were anemia, >70 years, HBP, BMI, CHF, previous cardiac surgery, surgery other than CABG. They performed a risk stratification of developing AKI: O-3 low (<5%), 4-7 intermediate (up to 15%), >8 high (>30%). It needs external validation in another cohort of patients.

Materials and Methods: A retrospective, observational study was designed. Data were collected from 162 patients who underwent cardiac surgery in two years, excluding those who underwent urgent surgery. AKI (increase of the creatinine twice above baseline or need for renal replacement therapy) was established as the outcome.
Results and Discussion: 22 patients (13.58%) presented acute renal failure. Of these, 14 (8.6%) doubled their baseline creatinine value and 14 (8.6%) required dialysis. It showed good discriminability capacity (AUC = 0.810) and good calibration in the Hosmer-Lemeshow test (c²=1.88 P=0.76).

Conclusion(s): GEDRCC-elective model has good discriminatory ability to predict patients who will develop acute renal failure in the postoperative period after elective cardiac surgery. Further studies with larger sample sizes are needed.

11AP06-01
Troponin T levels taken during the first hour after vascular surgeries and procedures are independently associated with myocardial injury events

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Background: Patients undergoing vascular surgeries and procedures of moderate-high surgical risk are at the highest risk for Myocardial Injury after Non-cardiac surgery (MINS). This can be attributed to their major comorbidities and to hemodynamic instability which is common in such surgeries. Since 2021 our department implemented routine monitoring of high-sensitivity troponin T levels (hs-TnT) taken during the 1st hour from PACU admission. To this date, all previously published studies on this topic tested TnT levels during the first 6-48 hours post-op. We aimed to investigate the association between hs-TnT obtained immediately upon admission to the PACU and the occurrence of postoperative MINS events.

Materials and Methods: This retrospective study, approved by the Institutional Review Board, included all patients admitted to the PACU following moderate and major cardiac risk vascular surgery or procedure. The primary outcome was MINS defined as one of the following complications:

1. Formal diagnosis of a new cardiac event,
2. Performance of cardiac catheterization,
3. Cardiology consultation for any reason.

A multivariable binary logistic regression model was performed using age, PACU 1st hour TnT, non-elective surgery, intra-operative norepinephrine, intra-op packed cells (PC) transfusion, and new post-op atrial fibrillation (AF) as independent variables and MINS as the dependent variable. Statistical analyses were conducted using SPSS (version 26).

Results and Discussion: Four hundred eighty-five patient files were examined for surgeries between 1.3.21-15.3.23. MINS occurred in 38 (7.3%) patients. Risk factors were: PACU 1st hour TnT [OR 1.019 (1.010-1.029)] p=0.001, non-elective surgery [OR 3.390 (1.372-8.374)] p=0.008, intra-op PC [OR 4.413 (1.794-10.857)], p=0.001, new AF [OR 3.914 (CI 1.329-11.530)], p=0.008. No association was found between immediate hs-TnT measured upon admission to the PACU after vascular surgeries and subsequent MINS events. Our findings indicate that, with a prudent selection of high-risk patients, measuring hs-TnT in this patient population could improve early detection and possibly prevention of MINS events, thus improving cardiac prognosis. There is a need for further prospective research to validate these findings.

Reference:

11AP06-02
Gastrointestinal endoscopy in patients with left ventricular assist devices: a fine balance between haemorrhage and thrombosis

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Background and Goal of Study: Left ventricular assist devices (LVAD) serve as cardiac support in severe cardiac dysfunction. The number of LVAD recipients is increasing, with a growing number of patients undergoing non-cardiac surgical procedures. Gastrointestinal (GI) bleeding is one of the most frequent complications, often requiring GI endoscopy (GIE). We describe our perioperative approach of LVAD patients undergoing GIE.

Materials and Methods: We reviewed all LVAD patients undergoing GIE from 2014 to 2023. Demographic data, perioperative management and complications were assessed.

Results and Discussion: 16 patients underwent LVAD implantation during the study period, all males aged between 20 and 75 years. 5 (31.3%) of them underwent a total of 13 GIE. The indication was GI bleeding in 2 (40.0%) patients, pre-transplant study in 2 patients (40.0%) and the evaluation of a suspected neoplasia in 1 (20.0%) patient. Preoperative evaluation was carried out by an anesthesiologist and a cardiologist. 9 (69.2%) GIE required an invasive procedure (polypectomies, biopsies, and treatment of angiodyplasias). In these cases, patients were admitted 2 to 5 days prior for anticoagulation bridge therapy.

When no invasive procedure was planned, patients were admitted on an outpatient pathway with no change in anticoagulation therapy. All procedures were performed under sedation with spontaneous ventilation with propofol and remifentanil in targeted controlled infusion. Standard monitoring was used. Capnography was used in 2 (15.4%) procedures. All patients received oxygen through nasal cannula. No patients required vasoactive support or advanced airway management. Of the 9 GIE with invasive procedures, 6 (66.7%) presented postprocedural GI bleeding as a complication, requiring longer hospital stay (up to 17 days). 2 (33.3%) required postprocedural transfusion. When there was no bleeding as a complication, patients were discharged in 3 days. Thrombotic complications were not observed in any patient. None of the procedures were cared by cardiac anaesthesiologists.

Conclusion(s): GIE in LVAD patients is a relatively common procedure. Bleeding is a frequent complication after invasive procedures during GIE. Deep sedation for GIE is a good option without requiring complex monitoring or a cardiac anaesthesiologist in suite.
11AP06-03
Reversal of heparin in cardiac surgery with a reduced protamine dose is safe and rarely leads to insufficient heparin reversal

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Background and Goal of the Study: Heparin reversal is mandatory after on pump and off pump cardiac surgery. Different strategies exist to estimate the needed dose of protamine. There is insufficient data to determine superiority from one over the other. A growing body of evidence suggest that lower ratios of protamine are sufficient to achieve complete heparin reversal and avoid protamine overdosing.

In this prospective audit we investigated if reducing the protamine to heparin ratio avoided protamine overdosing or led to clinically relevant protamine underdosing.

Material and Methods: At our institution we use a ratio driven approach to heparin reversal. We changed the ratio from 1:0.1 (1mg protamine to 100IU heparin induction dose) to 0.8:1 in August 2023. Data until December 2023 was analysed to insure adequacy of the change in protocol. Heparin induction dose was calculated from actual body weight (350IU/kg), moreover the CPB circuit contained 10,000IU independent of body weight. Activated clotting time (ACT) was measured before and 5min after heparin application, before separation from cardio pulmonary bypass (CPB) and 15min after protamine administration. Additional protamine was applied if there was suspicion of insufficient heparin reversal and clinical signs of insufficient hemostasis.

Results and Discussion: We included 86 patients undergoing coronary artery bypass grafting (CABG) including 10 off pump cases, isolated valve or combined valve/CABG surgery and two cases of type A dissection. Baseline ACT was 96s (88s/103s), ACT after heparin application was 508s (455s/548s), ACT before reversal was 452s (417s/482s) and after 107s (98s/114s) – values are given as mean (first/third quartile).

Repetition of protamine was deemed necessary in 5 cases (6%), however in two cases additional protamine did not lower ACT significantly, indicating that the initial dose was adequate. There was no clinically relevant protamine overdose. Effective protamine to heparin ratios varied between 0.54/1 and 0.73/1 depending on body weight due to the fixed additional dose in the CPB circuit.

Conclusions: Lowering the protamine to heparin induction dose ratio to 0.8:1 is safe and reduces the risk of protamine overdosing. Moreover, it rarely leads to clinically relevant protamine underdosing post CPB.

The optimal strategy for heparin reversal remains elusive but our study contributes to the growing body of evidence that lower doses than used in the past are sufficient.

References:
Online ahead of print.
**11AP06-05**
Influence of anesthetic choice on the occurrence of right ventricular dysfunction following left ventricular assist device implantation

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**Background and Goal of Study:** The utilization of Left Ventricular Assist Devices (LVADs) is increasingly vital in clinical practice due to the escalating demand for heart transplants surpassing organ availability. A notable complication associated with the use of these devices is right ventricular dysfunction. Therefore, it is imperative to investigate the impact of the anesthesia type in LVAD implantation surgery. Previously, our research group demonstrated the superiority of sevoflurane over propofol in this surgical setting. This study aimed to assess the influence of two widely used anesthetic gases (desflurane and sevoflurane) on right ventricular dysfunction in pulsatile flow LVADs.

**Materials and Methods:** An experimental animal study involving 12 minipigs was proposed, with randomization into two groups during the LVAD support period: sevoflurane vs. desflurane. All animals were monitored using a pulmonary artery catheter, and a left-sided pulsatile ventricular assist device (Berlin-Heart®) was employed for total assistance. Right ventricular dysfunction was measured using the Pulmonary Artery Pulsatility Index (PAPi), and myocardial perfusion was assessed using the Dye-Trak® microsphere method at various time points during the study.

This study was approved by the Ethics Committee on Animal Experimentation of the Gregorio Marañón University Hospital.

**Results and Discussion:** No statistically significant differences were observed in baseline measurements or assistance flow parameters between the two groups. In addition, there were no significant differences in microsphere levels or pulmonary artery pulsatility index between the two halogenated agents. Notably, right ventricular dysfunction was not detected in any of the studied animals.

**Conclusion(s):** In the experimental animal model of pulsatile flow, the halogenated agent used had no discernible influence on PAPi or right myocardial perfusion.

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**11AP06-06**
Halogenated anesthetics and myocardial perfusion in continuous flow LVAD implantation: unveiling insights into PAP index from a porcine study

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**Background and Goal of Study:** Right ventricular failure (RVF) is a prevalent cause of perioperative morbidity and mortality after left ventricular assist device (LVAD) implantation. Our research group has previously demonstrated that sevoflurane improves myocardial blood flow compared with propofol. The pulmonary artery pulsatility index (PAPi) has been proposed as a predictor of RVF in LVAD recipients. The aim of this study was to evaluate the impact of the two main anesthetic gases (desflurane and sevoflurane) on myocardial perfusion of the RV and their influence on PAPi.

**Materials and Methods:** 12 minipigs were randomized into two equal-sized groups according to the anesthetic agent used for maintenance during left ventricular device uses (desflurane or sevoflurane). Cardiac output (CO) and hemodynamic parameters were measured using a pulmonary artery catheter (PAC). A centrifugal left assist device that provided the total basal CO measured by PAC was implanted. The colored microsphere technique was used to measure RV blood flow at different times during the study. PAPi was the main variable evaluated. This study was approved by the Ethics Committee on Animal Experimentation of the Gregorio Marañón University Hospital.

**Results and Discussion:** Although myocardial perfusion was greater in the desflurane group, this was not accompanied by changes in PAP index. There were no differences in the pump flow between the groups. No animal presented right myocardial dysfunction.

**Conclusion(s):** In a porcine experimental model, the halogenated agent did not affect PAPi despite differences in right ventricular perfusion during total circulatory support of the left ventricle.

**Acknowledgements:** This study was financed by a grant from FIS 17/01319 and FEDER Funding.
11AP06-07
Comparison of echocardiographic parameters of left ventricular diastolic function in transthoracic and transesophageal echocardiography in mechanically ventilated patients – preliminary results from a prospective observational study

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Background and Goal of Study: Little is known about the comparability of parameters of diastolic function in transesophageal (TEE) and transthoracic echocardiography (TTE) in mechanically ventilated patients (1, 2).

Materials and Methods: The study was approved by the local ethics committee at Charité – Universitätsmedizin Berlin (EA4/134/21). A TTE and TEE examination was done directly after one another after induction of general anaesthesia at equal hemodynamic conditions before major vascular and abdominal surgery. Doppler measurements were performed without any intercept angle correction. Analysis was done using the workstation TomTec-Arena version 2.51.04. The following parameters were compared: Peak E-wave and A-wave velocity, E/A ratio, pulsed-wave tissue doppler e’ septal, lateral and average velocity, E/e’ ratio septal, lateral and average. Quantitative data are displayed as mean ± standard deviation (SD). Relative differences (RD) and intraclass correlation coefficients (ICC) and Bland-Altman plots assessing the bias and 95% limits of agreement are calculated using SPSS version 29 and GraphPad PRISM version 9.

Results and Discussion: 22 male/female patients were examined (age 69±8 years). There was moderate to excellent agreement for all parameters with little to no systematic bias (E-wave: RD=8.0±27.3%, ICC=0.836; A-wave: RD=4.1±27.0%, ICC=0.759; E/A: RD=4.7±35.9%, ICC=0.710; e’ septal: RD=3.6±28.8%, ICC=0.598; e’ lateral: RD=12.3±31.0%, ICC=0.626; E/e’ average: RD=0.7±20.8%, ICC=0.786; E/e’ septal: RD=3.8±28.1%, ICC=0.910; E/e’ lateral: RD=6.3±35.4%, ICC=0.862; E/e’ average: RD=6.2±25.5%, ICC=0.953) which is in accordance with a previous study on sedated, spontaneous breathing patients (1).
11AP06-09  
Anesthetic management, results and prognosis in Transcatheter Aortic Valve Implantation (TAVI)

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Background and Goal of Study: Transcatheter aortic valve implantation (TAVI) is the gold standard for treating aortic stenosis in patients not suitable for surgery. This procedure can be performed under sedation or under general anesthesia, depending on several factors. We aimed to analyze the evolution of patients undergoing TAVI, as well as to evaluate risk factors and anesthetic management of patients suffering postprocedural complications.

Materials and Methods: After obtaining the approval of the ethics committee, we carried out a retrospective observational study including all patients who underwent TAVI at our Hospital from January 2022 to June, 2023. Patients without complete information in medical records were excluded. Demographic variables, anesthesia (general versus sedation), complications during the procedure and clinical evolution in the postoperative period were evaluated.

Results and Discussion: Of the 200 patients included (55.5% male, 79±6 years old, ASA III 84%). Mean duration of TAVI was 84±66 min, hospital stay was 20±17 days. TAVI was performed under sedation in 85% and under general anesthesia in 15%. 3% of cases under sedation needed to be converted to general anesthesia. Euroscore of patients intervent under sedation was lower than those under general anesthesia (6.2 ± 4 vs 11.1 ± 10.9, p=0.022). ASA IV was more frequent in patients under general anesthesia than under sedation (37% vs 11%, p=0.001).

Incidence of intra procedural complications was 40.5%: atrioventricular block (20%), arterial hypotension (9%), vascular complications (5.5%), cardiopulmonary arrest (2.5%) and complications related to TAVI (3.5%).

Post procedural complications were: atrioventricular block (23.5%), vascular complications (10.5%), kidney failure (8%) and death (3.5%). When compared with those performed under sedation, patients under general anesthesia required a greater number of pacings (p=0.011), and suffered more deaths (p<0.001) and more post-renal failure (p=0.003), but fewer postoperative vascular complications (p=0.001).

No differences in the number of complications during the procedure (p=0.130), or postoperative cardiac complications (p=0.159) regarding to type of anesthesia were found. Risk factors for mortality were ASA (p=0.006), and severe aortic stenosis (p=0.025).

Conclusions: Sedation is the most frequent anesthetic used for TAVI. General anesthesia is still used in more complex patients, who suffer from more postoperative complications.

11AP06-10  
A retrospective analysis of high-sensitivity cardiac troponin (hs-cTn) results in patients with atrial fibrillation (AF) on the intensive care unit (ICU)

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Background and Goal of Study: New-onset atrial fibrillation (NOAF) is a common arrhythmia in critically ill patients. It is associated with increased morbidity and mortality. Elevated high-sensitivity cardiac troponin (hs-cTn) levels are also associated with increased mortality and may improve risk stratification and prognostication in NOAF. Limited literature exists on the relationship between hs-cTn levels and NOAF in critical illness. Aims of the study were to retrospectively analyse hs-cTn results for patients admitted to critical care at a tertiary referral centre and to investigate the association between hs-cTn levels and occurrence of NOAF in critical illness.

Materials and Methods: For this retrospective observational analysis we screened electronic patient records for all patients admitted to ICU between January 2017 and December 2019. Patients without a diagnosis of type 1 myocardial infarction, pulmonary embolism, or cardiac arrest in whom at least one hs-cTn measurement was reported, were included in the analysis. Peak hs-cTn values were compared between patients that developed NOAF, had pre-existing atrial fibrillation (PEAF), and those who had no episodes of AF (no AF) during their ICU stay.

Results and Discussion: 130 of 2299 patients screened developed NOAF during their ICU stay (5.7%). The prevalence of PEAF was 4.9% (112 patients). 501 patients had hs-cTn results documented on the electronic patients management system and 342 patients were included in the analysis (274 patients in the no AF cohort, 40 in the NOAF cohort, and 28 in the PEAF cohort).

Only a small proportion (13.8%; 18/130) had hs-cTn requested specifically because of development of NOAF. Hs-cTn requesting and reporting were not standardized or in line with existing guidelines. There was no significant difference in peak hs-cTn values between cohorts with NOAF, PEAF, and no AF (p = 0.874).

Conclusion(s): No association was observed between elevated hs-cTn levels and patients that developed NOAF in critical illness. However, findings were limited by the retrospective study design, a small sample size and inconsistent hs-cTn recording. Our preliminary results will serve to develop prospective studies with defined time points for hs-cTn measurements. Large studies or alternatively, matched-pair studies are required to confirm our findings.

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11AP06-11
Carotid body paraganglioma: 13 years of experience in our institution

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Background and Goal of Study: Carotid paragangliomas are usually benign neuroendocrine tumors with low incidence, characterized by slow growth and occasional association with genetic mutations and syndromes.

Materials and Methods: A retrospective review of 17 cases operated on from February 2010 to December 2023 was conducted. Various variables were analyzed, including Age, Gender, presence of cardiovascular risk factors, evidence of catecholamine secretion, presence of family history, intraoperative/postoperative complications, and mortality.

Results and Discussion: 17 cases were included in the review, with 58.8% being females and 41.2% males. Only three patients had family history (mutation of succinate dehydrogenase subunit D), and only these three cases presented bilateral paragangliomas. In none of the recorded cases, the paraganglioma secreted catecholamines. 64% of the patients had some cardiovascular risk factor (52% hypertension, 29% smoking, 29% dyslipidemia, 17% diabetes mellitus).

Regarding the surgical technique, in all cases, lateral cervical resection was performed without carotid artery repair, except for one case that required sectioning of the superior thyroid artery, external carotid, and Dacron patch on the internal carotid. In another 2 cases, the thyroid artery was ligated.

No major complications were recorded intraoperatively in any of the cases. Postoperatively, 3 patients presented peripheral facial paralysis, and 2 patients had dysphonia, with no recorded deaths.

Conclusion(s): Carotid paragangliomas are rare uncommon tumors and infrequently secrete catecholamines. The incidence of complications in intraoperative and postoperative periods is low, with no major complications evident in our database.

11AP07-01
Combined “warm” pulmonary thromboendarterectomy and heart transplantation procedure in a patient with cold agglutinin disease

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Background: Combining orthotopic heart transplantation and bilateral pulmonary thromboendarterectomy (PTE) poses challenges, particularly in the context of cold agglutinin disease. PTE stands as the standard treatment for chronic thromboembolic pulmonary hypertension, involving the removal of obstructing thromboembolic material and a true endarterectomy to restore pulmonary blood flow.

Patients with acute pulmonary emboli typically delay heart transplantation until the embolic burden is adequately addressed.

In our case, the presence of cold agglutinin disease complicated treatment, but a “warm” PTE with mild hypothermia was successfully attempted, effectively managing the risk of RBC agglutination.

Case Report: A 38-year-old male presented with hereditary cardiomyopathy and large bilateral pulmonary emboli. Preoperative evaluation revealed the presence of cold agglutinins, necessitating a tailored approach to mitigate the risk of agglutination and hemolysis.

Unlike conventional protocols involving deep hypothermic circulatory arrest during PTE, this patient was managed with mild hypothermia, reaching a core temperature of 32°C, and short periods of low bypass flow (1L/min) for surgical visualization.

Subsequent cardiac transplantation was successfully completed. The patient’s postoperative course was uneventful with the patient maintaining a stable neurological status postoperatively.

Discussion: While deep hypothermic circulatory arrest remains the standard for PTE, this case suggests that under unique circumstances, mild hypothermia can serve as a viable alternative. The individualized approach to temperature management, combined with short periods of low bypass flow and continuous neurological monitoring, proved effective in achieving successful surgical outcomes.

References:

Learning Points: PTE in mild hypothermia can be successful with low-flow bypass, careful neurological monitoring, and the appropriate institutional expertise.
11AP07-02
Commotio cordis: post-cardiac arrest following low impact car accident, a case report

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Background: Commotio cordis (CC) is defined as sudden cardiac death secondary to a blunt, non-penetrated precordial impact1 that could be a minor trauma precipitating ventricular fibrillation (VF). Impact with the steering wheel while driving with a velocity of 40 mph during the 20 to 40 millisecond window during the upslope of the T wave can trigger VF. Reports state the survival rate is around 50%.

Case Report: A 35-year-old male presented with cardiac arrest. The patient was a vehicle driver involved in a low velocity collision due to a hit of his car from the back at a low speed. Paramedics started Cardiopulmonary resuscitation till arrival to the ER where VF was the initial rhythm. He received multiple electric defibrillations of 200 Joules until return of spontaneous circulation (ROSC) after 30 minutes. No apparent clinical or radiological signs of any traumatic injury. His ECG showed rSr’ (Fig 1).

His transthoracic echocardiogram was unremarkable and The Electrophysiology team excluded any evidence of congenital channelopathies. During his hospital stay, our patient remained asymptomatic with no further documented dysrhythmias. The patient had anoxic brain injury and was discharged from the hospital later.

Fig 1.

Discussion: The diagnosis of Commotio Cordis in our patient was based upon the presence of a witnessed blunt chest impact followed by collapse, ECG data demonstrating VF, with absence of underlying cardiac diseases and lack of evidence of myocardial trauma.

References:

Learning Points: Commotio cordis is known to be a fatal condition. It is crucial to be kept in the list of differentials in cases of young fit patients with cardiac arrest after minor chest trauma, and to investigate the patient to rule out hidden cardiac pathologies. Rapidly providing life support measures and prompt use of automated external defibrillator could increase survival rate.

11AP07-03
A Case of Anomalous Origin of the Left Coronary Artery from the Pulmonary Artery Diagnosed Coincidentally during Surgery for Hypoplastic Left Heart Syndrome

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Background: Anomalous origin of the left coronary artery from the pulmonary artery (ALCAPA) often manifests in infancy with severe heart failure. ALCAPA only constitutes about 0.5% of congenital heart diseases, and its coexistence with hypoplastic left heart syndrome (HLHS) is exceptionally rare.

Case Report: We present the case of a 15-day-old female infant diagnosed with HLHS and moderate tricuspid valve regurgitation on postnatal echocardiography. Bilateral pulmonary artery banding was performed on the first day of life. A Norwood procedure, right ventricle-pulmonary artery shunt creation, atrial septal defect enlargement, and tricuspid valve annuloplasty were scheduled on the 15th day of life. Intraoperatively, a vessel branching from the right pulmonary artery, connecting to the heart, led to the diagnosis of ALCAPA. To maintain coronary perfusion, peripheral pulmonary artery was clamped, and additional arterial line was inserted into the main pulmonary artery immediately. The left coronary artery was transplanted to a new aorta.

We attempted to wean off from cardiopulmonary bypass, but maintenance of circulation was unsuccessful. Transient cardiac failure was suspected due to temporary low perfusion in the coronary arteries. Central extracorporeal membrane oxygenation (ECMO) was introduced, and the patient was transferred to the intensive care unit. ECMO removal was successful on postoperative day 3 and sternal closure was performed on postoperative day 13. A Glenn procedure was conducted at 7 months, with Fontan surgery planned after sufficient weight gain.

Discussion: ALCAPA with HLHS is extremely rare and is associated with a poor prognosis. Preoperative diagnosis is of significance (1), but despite the absence of this diagnosis in our case, the patient has followed a favorable course. However, early preoperative diagnosis of ALCAPA facilitates meticulous treatment planning and is likely to improve the overall prognosis.

References:

Learning Points: In complex congenital heart malformations, consideration of the possibility of coronary artery anomalies is crucial. Rigorous screening and thoughtful treatment planning are essential, especially when ALCAPA is suspected preoperatively.
**11AP07-04**

Cerebral oximetry monitoring for deep hypothermic circulatory arrest during Bentall procedure

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**Background:** The Bentall Procedure is a complex surgical technique to manage the aortic root abnormalities with ascending aorta and aortic valve (AV) diseases. Deep hypothermic circulatory arrest (DHCA) is crucial in this procedure to preserve organ function and reduce mortality and morbidity perioperatively. We aim to show how cerebral oximetry monitoring with near-infrared spectroscopy (NIRS) can be beneficial in this procedure.

**Case Report:** Male, 53 years old, planned for Bentall procedure to replace AV and ascending aorta. Computed tomography scan showed bicuspid AV and ascending aortic aneurysm with diameter 6.4 cm for 10.2 cm. Comorbidities including type 2 diabetes, hypertension, and old myocardial infarction. We obtain baseline values of NIRS (L56R76) while inserting central venous catheter and artery line prior to induction of anesthesia. Anesthesia was maintained with sevoflurane, fentanyl, and tral venous catheter and artery line prior to induction of anesthesia induction, a cystic lesion in the septum was identified on transesophageal echocardiography (TEE) and anaesthetic management in 2 different cases of hydatid cyst excision in the interventricular septum (IVS), which is rare.

**Learning Points:**


**References:**


**Learning points:** We recommend the use of cerebral oximetry monitoring with NIRS in procedure requiring DHCA such as Bentall procedure.

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**11AP07-05**

Intraoperative transesophageal echocardiography in interventricular septum hydatid cyst surgery: a report of two cases

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**Background:** Hydatid cyst is a parasitic infectious disease in which cardiac involvement is extremely rare. Very serious complications may occur, depending on the location of the cyst in the heart. The preferred treatment for cardiac hydatid cysts is surgical excision, even in asymptomatic patients. We aimed to demonstrate the importance of intraoperative transesophageal echocardiography (TEE) and anaesthetic management in 2 different cases of hydatid cyst excision in the interventricular septum (IVS), which is rare.

**Case Report:** In the initial case, following monitoring and anaesthesia induction, a cystic lesion in the septum was identified on TEE imaging. While the patient was under cardiopulmonary bypass, the cyst was aspirated by the surgeons and observed to shrink on TEE. The contents of the cyst were washed and aspirated three times. TEE confirmed maintenance of the cyst's integrity and an intact septum on each occasion.

In the second case, preoperative TEE revealed a pre-existing cyst that had ruptured, leaving only the cyst wall visible at the apex of the septum. As expected, only the cyst wall and germinal membrane were identified during ventriculotomy. The cyst contents were washed and aspirated prior to closure of the ventricle using capitonnage. Post-procedure, TEE confirmed the integrity of the cardiac cavities and septum, with no complications noted.

**Discussion:** The treatment of cardiac hydatid cyst is paramount in preventing catastrophic events, particularly in areas where echinococcal infections are prevalent. Suspected cardiac cysts should be evaluated and treated promptly.

Although it was not easy to visualize hydatid cysts in the IVS, TEE helped the surgeon to reach the cysts without causing complications. A case of cardiac hydatid cyst which ruptured the LV wall at autopsy in a patient with no known medical history was reported (1).

A systematic review of 37 studies identified surgical cyst rupture, pulmonary embolism and multiorgan failure as major causes of mortality, but no specific mortality rate (2).

**References:**


**Learning Points:** The rarity of IVS location of hydatid cysts, the severity of complications, and the importance of using TEE intraoperatively make these cases noteworthy.
**11AP07-07**

**Left ventricular assist device implantation in patient with complex congenital heart disease**

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**Background:** Transposition of great vessels is a rare congenital heart defect also known as dextro-transposition of the great arteries.

**Case Report:** A 54-year-old female patient was admitted to cardiology department one month prior the procedure for therapy optimization due to heart failure. She had previously corrected transposition of great arteries combined with dextrocardia. Severe regurgitation of an anatomically tricuspid valve but functionally left sided atrio-ventricular valve was present.

Anatomical left ventricle situated on the right side had preserved function, but right atrio-ventricular valve also had a moderate degree of regurgitation. Her anatomical right ventricle which served as a functional left started failing 15 years ago after her first pregnancy.

Right heart catheterization showed highly increased pressures in pulmonary artery and pulmonary vascular resistance (PVR) over 6.24 Wood Units. That excluded her as a candidate for heart transplant and decision to implant LVAD was made. Day before surgery, she was admitted to Cardiovascular ICU for invasive monitoring placement.

Due to profound dyspnea patient was intubated and continuous infusion of levosimendan was initiated. Next day she underwent LVAD implantation. Weaning from cardiopulmonary bypass to LVAD passed uneventfully. Next morning the patient was weaned from ventilator and extubated.

Postoperative transthoracic echo showed better contractility of both ventricles, decreased pulmonary artery pressures by half and low pressure gradients on all valves and LVAD cannulas. The patient was discharged from ICU on fifth postoperative day and discharged home asymptomatic two weeks later.

**Discussion:** Mechanical circulatory support (MCS) in terminal phase congenital heart disease is seldomly reported. MCS may help treat pulmonary hypertension making these patients eligible for heart transplantation.

**Reference:**


**Learning points:** Despite improved survival into adulthood, heart failure remains the leading cause of death for patients with congenital heart disease. Heart transplant remains the preferred treatment for these patients however many are ineligible for it due to high PVR or other comorbidities. Durable MCS devices are effective as bridge to transplant or destination therapy for these patients.

**11AP07-08**

**Recurrent severe Trigeminocardiac Reflexes (TCR) during bi-maxillary osteotomy (bimax): discussion and management of an unpredictable primitive phylogenetic reflex**

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**Background:** The TCR can be induced by peripheral, ganglionic or central stimulation of the trigeminal pathway (1). Due to complex interconnections between the parasympathetic and sympathetic nervous systems, the clinical features can vary, making management potentially difficult.

**Case report:** An ASA1, 25-year-old male was scheduled a bimax for maxillary hypoplasia. Surgery commenced following uneventful induction. When the down fracture of the maxilla was performed, heart rate dropped from 90bpm to 31bpm. The patient was normotensive with no drop in end-tidal carbon dioxide. The bradycardia was treated by halting surgical traction and intravenous atropine 300mcg. Heart rate recovered after 45 seconds. However, there was another bradycardia episode when the other side was instrumented, which again resolved following release of traction. No further events were noted and the patient made a full recovery.

**Discussion:** The clinical features of the TCR depend on the level of stimulation of the trigeminal pathway and can be explained by the complex connections of parasympathetic and sympathetic nerves in the pathway. The TCR at all levels is associated with bradycardia. However, central TCR is associated with hypotension or sudden hypertension, depending on the level. Bilateral
Peripheral nerve stimulation, known as the diving reflex, is associated with hypertension and apnoea. Stimulation higher in the pathway at the pterygopalatine ganglion level induces hypotension. Gasserian ganglion stimulation can lead to severe hypertension. Rarely, TCR can lead to asystole.

In this case, the sphenopalatine fossa containing the ganglion was mobilised, inducing the TCR response. As the procedure involves stimulation of maxillary branches and the pterygopalatine ganglion, the response can be mixed. A hypotensive response was not seen in our case.

References:

Learning points: Thorough monitoring and anticipation is important for timely intervention along with close cooperation with the surgeon.

11AP07-09
Perioperative management of bladder paraganglioma angioembolization and resection in a patient with left ventricular assist device

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Background: Bladder paraganglioma is a rare neuroendocrine tumour and resection in patients with left ventricular assist devices (LVAD) has not been presented in current literature. We present a unique case report describing the anaesthetic management of angioembolisation and resection of a bladder paraganglioma in a patient with continuous flow LVAD.

Case Report: A 67-year-old Chinese female with a Heartmate III LVAD implanted 4 years ago for non-ischaemic cardiomyopathy presented with recurrent admissions for lethargy, dyspnoea and micturition. She was admitted 5 days pre-operatively for optimization of anticoagulation, blood pressure and hydration status. Intubation, induction of general anaesthesia was performed with intravenous midazolam, propofol, remifentanil and rocuronium with inhalational sevoflurane used for maintenance.

Magnesium and dexmedetomidine infusions were commenced for possible catecholamine surges during tumour manipulation and handling. Mean arterial pressure (MAP) was targeted between 70-90mmHg. Marked hypotension was observed immediately post-induction and volume replacement guided by LVAD pump flows was initially successful. Subsequently, high doses of noradrenaline and adrenaline infusions were required to maintain MAP > 65mmHg. Vasopressin infusion was added which led to a rapid improvement in haemodynamics.

Hypertensive spikes secondary to tumour manipulation during angioembolisation were managed with phenolamine boluses and glyceryl nitrite and sodium nitroprusside infusions. Following surgical resection of the tumour, the patient turned hypotensive and was managed with vasopressin infusion. Pain management was achieved with On-Q® Painbuster® and oxycodone. The patient was weaned off vasopressin in the cardiothoracic intensive care unit and extubated the next day.

Discussion: Haemodynamic management is challenging in patients with paragangliomas and is compounded in the presence of a LVAD. High MAP increases afterload and causes a drop in LVAD flow which increases the risk of pump thrombosis, while a low MAP risks hypoperfusion to vital organs. This patient also demonstrated catecholamine-resistant hypotension prior to tumour resection and successful use of vasopressin has also been described in case reports.

Learning points: Early consideration for the use of vasopressin in catecholamine-resistant hypotension.

11AP07-10
Acute pump thrombosis in a patient with a Left ventricular assist device (LVAD) Heartmate III: a case report

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Background: Left ventricular assist device (LVAD) has become a mainstay of current management of patients with heart failure refractory to pharmacological interventions. Pump thrombosis (PT) is a dreaded short and long term complication of LVADs and refers to the clot formation in any of the pump components. We present a case of PT with Heartmate III in the early postoperative period.

Case report: A 63 year old male with ischaemic cardiomyopathy underwent left ventricular aneurysmectomy, left ventricular thrombectomy and LVAD insertion for treatment of chronic heart failure. During his postoperative stay in ITU, the patient developed acute deterioration with a sudden drop in LVAD flows to zero, with delayed increase in power, needing an increase in inotropic support and emergency endotracheal intubation. A trans-esophageal echocardiogram (TOE) was performed to determine cause of the deterioration. Whilst the TOE was being performed, flows dramatically improved and finally recovered completely. The patient developed visual deficit the next day and subsequently made a full recovery.

Discussion: Pump thrombosis is a serious complication in patients receiving LVAD support. Signs of PT include haemolysis, thromboembolism, heart failure and end organ hypo-perfusion, with changes of pump parameters such as increase in power. In this case, the sudden drop in flow to zero followed by partial recovery in flow is a strong indication of PT. The power increase in this case was delayed, which can make the diagnosis more challenging. The increase in power is due to more power going into the magnetic bearing to keep the rotor centered, which is challenged by a thrombus in the blade area. When there is a drop in flow, this can be explained by the inflow of the rotor being occluded, but not the
blade area, so there is an initial drop in power due to the reduced flow. When the thrombus migrates to the blade region, it allows some partial flow but there is an increase in power. The complete recovery in flow can be explained with a spontaneous clearance of the thrombus.

Learning points: PT is a rare complication with new generation of LVAD but, when occurs, can be fatal. The management depends on the haemodynamic status of the patient. Medical management includes thrombolysis and anticoagulation. In cases where medical treatment fails, patients can require device exchange or urgent transplantation.

**11AP08-01**

**Echocardiographic guided management of rare Escherichia coli infective endocarditis on bicuspid aortic valve complicated with a periannular aortic abscess**

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Escherichia coli causes 0.5% of Infective Endocarditis (IE) cases, has a mortality higher than gram-negative HACEK group bacteria (21% vs 4%) and is linked to genitourinary infections, immunosuppression or age >70 [1]. Bacterium aggressiveness and delayed diagnosis worsen prognosis. Periannular aortic abscess is a complication that requires optimal evaluation to choose the surgical approach. The role of the echocardiography is principal [2].

A 49-year-old man with bicuspid aortic valve and no other predisposing risk factor presented urinary sepsis (fever, chills, malaise, and urinary symptoms) due to Escherichia coli treated with Piperacillin / Tazobactam. After 8 days, chest pain suggested endocarditis. Transesophageal echocardiography (TEE) showed an aortic valve with thickened infected anterior cusp, severe regurgitation, and a 2.5 cm abscess involving the valve. Urgent surgery on the 9th day closed the abscess with a pericardial patch, and implanted a 21 mm mechanical valve. Anaesthetic management focused on hemodynamic stability. Postoperative echocardiography indicated a functional mechanical prosthesis. Ventilated postoperatively, the patient remained stable, and was discharged after 23 days.

This case highlights the challenging managing of a complex patient with rare IE and a severe complication as a periannular aortic abscess. Surgical approach was based on aortic ring integrity and required ETE perioperative anatomical and functional evaluations of the involved valves, as well as in-situ assessment of post-surgical defect correction [3].

**References:**


**Learning points:** E. coli can cause endocarditis in low-risk patients. Early intervention and thorough assessments for improved outcomes, especially in severe complications like periannular aortic abscess, are mandatory.

**11AP08-02**

**Spinal cathecholamine-producing paraganglioma: a multidisciplinary perioperative approach**

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**Background:** Paragangliomas are rare neuroendocrine tumors capable of producing catecholamines, becoming a significant anesthetic challenge due to the intricate perioperative hemodynamic control that require. While they typically manifest in the adrenal glands as pheochromocytomas, intradural cases involve additional complexities. Such cases, demand a multidisciplinary approach and a review of novel strategies to achieve strict perioperative hemodynamic control.

**Case Report:** In a retrospective analysis we present a case involving a patient diagnosed with a catecholamine-producing intradural paraganglioma. The early diagnosis prompted by refractory lumbago clinic, image studies and the analytic confirmation of the catecholamine metabolites in urine, permitted a collaborative preoperative approach. The collaboration of endocrinology, radiology and neurosurgery services orchestrated by anaesthesia, aimed to maximize preoperative optimisation, address the intraoperative hemodynamic challenge and facilitate postoperative care in such a complex case.

**Discussion:** Collaborative preoperative evaluation and tumor characterization resulted in the indication of an adequate alpha and beta pharmacologic blockade, along with angiographic embolization of the tumor’s vascular supply prior to the excision surgery. Anesthetic optimization during the perioperative phase involved intravenous infusions of dexmedetomidine, magnesium sulfate, and remifentanil. Additionally, pharyngeal local anaesthetic nebulization preceding intubation and invasive hemodynamic monitoring, facilitated optimal hemodynamic management, minimizing hypertensive events and reducing the need for vasodilator drugs.

**Learning points:**

1. Collaborative preoperative planning with endocrinologists and radiologists is crucial for accurate tumor localization and functional assessment.
2. The combination of angiographic embolization and alpha-beta blockade before surgery reduces the risk of hypertensive events.
11AP08-03
Successful anesthetic management of a patient with uncontrolled severe hypertrophic cardiomyopathy

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Background: In patients with hypertrophic cardiomyopathy (HCM), cardiovascular risk increases when resting left ventricular outflow tract (LVOT) pressure gradient (PG) exceeds 30 mmHg[1]. Strict perioperative management is therefore needed to prevent drastic hemodynamic changes due to surgical invasion.

Case Report: A 69-year-old woman (height: 157 cm, weight: 44 kg) was scheduled for an abdominal total hysterectomy for uterine cancer. In preoperative evaluation, a systolic murmur (Levine grade: 2/6) and abnormal Q wave were detected on electrocardiography. A transthoracic echocardiogram showed severe LVOT PG (84 mmHg) and moderate-to-severe mitral regurgitation due to systolic anterior motion of the mitral valve, for which she was diagnosed as having HCM. Her hysterectomy was scheduled for 1 month after starting daily antiplatelet therapy, was scheduled to endovascular repair of a descending aortic aneurysm. Laboratory values were in the normal range, and we tried to place a lumbar drain to prevent spinal cord ischemia. In the first attempt, a single medial and atraumatic L3-L4 puncture was performed, and a leak of blood fluid was evident, so we decided to postpone the intervention. The patient remained asymptomatic and was rescheduled after a week. New single medial and atraumatic L4-L5 puncture, with dirty blood coming out of the needle. The intervention was again postponed, and an MRI showed subdural hematomas extending anteriorly at the L3/L4 level, anteroly at L5, and posteriorly at S1. The neurological examination was normal, and a conservative attitude was maintained. MRI was repeated 20 days later, and we detected a decrease in the size of the L5-S1 hematomas, while the one on L3 had disappeared.

Discussion: Spontaneous spinal HE requires quick diagnosis because neurologic prognosis essentially depends on the interval time between symptoms and surgical decompression5. Our case illustrates that immediate surgical intervention may not always be necessary in certain patients and it is the symptomatology who dictates the need for invasive treatment.

References:

Learning points: The treatment of spinal HE depends fundamentally on the clinic and close surveillance may be an option in asymptomatic cases.

11AP08-04
Spinal epidural hematoma after catheter insertion in a patient undergoing TEVAR for descending aortic aneurysm

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Background: Spinal epidural hematomas occur more frequently in patients who receive anticoagulant therapy or who have hemodynamic profile alterations1. In addition, many studies associate them with traumatic insertion of needles or lumbar catheters2.

Case report: A 62-year-old man with a history of arterial hypertension and STEACS with a coronary stent and receiving dual antiplatelet therapy, was scheduled to endovascular repair of a descending aortic aneurysm. Laboratory values were in the normal range, and we tried to place a lumbar drain to prevent spinal cord ischemia. The neurological examination was normal, and a conservative attitude was maintained. MRI was repeated 20 days later, and we detected a decrease in the size of the L5-S1 hematomas, while the one on L3 had disappeared.

Discussion: Spontaneous spinal HE requires quick diagnosis because neurologic prognosis essentially depends on the interval time between symptoms and surgical decompression5. Our case illustrates that immediate surgical intervention may not always be necessary in certain patients and it is the symptomatology who dictates the need for invasive treatment.

References:

Learning points: The treatment of spinal HE depends fundamentally on the clinic and close surveillance may be an option in asymptomatic cases.
**11AP08-05**

**Coronary artery and pulmonary artery fistula: a case report**

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**Background:** Coronary to pulmonary artery fistula (CPAF) is a rare congenital or acquired anatomical anomaly while most cases were asymptomatic and the finding of which were mostly incidental. In this report, we presented a case with two CPAFs accidentally found during pre-operative examination for Mitral valve replacement.

**Case Report:** A 52-year-old male presented with fever, weakness, and myalgia for 3 days was diagnosed with infective endocarditis and mitral valve replacement was scheduled. Preoperative exam including CT Angiography (Fig. 1A) and Coronary angiography (Fig. 1B,C) revealed two fistulas arising from the right coronary sinus and left coronary artery, both terminating in the pulmonary artery without significant stenosis.

During the operation, the right CPAF was directly visible on the surgical field (Fig. 2A). Anterograde cardioplegia delivery causing whitening of the fistula was also noted (Fig. 2B). Ligation of the fistulas and mitral valve replacement went smoothly and the patient recovered well.

**Discussion:** CPAF is a type of Coronary artery fistula (CAF). CAF is a rare condition of vascular malformation, with a reported incidence rate of 0.05-0.8% [1]. Most patients with CAF were asymptomatic, while those with CAF greater than 2mm in diameter can develop symptoms similar to acute coronary syndrome. Treatment of such conditions include surgical repair like this case, or can be managed through transcatheter closure. Although recurrence of the CAF is rare, surgery is known to increase the rate of recurrence compared to catheterized closure.

**References:**

**Learning Points:** CPAF are unusual. While most cases remain asymptomatic for years, some develop symptoms including dyspnea, arrhythmia, syncope. Which can mimic other cardiac diseases. Proper diagnosis and optimal treatment options are relevant in such cases.

**11AP08-06**

**Peri-operative management in a patient with post myocardial infarction ventricular septal rupture with established MODS: a case report**

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**Background:** Post-infarction ventricular septal deficit (VSD) is a high mortality complication of myocardial infarction. We present the complex perioperative management of such a case involving of a 62 year-old male who underwent a VSD repair with concomitant coronary artery bypass graft after myocardial infarction with established Multiple Organ Dysfunction Syndrome (MODS).

**Case report:** A 62 year-old male, smoker (50py) with no known medical history presented to the hospital with severe retrosternal pain and dyspnea. Investigations revealed an anterolateral STEMI with apical ventricular septal rupture and severe left-to-right shunt (PG>60mmHg).

**Perioperative Management:** An Intra-Aortic Balloon Pump was inserted and the patient was scheduled for a repair procedure 3 days down the line in view of stabilization. During his CICU stay, rapid deterioration, MODS and hemodynamic instability were developed. High doses of inotropes and vasopressors were needed. Intraoperatively, induction was uneventful with propofol and remifentanil TIVA while external defibrillator patches were used as precaution. Transoesophageal Echocardiography -TOE revealed the exact territory affected by the deficit and guided the surgical repair.

Thromboelastometry and platelet function tests were performed intraoperatively that revealed remarkable coagulopathy concerning fibrinogen levels and severely impaired platelet activity. Heparin and protamine doses were titrated according to Hepcon HMS Plus (Medtronic, Minneapolis, MN) system. After weaning from CPB 2 gr of fibrinogen and I unit of PLTs were administered. By the end of the procedure a VA-ECMO was placed via the femoral vessels guided again by TOE. Although procedure was relatively uncomplicated as the initial planning dictated, the patient passed away in CICU on D3 post-op.

**Discussion:** The efficient perioperative management of a Post-infarction ventricular septal repair remains undoubtedly a challenge for the anaesthesia team. Hemodynamic instability, correction of...
severe coagulopathy and need of TOE performance are all aspects reflecting the multitasking required in such complex cases. The valuable role of thromboelastometry, platelet function tests as well as protamine and heparin titration and TOE were of paramount importance to the optimal management of that rare coagulopathy.

**Learning points:** Deployment of sophisticated hemostatic monitoring is important during the management of unique coagulopathies intraoperatively.

**11AP08-07**

Permissive hypertension with norepinephrine and vasopressin in a patient with acute spinal cord ischemia after a double aortic endoprosthesis (thoracic and abdominal) with non-functional lumbar drainage. Regarding a case

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**Background:** Spinal cord ischemic injury is one of the main complications following surgery on the thoracoabdominal aorta, whether open or endovascular. It can lead to permanent paraplegia or paraparesis, increasing morbidity and mortality in patients undergoing these interventions. This complication occurs in 4-25% of intervened patients, emphasizing the importance of identifying those at-risk individuals and implementing appropriate preventive measures. Once established, prompt detection and management using vasopressors such as norepinephrine and vasopressin, along with lumbar drainage, can help prevent fatal consequences.

**Case report:** We present the case of a 78-year-old woman who, after the placement of two aortic endoprostheses (a non-fenestrated thoracic one and an abdominal one with 3 fenestrations for the superior mesenteric and renal arteries), wakes up paraplegic with the inability to drain cerebrospinal fluid (CSF) because the catheter is not functioning. She shows significant improvement after the initiation of dual vasopressors (norepinephrine and vasopressin) to increase spinal cord perfusion in a controlled manner.

**Discussion:** The spinal cord has a highly vulnerable blood supply to ischemia. Ischemic events in the spinal cord occur during aortic surgery (due to microemboli, aortic clamping, vascular occlusion, etc.), especially in high-risk patients. Prevention through the identification of these patients for surgical optimization and the use of measures aimed at improving spinal cord perfusion, such as the use of lumbar catheters and controlled hypertension, can potentially prevent fatal consequences.

**References:**

**Learning points:** The optimization and identification of high-risk patients should be a standard practice for anesthesiologists to achieve better prognoses for our patients. Understanding the physiopathology of spinal cord ischemia in the perioperative period of aortic surgery is fundamental for establishing appropriate prevention and treatment by the professionals involved in these procedures.

**11AP08-08**
Cardiorespiratory arrest in an 80-year-old patient with thrombus in transit and massive pulmonary thromboembolism (PTE)

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**Background:** The treatment of PTE in the presence of thrombus in transit (Incidence 4%) is not defined, in spite of its high mortality (>44%).

**Case report:** We report a case of an 80-year-old woman diagnosed with a thrombus in transit and massive acute PTE, causing overload of the right chambers and severe pulmonary hypertension. During the mechanical thrombectomy she suffered cardiorespiratory arrest requiring advanced cardiopulmonary resuscitation manoeuvres for 50 min and fibrinolysis with Alteplase (r-tPA). The overall recovery was excellent, and she was discharged after 18 days to her reference hospital.

**Discussion:** The decision to perform mechanical thrombectomy was made in the presence of hemodynamic instability. Several studies have shown that this technique improves right ventricular function and pulmonary artery pressure in patients with intermediate or high risk PTE. Cardiac arrest occurred during the same procedure, so thrombectomy was stopped and a r-tPA was administered. As several studies have shown, thrombolytic treatment acts faster on pulmonary obstruction than anticoagulant treatment. Since the pulmonary circulation is particularly sensitive to thrombolytic therapy, given its anatomy, the drug passes only through the right cavities. Also, L.Arboine-Aguirre et al, described a case of a patient, who was diagnosed with thrombus in transit, was successfully managed with fibrinolytic therapy.

Postanoxic encephalopathy after cardiopulmonary arrest is a frequent event (44.6%) with high mortality. In our case, the patient developed multiple complications, such as renal failure and pancreatitis, but no neurological complications, which reflects that the treatment carried out was adequate.

**References:**

**Learning points:** Our case demonstrates the effectiveness of prolonged cardiopulmonary resuscitation maneuvers associated with fibrinolysis with r-tPA in patients with thrombus in transit and massive PTE.
11AP08-09
Successful vaginal delivery in a parturient with long qt syndrome type 2 by epidural analgesia: a case report

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Background: Congenital long QT syndrome (LQTS) is caused by a mutation in the genes that encode cardiac ion channels, and this can cause syncope or sudden death due to ventricular arrhythmia. Life-threatening arrhythmias are triggered by emotion and auditory stimuli in patients with LQTS2 so careful perinatal management especially during delivery is required.

Case Report: A 35-year-old pregnant woman with LQTS2 was scheduled to undergo vaginal delivery under epidural labor analgesia in the 40th week of pregnancy. She was diagnosed with LQTS2 by genetic testing since she has a family history of sudden death. She is a homozygous carrier of the KCNH2 mutation. However, she is asymptomatic, no treatment. One epidural catheter was placed at level L2-L3 without incident. The delivery proceeded uneventfully without pain. No adverse cardiac events were observed during the perinatal period.

Discussion: Congenital heart disease has increased among pregnant women from developed countries due to their longer survival, later age at pregnancy, new fertilization techniques and increased cardiovascular risk factors(1). Although labor-associated strong emotional and physical stress is considered a risk factor for fatal arrhythmia, the appropriate management of delivery has not yet been established. Moreover, no report has described the perinatal management of LQTS patients with focus on gene mutation type-specific risk stratification(2).

Although caesarean section is preferred for delivery in parturient with LQTS, postoperative pain is one of the biggest concerns for postnatal emotional stress and it is difficult to manage compared with vaginal delivery (3).

Thus, we opted for vaginal delivery with epidural analgesia in this patient.

References:

Learning Points: Vaginal delivery under epidural analgesia may be a viable option in LQTS2. Avoidance of drugs that may lengthen QT, continuous monitoring of the patient and adequate blood ion monitoring are essential.

11AP08-10
Complete AV block in the setting of TEVAR - an uncommon event

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Background: Perioperative cardiac arrhythmias are common during endovascular surgery and can lead to severe complications, increase in-hospital stay and mortality. Carotid artery surgery and cardiac valve replacement are known risk factors for bradyarrhythmia, either by vagal or carotid sinus stimulation or disruption of coronary blood flow.

Although proximal aortic surgery may share these pathophysiological changes, there is no published data of complete AV block in thoracic endovascular aortic repair (TEVAR).

Case Report: An 81-year-old male, ASA IV, presented for TEVAR regarding an aortic arch aneurysm (Ishimaru zone 2). Past history included hypertension, myocardial infarction and a recent episode of complete AV block with severe bradycardia requiring temporary transvenous pacing during a coronaryography. Balanced general anesthesia was performed under ASA standard and invasive blood pressure (BP) monitoring. Norepinephrine (NE) perfusion was used to keep MAP>60mmHg. Initial heart rate was 80bpm, sinus rhythm.

After placement of the endograft, a balloon dilator was used to adjust the new prosthesis onto the old, repeatedly. Soon after, a drop in BP followed by severe bradycardia of 28bpm and complete AV block occurred. Atropine boluses were ineffective. NE perfusion was increased and isoprenaline initiated, stabilizing the patient. Cardiology was consulted and a transvenous pacing device placed. The surgery carried on without further complications. Permanent pacemaker implantation was later scheduled.

Discussion: Numerous causes can lead to AV block, including coronary artery disease, degenerative or rheumatic heart conditions, infections, vagus nerve-mediated conducional block and iatrogenic factors.

In this case, endovascular dilation most likely resulted in direct vagal stimulation or increased carotid pressure due to aortic occlusion, resulting in complete AV block. The fact that this patient had a similar episode before put him in increased risk of having such complications perioperatively.

References:

Learning Points: TEVAR surgery has a great potential for intraoperative cardiovascular changes and instability requiring emergent compensation. Complete history and preoperative examination are essential to signal patients at greater risk for perioperative arrhythmias. Temporary cardiac pacing is instrumental in severe bradycardia and should not be delayed when other measures are ineffective.
11AP09-01
Navigating the complexities: managing a giant adrenal incidentaloma with inferior vena cava thrombus

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Background: Adrenal incidentalomas are increasingly detected with advanced imaging, posing challenges in their management. Optimal anesthetic strategies are crucial, especially in cases with mechanical compression, bleeding, hormone secretion and vascular extension.

Case report: We report a compelling case involving a previously healthy 17-year-old male who presented with abdominal pain, distention, and reduced oral intake. Clinical examination revealed a sizable right upper quadrant mass, leading to further investigation through ultrasonography and contrast-enhanced CT which unveiled a substantial mass originating from the right suprarenal gland, displacing the right kidney and compressing the inferior vena cava (IVC), hepatic veins, and infrahepatic vein, indicating a tumor thrombus. Extensive evaluations showed normal hormonal and tumor marker levels. The patient underwent a planned laparotomy adrenalectomy, with potential hepatectomy consideration. To manage hemodynamic challenges, central cardiopulmonary bypass (CPB) via median sternotomy was planned, utilizing the Edwards Lifesciences Acumen series system for fluid administration guidance. Intraoperatively, meticulous anesthesia induction, dual femoral artery cannulation, and transesophageal echocardiography were crucial. A dynamic shift to central CPB occurred as the tumor migrated to the right atrium. The tumor was skillfully resected in segments, necessitating both thoracic and abdominal cavity access. Postoperatively, the patient received careful care, achieving extubation on day 1 and transitioning to high-flow nasal cannula support followed by rehabilitation in the ward.

Discussion: This case highlights the role of advanced hemodynamic monitoring, exemplified by the Edwards Lifesciences Acumen system, in optimizing intraoperative care. Real-time transesophageal echocardiography proved crucial for dynamic insights, guiding surgical decisions. Adaptability was key, necessitating a shift to central cardiopulmonary bypass via median sternotomy as the tumor migrated. Interdisciplinary collaboration was paramount for success.

Reference:

Learning points: The report contributes valuable insights to managing complex adrenal masses, emphasizing individualized strategies and the evolving synergy between surgical, anesthetic, and imaging modalities.

11AP09-02
A case of severe bradycardia by mechanical stimulation to nasal cavity under general anesthesia

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Background: Trigeminocardiac reflex (TCR) is a brainstem reflex by stimulation of the sensory branch of the trigeminal nerve. It is defined as a sudden decrease in pulse rate with or without mean arterial blood pressure (MAP) that may result in asystole. TCR sometimes occurred during general anesthesia, but is particularly rare with nasal intubation.

We report a case of severe bradycardia induced by mechanical stimulation to nasal cavity.

Case report: A 57-year-old woman (151 cm, 55 kg) was admitted to our hospital to undergo extraction procedure for a buried wisdom tooth. The patient had glaucoma as a comorbidity and perioperatively showed normal vital sign presented as BP 130/75 mmHg, ECG a normal sinus rhythm with HR 66 bpm and SpO2 99% in room air. General anesthesia was induced with propofol, remifentanil, fentanyl, and rocuronium. Following loss of consciousness, we inserted cotton swabs soaked with a 2% lidocaine and 1:10,000 epinephrine solution with the left nasal to confirm the nasal passage. A sudden hypotension (66/37 mmHg) and sinus severe bradycardia (32 bpm) occurred, although SpO2 98% was stabled. While the insertion was stopped and total 8 mg ephedrine was established, the patient’s sinus rhythm returned with 63 bpm and BP 83/43 mmHg.

Surgery was uneventfully completed. At the end, the patient was successfully extubated and transferred to hospital ward for further observation.

Discussion: TCR reflex is usually seen under general anesthesia where all sympathetic reflexes are blunted and increased vagal activity due to stimulation of trigeminal nerve branches. Peripheral TCR is divided according to a branch of the affected trigeminal nerve into ophthalmocardiac reflex, maxillomandibulocardiac reflex and diving reflex. All subtypes present slowdown in bradycardia. The anterior ethmoidal nerve, a branch of the ophthalmic nerve, is distributed in the nasal cavity.

In addition, the nasal bridge is innervated by sensory branches of the maxillary division of the trigeminal nerve. When the nasal wall or external pressure is applied over the nasal bone, the infraorbital nerve may send signals via the maxillary division of the trigeminal nerve.

In this case, TCR was probably caused by stimulation of the anterior ethmoidal and the infraorbital nasal nerves during nasal insertion of swab.

Learning points: Administering parasympatholytic before insertion swab into nasal cavity could have been an option to increase sympathetic activity.
Background: Endovascular placement of proximal endografts in the thoracic aorta is hindered by blood flow and may require reduction of cardiac output.

The Munich Valsalva Implantation Technique (MuVIT) achieves this by increasing intrathoracic pressure and is an alternative to inferior vena cava occlusion, rapid pacing or adenosine induced asystole.

Case report: An 81-year-old male, ASA IV, presented for revision of a previous thoracic aorta aneurysm repair (Ishimaru zone 2). General anaesthesia was performed under ASA standard monitoring, anaesthetic depth and invasive arterial BP monitoring.

Norepinephrine perfusion was used to maintain MAP>60mmHg. To facilitate the deployment of the aortic endograft the MuVIT was performed through manual ventilation, closing the APL valve and keeping peak pressure at 30cmH2O.

We were successful in reducing BP, with a lowest SBP reading of 56mmHg. FiO2 was increased pre-emptively to accommodate the necessary apnoea and the lowest recorded pulse oximetry was 94%.

Prosthesis placement was complete in under 3 minutes. BP returned to normal shortly after with a minor increase in norepinephrine perfusion to a maximum of 30mcg/min. No other changes resulted from using the MuVIT.

Discussion: This was a successful case of applying the MuVIT for TEVAR, avoiding less reliable options like adenosine induced asystole or invasive approaches such as intra vena cava balloon.

Patient history and preoperative examination must be considered before using this technique. Severe emphysema, pneumothorax or poor right heart function may preclude the MuVIT.

Also, it requires intubation and mechanical ventilation. High doses of catecholamines or fluid overload might render it ineffective so a test phase consisting of a short MuVIT to assess patient response might be worthwhile.

References:
1. doi: 10.1016/j.ejvs.2016.03.025.

Learning points: The MuVIT is a non-invasive and easy to perform modified Valsalva manoeuvre used to reduce cardiac output and facilitate TEVAR of proximal aortic aneurysms. It consists of increasing intrathoracic pressure to 30cmH2O through manual ventilation in an intubated patient with a high fresh gas flow and a closed APL valve, requiring general anaesthesia.

Despite its low complication rate, proper screening is mandatory to exclude patients not suitable to withstand the MuVIT. This might include patients with emphysema, lung bullae, pneumothorax or poor right heart function.

1AP09-04

Perioperative use of transthoracic echocardiography in hemodynamically unstable patients, by trained anaesthesiologists. A case report

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Background: Perioperative use of transthoracic echocardiography (TTE) by trained anaesthesiologists is advancing nowadays. It can be useful in differential diagnosis and management of unstable patients.

Case Report: A 75-year old female, without known history of cardiovascular disease, was admitted to external fixation of her left ankle joint due to bimalleolar ankle fracture, as an urgent case. Baseline vital signs were SpO2 97%, HR 55/min and NIBP 120/80 mmHg.

Preoperative ECG indicated SR with occasional premature contractions. General anaesthesia was induced with propofol 120mg, fentanyl 100µg, rocuronium 50mg. Anaesthesia maintenance was with sevoflurane (MAC: 0.8) and remifentanil pump stand by. Intraoperative monitoring included ECG, SpO2, NIBP, BIS, core body temperature and urinary catheter.

Postintubation, the patient presented a prolonged severe hypotension period (systolic blood pressure, SBP<70mmHg, mean arterial pressure, MAP<50mmHg) and an increased frequency of supraventricular premature contractions on ECG. There was transient response to vasopressors.

Invasive arterial blood pressure monitoring was installed to the other hand. Invasive SBP, MAP values were also low, but approximately 20mmHg higher than NIBP. Biochemistry tests were sent to lab and arterial blood gas samples were analyzed and found within normal range.

An experienced anaesthesiologist with diploma in TTE obtained a subxiphoid view due to patient’s supine position, to rule out life-threatening conditions: pulmonary embolism, acute myocardial ischaemia, pericardial effusion, and severe heart valve disease or hypovolaemia.

Mild triscupid (Vmax:2.7m/s) and mitral regurgitation were shown. Haemodynamic instability was supported with fluids and vasopressors. Postextubation PLAX, PSAX, A4C, A3C, A2C and A5C views were obtained. Diastolic dysfunction of left ventricle(E/A:0.7) was also recorded with EF-55%.

Postoperatively patient’s haemodynamics recovered. Next morning the patient was referred to cardiologists, where a formal TTE was performed. Results were similar to the intraoperative TTE test.

Discussion: Perioperative use of TTE by a trained anaesthesiologist aided in ruling out severe life-threatening disorders in a haemodynamically unstable orthopaedic patient.

Reference:

Learning Points: Transthoracic echocardiography can be integrated into anaesthesiologists’ tools for management of unstable patients.
11AP09-05
Preventive Impella device in ablation of ventricular tachycardia in patient with severe reduction of left ventricle ejection fraction

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Background: Cardiogenic shock is a major complication associated with heart surgery. This is specially associated with history of reduced left ventricular ejection fraction (LV-EF).

The Impella device is a micro axial, left heart assist which pumps blood from the left ventricle into the aorta achieving an assist up to 6.2 L/min of blood, which decreases the stress applied to the left heart.

We present a case report of the use of Impella to assist in cardiac intervention.

Case Report: 57-year-old patient with implantable cardioverter-defibrillator (IDC) as prevention because of chronic ischemic cardiopathy with 15% LV-EF. Ventricular tachycardia (VT) caused defibrillation from the IDC so an electrophysiology study and ablation were indicated.

Induction of anaesthesia was achieved with 3 mg midazolam, 10 mg etomidate and 0.15 mg fentanyl to maintain the haemodynamic. An Impella CP was placed through the arterial access and set to minimum flow. With ECO guidance the left ventricle was scanned and the ablation of the trigger point of the VT was done successfully.

Cardiac output was monitored indirectly through patient’s diuresis. Based on this and patient’s haemodynamic stability the Impella was removed after the procedure.

Discussion: Reduce LV-EF is a risk factor for perioperative complications and often require mechanical support devices for haemodynamic support. Conditioning patients by preventive use of this devices could improve postoperative outcome.

The advantages of the Impella are being minimally invasive and miniaturized, achieving a support between 2.5 to 6.2 L/min. Thus, reducing left ventricle stress, myocardial oxygen consumption and increasing coronary perfusion.

This approach is especially interesting in elective cardiac surgery, where post cardiotomy shock is a major adverse event. However, less invasive procedures could benefit from this in selected patients with high-risk situations, where the assist could be removed once the intervention is over if patients conditions allow it.

Reference:

Learning Points:
• Preventive mechanical support could reduce complication in cardiac procedures.
• Patient situation should be assessed to evaluate who could benefit.

11AP09-06
The hemodynamics of myasthenia gravis: thoughtful choices in a dreadful scenario

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Background: With the advent of treatment innovations for Myasthenia Gravis (MG), the increased life expectancy forces the anesthesiologist’s knowledge on how to approach these patients of clinical scenarios associated with increased age, such as aortic stenosis. One must bear in mind the cardiac involvement of the disease and explore the lesser-known impact of cardiovascular agents.

Case Report: An 81-year-old male, ASA IV with a relevant medical history of MG, severe aortic stenosis, coronary artery disease, and hypertension, presented for percutaneous implantation of an expandable aortic valve via transfemoral route (TAVI).

The procedure was made under sedation with Remifentanil, local anesthesia, and oxygen support via nasal cannula. Isosorbide dinitrate was used for hypertension treatment and Amiodarone was prepared as antiarrhythmic therapy. The procedure was uneventful and the patient was discharged after two days under surveillance.

Discussion: Although the effects of neuromuscular blocking drugs are widely known, experimental data on cardiovascular drugs is sparse and the absence of evidence to support their use mandates a thoughtful anesthetic approach.

Based on previous case reports, adrenergic blockers, and calcium antagonists were found to be associated with an increased risk of exacerbation. Isosorbide dinitrate is an ultra-short-acting vasodilator, whose action depends on nitrous oxide, and acts mainly on the venous vasculature with effect on the pre- and afterload. We report its uneventful use as a safe alternative in this narrow therapeutic window in order to achieve tensional control. Simultaneously, while MG primarily affects the skeletal muscles and the neuromuscular junction, there have been reports of arrhythmogenic cardiac involvement. We anticipated the need for Amiodarone as antiarrhythmic, even though it was not needed.

Lastly, the avoidance of general anesthesia and potential postoperative pulmonary complications was achieved with Remifentanil up to 0.05 mcg/kg/min and a previous femoral block with Ropivacaine 0.2%.

Reference:

Learning Points: In the absence of an evidence-based consensus, we add to the literature a successful report on the administration of isosorbide dinitrate during a TAVI procedure under sedation.
11AP09-07
Management of newly diagnosed multiple valvular pathology in a 36-week pregnant patient with preeclampsia

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Background: Preeclampsia developed during the third trimester pregnancy and entangled with critical multiple valvular pathology represents a high risk of maternal mortality (1). This case report demonstrates successful resolution of pregnancy and complex valvular pathology along with effective patient management in ICU.

Case report: A 43-year-old 36-week pregnant female patient was complaining of shortness of breath at rest, swelling of lower extremities, palpitations, and severe general weakness for one month. PH: preeclampsia, BP on the right arm is 170/80 mmHg, on the left arm - 160/80 mmHg; obesity - BMI 38.45 kg/m².

ECHO: MV - stenosis, fusion along the commissures, PG max/mean – 42/21 mmHg, MR+; TV +++, annuloectasia; AV - end thickening of the valves, fibrotic changes, AR +++. Systolic Pulmonary Artery Pressure - 90 mmHg.

Due to the clinical picture of HF along with pregnancy at 36 weeks, she was indicated for the following surgery: 1st stage - caesarean section; 2nd stage - replacement of mitral and aortic valves with mechanical prosthesis, and tricuspid valve with biological prosthesis under CPB and spontaneous hypothermia.

Control TEE: no paraprosthetic leaks, locking/closure of the prostheses is functional.

Course of hospitalization: Early postoperative period required support of vasopressor and inotropes. AKI (St.II, KDIGO 2018) was resolved by RRT (HDF+HA330 for 4 days). Presence of respiratory failure required mechanical ventilation support and sani-
tation bronchoscopy.

Due to posthemorrhagic anemia and hypoalbuminemia, PRBC and ALB were transfused in a timely manner. After stabilization of the general condition and hemodynamic parameters, patient was transferred from the ICU. Length of stay: 9 days.

Discussion: Newly diagnosed multiple valvular pathology in a 36-week pregnant patient with preeclampsia is an emergency requiring immediate resolution that was shown in our case. Timely management along with high quality surgical and post-operative treatment resulted in patient’s fast recovery.

References:

Learning point: Although newly diagnosed critical valvular pathology in a 3rd trimester pregnant patient increases patient’s risk of developing mortality and morbidity, successful resolution is possible in combination of effective surgical and intensive care.

11AP09-08
Bispectral analysis in a patient scheduled for thoracic aortic aneurism: spurious values?

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Background: Bispectral analysis (BIS) uses a statistical process to analyze electroencephalographic signals and compute a number between 0 and 100 that represents the degree of awareness in patients under deep anesthesia or sedation. Values can change very much during anesthesia and sometimes the values seem not to correspond to the level of awareness.

Case Report: A 68-old year male patient was scheduled for a cardiac surgery under cardiopulmonary bypass (CPB) and deep hypothermia. General anesthetia with propofol 2ng/ml, sufentanil 50mcg and cisatracurium 10mg was preferred. From the start of anesthesia until the start of CPB, BIS levels variate between 35 and 50.

Due to posthemorrhagic anemia and hypoalbuminemia, PRBC and ALB were transfused in a timely manner. After stabilization of the general condition and hemodynamic parameters, patient was transferred to the Intensive Care Unit still intubated. The next day he was awake without any deficit. This is our third similar case and no patients had neurologic deficits.

Discussion: The use of BIS monitor is almost universal for cardio-
vacular operations. It is very important to prevent awareness in these kinds of procedures what could be catastrophic. Electric interferences form the bypass machine, forced-air warmed machines, hypothermia, pacemakers or others unknow reasons can be challenging for the anesthesiologist.

Some other important reasons can cause false BIS values. One study showed the midazolam has a weak effect in BIS levels, very different from our report.

References:
2. Teixeira Domingues Duarte L, Ângelo Saraiva R. When the Bispectral Index (Bis) can Give False Results*. Vol. 103, Revista Brasileira de Anestesiologia. 2009.
3. Morse Z, Kaizu M, Sano K, Kanri T. BIS monitoring during anesthesia until the start of CPB, BIS levels dropped to 5-0. We asked the surgery about the cannula, changed the side of the sensor, changed the BIS monitor, disconnect the power cable and injected flumazenil 0,5mg. The BIS levels did not change.

After 2 hours, the CPB finished and the BIS levels moved to normal levels. The operation lasted more 1h uneventfully. The patient was transferred to the Intensive Care Unit still intubated. The next day he was awake without any deficit. This is our third similar case and no patients had neurologic deficits.

Learning points: Although newly diagnosed critical valvular pathology in a 36-week pregnant patient increases patient’s risk of developing mortality and morbidity, successful resolution is possible in combination of effective surgical and intensive care.

Learning point: Although newly diagnosed critical valvular pathology in a 3rd trimester pregnant patient increases patient’s risk of developing mortality and morbidity, successful resolution is possible in combination of effective surgical and intensive care.
Background and Goal of Study: Among dialysis patients, those with residual kidney function (RKF) are known to have better life expectancy, but the impact on perioperative outcomes is unknown.

In this study, we examined the effects of possessing residual kidney function on the hemodynamic changes in general anesthesia induction.

Materials and Methods: The subjects were dialysis patients who underwent scheduled surgeries under general anesthesia at our hospital between May 2007 and December 2022 (n = 882). Patients with a urine output of ≥100 ml/day were categorized as having residual kidney function (RKF+).

The primary outcome was the decrease in systolic blood pressure at the induction of general anesthesia. Factors influencing a decrease in systolic blood pressure were investigated through multiple regression analysis. Additionally, after propensity score matching between the RKF+ and RKF- groups (1:1), we assessed whether there was a difference in the decrease in systolic blood pressure in general anesthesia induction. A subgroup analysis excluding renal transplant cases was also conducted (n = 720).

Results and Discussion: According to multiple regression analysis, significant explanatory factors for the decrease in systolic blood pressure were the surgical procedure (renal transplant or not), presence of RKF, and preoperative systolic blood pressure, while dialysis vintage and Charlson comorbidity index were not significant factors.

The results of propensity score matching showed a significantly lower minimum systolic blood pressure in the RKF+ group (111 ± 32 vs 105 ± 30mmHg, p = 0.04). In the subgroup analysis excluding renal transplant cases, both multiple regression analysis and propensity score matching showed similar results.

Conclusion(s): The presence or absence of RKF influenced the hemodynamics in the induction of general anesthesia in dialysis patients. One possible reason is that the RKF+ group had lower preoperative dehydration due to less fluctuation in fluid balance caused by hemodialysis. Additionally, residual kidney function is believed to alleviate the effects on blood vessels by excreting small amounts of difficult-to-remove middle molecules via dialysis.

From these results, the presence of residual kidney function suggests a beneficial impact on the hemodynamics during general anesthesia.

Reference:
Conclusions: As a first step in developing perioperative management protocols for patients undergoing this innovative surgery, these preliminary data show good hemodynamic tolerance, no postreperfusion syndrome and preserved liver function throughout the process.

12AP01-04
Hemostatic prophyle in portal and jugular plasma in patients with cirrhosis: is the portal vein an hypercoagulable vascular bed?

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Background and Goal of Study: Portal vein thrombosis (PVT) is a common complication in patients with cirrhosis that can prevent liver transplantation. The portal vein (PV) has a unique biochemical environment in patients with cirrhosis. Several studies have shown hypercoagulability in these patients. However, due to the inaccessibility of portal blood, the majority of these studies were conducted in the systemic circulation (SC). Our goal was to evaluate plasma levels of coagulation markers, thrombin generation, and thromboelastometry parameters in samples taken from the portal vein and compare them with those taken simultaneously from the systemic circulation in patients with cirrhosis.

Materials and Methods: Patients with cirrhosis undergoing transjugular intrahepatic portosystemic shunt placement were prospectively included 2020-22. Antithrombotic treatment, and PVT were exclusion criteria. Blood samples were taken simultaneously from the SC, and from the PV before TIPS placement. Coagulation markers and thromboelastometry were assessed. SPSS 25 was used.

Results and Discussion: Forty seven adult cirrhotic patients were enrolled. The median age was 58 (49-65) years and 23 (48%) were female. The majority of patients had moderate liver disease (Child A: 9 [18%]; Child B: 24 [52%]; Child C: 14 [30%]). In patients with cirrhosis, only isolated factors were different in the two vascular beds. (Table 1).

<table>
<thead>
<tr>
<th>COAGULATION MARKERS</th>
<th>Sistemic beed</th>
<th>Portal beed</th>
<th>Wilcoxon</th>
</tr>
</thead>
<tbody>
<tr>
<td>FII (%)</td>
<td>42(33-56)</td>
<td>44(35-56)</td>
<td>0.01</td>
</tr>
<tr>
<td>FV (%)</td>
<td>40(28-55)</td>
<td>41(29-53)</td>
<td>0.001</td>
</tr>
<tr>
<td>FVII (%)</td>
<td>40(23-53)</td>
<td>41(23-56)</td>
<td>0.004</td>
</tr>
<tr>
<td>FX (%)</td>
<td>51(37-61)</td>
<td>55(40-64)</td>
<td>0.000</td>
</tr>
<tr>
<td>FIX (%)</td>
<td>57(45-74)</td>
<td>60(47-69)</td>
<td>0.039</td>
</tr>
</tbody>
</table>

GLOBAL TEST

ETP(nM lla^a min) 605(517-709) 633(544-722) 0.134

THROMBOELASTOMETRY

CT EXTEM(sec) 68(62-74) 73(65-79) 0.070
CFT EXTEM(sec) 95(69-150) 90(77-146) 0.333
MCF EXTEM(mm) 53(47-59) 53(47-58) 0.967
FIBTEM(mm) 14(11-21) 14(11-19) 0.177

Table 1.

Conclusion(s): Although differences were noted in certain individual coagulation markers, indicating a slightly more prothrombotic state in the portal vein in this population, global tests such as thrombin generation and thromboelastometry remained similar in both vascular beds. Further investigations are needed to explore the significance of these findings in relation to portal vein thrombosis.

12AP01-05
A multicenter cohort study of risk factors of major bleeding and the role of prophylactic transfusion in patients with and without cirrhosis undergoing percutaneous liver procedures

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Background and Goal of Study: Percutaneous liver biopsy (PLB) and radiofrequency ablation (RFA) are frequently performed in patients with abnormal coagulation tests. Some guidelines suggest prophylactic transfusion is not always mandatory for these procedures. This study aims to determine the risk factors for major bleeding after percutaneous liver procedure (PLP) and the role of prophylactic transfusion, in a cohort of patients with and without cirrhosis.

Materials and Methods: This retrospective study includes patients who underwent a scheduled PLP at 3 centers in Spain. Patients with antithrombotic medications were excluded. Blood tests including standard coagulation assays were assessed before the procedure. Transfusion protocol was homogenized in all centers and considered for those with platelet counts <50,000 and/or INR > 1.5.

We recorded demographic, clinical, and technical procedure data. Patients with and without cirrhosis were analyzed separately. The primary outcome was major bleeding defined as fatal bleeding.

Results and Discussion: 1797 patients [(1481 without cirrhosis (82%) and 316 with cirrhosis (18%)] that underwent PLP were included. PLB was the most frequent procedure (86%). Baseline characteristics were similar in both groups. A total of 14 patients (0.8%) experienced major bleeding after procedure, (0.4% RFA and 0.8 % PLB).

No clinical or technical data were associated with bleeding. Bleeding occurred in 0.6% of patients with cirrhosis vs 0.8% in those without (p=ns).

Twenty-six (14%) patients (12 with cirrhosis and 14 without) had INR>1.5, and 22 (1.2%) patients (9 with cirrhosis and 13 without) had a platelet count < 50,000. Only 27% (7/26) of patients with INR >1.5 were transfused with FFP; and 72% (16/22) with platelet count <50,000 received platelet transfusions.

Patients with cirrhosis were more frequently transfused. None of patients who met the criteria for prophylactic transfusion experienced major bleeding, independently of whether they received transfusion or not.
On the other hand, none of the patients that had a major bleeding episode met transfusion criteria.

**Conclusion:** In this cohort, major bleeding after PLP occurred in less than 1% of patients. The current transfusion protocol although not uniformly adopted still led unnecessary blood product administration.

Our findings suggest that current recommendations of prophylactic transfusion for PLP need to be revised in patients with cirrhosis.

**12AP01-06**

**Assisted fluid management during major hepatic resection surgery: a randomized controlled trial**

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**Background and Goal of Study:** Fluid administration during major hepatic resection remains controversial. Conventional fluid therapy aims at minimizing fluids during the dissection phase to reduce central venous pressure, retrograde liver blood flow, and venous bleeding. This strategy, however, may lead to tissue hypoperfusion and hyperlactatemia. The Assisted Fluid Management (AFM) system, uses a novel decision support software whose complex algorithm helps clinicians guide intraoperative fluid bolus administration.

We tested the hypothesis that using AFM could decrease arterial lactate at the end of major hepatic resection without increasing intraoperative bleeding.

**Materials and Methods:** This two-arm, prospective, randomized controlled, superiority study included 90 consecutive patients undergoing major hepatic resection surgery. In the interventional (AFM) group, fluid therapy was guided throughout the procedure using the AFM system.

In the conventional (control) group, clinicians were recommended to restrict fluid infusion to 1-2 ml·kg−1·h−1 up to the completion of hepatectomy. They were then allowed to administer fluids liberally.

All patients had an arterial catheter and an uncalibrated stroke volume monitoring device. Noradrenaline was titrated in all patients to maintain a mean arterial pressure above 65 mmHg. The primary outcome was median arterial lactate level upon completion of surgery.

**Results and Discussion:** Forty-five patients were randomized to each group. Mean arterial lactate was lower in the AFM group than in the control group upon (2.8 (1.4) vs 4.5 (1.7) mmol·L−1, mean difference 1.7, 95% CI (1.0-2.4), p<0.001).

There was no difference in blood loss between groups (500 [300-800]ml vs. 450 [300-600]ml, p=0.727) despite CVP (mmHg) being slightly higher in the AFM group (7.7 (2.0) vs 6.6 (1.1), p=0.002).

**Conclusion:** Patients undergoing major hepatic resections and managed using an AFM strategy had a lower arterial lactate concentration at the end of the surgery when compared to a conventional fluid strategy. This indicates a better maintenance of tissue perfusion during major hepatic resection.

**Acknowledgements:** The study was sponsored by the APHP (Délegation à la Recherche Clinique et à l’Innovation). We wish to thank the anesthesiology and the surgical teams of Paul-Brousse hospital for their help in this study.

**12AP01-07**

**HPB surgery: abdominal wall catheter vs standard postoperative analgesia. The difference in postoperative pain evaluation. Randomized controlled study**

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1Lithuanian University of Health Sciences, Department of Anaesthesiology, Kaunas, Lithuania, 2Hospital of Lithuanian University of Health Sciences Kaunas Clinics, Department of Anaesthesiology, Kaunas, Lithuania

**Background and Goal of Study:** Pain after open HPB surgeries could be a huge challenge. It causes discomfort, organs' dysfunc-

**Materials and Methods:** The study was started in November 2022. Inclusion criteria: patient's consent; age > 18 years; transverse laparotomy incision. Exclusion criteria: chronic opioid use, age <18 years, hepatic insufficiency (Child- Pugh C) or chronic kidney disease (>3 st.). Included patients were randomized into two groups: interventional (abdominal wall catheter with Ropivacaine infusion) and standard (SM, systemic analgesics). The level of pain was documented on the day of surgery and 2 days after while rest (R) and on movement (M) 3 times per day (9AM, 4PM, 11PM) using VAS scale (0-10).

<table>
<thead>
<tr>
<th>Post-op day</th>
<th>SM group (n=20)</th>
<th>I group (n=14)</th>
<th>p</th>
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<tbody>
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<tr>
<td>R</td>
<td>4PM</td>
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<td>0,5 (0 - 5; 1,21)</td>
</tr>
<tr>
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<td>3 (0 - 6; 3,17)</td>
<td>1 (0 - 5; 1,29)</td>
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<td>3 (1 - 5; 2,79)</td>
<td>&lt;0,002</td>
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<td>2 (0 - 4; 2,08)</td>
<td>0,003</td>
</tr>
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</table>

The study was sponsored by the APHP Kuans Clinics.
Results and Discussion: During this period 34 patients were enrolled to the study. The two groups did not differ significantly. The pain significantly differed on the first and second post-op days and was significantly lower in the T group every time it was evaluated. We observed no significant differences in pain evaluation during the day of surgery.

Conclusion(s): Patients with abdominal wall catheters experienced significantly less pain on the first and the second day after HPB surgery and this method could be considered as a worthy alternative for patients after transverse laparotomies.


12AP01-08
Impact of remote ischaemic preconditioning on postoperative lactate clearance in patients undergoing liver resection: a randomized controlled study

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Background and Goal of Study: Surgical manipulations and the Pringle maneuver, especially if prolonged and/or repeated, can cause ischemia-reperfusion damage to the liver tissue evidenced by an impaired lactate metabolism in the post-operative period. It has been demonstrated that remote ischemic preconditioning (RIPC) could reduce hepatic dysfunction, in terms of hepatic enzyme alterations, after liver resection. We hypothesized that RIPC could be a protective factor against ischemia-reperfusion injury, assessed through postoperative lactate clearance, in patients undergoing liver resection.

Materials and Methods: The study protocol was approved by the local Ethics Committee (ID: 5033) and registered on ClinicalTrial.gov (NCT05594641). In this prospective, randomized, controlled, double-blind trial, 74 ASA II-III patients undergoing liver resection were assigned into 2 groups.

Patients from the treatment (T) group received RIPC before starting liver resection/Pringle maneuvers. A tourniquet was applied to the right arm and was inflated (3 cycles, each lasting 5 minutes, at a pressure of 200 mmHg); each cycle was followed by 5 minutes of rest. In the control (C) group, the tourniquet was applied to the right arm but the cuff was not inflated.

In the T group the primary end-point was lactate clearance 4 hours after liver resection. The secondary end-points were the patient's postoperative recovery, i.e. length of stay in post-anaesthesia care unit (PACU) and restoration of lactate metabolism. Student's t-test (or its nonparametric equivalent Mann-Whitney U) and chi-squared or Fisher's exact test were used for comparisons of continuous and categorical variables, respectively.

Results and Discussion: Lactate clearance was significantly higher 4 h after surgery in the T group (6.7±48.8) compared to the C (26.6±31.5) group (p<0.05). Moreover, patients of the T group showed a shorter length of stay in PACU compared to the C group (162±57 vs 211±48, respectively) (p<0.05). No difference in lactate clearance between the 2 groups was detected at 24 h.

Conclusion(s): RIPC has proven to be effective in enhancing lactate clearance in the early postoperative phase, regardless of the diagnosis, complexity of the liver resection procedure, or resection technique.

References:

12AP01-10
Which score may better predict liver dysfunction at day 90 after liver transplant?

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Background and Goal of Study: Early allograft dysfunction in the immediate posttransplant period influences both graft and patient survival in the liver transplant setting. There are many different scores in the literature that try to predict the outcomes of these lives and patient survival at 90 days. We want to assess which one of the most important scores (EAD, MEAF, MADIRE, I-graft day 7 and I-graft day10) may predict better early allograft dysfunction in our cohort of patients.

Materials and Methods: Retrospectively we studied all patient undergoing liver transplant in the Hospital Clinic Barcelona from 2008 to 2018. Living donor liver transplant and patients with acute liver failure were excluded. All data needed was obtained from the data base of the Hospital. Follow up was set until day 90.

Results and Discussion: 735 recipients were included (Men 52%, Age 55±10 years, BMI 26 ± 4, MELD 16 ± 7, Etiology Virus/Alcohol/Others (%) 46/30/24 CHILD 11. Donors: DBD/DCD (%) (94/6), cold ischemia time 365±69mins all scores were calculated following the original articles.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>AUC</th>
<th>Concordance or accuracy</th>
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<tr>
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<td>0.75</td>
<td>0.7</td>
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<tr>
<td>MEAF</td>
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<tr>
<td>MADIRE</td>
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<td>0.96</td>
<td>0.78</td>
<td>0.95</td>
</tr>
<tr>
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<td>0.93</td>
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</tr>
<tr>
<td>I-GRAFT 10</td>
<td>0.53</td>
<td>0.93</td>
<td>0.76</td>
<td>0.9</td>
</tr>
</tbody>
</table>
Conclusion(s): Among all scores analyzed, l-Graft was the one with better accuracy in predicting liver dysfunction 90 days after LT, in the current series however, considering its complexity the EAD is also a good alternative.

12AP02-03
Factors associated with acute kidney injury after on-pump coronary artery bypass grafting: retrospective study

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Background and Goal of Study: The occurrence and severity of AKI depends on a number of preoperative and intraoperative factors. The aim was to identify and analyze the risk factors for AKI in the early postoperative period after on-pump coronary artery bypass grafting (CABG).

Materials and Methods: Patients who underwent on-pump CABG at the “Heart Institute Ministry of Health of Ukraine” (Kyiv, Ukraine) during 2018 – 2020 were included in this retrospective analysis. The inclusion criteria were patients age between 18 to 65 years, with an ejection fraction >30% and a perioperative risk assessment according to EuroSCORE II <5%. The “XLSTAT” statistical data processing program was used to analyze the obtained results.

Results and Discussion: The study included 100 patients, of which 26 (26.0%) developed AKI. Univariate analysis showed that patients who developed AKI were characterized by significantly higher EuroSCORE II values (2.00±0.98 vs. 1.49±0.74, p = 0.006), higher initial levels of urea (7.62±2.94 mmol/L vs. 6.12±1.17 mmol/L, p = 0.002) and creatinine (107.7±38.5 µmol/L vs. 91.2±16.2 µmol/L, p = 0.003), a higher frequency of initial albumin level below 30 g/L (9 (34.6%) vs. 11 (14.9%) cases, p = 0.030) and a lower initial hemoglobin level (13.7±1.32 g/L vs. 14.6±1.36 g/L, p = 0.005) compared to patients without this complication.

As for the intraoperative period, in the group of patients with AKI, a significantly lower level of hemoglobin was recorded during CPB (9.21±1.14 g/dl vs. 9.85±1.35 g/dl, p = 0.030), a lower minimum delivery oxygen (DO2) (295.9±36.6 ml O2/min/m2 vs. 316.8±43.5 ml O2/min/m2, p = 0.030) and a higher need to use erythrocyte masses (20 (76.8%) vs. 31 (41.9%), p = 0.028).

Although there was no difference between patients with AKI and those without this complication regarding the stay in ICU (2.80±1.44 days vs. 2.51±0.55 days, p = 0.142), however, the total length of hospitalization in patients with AKI was determined reliably higher (14.3±5.45 days versus 12.6±3.05 days, p = 0.048).

Logistic regression showed that only oxygen delivery during CPB was associated with the development of AKI in the early postoperative period (OR 1.75, 95% CI 0.99–3.07)

Conclusion(s): The incidence of AKI in our study was 26%. Oxygen delivery during CPB is a risk factor identified for AKI development in our cohort.

12AP02-04
Association of myocardial injury and serum B-type natriuretic peptide levels in the early postoperative period after living donor liver transplantation

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Background and Goal of Study: In addition to an incidence rate of 17.9%, postoperative myocardial injury (PMI) after noncardiac surgery was significantly associated with 30-day mortality. Living donor liver transplantation (LDLT) is associated with a higher incidence rate of PMI due to longer surgical duration and increased blood transfusion necessity, however, the exact incidence of PMI following LDLT remains unknown.

This retrospective study aimed to determine the incidence of PMI following LDLT and the association between PMI and B-type natriuretic peptide (BNP) level, a biomarker for predicting the postoperative development of adverse cardiovascular events.

Materials and Methods: Twenty-six adult patients who electively underwent LDLT from July 2018 to July 2022 were retrospectively enrolled in this study. Target data were collected from patients’ electrical records. The levels of high-sensitivity cardiac troponin I (hs-cTn I) and BNP were measured four times in the following manner: immediately (T0), one day (T1), 2 days (T2), and 3 days (T3) after admission to the intensive care unit. If hs-cTn I levels Values of the hs-cTn I that exceeded 26.2 ng/L on at least one occasion were considered diagnostic for post-LDLT PMI.

Results and Discussion: Seventeen of the 26 enrolled patients were diagnosed with PMI (the incidence rate was 65.4%). Univariate regression analysis revealed that a longer surgical duration and more transfusion of packed erythrocyte units were significant predictors of PMI.

Furthermore, the patients in the PMI group demonstrated a significantly higher BNP value at T1 (median: 187.4 ng/L, range: 110.4–257.5) than those in the non-PMI group (median: 77.7 ng/L, range: 59.2–140.5) (p = 0.023). Levels of hs-cTn I and BNP showed a significant positive correlation; the correlation coefficient was 0.681 (95% confidence interval: 0.451–0.743, p < 0.001).

However, the development of cardiovascular adverse events and BNP levels demonstrated no significant association. This could be attributed to the small sample size of our study.

Conclusion(s): The incidence of PMI after LDLT is 65.4%, which is much higher than that in other noncardiac surgeries. The development of PMI is associated with higher BNP levels. Although longer surgical duration and greater blood transfusion necessity may be candidates for predicting PMI following LDLT, we need further study to clarify them.
12AP02-06
Positive end expiratory pressure and its effect on the central venous and hepatic venous pressures during pneumoperitoneum

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Background and Goal of Study: Anesthetic management during laparoscopic liver resections has aimed to reduce central venous pressure (CVP) in order to avoid bleeding in the field. Low volume status and zero positive end expiratory pressure (zPEEP) are among interventions used to achieve this. A high hepatic venous pressure (HVP) can increase bleeding from the liver during liver surgery, but whether CVP is a good marker of HVP is uncertain. In this clinical study, we aimed to compare the effect from PEEP on CVP and HVP during head-up tilt and pneumoperitoneum, hypothesizing that PEEP would increase HVP.

Materials and Methods: We included 11 patients planned for laparoscopic liver resection in the New Comet study (ethical approval REK 255384, separate consent form signed). The patients were anesthetized by TCI-TIVA (propofol and remifentanil), intubated, and ventilated 6 ml/kg to EtCO2 4-6.5 kPa. After induction, arterial, central venous and liver vein lines (through the femoral vein, guided by fluoroscopy) were placed for pressure recordings.

Before the resection, the following interventions were made, allowing a 3-minute stabilization period before each measurement: 1) head-up-tilt 10°, zPEEP and; 2) head-up-tilt 10°, PEEP 10 cm H2O. After establishing pneumoperitoneum at 12 mmHg, the same two recordings were repeated.

The results were expressed in means ± standard deviations (SD), paired samples T-test was used for comparison. p≤0.05 was considered significant.

Results and Discussion: The CVP correlated well with the HVP before pneumoperitoneum (Figure 1, stapled lines). During pneumoperitoneum, HVP increased more than CVP (Figure 1, solid lines). Adding PEEP, the CVP increased (5.3±2.6 to 8.2±2.5 mmHg, p<0.001), while HVP remained unchanged (11.0±2.8 to 11.0±3.1, p=1.0).

Conclusion(s): In the current study, the application of PEEP did not increase HVP in patients undergoing laparoscopic liver surgery.

These findings suggest that the benefit of zPEEP to reduce the risk of bleeding might be smaller than expected, potentially not outweighing the associated risk of postoperative pulmonary complications.

12AP02-07
Ischemic hepatitis secondary to cardiac tamponade and right ventricle failure: thromboelastogram as a bedside diagnostic tool, a case report

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Background: Ischemic hepatitis secondary to right heart failure is an infrequent condition with a high mortality in ICU. Coagulopathy an early manifestation which can be closely monitored through the use of bedside thromboelastogram (TEG).

Case Report: Our patient is a 76-year-old woman admitted to PACU after TAVI surgery complicated by pericardial tamponade (Image 1).

After pericardial drainage the patient experienced transient improvement; however, at 24h, she presented rapid atrial fibrillation associated with hemodynamic deterioration requiring vasoactive drugs, although echocardiography showed no significant effusion. Invasive hemodynamic monitoring was started with PICCO: IC 1.29, GEDI 561, VSI 15, VVS 26, ELWI 12, PVPI 3.2, dPmax 2799, SVRI 2100, compatible with persistent right ventricular failure. Bedside blood gases showed metabolic acidosis, as well as hyperbilirubinemia and hypoglycemia. TEG revealed an increased CK-R with a decreased CRT-MA (Image 2).

Blood tests (2h later) showed hypoglycemia, elevated transaminases, thrombocytopenia and severe coagulopathy. A CT scan showed signs of right heart failure and hepatic hypoperfusion suggestive of acute hepatitis (Image 3).

TEG-guided correction of coagulopathy was started with transfusion of prothrombin complex concentrate. Within 48 hours MARS therapy was established as specific treatment, with limited response.

Discussion: The present case highlights the role of TEG in two serious and infrequent complications of TAVI: first, pericardial tamponade and, second, ischemic hepatitis. The latter condition, scarcely studied in the literature, has an estimated in-hospital mortality of up to 51% [1].

Previous liver disease is a risk factor; however in half of the cases the ischemic event is secondary to acute right heart failure. Multifactorial and rapidly evolving coagulopathy is one of its main features and plays a key role in differential diagnosis (1).

Previous trials in other groups of patients with liver disease demonstrate that the TEG-guided strategy significantly decreases both mortality and blood product use compared to conventional therapy based on INR and platelet count (2).
Reference:

Learning Points: The use of bedside TEG in ischemic hepatitis allows for both early diagnosis of liver failure and early management of hemostasis.

12AP02-08
Case report: hemihepatectomy for hepatocellular carcinoma in adult female patient with McCune-Albright syndrome – anesthetist management

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Background: McCune-Albright syndrome (MAS) is a rare mosaic condition caused by a mutation in the GNAS gene. Clinical features include polyostotic fibrous dysplasia, hyperfunctioning endocrine disorders and hyperpigmented macular birthmarks with rough borders.

Case Report: There are several factors that need to be considered in management of patients with MAS. Fibrous dysplasia affects numerous bones that may undergo tension and pressure during the initial positioning, tracheal intubation, surgery. Since in this patient fibrous dysplasia was present in C2-C3 vertebrae as well as in the maxilla, clavicle, scapula and the occipital bone, bronchoscopic intubation was chosen to minimize head repositioning (notably, neck extension and maxillar traction). Deformation of multiple ribs on both sides mandated careful monitoring and adjustment of respiratory parameters but did not require any additional measures beyond regular lung protective ventilation. To prevent bone damage during puncture, Tuohy needle was inserted with an aid of ultrasound visualization. Extended preoperative evaluation has revealed nodular thyroid hypertyrophy, autoimmune thyroiditis, mild hypophosphatemia (0.72 mmol/L); elevated GGT and ALP (238 and 157 units/L) with normal ALT and AST; consolidated pathological fracture of the left hip, 90 degree kinking of the left coronary artery.

Surgery without features. Intraoperative blood loss was 800 ml. FFP transfusion according to thromboelastography. The postoperative period, according to the principles of ERAS, is uncomplicated. Coagulopathy was not observed in the early postoperative period.

Learning Points:

12AP02-09
Hepatectomy in a patient with severe aortic regurgitation

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Background: Hemihepatectomy in a patient with severe aortic regurgitation is a high-risk surgery and challenging for the anesthesiologist.

Case Report: A 76-year-old female presented in March 23 with severe shortness of breath, background of vasculitis, and bowel and breast cancer. Blood tests showed anaemia with Hb of 50 g/L. Investigations revealed a colonic tumour. CT and MRI demonstrated a large solitary liver metastasis in segment 7/8 effacing the right hepatic artery close to IVC. Echocardiography demonstrated severe aortic regurgitation with left ventricular hypertrophy but no left ventricular dilatation. After chemotherapy, the patient was listed for a right heimihepatectomy + IVC resection. An MDT with cardiology, liver surgery and anaesthesia was convened to proceed with urgent cancer surgery prior to valve replacement. Awake arterial line was sited followed by an opioid-based induction and the use of intra operative transoesophageal echocardiography. Goal directed judicious fluid was given based on the TOE findings, the patients HR was maintained between 80 – 100/min and SVR was allowed to fall whilst maintain a MAP of > 65 mm Hg. The liver resection necessitated IVC resection, right hemihepatectomy and some diaphragm resection. Postoperatively patient was admitted to ICU and made a good recovery.

Discussion: Patients with advanced cardiac disease presenting for oncological surgery pose difficulty for the anaesthesiologist. Balancing the risk of undertaking higher risk urgent surgery versus delaying the surgery by months to allow cardiac intervention is difficult and requires a MDT approach. The aim is to create awareness that perioperative anesthetic management of such cases is possible with continuous cardiac monitoring, multidisciplinary approach and strict vigilance.

Learning Point: With an ageing population, we will see an increased incidence of patients presenting for urgent hepatic resection with undiagnosed severe valvular disease. Delaying surgery in order to treat the valvular disease may not always be the right approach.

Reference:
Metabolic Disease and Obesity

12AP02-01
Coagulation patterns in the long term follow-up after the bariatric surgery

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Background and Goal of Study: Obesity is an established risk factor for developing postoperative thrombotic events. Deep vein thrombosis and pulmonary embolism are the major risk factors of mortality after bariatric surgery (BS). The aim of the study was to determine hypercoagulable states in patients undergoing BS and evaluate the dynamics of TEG parameters, clotting factors and inflammatory markers in the long term follow up in relation to weight loss after BS.

Materials and Methods: We included 60 consecutive patients undergoing BS. Hypercoagulable state was defined when patients showed clot strength (G) of ≥11 dynes/cm² or maximum amplitude (MA) ≥68 mm on TEG. TEG measurements, protein C, protein S, FVII, ATIII, CRP and hs-CRP were assessed at three time points: prior to surgery, one month and one year after surgery.

Results and Discussion: Fourteen patients (23.3%) had G≥11 dynes/cm² and seventeen (28.3%) had MA≥68 mm at baseline. One-year post-surgery average MA values were significantly lower (63.04 mm) when compared to baseline (65.60 mm; p=0.001). G values have significantly decreased both one month (9.19 dynes/cm²; p=0.018) and one year (8.71 dynes/cm²) when compared to baseline (9.83 dynes/cm²; p=0.001).

ATIII activity increased significantly from baseline (106.3%) compared to one month (115.6%; p<0.001) as well as one year post-surgery (119.2%; p<0.001).

FVII activity was reduced from baseline (132.7%) compared to activity one month (122.8%; p=0.038) and one year after the surgery (123.6%; p=0.043). Hs-CRP decreased from baseline (123.6%; p=0.043). Hs-CRP decreased from 7.1 mg/l to 2.3 mg/l one year after surgery (p=0.018) and one year (8.71 dynes/cm²) when compared to baseline (9.83 dynes/cm²; p=0.001).

Additional findings included reduced pro-coagulatory activity in relation to weight loss after BS.

Conclusion(s): A considerable proportion of patients referred to BS show a trend towards hypercoagulability on TEG. Significant changes of MA and G values on TEG analysis, as well as dynamics of FVII factor activity, ATIII and inflammatory markers suggest reduced pro-coagulatory activity in relation to weight loss after BS.

12AP02-02
Is bariatric surgery safe in patients with Chronic Heart failure? A retrospective cohort study

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Background and Goal of Study: In patients with obesity and chronic heart failure (HF), weight loss improves functional capacity. Bariatric surgery (BS) is a very effective and safe treatment. However, there is not clear evidence about the safety of BS in patients with severe chronic heart failure (CHF). We aim to assess the incidence of postoperative complications (PPC) in patients with severe obesity and CHF who underwent BS.

Materials and Methods: Single-center retrospective study in patients with body mass index (BMI) > 35 kg/m² and CHF defined as left ventricular ejection fraction (LVEF) < 45% having BS. We recorded demographic and clinical data, perioperative complications, and weight loss and LVEF 1-year after BS. The primary outcome was the incidence of PPC measured by the comprehensive complication index (CCI). The secondary, length of hospital stay (LOS), and weight loss and LVEF 1-year after BS.

Results and Discussion: 35 patients (57±9 y. o., BMI 45±6 kg/m², and LVEF 35±9 %) were included in the analysis. The overall incidence of PPC was 26% (1 intraoperative and 8 postoperative) and the average LOS was 3.8±1.7 day. One year after BS the BMI was 32±5 kg/m² and the LVEF improved to 38±10%. When patients were divided according LVEF < or >30%, patients with LVEF <30% showed a higher incidence of complications and higher CCI. However, complications were mild and no differences were observed in LOS. One year after BS, weight loss was the same but patients with LVEF<30 showed the greatest improvement in LVEF.

Conclusion: Bariatric surgery in patients with CHF seems to be effective and safe even in patients with LVEF<30%. Although they showed higher rate of complications there was no impact in LOS. Additionally, they showed a greater improvement in LVEF one year after BS.

Table 1. Demographic and clinic characteristics.

<table>
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<th>Age, y. o.</th>
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<td>55±9</td>
<td>58±9</td>
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<td></td>
</tr>
<tr>
<td>Sex: male/female, n</td>
<td>12 (100) / 0 (0)</td>
<td>18 (78) / 5 (22)</td>
<td>NS</td>
</tr>
<tr>
<td>BMI, kg/m²</td>
<td>46±6</td>
<td>44±6</td>
<td>NS</td>
</tr>
<tr>
<td>ASA III/V, n</td>
<td>9 (75) / 3 (25)</td>
<td>21 (91) / 2 (9)</td>
<td>NS</td>
</tr>
<tr>
<td>LVEF before-BS, %</td>
<td>24±4</td>
<td>41±4</td>
<td>NS</td>
</tr>
<tr>
<td>CHF Etiology: Ischemic /others, n</td>
<td>4 (33) / 8 (67)</td>
<td>11 (48) / 12 (52)</td>
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<tr>
<td>Surgery: Sleeve/bypass, n</td>
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<td>20 (87) / 3 (13)</td>
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<tr>
<td>Surgery duration, min</td>
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<td>79±19</td>
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</tr>
<tr>
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<td>Postoperative complications, n</td>
<td>5 (42)</td>
<td>3 (13)</td>
<td>P&lt;0.01</td>
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<tr>
<td>Hospital length of stay, days</td>
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<td>3.6±1.9</td>
<td>NS</td>
</tr>
<tr>
<td>ICU, days</td>
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<td>0.43±0.5</td>
<td>NS</td>
</tr>
<tr>
<td>BMI at 1-year, Kg/m²</td>
<td>33±4</td>
<td>33±5</td>
<td>NS</td>
</tr>
<tr>
<td>LVEF at 1-year, %</td>
<td>38±12</td>
<td>36±4</td>
<td>NS</td>
</tr>
</tbody>
</table>

Data expressed as mean±SD and n(%)

Table 1 Demographic and clinic characteristics.
Association of domain-specific physical activity with diabetes prevalence: a population-based study

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Background and Goal of Study: Leisure-time physical activity (LTPA) has been recognized for its role in reducing diabetes risk. However, the impact of other activity domains like Occupation-related Physical Activity (OPA) and Transportation-related Physical Activity (TPA) on diabetes prevalence is less explored. This study seeks to address this by examining the links between OPA, TPA, and overall physical activity with diabetes prevalence in adults.

Materials and Methods: In this research, 30,408 participants from the 2007–2018 National Health and Nutrition Examination Survey (NHANES) provided self-reported physical activity data. Diabetes status was identified through self-reports or glycosylated hemoglobin levels $\geq 6.5\%$ (48 mmol/mol). The study examined how diabetes prevalence varied with different intensities of physical activity across various domains and overall PA.

Results and Discussion: Participants adhering to the recommended physical activity guidelines of at least 150 minutes per week demonstrated varying degrees of reduced likelihood of having diabetes. This reduction was quantified as 26.0\% for total PA, 17.6\% for Transportation-related PA, 29.7\% for Leisure-time PA, and 15.8\% for Occupation-related PA. Additionally, engaging in total PA for 150–299 minutes and over 300 minutes per week corresponded to a 30.2\% and 32.7\% lower risk of diabetes, respectively. For Transportation-related PA at levels of 1–149, 150–299, and over 300 minutes weekly, the reduced odds of diabetes were 14.3\%, 25.5\% and 17.6\%, respectively. Leisure-time PA at 150–299 minutes and over 300 minutes per week showed a 26.6\% and 42.0\% lower diabetes risk, respectively. Finally, Occupation-related PA exceeding 300 minutes weekly was linked with a 16.7\% reduced likelihood of having diabetes.

Conclusion(s): LTPA, OPA, TPA, and overall PA each demonstrated a consistent association with reduced diabetes prevalence, regardless of the activity amount. This finding underscores the potential health benefits of enhancing physical activity, as even modest increases in PA could contribute to lowering the prevalence of diabetes.
Background: Opioids, including morphine and fentanyl, are integral to modern anesthetic management. However, their impact on the immune system and inflammation is a subject of ongoing debate. Most evidence supporting their immunosuppressive properties is based on morphine, which may lead to misconceptions about the immune effects of other opioids.

Materials and Methods: To investigate the immunomodulatory potential of fentanyl and morphine, we cultured macrophages (RAW 264.7) in media containing clinically relevant concentrations of both opioids (1, 10, and 100 ng/ml) overnight, followed by an inflammatory challenge using LPS (10 ng/ml).

We assessed the effects of fentanyl and morphine on inflammation by:

a. Analyzing real-time PCR data for the transcription dynamics of pro- and anti-inflammatory genes (IL-6, TNFα, and IL-10) during the first 6 hours post-stimulation,

b. Conducting flow cytometry analysis of the expression of CD40 in monocytes. Two distinct sepsis groups were observed based on the first 6 hours post-stimulation.

c. Evaluating changes in pro-inflammatory nitric oxide (NO) levels in the 24-hour supernatant using ELISA.

Results and Discussion: Our study unveiled significant distinctions in macrophage immunomodulation between morphine and fentanyl, with fentanyl demonstrating a more pronounced effect. Fentanyl exposure, in contrast to morphine, led to reduced IL-6 transcription but increased TNFα and IL-10 transcription as early as 3 hours post-stimulation.

A similar pattern was observed with a dose-dependent decrease in the expression of CD40 and CD86 surface markers at 24 hours, and;

Conclusion: While fentanyl and morphine are commonly used analgesics in intra- and perioperative settings, our findings suggest that fentanyl, but not morphine, possesses potent immunomodulatory properties. It can induce dose-dependent anti-inflammatory effects in macrophages. These findings have potential implications for managing both desired and undesired inflammatory responses in patients undergoing surgery or critical care.

Further research into the underlying mechanisms of fentanyl's immunomodulatory effects is warranted and may pave the way for new strategies to manage inflammatory conditions effectively.
13AP01-03
In depth analysis of different commonly used anaesthetics on natural killer cell cytotoxicity; an in vitro study

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Background: Anaesthetic agents likely contribute to immunosuppression during oncological surgery. A number of studies have found that exposure to volatile anaesthetics leads to reduced levels of natural killer (NK) cells, which are vital to the anti-cancer immune response. NK cells can be divided into different subsets, with varying levels of cytotoxic activity. The aim of this study was to evaluate the effects of different anaesthetics and combinations on the proliferation and cell-lytic molecule expression of NK cells and to compare changes between phenotypes.

Methods: Peripheral blood mononuclear cells collected from 8 healthy donors were treated for 4 hours with dexmedetomidine, remifentanil, lidocaine, propofol, sevoflurane, and combinations of these anaesthetics or left untreated. Flow cytometry was used to quantify proliferation through cell surface markers for CD56 and CD16 and to assess functional cytotoxicity through Granzyme B and Perforin surface expression. Differences in percentages to control were analysed using the paired-samples t-test for normalized data, and the Wilcoxon signed-rank test for non-normalized data.

Results: The percentage of total NK cells increased only after exposure to propofol with lidocaine (p=0.023). However, proliferation of CD56 dim CD16+ NK cells was inhibited after exposure to lidocaine (p=0.024), propofol (p=0.045), and sevoflurane (p=0.008). Dexmedetomidine and remifentanil did not compensate for the inhibitory effects, and lidocaine enhanced the inhibitory effects when combined with propofol (p=0.002) and sevoflurane (p<0.001) (Figure 1).

Conclusion: Propofol and sevoflurane suppress the mature and highly cytotoxic phenotype (CD56 dim CD16+) of NK cells, with those exposed to sevoflurane showing a greater inhibition. This immunosuppression was intensified with the inclusion of lidocaine into the anaesthetic regimen.

13AP01-04
Endothelial cells flow cytometry in human sepsis: a systematic review

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Background and Goal of Study: Sepsis is currently the leading cause of morbidity and mortality in ICU patients. Hence, its early identification is crucial. Being the endothelium a key factor for organ failure in sepsis, we aimed to examine the literature that has addressed the study of endothelial cells by flow cytometry (FCM) in human sepsis.

Materials and Methods: We systematically searched PubMed and Web of Science from inception until June 2023 to identify original research articles describing the use of FCM to study human endothelial cells in sepsis. We excluded studies that assessed other types of cells or that used FCM to evaluate endothelial cell apoptosis. Two investigators independently extracted the data and assessed the risk of bias. This systematic review has been conducted following the PRISMA 2020 statement.

The study protocol was prospectively registered with PROSPERO, CRD42023382856. The PRISMA-based flow diagram is shown in Figure 1.

Results and Discussion: 395 original articles were found, with 36 fulfilling the inclusion criteria. 10 studied circulating endothelial cells, either mature (CECs) or progenitor (CEPCs), describing how higher CEC and/or CEPC counts correlated with higher mortality; moreover, CEC numbers were increased even before shock development, confirming that endothelial damage occurs prior to organ failure. 26 manuscripts studied the phenotype of different human microvascular endothelial cells (HMECs), revealing that the expression of adhesion molecules ICAM-1, VCAM-1 and E-selectin were increased in sepsis but without proven relation to severity or mortality.

An imbalance between tissue factor and tissue factor pathway inhibitor-1 can have an adverse effect on septic patients’ prognosis. Although all studies included are prospective, heterogeneity is the main limitation.

Figure 1. Presented as percentage change of the median of samples to control.
Conclusion(s): Higher CEC and CEPC counts correlate with sepsis severity and mortality, hence confirming that their assessment by FCM can shed some light on early sepsis diagnosis. However, HEMC phenotyping does not seem to aid sepsis diagnosis or predict subsequent prognosis. More research is needed to assess how flow cytometry can contribute to sepsis.

13AP01-07
Early use of innovative biomarkers in post-cardiac surgery patients undergoing elective cardiac surgery: a monocenter, pilot case series

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Background and Goal of Study: Uncertainty about prognosis and missed diagnoses of sepsis are still frequent in the post-cardiopulmonary bypass (CPB) surgery when a systemic inflammatory response occurs, as a result of the combination of surgical trauma, activation of blood components in the extracorporeal circuit, ischemia/reperfusion injury, endotoxins release.

An urgent and unsatisfied need for new diagnostics might be represented by new biomarkers, such as Septicyte® RAPID (which rapidly investigate the host immune response evaluating the pla2g7 and plac8 genes expression in whole blood)1 and proadrenomedullin (pro-ADM).

Materials and Methods: Traditional and innovative biomarkers have been analysed within the first 24 hours post CPB of a pilot group of patients admitted to the cardiac Intensive Care Unit of the ‘Città della Salute e della Scienza’ University Hospital (Turin, Italy) between June and November 2023.

Results and Discussion: We collected data on 14 patients, 7 undergoing surgery for infective endocarditis (IE, Group 1) and 7 having elective non-complicated cardiac surgery (Group 2). Patient characteristics are shown in Table 1. Procalcitonin, lactate, pro-ADM were incremented in Group 1, characterized by SOFA 11; SAPS 57 and in need for high inotropic/vasopressor support; and not in Group 2. Septicyte® showed a moderate, border line increase in Group 1 (Table 2). No patients died in the first 28 days after surgery.

Conclusion(s): Although limited by the sample size, our preliminary data shown no biomarkers alteration in patients undergoing uncomplicated CPB surgery, in contrast to patients with IE. Further data are needed to better define the performance and the potential clinical role of the new biomarkers in the post-cardiac surgery.

Reference:
13AP01-08
Netrin-1 knockout promotes survival in a murine sepsis model

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Background and Goal of Study: Sepsis is defined as a dysregulated immune response to infection. Understanding the transition from hyperinflammation to immunoparalysis remains a challenge. A potential regulator of this transition is Netrin-1, a neural guidance protein known for its dual role in inflammation - reducing it in acute sterile scenarios and sustaining it in chronic conditions. Therefore, we investigate the role of Netrin-1 in the initiation and resolution of the murine cecal-ligation puncture sepsis model.

Materials and Methods: In mice with monocyte and neutrophil-specific Netrin-1 knockout (Ntn1fl/flLysMCreERT2) sepsis was induced through cecal ligation and puncture (CLP). Post-CLP, we assessed at different timepoints the impact of Netrin-1 knockout on survival and the altered immune responses, focusing on peripheral mononuclear blood cells (Fig A).

Results and Discussion: Data from 73 animals at various time points revealed intriguing trends. Wild-type (WT) mice exhibited significantly higher mortality, primarily within 24 hours post-CLP. (Fig B) Moreover, exerted WT animals increased immune cells in the peritoneal lavage while a decrease in the spleen was noted. (Fig C) In WT mice organ specific evaluation of T-cell subpopulations in lavage and blood demonstrates an increase of antiinflammatory Th2 and Treg in early stages (24h, 48h) contrasting with findings in the spleen.

This suggests that Netrin-1 might facilitate the early migration of Th2 and Treg cells from the spleen to inflammation sites. (Fig D)

Conclusion(s): Unpublished data on netrin-1 in ICU from our group already implied that Netrin-1 downregulation is beneficial for sepsis outcomes. The murine findings presented in this abstract support a detrimental role of netrin-1 in sepsis, showing improved survival in Netrin-1 KO mice, likely due to its role in cell migration and differentiation. However, further research is necessary to fully understand the mechanisms by which netrin-1 fosters sepsis.

13AP01-10
A shortened CytoSorb® adsorber mean change interval does not alter time until shock reversal in sepsis. A retrospective study

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Background: Sepsis and septic shock are characterized by high mortality. One goal of therapeutic efforts is rapid shock reversal that might be enhanced by adjunctive hemoadsorption with CytoSorb®.

We hypothesized that shortening of the CytoSorb® adsorber mean change interval, defined as adsorber used per time, has a positive effect on the course of disease and reduces the time until shock reversal.

Methods: In a retrospective study, we compared two groups of 17 patients with septic shock treated by CytoSorb® with short mean change interval (smci) (13.4±1.8h) vs. long mean change interval (lmci) (22.1±3.6h). Shock reversal was defined as the time from hemoadsorption start to the end of norepinephrine treatment. Secondary endpoints included heart rate, platelet count and interleukin-6 (II-6) decay.

Results: Time until shock reversal was not different between the groups (smci: 194.2±119 vs. lmci: 214.3±214h; p=0.763) and did not correlate with the mean change interval (p=0.344). At baseline, there was no difference in SOFA or APACHEII score or lactate between groups. The mean change interval correlated negatively with tachycardia (p=0.008) and II-6 levels (p=0.001) and positively with hypotension (p=0.025) and leucocyte count (p=0.030). II-6 was higher in the smci group at baseline and 24h but not thereafter. The mean change interval correlated negatively to the nor-epinephrine dose from baseline until 48h, with the SOFA score at 96h and positively with platelet count from 48h to 120h. The platelet count decreased significantly over time in both groups (p<0.001 and p=0.002, respectively). The maximum difference occurred at 72h with smci vs. lmci of 70.6±66.6 vs. 160.9±110.9 Gpt/l, respectively (p=0.003).

Conclusions: Special attention should be put on the mean change interval. It is a measure for the number of free adsorption binding sites which might be a factor for treatment success. Increasing the number of adsorbers per time interval had no influence on the time to shock reversal in patients with septic shock. Since baseline characteristics imply that patients with the shorter change interval might have been sicker, two conclusions are possible:

Either, an increased number of adsorber binding sites does not have a beneficial impact, or shortening of the change interval will level outcomes of the most compromised patients to those with lower risks.

Possible side effects have to be considered when using CytoSorb® “high dose” in the context of septic shock.
**13AP01-11**
The effect of adding a multivitamin preparation to total parenteral nutrition solution on microorganisms growth

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**Background and Goal of Study:** Aim of this study is to investigate the impact of the multivitamin supplement added to TPN solution on growth rates of microorganisms in TPN solution. Research groups were formed with clinically most commonly encountered 5 microorganisms as factors affecting nosocomial infections (P. aeruginosa, S. aureus, E. coli, S. epidermidis, C. albicans).

**Materials and Methods:** Two TPN solutions were prepared. 10 mL of normal saline was added to one of solutions. Other TPN solution (TPN-MV) was mixed with a multivitamin solution, prepared by diluting 10 mL of normal saline. Preparation of TPN solutions and the addition of multivitamins to solutions were carried out. 10 samples of 10 mL were taken from each solution into test tubes. To each tube, 1 mL of solutions containing microorganisms were added. In each group (TPN and TPN-MV), 5 microorganisms were prepared to be added to two test tubes. At the end of procedure, two test tubes were obtained for each microorganism used in study: one containing TPN without multivitamins (TPN) and another containing TPN with multivitamins (TPN-MV). Samples were taken from the incubated solutions at 24 and 48 hours. For assessment of proliferation, colonies on agar plates were counted, and arithmetic means were calculated. The values at 0, 24, and 48 hours were computed, and proliferation statuses were compared both within each time frame and between groups during the same time period.

**Results and Discussion:** It was observed that the proliferation rates of P. aeruginosa and E. coli decreased over time, with this decline being less pronounced in the TPN solution supplemented with multivitamins. In contrast, it was determined that both S. aureus and S. epidermidis proliferated in high quantities in both types of TPN solutions. Our study demonstrates that the multivitamin complex may have a potential effect on the proliferation of microorganisms within TPN solutions.

**Conclusion(s):** The findings suggest that multivitamins may enhance microorganism growth and potentially increase the risk of infection. Results of this study can serve as an important guide in development of nutrition and infection control strategies in clinical practice.

**Reference:**

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**13AP01-12**
Postoperative effects of preoperative recombinant Interleukin 2 administration on outcome after gastrointestinal cancer surgery: a systematic review and meta-analysis

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**Background:** Immunomodulation to prevent postoperative immunosuppression after gastrointestinal cancer surgery might reduce complications, lower perioperative mortality and prolong survival. Recombinant IL2 (rIL2) (Proleukin®) is an immunotherapeutic drug used in cancer treatment. It activates effector immune cells and can also stimulate regulatory T-cells. A systematic review or confirmative trial is not available.

**Objective:** Our objective was to investigate effects of preoperative administration of rIL2 for different dosages on postoperative outcome parameters including survival, surgery induced immunosuppression, surgical site infections and side effects of rIL2 in patients undergoing gastrointestinal cancer surgery.

**Method:** We conducted a systematic literature review and meta-analysis. We included trials that recruited adult patients undergoing gastrointestinal cancer surgery. The intervention group received preoperative subcutaneous rIL2 plus standard care. Patients in the control group received standard care alone. For most outcome parameters a random-effect model was applied. Statistical heterogeneity among the effect of the included trials was evaluated using the I² statistic. Odds ratio (OR) and 95%-CI were pooled for dichotomous and mean difference (MD) with 95%-CI for continuous outcomes.

**Results:** Out of 2,191 screened studies we included 13 randomized controlled trials and overall 504 patients. Lymphocyte counts [cells/mm³] at one week postoperatively were significantly higher in the intervention group compared to the control group (MD 865 (95%CI: 26; 1705)). Surgical site infections were less likely in the intervention group (OR 0.13 (95%CI: 0.03; 0.50)). Out of 301 patients none showed an event in the intervention group versus nine events occurred in the control group. Systemic infections were less likely to occur in the intervention group (OR 0.25 (95%CI: 0.10; 0.66)). No significant difference was observed towards long-term survival (OR 1 (95%CI: 0; 2)). Severe side effects of rIL2 were not reported for any dosages.

**Conclusion:** Preoperative administration of rIL2 appears to promote immunomodulation, to prevent postoperative immunosuppression and to improve outcome of gastrointestinal cancer surgery while the occurrence of severe side effects seems not to be relevant.
**13AP02-01**

**Risk factors for the development of purulent-septic complications in orthopedic surgery**

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**Background and Goal of Study:** The widespread development of total joint arthroplasty and corrective surgery on tubular bones, along with obvious advantages associated with improving the quality of life, is accompanied by an increase in the number of purulent-septic complications, reaching from 3.1 to 22.6% [1]. We want to determine the risk factors for the development of purulent-septic complications after orthopedic interventions.

**Materials and Methods:** The study included 38 patients who underwent orthopedic interventions from April 2018 to December 2019. General information such as gender, age, diagnosis, surgical site, anemia, and infectious complications was recorded. Statistical methods included the Pearson Chi-square test, univariate, and multivariate logistic regression analysis. All statistical analyses were performed using SPSS software (version 24.0; IBM Corporation, New York). P < 0.05 was considered statistically significant.

**Results and Discussion:** A total of 38 patients were examined and divided into 2 groups. Patients with infectious complications after surgery, such as SSI - 9, RTI - 2, UTI - 8 (IC) were included to the Group I. Patients without complications (WC) were included to the Group II. There were no significant differences between the groups in terms of gender and weight. The average age of patients in the IC group was 61.4±11.5 years, in the WC group - 61.6±13.2 years (p >0.05). It should be noted that 47.3% of patients in the IC group had preoperative anemia, while in the WC group only 5% (χ2 <0.02). Moreover, the hemoglobin level before surgery in the group I was 117±3±3.4 g/l, and in the Group II – 136.3±8.6 g/l, p < 0.001. It was also revealed that concomitant diabetes mellitus was observed in 52.6% of patients in the IC group, which was significantly higher than in patients in the WC group (10.5%, χ2 <0.04). Hyperglycemia above 7.5 mmol/l at the end of the operation occurred in 68.4% of patients in the IC group, whereas there were none in the WC group (χ2 < 0.002). No deaths were registered in the both groups. The findings of the study are supported by several other studies that the presence of preoperative anemia and diabetes mellitus in a patient are associated with high risk of periprosthetic infection. [2]

**Conclusion(s):** In summary, potential factors in the development of purulent-septic complications after orthopedic interventions likely related to perioperative anemia, concomitant pathologies such as diabetes mellitus, and the development of hyperglycemia in the intraoperative period.

**References:**

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**13AP02-02**

**Differential ventilation intensities amongst diverse categories of patients ventilated for reasons other than ARDS: a pooled analysis of 4 observational studies**

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**Background and Goal of Study:** Ventilation strategies may vary amongst diverse types of critically ill patients ventilated for reasons other than ARDS. This variation can potentially lead to differences in driving pressure(ΔP) and mechanical power of ventilation(MP) and their associations with outcome.

**Methods:** In this posthoc analysis we calculated and compared ΔP and MP in sepsis patients, pneumonia patients, and patients receiving ventilation for other reasons using a pooled database that merged the individual data of patients from four observational-studies of ventilation: ProVENT, ProVENT-MIC, Ericc, Lung Safe. ARDS patients were excluded. The coprimary endpoints were ΔP and MP on day 1. ΔP and MP on day 2 and 3, and duration of ventilation, intensive care unit(ICU)–length of stay(LOS) and mortality served as secondary endpoints.

**Results and Discussion:** Of 3356 patients without ARDS, 372(11%) and 944(28%) patients had sepsis or pneumonia, respectively. On day 1, median ΔP and MP was higher in sepsis patients and in pneumonia patients(ΔP, 14[11–18] and 14[11–18] cmH2O; MP, 13.3[9.7–18.6] and 13.6[10.1–19.6] cmH2O vs 11.3[8.3–15.4] and 11.2[7.3–15.4] cmH2O, respectively). On day 2 and day 3, differences in median ΔP and MP became smaller but remained statistically significant. ΔP, as opposed to MP, had an association with ICU mortality in both sepsis and pneumonia patients, and not in patients receiving ventilation for other reasons.

**Conclusion:** Measures of ventilation intensity are higher in sepsis or pneumonia patients compared to patients receiving ventilation for other reasons. Both ΔP and MP had a positive association with ICU mortality, duration of ventilation, and ICU–LOS.

<table>
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**Table. Association of ΔP and MP with clinical outcome.**

Data, inherent to day 1, are expressed using logistic regression model(95% Confidence Interval). Results were summarized as Odd Ratio (OR) for ICU mortality.
13AP02-04
Importance of New Delhi Metallo-Beta-Lactamase Enterobacterales surveillance in ICU: virulence of the pathogen or severity of the patients?

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Background and Goal of Study: In intensive care unit (ICU) patients, infections caused by carbapenemase-producing Enterobacterales are of growing importance. Outbreaks of New Delhi beta-lactamase (NDM) are of increasing importance in Italy. However, the severity of the clinical manifestations is variable, as it is the correlation between colonization and infection.

Materials and Methods: All ICU-patients admitted between January and July 2023 underwent weekly surveillance cultures (rectal swab, tracheal aspirate, urine), with additional examinations on clinical judgment. Isolates were identified using MALDI-TOF/MS and screened for carbapenemase production through lateral flow immunoassay or molecular tests. Antimicrobial susceptibility was determined with microdilution assay (EUCAST breakpoints).

Results and Discussion: Out of a total of 424 patients, 41 were positive for NDM-Enterobacterales in rectal swabs, and 12 developed invasive infections (Table 1). All patients were critically ill (SAPS II 33 for colonized, 47 for infected). The median time between ICU-admission and colonization/infection was 6 and 16.5 days, respectively. Significant disparities emerged between colonized and infected patients regarding the duration of mechanical ventilation (2 vs 28 days), ICU (7 vs 45 days) and hospital length of stay (26 vs 70.5 days).

Conclusion: Our data on NDM-Enterobacterales colonization/infection in severe patients confirm that identification of colonization and invasive infection is crucial, as treatment options are limited. A correlation between infection and increase in the length of ICU and hospital stay seems to emerge, while further studies are needed to investigate the role of previous infection and the effectiveness of new antimicrobial treatment.

13AP02-05
Assessing a role for platelet aggregates in sepsis

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Background and Goal of Study: Sepsis is a heterogeneous syndrome resulting from a dysregulated host response to infection, resulting in organ dysfunction and high mortality. Both hyperinflammation and subsequent immunosuppression contribute to this outcome, yet the intricate interplay between the immune system and coagulation remains unclear. Therefore, our work focuses on specific leukocyte populations’ immune response and their interaction platelets to form aggregates during sepsis.

Materials and Methods: Written informed consent was obtained from 38 septic patients on our intensive care unit and 15 controls. The study was approved by the ethics committee of TUM Munich (Az: 249/20 S-EB). On d1, d3 and d7 after sepsis diagnosis 10 ml of EDTA blood was collected for Flow cytometry to analyze the cell-specific immune state and digital holographic flow microscopy (CELLFACE) to assess platelet aggregate formation. Statistical analysis employed Kruskal-Wallis and Dunn’s tests.
Results and Discussion: Early in sepsis (day 1), septic patients exhibited cellular immunosuppression alongside increased pro-inflammatory interleukin levels in plasma. Monocytes showed diminished HLA-DR, IL-6, and TNF-α expression until partially recovering by day 7. Similar immune paralysis was observed in neutrophils and T cells, while only dendritic cells displayed heightened inflammatory activation. On the other hand, platelet aggregate formation with leukocytes significantly increased at the onset of sepsis, especially in non-surviving patients.

Conclusion(s): These findings underscore the importance of assessing individual immune status in sepsis patients. Furthermore, measuring platelet aggregates may offer valuable insights into the immune response during sepsis. Ongoing investigations delve deeper into the composition of these platelet-leukocyte aggregates.

13AP02-07
Critical care and candidemia: patients and prognosis
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Background and Goal of Study: Most invasive fungal infections in hospitalized patients in developed countries are caused by the 6 most common candidas: albicans, glabrata, tropicalis, parapsilosis, krusei and auria. Clinically, candidemia will manifest as sepsis, or septic shock, with a high mortality. We aimed to analyse the characteristics, prognosis, evolution and risk factors for mortality in patients who developed candidemia during their stay in our ICU.

Materials and Methods: After obtaining the approval of the ethics committee, we carried out a retrospective study including all patients admitted to the ICU with candidemia (2016 - 2023). All demographic and clinical variables that influence the development of candidemia and patients’ evolution were collected. The evolution of the patients was analysed during their admission to ICU as well as after discharge.

Results and Discussion: During the period of study, 44 patients suffered from candidemia (50% female; age 67 ± 12), caused by: 47.7% albicans, 27.3% glabrata, 22.7% parapsilosis, 6.8% tropicalis and 2.3% krusei. Two types of Candida were found in 6.8%.

Most patients with ischemic heart disease (87.5%) were infected by albicans (p=0.013) and 71.4% of patients without non-invasive mechanical ventilation were affected by non-albicans (p=0.032). Patients with albicans were older (p=0.038), had shorter length of stay in ICU (p=0.018), hospital stay (p=0.008) and antibiotic treatment (p=0.021). Patients infected by parapsilosis were treated with antibiotics for a longer time prior diagnosis of candidemia (p=0.023), and a longer total duration of treatment (p = 0.042). Overall mortality was 65.9% (38.6% in ICU, 6.8% in the hospital ward, 13.6% within one year after hospital discharge, and 6.8% within two years after discharge). No relationship was found between the type of Candida and mortality (p=0.402), or complications, such as renal failure (p=0.603), heart failure (p=0.252), pneumonia (p=0.666) or stroke (p=0.368). Coinfection by 2 candidas was associated with ophthalmologic complications (p<0.0001).

Conclusion: Patients affected by albicans are older and with a less invasive hospital care than patients with parapsilosis. This may be due to the lower susceptibility of parapsilosis to echinocandins and a possible more complex profile of patients infected by the latter. Despite the high mortality, no association was found between the type of Candida and mortality, probably due to the sample size.

13AP02-08
Measurement and characterization of immune thrombosis in ICU sepsis and ARDS patients
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Background and Goal of Study: Sepsis is a life-threatening condition caused by a dysregulated immune response to infection and associated with impaired blood clotting and increased thrombosis and thrombocytopenia. This mechanism is widely recognized as immune thrombosis. It was also observed in ARDS patients with severe Covid-19 infection. However, its assessment and the underlying pathomechanism need to be better understood. Therefore, we investigated in this study mechanisms of platelet activation upon stimulation in-vitro and their aggregation in sepsis and ARDS.

Materials and Methods: Adult patients treated in the intensive care unit (ICU) with diagnosed sepsis or ARDS were included in the study after ethics committee approval. Sepsis patients met the SEPSIS-3 criteria, ARDS patients fulfilled the revised Berliner definition of ARDS. Within 48h after diagnosis, blood was drawn from an arterial line in a Hirudin tube. Leukocytes and platelets were separated by magnetic erythrocyte depletion. Separated cells were stimulated with endogenous and artificial platelet activators and assessed by flow cytometry. Platelet-leukocyte-aggregates were identified as triple positive for CD45, CD62L, CD41a, whereas activated platelets were positive for CD62P.
Results and Discussion: It was observed that in healthy controls, ICU controls and viral ARDS platelets form more aggregates with monocytes than neutrophils and the monocyte-platelet aggregates show higher levels of CD62P than platelet-neutrophil aggregates. In contrast, in sepsis and bacterial ARDS, there was a strong elevation in platelet activation within platelet-neutrophil aggregates compared healthy controls. Overall, platelets in patient-derived aggregates exhibited increased CD62P expression compared to those from controls. Additionally, exposure to LPS stimulated aggregate formation in all patient groups but only minimally in controls.

Conclusion: Elevated numbers of neutrophil-platelet aggregates in bacterial infections suggest that neutrophils achieve higher responsiveness to interact with activated platelets during microbial pathogen invasion and may play a major role in the formation of immune thrombosis.

Immune paralysis in sepsis: deciphering the dysregulated immune responses of CD14 monocytes in sepsis non-survivors

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Background and Goal of Study: Despite advancements in clinical care, sepsis remains a massive challenge to contemporary medicine, accounting for every fifth death worldwide. The underlying cause of sepsis is the patient’s dysregulated immune response. The main challenge, however, remains in stratifying the dysregulation. To this end, we strove to discern the subject's individual immune status and correlate it with the patient’s clinics.

Materials and Methods: Blood from 69 septic patients, 19 ICU controls (ICU), and 20 healthy controls (H) was drawn. Peripheral blood mononuclear cells were stimulated in vitro with agonists of the toll-like receptors 1-9 (TLR) combined with immunomodulators and incubated for four h. Each subject's cell-specific immune response was assessed by flow cytometry.

Results and Discussion: A predominantly suppressive effect on CD14+ monocytes was observed during the onset of sepsis. Compared to H and ICU, sepsis patients express less proinflammatory IL-1β, IL-6, TNF-α, IFN-γ, HLA-DR and anti-inflammatory IL-10 at onset. While survivors (S) recovered cytokine expression over the course of the disease, non-survivors (NS) seem to become even less responsive over time. Within 48 hours post onset, stimulation with LPS, acalabrutinib, heat-killed Listeria monocytogenes (HKLM), IFN-γ or poly I/C prompts a higher increase in the expression of IL-1β, TNF-α, IL-6, and IFN-γ in NS compared to S and ICU.

Conclusion(s): Our data reveals immune-paralytic effects driven by classical CD14+ monocytes. The downregulation of cytokines such as HLA-DR, IL-1β, TNF-α, IL-10, IL-6, and IFN-γ reflects impaired responsiveness to endotoxins such as LPS and other immunomodulators. At the onset, GM-CSF and acalabrutinib restored IL-6 expression in non-survivors after LPS application. Applying this data to specific patient clusters by correlating the patients' clinical parameters and outcomes may lead to a better understanding of sepsis immunopathology and new individualized approaches to sepsis therapy.

The impact of general versus spinal anaesthesia on innate immune dysregulation during and after total hip arthroplasty

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Background and Goal of Study: Increasing evidence shows that postoperative dysregulation of the innate immune response is associated with delayed recovery and infectious complications. It remains unknown whether postoperative innate immune dysregulation is caused by the induced surgical trauma or the use of anaesthesia. Therefore, the aim of this study was to compare the effects of general and spinal anaesthesia on innate immune function during and after total hip arthroplasty (THA).
Materials and Methods: This matched cohort study used data from the control groups of two single-centre randomised-controlled trials. Patients in the control group of the HIPPO study (NCT05562999) received general anaesthesia (total intravenous anaesthesia (TIVA) with remifentanil) and were matched to the patients from the MAGIC study (NCT05723406) who received spinal anaesthesia in a 2:1 ratio (general:spinal). Immune function was assessed before surgery, after induction of anaesthesia, at the end of surgery, and on postoperative day 1 (POD1) by measurement of plasma cytokine concentrations and ex vivo cytokine production capacity upon whole blood stimulation with E. coli lipopolysaccharides (LPS). Mann-Whitney U test was used to determine differences between groups and Friedman tests with Bonferroni correction were performed to determine differences between the different timepoints within each group.

Results and Discussion: Plasma cytokine concentrations did not differ between the spinal and general anaesthesia group at most timepoints, except for TNF on the first day after surgery and IL-10 at the end of surgery, which were higher in the general anaesthesia group. In the general anaesthesia group, ex vivo cytokine production capacity of IL-1β and IL-6 was significantly lower after induction of anaesthesia compared to baseline. General anaesthesia also resulted in lower ex vivo cytokine production capacity of IL-1β and IL-6 at the end of surgery compared to spinal anaesthesia. However, on POD1 no differences in cytokine production capacity were observed.

Conclusion(s): General anaesthesia has a transient impact on innate immune function as reflected by a lower ex vivo cytokine production capacity shortly after induction. As no differences in innate immune function were observed on POD1, the clinical significance of anaesthesia-induced innate immune dysregulation might be limited.

13AP02-11
The ICU-built environment as a reservoir of multi-drug resistant pathogens

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Background and Goal of Study: The intensive care unit (ICU), where vulnerable patients inhabit, represents a hospital environment microcosm and acts as an incubator for the most resistant pathogens. Half of all ICU patients harbour an infection, and more than 70% receive antibiotics. The transmission of resistant organisms within the healthcare environment is a major contributor to the current global crisis of antimicrobial resistance (AMR).

The ICU-built environment is an under-appreciated reservoir of pathogens growing on surfaces as biofilms, especially in plumbing systems, and eliminating ICU water supply exposure reduces infection rates with Acinetobacter, Pseudomonas and Legionella. This study aimed to evaluate the potential of the ICU-built environment to harbour AMR microbes at two ICUs at two hospitals in Cape Town, South Africa.

Materials and Methods: This observational study that included adult patients with ARDS admitted to Hospital Clinic de Barcelona (Spain) between June 2019 and February 2021. Study protocol received approval from the Institution’s Internal Review Board (HCB/2018/0231). Bacterial rRNA from blood, faecal and lower-respiratory tract samples was analysed. Similarity between body sites microbiome was analysed with Jaccard Index. Spearman correlation analyses were performed between gut-specific bacteria and 23 biomarkers associated with mortality in ARDS patients.

13AP02-12
Characterisation of microbiome dynamics and its biological impact in patients with ARDS: a descriptive analysis

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Background and Goal of Study: In animal models of acute respiratory distress syndrome (ARDS) lung microbiome has been found to be enriched with gut bacteria (bacteroidales order). However, in patients with ARDS information on microbiome alterations and its biological impact is lacking.

In this study we described the dynamics of lung, blood and gut microbiome in these patients. Finally, we aimed to evaluate the association of gut-specific bacteria with systemic inflammatory response.

Materials and Methods: This is an observational study that included adult patients with ARDS admitted to Hospital Clinic de Barcelona (Spain) between June 2019 and February 2021. Study protocol received approval from the Institution’s Internal Review Board (HCB/2018/0231). Bacterial rRNA from blood, faecal and lower-respiratory tract samples was analysed. Similarity between body sites microbiome was analysed with Jaccard Index. Spearman correlation analyses were performed between gut-specific bacteria and 23 biomarkers associated with mortality in ARDS patients.
Results and Discussion: 21 patients with ARDS contributed to a total of 44 samples (16 blood samples, 18 lower-respiratory tract samples and 10 faecal samples). *Proteobacteria* was the most abundant phylum in lower-respiratory tract samples (relative abundance 55.2% [7.9; 73.2%]), whereas in blood it was *Bacteroidetes* (relative abundance 47.5% [29.1; 50.7%]) and *Firmicutes* in faecal samples (relative abundance 46% [13.65; 58%]).

Jaccard Index analyses revealed that blood and pulmonary microbiome shared 29.4% of operational taxonomic units (OTUs) and almost one quarter of respiratory microbiome was also found in gut. *Bacteroidales* order (comprised in *Bacteroidetes* phylum) was encountered not only in all faecal samples but also in 94% of blood and respiratory samples. *Bacteroidales* order translocation in lungs was related to higher levels of biomarkers related to inflammation, coagulation, and pulmonary epithelial and endothelial dysfunction.

Conclusion(s): Gut *Bacteroidales* order is frequently found in lungs from patients with ARDS and bacterial RNA presence in blood may indicate occult bacteremia as a potential source. The observed overlap between pulmonary, respiratory, and gut microbiome indicates a complex interplay between these communities in patients with ARDS. The observed association between *bacteroidales* translocation and biomarkers merits further investigation aiming to establish whether causality exists.

13AP03-02
Rare case of simultaneous infection caused by Entamoeba histolytica

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Background: Amoebiasis is an infection caused by Entamoeba histolytica *protozoa* consisting of intestinal symptoms such as acute diarrhoea, colitis or dysentery and, less frequently, extraintestinal symptoms. Cases of simultaneous infection of multiple organs are extremely rare. It is transmitted by food and water contamination, especially in developing countries, where sanitary and socioeconomic conditions are poorer.

Case report: A 34-year-old male with no medical record presented with abdominal pain, diarrhea, rectorrhagia and jaundice for a week. A thoracoabdominal CT scan showed a tumor in the cecum and three liver lesions suggestive of metastasis vs abscesses, so a right hemicolecotomy and CT-guided drainage of these liver lesions were performed, extracting 2 liters of purulent fluid. During his admission, the patient clinically worsens (presents generalized jaundice, liver dysfunction, progressive growth of the abscesses, rectorrhagia and anemia) so intensive resuscitation is required with several transfusions and surgical drainages of the liver abscesses.

Despite the poor prognosis, the cecum biopsy reported intestinal Entamoeba histolytica infection (amebic colitis), improving drastically the patient’s prognosis. Antibiotic treatment was immediately started with Metronidazole and Paromomycin with favorable clinical evolution including the reduction of the size of the abscesses and the interruption of any intestinal symptoms, so the patient could be discharged with no further complications.

Discussion: Amebic liver abscesses along with colonic masses (formed by granulation tissue called ameboma) is uncommon but may mimic colon cancer, so clinical suspicion and an early, aggressive approach are key.
Differential diagnosis includes, in case of intestinal symptoms, bacterial infections, ischemic bowel and inflammatory bowel disease and, in case of liver abscesses, cancer, pyogenic abscesses or Echinococcus infection. The majority of intestinal infections are asymptomatic and uncomplicated amebic liver abscesses has a low mortality rate if diagnosed and treated early.

**Learning points:** Although most of Entamoeba infections are asymptomatic, it may progress to aggressive, life-threatening conditions, especially in the presence of risk factors. Diagnosis is usually a challenge but early, appropriate treatment may reduce the mortality of disseminated amebiasis.

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**13AP03-04**  
Severe complication after intramuscular injection: a case report

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**Background:** Intramuscular injection is a common route of drug administration due to its numerous advantages and few complications, most them mild and local. However, systemic dissemination routes have been reported, such as hematogenous or direct with important consequences.

**Case report:** An 18-year-old diabetic and obese female presents with nausea, fever, asthenia, and abdominal pain three days after receiving intramuscular treatment for acute gastroenteritis. Anemia and signs of infection are showed in a blood test as well as psoas abscess in an abdominal ultrasound, so surgical drainage was performed.

However, the patient's evolution in the intensive care unit is torpid developing severe anemia, motor impairment (lower limb paraparesis) and cauda equina syndrome.

MRI shows multiple muscle collections with extension to extra-peritoneal space and lumbosacral plexus as well as right-sided empyema with two pleural communications towards right conjunctival fornax (T6-T11) and spinal space with posterior subdural (T8-11) and epidural abscess (L5-S1) ventrally displacing the medulla and signs of transverse myelitis at T11 and right sacroiliitis. A multidisciplinary team is required so intensive antibiotic treatment, physical rehabilitation and epidural and successive abdominal drainages are carried out.

After months of treatment, the size of both epidural and spinal abscesses is reduced as well as the pleural effusion. Also, myelitis disappeared, and the patient was able to walk with a cane, being discharged four months later.

**Discussion:** Serious complications of intramuscular injections such as sepsis, necrotizing fasciitis or abscesses are associated with two muscles particularly due to the proximity of the puncture site, the rich vascularization and the close contact with organs and structures: psoas and gluteus.

The extension of a pleural empyema into the spinal canal is a severe complication reported secondary to hematogenous or direct extension through muscular and interfascial planes from muscular abscesses.

Acute neurological symptoms with spinal pain, especially after the administration of intramuscular drugs should raise suspicion for this complication.

**Learning points:** An awareness of these conditions and a high index of suspicion are key in any patient with a history of intramuscular injection and signs of infection and back or abdominal pain. Early recognition and treatment are essential to improve the prognosis of these patients.

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**13AP03-05**  
Severe case of orolingual oedema after alteplase and captopril administration in a stroke victim

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**Background:** Orolingual angioedema (OA) is a known complication associated with recombinant tissue-type plasminogen activator (rtPA) due to increased bradykinin levels, C3 and C5 activation and histamine release. This is a rare but potentially life-threatening occurrence. Similarly, angiotensin-converting enzyme inhibitors (ACEI) increase bradykinin by disrupting its metabolism and can also result in OA.<br>

We present a case of ipsilateral OA after alteplase perfusion for thrombolysis and sublingual captopril for high BP.

**Case Report:** A 53-year-old male patient with past history of high BP and diabetes, arrived at the emergency room following symptoms of left hemiparesis and speech aphasia. Initial systolic BP was 184mmHg and sublingual captopril 25mg was administered. CT confirmed right middle cerebral artery obstruction and ischemic stroke. Alteplase perfusion was initiated, and he was brought for mechanical thrombectomy. General anaesthesia and intubation were performed under ASA standard monitoring. The thrombectomy took place with no complications and reperfusion was successful. After the procedure we observed significant right-sided facial and lingual oedema. Alteplase was immediately stopped. Clemastine 2g and methylprednisolone 125mg were administered and he was transferred to the ICU under mechanical ventilation. After 8 days of histamine and corticoid treatment tongue swelling had subsided but oropharyngeal oedema remained so icatibant 30mg was initiated. Simultaneously his neurological recovery was very poor, and the decision was made to perform a tracheostomy.

**Discussion:** rtPA and ACEI are commonly administered drugs in ischemic stroke victims. Together they can increase the risk of OA with dire consequences. Such cases require close monitoring to allow early detection of complications. Treatment of OA includes antihistamines and corticoids, but a more direct approach can be achieved with icatibant, a B2 bradykinin receptor antagonist. In severe cases invasive airway management might be required to maintain ventilation.

**Reference:**<br>
1. https://doi.org/10.1007/s10072-021-05279-y

**Learning Points:** Both rtPA and ACEI increase bradykinin levels and associating these drugs carries an increased risk of OA, a rare but potentially fatal complication that requires immediate action. Treatment options include antihistaminics, corticoids and direct bradykinin antagonism with icatibant. Intubation may be unavoidable to maintain airway patency.
13AP03-07
Hemophagocytic lymphohistiocytosis in intensive care: a neglected illness? A case series

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Background: Patients with severe multiorgan dysfunction (MODs) associated with shock represent the vast majority of Intensive Care Unit (ICU) patients. Hemophagocytic Lymphohistiocytosis (HLH) is an aggressive and life-threatening syndrome induced by aberrantly activated macrophages and cytotoxic T cells, clinically indistinguishable from sepsis or MODs1. Although rare, its overall frequency in ICU is unknown and probably under-reported, due to challenging diagnosis2.

Case report: We report a case-series of 3 patients admitted to ICU with elevated liver enzymes, single/multi organ dysfunction and recent various immune triggers. Patients' clinical characteristics are presented in Table 1. All 3 patients had a HScore 3 with high probability of HLH. Two patients were diagnosed with HLH during ICU stay and received specific treatment. One patient was never diagnosed in ICU and treated as septic shock with broad spectrum antimicrobial and antifungal therapy and intravenous acyclovir for disseminated HHV-1 infection. All three patients died before hospital discharge.

Discussion: Although rare, HLH severity and rapid evolution deserve a prompt clinical suspicion. In our series, HLH was specifically investigated in 2/3 cases, but HScore – despite partial results – was always positive. Bone marrow biopsy is only one of the items to be considered, as laboratory exams not routinely requested - ferritin, fibrinogen, triglycerides (Figure 1). In one case, due to the severity of presentation and the overlap of a viral disseminated infection with septic shock, the diagnosis was only autoptic. We suggest considering HLH as differential diagnosis in all patients presenting with MODs without established etiology and potential immune triggers.

References:

13AP03-08
Cutaneous mucormycosis in a multivisceral transplant patient - a case report

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Background: Mucormycosis is a life-threatening invasive fungal infection caused by fungi of the Mucorales order of zygomycete fungi. Cutaneous mucormycosis is the third most common manifestation of mucormycosis (19%)(1). It usually affects immunocompromised individuals. We present a case of a multivisceral transplant patient who developed this infection.

ID | Age | Sex | Diagnosis at admission | SOFA | SAPS II | MODs detail | H-score | Ferritin | TG | Fibrinogen | BMB | Suspected trigger | Treatment | Autoptic findings | Outcome: death | Days from admission to death (days)
--- | --- | --- | ------------------------ | --- | --- | ---------------- | --- | --- | --- | --- | --- | ---------------- | ---------------- | ---------------- | ---------------- | ---
1 | 62 | M | Intersitital Pneumonia in HSCT | 6 | 41 | ARF | 170 | 30270 | 616 | 400 | Positive | SARS-CoV-2 infection HSCT | Dexamethasone | Cylosporine | - | Yes (after ICU discharge) | 35
2 | 22 | F | Acute liver failure in HSV-1 systemic infection | 10 | 54 | Acute liver failure | 223 | - | 998 | 195 | - | HHV-1 infection | Acyclovir | | - | yes | 13
3 | 37 | F | Acute liver failure | 16 | 56 | Acute liver failure in recent chemotherapy | 242 | 33511 | - | 127 | Positive | Malignancy chemotherapy HHV-1 infection | Acyclovir Tociluzimab | Dexamethasone | - | yes | 6

TG, triglycerides; BMB, bone marrow biopsy; ARF, acute respiratory failure; HSCT, hemopoietic stem-cell transplant; HHV-1, Herpes simplex-1 virus

13AP03-07 Table 1.
Case report: A 43-year-old male underwent a multivisceral transplantation (liver, pancreas and small intestine) due to inflammatory bowel disease and parenteral nutrition associated liver failure. Unfortunately, his postoperative recovery was complicated by primary cutaneous mucormycosis, caused by the species Rhizopus oryzae. The lesion was found on the back of his left thigh and originated from minor trauma. The lesion initially presented as a painful erythematous rash that progressed to necrosis with an erythematous halo that eventually developed into an eschar. After histopathological and microbiological analyses, samples of the affected tissue confirmed the diagnosis of mucormycosis. A computerized tomography was used to determine the extent of the necrosis. The treatment of mucormycosis consisted of medications and surgical treatment. Intravenous antifungal therapy consisted of intravenous liposomal amphotericin B and isavuconazole for a prolonged period (60 days). Multiple extensive surgical debridement procedures, followed by negative pressure wound therapy, were done. Upon resolution, Thierch's method of skin grafting was used by the surgeon.

Discussion: This case report highlights the importance of being highly suspicious of invasive fungal infections in patients who have undergone solid organ transplantation and are immunosuppressed. Even when antifungal agents are routinely used post-transplant for prophylaxis and treatment of presumed fungal infections, clinicians should remain vigilant. Early recognition and aggressive treatment of the fungal infection can lead to a full recovery for the patient.

Reference:

Learning points: Early recognition, diagnosis, and prompt appropriate long-term antifungal therapy, combined with surgical treatment when needed, can lead to a favorable outcome, even in the most aggressive and rapidly progressive forms of mucormycosis, in solid organ transplant immunocompromised patients.
Utility of the Venous Excess Ultrasound (VEXUS) Score to track dynamic change in volume status in patients undergoing fluid removal during haemodialysis – the ACUVEX study

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Background/Goal: The use of ultrasound assessment, including the Venous Excess Ultrasound (VEXUS) score, is increasingly being utilised as part of fluid assessment in clinical practice. We aimed to evaluate the ability of the VEXUS score to track fluid removal during dialysis session and explore the relationship between traditional measures of fluid status and venous congestion.


Results & Discussion: Amongst 33 patients analysed, 5 (15%) had an elevated VEXUS score. There was no difference in dry weight or amount of fluid removed in patients with a normal VEXUS score and those with an elevated VEXUS score. In all patients with elevated VEXUS, the degree of venous congestion improved during the course of fluid removal. All patients with an elevated VEXUS score had evidence of both right and left ventricular systolic impairment.

14AP01-02
Reduced heart rate complexity at 1- and 6-hours pre-extubation is associated with both extubation failure and 30-day mortality in paediatric intensive care

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Background: Healthy biological systems exhibit complex patterns of variability and a reduction in physiological signal complexity has been hypothesised to reflect reduced adaptability to stressors. Extubation is a significant physiological stressor, and extubation failure (EF) is independently associated with morbidity and mortality in paediatric intensive care (PICU).
Predictive power of mortality of the SAPS-3 and RDW score: a postoperative cohort study in oncology patients

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Background and Goal of Study: Background: Recent published evidence suggests a correlation between SAPS-3 score and Red Cell Distribution Width (RDW) values in blood count with the prognosis and survival of cancer patients. Objectives: The primary outcome was to relate the SAPS-3 score to postoperative survival in patients with gastrointestinal tumors undergoing elective major abdominal oncological surgeries requiring recovery in an intensive care unit. The secondary outcome was to compare the predictive strength of SAPS-3 score mortality with RDW values from blood count.

Materials and Methods: Pre, intra and postoperative data from 134 patients were analyzed. The data were prospectively collected from electronic medical records.

Primary outcome analysis was conducted following the intention-to-treat principle, using Kaplan-Meier technique to estimate survival probabilities between groups. Secondary outcome analysis was performed using the Spearman correlation coefficient.

Results and Discussion: For the primary outcome, a statistically significant correlation was found, with p < 0.05, between increased SAPS-3 score values and lower survival, with a SAPS-3 cutoff value related to mortality of 38, demonstrating higher sensitivity than the value of 57 described in the literature.

For the secondary outcome, only a weak statistical correlation was found between WDW-CV values and SAPS-3 after 24 hours of admission to the ICU.

Conclusion(s): The SAPS-3 score is useful as a predictor of mortality, showing increased sensitivity in the oncological population under study. Preoperative RDW values did not correlate with mortality or SAPS-3 score.

14AP01-04
Can Mottling Score warn physicians about increased mortality in septic patients

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Background and Goal of Study: Microcirculatory dysfunction plays key role in pathogenesis of tissue hypoxia and organ failure in sepsis.1 Mismatch of systemic hemodynamic parameters and changes in microcirculation are more prominent during shock.2 Can mottling score (MS) which is a physical examination finding showing microcirculation and its correlation with mortality was investigated in patients diagnosed with sepsis.

Materials and Methods: 92 patients who were diagnosed as sepsis which was diagnosed according to international consensus reports were included in our prospective observational study. Age, body mass index, reason for intensive care unit admission, source of sepsis, comorbidities, SOFA and SAPS 2 scores were recorded.

Patients’ heart rate, mean arterial pressure, body temperature, capillary refill time (CRT), MS, arterial lactate level, hourly urine output, central venous pressure, central venous oxygen saturation, arteriovenous oxygen concentration difference, venous-arterial carbon dioxide partial pressure difference, dose of vasopressor/inotropic agent were obtained at 6-hour intervals in the initial 24 hours after diagnosis of sepsis. Survival of patients was recorded on 14th day after diagnosis.

Results and Discussion: Of 92 patients, 64 (69%) died within a 14-day period. MS was significantly different between the non-survivors and survivors at all measurement times (T0; p=0.002, T6; p=0.001, T12; p=0.001, T18; p=0.001, T24; p=0.009). It was observed that mortality increased at all times with the increase in MS (MS<2 versus MS≥2; T0; p=0.009, T6; p=0.003, T12; p=0.008, T18; p=0.006, T24; p=0.009).

Mortality, SOFA and SAPS 2 scores, lactate levels and CRT were found to be higher in patients with MS equal or greater than 2 within a 24-hour period compared to patients with MS less than 2 (p=0.001, 0.002, <0.001, 0.003, <0.001, respectively).
Conclusions: Sepsis affects microcirculation, leading to organ failure and mortality. Monitoring microcirculatory findings has prognostic importance in sepsis. The data from our study suggested that increasing levels of MS, at any stage of diagnosis or resuscitation, can be used as a warning sign for increased mortality.

References:

14AP01-06
Adult respiratory distress syndrome vs. acute lung oedema: the importance of chest X-ray

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Background and Goal of Study: With a 10% prevalence in patients admitted to intensive care units (ICU) and a 40% hospital mortality, acute respiratory distress syndrome (ARDS) is a deadly medical complication. Recognizing ARDS is not always easy. Absence of risk factors for ARDS or cardiac failure tend to hinder ARDS diagnosis, and having cardiac failure a different treatment, it is of paramount importance to reach the right diagnosis. ARDS diagnosis could be delayed or missed in 66% of patients, being chest X-ray interpretation variability one of the main causes. We aimed to compare the characteristics of patients with chest X-ray compatible with ARDS who were diagnosed of ARDS, versus patients with chest X-ray compatible with ARDS who were not diagnosed of ARDS, to evaluate ARDS impact on 60-day mortality

Materials and Methods: We performed a secondary analysis of a prospective observational study in 454 patients who underwent major surgery and developed sepsis. After chest X-ray assessment, 138 patients had an ARDS compatible chest X-ray. Those 138 patients were afterwards stratified in two groups depending on whether they met criteria for ARDS.

Primary outcome was 60-day mortality. Secondary outcome measures were potential risk factors for postoperative sepsis-induced ARDS, and for 60-day mortality. All data were analyzed using the IBM SPSS 27.0 software (SPSS, Chicago, IL).

Results and Discussion: Urgent surgery (OR 6.574, p<0.001), pneumonia (OR 8.153, p<0.001), abdominal infection (OR 5.970, p<0.004), and lactate (OR 3.994, p=0.019) were independently associated with ARDS development. ARDS patients showed lower length of ICU stay (14 [18] vs. 8 [14] days, p=0.041), whereas chronic cardiovascular disease was less frequent in ARDS patients (22.7% vs. 40%, p=0.046), being linked to acute lung oedema development.

Pulmonary compliance was significantly lower in ARDS patients (22.45 [10.25] vs. 30.5 [20.95] cmH2O, p=0.006). Age (OR 1.044, p=0.006), ARDS (OR 1.805, p=0.029) and SOFA>8 (OR 2.003, p=0.019) were independently associated with 60-day mortality. In light of the above, misinterpretation of chest X-ray can lead to an increased 60 day mortality. However, chest X-ray must always be assessed taking into account the clinical context of the patient, as that clinical context can guide us towards the correct diagnosis and the correct treatment.

Conclusion(s): Postoperative sepsis-induced ARDS is associated with higher 60-day mortality compared to patients who develop acute lung oedema, being X-ray interpretation essential for differential diagnosis. Urgent surgery, pneumonia, abdominal infection and higher lactate levels seem to be the most important risk factor for ARDS development, and must hinder us from acute lung oedema diagnosis.

14AP01-07
Postoperative sepsis-induced acute respiratory distress syndrome: a life-threatening complication

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Background and Goal of Study: Prevalence and mortality of the adult respiratory distress syndrome (ARDS) in intensive care units (ICU) are unacceptable high. Both sepsis and major surgery are common etiologic conditions associated with ARDS, but scarce literature about postoperative sepsis-induced ARDS exists. The aim of this study is to find risk factors for postoperative sepsis-induced ARDS development.

Materials and Methods: We performed a secondary analysis of a prospective observational study in 454 patients admitted into a single ICU who underwent major surgery and developed sepsis. After X-ray assessment, 138 patients had an ARDS compatible chest X-ray. Those 138 patients were afterwards stratified in two groups depending on whether they met criteria for ARDS.

Primary outcome was 60-day mortality of postoperative sepsis-induced ARDS. Secondary outcome measures were potential risk factors for postoperative sepsis-induced ARDS, and for 60-day mortality. All data were analyzed using the IBM SPSS 27.0 software (SPSS, Chicago, IL).

Results and Discussion: Both respiratory tract (OR 50.75, p<0.001) and abdominal (OR 7.89, p<0.012) source of infection were independently associated with ARDS. ARDS patients, compared to those who did not develop it, were associated with prolonged ICU stay (14 [18] vs. 5 [11] days, p<0.001) and longer need for mechanical ventilation (6 [14] vs. 1 [5] days, p<0.001). ARDS increased 60-day mortality by 2.7 (95%CI: 1.14–6.29), being represented in figure 1 the Kaplan-Meier curve. In the multivariate analysis, chronic renal failure (OR 4.0, p=0.026), elevated lactate
dehydrogenase (OR 1.7, p=0.015) and higher APACHE II score (OR 2.7, p=0.006) were independently associated with 60-day mortality.

Conclusion(s): Postoperative sepsis-induced ARDS is associated with higher 60-day mortality compared to non-ARDS postoperative septic patients. Respiratory tract and abdominal infections were independently associated with ARDS development. Chronic renal failure, APACHE II, and LDH were also independently associated with 60-day mortality. Further investigation is needed in postoperative sepsis-induced ARDS to avoid this complication.

### 14AP01-08
Measurement of sound levels in a general intensive care unit (ICU) in a small EU island state

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**Background and Goal of Study:** The World Health Organisation (WHO) Guidelines for Community Noise suggest that the average sound level in hospitals should not exceed 35 dBA (L_Aeq) with a corresponding maximum of 40 dBA (L_Amax). High ambient noise levels from mechanical ventilators, alarms, and round-the-clock staff interventions can negatively impact sleep in the ICU. This study aimed to measure sound levels in the ICU and compare the findings to the WHO recommended levels.

**Materials and Methods:** This prospective observational study was conducted in a 20-bedded mixed ICU of a university hospital. Daytime and night-time average (L_Aeq) and maximum (L_Amax) sound readings were recorded at 10.00, 16.00, 22.00 and 04.00 hours using a commercially available smartphone application (Decibel X, SkyPaw Co., Ltd) in each of the bed areas over seven consecutive days in May 2022. A one-sample t-test (SPSS v28) was used to compare the mean and standard deviation (±SD) with the WHO recommended levels.

**Results and Discussion:** Average and maximum sound levels exceeded the WHO recommended levels (p < .001) (Tables 1 and 2). The lowest average and maximum recordings were in the cubicle, whilst the 12-bedded area had the highest. Research has shown that sound levels in the ICU are consistently higher than recommended, even during the night. Sleep disruption in ICU is associated with negative sequelae including confusion, delirium and a longer hospital stay.

**Table 1: Average sound levels recorded (35dBA)**

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean ± SD</th>
<th>2-sided p-value</th>
<th>Difference</th>
<th>95% C.I. (LL - UL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All readings</td>
<td>51.98 ± 8.14</td>
<td>&lt; .001</td>
<td>16.98</td>
<td>15.21 - 18.75</td>
</tr>
<tr>
<td>Day Average</td>
<td>53.70 ± 7.66</td>
<td>&lt; .001</td>
<td>18.70</td>
<td>16.31 - 21.10</td>
</tr>
<tr>
<td>Night Average</td>
<td>50.26 ± 8.33</td>
<td>&lt; .001</td>
<td>15.26</td>
<td>12.66 - 17.86</td>
</tr>
<tr>
<td>8 Bedded Average</td>
<td>52.76 ± 7.87</td>
<td>&lt; .001</td>
<td>17.76</td>
<td>14.71 - 20.82</td>
</tr>
<tr>
<td>12 Bedded Average</td>
<td>54.10 ± 7.85</td>
<td>&lt; .001</td>
<td>19.09</td>
<td>16.05 - 22.14</td>
</tr>
<tr>
<td>Cubicle Average</td>
<td>48.86 ± 8.32</td>
<td>&lt; .001</td>
<td>13.86</td>
<td>10.63 - 17.08</td>
</tr>
</tbody>
</table>

**Table 2: Maximum sound levels recorded (40dBA)**

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean ± SD</th>
<th>2-sided p-value</th>
<th>Difference</th>
<th>95% C.I. (LL - UL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All readings</td>
<td>63.44 ± 11.09</td>
<td>&lt; .001</td>
<td>23.44</td>
<td>21.04 - 25.85</td>
</tr>
<tr>
<td>Day Maximum</td>
<td>65.96 ± 11.01</td>
<td>&lt; .001</td>
<td>25.96</td>
<td>22.52 - 29.39</td>
</tr>
<tr>
<td>Night Maximum</td>
<td>60.92 ± 10.71</td>
<td>&lt; .001</td>
<td>20.92</td>
<td>17.59 - 24.26</td>
</tr>
<tr>
<td>8 Bedded Maximum</td>
<td>65.14 ± 11.09</td>
<td>&lt; .001</td>
<td>25.14</td>
<td>20.84 - 29.44</td>
</tr>
<tr>
<td>12 Bedded Maximum</td>
<td>66.96 ± 8.97</td>
<td>&lt; .001</td>
<td>26.96</td>
<td>23.49 - 30.44</td>
</tr>
<tr>
<td>Cubicle Maximum</td>
<td>58.23 ± 11.44</td>
<td>&lt; .001</td>
<td>18.23</td>
<td>15.80 - 22.67</td>
</tr>
</tbody>
</table>

Conclusion(s): The sound levels recorded exceeded the recommended levels by the WHO. Noise levels are a modifiable risk factor to sleep disruption in the ICU and interventions to reduce noise throughout our unit are being developed.

### 14AP01-09
Hemodynamic optimization algorithm including Veno-Arterial Extracorporeal Membrane Oxygenation (VA-ECMO) to improve cardiac dysfunction after brain death. Is it possible to increase heart donation?

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**Background and Goal of Study:** Stress cardiomyopathy (SC) followed by cardiac dysfunction (CD) appears frequently in brain dead donors2, compromising cardiac donation. We attended a patient with traumatic brain injury progressing to brain death (BD) who developed SC refractory to vasoactive support and was treated with VA-ECMO as a bridge to organ recovery. Cardiac and visceral function improved after 24h, and perfusion normalized. Liver and kidney transplantation were performed but cardiac graft was rejected due to minimal CD, and VA-ECMO support prolongation was denied due to family request. BD associated CD has been traditionally regarded as a contraindication to cardiac donation despite being a potentially reversible condition, as demonstrated in our case and as shown by some expert groups3. Our goal was to analyze BD donors during a 5-year period (2018-2022) in a tertiary referral hospital, in order to determine the incidence of CD, its management and the impact of it on cardiac donation.
Materials and Methods: Single-center retrospective observational review including all BD from the 1st of January 2018 to 31st December 2022.

Results and Discussion: 150 patients were analyzed. 68 (45.3%) did not have echocardiographic assessment and 82 (54.6%) did, showing CD in 32 patients (21.3%). 141 patients (94%) needed vasopressor support, and 23 (15.3%) also inotropes. Only 21 patients (14%) donated the heart, and 129 (86%) were rejected. Underlying reasons for rejection were: age in 45 cases (30%), CD in 19 (12.7%) and previous cardiac disease in 18 (12%).

It is relevant to mention that if we consider patients with CD and/or those who developed MOF, up to 49 patients (32.7%) were potential candidates for cardiac donation but these conditions made it not possible.

Conclusions: Cardiac donation in our BD series was low (14%) due to several reasons, being the age and CD the most important ones, as it has been shown in other reported series. The incidence of CD and MOF in our series is high (32.7%), leading to a decrease in the availability of heart and other organs suitable for transplantation. It could be potentially reversible with protocolized care and also be a source of new grafts.

We have developed a management algorithm that includes VA-ECMO if needed, in order to reduce catecholamine exposure, as it has been shown to be the main underlying cause of CD. We plan to prospectively test this algorithm to improve cardiac donation in our center.

14AP01-10
Microbiologic landscape and antibiotic resistance in patients with combat-related injuries in Ukraine

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Background and Goal of Study: Patients with combat-related injuries face a heightened risk of infectious complications, primarily attributed to impaired care, injury characteristics, etc (Conger et al, 2008). While the prevalence of infectious complications in patients with non-combat injuries is estimated to be around 6.8%, those with combat-related injuries may experience rates as high as 35% (Tribble et al, 2018). However, microbiological landscape of combat-related injuries varies according to the geographical region as causative agents were different during campaigns in Iraq and Afghanistan (Yun et al, 2017). Importantly, nosocomial contamination was identified as a source of these infections during the stages of evacuation and hospital treatment.

Therefore, our primary objective is to assess the most common causative agents among injured military personnel in Ukraine at different stages of care and to monitor antibiotic resistance throughout the care process.

Materials and Methods: We conducted a retrospective analysis of 127 and 630 wound culture results obtained from samples collected as a standard of care between March and December 2022 from patients with combat-related injuries and infectious complications at the secondary and tertiary levels of care, respectively. Culture procedures followed standard protocols using the Walk-away-40 system. Antibiotic resistance was evaluated using the disk diffusion technique on Mueller-Hinton agar, following NCCLS recommendations. Statistical analysis was performed using Microsoft Excel.

Results and Discussion: Results are presented in table below:

<table>
<thead>
<tr>
<th>Candida spp</th>
<th>S.aureus</th>
<th>K.pneumoniae</th>
<th>P.aeruginosa</th>
<th>A.baumannii</th>
<th>E.faecium</th>
<th>No growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secondary</td>
<td>7.9% (n=10)</td>
<td>22% (n=28)</td>
<td>16.5% (n=21)</td>
<td>11.8% (n=15)</td>
<td>- (n=1)</td>
<td>0.79% (n=1)</td>
</tr>
<tr>
<td>Tertiary</td>
<td>3.8% (n=24)</td>
<td>3.17% (n=20)</td>
<td>24.3% (n=153)</td>
<td>13.2% (n=83)</td>
<td>14.6% (n=82)</td>
<td>7.46% (n=47)</td>
</tr>
</tbody>
</table>

Table.

Our findings support prior evidence indicating that infectious complications in combat-related trauma are predominantly associated with nosocomial contamination. This is substantiated by the distinct agent distribution patterns at the secondary and tertiary care levels.

Conclusion(s): The substantial levels of antibiotic resistance underscore the necessity for enhanced antibiotic stewardship in combat-related trauma centers. Recommendations have been made to curtail the use of ceftriaxone and fluoroquinolones due to their high resistance rates, while the cefoperazone/subbactam is recommended for antibiotic prophylaxis during the initial stages of evacuation.

14AP02-01
Outcomes of percutaneous versus surgical tracheostomy in an Australian quaternary intensive care unit: an entropy-balanced retrospective study

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Background and Goal of Study: Studies comparing complications with the percutaneous tracheostomy (PT) and surgical tracheostomy (ST) in the critically ill patient population with high acuity, complexity, and severity of illness are sparse. This study evaluated the outcomes of elective PT vs ST in such patients managed at a quaternary referral center.

Materials and Methods: Patients were selected from the ICU admission registry between August 2018 to August 2021. Patients were included if an elective tracheostomy was performed during their ICU admission. Patients were excluded if admitted with a pre-existing tracheostomy or underwent an obligatory tracheostomy requirement (e.g., total laryngectomy). Hainmueller’s entropy balancing method matched the admission type, APACHE III score, body mass index (BMI), age, and gender for both groups. Logistic regression evaluated post-procedure complications and mortality, while ordinary least squares regression examined the duration of stay and time to decannulation data.
Results and Discussion: 349 tracheostomized patients were included in the study; after exclusions, the final sample consisted of 135 patients, 63 in the PT group and 72 in the ST group. Patients receiving ST were noted to be significantly older with a significantly higher mean BMI as compared to the PT group. There were no significant differences in gender, APACHE II, and ANZROD scores between the two groups. There was no difference in hospital mortality between the two groups (OR 0.91, CI 0.26–3.18, p=0.88). The two groups had no differences in ICU mortality, ICU and hospital stay length, and decannulation time. PT was associated with a greater likelihood of complications (OR 3.86; 95% CI 1.63–1.97; p<0.01). PT was associated with a greater risk of complications in those who had early (<10 days of intubation) as well as late (>10 days of intubation). To minimize the effect of confounders on the results, we utilized a novel and robust matching technique in our analysis: entropy balancing (1).

Conclusion(s): Percutaneous tracheostomy was associated with higher complications than surgical tracheostomy, with comparable mortality rates, ICU and hospital length of stay, and time to decannulation. Complications were related to sternal site bleeding and infection, decannulation, sputum plugging, and cuff deflation. Opportunities to improve quality and safety have been identified.

References:

14AP02-02
Urinary cell-cycle arrest biomarkers for prediction of acute kidney injury following lung transplant

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Background: Lung transplant (LUTX) is a feasible option for end-stage respiratory failure. Acute kidney injury (AKI) is a common and impactful complication of LUTX. The use of urinary cell cycle arrest proteins for the early diagnosis of AKI has never been tested in LUTX recipients.

Materials: In a single-center prospective observational study, we are assessing the capabilities of early urinary Tissue Inhibitor of Metalloproteinase-2 (TIMP-2) and Insulin-Like Growth Factor Binding Protein 7 (IGFBP7) ([IGFBP7]×[TIMP-2]) measured at 6 and 36 hours from graft reperfusion in predicting AKI and acute kidney disease (AKD). PT was associated with a greater risk of complications in those who had early (<10 days of intubation) as well as late (>10 days of intubation). To minimize the effect of confounders on the results, we utilized a novel and robust matching technique in our analysis: entropy balancing (1).

Conclusion(s): Percutaneous tracheostomy was associated with higher complications than surgical tracheostomy, with comparable mortality rates, ICU and hospital length of stay, and time to decannulation. Complications were related to sternal site bleeding and infection, decannulation, sputum plugging, and cuff deflation. Opportunities to improve quality and safety have been identified.

References:

14AP02-03
Identification of candidate drug to improve propofol-induced skeletal muscle damage

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Background and Purpose: Propofol is a commonly used sedative drug. Propofol infusion syndrome (PRIS), a rare but fatal complication, occurs by long-term high-dose administration of propofol. Rhabdomyolysis is a major symptom of PRIS. Although propofol can induce mitochondrial dysfunction in cultured cells, detailed mechanism of PRIS has not been elucidated. The purpose of this study is to elucidate the pathomechanism of PRIS and to search for therapeutic agents for PRIS by using zebrafish larvae as an animal model.

Methods: After culturing wild-type zebrafish on the fourth day post fertilization (dpf) in a propofol solution, we counted heart rate and examined skeletal muscle damage under a microscope using polarized lens (birefringence assay). After determination of the suitable cultured condition, we analyzed gene expression changes by quantitative RT-PCR (qPCR).

Drug screening was performed using a chemical library containing 1,280 drugs. Wild-type zebrafish larvae at 4 dpf were treated with 125 μM of propofol together with 10 μM of each drug for 3 hours.
After drug treatment, structural change of skeletal muscle was analyzed by birefringence assay.

**Results:** 4 dpf wild-type zebrafish were bred in 125 µM propofol solution for 3 hours. A significant decrease in heart rate was observed in the propofol-treated larvae. In addition, birefringence assay confirmed propofol-induced skeletal muscle structural abnormalities.

By qPCR we confirmed a reduced expression of pgc1α, a maker of mitochondrial biogenesis, at 3 hours after propofol administration. After screening of the drug library, we found 26 candidate drugs to improve muscle structural abnormalities of propofol-treated fish. We confirmed one drug to improve the gene expression level of pgc1α.

**Conclusion:** We found one candidate drug to improve propofol-induced skeletal muscle damage.

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**14AP02-04**

**Judicious use of critical care resources by predicting the need for extended ICU-admission following esophagectomy**

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**Background and Goal of Study:** With the advances made in the care for esophagectomy patients, including enhanced recovery protocols, the need for routine postoperative intensive care unit (ICU) admission is under debate. We developed a prediction model to preoperatively distinguish patients requiring prolonged ICU admission from those who can be cared for in a post anaesthesia care unit (PACU).

**Materials and Methods:** This was a retrospective cohort study including consecutive adult patients undergoing elective esophagectomy between January 2011 and June 2021 in the UMC Utrecht. Firth’s-corrected multivariable logistic regression with backward selection of preoperative covariates was used to develop the model and simultaneously shrink model coefficients. The model was internally validated to obtain optimism-corrected measures of performance.

**Results and Discussion:** A total of 619 patients were included, 376 (61%) of whom received cardiorespiratory support beyond the first morning following surgery (with 83 (13%) continued to be mechanically ventilated; 310 (50%) still received inotropes and/or vasopressor support). However, among 293 patients with vasopressor support only, noradrenaline infusion rate was low (<0.1 mcg/kg/min) in 176 (60%) cases.

Risk factors retained in the final model included age, female sex, diabetes mellitus, hemoglobin level <7.5 mmol/L, eGFR <60 mL/min, forced expiratory volume in one second, prior chemotherapy or no neoadjuvant therapy (vs. neoadjuvant chemotherapy alone), planned thoracotomy (vs. thorascopic procedure), planned transthoracic approach (vs. transhiatal), and tumour T stage ≥3. Predictive discrimination was acceptable (AUC crude 0.71 (0.67 – 0.75); optimism corrected 0.67 (0.63 – 0.71)), implying that by using a >45% probability cut-off, approximately 20% of ICU beds could be saved at a cost of wrongly allocating 14% of patients wrongly to a PACU. An extended model, that also included intraoperatively collected data, yielded similar predictive performance.

**Conclusion(s):** More than a third of elective esophagectomy patients do not need prolonged cardiorespiratory support, and a significant remainder merely received low-dose vasopressors that could potentially also be administered in non-ICU settings.

Although the predictive performance of our model is only moderate, its implementation could still reduce elective ICU admissions by potentially 20%.

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**14AP02-05**

**Prevalence of pain in the post-intensive care syndrome**

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**Background:** Post-intensive care syndrome (PICS) is the physical, cognitive, or psychiatric impairment that occurs after a critical illness and persists following hospitalization. It has been shown that pain after ICU stays can affect between 10-50% of patients. Currently, there is no standardized follow-up model for PICS and the diagnosis and treatment can be challenging.

The goal is to describe the prevalence and characteristics of pain in our PICS clinic among ICU patients of our center between March 2020 and May 2023.

**Materials and Methods:** This is a descriptive study of the prevalence of pain in the PICS clinic. Patients underwent pain assessment using the VAS, and for the detection of neuropathic pain, the Douleur Neuropathique-4 items questionnaire (DN4). Whom presented a VAS > 4 or a positive DN4 was referred to our pain unit (UDO) for further evaluation.

**Results and Discussion:** We evaluated 152 patients. A sum of 25 patients (16.4%) required a referral to the UDO, with a mean ICU stay of 20.8 days (SD14.4). Among them, 19% had somatic pain and 62% had neuropathic pain. The most prevalent location was in the lower extremities (12 cases). Depending on the scale and the measurement method, the prevalence of pain after ICU stay can affect up to 50% of patients, in our series, 16.4% of them. Pain’s prevention and treatment in pain units can help prevent chronification and facilitate the reintegration into previous lives.

**Conclusion:** Pain is a prevalent symptom in PICS clinics. It is important not only to quantify pain but also to classify it. Preventing pain from the ICU, early recognition and treatment in pain units can prevent its chronicity and facilitate the reintegration of our patients into their previous lives.

**References:**

14AP02-06 Effects of time from symptom onset to intubation in Covid-19 - a retrospective analysis of a Swedish ICU cohort

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Background: The optimal type and timing of respiratory support in COVID-19 caused respiratory failure is debated. When oxygen administered by face mask, high flow nasal cannula (HFNC) or non-invasive ventilation (NIV) is insufficient, invasive mechanical ventilation (IMV) may be needed. (1-3) The aim of this study was to explore whether time from symptom onset to intubation may influence outcome of COVID-19 caused respiratory failure in patients admitted to the intensive care unit (ICU).

Method: A retrospective analysis of patients with COVID-19 admitted to two ICUs in Kalmar County, Sweden, during 2020-2021 was performed. Primary endpoints were 90-day mortality, rate and duration of invasive ventilation. Direct acyclic graphs (DAGs) were used to create a causal diagram to identify confounders. Multivariable logistic regression and COX proportional hazard regression analysis were used. A p-value of < 0.05 was considered significant.

Results: In total 125 patient were included. Median time from symptom onset to intubation was 12 days (IQR 8-15) and time to intubation was significantly associated with 90-day mortality in both logistic regression analysis (OR 1.16, CI 1.02-1.31) and survival analysis (HR 1.05, CI 1.001-1.102).

Furthermore, there was a significant increase in hazard ratio for patients intubated within 10 days and after 15 days from symptom onset, but not for patients intubated between 10-15 days, when compared to non-intubated.

Conclusion: Time from symptom onset to intubation was associated with mortality. Risk of death was lowest among patients intubated between day 10 and day 15 from symptom onset. We suggest that time from symptom onset to intubation rather than from ICU admission may avoid confounders in terms of hospital logistics and may help to focus on treatment strategies and host response during different stages of Covid-19.

Acknowledgements: We thank Häkan Johansson for invaluable statistical advice.


14AP02-08 Relationship between preoperative malnutrition and postoperative delirium in cardiac surgical intensive care unit: a retrospective study

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Background and Goal of Study: Inadequate nutritional support of surgical patients has a major impact on postoperative morbidity and mortality, but it is still unclear whether this may be a determining factor on the onset of postoperative delirium (POD). We aimed to studying the incidence of POD in malnourished patients undergoing cardiac surgery.

Materials and Methods: In medical charts of patients admitted to post-cardiac surgery unit, in the period between February and July 2023, who had a LOS>3 days, were recorded CAM-ICU-7, to evaluate the onset of POD, and mNUTRIC, to evaluate nutritional status upon admission to intensive care.

Results and Discussion: The results are shown in Table 1.

![Figure 1. Survival over time for Covid-19 patients divided into groups depending on time to intubation.](image-url)
11 patients (30.55%), out of 36, were classified in the group with high mNUTRIC (mNUTRIC ≥ 5); these ones had longer extubation times (6.36 days vs 1.64), duration of longer intensive care unit stay (23.63 days vs 7.4), and the incidence of POD was higher (72.7% vs 16%). High mNUTRIC scores were associated with a greater risk of postoperative delirium (OR=14.00 95% CI 2.54-76.95).

Conclusion(s): Our findings suggested that preoperative malnutrition is associated with POD in cardiac surgery patients.

**14AP02-10**

**Effects of extracorporeal cytokine elimination on hemodynamics and mortality in critical patients**

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**Background and Goal of Study:** In critically ill patients, hyperinflammation due to cytokine storm causes to vasopressor shock (VS) resistant to vasopressor therapy. In recent years, extracorporeal cytokine hemadsorption (ECH) techniques have been used to provide a balanced inflammatory response. The aim of this study is to observe the effects of ECH with oXiris® membrane on hemodynamics and mortality in non-infectious patients with VS.

**Materials and Methods:** The prospective observational study was conducted from October 2022 to January 2023, after ethics committee approval dated September 22, 2022. 30 non-infectious patients greater than or equal to 18 years with VS (defined as need for noradrenaline greater than 0.2µg/kg/min to maintain a mean arterial pressure [MAP] greater than or equal to 65mmHg), a C-reactive protein (CRP) value greater than 100mg/L, a procalcitonin (PCT) value less than 2µg/L were enrolled. Patients’ age, body temperature, MAP, heart rate, respiratory rate, Glasgow Coma Scale (GCS), Norepinephrine (NE) dosage, lactate, CRP, PCT, hemogram, Sequential Organ Failure Assessment (SOFA) score, PaO2/FiO2 ratio, IL-6, IL-1β, IL-10, TNF-α values were recorded. Resolution time of VS, duration of intensive care unit stay, 7-day mortality, mortality until hospital discharge, start time of oXiris®, and duration of oXiris® were recorded.

**Results and Discussion:** The heart rate, respiratory rate, body temperature, acute-phase reactants, creatinine, lactate, cytokine levels, SOFA score and NE dosage of the patients post-oXiris® were lower than those pre-oXiris® (p<0.05). MAP, GCS, oxygenation and urine volume of the patients post-oXiris® were higher than pre-oXiris® (p>0.05). Patients whose VS resolved were younger (p>0.05). VS resolution time was higher in older patients. We observed that patients whose VS resolved were started on oXiris® earlier, and that early oXiris® resolved VS earlier (p<0.05). 7-day mortality was higher in patients who received less oXiris® (p<0.05). IL-6 levels 72 hours after oXiris® were higher in patients with 7-day mortality than without mortality (p=0.05). IL-1β, TNF-α levels 72 hours after oXiris® were higher in patients with mortality until hospital discharge than without mortality (p<0.05).

**Conclusion(s):** The oXiris® can improve the hemodynamic indicators of non-infectious patients with VS, reduce the cytokines, thereby improving the patients’ organ function. Early oXiris® has beneficial effects on resolving VS. It has good clinical application value in non-infectious patients with VS.

**14AP03-01**

**The association between no-visitation policy during COVID-19 and delirium in critically ill patients**

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**Background and Goal of Study:** Delirium in intensive care unit (ICU) can lead to longer ICU stays, increased risk of long-term cognitive impairment, and higher mortality rates. The impact of family visitation on delirium varies depending on factors such as type of visitation or ICU admission. Several studies had showed that unrestricted visitation may benefit for the reduction of delirium compared to restricted visitation. However, the coronavirus disease of 2019 (COVID-19) pandemic led to no-visitation policies, with mixed results on delirium. In this study, we aimed to evaluate the association between no-visitation policy during COVID-19 period and the risk of delirium in critically ill patients.

**Materials and Methods:** We reviewed the electronic medical records of all adult patients who admitted to two ICUs (medical and surgical) in Seoul National University Hospital during the two period: before the COVID-19 (from June 2017 to May 2019) and the COVID-19 period (from June 2020 to May 2022). While regular visitation was allowed twice a day before the COVID-19 period, visitation was prohibited during the COVID-19 period. Patients with cognitive dysfunction or delirium at ICU admission, as well as those discharged within 24 hours of admission, active COVID-19 were excluded. Delirium was defined as composite of positive, or inability to assess Confusion Assessment Method for ICU (CAM-ICU) except for patients with Richmond agitation sedation scale -4 or -5.

The primary outcome was the association between visitation policy and the risk of delirium.

**Table. Risk factors of delirium.**
Results and Discussion: A total of 1566 patients before the COVID-19 period and 1404 patients during the COVID-19 period were included for analysis. Delirium occurred in 602 (38.4%) and 675 (48.1%) patients in visitation and no-visitation groups, respectively. Multivariate logistic regression analysis showed that the restricted visitation during the COVID-19 was significantly associated with the increased risk of delirium in ICU (Table).

Conclusion(s): The no-visitation policy in ICU during the COVID-19 period was significantly associated with the increased risk of delirium.

14AP03-02
Performance of the Hypotension Prediction Index in non-ventilated post-anesthesia and ICU patients

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Background: Hypotension is common in the intraoperative, postoperative and intensive care unit (ICU) environments and associated with end-organ injury and mortality. Machine-learning algorithms, such as the Hypotension Prediction Index (HPI), integrated in monitoring devices may reduce hypotension in the post anesthesia care unit (PACU) and in the ICU. However, HPI has not been validated in non-mechanically ventilated PACU and ICU patients.

As mechanical ventilation may substantially alter the physiologic interactions that HPI is said to be based on, we evaluated the performance of HPI in spontaneously breathing, non-ventilated PACU and ICU patients.

Goal: To evaluate the performance of HPI in PACU and ICU patients without mechanical ventilation.

Materials and Methods: Continuous invasive arterial blood pressure (BP) and HPI data were recorded during PACU (n=54) or ICU (n=240) stay. Data were used only when the absence or cessation of mechanical ventilation could be confirmed and ≥3 hours of BP and HPI data were available. Probable artefacts and hemodynamic interventions were filtered to prevent bias. When the HPI rises, hypotension becomes more probable.

For this study, a HPI value ≥85 for ≥1 minute was considered a prediction of hypotension, or HPI-alert. After each HPI-alert or change in T slope setting. Respiratory mechanics were obtained for each patient for a total of 80 minutes with measurements of 20 minutes at each T slope time, (MP, Respiratory rate (RR), PEEP, TVe, Pinsp, T slope, WOBV, Vee, FIO2, Spo2, and EICO2).

Results and Discussion: Univariable logistic regression analysis performed at both I:E ratios (1:2 and 1:1) and all T slope times showed that the MP dyn and MP LM equations for the patient averages, the minimal difference between the equations in terms of both quantity and proportion was found to be statistically significant.

Overall mean age was 62.9 (SD 13.3), 194 (66%) patients were male. With an HPI threshold of ≥85 a sensitivity of 0.99 (95%CI 0.98-1.00), specificity of 0.71 (95%CI 0.67-0.75), median time-to-event of 259 seconds (95%CI 251.63-265.95), PPV of 0.70 (95%CI 0.65-0.74) and NPV of 1.00 (95%CI 0.99-1.00) was found. These results suggest that the absence of positive pressure ventilation, and its influence on hemodynamic parameters, does not affect the performance of the HPI algorithm in predicting hypotension.

Conclusion: HPI reliably predicts hypotension in a non-mechanically ventilated PACU and mixed ICU population. Future research should evaluate whether HPI implementation positively affects patient outcomes in these settings.

14AP03-03
The effect of inspiratory rise time on mechanical power calculations in pressure control ventilation: dynamic approach

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Background and Goal of Study: Mechanical power (MP) is a valuable parameter used to predict ventilation-induced injury in patients (1). The linear model MP equation (MP lm) calculates the closest result to the reference method in PCV. The dynamic MP equation (MP dyn) calculates power using the work of breathing ventilatory parameter, which is automatically measured by the mechanical ventilator.

In this study, MP was calculated with MP lm and MP dyn equations with different inspiratory rise times (T slope, 5%, 10%, 15% and 20%) in PCV mode in Covid-19 Acute Respiratory Distress Syndrome (C-ARDS) patients and compared with each other.

Materials and Methods: This study was carried out between 2022 and 2023 in the Dr. Sadi Konuk Training and Research Hospital. The study included 38 C-ARDS patients who were deeply sedated and mechanically ventilated in PCV mode between 24-48 hours after admission in the intensive care unit. T slope was changed between 5% and 20% in two different I:E ratios (1:2 and 1:1) with 5% increases every 20 minutes. To check the presence of intrinsic PEEP, total PEEP was measured by performing the expiratory hold maneuver at every change in T slope setting. Respiratory mechanics were obtained for each patient for a total of 80 minutes with measurements of 20 minutes at each T slope time, (MP, Respiratory rate (RR), PEEP, TVe, Pinsp, T slope, WOBV, Vee, FIO2, Spo2, and EICO2).

Results and Discussion: Univariable logistic regression analysis performed at both I:E ratios (1:2 and 1:1) and all T slope times showed that the MP dyn and MP lm equations correlated with R² ≥ 0.96. As a result of the Bland-Altman analysis of the power values calculated with MP dyn and MP lm equations for the patient averages, the minimal difference between the equations in terms of both quantity and proportion was found to be statistically significant,
but it was not considered clinically significant. In addition, every 5% increase in T_slope time resulted in a decrease in mechanical power values of approximately 1 J/min.

**Conclusion:** The difference between the MP values calculated with $MP_{\text{dyn}}$ and $MP_{\text{LM}}$ equations at different $T_{\text{slope}}$ times was not clinically significant.

For calculating MP practically and continuously in both VCV and PCV mode, the $MP_{\text{dyn}}$ equation may be a useful option. As the $T_{\text{slope}}$ times increased, the mechanical power was calculated to be clinically significantly lower.

**Reference:**

**14AP03-04**
**Depth of sedation in Intensive Care Unit: assessment of the individual performance of multiple variables**

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**Background and Goal of Study:** No gold-standard prevails to objectively monitor the depth of sedation (DoS) in Intensive Care Unit (ICU). It is thus recommended to use a hypnotic titration protocol based on clinical hetero-assessment scores of alertness(1). In France, the scores most commonly used to assess and monitor sedation are the Richmond Agitation-Sedation Scale (RASS, 2). Thanks to machine learning models applied to a multimodal and high-frequency recording channel in a mixed ICU, we aimed at evaluating the individual performance of every variable measured in the ICU.

**Materials and Methods:** From January 1st, 2022 until August 31st, 2023, 24 patients have been included. Carescapes monitor B850 (GE (R)) and the Dräger Evita V500 were recorded to generate a database of multimodal monitoring including 2-channel EEG, BIS®, respiratory and hemodynamic parameters. Patients were monitored, respectively mortality data was sourced from the local population registry.

**Results and Discussion:** After labelization of the datasets, we compared the 28 parameters between the 2 groups by looking at the features importance given by a RandomForest classifier (3). When analyzing all the patients included, without taking into account their sedative drugs, the most interesting variables were respiratory parameters (mean spontaneous tidal volume, respiratory rate, and minute volume ventilation), the EMG recorded by the BIS, and the Heart rate. Surprisingly, delta/beta ratios and EEG-derived SEF95 were not discriminative in separating the two groups. The figure presents boxplots relating to the different variables of interest, represented by their mean or std over a 10-minute signal before stimulation.

**Conclusion(s):** In order to build a multimodal algorithm to improve the prediction of the DoS for ICU patients, we identified parameters of interest, principally ventilatory parameters.

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**14AP03-05**
**Clinical outcome of surgical intensive care patients 6 and 12 months after admission to intensive care**

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**Background and Goal of Study:** Understanding longitudinal outcomes of patients is crucial for improving hospital care and to identify patients at risk. This study aimed to assess functional independence, mental health and cognitive impairment at 6 and 12 months after admission to two surgical intensive care units at the Klinikum rechts der Isar, Munich.

**Materials and Methods:** From May 2018 to April 2019, adult patients were enrolled in the Prospective Registry of Mobilization-, Routine- and Outcome Data of Intensive Care Patients (NCT03666286). Inclusion criteria was an ICU stay exceeding 24 hours while exclusion criteria were language barriers, inability to provide consent and readmission. Survivors were contacted at 180 and 360-days post ICU admission. Follow up via phone or written forms was conducted including Mobility- Barthel, IADL, HADS and MOCA Blind. Readmissions were monitored, respective mortality data was sourced from the local population registry.

**Results and Discussion:** The mean age was 65 years (SD 16.1), with frailty being present in 24.5% (CFS 5-9). The mean SOFA Score was 6.1 (SD 3.7), average length of stay in ICU was 14 days (SD 16.2). 406 eligible patients were identified of which 237 could be contacted on day 180 and 197 on 360d (58.4% and 48.5%, respectively). Mortality was 19.2% (n=78) until 180d and 25.6% (n=104) until 360d.
Not all patients were able to provide full information; complete questionnaires could be obtained in 110/79 patients (180d/360d). Prior to the ICU stay the mean Barthel Index score was 92 reflecting functional independence. 360 days after the critical illness, cognitive impairment was detected in 59.4%/59.0% using MOCA blind (n180=114; n360=80), 45.0%/44.0% screened positive in HADS for depression (n180=120; n360=93, respectively).

Independent mobility (Mobility Barthel score of 25 or higher) was achieved by 72.4%/72.2% (n180=199, n360=151). Functional independence (IADL score of 8, n180= 160; n360=117) was reached by 44%/42% (180d/360d).

Conclusion(s): The findings underline the challenges survivors of critical illness are facing. Limited mobility, cognitive impairment and depression are prevalent. Many intensive care survivors did not recover fully one year after critical illness. Targeted interventions and therapies might be necessary to improve outcomes.

14AP03-06
Bioelectrical impedance analysis-derived phase angle at ICU admission: a complementary tool enhancing prognostic efficiency of SAPS-3

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Background and Goal of Study: Bioelectrical impedance analysis (BIA)-derived phase angle (PA) serves as a prognostic tool in various clinical scenarios and has been compared with established morbidity and mortality scores such as APACHE II or SOFA. This study aims to assess whether PA increases the predictive capability of the Simplified Acute Physiology Score III (SAPS III) for intensive care unit (ICU) length of stay (LOS).

Materials and Methods: This prospective observational study was conducted in the adult ICU of our hospital. BIA was performed within the first 6 hours of admission for all patients, excluding those under 18 years and those who refused. Prognostic indices (SAPS III and SOFA) were assessed, and clinical outcomes (ICU discharge, LOS, and mortality) were recorded. PA was measured using a portable BIA device (Akern S.L). Simple linear regression analyses were conducted to evaluate the association of PA and SAPS III independently with LOS and mortality.

Subsequently, a multiple linear regression incorporating PA and SAPS-3 was performed, and the relationship with the same variables was tested, utilizing the coefficient of determination (R²).

Results and Discussion: BIA was conducted in 86 patients (63.9% male) with a mean age of 62 years. The LOS was 2 days (1–8 days), 90-day mortality was 4%, SAPS-3 and SOFA scores were 37 and 2 points, respectively, and the mean PA was 5.13º. The primary admission reasons were postoperative monitoring after major surgery (77 patients) and sepsis (8 patients). Of the 86 subjects, only 31 stayed in the ICU for more than 2 days. Multiple linear regression analysis in this subgroup demonstrated an increase in R² from 32% to 65.4%.

Notably, patients with ICU stays exceeding 3 days (11 patients) exhibited a significant increase in R² from 37.7% to 86.8% (P=0.015).

Conclusion: PA in patients admitted to the ICU for more than two days significantly increases the predictive capacity of the SAPS 3 score for LOS.

References:

14AP03-07
Hyperlactatemia, and mortality in patient undergoing continuous renal replacement therapy for acute kidney injury during cardiac surgery

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Background and Goal of Study: The presence hyperlactatemia usually occurs in critical patients in intensive care, and are bad prognostic indicators for patient survival. How is the progress of patients taking into consideration this indicator during continuous renal replacement therapy (CRRT.)

Materials and Methods: During a period of 6 years, 145 critically patients, operated for open heart surgery, developed Acute Kidney Injury (AKI). But 60 of them, who had hyperlactatemia over 9mmol/L at the time of starting CRRT were studied, and the progression of this marker was observed over several days.

The mortality risk was evaluated after adding serum lactate levels to the Sequential Organ Failure Assessment (SOFA) and the Acute Physiology and Chronic Health Evaluation (APACHE) II score-based models

Results and Discussion: 44 patients (73.3%), had a progressive decrease in lactate until normalization after 54±12 hours and survived. In 5 patients (8.3%), a decrease was observed to a value of 4.5±1.5 after 48 hours, but again there was a progressive increase, and these patients did not survive. 11 patients (18.3%) hyperlactatemia over 8 mmol/L and metabolic acidosis persisted during CRRT, all patients died. Overall mortality was 26%

Hyperlactatemia is attributable to either excessive production of lactate due to hypoxia or impaired clearance. Lactate has been a well-known factor related to poor prognosis in critically ill patients (1). Lactate clearance which normally depends on liver gluconeogenesis, could depend more on oxidation in injured, post ischemic or resting tissues during stressful states including sepsis (2).

It has been suggested that the beneficial effect of CRRT on hyperlactatemia is the improvement in acid–base and metabolic status leading to enhanced lactate metabolism, rather than the direct removal of lactate by ultrafiltration and dialysis.
Conclusion(s): Presence of hyperlactatemia during CRRT is an alarm for the intensivist to change something in the treatment of the critically patients because death is inevitable.

References:

14AP03-08
REnal reCOVery after ECMO for Cardiogenic Shock (RECOVECMO)

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Background and Goal of Study: Refractory cardiogenic shock (CS) occurs with persistent organs hypoxia despite administration of vasoactive medications and may require Veno-Arterial Extracorporeal Membrane Oxygenation (VA-ECMO) support. Nearly sixty percent of patients will develop an Acute Kidney Injury (AKI) during CS. There are many definitions of renal recovery in the literature but none has clearly defined renal recovery after refractory CS requiring VA-ECMO. Or, the absence of renal recovery increases in-hospital and long-term mortality in these patients. The objective of this study was to determine the performance of 2 definitions of renal recovery for predicting the incidence of 2-year major adverse kidney events in patients suffering from refractory CS requiring VA-ECMO and renal replacement therapy (RRT).

Materials and Methods: Patients implanted with VA-ECMO and RRT for medical or post-cardiotomy refractory CS between January 2012 and June 2020 were retrospectively enrolled. Renal recovery at day 90 (D90) was assessed according to two serum creatinine (Scr) thresholds: D90-Scr, less than 1.5-fold basal Scr recovery at day 90 (D90) was assessed according to two serum creatinine (Scr) thresholds: D90-Scr, less than 1.25-fold basal Scr (according to Pannu et al.) and D90-Scr, less than 1.5-fold basal Scr (according to the ADQI group) and D90-Scr, less than 1.25-fold basal Scr (according to Pannu et al.).

Results and Discussion: The incidence of MAKE at 2 years was 44%. The sensitivity and specificity of the ADQI group were 0.925 and 0.823 respectively. The sensitivity and specificity of Pannu et al. were 0.925 and 0.525 respectively. Renal recovery based on the ADQI group was associated with better renal survival and, after adjusting, the number of red blood cells units transfused remains associated with 2-year MAKE (HR 1.02, 95% CI [1.006; 1.035] p=0.007).

Conclusion: After VA-ECMO and RRT for a CS, renal recovery according to the ADQI group showed better statistical performances to predict long-term renal survival.

14AP03-09
Effects of Continuous External Negative Pressure during Mechanical Ventilation with Spontaneous Breathing activity on lung function variables in pigs with experimental ARDS

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Background and Goal of Study: In patients with acute respiratory distress syndrome (ARDS), spontaneous breathing (SB) during mechanical ventilation (MV) improves lung function and mechanics but may worsen lung injury. These positive effects were also achieved by thoraco-abdominal continuous external negative pressure (CENP) during controlled MV in pigs [1]. We hypothesized that CENP improves oxygenation independent of SB in experimental ARDS.

Materials and Methods: After approval (DD24.1-5131/449/72), 12 pigs were anaesthetized and ventilated (BIPAP-Assist, tidal volume [Vt] 6ml/kg, respiratory rate titrated for pH>7.20, PEEP 7cmH2O; fraction of inspired oxygen 1.0, inspiratory-expiratory ratio 1:1, EvitaXL, Dräger, Germany). Muscle paralysis (3mg/kg/h atracurium during CON, CON+CENP and CON+Pegaso Vent, Dima Italia, Italy). Muscle paralysis (3mg/kg/h atracurium during CON and CON+CENP) was assessed using train-of-four electromyography (TOF). Measurements were performed before each block (without PEEP/CENP), repeated 30min after establishing block settings,
and their changes calculated as $\Delta(\text{variable}) = 30\text{min}(\text{variable}) - 0\text{min}(\text{variable})$. Statistics included t-tests and general linear model (between-subject factor sequence; within-subject factor block; $\alpha=0.05$, Sidak-adjusted).

**Results and Discussion:** After lung injury, oxygenation ($\text{PaO}_2/\text{FiO}_2$, mean±SD, 639±69 vs. 260±130mmHg; $P<0.001$) and compliance ($C_r$; 5±4 vs. 20±8ml/cmH$_2$O; $P<0.001$) decreased. TOF was 0±0 in both CON+CENP and CON, as well as 4±0 in both CENP+SB and SB. $\Delta(V_t)$, $\Delta$(minute volume), $\Delta$(driving pressure), $\Delta(\text{PaCO}_2)$, $\Delta$(pH), $\Delta(C_r)$, and $\Delta$(resistance) did not differ between blocks.

Oxygenation increased during all blocks and was higher with preserved SB. $\Delta\text{PaO}_2/\text{FiO}_2$ was higher during CON+CENP than CON (456±81 vs. 182±142mmHg; $P<0.001$), but similar between SB+CENP and SB. Mean arterial (-19±11 vs. -6±10mmHg; $P=0.038$) and central-venous pressure (-2±2 vs. 0±1mmHg; $P=0.009$) decreased more during CON+CENP than CON, but changes did not differ between SB+CENP and SB. Cardiac output was not significantly affected by CENP.

**Conclusion:** In experimental ARDS, CENP improved oxygenation during controlled MV but not during MV with SB.

**Reference:**
1. Scharffenberg M et al., ICMx 8 (Suppl 1), 49 (2020)

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**14AP03-11**

**Effect of vasopressor therapy on microcirculation evaluated by remote photoplethysmography. Pilot study**

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**Background and Goal of Study:** Sepsis can progress to septic shock, a life-threatening condition with high mortality rates. The current resuscitation strategy for septic shock patients consists of fluid and vasopressor therapy, to restore systemic hemodynamic parameters and tissue oxygenation. However, high doses of vasoactive drugs can impair microcirculatory function and perfusion, which are crucial for organ viability.

Therefore, there is a need for a non-invasive, optical technique that can monitor the microcirculation and guide resuscitation therapy in septic shock patients.

We aimed to assess the effect of vasopressor therapy on the photoplethysmography (PPG) signal, a potential and low-cost alternative that utilizes light reflection to detect changes in blood volume in the microvascular bed.

**Materials and Methods:** In this single-center, prospective observational pilot study, we included four patients with septic shock. Patients received varying dosages of noradrenaline. During the test, systemic hemodynamic changes were registered using continuous blood pressure monitoring, and pulse wave changes were detected using remote PPG from the skin.

**Results and Discussion:** The mean PPG pulse wave diastolic component decreased by 6% (from 0.56 to 0.53 a.u.) across the maximal noradrenaline dosage range. Results showed that high noradrenaline dosage microcirculation disturbance increased.

**Conclusion:** Preliminary data from the pilot study indicate that remote photoplethysmography is a promising tool for assessment changes in microcirculation during different dosage of vasoactive drugs.

**Acknowledgements:** We gratefully acknowledge the financial support provided by the Latvian Council of Science under the project FLPP-0326, & Development and Application of a Multimodal Optical Technique for Guiding Fluid Resuscitation and Vasopressor Therapy in Critically Ill COVID-19 Patients” (Project No. Izp-2022-1/0326).

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**14AP04-01**

**An optimal exposure of linezolid is associated with better clinical outcomes in critically ill patients with confirmed infections caused by Gram-positive bacteria: an urgent call for TDM**

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**Background and Goal of Study:** Pathophysiological changes in critically ill patients with severe infections may alter the pharmacokinetics (PK) of antimicrobials, leading to treatment failure or toxicity.

The objectives were to assess the interindividual PK variability of linezolid (LNZ) and to evaluate the relationship between exposure and clinical outcomes.

**Materials and Methods:** Single-center, retrospective, observational PK study (January 2010-January 2022) in patients admitted to the intensive care unit (ICU) treated with LNZ at a standard dosage (600 mg/12h) for a confirmed Gram-positive bacteria and undergoing therapeutic drug monitoring (TDM). Demographic, clinical, microbiological and pharmacokinetic/pharmacodynamic (PKPD) variables were collected.

Blood samples before dose (Cmin) at steady state were obtained within a TDM program and LNZ plasma concentrations were analyzed by a high-performance liquid chromatography (HPLC) method. An optimal PKPD target attainment was defined as Cmin >7 mg/L.

**Results and Discussion:**
- A total of 165 patients were included. Demographics, clinical and PK data are shown in Table 1.
- All patients had a confirmed infection caused by Staphylococci, Enterococci or Streptococci. At the first TDM monitoring, only 25.21% of patients had LNZ Cmin within the therapeutic range.
A higher clinical cure rate was observed in patients with a therapeutic Cmin compared to those with a lower one (86.5% vs 63.5%, p=0.008), as well as a tendency to a lower in-hospital mortality (25.0% vs 7%, p=0.116). No differences were observed -

### Table 1. Clinical and pharmacokinetic data.

<table>
<thead>
<tr>
<th>Demographic and clinical variables</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males n, (%)</td>
<td>113 (69.1%)</td>
</tr>
<tr>
<td>Age (years), mean (SD)</td>
<td>65.6 (14.7)</td>
</tr>
<tr>
<td>Body Mass Index (kg/m²), mean (SD)</td>
<td>27.8 (7.2)</td>
</tr>
<tr>
<td>Charlson Index, mean (SD)</td>
<td>2.5 (2.0)</td>
</tr>
<tr>
<td>APACHE-II score, mean (SD)</td>
<td>20.1 (7.4)</td>
</tr>
<tr>
<td>Baseline estimated glomerular filtration rate (by CKD-EPI), (ml/min/1.73m²), mean (SD)</td>
<td>67.3 (41.1)</td>
</tr>
<tr>
<td>Creatinine serum concentrations (mg/dL), mean (SD)</td>
<td>1.5 (1.4)</td>
</tr>
</tbody>
</table>

### Background and Goal of Study:

Screening to recruitment rates vary with study design and were highest for multistep interventional studies requiring prerecruitment testing for eligibility. A significant proportion of patients or relatives decline participation in research, particularly in emergency and critical situations. Logistical barriers, e. g. working patterns and staff availability may contribute to low recruitment rates especially in studies with tight recruitment windows.

### Conclusion(s):

Study design and complexity of study interventions have a significant impact on recruitment rates. Consent processes, interaction between clinical and research staff and timely recruitment after screening represent areas for further research to improve recruitment rates for critical care studies.

### 14AP04-02

**Barriers to recruitment into critical care research studies in a large university teaching hospital**

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**Background and Goal of Study:** Screening to recruitment rates in critical care research studies remain high, resulting in substantial resource utilisation for screening activities without subsequent recruitment. Recruitment success may depend on study methodology and study-specific interventions. The study screening log provides a comprehensive list of all subjects screened for eligibility and is required for both observational and interventional clinical studies.

In this retrospective analysis of screening and recruitment logs, we aimed to identify barriers to recruitment in relation to study design and complexity of intervention.

**Materials and Methods:** We analysed screening and recruitment activity for 11 critical care studies between 25/4/2022 and 25/9/2023.

All studies were open to recruitment at the Royal Liverpool University Hospital and supported by the National Institute of Health and Social Care Research.

We analysed data for observational and interventional studies and clinical trials of investigational medicinal products (CTIMPs). Reasons for recruitment failure were categorised based on study design and complexity.

**Results and Discussion:** Recruitment rates were higher for observational studies (21%) than for interventional studies (7%) or CTIMPs (4%). Recruitment was lowest for complex multistep interventional studies with recruitment of less than 5% of patients screened. Common reasons for exclusion were declined consent (15%), no longer meeting inclusion criteria after screening (14%) and timing out (1%).

Despite evolving guidance for consent in emergency and critical care research, declined consent remains the most common reason for exclusion. Screening to recruitment rates vary with study design and were highest for multistep interventional studies requiring prerecruitment testing for eligibility.

**Conclusion(s):** Study design and complexity of study interventions have a significant impact on recruitment rates. Consent processes, interaction between clinical and research staff and timely recruitment after screening represent areas for further research to improve recruitment rates for critical care studies.

### 14AP04-03

**Economic analysis of volatile short-term sedation in intensive care**

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**Background and Goal of Study:** The use of volatile sedatives for short-term sedation in intensive care units is rarely used as a primary method. Increased costs are often cited as a reason. However, the additional costs have not yet been specified and will therefore be investigated in the present study.

**Materials and Methods:** Prospective data collection within 60 minutes of short-term sedation was carried out with a recording of the required staff work times and consumption data, which were offset against the market prices in a secondary data analysis and specified concerning the device used for sedation application. Descriptive data analysis was carried out to compare the anaesthetic conserving devices (ACD) on the market: MIRUS and AnaConDa a Kruskal-Wallis-test will be used.

**Results and Discussion:** We could verify that the costs of volatile short-term sedation even under optimized conditions were twice as high as under propofol sedation (AnaConDa 99.80 € MIRUS 109.10 € Propofol 54.10 €), without optimization in the sense of multiple uses of the ACD possible for MIRUS and full utilization of the absorber capacities, the costs were 168.60 € for AnaConDa and 427.30 € for MIRUS (Figure 1). The required working time for the set-up at the bedside was calculated based on corresponding payments of £3.30.
Conclusion: The increased expenses associated with inhaled sedation are limited in relation to the overall costs of intensive care treatment. The repeatedly described advantages of this sedation procedure, such as earlier awakening, faster extubation and accelerated eligibility for transfer to a normal ward, could outweigh these additional costs considerably.\cite{1,2}

References:

### 14AP04-04
Repeatability and accuracy of interstitial continuous glucose monitoring in critically ill patients

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Background and Goal of Study: Hyperglycemia and hypoglycemia are prevalent challenges in intensive care unit (ICU) patients. Continuous glucose monitoring systems used in diabetic outpatients hold promise for enhancing glycemic control in ICU settings and potentially lessening nursing burdens. However, the adoption of the Freestyle Libre monitoring system (FLS-CGM) in the ICU has shown contradictory results in terms of its precision and clinical accuracy. Our investigation endeavors to evaluate the reliability and accuracy of the FLS-CGM in a cohort of 40 ICU patients.

Materials and Methods: Repeatability was assessed by comparing the 4-day mean CGM measurements for each time-point. The accuracy analysis involved comparing the average FLS-CGM measurements across three time-points over 4 days with arterial and venous blood gases and capillary glucose readings, examining 160 data pairs for each comparison. Accuracy was assessed with mean absolute relative difference (MARD), Bland-Altman plots with determination of bias and Limits of Agreement (LoA), criteria from Finfer’s work, Clarke Error Grid (CEG), Parkes Error Grid (PEG) and Surveillance Error Grid (SEG).

Results and Discussion: MARD between FLS-CGM and arterial, venous, and capillary measurements was 12\%, 11.57\%, and 11.03\%, respectively. Bland-Altman analysis revealed biases (LoA) of 10.28 mg/dl (-27.16;47.7), 8.71 mg/dl (-28;45.5), and 2 mg/dl (-37;42). Clinical accuracy analyses demonstrated over 95\% of data within zones A and B of CEG and PEG, indicative of good clinical accuracy and SEG showed similar results.

Comparing arterial blood values and CGM measurements, only 61\% met Finfer’s criteria for values above 100 mg/dl, and 70\% for values below 100 mg/dl. Subgroup analysis showed no significative differences in accuracy.

Conclusion(s): This system has demonstrated reliable repeated measurements over time and has shown acceptable clinical accuracy. This makes it a promising tool for future studies on glycemic control in intensive care, considering its low invasiveness and continuous glucose value readings. Future research could focus on the use of this system to guide insulin therapy.

### 14AP04-05
One does not fit all: taking into account the sedation drug to predict the depth of sedation in Intensive Care Unit

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Background and Goal of Study: Sedation is often required for Intensive Care Unit (ICU) patients, but so far, no gold-standard exists to personalize the treatments administered. In order to develop such a tool, we recorded several parameters while assessing the level of consciousness of ICU patients.

In this work we tested the hypothesis that cerebral mechanisms of sedation were not the same depending on the drug used to provide sedation, so an EEG-derived monitor should take into account the type of sedative drugs used to predict the depth of sedation in ICU.
Materials and Methods: From January 1st, 2022 until August 31st, 2023, 24 patients have been included. Care scape monitor B850 (GE®) and the Dräger Evita V500 were recorded to generate a database of multimodal monitoring including 2-channel EEG, BIS®, respiratory and hemodynamic parameters. 

During the recording sessions, patients were assessed hourly by 2 scores: Glasgow and RASS before and after a standardized stimulation. Then, each epoch of the database was labeled: reactive if the difference between the GCS before stimulation and the GCS after stimulation is greater than or equal to 1, and non-reactive if the difference is equal to 0. All the sedative drugs were retrieved from the medical files and we divided our dataset into several subgroups, depending on the sedation previously recorded and on the sedative drugs currently administered.

Results and Discussion: When analyzing all the patients, we observed that EEG-derived parameters were not discriminative in separating the two groups. By separating the groups depending on the sedative drugs received by the patients, we observed strong differences in EEG-derived parameters between reactive and non-reactive parameters. The figure shows the results of delta/beta ratios, and mean EEG power for the all cohort and depending on the drugs administered.

Conclusion(s): In order to build a clinically useful monitor to adjust the depth of sedation for ICU patients, a multimodal approach is a promising way. But to improve the prediction, our results suggest that drugs administered to the patients should be taken into account.

14AP04-06
Predictive hypoxemic parameters for tolerating apnea test while assessing death by brain criteria

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Background and Goal of Study: The apnea test (AT), a crucial step in the diagnosis of brain death, assesses the absence of spontaneous respiratory activity. It involves disconnecting the patient from mechanical ventilation to evaluate the capacity for independent breathing. Lack of any respiratory effort when Paco2 ≥60 mmHg supports the diagnosis of brain death. Occasionally AT needs to be aborted due to hypoxia to prevent further patient deterioration. Aborting the AT may lead to family confusion and frustration and objection to the process. PaO2 level at the beginning of AT in which the patient is not anticipated to tolerate the AT is not clear. Our goal in this study was to assess which PaO2 levels could be addressed as a high risk of AT failure.

Materials and Methods: This is a retrospective cohort of patients who were suspected of brain death at the Tel Aviv Medical Center between 2017-2022. The primary outcome was PaO2 of 60 mmHg at the end of AT because this value represents the deflection point of the saturation curve from which the patient's oxygen saturation could rapidly deteriorate. The Mann-Whitney test was used to determine the correlation between PaO2 at the beginning of the AT with PaO2<60 mmHg at the end. To assess the discriminative ability of PaO2 at the start as a potential predictor of desaturation ROC model was applied.

Conclusion(s): In order to build a clinically useful monitor to adjust the depth of sedation for ICU patients, a multimodal approach is a promising way. But to improve the prediction, our results suggest that drugs administered to the patients should be taken into account.

Figure 1.
Results and Discussion: Data from 72 patients was analyzed of which 6 patients had a PaO2< 60 mmHg by the end of the AT and thus were defined as group B. No significant differences in demographics were found between the two groups. PaO2 at the beginning of the AT was significantly higher in group A: 379 (IQR 277,445) Vs 175 in group B (IQR 104,274) with P-value of 0.0041. The ROC curve analysis (Figure 1) demonstrated that PAAO2 at the start has a good discriminative ability to low PaO2 with an AUC=0.86 95%CI (0.72-0.99). A threshold of PaO2< 332 mmHg will yield a sensitivity of 100% and a specificity of 64%.

Conclusion(s): Pre-test PaO2< 332 mmHg before starting the apnea test is correlated with reaching hypoxic levels (PaO2<60 mmHg) during the test thus risking test cessation.

14AP04-07
Short-term outcomes, fail to rescue and mortality analysis at a surgical critical care unit in a tertiary hospital

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Background and Goal of Study: Large ICU-based cohort studies have demonstrated significant temporal reductions in risk-adjusted mortality and ICU length of stay (LOS). The rate of death following complications has become known as the failure to rescue (FtR) rate.

The goal of this single-centre retrospective study was to describe the clinical characteristics, presented complications and outcomes of patients admitted to a post-surgical critical care unit (SICU) for a period greater than 9 days, compared with the group of patients who remained admitted for a period between 2 to 9 days.

Materials and Methods: 525 patients were included, 459 patients had a SICU LOS between 2 and 9 days (short stay-SS) and 66 patients had a SICU LOS greater than 9 (prolonged stay-PS). Numerous variables were collected: sex, age, days of SICU admission, days of mechanical ventilation (VM), need for MV > 24 hours, type of surgery, readmission and mortality.

Complications were also recorded: pneumonia, adult respiratory distress syndrome (ARDS), septic, cardiogenic and hypovolemic shock, need for renal replacement therapy (RRT), tracheostomy and stroke during admission. The FtR rate was calculated for each group. In addition, the support therapies were registered: use of extracorporeal CO2 removal (ECCO2R), extracorporeal membrane oxygenation (ECMO) and nitric oxide (NO).

The association of risk factors with SICU mortality was assessed in univariable and multivariable regression models. Statistical significance was set at p <0.05. Analyses were performed using STATA 16.

Results and Discussion: Considering the differences between groups, we found significant differences (p <0.05) in LOS (20.3±12.9 PS vs 2±3.1 SS), readmission (22.7% PS vs 13.2% SS), MV >24 hours (81.8% PS vs 15.8% SS), days of MV (8.6±10.6 PS vs 0.4±1 SS) and mortality (22.7% PS vs 3.7% SS). Similarly, all complications were significantly more frequent in the prolonged stay group, as was the FtR rate (24% PS vs 7.9% SS). Regarding the rescue therapies used in these patients, the PS group made a greater use (p<0.001) of ECCO2R therapy and nitric oxide.

We found a significant correlation with prolonged stay, MV >24 hours, the appearance of pneumonia, ARDS, shock and the need for ECCO2R, NO and RRT in the univariate analysis. The logistic regression model showed a significant influence of age, SICU admission days, MV >24 hours and hypovolemic shock on SICU mortality.

Conclusion(s): Patients with prolonged SICU stay showed increased SICU mortality than patients who are treated less than 9 days. Age, prolonged SICU stay and MV >24 hours are risk factors associated with SICU mortality. Likewise, patients with prolonged SICU LOS experiencing any complication after surgery, are less likely to be rescued.

14AP04-08
Assessing the concordance of SpO2 and SaO2 in mechanically ventilated patients in a large cohort

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Background and Goal of Study: In critically ill adults, mechanical ventilation demands precise FiO2 adjustments to optimize arterial oxygen saturation, as assessed by pulse oximetry (SpO2), blood gas analysis (SaO2), or partial arterial oxygen pressure (PaO2). While higher SpO2 targets (95-98%) provide a margin of safety against hypoxemia, imprecise monitoring can lead to excessive FiO2 administration, increasing the risk of hyperoxemia and related complications. Our aim was to evaluate the SpO2/SaO2 concordance in a substantial ICU patient cohort, identifying potential discordances leading to unnecessary FiO2 administration.

Materials and Methods: We analyzed data from 16109 invasively ventilated patients in the AmsterdamUMC ICU database, excluding those ventilated <2 hours (n=983), with stays <24 hours (n=5915), and with FiO2 ≤ 21% (n=1766), creating a cohort of 7445 patients. We extracted each patient’s SaO2, concurrent PaO2 and PaCO2, and the closest SpO2 measurement within a 1-hour interval. From this cohort we selected cases with SaO2>SpO2, blood gas analysis (SaO2), or partial arterial oxygen pressure (PaO2). 35 and 45 mmHg, and PaO2>100 mmHg, creating a “hyperoxemic” subcohort (n=4233) for comparison with the rest.

Figure 1. Bland-Altman plot of blood gas analysis saturations (SaO2) and pulse oximetry saturations (SpO2)

Figure 1. Bland-Altman plot of blood gas analysis saturations (SaO2) and pulse oximetry saturations (SpO2)
Results and Discussion: Analysis of 168,092 paired SaO2 and SpO2 values revealed a mean difference (bias) of 0.01, with limits of agreement from -0.14 to +0.15 as demonstrated in Figure 1. A mean difference ≥2% was found in 39.7% of patients. In the hyperoxemic subcohort (56.5% of patients), 12.7% of measurements (n=21350) showed SpO2 higher than SaO2 when PaO2 exceeded 100 mmHg. Differences are shown in Table 1.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Non-high PaO2 subcohort (n=3212)</th>
<th>Hyperoxemic subcohort (n=4233)*</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>64.5 (20.0)</td>
<td>64.5 (20.0)</td>
<td>0.040</td>
</tr>
<tr>
<td>Predicted body weight (kg)</td>
<td>74.5 (10.0)</td>
<td>74.5 (10.0)</td>
<td>0.380</td>
</tr>
<tr>
<td>Duration of mechanical ventilation (hours)</td>
<td>33.2 (159.9)</td>
<td>420 (1477.1)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Initial SOFA score</td>
<td>8.0 (4.0)</td>
<td>8.0 (4.0)</td>
<td>0.800</td>
</tr>
<tr>
<td>Initial hemoglobin (g/dL)</td>
<td>6.8 (1.8)</td>
<td>6.8 (1.8)</td>
<td>0.694</td>
</tr>
<tr>
<td>Initial white blood cell count (× 10³/L)</td>
<td>12.5 (7.3)</td>
<td>12.6 (7.1)</td>
<td>0.328</td>
</tr>
</tbody>
</table>

*Criteria: SaO2 > SpO2 and PaO2 > 100 mmHg and 35 mmHg ≤ PaCO2 ≤ 45 mmHg

Table 1. Comparison of baseline characteristics of normoxemic and hyperoxemic cohort

Conclusion(s): Our study demonstrates SpO2/SaO2 concordance differing greatly with decreasing values. Differences of more than 2% value were more frequent than in previous research. The results demonstrate potential use of too high FiO2 based on SpO2 values lower than SaO2. These findings emphasize the importance of individualized oxygen therapy and the need for further research into specific patient subgroups.

14AP04-11
Feasibility and safety of extracorporeal CO2 removal (ECCO2R) to enhance protective ventilation of surgical critical care ill patients

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Background and Goal of Study: Extracorporeal CO2 removal (ECCO2R) provides respiratory support to patients suffering from hypercapnic respiratory failure by utilizing an extracorporeal shunt and gas exchange membrane to remove CO2. It is a form of extracorporeal life support that can be integrated into a standard continuous renal replacement therapy (RRT) circuit. The aim of this work is to evaluate the feasibility and safety of this technique in a surgical intensive care unit (SICU) of a Tertiary Hospital.

Materials and Methods: The inclusion criteria for the use of ECCO2R were the existence of severe hypercapnic respiratory acidosis (pCO2 > 60 and pH < 7.25) for more than 3 hours and the impossibility of performing protective mechanical ventilation (DP ≥15 cmH2O, Pplateau (Pp) ≥ 30 cmH2O, respiratory rate (RR) ≥ 30). The diagnostic of severe ARDS was made meeting the Berlin criteria. The following variables were collected: SICU and in-hospital mortality, days of SICU stay, days of mechanical ventilation (MV), time to start ECCO2R after meeting criteria, duration of therapy, presence of ARDS, need for tracheostomy, adjuvant therapies (nitric oxide, prone and corticosteroids) as well as associated complications related to the technique. Also, ventilator settings (VT, PEEP, RR, Pplat, FIO2), and arterial blood-gas values (pH, PaO2, PCO2), were collected at baseline, 24 and 96 hours.

Results and Discussion: The patients who met the inclusion criteria were 11. All patients were intubated and connected to MV prior to the start of therapy, SOFA on admission was high 9.5±2.5 [7.8-11.2]. The mean duration of MV was 17.7±3.5 [9.9-25.5] days. Of the 11 patients, 10 were diagnosed of severe ARDS and 9 managed to be weaned from ECCO2R. 5 patients were extubated after ECCO2R therapy. Regarding the ventilatory parameters collected, and attending to the baseline situation, we found differences (p < 0.05) in PaCO2 values in blood gases at 24 and at 96 hours after starting the technique and also in RR in both moments (24 v 36 hours). The overall SICU mortality was 72.7%, same as in hospital mortality.

Conclusion(s): ECCO2R therapy is effective in lowering PaCO2 and preserving protective MV without notable side effects. Despite the high mortality observed, only one of the deaths was related to the technique, so we believe that ECCO2R has the potential to change our approach to the treatment of acute hypercapnic respiratory failure.

14AP05-01
Impella induced hemolysis and vascular access complications: edgy decisions; A Case Report

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Background: Mechanical circulatory support (MCS) devices, including the Impella, are employed when inotropic or vasopressor treatments are insufficient. However, complications can arise if the devices were not handled appropriately.1 One less common but notable complication is Impella-induced hemolysis, and concerns persist regarding the standardization of guidelines, including protocols, device weaning, and managing complications.

Case Report: A 61-year-old female with a history of ischemic heart disease, end-stage renal disease, and peripheral vascular disease. She experienced cardiogenic shock after a cardiac catheterization procedure, leading to the insertion of an Impella device. Despite careful monitoring and confirmation of the device’s position, the patient experienced severe bleeding and hemolysis. Attempts to remove the Impella device were hindered by the patient's unstable hemodynamics.

Discussion: Hemolysis from Impella device can occur due to various factors, including improper device positioning, inadequate anticoagulation, and suboptimal left ventricular filling. In this case, despite severe complications, device removal was not possible. Managing bleeding and thrombosis associated with Impella devices is challenging, as anticoagulation is necessary to prevent blood clots but increases the risk of bleeding. Adjusting the device’s settings, using specific solutions, and monitoring the patient are crucial to mitigate these risks.

Our case illustrates that the Impella device can be employed safely, even in the presence of pre-existing or ongoing hemolysis as compared with literature5.
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cardiomyopathy. Using vasopressin that has alternative pathways and beta-agonists may worsen catecholamine-induced stress who have suspected catecholamine-secreting tumours. Alpha appropriate vasoactive drug in patients with cardiogenic shock weaned off the next day. 

sin on the same day, with noradrenaline and then vasopressin Her hemodynamics improved following initiation of vasopressin-induced cardiomyopathy was made. 

Repeat imaging excluded active adrenal mass bleeding. A work -showed reverse Takotsubo with ejection fraction of 20%. 

Repeated due to escalating noradrenaline requirements in the ICU 

- fxation was excluded after serial electrocardiograms. Initial chest X-ray (CXR) and point-of-care ultrasound (POCUS) were normal. A large adrenal cystic mass with suspected haemorrhage was seen on CT Aortogram. 

She developed hypotension and type 1 respiratory failure refractory to non-invasive ventilation, requiring initiation of peripheral noradrenaline and intubation. 

Repeat CXR showed acute pulmonary oedema (APO). POCUS repeated due to escalating noradrenaline requirements in the ICU showed reverse Takotsubo with ejection fraction of 20%. 

Repeat imaging excluded active adrenal mass bleeding. A working diagnosis of cardiogenic shock with APO due to a catecholamine-secreting adrenal tumour precipitating catecholamine-in-duced cardiomyopathy was made. 

Her hemodynamics improved following initiation of vasopressin on the same day, with noradrenaline and then vasopressin weaned off the next day.

Discussion: Careful consideration is needed when choosing the appropriate vasoactive drug in patients with cardiogenic shock who have suspected catecholamine-secreting tumours. Alpha and beta-agonists may worsen catecholamine-induced stress cardiomyopathy. Using vasopressin that has alternative pathways via V1A and V2A receptors may prove beneficial.3

References:

Learning Points: Phaeochromocytoma crisis causing cardiogenic shock should be considered. Early diagnosis and treatment of hypotension with vasopressin with multi-disciplinary involvement of the endocrinologist and surgeon for optimisation and timely adrenalectomy is lifesaving.

14AP05-03 Sinus vein thrombosis developing in a patient with Pyrimidine 5’ nucleotidase deficiency

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Background: Sinus vein thrombosis is a cerebrovascular event characterized by increased intracranial pressure due to occlusion of the dural sinus and/or cerebral veins. Gene changes that predispose to thrombophilia, enzyme deficiencies, pregnancy, hormonal contraceptive therapy are risk factors for sinus vein thrombosis. Our patient has two risk factors which are enzyme deficiency and hormonal contraceptive using

Case Report: 21-year-old patient, previously diagnosed with 5’ pyrimidine nucleotidase enzyme deficiency and used oral contraceptives due to menstrual irregularity, presents to the emergency department with headache, recurrent generalized tonic-clonic seizures lasting 2-3 minutes. Diazepam, levatiracetam are administered to the patient. Extubated patient, GKS12-13, who had increased diameter in bilateral cortical veins on imaging was admitted to our intensive care unit for further examination. MR venography revealed thrombosis in the superior sagittal sinus. The treatment of the patient was arranged as low molecular weight heparin, levatiracetam, folic acid. The patient who regained GCS on the third day of hospitalization was intubated, cranial CT was re-evaluated. Lacosamide, low-dose aspirin were added to the patient’s treatment. She was extubated on the 8th day of intubation, was transferred to the neurology service. Two months later, the patient, who was admitted to our hospital with complaints of hoarseness and stridor was diagnosed with tracheal stenosis. The patient received tracheal stent treatment men didn’t benefit from the treatment. Primary tracheal resection and reconstruction was performed

Discussion: Increased risk of ischemic stroke has been reported in some patients with pyrimidine nucleotidase deficiency(1). Caution should be exercised when starting oral contraceptives in patients with this enzyme deficiency. Sinus vein thrombosis should be considered in patients presenting with a history of new seizures and headache

References:
Learning points: Doctors should be careful when starting oral contraceptive use and examine the patient's history in depth.

14AP05-04
Veno-Venous Membrane Oxygenation (VV-ECMO) for the management of acute respiratory distress syndrome caused by fat embolism syndrome. A case report

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Background: VV-ECMO is a rescue therapy to improve oxygenation in patients suffering from severe refractory acute respiratory syndrome (ARDS) despite optimizing mechanical ventilation, neuromuscular blockade and prone positioning. Fat embolism syndrome (FES) is a well-known and potentially life-threatening complication of long bone fractures, with a rate of mortality up to 20%. Therefore, VV-ECMO can be a bridge-to-recovery therapy in patients suffering from this condition.

Case report: A 41 year-old male was admitted to hospital due to a 10 meter-fall. Initial assessment revealed symmetric expansion of both hemithorax and a SpO₂ 10 meter-fall. After nine days of therapy, the patient was decannulated. Three days later, successful extubation was achieved and could be successfully discharged from the intensive care unit.

Discussion: Despite proper optimization of mechanical ventilation in FES, refractory severe hypoxemia can be developed, and VV-ECMO can be lifesaving. We consider relevant to share the successful management of a patient in this unusual clinical setting, because there is poor evidence and many clinicians could be hesitant to use it in a pro-hemorrhagic condition like severe trauma.

References:
1. Momii K, Shono Y, Osaki K et al. Medicine (Baltimore) 2021 Feb 26; 100(8)

Learning point: VV-ECMO should be considered in severe refractory hypoxemia of any cause, including unusual etiologies that can be life-threatening like FES.

14AP05-05
ACE inhibitor-induced angioedema with severe upper airway obstruction and near-fatal negative pressure pulmonary edema in a 72-year-old man: successful management with venovenous extracorporeal membrane oxygenation

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Background: Angioedema is a rare adverse effect of angiotensin-converting enzyme (ACE) inhibitors. This case report details the unique presentation of a male patient with captopril-induced angioedema leading to development of near-fatal negative pressure pulmonary edema (NPPE) requiring venovenous extracorporeal membrane oxygenation (VV-ECMO).

Case Report: A 72-year-old obese male (173cm; 110kg; BMI 36.8) with a medical history of hypertension developed rapid-onset angioedema after taking captopril, necessitating admission to the emergency department. Difficult intubation prompted an acute tracheostomy and subsequent transfer to the intensive care unit (ICU). During next 36 hours the patient’s respiratory status deteriorated, leading to a diagnosis of severe acute respiratory distress syndrome (ARDS), P/F ratio 39 mmHg. The chest CT scan showed no signs of aspiration, confirming the absence of pulmonary infection or aspiration-related complications.

The absence of elevated inflammatory markers and sterile blood and tracheal aspirate cultures in conjunction with a pink, foamy fluid during bronchoscopy suggested that NPPE, which devel-
Pain management of thoracic trauma in an ICU patient: a case report

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Background: Thoracic trauma patients pose unique challenges due to the potential for respiratory insufficiency resulting from chest injuries. Mechanical chest disruption and associated pain can impair ventilation, reduce lung compliance, and elevate the risk of respiratory complications. Regional anesthetic techniques, such as continuous peripheral nerve blocks, have shown promising results in providing superior analgesia for these patients (1,2).

Case Report: We present a trauma case of a patient with multiple ribs fractures and an elbow fracture, in which with continuous left erector spinae block and axillary plexus block we effectively controlled pain, eliminating the need for mechanical ventilation, promoting early mobilization, and reducing systemic opioid requirements.

Discussion: Multiple rib fractures amplify pain and restrict respiratory dynamics, predisposing patients to atelectasis and subsequent complications. Continuous peripheral nerve blocks (CPNB) in trauma provide comprehensive pain relief, enhance respiratory mechanics, and mitigate the risk of respiratory insufficiency. Our clinical case demonstrates the effectiveness of continuous regional analgesia, enabling spontaneous ventilation and preventing mechanical ventilation, thereby ensuring a safer and faster recovery process for the patient.

Additionally, targeted nerve block placement allowed for pain control during the patient’s surgical intervention, presenting a safer alternative to general anesthesia.

Temporal abscess as a rare complication of otitis media: a case report

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Background: Temporal abscess typically arises from the spread of infections around the temporal bone and is often attributed to sources such as dental infections or sinusitis. It can result from untreated or inadequately managed infections, commonly stemming from dental infections or sinusitis. While temporal abscess following otitis media is a rare complication, it often arises due to untreated or inadequately managed infections. Clinical progression may manifest insidiously with persistent ear pain, fever, and in some cases, a noticeable swelling or lump behind the ear.

Early diagnosis and intervention are crucial to reduce the risk of severe neurological outcomes and systemic dissemination.
**Case Report:** A 36-year-old male patient presented to the emergency department with increased purulent discharge from the right ear, despite outpatient treatment with antibiotics by an otorhinolaryngologist. While in the emergency department, the patient experienced a decline in consciousness. A computed tomography scan revealed a temporal abscess. After patients GCS score continued to decrease, patient was intubated. Suspecting herniation, the patient underwent emergency surgery for abscess drainage and was subsequently transferred to the intensive care unit while still intubated. Further evaluations by neurosurgery and otorhinolaryngology revealed ongoing otitis media despite antibiotic therapy. The patient underwent aspiration and modification of antibiotic therapy, leading to successful weaning from mechanical ventilation.

**Discussion:** Temporal abscess as a consequence of otitis media is an infrequent complication. In a case resembling ours, Alva et al. (1) encountered a temporoparietal abscess associated with otitis externa, necessitating abscess drainage along with radical mastoidectomy in the patient. Consequently, appropriate antibiotic therapy should be administered in cases of otitis media, and clinicians should maintain a high index of suspicion for temporal abscess in patients showing a decline in consciousness.

**Reference:**

**Learning points:** Even in commonly encountered and benign diseases like otitis media, it is essential to consider the potentially life-threatening complications that may arise with a deterioration in the patient's general condition.

**14AP05-08**

**Case report: veno-arterial extracorporeal membrane oxygenation (VA-ECMO) as a bridge therapy for tricyclic antidepressants toxicity**

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**Background:** Tricyclic antidepressants (TCAs) are neuropsychiatric agents that are ideal for overdose cardiac toxicity which could be manifested as refractory hypotension, dysrythmias, cardiogenic shock and cardiac arrest. In this situation, veno-arterial Extracorporeal Membrane Oxygenation (VA-ECMO), as the last resort, may be life-saving.

**Case Report:** We report a 26-year-old female patient with a history of mild depressive disorder, presented in the emergency room with cardiac arrest. Return of spontaneous circulation (ROSC) achieved after 5 cycles of CPR. TCA was positive in urine then came later positive in serum sample ( > 1000 ng/ml). The level of possible co-investments (opioids, benzodiazepines, paracetamol, ethanol) were negative. Electrocardiogram before cardiac arrest showed prolonged (corrected QT) interval (512 ms), QRS duration (140 ms), left axis deviation with right bundle and no ischemic changes. R wave was of 6 mm and R/S ratio was 5:1 in aVR (figure 1). Bedside echocardiography revealed severe cardiomyopathy (ejection fraction 35%) and global hypokinesia. The decision was extracorporeal life support (ECLS) and veno-arterial Extracorporeal Membrane Oxygenation (VA-ECMO) was instituted. After 24 hours of hemodynamic stabilization on the VA-ECMO, inotropic support started tapering down, QRS duration was normalized, the patient tolerated low pump flow 1,5 l/min and even sedation vacation. ECMO was weaned off on the 6th day and the patient was extubated on the 9th day of ICU admission.

**14AP05-09**

**Lemierre syndrome with Fusobacterium necrophorum sepsis induced thrombophilia**

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**Background:** Lemierre syndrome is a rare (1/1,000,000)¹ but potentially fatal condition characterized by oropharyngeal infection leading to septic thrombosis of the internal jugular vein. It is quite often overlooked and identifying is challenging. The aim of this case report is to present thrombophilia as a severe complication of Lemierre syndrome.

**Case report:** A 21-year-old male was hospitalized with a 3-day history of fever and sore throat. Due to high inflammatory parameters and positive meningeal symptoms, a lumbar puncture was performed and neutrophilic pleocytosis was found. CT scan of
the lungs showed pulmonary artery embolism of the right lower lobe, infiltration of both lungs and left internal jugular vein thrombosis. On the MRI, the cervical spinal epiduralis was revealed. The blood culture was positive for Fusobacterium necrophorum. Hypercoagulation with secondary hyperfibrinolysis was discovered based on rotational thromboelastometry results.

A therapeutic dose of enoxaparine was initiated, but the goal of anticoagulation was not achieved, while control CT showed progression of thrombosis to the left brachiocephalic, left vertebral veins and left sigmoid sinus. Continuous heparin infusion was started and scaled up to achieve the desired APTT. It was switched to fondaparinux and finally the desired level of anticoagulation was achieved. Follow-up CT revealed partial resolution of thrombosis.

Discussion: The incidence of hypercoagulable state associated with Lemierre syndrome is unknown and therefore there is no consensus regarding the role of anticoagulation.*

* Our case highlights the importance of coagulation monitoring for early recognition of any deviations and timely intervention to prevent potentially fatal complications.

References:

Learning points: We would like to emphasize the importance of standard coagulation tests, point-of-care coagulation testing and anti-FXa activity monitoring to achieve an appropriate balance between preventing thrombosis, and the risk of bleeding.
Discussion: There is increasing evidence and knowledge about the use of Point of Care Ultrasound (POCUS), as an initial diagnostic tool in the critically ill patient. Among its many advantages are that is a bedside, abbreviated exam, that avoids unnecessary transfers to other services, (of note in hemodynamically unstable patients), besides is a radiation free method, repeatable as many times as needed. CT scan is the gold standard; however, it may not be feasible in the unstable patient, chest radiography can also be used.

In this case, the origin of the acute bleeding was unknown, but the possible source could be identified by ultrasound. This allowed us to direct the management in a safer, quicker and cheaper way, and highlights the importance of follow-up with POCUS to assess changes in the ICU patient.

References:

Learning Points: The importance of the use of tools such as POCUS to complement the medical history and physical examination in the critical care units, as well as in the OR.

14AP06-01
Diagnosis and management algorithm in intensive care units of an acute negative-pressure hydrocephalus: a case report

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Background: Acute negative-pressure hydrocephalus (ANPH) is an underrecognized pathology with a high mortality. It is defined as ventriculomegaly despite low/normal pressure, clinical and radiologic response to drainage at negative pressures and the exclusion of another causes 2.

We report an ANPH-case and how the diagnosis and treatment was carried out in our ICU.

Case Report: 44-year-old female with a history of traumatic brain injury with a ventriculoperitoneal shunt (VPS). In the current episode, she presented exacerbation of her neurological status due to challenges in delivering adequate antifungal therapy.

CT scan revealed tetraventricular hydrocephalus, performing an urgent surgical repair of the VPS. Despite proper valve positioning, the patient experienced a worsening level of consciousness. Repeated CT showed the results of Image 1.

A external ventricular drain system (EDV) was connected (Pset:0mmHg, Vset:10ml/h) to maintain intracranial pressures <15mmHg. After the extraction of 300mL of cerebrospinal fluid (CSF), the patient began to regain an adequate level of consciousness.

Discussion: The lack of understanding of ANPH pathophysiology can lead to disappointing results. A key aspect is the differential diagnosis with normal pressure hydrocephalus, where patients are usually older and pathological waves are found during CSF monitoring (absent in ANPH) 1.

Treatment involves the subzero EDV, titrated to drain 10-15mL/h of CSF 2. Once the clinical and radiological improvement is confirmed, a definitive type of shunt should be placed.

References:

Learning Points:
• Knowledge of this pathology facilitates its early identification and diagnosis.
• It seems essential to carry out close monitoring of intracranial pressure and CSF drainage during the patients’ stay in the ICU.
• According to our review, the subzero EDV method still seems to be the most effective.

14AP06-03
Beyond odds: a miraculous odyssey through invasive pulmonary aspergillosis in an immunocompromised parturient

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Background: Invasive pulmonary aspergillosis (IPA) poses a significant threat to immunosuppressed individuals, characterized by angioinvasion resulting in sequestered infected tissue with compromised vascular supply, often leading to treatment failure due to challenges in delivering adequate antifungal therapy.

Case report: We present a compelling case of a 37-year-old pregnant woman at 24 weeks gestation with a complex medical history of Systemic Lupus Erythematosus (SLE) with hematologic, musculoskeletal involvement, and lupus nephritis, managed with long-term steroids and hydroxychloroquine since 2014. Notably, she had a history of smear-positive pulmonary tuberculosis (PTB) in 2010 and 2013. The patient presented to the hospital with hemoptysis, prompting a thorough tuberculosis workup. Unfortunately, her respiratory function deteriorated, necessitating urgent intubation.

References:

Learning Points:
• Knowledge of this pathology facilitates its early identification and diagnosis.
• It seems essential to carry out close monitoring of intracranial pressure and CSF drainage during the patients’ stay in the ICU.
• According to our review, the subzero EDV method still seems to be the most effective.
The diagnosis of IPA was established through radiological findings and positive aspergillus antigen. Management involved appropriate antifungal therapies and optimization for a lobectomy due to recurrent hemoptysis, attributed to suboptimal angioembolization of the affected pulmonary artery.

Despite the complexities, we successfully delivered the baby at 28 weeks via classical cesarean section to improve overall outcomes. Post-delivery, once the infection was controlled with antifungals, a right lobectomy was performed, incorporating advanced measures to control postoperative cytokine release through a cytokine filter (CytoSorb®).

Remarkably, the postoperative course was uneventful, and the patient was discharged to the ward, achieving a prompt recovery at home.

**Discussion:** This case emphasizes the intricate management challenges in pregnant patients with complex medical histories. The criticality of the situation, marked by hemoptysis and respiratory failure requiring urgent intervention, necessitated a comprehensive diagnostic approach, culminating in the identification of IPA.

The management strategy, encompassing antifungal therapy, lobectomy optimization, and successful delivery, underscores the value of a multidisciplinary approach.

**Reference:**

**Learning points:** Integration of obstetric, respiratory, and surgical expertise played a pivotal role in navigating this complex clinical scenario, resulting in a favorable outcome for both the mother and the newborn.

**14AP06-04**
Stellate Ganglion Block for Takotsubo Cardiomyopathy

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**Background:** Takotsubo cardiomyopathy (TCM) is a reversible cardiomyopathy characterized by apical ballooning of the left ventricle. Catecholamine discharge plays a key role in its etiology. Refractory ventricular arrhythmias are associated with TCM. Although supportive and symptomatic treatment is the main treatment method, since ventricular arrhythmias are usually triggered by the sympathetic nervous system, sympathetic denervation could be beneficial.

Stellate ganglion provides efferent sympathetic fibers to myocardium, and sympathetic denervation with stellate ganglion blockade (SGB) may be an option in treatment.

After obtaining approval from the patient, we aimed to present a case of a successful SGB to a TCM patient with prolonged QT and refractory ventricular arrhythmias in the intensive care unit (ICU).

**Case report:** A 51-year-old female patient with known epilepsy, and ovarian cancer had cardiac arrest following ventricular fibrillation (VF) during her follow-up after cytoreductive surgery and was transferred to the ICU after 9 minutes of successful resuscitation. After examining blood tests, ECG and echocardiographic findings, a diagnosis of TCM was made. Despite the medical therapy, the patient continued to have recurrent sustained polymorphic VT episodes. The patient underwent 200 joule biphasic electrical cardioversions by patches placed anteroposteriorly. Since the patient was in sepsis temporary pacemaker was not considered.

Unilateral SGB was performed with 7 mL 0.5% bupivacaine at the bedside in the ICU, under ultrasound guidance, with an in-plane technique, with the echogenic needle tip visible at the C6 level between the carotid artery and the longus colli muscle.

No complications were observed during or after the procedure. The patient responded positively to SGB, her hemodynamics remained stable, and no ventricular arrhythmia was observed for 72 hours after the block. The patient had no additional problems during follow-up and was discharged from the ICU.

**Discussion:** General approach, medical therapy and temporary pacemaker are recommended in refractory long QT ventricular arrhythmias. SGB can be applied as an alternative option in symptomatic sustained ventricular arrhythmias of TCM that do not respond to treatment.

A multidisciplinary approach, including cardiology, anesthesia and algology, is beneficial in the treatment process of this critical patient group.

**14AP06-05**
Dapaglifocin-associated euglycaemic diabetic ketoacidosis in a postoperative cardiac surgery patient. Diagnosis and treatment according to our hospital guidelines

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**Background:** Diabetic euglycemic ketoacidosis (EuDKA) is a rare complication associated with risk factors such as fasting, and surgery, and new cases associated with the use of SGLT2i have been described. The SGLT2i are oral antidiabetics that are used as treatment in patients with DM type II and in patients with heart failure and LVEF >40% diabetic or not. They increase urinary glucose excretion by blocking its reabsorption in proximal renal tubules.

Diagnostic criteria: glycemia <250 mg/dL, severe metabolic acidosis, with increased osmolar GAP, pH less than 7.3, serum bicarbonate less than 18 mEq/L and ketonemia.

**Case Report:** A 60 years old man. DM type II on metformin and SGLT2i. Two days after surgery, he presents nausea and abdominal pain, tachypnea and tachycardia. An ABG shows an elevated AG metabolic acidosis pH 7 pCO2 18 mmHg, HC03 6 mmol/L, anion GAP 20 Glycemia 180 mg/dL. Urine MEK was elevated. We start the treatment according to the guidelines of our unit. 24 h after the episode, the patient was asymptomatic and the blood gases had been corrected.
Discussion: SGLT2i are increasingly used, which is why as anesthesiologists we must be aware of this complication. In our hospital we have guidelines for patients taking these drugs, based on the latest evidence (2,3).

Learning Points:
- Treatment with SGLT2i should be discontinued as soon as EDKA is diagnosed an 72h before planned surgery (2).

References:

14AP06-06
Differential diagnosis of Creutzfeldt-Jakob disease in the intensive care unit

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Background: Creutzfeldt-Jakob Disease (CJD) is a rapidly progressing neurodegenerative disorder characterized by cerebellar, pyramidal-extrapyramidal, visual, and psychiatric symptoms, dementia and myoclonus (1).

In this case, we aim to describe the differential diagnosis of CJD in a patient with a history of psychiatric illness admitted to the intensive care unit.

Case Report: 49-year-old male patient with a history of schizophrenia followed in the psychiatric clinic for psychosis, visual hallucinations, orientation loss, and sleep disturbances. Consulted to the intensive care unit due to a septic condition and the development of rhythmic dyskinetic movements in all extremities. Upon admission to the intensive care unit (ICU), the patient had a Glasgow Coma Score (GCS) of 8, was desaturated, tachypneic and hypotensive with intensified dyskinetic movements. The patient was intubated and sedated.

Despite high doses of midazolam and fentanyl infusion, movements persisted and sudden increases in contractions were observed with external stimuli. Septic symptoms improved during follow-up but rhythmic contractions continued similarly under sedation. Myoclonic seizures were observed under sedation, and valproic acid therapy was initiated.

Contrast-enhanced Brain MR imaging revealed widespread cortical diffusion restriction and hyperintense lesions on FLAIR sections. Lumbar puncture for encephalitis panel was negative. At this point, the clinical picture and MR image were considered compatible with prion diseases.

Cerebrospinal fluid (CSF) 14-3-3 protein test was positive. The patient was diagnosed with probable CJD according to the Centers for Disease Control and Prevention (CDC) criteria.

Discussion: CJD is a rare disease with variable symptoms that can get mixed with other diseases causing rapidly progressing dementia. In cases with neuropsychiatric symptoms, treatment resistance, and atypical presentations, CJD should be considered in the differential diagnosis.

References:

Learning Points: CJD in ICU might be overlooked but we can try to be more mindful of this fatal disease to inform the relatives of the patient.
Management of intravenous prallethrin poisoning

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Background: There are no data on the characteristics and symptoms of severe intravenous prallethrin poisoning.

Case report: A 24-year-old male patient was brought to the emergency department with a history of sudden onset of generalized tonic-clonic convulsion and loss of consciousness. He was intubated with 5mg diazepam and admitted to intensive care unit. There was no history of fever, epilepsy or trauma. He had a medical history of major depression (olanzapine, citalopram) and a known history of 3 suicide attempts by injection of drugs. The patient injected 20 ml of Prallethrin 1.2% (Raid liquid, SC-Johnson) iv into himself for suicidal purposes. ECG was sinus rhythm. Brain tomography scan, echocardiography, blood sugar and electrolytes were normal. Metabolic acidosis and high lactate levels were present (pH: 6.6, Lactat:29, HCO3: -22).

The patient was extubated at the 6 hour of intensive care follow up (Glasgow coma scale:15). Hemodiafiltration was started on the 1st day and stopped on the 6th day. On the 3rd day, dyspnea started and initially 40L/min HFO therapy was applied and when adequate oxygenation could not be achieved, CPAP was started. Ceftriaxone and clarithromycin were started on the 3th day with a prediagnosis of pneumonia. CRP, procalasitonin increased, the patient's chest X-ray showed progression in the areas of consolidation on the 7th day (Figure 1). Meropenem and teicoplanin was started. Anemia and leukopenia was also seen on the 7th day. The patient was transferred from the intensive care unit to the psychiatry clinic on the 17th day.

Discussion: Most cases of prallethrin poisoning present with neurological and gastrointestinal manifestations, while acute kidney injury and hypersensitivity reaction to prallethrin in lung tissue are rarely reported(1).


Learning points: We report neurological symptoms, acute kidney injury, anemia, leukopenia and pralletrin reaction in lung tissue in this case.

Factor XIII-hide and seek

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Background: Factor XIII is crucial component in the terminal phase of the clotting cascade and wound healing. Low FXIII levels can be important to evaluate the risk of bleeding complications. Supplementation of FXIII may help maintaining haemostasis.

Case report: 59-year old male was admitted to ICU after operation of necrotizing pancreatitis with abdominal compartment. He was operated multiple times (LPRT, abdominal drainage device change, abdominal wall closure). Percutaneous tracheotomy was performed on the 9th day. He was dependent to mechanical ventilation, treated for sepsis with broad-spectrum antibiotics and blood transfusions. We included CVVHDF and switched to intermittent dialysis which was stopped due major bleeding in femoral region where the catheter was placed. DSA with embolization of branches of IAA and CFA. Also left gluteal fasciotomy was performed. Haematological diagnostic showed deficiency of FXIII (0,36). Haematologist stated that in case of prolonged bleeding we can considerate replacement. Due technical procurement problems administration was postponed. He became HD unstable and showed signs of bleeding from femoral region. We administered 3200IU of FXIII(40IU per kg). After the administration labs showed FXIII 1,18 and patient had no signs of bleeding. Wound was closed. 35 days after administration FXIII developed obstructive icterus and ERCP was done. Cholecystectomy was indicated. For preoperative preparation the value of FXIII was 0,5 and administered 2000IU of FXIII(25IU per kg). Operation went without complications the patient was stable and didn't show signs of intraoperative and postoperative bleeding.
Discussion: FXIII is placed outside of coagulation cascade and usually doesn’t affect on PT and APTT. In bleeding surgical patients with normal values of coagulation tests we have to think on deficit of FXIII and considerate replacement when FXIII is below 0.6.

Learning points:
1. We don’t know enough about classification, diagnostic and treatment of FXIII deficit in surgical patients.
2. Understanding the role of FXIII is crucial in diagnosis and treatment of bleeding in surgical patient as it plays a critical part in maintaining effective haemostasis.

References:

Learning Points:
- Baclofen withdrawal is a rare but potentially life-threatening complication of ITB.
- Treatment includes early recognition, intensive care management, high-dose benzodiazepines and reinstitution of baclofen.

14AP06-10
Descending necrotizing mediastinitis related to Epstein-Barr virus: a case report

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Background: Epstein-Barr virus (EBV) is the primary agent of infectious mononucleosis (IM), characterized by the triad of pharyngitis, fever and lymphadenopathy. Nevertheless, the possibility of developing serious complications such as spleen rupture or descending necrotizing mediastinitis (DNM) must always be kept in mind.

Case report: A 17-year-old woman, with no comorbidities except for a coeliac disease, came to the Emergency Department for a persistent sore throat, fever, progressive dysphagia and cervical rigidity 5 days after being diagnosed with IM. Initial laboratory tests showed neutrophilic leucocytosis and high C-reactive protein levels (29.2 mg/dl). CT scan revealed posterior necrotizing mediastinitis secondary to a cervical abscess. The patient was transferred to our center for surgical drainage by cervicotomía and right thoracoscopy, after which she was admitted to our intensive care unit (ICU). In spite of early source control surgery, subsequent surgeries for the placement of up to 13 chest and cervical drainages were needed. Furthermore, bilateral vocal cord paralysis probably secondary to inflammatory damage of both recurrent laryngeal nerves was confirmed during an extubation attempt jointly performed by Anaesthesiology and Otorhinolaryngology clinicians. A tracheostomy was required to secure the airway. She was discharged to the ward 20 days later.

Discussion: To the best of our knowledge, this could be the tenth DNM related to EBV infection reported in literature. Previous cases have also been reported on healthy and young adults so it has been postulated that EBV induces immunosuppression with a transient decrease in T-cell-mediated immunity that may predispose to bacterial superinfection, allowing oral commensals to become pathogens and resulting in mediastinitis by breakthrough of peritonsillar abscess through the alar and prevertebral fascia of the neck. [1]

References:

Learning Points: Although IM is usually a benign and self-limited disease and DNM is an extremely rare complication of EBV, its high mortality rate must lead to an early suspicion and admission.
in ICU. The complex management of this pathology and its complications requires a multidisciplinary approach that allows the best chances of success.

14AP06-11
Management of recent dual antiplatelet therapy in patients undergoing invasive procedures in the Intensive Care Unit

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Background: Percutaneous tracheostomy is an invasive technique often necessary for managing patients in intensive care units (ICUs). It is increasingly common to find in these units patients undergoing dual antiplatelet therapy due to coronary artery disease. Short-acting antiplatelets have gained interest as they provide an alternative to discontinuing dual antiplatelet therapy, allowing it to be maintained until the time of the procedure, interrupted, and subsequently reintroduced. Cangrelor is an intravenous P2Y12 platelet inhibitor that offers these benefits, as platelet function is restored within an hour after discontinuation. However, data on this subject is limited.

Case report: We present a 71-year-old patient admitted to our ICU following a cardiac arrest (CA) and recovery after advanced cardiac life support. Once the pulse was restored, a coronary angiography was performed and a multivessel disease was diagnosed implementing two drug-eluting stents.

Dual antiplatelet therapy was established with AAS + ticagrelor. During the ICU stay, early withdrawal of vasopressor support was achieved, but respiratory weaning was unsuccessful.

A tracheostomy was indicated but given the combination of risks, bridging therapy was decided. Infusion of cangrelor at 0.75 mg/kg/min was started at the time of the ticagrelor dose, omitting the latter, and maintained for 3 days.

The infusion was stopped 1 hour before the percutaneous tracheostomy, and ticagrelor administration was resumed after the technique. Neither bleeding nor thrombotic complications happened.

Discussion: The increasing incidence of critically ill cardiac patients highlights the need for proper antiplatelet management. Despite recent retrospective studies where dual antiplatelet therapy and anticoagulation did not pose a significant risk factor for severe bleeding during percutaneous tracheostomies; it is interesting to consider the possibility of implementing antiplatelet bridging therapy and it is an object of study at the moment. This approach allows for a shorter interruption of the therapy, reducing the risk of both thrombosis and bleeding.

References:

Learning points: The use of Cangrelor proved to be an effective alternative as bridging therapy. Nevertheless, the door is left open for investigation since evidence is very limited.
15AP01-01
Comparison between efficacy of protective lung strategy versus protective lung strategy plus cycling recruitment in reducing the incidence of major postoperative pulmonary complications in morbidly obese patients undergoing bariatric surgery: a randomized controlled study

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Background and Goal of Study: Protective ventilation's perioperative application and importance in surgical patients are becoming well understood. Obesity presents unique challenges for adequate mechanical ventilation, including restricted lung mechanics brought on by excessive adiposity, frequent respiratory comorbidities and worries about postoperative respiratory depression and other pulmonary complications. Obese surgical patients are becoming more prevalent, and operating rooms and intensive care units around the world frequently deal with their problems.

This study was designed to evaluate the efficacy of cyclic RM in addition to lung protective ventilation on reducing postoperative pulmonary complications in morbidly obese patients undergoing laparoscopic bariatric surgeries under GA:

Patients and Methods: The study was performed on forty-six patients undergoing laparoscopic bariatric surgeries under general anesthesia. Patients were randomly assigned into two equal groups; the control group included twenty-three patients who received mechanical ventilation with tidal volume 6-8 ml/kg and fixed PEEP (10 mmHg) without lung recruitment maneuver and the recruitment group which included twenty-three patients who received mechanical ventilation with tidal volume 6-8 ml/kg and cyclic lung recruitment maneuver. Three steps every 5 breaths in increments of 3 mmHg to 13, 16 and finally 19 mmHg PEEP, repeated hourly

Results: The incidence of postoperative pulmonary complications was significantly lower in the recruitment group than in the control group. Also, Days of hospital stay were significantly lower in the RM group. There was a significant increase in compliance between a Decrease in RVD and the number of resected segments (R2=0.69). An anatomical lung resection (i.e. resection of 1 or more segments) was an independent factor of postoperative RVD (OR 5.73, 95%CI: 1.36 – 52.9).

Conclusion(s): Cyclic recruitment maneuvers significantly decrease the incidence of postoperative pulmonary complications when added to protective lung ventilation in morbidly obese patients undergoing laparoscopic bariatric surgery under general anesthesia

References:

15AP01-03
Impact of lung surgery on right ventricular function: a monocentric prospective controlled study

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Background and Goal of Study: Pulmonary resection surgery is associated with impaired right ventricular function postoperatively, which is thought to be due to elevated pulmonary arterial pressure. Currently, assessment of right heart function is not part of the pre-operative evaluation of thoracic surgery patients. We aimed to assess the incidence of RV dysfunction according to the extent of resection

Materials and Methods: We performed a prospective analysis between January 2020 and November 2021 on a cohort of patients scheduled for thoracic surgery for pulmonary resection. Right ventricular function (TAPSE, S-Wave and systolic PAP) was assessed by echocardiography within 24 hours after surgery and within 24 hours after surgery.

Results and Discussion: 150 patients were analyzed. The postoperative right ventricular dysfunction (RVD) incidence was 27/150 (18%, 95%CI: 0.12-0.25). There was a negative linear relationship between a Decrease in RVD and the number of resected segments (R2=0.69). An anatomical lung resection (i.e. resection of 1 or more segments) was an independent factor of postoperative RVD (OR 5.73, 95%CI: 1.36 – 52.9).

Change in sPAP was correlated with the number of the resected segment (R2=0.34) and was associated with protective RVD (OR 1.89, 95%CI: 1.23-2.91).
Conclusion(s): Pulmonary resection surgery is associated with right ventricular dysfunction and increased sPAP. These variations are correlated with the number of segments resected. Echocardiographic assessment of right heart function should be an integral part of the pre-operative workup, especially for COPD Gold >2 undergoing surgery with at least 3 resected segments.

References:

15AP01-04
Individualised, perioperative, open-lung ventilation strategy during one-lung ventilation in thoracic surgery: less postoperative pulmonary complications?
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Background and Goal of Study: It is uncertain whether individualised perioperative open-lung approach (iOLA) ventilation reduces postoperative pulmonary complications (PPCs) in patients undergoing lung resection and requiring one-lung ventilation (OLV).

Materials and Methods: Multicenter, international, randomized, controlled trial enrolling 1,380 patients scheduled for open or video-assisted thoracic surgery using OLV. Patients were randomised to receive perioperative individualised OLA (iOLA) or standard lung-protective ventilation (STD). iOLA included recruitment maneuver to 40 cmH2O of end-inspiratory pressure followed by individualised positive end-expiratory pressure (PEEP) titrated to best respiratory system compliance, and individualised postoperative respiratory support with high-flow oxygen therapy. STD combined intraoperative 4 cmH2O of PEEP and postoperative conventional oxygen therapy.
The primary outcome was a composite of severe PPCs within the first seven postoperative days.

Conclusion(s): An iOLA approach in patients subjected to lung resection under OLV reduced the risk of severe PPCs when compared to standard lung-protective ventilatory management.

References:

15AP01-05
Effects of different PEEP approaches on postoperative systemic complications after one-lung thoracic surgery
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Background and Goal of Study: It is uncertain whether different positive end-expiratory pressures (PEEP) impacts non-pulmonary complications in patients undergoing one-lung ventilation (OLV).

We aimed to compare the effects on systemic complications of two different PEEP approaches: individualized PEEP to best respiratory system compliance after an alveolar recruitment maneuver (iOLA) vs. 4 cmH2O standard PEEP.

Materials and Methods: International multicenter randomized controlled trial enrolling 1,380 patients scheduled for thoracic surgery using OLV. Patients were randomized to receive iOLA or standard lung-protective ventilation (STD). The outcome were composites of systemic complications which included: infectious complication (surgical site infection plus other infections, sepsis and septic shock), cardiac complications (de novo atrial fibrillation, myocardial ischaemia) and acute kidney injury (AKI) within the first 30th postoperative days.

Outcomes were assessed as total occurrence within the observation window, or as yes/no occurrence. To test categorical variables, including composite primary-outcome, Chi² test, relative risks (RRs), in addition to the absolute risk reduction (ARR) and number needed to treat (NNT) with 95% confidence intervals (CI) were calculated.

Results and Discussion: A total of 1,308 patients were included in the final analysis: 670 assigned to iOLA and 638 to STD group. The proportion of patients with severe PPCs was lower in the iOLA compared to STD [40 (5.9%) vs 79 (12.5%), RR: 0.39, 95% confidence interval (CI): 0.28-0.56]. Individual PPCs, such as severe respiratory failure and pulmonary infection were significantly different between iOLA and STD, respectively.

Conclusion(s): An iOLA approach in patients subjected to lung resection under OLV reduced the risk of severe PPCs when compared to standard lung-protective ventilatory management.
No differences were found in infectious complications 19 (2.8%) vs 27 (4.2%), RR 0.66 (0.38-1.19); cardiac complications 14 (2.0%) vs 15 (2.3%), RR 0.89 (0.43-1.85); AKI 12 (1.7) vs 19 (2.9), RR (0.29-1.23).

Conclusion(s): We found no differences in systemic complications between the intraoperative iOLA and STD PEEP approaches.

References:

15AP01-06
Does the individualization of PEEP with low driving pressure during one-lung thoracic surgery impacts on intraoperative hypoxemia?

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Background and Goal of Study: It is uncertain whether individualized positive end-expiratory pressure (PEEP) adjustments based on dynamic compliance (Cdyn) and Driving pressure (DP) in patients requiring one-lung ventilation (OLV) impacts on perioperative respiratory complications.

We aimed to compare ventilator mechanics applying two different strategies (individualized PEEP to best respiratory system compliance after an alveolar recruitment maneuver (iOLA) vs. 4 cmH2O standardized PEEP (STD), and its impact on intraoperative hypoxemia and rescue maneuvers.

Materials and Methods: Randomized, international, multicenter controlled trial enrolling 1380 patients scheduled for thoracic surgery using OLV. Patients were randomized to receive perioperative iOLA titration PEEP based on best Cdyn and lower DP with postoperative respiratory support with high-flow oxygen therapy or standard lung-protective ventilation (STD) with invariable 4cmH2O PEEP. The outcome was composite of severe PPCs within the first seven postoperative days.

Composite primary-outcome was assessed as total occurrence within the observation window, or as yes/no occurrence. To test categorical variables, Chi² test, relative risks (RRs) with 95% confidence intervals (CI) were calculated. A two-sided p<0.05 was considered statistically significant.

Results and Discussion: A total of 1,308 patients were included in the analysis (iOLA=670, STD=638). Baseline characteristics did not differ among groups. Intraoperatively, mean individualized PEEP was higher in iOLA than in STD patients (8±2 vs 4±1 cmH2O, p<0.001).

Driving pressure was lower in iOLA (11 vs. 13 cmH2O, p<0.001). iOLA patients had less intraoperative hypoxic episodes (54 vs. 94, p<0.001) and required less intraoperative rescue maneuvers (49 vs. 82, p<0.001).

Conclusion(s): Using an iOLA approach vs standard of care during OLV thoracic surgery may reduce intraoperative hypoxicemic events and need for rescue maneuvers.

References:

15AP01-07
Individualized PEEP and alveolar recruitment maneuver in one-lung ventilation: does it make a difference?

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Background and Goal of Study: One lung ventilation (OLV) ventilates one half of the lung, leaving other side collapsed. Inadequate PEEP can lead to atelectasis or alveolar overdistension. Studies have demonstrated improved oxygenation with compliance based individualized PEEP during OLV but no data on postoperative period is available.

We aim to determine impact of individualized PEEP both during and after OLV on PaO2/FiO2 and how long it lasts.

Materials and Methods: Between Dec 2021 to Dec 2022, 40 patients undergoing elective surgery with OLV were enrolled and randomized in 2 groups: Group 1 (PEEP 5cm H2O), and Group 2 (Individualized PEEP). In group 2, alveolar recruitment manoeuvre (ARM) and individualized PEEP were performed twice, first during OLV and at the end when TLV was resumed.

The PEEP value corresponding to highest compliance was chosen as individualized PEEP. ABG, haemodynamic and ventilatory parameters were recorded at: intraoperatively (T1 – supine, TLV, 5 mins post induction; T2 – lateral decubitus, OLV, 30 mins post-ARM & PEEP titration; T3 – supine, TLV initiated after OLV, 30mins post ARM & PEEP titration) & postoperatively (T4- 30 mins post-extubation; T5 - 24 hrs post-surgery).

Normality of data was tested using the Kolmogorov-Smirnov test and group comparison with unpaired t-test. Qualitative variables were compared using the Chi-square test/Fisher’s exact test, and a p-value of < 0.05 was considered statistically significant.

Results and Discussion: Individualized PEEP in group 2 was 7.70 ± 1.49 cm H2O (OLV) and 7.50 ± 1.70 cm H2O (TLV post-OLV), significantly higher (p=0.001) compared to the conventional PEEP value of 5cm H2O. Group 2 (35.35 ± 18.77 ml/cmH2O) had higher compliance (22.55 ± 10.26 ml/cm H2O; p=0.04).

Peak pressures were higher at T3 in the control group (p=0.04). The PaO2/FiO2 was similar at time points, but a decline was noted at T3 compared to T1 in group 1 (T3-T1= ± 83.82 ± 141.10; p=0.008), unlike group 2 (T3-T1= ± 13.28 ± 88.41; p=0.049).

No significant changes in hemodynamic parameters & ABG parameters were recorded. Impact of individualized PEEP is limited to intraoperative period only, but we need to explore other factors affecting the patient outcome.
Conclusion(s): Oxygenation and lung mechanics are better with individualized PEEP, but the increment is transient and not sustained in the postoperative period. Individualized PEEP is higher than conventional value of 5cm H$_2$O.

15AP01-08
The association of mechanical power with pulmonary inflammation in experimental acute lung injury in pigs depends on the calculation method – a study on the contribution of PEEP

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Background and Goal of Study: Mechanical Power (MP) is associated with increased mortality in acute respiratory distress syndrome (ARDS). However, its calculation method is controversially debated. We hypothesised that MP is associated with neutrophilic pulmonary inflammation in experimental ARDS when static energy due to positive end-expiratory pressure (PEEP) is not considered.

Materials and Methods: We used data of 60 anaesthetised pigs from three randomized trials (files 24-9168-11-1/2013-53, 24-5131/338/28, 25-5131/474/31). ARDS was induced by surfactant depletion (n=24), or surfactant depletion and injurious ventilation (n=36). Measurements were performed at baseline, after ARDS induction (injury), and during the intervention time (12-24h). Thereafter, normalised 2-deoxy-2-[$^{18}$F]fluoro-D-glucose uptake rate ($K_{dp}$) was determined by positron emission computed tomography. MP was calculated with (MP$_{PEEP}$) and without a PEEP term (MP$_{ER}$), and averaged over time. Animals were divided into high vs. low groups using the median values of MP$_{ER}$, MP$_{PEEP}$, and driving pressure ($\Delta P$). Statistics included non-parametric tests and Spearman rank correlation ($\alpha=0.05$).

Results and Discussion: There were no significant differences between the low and high groups at baseline and injury. MP$_{ER}$ ($p=0.358$, $p=0.045$; Fig.1A) and $\Delta P$ ($p=0.348$, $p=0.006$) correlated with $K_{dp}$, but not MP$_{PEEP}$ ($p=0.073$, $p=0.579$), MP$_{PEEP}$ plateau pressure, respiratory rate, or cumulative fluid balance. The median (IQR) MP$_{ER}$ and MP$_{PEEP}$ of the Low groups was 4.3 (1.1) and 9.8 (3.1) J/min vs. 7.0 (1.7) and 15.1 (4.0) J/min in the High groups. Median $\Delta P$ was 12 (4) and 18 (4) cmH$_2$O for $\Delta P_{Low}$ and $\Delta P_{High}$. The $K_{dp}$ in MP$_{ER,Low}$ and $\Delta P_{Low}$ was lower compared to MP$_{ER,High}$ and $\Delta P_{High}$ (Fig.1B). $K_{dp}$ did not differ between MP$_{PEEP,Low}$ and MP$_{PEEP,High}$.

Conclusion(s): In these models of ARDS, MP was associated with pulmonary neutrophilic inflammation when a static energy term due to PEEP was not considered in the calculations.

References:

15AP01-09
Effect of tension capnothorax on respiratory mechanics during robotic lung resection

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Background and Goal of Study: During robotic-assisted thoracic lung resection, the use of tension capnothorax is frequent, but it is uncertain the effect this capnothorax has on the pulmonary mechanics and gas exchange. Therefore, we propose this study to analyze its effect on the optimal PEEP and the static compliance.

Materials and Methods: Prospective, observational, and descriptive study enrolling patients scheduled for robotic-assisted lung resection using tension capnothorax. Volumetric capnography was used to assess dead space. Recruitment maneuvers (RM) were performed, and optimal PEEP was calculated during one-lung ventilation (OLV) before and after the application of capnothorax. Furthermore, respiratory parameters were collected 8 times during surgery: during two-lung ventilation (TLV, T1), OLV before the RM (T2), OLV after the RM (T3), OLV after the application of capnothorax (T4), OLV after the application of capnothorax and after the second RM (T5), 20 minutes after the RM (T6), at the end of OLV(T7) and before extubation (T8). To test quantitative variables, T-test was used.

Results and Discussion: A total of 27 patients were included in the analysis. Main results are shown in table 1 as mean +/- standard deviation.

<table>
<thead>
<tr>
<th>TLV</th>
<th>OLV</th>
<th>OLV +RM</th>
<th>OLV +capno</th>
<th>OLV +capno +RM</th>
<th>20 minutes after RM</th>
<th>End OLV</th>
<th>End MV</th>
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<tr>
<td>43.5 +/- 0.0</td>
<td>14.8 +/- 0.0</td>
<td>23.2 +/- 0.0</td>
<td>36.5 +/- 0.0</td>
<td>19.8 +/- 0.0</td>
<td>40.2 +/- 0.0</td>
<td>27.4 +/- 0.0</td>
<td>27.9 +/- 0.0</td>
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<tr>
<td>Compliance (ml/cmH$_2$O)</td>
<td>PEEP (cmH$_2$O)</td>
<td>$\Delta P_{OLV}$</td>
<td>$\Delta P_{OLV +capno}$</td>
<td>$\Delta P_{OLV +capno +RM}$</td>
<td>$\Delta P_{20 minutes after RM}$</td>
<td>$\Delta P_{End OLV}$</td>
<td>$\Delta P_{End MV}$</td>
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<td>5 +/- 0.0</td>
<td>5 +/- 0.0</td>
<td>6.4 +/- 2.2</td>
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<tr>
<td>$\Delta P_{20 minutes after RM}$</td>
<td>0.3 +/- 0.1</td>
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<tr>
<td>$\Delta P_{End OLV}$</td>
<td>0.3 +/- 0.1</td>
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Table 1: No complications were seen during RM. The application of capnothorax significantly decreased pulmonary static compliance. RM improved static compliance, and their effect was conserved 20 minutes later. Optimal PEEP during one-lung ventilation before capnothorax was 6.43 cmH$_2$O vs. 11.78 cmH$_2$O (p<0.05) after the capnothorax. Even though the application of capnothorax required higher PEEP it did not significantly increase alveolar dead space. Significant hypercapnia was seen at T7 (54.6 +/- 9.1), that was already corrected before extubation (42.8 +/- 6.3).
Conclusion(s): Tension capnothorax decreases pulmonary static compliance and increases PEEP requirement. RM and PEEP titration after the capnothorax help to improve respiratory mechanics.

15AP01-10
Effect of prone positioning and PEEP on respiratory mechanics in children undergoing scoliosis surgery

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Background and Goal of Study: Surgery for severe Scoliosis (SS) is usually performed in the prone position (PP). Changes in respiratory mechanics during anesthesia are understudied. Our aim was to investigate the effect of PP and expiratory pressure (PEEP) on the respiratory mechanics of scoliotic children undergoing spine surgery.

Materials and Methods: Prospective, crossover study performed in two pediatric hospitals (Uruguay and Italy). Shortly after induction, studies of pulmonary mechanics were performed using inspiratory and expiratory breath holds during volume-controlled mechanical ventilation with a set tidal volume of 8 ml/kg and a respiratory rate adjusted to maintain normocapnia.

Measurements of peak, plateau and total PEEP (tPEEP) were obtained at three levels of applied PEEP: 0, 5, and 10 cmH2O both in supine (baseline) and prone positions. Static Respiratory System Compliance (Crs) and pressures were calculated as follows: Tidal Volume/ driving pressure (Plateau Pressure – tPEEP) and indexed to ideal body weight.

Crs and pressures were analyzed with a mixed linear regression model with a randomly varying subject effect, to account for repeated measures.

Results and Discussion: 28 patients were enrolled; 15 idiopathic and 13 with scoliosis secondary to neuromuscular disease. Median BMI was respectively 19.0 (16.9-23.6) in the idiopathic and 14.8 (13.0-19.9; p<0.001) in the secondary scoliosis; Cobb angles were 70.0 (60.0-80.5) and 77.2 degrees (63.2-91.0) in the idiopathic vs secondary group (p<0.001).

In supine position at 5 cmH2O PEEP level, Crs is associated with BMI in a quadratic relationship (Crs=0.88+0.17*BMI-0.003*BMI2; p=0.007) and with Cobb angle in a linear negative relationship (Crs=1.58+0.008*Cobb; p=0.01).

Crs significantly improves from PEEP 0 to 5 (Coef: 0.12; p<0.001) and less markedly from 5 to 10 cmH2O (Coef: 0.07; p=0.002); Crs decreases from supine to prone (Coef: - 0.1; p<0.001) at any PEEP level.

Driving pressure is reduced by application of PEEP (Coef: -1.2 at PEEP 5, -1.48 at PEEP10; p<0.001) and increased in prone position at any PEEP level (Coef: 1.2; p<0.001).

15AP01-11
Modifications in regional ventilation distribution in pediatric patients from spontaneous breathing to positive pressure ventilation at two PEEP levels: an Electrical Impedance Tomography (EIT) – based, prospective crossover study

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Background and Goal of Study: There is limited research on the physiological impact of tracheal intubation (TI) on respiratory mechanics in pediatric patients. Electrical Impedance Tomography (EIT) is a non-invasive technique that creates a dynamic map of ventilation distribution, dividing the lung into 4 Regions of Interest (ROI) from ventral to caudal.

We aimed to determine the changes in regional ventilation distribution in healthy anesthetized children from spontaneous breathing (SB) to positive pressure ventilation (PPV) and TI at two Positive End-Expiratory Pressure (PEEP) levels (5-10 cmH2O).

Materials and Methods: Prospective, crossover study. Healthy children younger than 17 years old scheduled for elective surgery were included. EIT measurements were obtained before induction of anesthesia (in SB) and after TI and PPV institution (volume-control ventilation; tidal volume 8 ml/kg).

Static Respiratory System Compliance (Crs) and driving pressure (dp) were calculated as follows: Tidal Volume/ dP (Plateau Pressure – PEEP) and indexed to ideal body weight.

Regional lung distribution was analyzed with a mixed linear regression model with a randomly varying subject effect, to account for repeated measures.

Results and Discussion: 61 patients were included. Median age was 11 (6-14) years; 15 patients were under 2 years of age. From SB to PPV, ROI 1 ventilation significantly raised (Coef: 4.95; CI: 3.96 –5.93), ROI3 significantly decreased (Coef: - 2.81; CI:-4.33 – -1.31) and ROI 2 and 4 did not change. In the toddlers’ group, ROI 1 significantly rose (Coef: 3.65; CI: 1.33 – 5.97) while the other did not change. Rising PEEP from 5 to 10 cmH2O reduced ROI1 ventilation. Mean Crs was 11 (6-14) years; 15 patients were under 2 years of age. From SB to PPV, ROI 1 ventilation significantly raised (Coef: 4.95; CI: 3.96 –5.93), ROI3 significantly decreased (Coef: - 2.81; CI:-4.33 – -1.31) and ROI 2 and 4 did not change. In the toddlers’ group, ROI 1 significantly rose (Coef: 3.65; CI: 1.33 – 5.97) while the other did not change. Rising PEEP from 5 to 10 cmH2O reduced ROI1 ventilation. Mean Crs was 11 (6-14) years; 15 patients were under 2 years of age. From SB to PPV, ROI 1 ventilation significantly raised (Coef: 4.95; CI: 3.96 –5.93), ROI3 significantly decreased (Coef: - 2.81; CI:-4.33 – -1.31) and ROI 2 and 4 did not change. In the toddlers’ group, ROI 1 significantly rose (Coef: 3.65; CI: 1.33 – 5.97) while the other did not change. Rising PEEP from 5 to 10 cmH2O reduced ROI1 ventilation. Mean Crs was 11 (6-14) years; 15 patients were under 2 years of age.

Conclusion(s): The addition of PEEP improves respiratory mechanics by increasing compliance and reducing the driving pressure in these patients, mechanical ventilation in the prone position worsens it.
### 15AP01-12
Modification of regional volume distribution during pediatric laparoscopy: an Electrical Impedance Tomography (EIT)-based, prospective, crossover study

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**Background and Goal of Study:** Use of laparoscopy has expanded in pediatrics. The rise in Intra-Abdominal Pressure (IAP) of laparoscopy leads to an upward shift of the diaphragm, with consequences on the lung. Electrical Impedance Tomography (EIT) shows a dynamic map of ventilation distribution across the lung, dividing it into 4 Regions of Interest (ROI) from ventral to caudal. Data on regional ventilation changes during laparoscopy are still lacking for the pediatric population.

The present study aims to investigate how the insufflation of CO2 into the abdominal cavity during laparoscopy can affect regional ventilation distribution in healthy pediatric patients and how these changes correlate with respiratory mechanics.

**Materials and Methods:** EIT and pulmonary mechanics measurements were performed in volume-control ventilation with a set tidal volume of 8 ml/kg. Measurements of peak inspiratory (PIP), plateau (PPL), and total PEEP (tPEEP) were performed with PEEP 5 and 10 cmH2O before and during pneumoperitoneum.

Static Respiratory System Compliance (Crs) and driving pressure (dp) were calculated as follows: Tidal Volume/ dP (Plateau Pressure – tPEEP). Crs, working pressures and ROIs ventilation (expressed as % of tidal volume) were analyzed with a mixed linear regression model with a randomly varying subject effect, to account for repeated measures.

**Results and Discussion:** 61 patients were included. Median age was 11 (6-14) years; 15 patients were under 2 years of age. Crs was increased from PEEP 5 to 10 and decreased by pneumoperitoneum (Coeff: -0.26; CI: -0.031 to -0.02). Peak and Plateau pressures were increased by PEEP (Coeff: 4.63; CI: 3.06 – 6.20 and Coeff: 0.7; CI: 0.117 – 1.19 respectively) and pneumoperitoneum (Coeff: 4.45; CI: 2.17 – 6.73; Coeff: 2.58; CI: 2.22 – 2.93 respectively). dp was decreased by PEEP 10 compared to 5 and raised by pneumoperitoneum (Coeff: 2.6; CI: 2.13 – 3.07).

With pneumoperitoneum, ROI1 ventilation increases (Coeff: 4.23; CI: 3.21 – 5.24) as well as ROI3 and 4. ROI2 ventilation decreased (Coeff: -9.26, CI: -10.43 – -8.09). In patients under 2 years, ROI1 but not ROI4 increases (Coeff: 4.0; CI: 1.88 – 6.13).

**Conclusion(s):** Pneumoperitoneum affects Crs, working pressures and ventilation distribution. Different redistribution of ventilation in different age groups could be explained by the different shape of the diaphragm, which becomes higher in laparoscopy.

### 15AP02-01
Sex dependence of postoperative pulmonary complications – a post hoc analysis of LAS VEGAS


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**Background and Goal of Study:** Sex has been reported as a risk factor for the development of postoperative pulmonary complications (PPCs).

We reanalysed the database of ‘Local ASsessment of Ventilatory management during General Anaesthesia for Surgery study’ (LAS VEGAS) to evaluate differences between females and males with respect to PPCs and their severity.

**Materials and Methods:** Post hoc analysis of LAS VEGAS, an international observational study in patients undergoing intraoperative ventilation under general anesthesia for surgery in 146 hospitals across 29 countries.

The primary endpoint was the incidence of PPCs, a composite endpoint of six individual PPCs. Secondary endpoints were the severity grades of each individual PPC and mortality. The worst severity grade of each patient was used.

**Results and Discussion:** The cohort consisted of 8941 patients; 4922 (55.0%) females and 4019 (45.0%) males. The incidence of PPCs was not different between females and males (9.9 vs 10.8%; OR 0.91 [0.79–1.05]; P = 0.18). Females with PPCs were less often classified with PPC severity grade 2 (0.9 vs 1.9%; OR 0.48 [0.33–0.71]; P = 0.001) and PPC severity grade 3 (0.8 vs 1.3%; OR 0.60 [0.39–0.92]; P = 0.02).

![Severity grades of postoperative pulmonary complications (PPCs) and mortality](image)

- Grade 0 = no PPC
- Grade 1 = unexpected postoperative supplementary oxygen
- Grade 2 = one or multiple of the following: pneumonia, pneumothorax or respiratory failure
- Grade 3 = new invasive ventilation and/or acute respiratory distress syndrome (ARDS)
- Grade 4 = death
Conclusion(s): In this conveniently–sized worldwide cohort of patients receiving intraoperative ventilation under general anaesthesia for surgery the incidence of PPCs is not different between sexes. PPCs with severity grades 2 and 3 occurred less often in females.

15AP02-02
Effect of smoking status on postoperative pulmonary complications – a post hoc analysis of LAS VEGAS

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Background and Goal of Study: Protective ventilation strategies have emerged as a cornerstone in perioperative care, aiming to reduce the risk of postoperative pulmonary complications (PPCs). With these developments, the question arises as to whether smoking still has a significant impact on PPCs in contemporary practice.

We conducted a post hoc analysis of the database from the ‘Local Assessment of Ventilatory Management during General Anaesthesia for Surgery’ (LAS VEGAS) study to assess the effect of smoking status on PPCs in patients at increased risk of PPCs.

Materials and Methods: Post hoc analysis of LAS VEGAS, an international observational study in patients undergoing intraoperative ventilation under general anaesthesia for surgery in 146 hospitals across 29 countries. Patients at increased risk of PPCs (ARISCAT score ≥ 26 points) were included in the current analysis.

The primary endpoint was the incidence of PPCs, defined as a composite endpoint comprising six individual PPCs. Secondary endpoints included the severity of each individual PPC, the most severe PPC of each patient was used.

Results and Discussion: The cohort comprised 2632 patients; 2101 (79.8%) non-smokers and 531 (20.2%) smokers. The incidence of PPCs did not differ between non-smokers and smokers (19.4 vs 19.4%; OR 0.99 [0.78–1.28]; P = 1.00). There is a shift toward more severe PPCs in the smokers group. In particular respiratory failure occurs more frequently compared to non-smokers (4.33 vs 2.33%; OR 1.90 [1.09–3.20]; P = 0.016).

Conclusion(s): In this worldwide cohort of patients receiving intraoperative ventilation under general anesthesia for surgery there is no significant difference in the incidence of PPCs between smokers and non-smokers. However, respiratory failure occurred more frequently in smokers.

15AP02-03
Indications for ECMO in Lung Transplantation (LungTx): a monocentric retrospective study at Erasme (Bruxelles, 2016-2022) and European questionnaire

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¹ULB/ERASME, Anesthesia, Brussels, Belgium

Background and Goal of Study: In recent years, ECMO’s superiority in lung transplantation over CPB has been firmly established¹. However, its routine use for all lung transplantations is still debated².

This study aims to share our 5-year experience with perioperative ECMO in lung transplantation, specifying indications and analyzing varied European protocols.

Materials and Methods: Survival analysis employed the Kaplan-Meier method and the log-rank test. Perioperative ECMO risk was assessed using logistic regressions. Diverse lung transplantation protocols in Europe were scrutinized via an online questionnaire sent to centers in France and Euro Transplant.

Results and Discussion: Analysis of 93 lung transplantations revealed: ECMO use of 20%. Primary indications included preoperative right ventricular (RV) dysfunction (26.3%), hemodynamic or respiratory intolerance during the pulmonary artery clamping test (42.3%), or PGD (21%).

In our protocol, the PA clamping test is positive if cardiac index < 2/l/min/m², SvO2 < 60%, MAP < 50-60mmHg, pH < 7.1, or RV failure. The PAM/PAPs index is not used. Among 88 patients without ECMO, all underwent a clamping test.
Only one patient with a negative test required ECMO for RVD during the first lung implantation (intolerance to atrial manipulation). Survival rates at 1, 3, and 5 years are 87%, 79%, and 74%. ISHLT reported 85% and 59% overall survival at 1 and 5 years (2010-2020). ECMO percentages by etiology were 11.3% for COPD, 38% for IPF, 12.5% for cystic fibrosis, 80% for PAH, and 25% for other etiologies. Logistic regression identified IPF, PAH, and preoperative RV dilation (Echographic) as predictive factors for perioperative decompensation requiring ECMO. 

**Conclusion(s):** In our center, the use of ECMO is curative, and predictive factors for decompensation during pulmonary artery clamping are IPF, PAH, and preoperative RV dilation. Given the disparity in perioperative ECMO use in lung transplantation in Europe (curative versus preventive), a randomized study comparing the two uses in the highest-risk etiologies is needed.

**References:**

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**15AP02-04**

**Does oxygenation with high-flow nasal cannula improve gas exchange during endoscopic retrograde cholangiography procedures? A randomized controlled trial**

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**Background and Goal of Study:** Patients undergoing endoscopic retrograde cholangiography procedures (ERCP) have increased risk of hypoxemia and hypercapnia during deep sedation. Oxygenation with high-flow nasal cannula (HFNC) seems to improve hypoxemia during endoscopic procedures but there is no data about hypercapnia. We aim to evaluate whether oxygenation with HFNC improves gas exchange compared to standard nasal cannula (NC).

**Materials and Methods:** Single-tertiary-center, non-masked, randomized control trial, in adult patients undergoing ERCP. After signing the informed consent and completing STOP-Bang questionnaire patients were randomized 1:1 with obstructive sleep apnea (OSA) stratification, to HFNC (60L min-1, FiO2 0.4) and NC (6L min-1).

The procedures were performed under deep sedation with propofol and remifentanil target-controlled infusion. ECG, pulse oximetry (SpO2), blood pressure, bispectral index (BIS), rescue airway maneuvers, and transcutaneous CO2 (PICO2) were collected.

The primary outcome was hypoxicemic events defined as SpO2 ≤ 90% during 15 s. The secondary was for the need rescue maneuvers and hypercapnia defined by the maximum PICO2 values registered during the procedure.

**Results and Discussion:** 191 patients were included in the analysis. Groups were balanced except for higher doses propofol in the NC group without differences in the BIS levels. We did not find significant differences in incidence of desaturation events or airway rescue maneuvers. However, PtCO2 level was significantly higher in the NC than in the HFNC group.

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**15AP02-05**

**The effect of intraoperative intravenous or paravertebral lidocaine versus control during video-assisted thoracoscopic lung resection surgery on postoperative complications: a randomized controlled trial**

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**Background and Goal of Study:** Lung resection surgery (LRS) is associated with a variety of potential postoperative complications (PC) which have been related to an exaggerated perioperative systemic and pulmonary inflammatory response. Lidocaine has proven anti-inflammatory effects. The main goal of the present study was to compare the proportion of patients included in the different scales of the Clavien-Dindo classification of PC between patients undergoing video-assisted thoracoscopic LRS who have received intraoperatively either IV or PV lidocaine vs saline. Furthermore, we compared the perioperative pulmonary and systemic inflammatory response.

**Materials and Methods:** A prospective, randomized single-center phase IV study was designed (NCT 03905837; EudraCT 2016-004271-52) and approved by the local Ethics Committee. The patients were randomly assigned to one of the following groups:

<table>
<thead>
<tr>
<th>IV LIDO</th>
<th>IV lidocaine (1.5mg/Kgh)</th>
<th>PV saline</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. PV LIDO</td>
<td>PV lidocaine 2% (0.1mL/Kgh)</td>
<td>IV saline TE</td>
</tr>
<tr>
<td>3. REMI</td>
<td>IV remifentanil (0.1mg/Kgm/min)</td>
<td>PV saline</td>
</tr>
</tbody>
</table>

All the patients were managed with the same anesthetic protocol, which included protective ventilation and postoperative PV analgesia. IL1,6,8,10,18,MCPI,TNF,S100 and NSE were analyzed in fiberoptic bronchoalveolar lavage (BAL) of the dependent lung (before and after one lung ventilation, OLV) and arterial blood samples (intraoperatively and 24h after surgery).

**Conclusion(s):** In patients undergoing ERCP, HFNC did not reduce the incidence of desaturation events and airway maneuvers. However, HFNC significantly reduced patients’ hypercapnia.
Results and Discussion: The 3 groups had similar preoperative and intraoperative data. The patients that received lidocaine (IV or PV) had a less intense pulmonary and systemic inflammatory response than REMI group.

<table>
<thead>
<tr>
<th>Clavien Dindo Classification</th>
<th>IV LIDO (n=54)</th>
<th>PV LIDO (n=49)</th>
<th>REMI (n=51)</th>
<th>TOTAL (n=154)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO COMPLICATIONS</td>
<td>35 (64.8%)</td>
<td>30 (61.2%)</td>
<td>22 (43.1%)</td>
<td>87 (56.5%)</td>
<td></td>
</tr>
<tr>
<td>MINOR COMPLICATIONS (II)</td>
<td>17 (31.5%)</td>
<td>17 (34.7%)</td>
<td>23 (45.1%)</td>
<td>47 (27%)</td>
<td>0.037</td>
</tr>
<tr>
<td>MAJOR COMPLICATIONS (III/IV)</td>
<td>2 (3.7%)</td>
<td>4 (8.1%)</td>
<td>6 (11.8%)</td>
<td>10 (6.4%)</td>
<td></td>
</tr>
<tr>
<td>Atelectasis</td>
<td>5 (9.3%)</td>
<td>6 (12.2%)</td>
<td>14 (27.5%)</td>
<td>25 (16.2%)</td>
<td>0.027</td>
</tr>
<tr>
<td>Suspected pulmonary infection</td>
<td>10 (18.5%)</td>
<td>5 (10.2%)</td>
<td>14 (27.5%)</td>
<td>29 (18.8%)</td>
<td>0.088</td>
</tr>
<tr>
<td>Wound infection</td>
<td>1 (1.9%)</td>
<td>2 (4.1%)</td>
<td>4 (7.8%)</td>
<td>7 (4.5%)</td>
<td>0.348</td>
</tr>
<tr>
<td>Prolonged pulmonary air leak</td>
<td>7 (13%)</td>
<td>3 (6.1%)</td>
<td>3 (5.9%)</td>
<td>13 (8.4%)</td>
<td>0.414</td>
</tr>
<tr>
<td>Atrial fibrillation</td>
<td>11 (19.4%)</td>
<td>1 (2%)</td>
<td>4 (7.8%)</td>
<td>6 (3.9%)</td>
<td>0.523</td>
</tr>
<tr>
<td>Acute kidney injury</td>
<td>0 (0%)</td>
<td>2 (4.1%)</td>
<td>0 (0%)</td>
<td>2 (1.3%)</td>
<td>0.100</td>
</tr>
<tr>
<td>Postoperative cognitive dysfunction</td>
<td>7 (13.5%)</td>
<td>8 (16.3%)</td>
<td>7 (14%)</td>
<td>22 (14.5%)</td>
<td>0.991</td>
</tr>
<tr>
<td>Length of hospital stay (days)</td>
<td>4 (3-6)</td>
<td>4 (3-5)</td>
<td>4 (3-7)</td>
<td>4 (3-6)</td>
<td>0.177</td>
</tr>
</tbody>
</table>

Conclusion(s): Lidocaine (IV or PV) results in a better clinical outcome than IV remifentanil, and this could be related to an attenuation of the systemic and pulmonary inflammatory response.


15AP02-07 Predicting the outcome of High Flow Nasal Cannula: beyond the ROX index

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Background and Goal of Study: The ROX index is defined as SpO2/FiO2/respiratory rate. It was proposed as a predictor of high-flow nasal cannula (HFNC) failure in patients with acute hypoxemic respiratory failure (AHRF). The aim of this study was to evaluate the predictive value of two other indices: ROX-HR defined as ROX/heart rate(HR)*100 and HR/SpO2 in comparison to ROX.

Materials and Methods: Retrospective analysis of large, publicly accessible critical care database MIMIC-IV was performed. Patients with AHRF, defined as paO2/FiO2<300mmHg or paO2<60mmHg or SpO2<90% or tachypnoea>30/min, and pCO2<=45mmHg, treated with HFNC were identified. Patients with invasive mechanical ventilation (IMV) or non-invasive ventilation (NIV) prior to HFNC were excluded from the study. HFNC failure was defined as a subsequent need for NIV, IMV or invasive ventilation (NIV) prior to HFNC were excluded from the study. HFNC failure was defined as a subsequent need for NIV, IMV or death.

Mean values of respiratory parameters 4 to 6 hours as well as 10 to 12 hours post HFNC initiation were used for calculations of indices. The predictive value of the ROX index, ROX-HR and HR/SpO2 was calculated.

Results and Discussion: 435 patients with AHRF treated with HFNC were identified in MIMIC-IV. Patients with prior NIV or IMV use (n=211) were excluded. The final cohort consisted of 224 patients. HFNC failure was observed in 92(41%) cases. Baseline characteristics of patients with HFNC failure and success were similar. Statistically significant differences were found between these patient groups in terms of analysed indices (Table 1).

<table>
<thead>
<tr>
<th>Variable</th>
<th>All AHRF patients using HFNC (n=224)</th>
<th>HFNC failure (n=92)</th>
<th>HFNC success (n=132)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROX 4-6h</td>
<td>6.4 [5.6 – 7.5]</td>
<td>6.4 [5.4 – 7.6]</td>
<td>6.3 [5.7 – 7.5]</td>
<td>0.629</td>
</tr>
<tr>
<td>ROX-HR 4-6h</td>
<td>7.1 [5.6 – 9.0]</td>
<td>6.6 [5.3 – 8.1]</td>
<td>7.6 [5.9 – 9.3]</td>
<td>0.005</td>
</tr>
<tr>
<td>HR/SpO2 4-6h</td>
<td>1.0 [0.83 – 1.12]</td>
<td>1.05 [0.89 – 1.19]</td>
<td>0.91 [0.79 – 1.07]</td>
<td>&lt;=0.001</td>
</tr>
<tr>
<td>ROX 10-12h</td>
<td>6.5 [5.5 – 8.0]</td>
<td>6.3 [5.3 – 7.5]</td>
<td>6.9 [5.6 – 8.3]</td>
<td>0.049</td>
</tr>
<tr>
<td>ROX-HR 10-12h</td>
<td>7.65 [6.5 – 9.8]</td>
<td>6.80 [4.9 – 8.8]</td>
<td>8.4 [6.1 – 10.3]</td>
<td>0.005</td>
</tr>
<tr>
<td>HR/SpO2 10-12h</td>
<td>0.95 [0.80 – 1.13]</td>
<td>1.08 [0.85 – 1.24]</td>
<td>0.91 [0.78 – 1.05]</td>
<td>&lt;=0.001</td>
</tr>
</tbody>
</table>

According to values 4 to 6 hours post HFNC initiation AUC of ROX-HR(0.63) and AUC of HR/SpO2(0.68) were larger than AUC of ROX(0.52). Similarly, according to values 10 to 12 hours post HFNC initiation AUC of ROX-HR(0.64) and AUC of HR/SpO2(0.63) were larger than AUC of ROX(0.60) (Figure 1).

Figure 1. 4 to 6 hours post HFNC initiation 10 to 12 hours post HFNC initiation

Conclusion: Both ROX-HR and HR/SpO2 may be useful predictors of HFNC outcomes in AHRF patients.

15AP02-08 The real reason for the effectiveness of thorough pre-oxygenation: the concentration effect

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Background and Goal of Study: Pre-oxygenation is universally practiced to prolong anaerobic oxygenation time prior to airway intubation at anaesthetic induction. Customary teaching explains its effectiveness in delaying arterial oxyhaemoglobin desaturation during apnoea by increasing the volume of O2 in the lung (“reservoir effect”). However, this ignores the “concentration effect”, a term traditionally used to describe how nitrous oxide delivered at high concentrations achieves a high alveolar concentration faster, relative to inspired concentration, at any given rate of lung uptake. Similar considerations will apply to O2 breathing, and be important because arterial oxyhaemoglobin saturation depends directly on fractional alveolar O2 concentration (FAO2), rather than simply on lung O2 volume (VAO2) itself.

Materials and Methods: A simple mass balance computer model of FAO2 and uptake rate (VO2) in the presence of a variable lung alveolar volume (VA) during apnoea (“closed glottis model”) was created using LabVIEW (NI, USA). The time course of change in arterial oxyhaemoglobin saturation was simulated simulating different levels of pre-oxygenation (FAO2) varying from 1.0 to 0.15. VO2 was set at 0.25 L/min and initial VA at 2 L.
Results and Discussion: Despite the rate of fall in VAO$_2$ (dVAO$_2$) being identical (equal to VO$_2$) in all scenarios (Fig 1, & Fig 2 broken line), fall in FAO$_2$ (dFAO$_2$) was slower as FAO$_2$ increased (Fig 2, solid coloured lines), with the limiting case being FAO$_2$ of 1.0 where FAO$_2$ remained constant.

Figure 1: Fall in VAO2 from t=0

Figure 2: Fall in FAO$_2$ and VAO$_2$ (broken line) relative to baseline (t=0)

Conclusion(s): The effectiveness of thorough pre-oxygenation in slowing the rate of fall in FAO$_2$ and prolonging expected time to arterial desaturation is dominated by the concentration effect, rather than a simple $O_2$ reservoir effect.

15AP02-09
Tracheal intubation adversely impacts the respiratory mechanics of healthy children undergoing general anesthesia and mechanical ventilation

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Background and Goal of Study: There is limited research on the physiological impact of tracheal intubation (TI) on respiratory mechanics in pediatric patients.

Our aim was to determine the changes in respiratory mechanics in healthy anesthetized children undergoing surgery.

Materials and Methods: Prospective, crossover study. Healthy children younger than 15 years old scheduled for elective surgery were included. After induction of anesthesia and paralysis, measurements of pulmonary mechanics were performed in volume-control ventilation. Measurements of peak inspiratory (PIP), plateau (PPL), and total PEEP (tPEEP) were obtained in two time points: before (masking ventilation) and after TI. Measurements were performed with PEEP 0 and 5 cmH2O. Static Respiratory System Compliance (Crs) and driving pressure (dP) were calculated as follows: Tidal Volume/ dP (Plateau Pressure – tPEEP).

To detect changes in the resistive component we calculated the gradient between PIP and PPL. Crs and working pressures were analyzed with a mixed linear regression model with a randomly varying subject effect, to account for repeated measures.

Results and Discussion: 28 patients were included. Median age was 48.0 (12.0-96.0) months. Crs improved with the addition of PEEP 5 cmH2O (Coeff: 0.462; CI: 0.36-0.56; p<0.001) and decreased from mask ventilation to intubation (Coeff: - 0.213; CI: -0.31- - 0.13). dP increased from mask to tube (Coeff: 1.6; CI: 1.12 - 2.18; p<0.001) and decreased from 0 to 5 PEEP (Coeff: - 2.02; CI: - 2.5 - - 1.52, p<0.001).

PIP significantly increased when intubated (Coeff: 2.32; CI: 1.64-3.06;p<0.001) and with the addition of PEEP (Coeff: 3.07;CI: 2.40-3.74; p<0.001). The difference between PIP and PPL increased after TI (Coeff: 0.58; CI:0.14-1.03, p<0.001).

Conclusion(s): Changes in respiratory mechanics were noticed after the addition of PEEP and intubation in healthy pediatric patients. While after intubation an increase in PIP and dP was observed (with a decrease in compliance) the addition of 5 PEEP cmH20 improved Crs. These changes indicate a deterioration of both the resistive and elastic components of working pressure after intubation during MV.
Background and Goal of Study: Robot-assisted thoracic surgery (RATS) has theoretically multiple advantages, being a great innovation in the field of surgery in recent years. Our study aims to provide information on the intraoperative anesthetic management of RATS, as well as to analyze the postoperative results and the learning curve of the technique.

Materials and Methods: We perform a retrospective study of the clinical history of 50 patients who underwent RATS using Da Vinci dVX® between 2018 and 2021 in an academic tertiary hospital. Statistical analyses of the clinical-demographic variables and those related to airway management, intraoperative dynamics and postoperative outcomes was carried out. Subgroup analysis of patient cases was performed based on the date of surgical intervention in order to compare the operative time, length of hospital stay and postoperative complications as surrogates of the learning curve.

Results and Discussion: 92% of the patients were intubated with double-lumen tubes (70% VivaSight-DL vs 22% standard double-lumen tubes) and the most used caliber was 37Fr (68% of cases). Tracheal intubation was difficult in 8% of patients who underwent lung isolation using an endotracheal tube and a bronchial blocker. The mean duration of the interventions was 135.4 minutes. The mean hospital stay was 5.2 days and the mean number of complications was 0.52 per patient. Arterial hypotension was higher during the one-lung ventilation period (20%), especially in patients undergoing a thoracic epidural block. There were no significant changes in operative time, length of hospital stay and postoperative complications between early and late subgroup of patients undergoing robotic thoracic surgery.

Conclusion(s): RATS is a safe surgery associated with a short hospital stay and a low incidence of postoperative complications. Double-lumen tubes and locoregional blocks, such as paravertebral or intercostal, are recommended techniques during RATS. Therefore, more studies are needed to confirm the benefits of RATS in order to justify its high costs.

References:  
2. Granell G, Martínez Plumed E, García del Olmo E, Pastor Martínez J, A. de Andrés Ibáñez R, Guijarro Jorge R, RATS Consorcio HGUV (Dra. Ana Broseta, Dr. Javier Morales, Dra. Marta Grynovska, Dr. José Tatay, Dra. Elena Biosca, Dr. Juan R. Ruiz)  
15AP02-12 Effects of general and locoregional anaesthesia on lung atelectasis during orthopaedic surgery

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Background: General anaesthesia with neuromuscular blockade, intubation, and mechanical ventilation leads to lung atelectasis. Although regional anaesthesia may be preferred in patients with a high risk of postoperative pulmonary complications, there is limited knowledge on the incidence of lung atelectasis after regional anaesthetic procedures. The study aimed to compare the incidence of perioperative lung atelectasis after orthopaedic surgery performed under general anaesthesia (GA), spinal anaesthesia (SA) and peripheral nerve blocks (PNB).

Materials and Methods: We prospectively included patients undergoing any elective orthopaedic surgery and performed several pleuropulmonary ultrasound exams following a standardized procedure. Atelectasis was quantified using a validated Lung Ultrasound Score (LUS) considering B-lines and consolidations in 12 lung windows, according to (1).

LUS was performed on admission (A), after induction of anaesthesia (B), at the end of the surgery (C) and 1h after arrival in the recovery room (D). The ultrasound images were scored by two blinded investigators. The primary outcome was the LUS at the end of surgery (timepoint C). The LUS was analysed using a Poisson regression including 4 timepoints (A to D) and 3 types of anaesthesia: GA, SA and PNB. The regression accounted for an interaction between timepoint and group and for repeated measures.

Results and Discussion: Sixty patients undergoing GA (n=19), SA (n=21) and PNB (n=20) were included. LUS was significantly reduced at timepoint C in patients with PNB (GA: 2.4 ± 2.2 [mean ± SD]; SA: 1.9 ± 2.4; PNB: 0.8 ± 1.8; p=0.049).

With the regression model, patients in the PNB group had the lowest LUS at timepoint C with a mean (95%CI) of 0.74 (0.24 to 1.24) as compared with the GA group (2.64 [1.23 to 4.05], p=0.012) and the SA group (1.87 [0.88 to 2.87], p=0.043).

There was no significant difference between groups at the other timepoints. Finally, there were no symptomatic respiratory complications in any patients.

Conclusion(s): Patients undergoing elective orthopaedic surgery under PNB develop less atelectasis at the end of surgery measured with an ultrasound exam, as compared with GA or SA.

Reference:

Trial approval and Registration: Approved by the Cantonal Ethics Committee for Human Research (CER-VD, Project-ID 2022-00712). Registered in Clinicaltrials.gov NCT05384795.

15AP03-01 Impact of a positive end-expiratory pressure strategy on oxygenation, respiratory compliance, and hemodynamics during laparoscopic surgery in non-obese patients: a systematic review and meta-analysis

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Background and Goal of Study: Higher positive end-expiratory pressure (PEEP) during laparoscopic surgery may increase oxygenation and respiratory compliance. This meta-analysis aimed to compare the impact of different intraoperative PEEP strategies on arterial oxygenation, compliance, and hemodynamics during laparoscopic surgery in non-obese patients.

Materials and Methods: We searched RCTs in PubMed, Cochrane Library, Web of Science, and Google Scholar from January 2012 to January 2022 comparing the different intraoperative PEEP (Low PEEP (LPEEP): 0 mbar; Moderate PEEP (MPEEP): 5–8 mbar; high PEEP (HPEEP): >8 mbar; individualized PEEP - iPEEP) on arterial oxygenation, respiratory compliance (Cdyn), mean arterial pressure (MAP), and heart rate (HR).

We calculated mean differences (MD) with 95% confidence intervals (CI), and predictive intervals (PI) using random-effects models. The Cochrane Bias Risk Assessment Tool was applied.

Results and Discussion: 21 RCTs (n=1554) met the inclusion criteria. HPEEP vs LPEEP increased PaO2 (+29.38 [16.20; 42.56] mmHg, p=0.0001) or PaO2/FiO2 (+36.7 [+2.23; +71.70] mmHg, p=0.04). HPEEP vs MPEEP increased PaO2 (+22.00 [+1.11; +42.88] mmHg, p=0.04) or PaO2/FiO2 (+42.7 [+2.74; +82.67] mmHg, p=0.04). iPEEP vs MPEEP increased PaO2/FiO2 (+115.2 [+87.21; +143.20] mmHg, p<0.001). MPEEP vs LPEEP and HPEEP vs MPEEP increased PaO2 or PaO2/FiO2 significantly with different heterogeneity. HPEEP vs LPEEP increased Cdyn (+7.87 [+1.49; +14.25] ml/mbar, p=0.02). MPEEP vs LPEEP, and HPEEP vs MPEEP didn’t impact Cdyn (p=0.14 and 0.38, respectively).

iPEEP vs LPEEP decreased driving pressure (-4.13 [-2.63; -5.63] mbar, p<0.001). No significant differences in MAP or HR were found between any subgroups.

Conclusion(s): HPEEP and iPEEP during PNP in non-obese patients may improve oxygenation, increase Cdyn without clinically significant changes in MAP and HR. MPEEP could be insufficient to increase respiratory compliance and improve oxygenation. LPEEP could lead to hypoxemia and decreased respiratory compliance.
15AP03-02
Postoperative pulmonary complications in emergency abdominal laparotomy/laparoscopy (PEAL). Perioperative management and independent risk factors

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Background and Goal of Study: Postoperative pulmonary complications (PPCs) are the most frequent postoperative complications in emergency and non-emergency abdominal surgery. Indeed, different studies such as ARISCAT or LAS VEGAS have shown that emergency abdominal surgery is an independent risk factor for PPCs. The aim of this study is to analyze the association between perioperative factors including ventilatory variables, and PPCs in patients undergoing emergency abdominal surgery.

Materials and Methods: The Postoperative pulmonary complications in Emergency Abdominal Laparotomy/Laparoscopy (PEAL) study is a prospective international cohort study enrolling all adult patients above 18 years old undergoing emergency abdominal surgery. From April to June 2023 each hospital selected a single 7-day period for the recruitment with a 7-day follow-up. The association between perioperative factors such as patient risk and comorbidities, surgical technique and level or anesthetic perioperative factors and PPCs was analyzed.

Results and Discussion: A total of 507 patients were included in the analysis. The multivariate analysis showed that the independent risk factors for PPCs were: high ARISCAT score (OR: 2.67; 95%CI 1.06 to 6.86), laparotomy (OR: 2.29; 95%CI 1.06 to 5.01), neuromuscular reversion (OR: 0.36; 95%CI 0.16 to 0.82), volume of crystalloids (OR: 1.01; 95%CI 1.00 to 1.01), and postoperative positive air-test (OR: 2.05; 95%CI 1.02 to 4.24).

Conclusion(s): In this study we observed that 22% of patients were diagnosed of at least one PPC and close to 40% from surgery level 2 during the first seven postoperative days. Previous studies have reported a heterogeneous proportion of patients (from 5% and up to 48%) developing PPCs, justified by several factors such as the population included, the number of PPCs reported or the definition of PPCs used.

References:

15AP03-04
The efficacy of nasal administration of esketamine in patients with perceivable pain after preoperative CT-guided needle localization: a randomized, double-blind, placebo-controlled trial

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Background and Goal of Study: Whether nasal administration of esketamine provides effective analgesia is unclear in patients with acute pain after preoperative CT-guided needle localization.

Materials and Methods: In this double-blind, randomized, placebo-controlled trial, patients were assigned to receive either nasal administration of esketamine (0.3mg/kg or 0.5mg/kg) or saline placebo (identical in appearance to esketamine) when they had a visual analogue scale (VAS) exceeding 3/10 during deep breathing after preoperative CT-guided needle localization. The primary end point was successful remission rate of moderate-to-severe pain, defined as the VAS below 4/10 within 15 minutes after treatment. Secondary end points included VAS at a series of time points, the incidence and cumulative dose of rescue hydromorphone use, and related adverse events.

Results and Discussion: A total of 90 patients was included in the final analysis. Moderate-to-severe pain occurred in 25/30 (83.3%) of saline group, 13/30 (43.3%) of 0.3mg/kg nasal esketamine group and 14/30 (46.7%) of 0.5mg/kg nasal esketamine group (p=0.002). The median VAS during deep breathing was less after both nasal esketamine spray (median [IQR], 3[3, 5]) in either of 0.3 mg/kg or 0.5 mg/kg esketamine compared to saline group (5[4, 6]), p=0.009. The incidence of rescue hydromorphone use was also detected less in nasal esketamine group compared to saline group (43.4% in 0.3mg/kg esketamine, 36.7% in 0.5mg/kg esketamine group and 73.3% in saline group, p=0.010). The adverse events were similar among the three groups (p=0.05).

Conclusion(s): Nasal administration of esketamine is feasible to alleviate the acute pain in patients after preoperative CT-guided needle localization without significant adverse effects.
Enhancing heart protection in lung cancer surgery with lidocaine or phosphocreatine: exploring effectiveness

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Background: Cardiovascular (CV) diseases are the leading global cause of death. Each year, the number of patients undergoing lung cancer surgery with concurrent CV issues is increasing. Despite advancements in surgery and anesthesia techniques, such stress poses a high risk of CV complications, especially in patients with a burdensome history. Therefore, we assessed the short-term adjuvant cardioprotective effects of lidocaine (L) and phosphocreatine (PhC) in thoracic oncosurgery for moderate or high-risk CV patients.

Materials and Methods: The study included 121 patients (94 men/27 women, Me 68 years, Q1-Q3 62-72 years), comprised a lung cancer diagnosis of I-IIIa stage and one of the following conditions: myocardial infarction, stroke, heart rate disturbances, or coronary artery surgery. All patients received epidural anesthesia at Th5-6 level, and double-lumen tube intubation. Patients were randomly assigned to three groups: Group L (n=35) received L i/v bolus+infusion during surgery, Group PhC (n=36) received PhC infusion on the day before surgery, intraoperatively, and three days postoperatively (p/o); Control group (C,n=50) received no additional therapy. Treatment efficacy was assessed using NT-pro-BNP and early complications (up to 7 days p/o, Clavien-Dindo ≥2). Statistical analysis included non-parametric tests, ROC-analysis and linear regression.

Results and Discussion: The L group exhibited significantly fewer complications than the C group (2.9% vs 22.0%, p=0.038). CV and respiratory complications dominated the structure (41% each). The use of PhC was also decreasing the number of complications (NNT=9.2) but without statistical significance (p=0.254). NT-pro-BNP levels on p/o day 3 were lower in the L group (p=0.01 for C group and p=0.035 for PhC group). Multifactorial analysis identified age, OR 1,127, 95%CI[1,013-1,255], p=0.001, anesthesia duration, OR 1,035,95%CI[1,015-1,057], p<0.001, and NT-pro-BNP levels on p/o day 3, OR 1,002, 95%CI[1,001-1,002], p<0.001, as crucial factors for complication development.

Conclusion: L demonstrates favorable adjuvant cardioprotective properties in moderate or high-risk CV patients during lung cancer surgery. While PhC can also be implied for cardioprotective goals, further studies are necessary.

Incidence and severity of perioperative pulmonary aspiration: a retrospective analysis of 1.2 million procedures

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Background and Goal of Study: Concerns regarding perioperative pulmonary aspiration and its complications guide preoperative fasting in hundreds of millions of patients.(1) Nonetheless, the incidence of perioperative pulmonary aspiration and the severity of its complications remain poorly characterized. We therefore quantified the incidence and severity of perioperative pulmonary aspiration in a contemporary cohort of patients receiving anesthesia care.

Materials and Methods: We conducted a retrospective analysis of emergent, urgent, or elective anesthesia cases in adult and pediatric patients between 2018 and 2022 at the Massachusetts General Hospital, Boston, USA. Cases with suspected aspirations were obtained from a rigorous hospital quality assurance program which included a mandatory survey on perioperative complications. Specifically, providers receive reminders by email and pager until the survey is completed for each anesthetic. Case characteristics and clinical outcomes were obtained from medical records. In uncertain cases, the likelihood of an aspiration event and whether there was a causal relationship between aspiration and clinical outcomes were adjudicated by an attending anesthesiologist.

Results and Discussion: We identified 115 cases of suspected perioperative pulmonary aspiration among 1,180,093 anesthetics performed during the study period (incidence 1 in 10,261). Among these 115 cases, 67 (58%) occurred during elective, 40 (35%) during urgent, and 8 (7%) during emergent procedures. Seven (6%) occurred in pediatric cases. Aspiration resulted in death in nine (8%) cases (mortality 1 in 131,124).

In twenty-one cases (18%), aspiration resulted in an unplanned Intensive Care Unit (ICU) admission (1 in 56,195). Among 50 planned outpatient cases with suspected perioperative pulmonary aspiration, only 13 (26%) required unplanned admission.

Conclusions: Among suspected aspirations, about 18% (1 in 56,000 anesthetics) resulted in ICU admission and 8% (1 in 130,000 anesthetics) resulted in death. Furthermore, three-quarters of outpatient cases with suspected aspiration did not require admission.

Our findings contradict the perception that most aspiration events lead to major morbidity or mortality and support recent liberal fasting practices.(2,3)

References:
15AP03-09
Prolonging breath-holds to at least 5 minutes with preoxygenation combined with mechanical hyperventilation in conscious volunteers lead to diaphragm drift which can be counteracted by mechanical reinflation

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Background and Goal of Study: Minimizing diaphragm motion in conscious patients by prolonged breath-holds increases the efficiency of radiotherapy. During prolonged breath-holds of at least 5 min a cranial diaphragm drift occurs at a speed of ~3 mm/min. Here we studied whether this diaphragm drift can be compensated by using the mechanical ventilator to re-inflate the chest intermittently during prolonged breath-hold in conscious volunteers.

Materials and Methods: We had ethics committee approval (NL77351.018.21) and trial registration (ICTRP, NL9841) and written informed consent from 8 healthy volunteers. In 5 volunteers chest circumference was measured with a wrap-around band connected to a spring-loaded resistor. In 3 volunteers, diaphragm drift was measured in the MRI using a 1D navigator acquisition. We instructed subjects to trigger the ventilator on command in order to let the lung re-inflate with a constant pressure. The net effect of these short inflations were measured and compared to prolonged breath holds without reinflation.

Results and Discussion: Heart rate, blood pressure and SpO2 stayed within normal range during the experiments while PetCO2 declined to about 20 mmHg during hyperventilation and returned to a low normal values after the breath hold. During prolonged breath-holds, intermittent reinflation returned the chest circumference to the circumference at the beginning of the breath hold (figure 1) as measured by the chest band. MRI revealed that, while the diaphragm briefly descended and re-ascended by ~5 mm during each reinflation, for ~90% of time the diaphragm position remained stable within a range of 4 mm. At the end of the breath hold, the diaphragm was within 3 ± 1 mm of its starting position.

Conclusion(s): We demonstrated that healthy volunteers can be trained to perform breath-holds of 5 minutes after preoxygenation and hyperventilation. The gradual decrease in lung volume and chest circumference during breath-holding could be compensated by a triggered pressure-controlled reinflation on command. These techniques could also be used for any procedure requiring prolonged apnea in conscious subjects.

15AP03-10
Massive right hemothorax following lobectomy with an unclear cause: a case report

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Background: Arterial bleeding, without understanding its underlying cause, can jeopardize the patient's life if not promptly recognized and treated.

Case report: A 61-year-old woman with no relevant medical record underwent a scheduled right lower lobectomy for a pulmonary tumor via thoracotomy. Due to technical difficulties in placing a thoracic epidural catheter, it was decided, to place an ultrasound-guided catheter in the right erector spinae muscle at T6 for postoperative analgesia. Several hours after surgery, the patient presented with tachycardia and hypotension, necessitating the infusion of vasopressive drugs, as well as desaturation and dyspnea, accompanied by increased, hematic output through the chest tube (approximately one liter in a few hours).

Chest X-ray revealed a massive right hemothorax, requiring urgent reintervention. Bleeding from the right paravertebral artery at T4 and a perivascular parietal pleural tear were observed, so massive transfusion protocol was activated and surgical hemostasis control was achieved, placing two chest tubes. The patient's postoperative course was favorable. Hemothorax resolved within 24 hours and the patient remained hemodynamically stable, and her anemia normalized without needing any further transfusions or surgery.

Discussion: There are different potential explanations for the acute hemorrhage in this case. From a surgical standpoint, the procedure was challenging, requiring the conversion from videothoracoscopy to thoracotomy. Also, paravertebral infiltration with ropivacaine was performed from the 2nd to the 8th intercostal space before the placement of the thoracic tube. On the other hand, multiple unsuccessful attempts were made to place an epidural catheter, ultimately resulting in the insertion of a catheter in the erector spinae plane (ESP). All these techniques pose a risk of bleeding due to their proximity to vascular structures and lack of direct vision, making it challenging to determine the exact cause.

Learning points: Erector spinae plane block is considered a safe and valuable technique for postoperative analgesia in thoracic surgery, with fewer adverse effects compared to the paravertebral approach. Massive hemothorax can result from various causes, particularly in patients undergoing thoracic surgery. Early clinical recognition is crucial for initiating prompt treatment and reducing morbidity and mortality.
15AP04-01
When to cancel a elective surgery after anesthesia induction? A clinical case

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Background: Cancelation of surgery is a constant agonizing dilemma for nearly all healthcare services, particularly after the anesthesia induction. Cancelation of surgery after anesthesia induction are very rare and a very difficult decision in some not so obvious serious cases and elective surgeries. We describe a clinical case of a challenging decision.

Case Report: A 48-year-old man presented to the hospital for his 5th hip surgery due to femoroacetabular impingement, all through arthroscopy, spaced over time and uneventful. The patient had no other relevant medical history. After anesthetic induction and orotracheal intubation, the patient was placed in the right lateral position and correct positioning was verified. After 15 minutes, just before the incision, the patient showed desaturation of up to 86%.

An ABCDE assessment was performed. In short, the correct positioning of the tube was verified using radiography. Pneumothorax was excluded, but the image presented a hypopneumothorax of the entire right lung field. After excluding other positioning complications and placing the patient in the supine position, all findings remained. We resorted to different therapeutic attempts, as well lung recruitment maneuvers, all unsuccessful. Despite no clinical worsening, it was decided not to proceed with the surgery.

Discussion: The occurrence of an atelectasis was hypothesized. As the problem persisted even after all therapeutic efforts, the risk versus benefit of continuing with surgery was assessed. Extubation was subsequently carried out. The patient was completely asymptomatic and the clinical and radiography findings previously found completely disappeared.


15AP04-02
Unraveling the puzzle: addressing post-esophagectomy fistula diagnosis in post-anesthesia care unit

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Background: Broncho-esophageal fistula (BEF) is an infrequent life-threatening esophageal cancer resection complication. Incidence ranges 0.3-1.5%1, mortality rates are around 57%, due to respiratory failure and septic shock2.

Case Report: A 67-year-old man, with a history of chronic obstructive pulmonary disease (COPD) and local recidive of esophageal epidermoid carcinoma. He underwent an uneventful McKeown esophagectomy. Extubation was performed at the day of admission in the post-anesthesia care unit (PACU). During first week of stay, he developed progressive respiratory distress, fever, right sided thoracic crackles and elevation of elevation of inflammatory markers leading to a presumed diagnosis of pneumonia. A CT scan on day 5 post-surgery revealing cervical anastomotic dehiscence and reintubation was required on day 6.

On day 7, PACU team noted low-pressure alarms and delivery of only 50% of set tidal volume, with difficult ventilation and oxygenation. An endotracheal cuff leak was presumed and the tube was exchanged using a videolaryngoscope.

On day 8, persistency of inadequate ventilation led to a new tube revision, during which was possible to hear air leak from the patient's mouth and bubbles from the esophageal opening. A flexible bronchoscopy was performed and a BEF identified at the left main-stem bronchus. Right selective mechanical ventilation and left lung functional exclusion with a single-lumen ETT was decided to favor the conservative healing of the BEF(3).

Although the opted approach for airway protection, the patient had an extensive esophageal dehiscence, overruling the possibility of an esophageal stent insertion, that progressed even after mediastinal surgical drainage with omental patch allocation for BEF closure, leading to the patient's death 22 days after surgery.

Discussion: Due to the low incidence and complexity of BEF after esophagectomy, a high index of suspicion and multidisciplinary evaluation is needed for correct diagnosis and treatment.

References:

Learning Points: Emphasise the anaesthesiologist’s role on the early diagnosis in post-operative period of BEF.
**15AP04-03**
Easing discomfants during radiofrequency ablation in patient with Superior Vena Cava syndrome due to lung tumour: case report

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**Background:** Lung tumour could potentially develop superior vena cava syndrome (SVCS) and radiofrequency ablation (RFA) is a minimal invasive therapy option but challenging in dyspnoeic patients with SVCS.1

We demonstrated successful sedoanalgesia in such patient.

**Case Report:** Female, 41-year-old with SVCS due to right lung tumour planned for RFA. She was alert but appeared restless, diaphoretic, tachypnoea, oxygen saturation was 96% with simple mask 8 litres per minute in sitting position. She preferred to lie on the right side or 60 degrees upright. Computed tomography scan showed large mass occupying right hemithorax pressing the heart, trachea lumen, some right main bronchus and SVC.

The procedure was performed in left lateral decubitus position. Sedation initially used dexmedetomidine (dex) 0.4–1 mcg/kg/hour with 10 minutes loading dose of 1 mcg/kg prior, combined with intermittent boluses of ketamine 0.2–0.375 mg/kg and propofol infusion 0.75–1.25 mg/kg/hour. Ventilation was adequate throughout the procedure, without desaturation, however face oedema worsen at the end of procedure due to position, she was sent to the intensive care unit for further monitoring. The following day, she was alert, stable, without complications and planned for stepdown.

**Discussion:** RFA requires patient to remain still without coughing to prevent complications and the electrode from moving, also withstand the heat generated. Our goals were maintaining adequate spontaneous ventilation, analgesia and relative immobility. Dex as single agent sedation had been demonstrated safely in patient with SVC syndrome requiring sedation. In our case, our goal was not achieved initially by using dexmedetomidine alone. The use of multimodal agents may have potential benefits, reducing the requirements of other agents and/or provide analgesia through other pathways. Local anaesthetics infiltration could also decrease anaesthetics requirements with regard to toxicity.1,2

**References:**

**Learning points:** Dex with combination of ketamine and propofol infusion could be considered in providing safe sedoanalgesia for patient with SVC syndrome undergo RFA.

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**15AP04-04**
Our experiences on flow controlled ventilation and high frequency jet ventilation in tracheal resections: no more apnea!

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**Background:** Tracheal resections are require multidisciplinary approach for the safety of the airways(1). Existence of abnormal airway anatomy, the need to share the airway with the surgeon, and keeping the vital parameters stable are very challenging situations during anesthesia. In this case series, we aimed to emphasize our anesthesia management with flow controlled ventilation (FCV) and high frequency jet ventilation (HFJV) in tracheal resections.

**Case Report:** The demographic and clinical characteristics of the patients were detailed in table 1.

<table>
<thead>
<tr>
<th>Case 1</th>
<th>Case 2</th>
<th>Case 3</th>
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<td>Stenosis Grading Scale*</td>
<td>Grade II</td>
<td>Grade II</td>
</tr>
</tbody>
</table>

*Percent of stenosis is defined according to the Myers-Cotton subglottic stenosis grading scale (Myer CM, O'Connor DM, Cotton RT. Proposed grading system for subglottic stenosis based on endotracheal tube sizes. Ann Otol Rhinol Laryngol. 1994 Apr;103:319-323). Grade I, 0-50%; Grade II, 51-70%; Grade III, 71-99%; Grade IV, 100%.

**Table 1.**

After anesthesia induction a Tritube® was inserted. FCV and HFJV were applied as needed during resection and anastomosis (Figure 1).

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**Figure 1.**
There were no periods of intraoperative apnea and no hemodynamic instability. At the end of surgery, all patients were extubated using HFJV.

**Discussion:** For performing tracheal resections, a patient-centered approach and multidisciplinary evaluation of the surgery and airway management are key to success(2). One of the most critical stages of this process is to ensure effective airway management. Techniques such as repeated apnea periods, ‘cross-field’ ventilation, and HFJV are frequently used for this purpose(3). Recently, applications where FCV and HFJV are used together have been tried, albeit on a case-by-case basis. In this case series, Evone® provided adequate oxygenation without causing hypercarbia and hemodynamic instability in all our cases.

**References:**

**Learning points:** We have successfully used FCV and HFJV modes with TriTube®/Evone® (Ventinova®, Eindhoven, Netherlands) to maintain hemodynamic stability and maximize surgical comfort in complex airway surgery.

**15AP04-05**

Laparoscopic surgery in a severe respiratory disease patient - the role of opioid free anesthesia

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**Background:** Laparoscopic surgery is now widely established with its advantages of reduced morbidity with early recovery(1). The pneumoperitoneum leads to significant effects on respiratory physiology. The raised intra-abdominal pressure increases airway resistance and decreases functional residual capacity, causing a reduction in compliance, atelectasis, potential hypoxaemia and hypercarbia(2).

Opioid free anesthesia (OFA) is a technique where no intraoperative opioid is administered. The use of OFA is especially important in obese patients, obstructive sleep apnea (OSA), chronic obstructive pulmonary disease (COPD), because it significantly decreases the opioid side effects, such as respiratory depression(3).

**Case report:** A 73-years-old male patient, ASA IV, was proposed for a laparoscopic radical nephrectomy. Personal history included GOLD E OSA-COPD Overlap Syndrome treated with CPAP and long-term home oxygen supplementation, dyslipidemia, diabetes mellitus and arterial hypertension. Pulmonary function test showed a severe obstruction pulmonary disease with a FEV1 45%.

The case was discussed in a multidisciplinary team with the anesthesiologist, surgeons and the patient. The plan was to perform a laparoscopic surgery and in case of difficult ventilation convert to open surgery.

We performed a combined anesthesia with a thoracic epidural analgesia and general anesthesia. An OFA was achieved with a multimodal analgesia strategy with ropivacaine 0.1% epidural infusion, paracetamol, ketamine, lidocaine and magnesium sulfate.

The patient was ventilated with a lung-protective strategy with a tidal volume 6-8ml/kg; PEEP 5-7cmH2O; adjusted respiratory rate to maintain EtCO2 35-45mmHg. The procedure was uneventful without any respiratory complications.

The patient was extubated at the end of surgery and transferred to the post-anesthetic care unit (PACU) in spontaneous ventilation with controlled pain. He stayed in PACU for 24 hours and 6 days after surgery was discharged home without complications.

**Discussion:** OSA-COPD Overlap Syndrome remains a challenge for the anesthesiologist especially in laparoscopic surgery as there are significant effects on respiratory physiology. OFA is an alternative to standard opioid-based techniques in the management of severe respiratory disease patients.

Epidural analgesia has a role in OFA, decreasing the opioid side effects, such as respiratory depression, nausea and vomiting and pruritus.

**15AP04-06**

Anaesthetic technique in a patient with a large anterior mediastinal mass coming for minimally invasive coronary artery bypass surgery and subsequent trans-cervical and video-assisted thoracoscopic resection of mediastinal mass

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**Background:** The presence of an anterior mediastinal mass poses significant challenges to the anaesthetist in a patient coming for surgery due to the compressive effects that it has on the airway and major vessels. Compression could result in a loss of ventilation as well as significant haemodynamic compromise post-induction.

**Case Report:** The patient had a large anterior mediastinal mass with significant tracheal and oesophageal compression. He presented for minimally invasive direct coronary artery bypass (MID-CAB) surgery followed by resection of the mediastinal mass via transcervical and video-assisted thoracoscopic approach on post-operative day 1. He was induced with propofol and a dexmedetomidine infusion.

After bag mask ventilation was successful, atracurium was given. The patient was intubated with a single lumen endotracheal tube (ETT). A bronchial blocker was then placed under bronchoscopic guidance to achieve lung isolation. An intra-arterial line, central venous catheter, as well as lines standby for extracorporeal membrane oxygenation were placed prior to induction. Lung isolation was achieved, and MIDCAB proceeded uneventfully.

The patient was kept intubated in anticipation for surgery the next day where the ETT was exchanged with a neural integrity monitor electromyogram tube. A bronchial blocker was again placed and surgery was then completed uneventfully.

**Discussion:** Careful assessment of the patient pre-operatively was necessary to plan the anaesthetic technique for surgery. Different techniques for lung isolation were considered taking the mass into consideration, as well as the need to keep the patient
intubated, and facilitate surgical access for surgery the following day. Close communication and coordination between all surgical specialties involved is crucial.

**Learning points:** Presence of a mediastinal mass with significant tracheal compression risks the inability to ventilate the patient post-induction and paralysis. Additionally, compression of the great vessels may cause significant haemodynamic compromise hence careful assessment and planning for cardiopulmonary collapse is prudent. To achieve optimal surgical exposure for both surgeries, lung isolation was required. However, distal tracheal compression by the mass complicates the choice of lung isolation technique. Finally, close coordination amongst the various surgical specialties was required to ensure that the patient is optimised for both surgeries to occur in succession.

**15AP04-09**

**Ventilatory management of tracheobronchial perforation. A case report**

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**Background:** Tracheobronchial perforation is a rare but life-threatening condition often resulting from iatrogenic injuries. The diagnosis relies on fiberoptic bronchoscopy (FOB) and imaging. While specific treatment guidelines are lacking, surgery is commonly the first choice for iatrogenic injuries. Airway and ventilation management pose challenges, with strategies like intermittent apnea or jet ventilation employed. In complex cases, intraoperative extracorporeal therapies (ECLS), such as veno-venous ECMO, may be considered for optimal gas exchange.

**Case Report:** The presented case involves a 49-year-old male experiencing dyspnea and cervical emphysema on the 5th postoperative day following Ivor-Lewis surgery. CT scans revealed emphysema and a defect in the left main bronchus. Surgical intervention, including bronchial plasty with pectoral muscle, was performed. Intraoperatively, left single-lung ventilation with intermittent apnea was used, and the patient was extubated postoperatively.

Persistent air leaks on day +10 led to selective right endotracheal intubation which the patient didn’t tolerate well. Then, initiation of veno-venous ECMO therapy before surgery to place an endobronchial prosthesis was decided.

Throughout the intraoperative period, lung-protective ventilation and ECMO therapy were maintained. A mediastinoscopy through cervicostomy and simultaneous flexible FOB through the endotracheal tube (ETT) were conducted to replace the ETT with a rigid FOB for manual jet ventilation.

The prosthesis was positioned through the FOB, covering the bronchial defect. The patient was then reintubated and transferred to the ICU. 12 days later, the patient succumbed to spontaneous pulmonary artery rupture related to arterio-bronchial fistulization due to the stent.

**Discussion:** Traditional ventilatory strategies in tracheal repair surgeries are generally sufficient. However, ECLS, particularly V-V ECMO, is increasingly favored in managing critically ill patients with potentially reversible acute respiratory failure.

**References:**
Learning Points: The rare incidence of tracheal pathology, together with anesthetic management challenges, necessitates a clear ventilatory strategy. Clinicians should be aware of alternative options, including ECLS, for comprehensive patient care.

15AP04-10
Intraoperative tee during lung transplant: a decisive monitoring tool

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Background: Pulmonary vein thrombosis (PVT) after lung transplantation is a potentially devastating complication. Early detection is essential in decreasing the associated morbidity and mortality.

We present a case of PVT after single lung transplantation detected with intraoperative transesophageal echocardiography (TEE) and successfully managed by surgical thrombectomy.

Case report: A 65-year-old male with end-stage interstitial lung disease proposed for either single or sequential bilateral lung transplantation without the use of cardiopulmonary bypass (CPB). A general anesthesia was performed according to the local protocol.

After first lung reperfusion, a complete TEE exam revealed a 4 cm thrombus originating from the left upper pulmonary vein without respiratory or haemodynamic derangements. According to this finding, the surgical team decided to interrupt the surgery until the arrival of a cardiac surgeon.

Some minutes later, the implanted lung became edematous and oxygen saturation dropped down. This severe desaturation could be managed by resuming bilateral lung ventilation until CPB was initiated. The thrombus was successfully removed and the second lung not implanted due to prolonged ischemia. The patient could be extubated 48 hours later and discharged home without sequelae.

Discussion: Although there is growing evidence that supports the use of TEE as a monitoring tool during lung transplant, specific recommendations about when and how to perform the exam are scarce. A thorough and systematic exam after reperfusion of the first lung became decisive to diagnose a potentially lethal complication.

The diagnosis prevented further manipulation of the atrium which could have eventually caused a fatal embolism and allowed to halt the surgery before removing the second lung, which turned out to be crucial for maintaining oxygenation until initiation of CPB. TEE was also essential to plan the best surgical option to extract the thrombus.

Reference:

Learning points: TEE may play a key role during lung transplant surgery. It can be decisive in detecting complications, guiding treatment, and guaranteeing the success of the procedure. Its use as a standard monitoring tool should be generalized.

15AP04-11
Successful anesthetic management in pediatric high-risk neuroblastoma surgery: a case report emphasizing an unconventional airway approach

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Background: Pediatric anesthesia for neuroblastoma surgery presents unique challenges, especially in high-risk cases with thoracic involvement. This report details a noteworthy approach in a 3-year-old male with stage 4 high-risk multifocal neuroblastosma, focusing on an unconventional airway management strategy for achieving unipulmonary ventilation.

Case Report: The patient underwent curative thoracic neuroblastosma removal via left video-assisted thoracotomy. The patient was submitted to a balanced general anesthesia, using weight-adjusted propofol, fentanyl, and rocuronium for induction.

Using a videolaryngoscope, a UniBlocker bronchial blocker (Ambu A/S, Ballerup, Denmark) (5Fr) was inserted before intubation, a reversal of the typical sequence. This was followed by intubation with a size 5 cuffed endotracheal tube (EOT), with fibroscopy through the EOT confirming UniBlocker positioning afterward.

There were no surgical or anesthetic complications. The patient was admitted to the Pediatric Intensive Care Unit for post-operative care. Discharge was on the third postoperative day, with no additional complications.

Discussion: This case highlights the possibility of UniBlocker placement before intubation to achieve unipulmonary ventilation. In cases where double-lumen tubes are unsuitable due to age constraints, and selective intubation via the endotracheal tube alone is less desirable, using a purpose-built device like the UniBlocker offers an alternative, however, the inability to pass the UniBlocker through the endotracheal tube demands a modified approach, underscoring the need for adaptable strategies in pediatric airway management. This method's success, with safe and effective ventilation management, indicates its potential in similar pediatric surgeries.

References:

Learning Points: The case underscores an innovative approach to managing airway and unipulmonary ventilation in pediatric thoracic surgery. The pre-intubation placement of a UniBlocker, adapted for pediatric use, presents a safe, effective method in complex cases where conventional tools are impractical.

This case contributes to the growing body of knowledge in pediatric anaesthesiology, offering insights into alternative airway management strategies for complex thoracic surgeries in younger patients.
Esophageal rupture in a patient with Beckwith-Wiedemann syndrome and severe scoliosis

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Background: Beckwith-Wiedemann syndrome (BWS) is an overgrowth disorder, caused by genetic or epigenetic alterations on chromosome 11p15.5. We present the first documented case of an adult BWS patient with an esophageal rupture secondary to a failed Nissen fundoplication. The patient had severe scoliosis, which created potential difficulties for airway management. Written authorization for the case report was provided from the patient family.

Case report: A 41-year-old male patient with BWS presented to the Centro Hospitalar Universitário do Algarve Emergency Department with septic shock. Seven days prior, he underwent elective laparoscopic Nissen fundoplication and diaphragmatic hernia repair. He was emergently taken to the operating room after a CT scan revealed an esophageal perforation with a moderate-sized hematobezoar and food debris in the left pleural cavity. Orotracheal intubation and mechanical ventilation was achieved without difficulty. A target-controlled infusion of propofol and remifentanil was used for maintenance of anesthesia. The endotracheal tube was repositioned to achieve left lung isolation using a flexible bronchoscope. Surgery was uneventful. The patient was transferred to the intensive care unit for continuum of care, where he remains as of the writing of this case report.

Discussion: The clinical features of BWS include macroglossia, abdominal wall defects and increased susceptibility to embryonal tumors. The diagnosis and management of BWS are mainly relevant in the pediatric population. BWS cases in adults are poorly documented in the literature, and even less so are the anesthetic implications. As such, we present the first documented case of a emergency esophageal surgery in an adult patient with this syndrome.


Learning points: Anesthetic implications and intraoperative management of a potential difficult airway in a patient with BWS.
17AP01-01
Output current and efficacy during pulsed radiofrequency to lumbar dorsal root ganglion

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Background and Goal of Study: Lumbar radicular pain (LRP) is a challenging clinical problem. Pulsed radiofrequency (PRF) uses short pulses of radiofrequency current and effective in treating various pain disorders. There have been few studies on the effect of PRF and its modifying parameters. The goal of this study is to determine the which intraoperative parameter during PRF to lumbar dorsal root ganglion (DRG) relate with effects in patients with LRP unresponsive to transforaminal epidural steroid injections (TFESI).

Materials and Methods: This study was a prospective, double-blind randomized controlled study. The patients were distributed equally into 2 groups according to preset maximum voltage: (1) high-voltage (60V), (2) standard-voltage (45V). We measured output current, sensory threshold and impedance. Outcomes were:
1. Radicular pain intensity;
2. Physical functioning;
3. Global improvement and satisfaction with treatment; and,
4. Adverse events.

The assessments were performed until the 3-month after procedure.

Results and Discussion: Patients in the standard-voltage group showed significant negative linear relations with analgesic efficacy. The output current is significant related with pain intensity (P = 0.005) and ODI score (P = 0.004) at 3 months in multiple regression analysis. The best cutoff value of output current to lower pain intensity after 3 months was 163.5 mA with 87.5% sensitivity, 100% specificity, and AUC 0.92 (95% CI: 0.76-1.00).

Conclusion(s): We found that lower output currents during PRF to lumbar DRG associated with higher analgesic effects in elderly patients who did not respond to therapeutic TFESI.

17AP01-02
Patient satisfaction in severe chronic low back pain: a comparison between pharmacological treatment, interlaminar epidural steroid injections and combined therapy

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Background and Goal of Study: Chronic low back pain (CLBP) is a major health problem worldwide and requires patient satisfaction with treatment. The purpose of this study is to clarify which method of therapy is more satisfying for patients with CLBP.

Materials and Methods: 219 patients aged 20-87 years (median age 69.7 years, female 56.8%) with CLBP were enrolled to this study. Patients with severe CLBP (numeric rating scale ≥ 7), randomly were divided into 3 groups, those who received pharmacological treatment (n=69), interlaminar epidural steroid injections (n=72) and combined therapy group (n=78). All the patients were prospectively followed-up after 3 and 6 months of therapy. Patients’ satisfaction was measured using EuroQol-5D, Numeric rating scale (NRS) and Oswestry index (OI).

Results and Discussion: Patients’ satisfaction with combined therapy was considerably higher than satisfaction with the other therapy methods (p<0.001). Satisfied patients reported higher physical function, lower pain intensity and higher quality of life score for short and long-term results. (p<0.002).

Interlaminar epidural steroid injection therapy showed good results in patients’ satisfaction for short-term period of treatment (p<0.001). NRS for CLBP correlated significantly with patients’ satisfaction, however no other measures correlated significantly with patients’ satisfaction (p<0.002).

Conclusion(s): The patient experience with CLBP is complex and satisfaction with treatment is dependent on many factors. We have chosen to assess satisfaction with pain therapy using three patient-reported measurements: pain relief, patients’ disability and pain impact on quality of life. Both interlaminar epidural steroid injections and combined therapy have higher patients’ satisfaction than pharmacological treatment for patients suffering CLBP.
Experiences and perspectives of adults on using opioids for pain management in the postoperative period: a scoping review

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Background: Opioids have been the primary choice for postoperative pain management. However, concerns regarding the opioid crisis, addiction and side effects complicate their use. Inadequate perioperative pain control can lead to increased morbidity, persistent opioid use and diminished quality of life. The opioid crisis, particularly in the UK, contributes to high consumption rates and substance use disorders. Limited evidence exists on adults’ postoperative opioid experiences.

Aim: To synthesise evidence on adults’ experiences of postoperative opioid use and investigate their opinions and concerns.

Methods: A scoping review registered with OSF encompassed a structured methodology and comprehensive literature searches across six databases. Eligible studies, in English, included qualitative or mixed methods exploring adults’ opinions or concerns about opioids and/or opioid reduction in the postoperative period. Studies addressing adults’ experiences related to opioid use for postoperative pain control, including satisfaction and aspects of overall quality of life were considered.

Results: Ten studies were included, mostly from Europe and North America, nine qualitative and one mixed methods, shedding light on adults’ experiences with postoperative opioids. Recurring themes included opioid dependence, adverse effects, stigmatization, gender roles, trust and shared decision-making. Analysis using the Theoretical Domains Framework identified key domains that significantly influence individuals’ perceptions and experiences with opioids. Notably, adults exhibited diverse pain management goals.

Conclusion: Perioperative individual, environmental and social factors significantly influence adults’ experiences with postoperative opioids. Participation in pain management decisions impacts adults’ experiences with opioid use, satisfaction, patient-provider relationships and communication. There is a notable research gap, particularly in the European context. A deeper understanding of perioperative opioid experiences empowers healthcare providers and policymakers to enhance patient care and refine postoperative pain management guidelines, particularly in the use of opioids.

Adults’ experiences of perioperative opioid use: a mixed-method study protocol

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Background and Goal of Study: Perioperative opioid use presents challenges due to concerns about side effects, addiction, and misuse. Improving pain management and optimizing opioid use through comprehending patients’ experiences and implementing patient-centred care is crucial to alleviate unnecessary postoperative pain. Limited research in the European context emphasizes the need for comprehensive understanding. Our ongoing study, part of the Pain and Opioid After Surgery (PANDOS) project, investigates adults’ experiences with postoperative opioids, aiming to empower healthcare providers and policymakers to enhance patient care and refine postoperative pain management guidelines.

Materials and Methods: We employ a mixed-methods approach, combining quantitative data from The International Pain Outcome Questionnaire (IPOQ) within 14 days after surgery with qualitative semi-structured interviews up to 3 months post-surgery. Quantitative data will be analysed using descriptive statistics in SPSS, while qualitative data will undergo thematic analysis.

Results: The quantitative phase explores the association between patients’ satisfaction with pain management (opioid) and their involvement in pain treatment decisions within 14 days post-surgery. It also investigates associations between patient preferences for more pain treatment and involvement in decision-making, along with potential risk factors in the PANDOS database. The qualitative phase delves into in-depth patient experiences and opinions about opioid use and shared decision-making in postoperative pain management beyond the initial 3 months.

Conclusion: Our ongoing research within the PANDOS project addresses the critical issue of perioperative opioid use and its impact on patient experiences. Given the associated risks of addiction and side effects, understanding patient experiences and implementing a patient-centred approach is vital for optimizing pain management. Our study, offering valuable insights, is particularly relevant within the Euro-
17AP01-05
Acid-sensing Ion channels 3 promote M1 macrophage polarization of plantar tissue in a chronic inflammatory pain model

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Background and Goal of Study: Our previous studies showed that acid-sensing ion channels 3 (ASIC3) upregulated in the plantar tissues of an acute inflammatory pain model and was associated with pain behaviors. The cytokines derived from infiltrating macrophages are now recognized as important mediators of inflammatory pain. However, it is unknown whether local upregulated ASIC3 is expressed on macrophages and promotes macrophage polarization to regulate inflammatory pain. Therefore, this study aimed to explore the potential mechanism of ASIC3 in chronic inflammatory pain.

Materials and Methods: The chronic inflammatory pain model was induced by intraplantar injection of complete Freund’s adjuvant (CFA) to Asic3+/+ and Asic3−/− rats. Control rats were injected with isopyknic saline. Immunofluorescence and western blot analysis were used to measure the protein levels of CD68, F4/80, and CD86. Flow cytometry was used to analyze the M1 macrophage population (CD11b+/CD68+/CD86+) in the plantar tissues of control and inflammatory groups. In addition, Elisa test was used to measure inflammatory cytokines including IL-1β, IL-6, and TNF-α in the inflamma- tory tissues of these two groups.

Results and Discussion: ASIC3 is abundantly expressed in sensory neurons [1]. We also found up-regulated ASIC3 co-labeled with macrophage markers F4/80 and CD68 in plantar tissues post-CFA injection. The expression of iNOS and CD86 in the hindpaw of Asic3−/− rats was weaker than that of Asic3+/+ rats. Flow cytometry also detected reduced numbers of CD11b+/ CD68+/ CD86+ macrophages at the intraplantar sites of Asic3−/− rats compared with the counterpart of Asic3+/+ rats. M1 macrophages release inflammatory cytokines leading to pain sensitization [2].

The chronic inflammatory pain model was induced by intraplantar injection of complete Freund’s adjuvant (CFA) to Asic3+/+ and Asic3−/− rats. Control rats were injected with isopyknic saline. Immunofluorescence and western blot analysis were used to measure the protein levels of CD68, F4/80, and CD86. Flow cytometry was used to analyze the M1 macrophage population (CD11b+/CD68+/CD86+) in the plantar tissues of control and inflammatory groups. In addition, Elisa test was used to measure inflammatory cytokines including IL-1β, IL-6, and TNF-α in the inflammatory tissues of these two groups.

Conclusion(s): The activation of ASIC3 promotes M1 macrophage polarization leading to inflammatory reactions.

References:

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17AP01-06
Risk factors of postoperative complications and prolonged length of hospital stay after spine surgery

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Background and Goal of Study: Introduced in 2004, the Clavien-Dindo classification for post-operative complications serves as a foundational framework. At our institute, we have integrated this classification and the spine surgery complexity score (SSCS) into our assessment of patients undergoing spine surgery, with the primary goal of pinpointing risk factors associated with postoperative complications.

Materials and Methods: A retrospective examination of electronic medical records for patients who underwent spine surgery at VGHTEP from January 1, 2018, to December 31, 2018, was conducted. The analysis included a total of 780 operations. Patients were stratified into four groups based on their Clavien-Dindo (CD) scores (0, 1, 2, and 3 or more), and risk factors linked to CD scores were scrutinized using ordinal logistic regression analysis.

Results and Discussion: The final analysis encompassed 679 patients, with 66.3% encountering various postoperative complications. Age, surgical time, and blood loss emerged as notable factors linked to an elevated risk of more severe postoperative complications. Moreover, both the number of spinal segments involved and SSCS were identified as significant predictors of heightened complication severity. The study delved into factors associated with postoperative pain intensity and predictors of the length of hospital stay.

Conclusion(s): This study has effectively identified risk factors for complications following spine surgery, providing clinicians with crucial insights to foresee surgical outcomes before the actual procedures take place.

Reference:
**Background and Goal of Study:** Wound infiltration emerges as an attractive analgesic practice aiming to attenuate pain, alleviate complications, and thus fasten the recovery of the involved patients. Our goal was to investigate the effect of wound infiltration using magnesium sulfate, tramadol, or dexmedetomidine - when used as adjuncts to local anesthetic in the context of a multimodal analgesic approach - on analgesics' consumption, and perioperative outcomes after lumbar spine surgery.

**Materials and Methods:** Seventy-two patients undergoing lumbar spine surgery were enrolled in this randomized, double-blind study. A standard anesthesia protocol using remifentanil in TCI mode as the sole intraoperative analgesic regimen and desflurane for maintenance of anesthesia was applied to all patients. Participants were randomly allocated into the following groups according to the solution used for local infiltration before wound closure: 1) group RM received 100mg ropivacaine plus 10mg/kg magnesium, group RT received 100mg ropivacaine plus 2mg/kg tramadol, group RD received 100mg ropivacaine plus 1μg/kg dexmedetomidine, and 4) group R received 100mg ropivacaine. Equal volume solutions were applied. Patients' demographics, surgery duration, anesthesia recovery characteristics, time to first analgesic request postoperatively, cumulative analgesic consumption over 24h (morphine equivalents), adverse events, as well as the quality of recovery before hospital discharge and 1 month later (assessed by QoR-40 scale), were registered.

**Results and Discussion:** Demographics, surgery duration, and recovery profile were comparable between groups. Data on the quality of postoperative analgesia and recovery [mean (SD) are shown in the Table. No notable adverse effects were recorded.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Group RM</th>
<th>Group RT</th>
<th>Group RD</th>
<th>Group R</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time to first rescue analgesia (min)</td>
<td>175 (127)*</td>
<td>267 (176)*</td>
<td>283 (126)*</td>
<td>44 (42)</td>
<td>0.004</td>
</tr>
<tr>
<td>Total analgesic consumption (mg)</td>
<td>8.2 (5.1)*</td>
<td>6.4 (3.8)*</td>
<td>6.5 (4.9)*</td>
<td>14 (8.7)</td>
<td>0.002</td>
</tr>
<tr>
<td>QoR-40 (discharge)</td>
<td>186 (8)*</td>
<td>184 (4)*</td>
<td>189 (7)*</td>
<td>170 (16)</td>
<td>0.000</td>
</tr>
<tr>
<td>QoR-40 (1 mo)</td>
<td>198 (4)</td>
<td>198 (1.3)</td>
<td>198 (1.5)</td>
<td>197 (3.4)</td>
<td>0.366</td>
</tr>
</tbody>
</table>

**Conclusion(s):** Implementing magnesium sulfate, tramadol, or dexmedetomidine as local anesthesia adjuvants enhances analgesic effect after lumbar spine surgery with dexmedetomidine and tramadol showing a relative superiority over magnesium. In turn, this favorable effect is associated with an improved quality of recovery upon hospital discharge.

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**References:**
17AP01-10

Cross-cultural adaptation and psychometric validation of the French Version of the “Defense and Veterans Pain Rating Scale” for acute and chronic pain: a prospective clinical study

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Background and Goal of Study: Pain assessment and proper evaluation of pain is a prerequisite for treatment of acute and chronic pain. There are numerous pain scales used for the assessment and self-reporting of pain. Until now, most evaluations use only a unidimensional scale, although multidimensional pain assessment and especially assessment of functional pain impact on activities is recommended. A new functional pain scale, the “Defence and Veterans Pain Rating Scale (DVPRS)” permits this multidimensional assessment, and adds visual aids and phrases linking pain and impact on activities.

The goal of this study was to create and validate a French translation of the DVPRS, called functional pain scale (figure).

Materials and Methods: Prospective observational study in two large hospitals of the French-speaking region of Switzerland. Patients with acute or chronic pain in different settings received a paper questionnaire with both the NRS and the functional pain scale and a customized evaluation questionnaire. Analysis of correlation with NRS, psychometric properties and patient preferences were planned also for subgroups (acute and chronic pain, patients >75 years).

Results and Discussion: For the whole group of 232 patients and all subgroups, correlation with the NRS was high (ICCs all 0.88). The study showed excellent internal consistency (Cronbach’s alpha 0.89) and a two-factor structure with activities- and emotions-related items. Patients in all subgroups preferred the functional pain scale over NRS and confirmed ease of use. In a subgroup of 30 patients an excellent concordance of patient’s ranking of the phrases with the scale values was shown (Kendall’s W 0.98).

Conclusion(s): The study confirms that the French translation of the DVPRS (= functional pain scale) is a valid measurement instrument for acute and chronic pain evaluation in a wide range of patient groups, easy to use by patients.

References:

17AP01-11

Morphine versus dexmedetomidine and morphine PCA for acute postoperative pain management after laparoscopic colon surgery

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Background and Goal of Study: Despite multimodal analgesia strategies and the use of laparoscopic techniques, it is still a challenge to optimize postoperative pain control after colonic surgery.

Our study investigated the analgesic efficacy and safety of morphine compared to morphine and dexmedetomidine delivered by PCA, during first 24 hours after colon laparoscopic surgery.

Materials and Methods: This prospective randomized double-blind controlled clinical trial enrolled 75 patients (ASA I-III) candidates to laparoscopic colon surgery under balanced general anesthesia. Patients were randomly allocated to two groups. Group D (n=38 patients) received 50µg dexmedetomidine and 20 mg morphine, whereas group M (n=37 patients) was administered 20 mg morphine in normal saline to a total volume of 100 ml, in both situations.

This medication intended for acute postoperative pain during first 24h after surgery was delivered by PCA, as an iv bolus of 1ml on demand, with a lockout of 15 minutes and a background infusion rate of 2ml/h. Severity of pain during resting and movement was assessed at 2, 4, 8, 24h postoperatively using visual analog scale (VAS). We registered the morphine consumption during the study. The incidence of nausea/vomiting, hypotension, bradycardia and patients’ satisfaction were documented, too. Data were analyzed by t-test, chi-square and Fisher test, p values of less than 0.05 being statistically significant.

Results and Discussion: Patients from group D experienced statistically less pain for all time intervals, in both resting and movement (p<0.05), as documented by VAS assessment. Group D also registered significantly lower morphine consumption than group M during first 24h following surgery (p<0.05).
Nausea/vomiting events encountered statistically less frequent in group D versus group M (p<0.05). We detected no between-group differences in incidence of hypotension and bradycardia (p=0.1). Significantly more patients from Group D reported favourable satisfaction scores compared to group M (p<0.05).

Conclusion(s): According to our findings dexmedetomidine as adjuvant to morphine by PCA significantly improved postoperative outcomes reducing pain intensity and morphine consumption, decreasing the incidence of nausea/vomiting, optimizing patient satisfaction. Thus, dexmedetomidine added to morphine by PCA could be considered a promising option for postoperative pain control during first 24h after laparoscopic colon surgery.

17AP02-01

Intravenous high-dose vitamin C reduces postoperative pain and soreness following total knee arthroplasty: a double-blind randomized controlled trial

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Background and Goal of Study: This prospective, double-blinded research investigated Vitamin C as an adjunctive intervention for postoperative pain and soreness in total knee arthroplasty (TKA).

Materials and Methods: In this trial, we examined the impact of preoperative intravenous vitamin C (100 mg/kg) on postoperative pain and soreness in TKA patients. All participants received total intravenous anesthesia with multimodal analgesia, including preoperative ultrasound-guided subsartorial block and iPACK block, as well as postoperative acetaminophen and celecoxib.

Primary outcomes assessed pain and soreness at 15 minutes, 1, 5, 24, and 48 hours postoperatively, while secondary outcomes investigated postoperative nausea and vomiting, opioid consumption, and early functional outcomes.

Results and Discussion:

| Table 1: Demographic and clinical characteristics of 78 TKA patients with and without IV vitamin C. |
|-------------|----------|----------|----------|----------|
| Vitamin C   | N=33     | Control  | N=33     | P        |
| Age, Mean (SD) | 71.0 (5.6) | 69.6 (5.4) | 0.351 |
| Gender      | Male, n (%) | 20 (62.1%) | 8 (25.8%) | 0.046 |
| BMI, Mean (SD) | 27.5 (3.7) | 27.6 (3.7) | 0.793 |
| Charlson comorbidity index | 1.7 (0.7) | 1.7 (0.7) | 0.519 |
| Knee x-ray grade 0-4 | 3.3 (0.7) | 3.4 (0.7) | 0.150 |
| Pre-op. average pain (NRS 0-10) | 3.0 (1.5) | 0.15 (1.4) | 0.365 |
| On movement, mean (SD) | 3.0 (2.0) | 3.4 (2.0) | 0.814 |

Intravenous high-dose vitamin C reduces postoperative pain and soreness. Future studies are required to confirm our findings.

17AP02-02

Evaluation of an ERAS pain management protocol in a tertiary hospital in the Philippines for patients who had undergone sigmoidectomy

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Background and Goal of Study: Enhanced Recovery After Surgery (ERAS) programs are multimodal perioperative care pathways that aim to achieve early recovery after surgical procedures by maintaining preoperative organ function and reducing the profound stress response following surgery. One key element is multimodal and preemptive analgesia with minimal side effects to achieve important ERAS milestones such as early mobilization and oral feeding.

The aim of this study was to evaluate an existing ERAS pain management protocol wherein only oral pain medications were given for pre-emptive analgesia and postoperative pain management with a goal of minimizing opioid use in a tertiary teaching hospital in Metro Manila, Philippines for 64 ERAS-enrolled patients who had undergone either open or laparoscopic sigmoidectomy.

Materials and Methods: A retrospective chart review of ERAS-enrolled patients who had undergone elective open or laparoscopic sigmoid colectomy or sigmoidectomy was done. These patients were identified for inclusion using surgical procedure codes specific for open or laparoscopic sigmoidectomy. Between July 2021 and December 2023, patients who were above 18 years of age and had an American Society Association (ASA) grade of 1 to 3 were included in the study. Patients with an ASA grade of 4 or 5 and are younger than 18 years were excluded from analysis.

Results and Discussion: In this retrospective descriptive study, the primary outcomes evaluated were postoperative pain rating and administration of rescue pain medication. The secondary out-
comes evaluated were length of stay, hours of mobilization and time to first oral feeding. This study found that there is a decreasing trend in numeric pain rating scale from postoperative days 0 to 2 (D0 [M = 3.35; SD = 1.66], D1 [M= 3.05; SD = 1.65], D2 [M = 2.2; SD = 1.52]), the average length of stay was 4 days (M = 4.56; SD = 2.78), the ambulation time on day 0 was 4 hours (M = 4.14; SD 1.76) and time to first oral feeding was 2 days (M = 2.23; SD = 11.5).

Conclusion(s): In an ERAS setting for patients who had undergone sigmoidectomy, the administration of an opioid minimizing oral pain regimen effectively managed post-operative pain. This strategy also shortens length of stay, time to mobilization and oral feeding.

17AP02-03
FCGR3A mediates nerve injury-induced peripheral neuropathic pain in rats
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Background and Goal of Study: The molecular pathway to the development of peripheral neuropathic pain has not been fully understood. FCGR3A, also known as CD16, was found associated with other autoimmune diseases and central neuropathic pain. Transcriptomic profiles of rats with spared nerve injury (SNI)-induced peripheral neuropathic pain showed markedly increased transcription of FCGR3A mRNA. To identify whether FCGR3A mediates the development of nerve injury-induced peripheral neuropathic pain.

Materials and Methods: Adult Sprague-Dawley rats underwent either the spared nerve injury (SNI) surgery or sham surgery. Behavioural profiling using manual von Frey test and thermal plate preference test (TPPT) was performed on the day before surgery as well as post-operative days 5, 7, 14 and 21. The dorsal horn of spinal cord at L4-L6 spinal levels contralateral to the operated side was taken for RT-qPCR, western blot. A temporary genetic knockdown experiment was performed by daily intrathecal injection of dsiRNA targeting FCGR3A gene on post-operative days 7-8, followed by behavioural profiling and animal sacrifice for molecular assays on day 9. Between-group difference was tested by Student’s t-test at a level of significance of 0.05.

Results and Discussion: Compared to the sham group, the SNI group exhibited mechanical and thermal allodynia through post-operative days 7-21 (p < 0.05 for both tests at all time points). This is coherent with previous studies using rodent SNI models. Spinal cord samples collected on day 7 showed increased FCGR3A mRNA transcription and protein expression (p <0.05 for both assays). FCGR3A knockdown resulted in relative relief of mechanical but not thermal allodynia (von Frey test: p < 0.05, TPPT: p > 0.05), thus showing that FCGR3A helps mediate the mechanical allodynia behaviour after spared nerve injury.

Conclusion(s): FCGR3A helps mediate peripheral neuropathic pain behaviours induced by spared nerve injury.

17AP02-04
HSK21542, a new peripherally-restricted kappa opioid receptor agonist in patients with postoperative pain: a phase 3, multicentre, double-blind, randomized controlled trials
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Background and Goal of Study: There is a great unmet need for advanced therapies that provide aggressive, early postoperative pain relief for patients who underwent surgery. Given that peripheral kappa opioid receptor (KOR) agonists may not only provide effective analgesia but also avoid the side effects inherent to traditional centrally opioid receptors agonists. We assessed the efficacy and safety of HSK21542, a peripherally selective KOR agonist, in patients with moderate to severe post-operative pain after abdominal surgery.

Materials and Methods: This is a multicenter, randomized, double-blind, controlled phase 3 study. In the study, patients who undergo elective abdominal laparoscopic surgery under general anaesthesia with expected operation duration of 1-5 hours (including 1 and 5 hours), the American Society of Anesthesiologists (ASA) grade I-II, aged 18-70 years old, body mass index (BMI) 18-40 kg/m² were randomized 1:1 to placebo and HSK21542-1.0μg/kg. The primary efficacy endpoint was summed pain intensity differences (SPID) over 12 and 24h. Secondary endpoints included the consumption of rescue analgesics, and pain intensity differences (PID), as well as proportion of patients with NRS≥3. The efficacy analyses were based on the intent-to-treat population. The safety endpoint was incidence of Treatment-emergent adverse events (TEAEs).

Results and Discussion: SPID0-12h and SPID0-24h in HSK21542-1.0μg/kg group were lower than those in placebo group (-17.26 ±0.917 vs. -11.96 ±0.920, P<0.001; -39.14 ±1.878 vs. -27.41 ±1.885, P<0.001). The proportion of patients who received rescue analgesics within 12h and 24h (29.4% vs. 45.2%, P=0.002 and 33.1% vs. 46.7%, P=0.009). Rescue analgesics use within 12h and 24h after surgery in HSK21542 group was lower (1.68 ±3.446mg vs. 2.51 ±3.809mg, P=0.009 and 2.29 ±4.864 vs. 2.92 ±4.217, P=0.022). The proportion of patients with NRS scores≥3 within 12h and 24h after the first administration of HSK21542 group was higher (49.3% vs. 36.3%, P=0.006 and 48.5% vs. 35.6%, P=0.007). The most common adverse events were nausea and vomiting. The incidence of TEAEs was similar between the HSK21542 and placebo groups (69.1% and 74.1%), respectively. No severe adverse events were reported.

Conclusion(s): Treatment of HSK21542 demonstrated a positive efficacy and safety profile and could be an effective treatment option for patients with moderately to severely postoperative pain after abdominal laparoscopic surgery.
17AP02-05
Effects of paraspinal intramuscular injection of atelocollagen in patients with chronic low back pain: a retrospective observational study
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Background and Goal of Study: Atelocollagen is used for soft tissue repair and reconstruction by replacing defective or damaged muscles, membranes, ligaments and tendons. This study aimed to evaluate the clinical efficacy and safety of additional paraspinal intramuscular injection of atelocollagen on lumbar epidural steroid injection for reducing pain and improving functional capacity of patients with chronic low back pain (CLBP).

Materials and Methods: We retrospectively enrolled 608 consecutive patients with CLBP who received lumbar epidural steroid injection with (Group ATCOL) or without (Group LES) additional paraspinal intramuscular injection of atelocollagen. The Numerical Rating Scale and the Oswestry Disability Index were used to assess pain and functional capacity, respectively, before the procedure, and three months after the injection. Also, we analyzed the relationship between the additional paraspinal intramuscular injection of atelocollagen and the success rate.

Results and Discussion: Both Numerical Rating Scale and the Oswestry Disability Index scores were significantly reduced in both groups at three months after injection. However, there was a significant difference between the two groups. Furthermore, the success rate was significantly higher in the additional paraspinal intramuscular injection of atelocollagen group (31.3%, 15.9%, respectively).

Conclusion(s): This study’s results showed that additional paraspinal intramuscular injection of atelocollagen on lumbar epidural steroid injection reduced pain and improved functional capacity for patients with CLBP. Therefore, the paraspinal intramuscular injection of atelocollagen may be a promising option for the treatment of patient with CLBP.

17AP02-06
The evaluation of burnout levels of healthcare personnel providing palliative care services in a Greek hospital treating patients suffering from cancer
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Background and Goal of Study: The daily exposure of healthcare personnel, providing palliative care services, in this stressful environment intensifies the risk of burnout syndrome (BOS). We assessed the burnout levels and possible predisposing factors, including personality traits of healthcare personnel working in a palliative care unit in a secondary Anti Cancer Hospital.

Materials and Methods: The study was conducted from April to August 2022 at “Theagenio” Hospital in Thessaloniki. An anonymous questionnaire involving physicians and nurses providing palliative care was used. The questionnaire included basic demographics, the validated Maslach Burn Out Inventory (MBI) for the 22-item self-report measurement of burnout and the Eysenck Personality Questionnaire (EPQ) for the assessment of personality traits, evaluating the three main dimensions of personality (neuroticism, psychotism, extraversion), and “dishonesty”. Univariate and multivariate statistical analysis was performed using SPSS 29.0.

Results and Discussion: The questionnaire was filled in by 40 physicians and 40 nurses (response rate 91.3%), mostly females (n=54, 67.5%). A small proportion suffered from BOS (n=5, 6.3%), mostly female nurses (4/5). However, more than 50% of our study sample suffered from “high risk for burnout” (52.5%). There was no statistically significant difference between physicians or nurses and between male and females (p>0.05), respectively. Multivariate logistic analysis revealed that neuroticism was an aggravating factors for “high risk for burnout”.

Variable Pre NRS Post NRS NRS difference † P-value
Group LES 6.69 (1.33) 5.27 (1.77) 1.41 (1.58) <.001
Group ATCOL 6.56 (1.21) 4.49 (1.85) 2.07 (1.68) <.001
† P-value .232 <.001 <.001

Comparison of numerical rating scale and Oswestry disability index scores before and 3 months after injection.
Conclusion(s): Levels of “high risk for burnout” were high (52.5%) in healthcare personnel, working in a palliative care unit in “Theageneio” Anti Cancer Hospital of Thessaloniki. However, the levels of BOS were low (6.3%). Neuroticism was an aggravating factor for “high risk for burnout”.

Analgesic effects of dendropanoxide isolated from dendropanax morbifera in a rat model of diabetic neuropathic pain

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Background and Goal of Study: Diabetic neuropathic pain (DNP), one of the main consequences of diabetes mellitus, is challenging to treat. Dendropanoxide (DPx), a triterpenoid isolated from Dendropanax morbifera, showed protective effects against reactive oxygen species-induced oxidative stress. This study aims to evaluate the analgesic effect of DPx in a rat model of streptozotocin (STZ) induced neuropathic pain.

Materials and Methods: A single intraperitoneal (IP) injection of STZ at 60 mg/kg was injected intraperitoneally in rats to induce diabetes mellitus. Diabetic rats exhibiting neuropathic pain 5 weeks after STZ injection underwent a single IP injection of DPx at various doses (5, 10, and 15 mg/kg) or multiple injections (5 mg/kg twice a day for 4 days). The mechanical thresholds, thermal withdrawal latency, blood glucose level, TRPV1, and Caspase-3 were assessed with behavioral tests, including tactile allodynia and thermal hyperalgesia, western blotting in the lumbar DRG, and spinal cord.

Results and Discussion: Single and multiple injections of DPx reduced mechanical hyperalgesia (Fig. 1). STZ significantly increased the TRPV1 and DPx reversed the expression of TRPV1 in the lumbar DRG. Furthermore, DPx increased the expression of Caspase-3 in the DRG and spinal cord of diabetic rats (Fig 2).

Conclusion(s): DPx alleviated diabetic neuropathic pain by reversing the upregulation of TRPV1 and modulating apoptosis in the DRG and spinal cord.

Fast therapy (Fast-acting subperception therapy) for the treatment of neuropathic pain

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Background: Neuropathic pain is defined as a lesion in the central and/or peripheral sensory nervous system. It affects about 10% of the population and has a great impact on the quality of life of patients. Spinal Cord Stimulation (SCS) has been used for years as a treatment for neuropathic pain and is based on the gate theory. Nowadays, SCS is accepted mainly for the treatment of chronic refractory neuropathic pain, failed back surgery syndrome, complex regional pain syndrome and refractory angina pain. FAST (Fast-acting subperception therapy) is a form of SCS without paresthesia for the treatment of neuropathic pain. The advantages of this new modality are the analgesic effect within minutes after device implantation and the absence of paresthesias for the onset of the analgesic effect.

The main objective of this study is to evaluate the efficacy of FAST therapy in reducing neuropathic pain in patients at our centre at 3 and 6 months after SCS full implant. The efficacy has been evaluated using the Numeric Rating Scale pain scale.

Materials and Methods: A sample of 21 patients with full implant was selected, of which, 16 were included in the statistical analysis. The 5 excluded patients dropped out of the study after full implant. The null hypothesis (pain is not altered by FAST therapy) was contrasted with a statistical significance level of 95%, using Student’s t test or Wilcoxon test. Sample normality was contrasted using the Saphiro-Wilk test.

Results: Results at 3 and 6 months were generally inconclusive. The overall pain score on the NRS scale at 3 months was 3.44 ± 3.05 and at 6 months 4.43 ± 2.79. At 3 months postimplantation the mean overall pain reduction was 4.06 ± 1.4 (p < 0.0001); at 6 months: 3.29 ± 1.83 (p 0.0019). In terms of pain location, a statistically significant relationship was also observed. Pain located in the lower limbs presented a mean pain reduction at 3 months of 5.22 ± 2.45 (p 0.001) and at 6 months 5.1 ± 2.47 (p 0.001). In low back pain at 3 months post-implantation the mean pain reduction was 3.86 ± 2.23 (p 0.005) and at 6 months 2 ± 2.3 (p 0.07).

Conclusion: The results obtained point to the effectivity of the FAST SCS therapy at least during the first 6 months. In lower limbs, a clinically and statistically significant effect is observed that lasts up to 6 months post-implant and in relation to low back pain, a significant effect is observed only in the first 3 months post-implant.
17AP02-10
Differences in pain perception between male and female outdoor athletes

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Background and Goal of Study: Historically, the representation of women in pain studies has grappled with challenges and biases, leading to a restricted understanding of how pain varies across diverse populations. A critical need exists to bridge this gap, especially in athlete-centric pain studies, where biases persist despite substantial strides in other realms of pain research. Our study is a response to this ongoing bias, with the aim of exploring potential differences in pain intensity, threshold, and tolerance between male and female outdoor athletes.

Materials and Methods: We recruited 166 recreational outdoor athletes (41 skyrunners, 73 hikers, and 52 rock climbers). All athletes identified as male (54%) or female (46%). Participants were asked to report the maximum and average pain intensity during their respective sport events using Numeric Rating Scale (NRS) from 0 to 10. Cold Pressor Test (CPT) was used to determine pain threshold and tolerance, and to record pain intensity during the 20 s intervals of the test.

Activity intensity was expressed objectively, as kilometer-effort/hour, and subjectively using NRS. Generalized linear model (GLM) was employed to investigate the relationship between gender and pain outcomes.

Results and Discussion: We found no significant difference in maximum and average pain intensity, and pain threshold between genders in all three groups of athletes. Controlled for activity intensity and duration, gender was not a significant predictor of maximum and average pain intensity during sport event. Compared to males, female rock climbers had significantly lower pain tolerance (p < 0.01) and higher pain scores at 80, 100, 140, 160 and 180s of CPT (p < 0.05 for all). In hikers and skyrunners, pain tolerance and pain intensity at all time points of CPT were similar between genders.

Conclusion(s): Our results suggest similar pain perception in outdoor athletes of both genders with the exception of female rock climbers who had lower pain tolerance.

17AP02-11
The effects of a high-fat diet on a postoperative pain model in rat

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Background and Goal of Study: It is widely recognized that postoperative pain is more severe in obese patients. However, the manner in which obesity enhances and prolongs postoperative pain is not well understood. The objective of this study was to examine the mechanism of how obesity triggers an increase and prolongation of postoperative pain, using behavioral tests and electrophysiological techniques.

Materials and Methods: The rat postoperative pain model was developed based on Brennan’s plantar incision method. Rats were randomly divided into two groups: a high-fat diet group and a control group. The high-fat group was fed a high-fat diet, while the control group was given a standard diet. After surgery, the animals were tested for three pain-related behaviors (spontaneous pain-related behavior, escape threshold to mechanical stimuli, and escape latency to thermal stimuli) as indicators of postoperative pain assessment. Also, in vitro single-fiber recording was undertaken on postoperative day 1 using plantar skin-tibial nerve preparation. The authors recorded from at least 36 mechanosensitive C fibers among the two groups.

Results and Discussion: The behavioral analysis revealed that rats that became obese by consuming a high-fat diet had enhanced and prolonged postoperative pain (21 days v.s. 7 days; control). Electrophysiologically, the action potentials of peripheral nerves in obese rats did not increase compared with the control rats for ongoing activities and mechanical stimuli.

Conclusion(s): In this study, we found that i. Obese due to high-fat diet intake seemed to enhance and prolong postoperative pain based on the increased guarding pain score and decreased threshold for escape behavior to mechanical stimuli, and ii. There were no differences in peripheral nerve excitability among both groups.

These suggest that nociceptive sensitization of primary afferent fibers was not related to obese-enhanced postoperative pain, but central sensitization.

References:
17AP03-01
Implantable anesthetics for sustained non-opioid local pain relief and accelerated recovery after spinal fixation: a first-in-human Phase Ib study

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Background & Goal of Study: There is a troubling lack of effective pain treatments after major surgery. Opioids remain dominant despite their many drawbacks, resulting in worse outcomes and higher costs. Locoregional anesthetics are increasingly employed, but their added value remains limited.

BR-003 is an implantable anesthetic designed for spine fixation surgery. It consists of a ring-shaped biodegradable hydrogel that is easily co-implanted with pedicle screws. Unlike injections, BR-003 stays in place and delivers bupivacaine to the surgical site for three days.

By reducing pain and opioid-related side-effects, BR-003 may help patients leave the hospital sooner and in better shape. Now, it is tested in humans for the first time.

Materials & Methods: Ongoing open-label Phase Ib study on BR-003 safety and pharmacokinetics. Patients are scheduled for posterior degenerative spine fixation in two hospitals. Cohort 1 (n=6) received 4 pedicle screws with 4 BR-003 rings. Three patients underwent minimally invasive surgery (MIS) in one hospital, three underwent open surgery in the other. Cohort 2 is the same but with 6 screws and 6 BR-003 rings.

The primary endpoint is bupivacaine Cmax. Secondary endpoints include pharmacokinetics, safety, and exploratory efficacy up to 6 weeks. Safety monitoring includes AEs, ECGs, X-rays, and blood tests. Efficacy is explored by comparing back pain in rest (AUC-NRS) and opioid use (MMEs) in the first three days to a recent historical cohort in the same hospitals. In MIS cohort 1, pre-emptive analgesia was restricted to assess the early effects of BR-003.

Results & Discussion: So far, 9 of 12 patients were included (cohort 1 & 3 MIS patients in cohort 2). In the first 3 patients, the Cmax was 10x lower than the known toxic threshold. No serious adverse events were attributed to BR-003 so far. After MIS with BR-003, the average AUC-NRS was 1.2 points lower (3.7 vs 4.9) despite restricted pre-emptive analgesia.

After open surgery, the AUC-NRS was 2.2 points lower (0.8 vs 3.0). Total opioid use was 39% lower with BR-003 (MMEs 150 vs 247). Opioid use on days 2 and 3 was low, providing opportunities for earlier discharge.

Conclusion(s): BR-003’s first-in-human study revealed no safety concerns to date. A substantial reduction in pain and opioid use was found compared to a historical cohort. A large randomized controlled trial is needed to substantiate the impact of BR-003 on pain and opioid use after spine fixation surgery.

17AP03-02
Mendelian randomization highlights sleep disturbances mediated the effect of depression on chronic pain

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Background and Goal of Study: Depression and chronic pain are significant contributors to the global burden of disease. Previous research has revealed complex relationships between these two conditions, which may be influenced by sleep quality. However, observational studies have limitations, including confounding factors and reverse causation. This study aims to explore the mediating effects of sleep on the relationship between depression and chronic pain using Mendelian randomization (MR).

Materials and Methods: We conducted a two-step, two-sample Mendelian randomization study using mediation analysis. We obtained MDD GWAS data from Wray et al.’s GWAS meta-analysis. Phenotypic data related to sleep were collected from the UK Biobank. Chronic pain data were obtained from the Finnish database.

Results and Discussion: MR analysis revealed significant genetic associations between MDD and chronic localized pain (OR = 1.26) as well as fibromyalgia (OR = 2.17). Genetic susceptibility for MDD
was also associated with insomnia (OR = 1.10) and self-reported short sleep duration (OR = 1.03). The mediating effects of insomnia and fibromyalgia on the pathway from depression to chronic regional pain were 1.04 and 1.03, respectively, with mediation proportions of 12.8% and 15.2%. Insomnia mediated the pathway between depression and fibromyalgia with an effect of 1.12, accounting for 15.2% of the total effect.

Conclusion(s): This two-step Mendelian randomization analysis strengthens the evidence of genetic predictive associations between depression and chronic pain, highlighting the mediating roles of insomnia and short sleep duration. It further elucidates the specific roles of distinct sleep disorders, differentiating insomnia and short sleep duration from other sleep-related phenotypes.

### 17AP03-04

**The relationship between age and musculoskeletal pain in amateur endurance athletes**

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**Background and Goal of Study:** The connection between age and pain during physical activity is complex. Although adopting suitable exercises and a healthy lifestyle can alleviate age-related pain for many, it's crucial to recognize that physical activity itself, especially in athletes, can contribute to musculoskeletal pain. Our study aimed to examine the relationship between age and acute musculoskeletal pain in amateur endurance athletes.

**Materials and Methods:** We recruited 122 athletes (age 39.5 [35.0 – 46.0] years, 50% female) who were participating in an outdoor endurance event. Athletes were asked to report the maximum and average pain intensity during the sport event and during training using Numeric Rating Scale (NRS) from 0 to 10. Maximum and average pain intensity were aggregated as Pain Composite Score (PCS) for sport event (PCSactivity) and training (PCStraining). Intensity of physical activity was calculated as kilometer-effort/hour.

Participants were also asked to provide a subjective assessment of activity intensity using NRS during sport event and during training. Generalized Linear Models were used to assess the impact of age on pain outcomes controlling for gender, activity intensity and duration.

**Results and Discussion:** Athletes reported PCSactivity 3.0 [1.5 – 5.0] and PCStraining 3.5 [1.5 – 5.5]. Age of the athletes had a negative correlation with PCStraining (Kendal tau-b - 0.146, p < 0.05). However, when controlling for gender, activity intensity and duration, age was not a significant predictor of neither PCSactivity or PCStraining.

**Conclusion(s):** Age is not a significant predictor of the acute musculoskeletal pain intensity in amateur endurance athletes.

### 17AP03-05

**The effect of recreational outdoor activity on pain threshold and tolerance**

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**Background and Goal of Study:** Numerous studies have indicated that pain threshold and tolerance are significantly influenced by exercise. However, the majority of these studies have been conducted in controlled laboratory settings, often involving professional or elite athlete. Consequently, their conclusions may not be easily extrapolated to the general population in real-world conditions.

To address this gap, we studied if physical activity affects pain tolerance in recreational skyrunners and rock climbers.

**Materials and Methods:** We included 39 skyrunners and 47 climbers (age 29 [24-35.75] female 40%). To assess pain threshold and tolerance, we conducted a Cold Pressor Test (CPT) before and after sport activity. The activity intensity was assessed as kilometer-effort/hour as well as subjectively on a scale 0 to 10.

**Results and Discussion:** Skyrunners had significantly lower pain threshold before the activity compared to rock climbers p < 0.01. Physical activity significantly reduced pain threshold in both skyrunners (20 [10-51]s vs 51 [10 – 163], p < 0.01) and rock climbers (10 [8-15]s vs 12 [10 – 163], p < 0.01). The difference in pain threshold was not significantly correlated with objective or subjective activity intensity or duration. Pain tolerance was similar in skyrunners and rock climbers (180 [180 – 180]s for both groups) and did not change with physical activity.

**Conclusion(s):** Recreational skyrunners have higher pain threshold, but similar pain tolerance to rock climbers. Both types of physical activities increased pain threshold independently of activity intensity and duration.
17AP03-08

The impact of combined massage-electroacupuncture versus epidural analgesia on quality of life in patients with chronic low back pain: a randomized controlled trial

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Background and Goal of Study: Chronic Low Back Pain (CLBP) affects health and Quality of Life (QoL) of people suffering from it. A prospective study was conducted to evaluate the efficacy of combined Massage-Electroacupuncture (MA) versus Epidural Analgesia (EP) on QoL in patients with CLBP.

Materials and Methods: At the outpatient Pain Clinic of the University Hospital of Larissa, after approval of the Ethical Committee, between September 2019 - September 2021, two groups of patients were randomly allocated after signed informed consent. MA group underwent 8 therapeutic sessions, while EP received 3 epidural injections. QoL was one of the endpoints of the study and assessed based on the 36-item Short Form (SF-36) survey, at first visit, immediately after the completion of the therapy, at 6 months and 1 year later.

Statistical analyses were performed using the statistical package IBM SPSS 26. The corrected significance threshold of 0.008 was used. Within-group improvements were also assessed using repeated measures ANCOVAs, however, according to an even stricter cut-off for significance: α= 0.001.

General Lineal Models (GLMs, repeated measures ANCOVAs) adjusted for age and gender were applied to test for potential differences in the effectiveness of the two interventions.

Results and Discussion: A total of 109 patients (58.7% female), 49.97 years ±9.90, were recruited: 55 and 54 in MA and EP group respectively. Both groups documented significant improvements on QoL on completion of therapy, with MA group showing the more favorable result in the subscale of General Health of the SF-36 questionnaire, compared to EP (p< .001).

Furthermore, the superiority of MA to EP in the subscales of Pain (p<.001), General Health (p< .001), Physical Functioning (p<.001), Emotional Role (p<.001) and Physical Role (p<.001) that was observed at completion of the therapy lasted up to 1 year.

Conclusion(s): MA constitutes a non-invasive approach that seems to be more effective than EP in improving QoL parameters in individuals with CLBP.

17AP03-09

AMAZONE acute online cognitive behavioral therapy reduces postoperative pain after breast cancer surgery: results of an interim analysis

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Background and Goal of Study: After breast cancer surgery 60% of the patients suffer from severe pain in the acute postoperative phase. Intense postoperative pain, treatment related factors and psychological distress (PD) increase the risk for persistent pain after breast cancer treatment (PPBCT). Psychological interventions targeting PD reduce postoperative pain and analgesic use.

AMAZONE acute examines the impact of online perioperative cognitive behavioral therapy (eCBT) on postoperative pain intensity and opioid use in patients with high preoperative psychological distress (PD).

Materials and Methods: Women undergoing primary unilateral breast cancer surgery with high PD were randomized to eCBT or a sham intervention (EDU), patients with low PD receive treatment as usual (TAU).

Endpoints are acute postoperative pain intensity, time to opioid cessation (POC) and prevalence of pain and PD after two months. AMAZONE acute is embedded in the AMAZONE trial. Data from a scheduled interim analysis are presented.

Results and Discussion: Until May 2023, 188 patients have been included. Interim analyses included 30 eCBT, 26 EDU and 95 TAU patients at two months, 37 were excluded or lost. The majority of patients had low stage breast cancer and underwent breast conserving surgery. PD was determined by anxiety (eCBT 82% / EDU 89%) surgical fear (eCBT 48% / EDU44%) or pain catastrophizing (eCBT 33% / EDU 22%). The pain-intensity after surgery was lower in eCBT and TAU (Figure 1).

Time to POC was 0.5 days in eCBT and TAU and 1.3 days in EDU. At 2 months PD was lower in eCBT compared to EDU (fig. 2).

Figure 1. Mean postoperative pain intensity.
17AP03-10  
Comparing postoperative analgesic effects of patient-controlled analgesia morphine in combination with dexmedetomidine  

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Background and Goal of Study: Patient-controlled analgesia (PCA) morphine with dexmedetomidine as an adjunct has been used to reduce opioid consumption and provide better pain relief. In most other studies, the dose of dexmedetomidine as an adjunct ranged from 2 mcg/ml to 5 mcg/ml. The objective of our study was to observe the effectiveness in pain relief between two low concentration of dexmedetomidine (2 mcg/ml versus 1 mcg/ml) as an adjunct to PCA morphine 1 mg/ml.  

Materials and Methods: This was a prospective randomised study of patients prescribed with PCA morphine 1 mg/ml with dexmedetomidine as adjunct at 1 mcg/ml (Group D1) compared to 2 mcg/ml (Group D2), who underwent elective or emergency laparotomy.  

A total of 68 patients were recruited in this study. Patients were followed up 6, 12, and 24 hours postoperatively to look at total PCA consumption and pain scores using visual analogue scale (VAS). Side effects such as sedation, nausea, vomiting, hypotension (MAP < 65), and bradycardia (HR < 60) were monitored as well.  

Results and Discussion: There were no significant difference in the total PCA consumption between both combination of dexmedetomidine dose, but pain scores were significantly better in the dexmedetomidine 2 mcg/ml combination at 6 and 12 hours at rest and 24 hours postoperative during movement compared to dexmedetomidine 1 mcg/ml combination (Table 1). There were no significant differences in incidence and severity of nausea, vomiting, sedation, hypotension and bradycardia.  

Conclusion(s): PCA morphine-dexmedetomidine 2 mcg/ml confers significantly better pain scores compared to morphine-dexmedetomidine 1 mcg/ml and both were equally comparable in terms of total PCA consumption, sedation and side effects.  

References:  
dominal bloating (57.8%), a sensation of fullness (24.1%) or occurred during urination (24.1%). Visceral pain was perceived as more severe compared to somatic pain (Figure 1) and correlated with strongest perceived pain (r=0.62; p<0.001). Preoperative expected pain matched with perceived somatic pain, but not with visceral pain. Also, higher visceral pain intensity, but not somatic pain was associated with side effects such as drowsiness, nausea and dizziness.

Taken together, patients undergoing C-section experience severe pain and associated complaints. Even after surgery, visceral pain was perceived as more intense than somatic pain, was greater than expected and was associated with various side effects along the gut-brain axis.

**Figure 1.** Pain intensity after cesarean delivery divided into somatic (pain in the area of wound/scar) and visceral pain (pain deep in the abdomen); Visual Analog Scale (VAS 0-100; 0=no pain, 100=strongest pain imaginable), Box plots (min. to max.), paired t-test.

**Conclusion:** The visceral component of pain appears to be particularly prominent after C-section and has hardly been considered after surgery on visceral structures. To improve understanding of pain after surgery and to enable targeted interventions, visceral postoperative pain should be further investigated and routinely assessed.

**17AP03-12**

CCL5, adiponectin and resistin modulate pain to persist in patients after fracture-related surgery

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**Background and Goal of Study:** Bone surgery often leads to chronic postoperative pain (CPP). Despite the multifactorial etiology of CPP, this high incidence reveals specific underlying mechanisms possibly attributable to bone involvement. Although there is evidence for an inflammatory response in CPP, studies investigating these processes are lacking, especially after trauma and surgery. Consequently, we analyzed various cytokines as potential biomarkers in patients with and without CPP after fracture-related surgery.

**Materials and Methods:** All patients (n=30) included in this analysis were obtained from the CHRONPOST study. Blood was taken on the first day (D1), at week six and one year (Y1) after surgery. Serum protein concentrations of cytokines were analyzed using Multiplex Assays (Luminex Technology, 22 cytokines).

For analysis and comparison of cytokines over time, a mixed effect model with repeated measures was applied.

**Results and Discussion:** Out of multiple cytokine analysis the cytokine profiles of patients with (n=12) and without (n=18) CPP diverged for CC-Chemokin-Ligand-5 (CCL5), Adiponectin and Resistin (Fig. 1). Levels of CCL5 were higher in patients with CPP, particularly at D1 (Fig. 1A).

For Adiponectin and Resistin comparable profiles were observed. All patients showed an increase of Adiponectin over time (Fig. 1B). CPP patients had higher Adiponectin at Y1 than patients without CPP (Fig. 1B). For Resistin, a main effect was observed over time, an overall group difference and a group*time interaction (Fig. 1C).

This is the first study to follow serum cytokines in patients who developed CPP after fracture-related surgery. Elevated CCL5 levels immediately after surgery may trigger CPP and predict its development, while Adiponectin and Resistin rather contribute to its long-term progression.

As osteoblasts express these cytokines, CPP after fracture-related surgery possibly relates to inflammatory processes caused by bone involvement.

**Conclusion:** Our cytokine analysis revealed CCL5, Adiponectin and Resistin as novel circulating biomarkers for CPP after fracture-related surgery, opening new pathways for translational and interdisciplinary research.

**17AP04-01**

Management of electrical burns with a focus on hyperalgesia

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**Background:** Electrical burns can cause serious and potentially fatal injuries, and have unique characteristics, so individualized management is essential. The management has many challenges such as increased need for fluids, high chances (up to 46%) of arrhythmias, possible myocardial damage and myoglobinuria with renal injury, after this it is important to point out the challenges in the management of these patients hyperalgesia.
**Case Report:** We present the case of a 53-year-old patient who was admitted to the burn unit with electrical burns over approximately 35% of his body surface. The electrical current entered the right upper limb, while the exit point was the left flank. The patient underwent several procedures, in which multimodal anaesthesia was chosen, which included peripheral nerve blocks and the use of ketamine, magnesium sulfate, lidocaine and sevoflurane. During the tenth day of treatment, the patient developed hyperalgesia, which was managed with continuous infusion of dexmedetomidine and ketamine, non-steroidal anti-inflammatory drugs and pregabalin in staggered doses of up to 600 mg per day, in addition to therapeutic planning for the next approaches. The outcome was favorable with resolution of the condition in the subsequent months and patient discharge.

**Discussion:** Electrical burns present several pain management challenges. Hyperalgesia is a common complication and can be difficult to treat. The use of multimodal anesthesia, which peripheral nerve blocks, epidural analgesia, and systemic analgesics, can help relieve acute pain and reduce postoperative hyperalgesia. In addition, the use of tricyclic antidepressants can be effective treatment for hyperalgesia. The possibility of opioid-induced hyperalgesia must be elucidated and its mitigation involves the use of methadone, multimodal therapy and psychological follow-up.

**References:**

**Learning Points:** Challenge in postoperative pain: Impacts the planning and choice of anesthetic technique, as well as postoperative management.

**Goal in analgesia:** Ensure patient comfort and quality of life while avoiding the risks of excessive opioid use.

**Multimodal anesthetic therapy:** A safe and effective alternative to ensure analgesia and comfort.

**Satisfactory results:** Appropriate choice of drug combinations: Intervals and doses for greater efficacy and safety.

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**17AP04-03**

**Leakage of implantable pulse generator battery discovered during spinal cord stimulator removal after long-term use: a case report**

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**Background:** The causes of complications and failure of spinal cord stimulator (SCS) include migration, breakage, disconnection of the lead, fibrosis, effluence of cerebrospinal fluid, and infection-induced meningitis.

Here, we report an unusual case of leakage of implantable pulse generator (IPG) batteries during SCS removal.

**Case Report:** A 76-year-old woman diagnosed with complex regional pain syndrome type 1 underwent SCS implantation 13 years ago to treat her arm pain. The SCS was equipped with an Octrode electrode lead at C5–C6 cervical vertebrae level and the IPG was placed on the right hip through an extension catheter. She visited the hospital for SCS removal as it was nonfunctional. The patient underwent surgery for the removal of the implanted spinal cord stimulator.

Upon incision at the IPG pocket site, a clear milky pus-like liquid discharge was observed. An abscess was suspected, and total drainage was attempted after widening the incision. However, white corroded areas were observed around the IPG after the completion of the drainage.

Following the removal of the IPG, the granulation tissue in the pocket was thoroughly removed, and the wound site was irrigated with normal saline containing antibiotics because we were concerned about wound infection and healing. The patient was discharged two days after surgery.

On suture removal two weeks later, we observed that the suture site was clean. The pathological and histological results confirmed chronic inflammation.

**Discussion:** Although battery leakage from the IPG had occurred, the patient had no symptoms because the granulation tissue had prevented the absorption of the leaked products from the battery into the systemic circulation. Absorption of lithium from a corroded battery into the blood in concentrations exceeding 1.5 mEq/L could cause loss of appetite, nausea, vomiting, diarhoea, abdominal pain, headache, and muscle weakness and tremors.

**References:**

**Learning points:** Therefore, we recommend replacing the IPG after 9–10 years or as the product manufacturer recommends. Furthermore, it should not be left for a long time if the patient has developed resistance to it. SCS removal is considered a safe way to prevent unintended complications during its long-term placement.

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**17AP04-04**

**Management of refractory pain in a patient with calciphylaxis: a case report from the Hospital das Clínicas, University of São Paulo, Brazil**


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**Background:** Calciphylaxis is a rare and devastating disease that most commonly affects patients undergoing dialysis. It is characterized by painful and nonhealing skin lesions caused by cutaneous arteriolar calcification leading to tissue ischemia, what causes a extremely high morbi-mortality and a six-month survival of 50%. However, there is no evidence to guide pain management and improve quality of life. In this report, we present a case of a patient who had difficult-to-control pain and died 6 months after diagnosis.

**Case Report:** G.P.S., 51-year-old man of chronic lower limb pain secondary to ulcer lesions with calciphylaxis diagnosed by biopsy. Past records were positive for heart failure, terminal CKD and atrial fibrillation. He was admitted to the intern medicine ward and the pain team was called.
Methadone doses were adjusted and associated with dipyrrone, gabapentin and duloxetine at maximum doses. Besides that, the patient still had severe pain. An epidural catheter was inserted for the administration of ropivacaine and fentanyl under a Patient Controlled Administration (PCA) regime. However, the results were unsatisfactory.

Then, the saphenous and popliteal nerves were blocked meanwhile IV PCA with methadone was initiated, but it showed poor outcomes. When trying IV PCA with Fentanyl, he evolved with worsened pain, suggesting opioid-induced hyperalgesia.

At the end, a continuous infusion of Ketamine was prescribed and better results were found on the next 10 days. After this period, the patient's clinical condition deteriorated and he eventually passed.

**Discussion:** Pain control in calciphylaxis poses challenges. Fentanyl caused hyperalgesia, limiting its use. Methadone, epidural analgesia, nerve blocks offered transient relief. Ketamine infusion showed satisfactory results. Multimodal and Multidisciplinary approach in early stages is crucial to provide quality of life.

**References:**

**Learning points:**
- Calciphylaxis pain management is often demanding and calls for a multidisciplinary approach.
- Opioid-induced hyperalgesia should be rapidly recognised and not mistaken with worsening of pain.
- Multimodal analgesia, when possible, lessen side effects and provide satisfactory pain control.

**17AP04-05**
**Anesthetic care for Ilizarov surgery: validating lidocaine infusion and multimodal analgesia as an alternative strategy**

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**Background:** The anesthetic approach for Ilizarov external fixator surgery typically involves combining general anesthesia along with peripheral nerve block or neuraxial techniques (1). However, there is an estimated 2% risk of experiencing postoperative compartment syndrome following this procedure (2). As a result, certain surgical teams might prefer to refrain from using regional anesthesia due to worries about masking the symptoms of compartment syndrome.

**Case Report:** A 54-year-old male (70kg,169cm), ASA II, with diabetes and chronic osteomyelitis, was scheduled for an Ilizarov external fixator surgery. Following standard ASA monitoring, the anesthesia induction consisted of 150μg of fentanyl, 70mg of lidocaine, 160mg of Propofol, and 50mg of rocuronium. The surgery lasted for 3 hours, and intraoperative analgesia comprised an infusion of lidocaine (1.5mg/kg/h), a bolus of 20mg of ketamine, 1g of paracetamol, 2g of magnesium sulfate, and 30mg of ketorolac. The patient maintained stable hemodynamics throughout the entire procedure, and upon discharge from the post-anesthesia care unit, reported no pain.

A regimen of fixed 1g paracetamol, 30mg of ketorolac, and 100mg of tramadol, all every 8 hours for 3 days was prescribed. During his hospital stay, he indicated a maximum pain level of 3/10 on the numeric pain scale, and no additional rescue analgesia was needed.

**Discussion:** Limited literature exists regarding the anesthetic approach for Ilizarov surgery. This case demonstrates the advantageous outcomes achieved by employing a lidocaine infusion alongside a multimodal analgesic approach during this surgery. Such a strategy could be a reliable intraoperative antinociceptive strategy when regional anesthesia is not an option.

**References:**

**Learning Points:** The combination of lidocaine infusion with a multimodal analgesic approach appears to be a valid choice for Ilizarov surgery.

**17AP04-06**
**Use of intrathecal morphine for postoperative analgesia in a patient undergoing thoracic microdiscectomy**

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**Background:** Intrathecal morphine can be useful for postoperative analgesia in patients undergoing thoracotomy.

**Case Report:** A 32-year old male (70kg) with no previous medical history (only reported current use of cannabis and other substances) was admitted for left thoracotomy and thoracic microdiscectomy due to the presence of a herniated disk between T9 and T10. The patient presented with paresis of both legs. Baseline vital signs were SpO2 99%, HR 55/min and NIBP 120/70mmHg. Multimodal, preemptive anaesthesia plan was induced and included dexamethasone 8mg, MgSO4 infusion of 2.5gr (in 100 mL N/S solution) and parecoxib 40mg. Anaesthesia was induced with 100μg fentanyl, 200 mg propofol and 70mg rocuronium and the patient was intubated with 39fr DLT. Anaesthesia maintenance included desflurane 4% to 6% and O2 / air. Intraoperative analgesia was maintained via continuous pump infusion of lidocaine at a rate of 1mg/kg/h and esmolol infusion. Additionally oxycodone 10mg, clonidine 75μg and paracetamol 1gr at the beginning and 1gr at the end of the operation (9½ hours later) were given. Intraoperative monitoring included ECG, SpO2, EtCO2, BIS, core body temperature and invasive arterial blood pressure. A central venous catheter was also introduced. Vital signs intraoperatively were stable. Due to resection of 2 ribs increased postoperative pain was expected so at the end of the operation 500μg morphine (approx. 8μg/kg) were given intrathecally. A PCA pump with 1mg/ml morphine was induced, along with
17AP04-07
Delayed onset of herpes zoster-associated aseptic meningitis in an immunocompetent patient with acute zoster reaction of C3 dermatome

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Background: Herpes zoster (HZ)-associated aseptic meningitis (AM) is uncommon, but when it occurs, it requires hospitalization and a long period of treatment. In HZ patients, skin rash with cranio-cervical distribution and male gender were associated with a higher risk of AM.

Case Report: A 62-year-old male patient presented to the pain clinic with 3 weeks of uncontrolled neck pain and a rash over the right C3 dermatome. His pain was 9-10 on a visual analogue scale (VAS). Cervical epidural block and epidural catheterization for continuous epidural analgesia were performed to treat his pain, but the pain was not controlled. On the third day of hospitalization, the neck pain decreased to VAS 3-4 after the intravenous administration of patient-controlled analgesia mixed with fentanyl. On the 6th day of hospitalization, the patient suddenly developed a fever of 38.3°C and complained of mild headache and neck stiffness. As a result of spinal tap, the cerebrospinal fluid pressure was 24 cmH2O, 0 red blood cells, 12 white blood cells (lymphocytes 90%), protein 42.4 mg/dl, and glucose 53 mg/dl. There were no abnormal findings in CSF culture and HZ polymerase chain reaction. After receiving IV Acyclovir 500 mg for 5 days, all symptoms of AM disappeared.

Discussion: Intrathecal use of morphine proved to be an effective measure for postoperative pain management in a patient undergoing combined thoracotomy by thoracic surgeons and thoracic microdiscectomy by neurosurgeons.

Reference:

Learning points: Patients undergoing thoracic microdiscectomy through thoracotomy can benefit by the use of intrathecal morphine regarding postoperative pain management.

17AP05-01
No pain no gain? Anesthetic management of a patient with congenital insensitivity to pain

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Background: Congenital Insensitivity to Pain with Anhidrosis (CIPA) is a rare disease caused by mutations in the NTRK1 gene. Its main symptoms consist of the absence of pain perception, accompanied by anhidrosis, heat intolerance, and intellectual disability.

Although patients with CIPA have innate analgesia, it has been reported that they also present tactile hyperesthesia and abnormal autonomic functions and thus, require perioperative anesthetic management (1,2).

Case Report: We present a case of a 20 year old woman with CIPA who underwent a lumbar spinal arthrodesis surgery under general anesthesia using an opioid free anesthesia (OFA) protocol. The patient was monitored on a regular basis plus invasive arterial pressure, temperature and bispectral index. After pre-oxygenation, the induction was performed with ketamine 20 mg, lidocaine 60 mg, propofol 200 mg and rocuronium 1.5mg/kg/h and magnesium sulfate 3g. Both intubation, surgery and symptoms of AM in patients with HZ infection with risk factors.

Discussion: Neurological complications of VZV infection, such as AM, can be difficult to diagnose, and treatment may be delayed, especially in the case of cranio-cervical dermatological manifestations of HZ. This case demonstrates that HZ-associated AM can occur as late as 28 days after skin rash in an immunocompetent patient. The anatomical distance between cranio-cervical skin lesions and the cranial nerves or brain suggests that viral invasion of the meninges can easily occur. In addition, postherpetic neuralgic pain in this area may have masked AM symptoms and delayed the diagnosis of AM.

Reference:

Learning points: Closer observation is needed to detect signs and symptoms of AM in patients with HZ infection with risk factors.

Learning Points: Although CIPA patients have innate analgesia, we believe that perioperative management using an OFA protocol would help controlling autonomic reflexes that may occur during the intubation and surgical intervention, reducing possible complications.

17AP05-02
A consideration of cases with High Flow Nasal Cannula (HFNC) therapy beneficial for end-of-life patients

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Background: High-Flow Nasal Cannula (HFNC) therapy is non-invasively delivers heated, humidified air and oxygen through nasal cannulas.[1] Although American Society of Clinical Oncology (ASCO) guidelines for patients experiencing respiratory distress with SpO2 levels of 90% or below[2] recommends to use HFNC for end-of-life care, there are few reports on its effectiveness. Patients experiencing respiratory failure often require management with devices such as an oxygen reservoir mask (reservoir), which can negatively impact their quality of life (QOL). We report eight cases of terminal-stage patients treated with HFNC.

Case Report: After obtaining approval from the Ethics Committee of Kawasaki Municipal Ida Hospital, we retrospectively examined electronic medical records. Informed consent was obtained from patients, and consent was obtained from their family for the patients who cannot sign. From 2020 to 2021, we retrospectively studied on eight patients aged 30 to 80 years who were treated with HFNC in our palliative care ward. We examined SpO2 levels, oxygen delivery amounts, respiratory rates, HFNC parameters (flow rate, FiO2), and the duration of HFNC. The M-Borg scale was employed to assess respiratory distress for each patient, and the Integrated Distress Activity Score (IDAS) served as an indicator for Quality of Life (QOL). The median duration of HFNC use was 9.5 days. Six cases were able to have conversations with family members, good oral intake and maintain oral care. The M-Borg scale showed a decreasing trend and IDAS score remained stable or increased in seven cases. Among these patients who underwent HFNC, two patients exhibited delirium, and another showed impaired consciousness, with neither experiencing an improvement in QOL.

Discussion: With the introduction of HFNC, the median SpO2 increased from 90% to 94.5%, resulting in alleviation of patients’ respiratory distress and enabling conversations with family and oral intake. While HFNC is considered effective for patients with terminal respiratory failure, careful consideration is necessary for the applicability, in cases with agitation, delirium, or in patients with a decreased level of consciousness.

References:
1. Respiratory care 2016; 61: 529-41
2. Clin Oncol. 2021 Apr 20;39(12):1389-1411
3. Prog Palliat Care 2018; 26; 129-36

Learning Points: The use of HFNC demonstrated an improved quality of life as it eliminates the need for wearing a reservoir.

17AP05-03
Dropped Head syndrome after bilateral cervical radiofrequency ablation. A case report

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Background: Denervation of cervical facet joints by radiofrequency (RFA) is a minimally invasive treatment for chronic cervical facet pain. It is a technique not without complications, the most common being paraesthesia and transient increase in pain. Serious complications include vascular or nerve injuries, infections, and burns. Dropped head syndrome (DHS) is the weakness of the paraspinal muscles of the neck, causing a chin-on-chest deformity where the head falls forward while standing, resulting in significant limitation. We present a case of DHS as a complication of bilateral cervical RFT.

Case Report: A 86 yo male with nociceptive cervical pain underwent bilateral medial branch RFA at another center. In 24 hours, he developed neck extensor muscle weakness, a contracture with limited cervical extension and pain due to cervico-dorsal myofascial syndrome from trapezius and levator scapulae contracture. A year later, he came to our clinic with posterior cervical pain radiating to occipital and retro-orbital regions, hinting at greater occipital nerve involvement.

MRI a week post-procedure showed no acute complications; electromyography at 6 weeks showed signs of axonal loss in paraspinal and proximal shoulder muscles. After ruling out other causes, we diagnosed DHS due to bilateral cervical RFA. Conservative treatment with rehabilitation and physiotherapy was recommended.

Discussion: DHS is a rare but serious complication of bilateral cervical RFT. There are few reported cases, RFA denervates 20% of local musculature and is discouraged bilateral/multilevel RFA in a single procedure. It is crucial to conduct a diagnostic block prior to RFA to identify facet pain origin and avoid subjecting the patient to unnecessary procedures. Initial management is conservative, with rehabilitation being the cornerstone of the treatment.

Physical examination: bilateral trapezius muscle hypertrophy and inability to perform cervical extension.
If it significantly impacts quality of life, surgical approach with posterior cervical fixation may be considered.

Learning points: DHS is a severe complication and should not be taken lightly. Bilateral/multilevel RFA should not be performed simultaneously to prevent this complication. Perform a diagnostic block prior to RFA.

17AP05-04
Dexmedetomidine in palliative sedation

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Background: Palliative care presents a critical component of complete medical care. Palliative sedation has been considered as a medical intervention to ease the suffering of patients experiencing uncontrollable symptoms, such as pain, delirium, or near-death anxiety, associated with advanced diseases. We present the use of dexmedetomidine as a drug of choice for palliative sedation that has successfully improved patient’s symptoms without the need for additional application of other commonly used drugs.

Case Report: A 35-year-old woman with a metastatic adrenocortical carcinoma expressed a wish to end her life due to unbearable psychosocial suffering. Despite multiple interventions, including high doses of benzodiazepines and psychiatric support, her psychological distress persisted. After the patient’s and her family approval had been obtained, a multidisciplinary team, consisting of palliative medicine, anesthesiology and psychiatry specialists started a temporary palliative sedation using monotherapy with midazolam. As midazolam turned out to be ineffective, an intravenous infusion of dexmedetomidine was introduced. We managed to achieve a mild sedation (RASS -2). The patient was able to occasionally wake up, and due to significant improvement of her psychosocial symptoms, she decided to discontinue sedation and was transferred home. We prescribed a subcutaneous elastomeric pump, containing low, non-sedative doses of dexmedetomidine. The patient died peacefully at her home.

Discussion: Due to its safety and the reported benefits described in the available literature, dexmedetomidine might be regarded as an efficient drug in palliative sedation, although it has not been included in Slovene guidelines (1). Moreover, we have shown that a continuous sedation until death is not necessary since our patient peacefully died at home having been treated with a low maintenance dose of dexmedetomidine. Palliative sedation requires a careful planning, open communication, and a holistic, multidisciplinary approach.

Reference:

Learning Points: Our case report presents the use of dexmedetomidine for palliative sedation, with subsequent withdrawal thereof due to improvement of the patient’s symptoms.

17AP05-05
Thoracic schwannoma as a cause of abdominal discomfort and back pain

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Background: Spinal tumors can be cause of abdominal pain [1,2]. If undiagnosed abdominal pain presents, we call attention to occasions of spinal tumors.

Case Report: A 47-year-old female patient with a 5-month history of back pain and abdominal discomfort without leg weakness was referred to pain clinic. Outside CT and MRI of LS (lumbosacral) spine were normal. She could ambulate but could not stand upright while walking. The DTR of knee/ankle were normal bilaterally. Lumbar epidural block was not helpful, so painkillers were prescribed for a week, and when she came back, her pain became aggravated. Extensive work-ups were normal, but CT of TL spine revealed spinal cord tumor at T10 (Fig. 1).

The CT was only for checking urinary abnormality under the impression of urinary stone. Emergency MRI of TL spine demonstrated extramedullary intradural schwannoma (1.3 x 0.9 x 1.4 cm, Fig. 2), and the patient underwent urgent laminectomy for tumor removal under SSEP monitoring. Postoperatively, the patient improved significantly.

Fig. 2

Discussion: There was negligence in relating the patient’s pain to specific spinal lesions while outside CT and MRI of LS spine were already normal. The tumor was found incidentally on the abdominal CT of TL spine for urinary tract. The T10 dermatome corresponds to the umbilical region and this reasonably explain a mechanism by which a lower thoracic schwannoma, compressing spinal cord, may present as abdominal pain or discomfort.
**Reference:**


**Learning Points:** Spinal cord tumors had to be considered as a possible cause of the patient's back pain and abdominal discomfort.

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**17AP05-06**

**Intrathecal Ziconotide for the treatment of refractory chronic pain in pelvic osteosarcoma**

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**Background:** Oncologic pain typically has a mixed mechanism of production, with the occurrence of pure neuropathic, visceral, or somatic pain being uncommon. In the case of oncology patients with refractory pain, continuous intrathecal Ziconotide infusion is one of its main indications.

**Case report:** A 75-year-old woman referred to the Chronic Pain Unit of our hospital with mixed chronic pain, predominantly neuropathic in the L1-L2 region.

She underwent surgery for a chondrosarcoma of the left pelvis in 1987, 2007 and 2012. Currently receiving adjuvant radiotherapy and chemotherapy, as it is considered palliative treatment for an inoperable recurrent tumor.

Upon examination, there is continuous pain radiating from the left hip to the foot, characterized by neuropathic features. The initial Visual Analog Scale (VAS) score was 8/10.

After confirming a limited response to first and second-line analgesics. Initial trial dose with 2 micrograms of intrathecal Ziconotide, resulting in a significant improvement in symptoms.

Two months later, a definitive intrathecal Ziconotide infusion pump was implanted with 200 mcg of Ziconotide and an infusion rate of 0.8 mcg/day.

One week later, the patient returned with partial improvement in pain, prompting a gradual dose increase over the next 5 months until achieving optimal analgesic control with no side effects at an infusion dose of 2.1 mcg/day, maintaining a VAS score of 1-2/10.

**Discussion:** The mechanism of action of Ziconotide is based on the antagonism of voltage-dependent N-type calcium channels.

Its primary use is intrathecal in patients with refractory oncologic pain to other analgesic measures due to its ability to inhibit the release of neurotransmitters responsible for nociception in the posterior spinal horn.\(^2\)

Initiating treatment at low doses helps prevent the occurrence of undesirable effects such as confusion, drowsiness, or mood alterations typical of this drug.

**References:**


**Learning points:** While the intrathecal use of Ziconotide is known for managing refractory oncologic pain, there is limited literature on its use in patients with malignant neoplasms in the proximal femur.\(^2\)

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**17AP05-07**

**Sphenopalatinal ganglion blockade in postdural puncture headache: experience from self-application**

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**Background:** One of the complications in patients after lumbar puncture (LP) is postdural puncture headache (PDPH). The gold standard treatment is the application of an epidural blood patch, an invasive procedure with potential risks and complications. Sphenopalatine ganglion blockade (SPGB) is a relatively non-invasive procedure that is still used as a treatment modality for various types of headaches and may also play an important role in the treatment of PDPH. In this case, the patient was the anesthesiologist applying SPGB herself.

**Case Report:** A 35-year-old female patient developed symptoms of PDPH (postural pain of VAS=8, neck stiffness, vertigo, nausea) 24 hours after the LP. SPGB was performed 48 hours after LP, in a supine position by topical application of cotton swabs soaked with 0.5 + 0.5 mL of 10% lidocaine, inserted into both nostrils and left in situ for 15 min. Subsequently, the patient reported maximal pain VAS=2 for 20 hours, choosing the brief horizontal position at 4-hour intervals for neck stiffness without the need for further analgotherapy. SPGB had to be repeated after 24 hours for VAS=7, with permanent effect of VAS=0.

**Discussion:** Known indications for SPGB are migraine, cluster headache and trigeminal neuralgia. The ganglion can be accessed in different ways; the least invasive is transnasal; by topical application of various types of local anesthetics was described, as well as depot steroids, phenol, and alcohol; and the mechanical stimulation of local anaesthetic via cotton swabs, spray or drops. The use of various types of local anesthetics was described, as well as depot steroids, phenol, and alcohol; and the mechanical stimulation of the ganglion may also play the role in blockade. Effect of the blockade is due to the interruption of trigeminal-autonomic reflex. To the best of our knowledge, this is the only case report of an anesthesiologist's own experience with SPGB in PDPH.

**References:**


**Learning Points:** Blockade of the sphenopalatine ganglion by transnasal approach represents a simple, rapid and minimally invasive method of effective analgesia for post dural puncture headache, that may reduce the need for epidural blood patch application.
New anesthetic challenges in vascular surgery: a clinical case

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Background: Venous stenting is recognized as a possible treatment to help assist patients with symptomatic ilio caval venous obstruction as an alternative to traditional surgery. Iliocaval venous obstruction contributes to the morbidity of chronic venous insufficiency and chronic venous hypertension. In our center we performed a new and innovative surgical technique in the country, using specific stents for venous vessels. And therefore also a challenge for the anesthetic team.

Case report: We present 2 cases of angioplasty with venous stent placement. The first one was performed in a 38 years old woman with vena cava thrombosis after pregnancy, with the venous stent being placed in the inferior vena cava. The other case was in a 25 years old woman, with iliofemoral deep vein thrombosis. The first case was performed under sedation due to the patient's need for cooperation during surgery and the second case under general anesthesia. The biggest anesthetic challenge was controlling a low back pain immediately after stent placement in the first case and postoperatively in the second one. In both cases, multimodal intravenous analgesia was performed with ketorolac, paracetamol and the use of remifentanil infusion. Despite high doses of remifentanil and the use of other opioids and the introduction of ketamine infusion, the pain remained even postoperatively.

Discussion: Surgical complications were soon ruled out. More recently, Snow et al (2023) [1] describe that venous stent placement typically causes low back pain for a variable duration. Regional analgesia could not be considered due to anticoagulation. Despite our efforts and various analgesic approaches, both patients maintained mild pain.

Reference:

Learning points: An effective analgesic technique without causing unwanted effects is sometimes difficult and challenging, especially if we cannot resort to regional analgesia. With the growth of medicine and the emergence of new surgical techniques, more reports are important for the effective creation of anesthetic and analgesic protocols for these cases.
Patient Safety

18AP01-01
Unveiling transformations in employee feedback two years after the debut of eGENA in anesthesia emergency care at a pioneer clinic

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Background: Since introduction of the “Digital Cognitive Aid for Anesthesia to Support Intraoperative Crisis Management” (eGENA) by the German Society for Anesthesiology and Intensive Care Medicine (DGAI) and the Association of German Anesthesiologists (BDA in August 2020, there has been limited data on the implementation and attitudes of staff regarding its practical application.

This study aims to outline the initial expectations of the app’s usage and highlight differences in its routine application.

Methods: 35 questionnaires from anesthesia staff of a pilot hospital, all trained in part A, B, and C implementation workshops, were collected and analyzed. Participants responded to evaluation questions using a 5-point Likert scale. Using an anonymized five-digit code, individual responses were tracked over time. Significant changes were collectively examined using paired t-tests for dependent samples (p < 0.05).

Results and Discussion: The initial positive responses in the first evaluation showed diminished trends after a median of 20 months. Evaluators have been using content for self-study significantly less frequently (1.69 vs. 2.29, p=0.006) as planned, and the staff expressed less agreement with the enhancement of treatment quality through eGENA compared to the first survey (2.06 vs. 2.68, p=0.002). Respondents showed more agreement in the assessment of joint emergency therapy by physicians and anesthesia nursing staff (1.35 vs. 1.91, p<0.001).

When asked about self-assessed confidence in emergency therapy on a scale of 0 to 10, significantly higher values are noted at the second survey time point (except for C-emergencies) in all categories (Anesthesiological emergency 5.53 vs. 6.15, p=0.03). Respondents were significantly more frequently involved in emergency therapy at the second survey time point (1 to 6; 3.39 vs. 3.73, p=0.03).

eGENA cannot be held causally responsible for the improved sense of security and more frequent emergency management over the 20 months observation period, considering the personal development of physicians and nursing staff in this time.

Conclusions: The initial optimism regarding the everyday use of eGENA has waned over time. While confidence and participation in emergency situations have significantly increased during the observation period, these changes cannot be causally attributed to eGENA. Further studies with larger sample sizes are necessary to validate the observed effects.

18AP01-03
Comparison of the plasma concentration of bupivacaine during LAST under the general anesthesia based on sevoflurane or propofol: experimental study

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Background: Bupivacaine was synthesized in 1957. Despite the advantages, the consequences of improper use or overdose can be severe. Bupivacaine has the most cardiotoxicity among all local anesthetics. Even when injected properly, large doses of bupivacaine may result in toxic plasma concentrations. One of such settings coincides with possibly the most valuable application of bupivacaine – regional analgesia for limb trauma, particularly when related to combat injuries that require evacuation and surgical revisions. Such patients often require multiple injections per day, commonly supplemented by sedation or general anesthesia.

This study aims to compare propofol and sevoflurane in regards to their margin of safety when combined with potentially toxic plasma concentrations of bupivacaine.

Methods: 2-group randomized experimental study. 10 domestic rabbits (Oryctolagus cuniculus domesticus) were divided into 2 groups depending on the type of GA: the group of propofol and sevoflurane. I.m. sedation were delivered initially. After the tracheal intubation, MV was initiated. In the 1group, a propofol 1% was initiated at the rate of 1.8 mg/kg/min. In the 2, 4.0% sevoflurane was delivered. An i.v. bupivacaine 0.25% at the rate of 1.0 mg/kg/min was initiated. Samples were obtained initially, when ECG changes were observed, and in moment of asystole.

The analysis of bupivacaine in rabbit plasma was carried out using liquid chromatography–tandem mass spectrometry on Shimadzu LCMS-8050 according to the method developed at NMU.

Results: Mean serum bupivacaine hydrochloride concentration was lower for propofol group at the moment of appearance of first ECG changes (2.542 mcg/ml ± 1.415, 95% CI [0.785 – 4.299] vs 6.997 mcg/ml ± 2.197, 95% CI [4.27 – 9.725]) and asystole (110.7 mcg/ml ± 22.22, 95% CI [49.02 – 172.4] vs 226.6 mcg/ml ± 98.61, 95% CI [104.1 – 349]).

Conclusion: At similar infusion rates, cardiotoxic action detected earlier when propofol is used as anesthetic agent compared with sevoflurane as it develops at lower plasma drug concentrations. Cardiac arrest occurs later and at higher plasma concentrations during sevoflurane anesthesia. So it may be a safer agent during combined anesthesia.

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eGENA's impact on emergency therapy: evaluating treatment quality through randomized In-House simulations at a pioneering eGENA Clinic

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Background: Since introduction of the “Digital Cognitive Aid for Anesthesia to Support Intraoperative Crisis Management” (eGENA) by the German Society for Anesthesiology and Intensive Care Medicine (DGAI) and the Association of German Anesthetists (BDA) in August 2020, limited data exists on the impact of its application on treatment quality. This study aims to evaluate effects on treatment quality through the use of eGENA support compared to its absence in standardized In-House simulation scenarios.

Methods: The analysis involved 18 training sessions distributed among 9 groups, each comprising 4 trainees. The randomization process determined the order of the 2 scenarios (Pulmonary Embolism and Anaphylaxis), the application of eGENA within each scenario, and the assignment to the training groups. Participants included 24 physicians (7 attendings, 17 residents) and 12 nurses (3 ATA, 6 specialized nurses, 3 general nurses). Scenarios were standardized for consistent case progression. Treatment evaluation utilized a predefined 20-point checklist, with 10 pts. for CPR-related and 10 pts. for case-related measures. Statistical significance was assessed through paired t-tests for dependent samples, significance level was set at p<0.05.

Results and Discussion: Scenarios demonstrated comparable case complexity (14.9 vs. 16.3 points out of 20, n.s.). Physicians used eGENA seven times, while nursing staff used it twice via tablet application. eGENA use resulted in higher case-related scores (7.6 vs. 5.6 out of 10, p=0.03) and a higher total score (16.9 vs. 14.3 out of 20, p=0.02). CPR-related points did not show significant differences (9.3 vs. 8.8 out of 10, p=0.1). Implementation of algorithm-based resuscitation measures was not temporally affected by eGENA use. Notably, an increased frequency of team discussions on differential diagnoses and also extended therapeutic and diagnostic measures (e.g. position optimization, consideration of contraindications, bronchospasmyolysis, specific medication) was observed with eGENA.

Conclusions: eGENA use did not lead to improvements in resuscitation measures and CPR was not delayed. With eGENA support, better case-related outcomes were observed (higher frequency of extended diagnostics and therapy implementation) in challenging emergency scenarios. This positively contributed to the overall enhancement of treatment quality. To validate these findings further, additional studies with larger sample sizes are recommended.

Effect of choice of inhaled versus intravenous anesthetics on postoperative outcomes in non-small cell carcinoma resection: a target emulation trial using large Japanese real-world data

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Background and Goal of Study: The impact of intravenous anesthesia (TIVA) and inhalation anesthesia (IA) on patient outcomes has not yet been adequately studied. We attempted to evaluate the impact of IA and TIVA on hard outcomes for Non-small cell lung cancer (NSCLC) using a target emulation trial method that mimics an RCT, using a large nationwide Japanese medical practice database.

Materials and Methods: The database of Medical Data Vision Co., Ltd. was used in this study. This database consists of two data sources, hospital claims, and health insurance association claims, with records on more than 450 hospitals and 40 million patients in Japan. This database is one of the largest in Japan and is frequently used for epidemiological studies as real-world evidence. Patients in this study were diagnosed with NSCLC between April 1, 2008 and December 31, 2022 and underwent resection. Patients were divided into TIVA and IA groups and were analyzed using the Cox proportional hazards model and Kaplan-Meier curve (log-rank test) after 1:1 high-dimensional propensity score (hdPS) matching using the patient characteristics, Surgical procedure, comorbidity, cancer stage, smoking index and others. Outcomes were defined as a composite of outcomes including death, rehospitalization, reoperation, and serious postoperative complications within 30 days after surgery.

Results and Discussion: The total eligible population was 54,472 (IA, N = 38,341, TIVA, N = 16,131). 1,678 (IA, N = 839, TIVA, N = 839) after hdPS matching were included in the analysis. The Kaplan-Meier curves for both group are shown in Figure 1.
The results of the Cox proportional hazards model revealed a significantly lower risk of occurrence of the composite outcome in the IA group Hazard Ratio [HR] 0.74 (95% confidence interval 0.57 to 0.94).

Conclusion(s): We used a large Japanese real-world dataset to evaluate the impact of TIVA and IA for NSCLC on patient outcomes. Results showed that IA significantly reduced composite outcomes, including death, rehospitalization, reoperation, and serious postoperative complications.

18AP01-06
Mental models of anesthesiologists and surgeons in the operating room – a qualitative study

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Background and Goal of Study: Patient safety hinges on effective teamwork. Enhanced communication between anesthesiologist and surgeon fosters a fulfilling relational experience. Understanding each other’s roles is crucial for the operating room (OR) team. Mental models facilitate the comprehension of complex situations and systems, representing internalized knowledge about theories, principles, and procedures. Bridging gaps between individual mental models promotes global teamwork, patient safety, and professional well-being.

Our study aimed to provide a comprehensive summary of anesthesiologists and surgeons mental models and raise awareness about their similarities and differences.

Materials and Methods: We used a qualitative method to examine mental models and interaction between the anesthesiologists and surgeons. Data analysis was performed separately by two researchers (one anesthesiologist, one surgeon), using a thematic analysis and comparative method to identify a list of main themes and assess differences and similarities.

Results and Discussion: We conducted 17 semi-structured interviews (9 anesthesiologists and 8 surgeons). Both surgeons and anesthesiologists recognize the importance of dialogue, trust, and expertise to best collaborate in the patient’s interest. Differences emphasize performance, approach to resident training, and the perception of OR hierarchy. Identifying specific mental models characteristics allowed us to delineate three main relational stressors: time spent with patient, conflicts on hierarchy fueled by personality differences and performance over safety priorities.

Conclusion(s): The study identified specific mental models employed by each specialty. Shared characteristics of surgeons and anesthesiologists’ specific mental models clearly catalyze a positive relational dynamic. Awareness of contrasting characteristics is important as it may allow fine-tuned, targeted relational tuning.

18AP01-07
Self-evaluation of patient safety practices in perioperative care: SAFEST project

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Background and goal of the study: Patient safety is a cornerstone in perioperative care and there is a need to identify improvement areas in a comprehensive way. This study aims to assess the adherence to a set of multidisciplinary evidence-based patient-focused standardised practices (SSiD) for patient safety along the perioperative continuum of care in a sample of ten hospitals from five European countries.

Methods: A multicentre, multi-country, cross-sectional observational study using a guided self-evaluation process was conducted in ten hospitals from Spain, Portugal, Estonia, Czech Republic, and The Netherlands. The self-evaluation consisted in an online survey including a set of 104 SSiD translated into 154 measurable elements (ME) which evaluate 12 areas: Blood Management, Intraoperative and Common Complication Prevention, Communication, Continuity of Care, Equipment, Infection Prevention, Medication Safety, Preoperative Evaluation, Patient Information and Safety and Quality Management. The SAFEST research team guided the process. Training materials and a platform were developed to report the scoring and the requested supporting evidence. Descriptive statistics including frequency, mean and standard deviation were used to summarise the compliance level.

Results: The participating hospitals assessed their compliance level to the SSiD and MEs. The most frequently high scored area was Blood Management (6 hospitals), whereas the lowest scored area was preoperative evaluation (5 hospitals). The SSiD with the lowest scores were related to the optimisation of patients in the preoperative care including managing preoperative risk factors, depression screening in old patients, protocols for patients with complex cardiovascular diseases, obesity, diabetes, frail patients, patients with higher surgical risk or with additional requirements.

Conclusions: Findings offer several opportunities for improvement, and they are a good starting point for hospital teams to intervene with measures to promote patient safety. Although these results are not generalisable to Europe, common areas are a good insight for decision to establish priorities. Additionally, this instrument and tools developed will offer an opportunity to other hospitals to explore their own areas of improvement.

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Keywords: patient safety, quality improvement, perioperative care, quality standards, self-evaluation
Propofol dosing errors in pediatric surgical patients due to multi-drug infusion and intravenous connecting setups: a systematic review

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Background and Goal of Study: When multiple IV anesthetics are given for pediatric patients under total intravenous anesthesia, it’s common to connect several extension lines carrying drugs at varying flow rates due to limited intravenous access. The study aims to examine potential causes of dosing errors of propofol arising from multiple intravenous connecting tubings.

Materials and Methods: A search of the databases PubMed and Ovid MEDLINE was conducted in June 2023 using relevant search terms. After reviewing titles, abstracts, and full-length articles, 11 related articles were reviewed.

Results and Discussion: Literature has highlighted safety concerns regarding dead space, extension tubing material, and variations in infusion pump settings, which can result in unexpected delivery speeds and serious dosing errors. Tubing disconnection and drug reflux should also be avoided. However, anesthesiologists may not be sufficiently aware of these issues. Dead volume in the system accumulates drug mass potentially available for inadvertent bolus if a clinician initiates upstream bolus or increases flow rates. This could cause adverse effects, especially in infants. Using a separate line for bolus medications and for fluid replacement, can prevent inadvertent dosing errors.

Figure 1 depicts a simulated scenario illustrating potential lethal errors due to inappropriate tubing connections. For pediatric patients, it is notably unsuitable to connect multiple drugs without carrier fluid and utilizing tubing with a significant dead space. During maintenance, the infusion rate stands at 7.1mg/kg/hr, resulting in a rate of 49mg/hr or 0.816mg/min for a 7-kg child. Considering 1ml of 1% propofol equals 10mg, only 0.08ml of the drug is infused per minute.

An extended dead space of 8.4ml translates to a 105-minute delay in reflecting the true infusion rate. A bolus administered from the port could flush in a lethal dose of propofol that has accumulated within the dead space.

Conclusion(s): Continuous education for the safety of pediatric patients under TIVA is crucial. Using low dead space tubing and sufficient carrier fluid prevents drug retention and dosing error.

Implementation of a standardized anaesthesia trolley in a third-level hospital

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Background and Goal of Study: Medication errors are among the most common incidents inside the operating theatre, causing significant morbidity and mortality. A substantial portion of the medication used by anaesthesiologists within the theatre are classified as high-risk medication.

The goal of the survey was to evaluate the impact of the implementation of a standardized model of anaesthesia trolley in every area where anaesthetic procedures are performed in our hospital. Anaesthesia trolleys contain all medication necessary to conduct an anaesthetic procedure.

Materials and Methods: We formed a multidisciplinary task force for the design and implementation of the new trolleys. A SWOT analysis was conducted to get an overview of the process. A thorough bibliographic research as well as an assessment of local necessities and benchmarking were performed.

The task force designed jointly with the manufacturer a personalised model of trolley pursuing to improve patient safety as the main objective. Draws were structured according to Lean methodology and six sigma principles and taking into account ergonomics. Medication was organised considering its pharmacological group and frequency of use.

Additionally, a distinctive yellow colour was chosen for easy recognition and icons were designed to help identify drawer contents.

Two years after implementation, a survey was conducted among the operating room staff to assess the effectiveness on prevention of medical errors.

Results and Discussion: 104 persons answered the survey; 39% medical staff, 27% medical residents, 30% nurses, and 4% nurse assistants. 47% considered that previous non-standardised trolleys implied a serious concern for patient safety and it may contribute to delayed response to crisis situations. 76% of the staff were unsatisfied with the previous organisation.

After the implementation of the standardised models, nearly 92% of the staff consider that it has contributed to a better patient safety atmosphere and a better response to emergencies. 97% of respondents considered the measure as extremely necessary and 68% say it has improved the daily tasks.
Conclusion(s): A standardised model of anaesthesia trolley is a key part of drug errors prevention, and a pivotal component of patient safety in every area where anaesthesia procedures are performed.

Reference:

18AP01-12 Simulation training efficacy for acquisition of competence in management of perioperative emergencies and critical incidents by anesthesiology residents

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Background and Goal of Study: The simulation method is actively used in healthcare to replace or reinforce real experience with the patient, preventing risks to their life and health. The purpose of this study was to determine the simulation training efficacy for competency acquisition in the management of perioperative emergencies and critical incidents by resident anesthesiologists in comparison with traditional lecture-based teaching techniques.

Materials and Methods: A prospective randomized controlled trial was conducted at the Department of Surgery, Anesthesiology and Intensive Care of the Bogomolets National Medical University (Kyiv, Ukraine) within the period from May 2022 to August 2023. Second-year residents of the specialty “Anesthesiology and Intensive care” were randomly distributed into 2 groups: the control group (C) and the research group (R) in a ratio of 1:1. Simulations were performed using the Laerdal SimMom Advanced Patient Simulator, remotely controlled patient monitor and a Löwenstein Leon anesthesia workstation. Residents in the control group completed a standard 2-day course. Residents in the study group were trained at a 2-day simulation training, during which they worked through 10 scenarios with structured debriefing and analysis following each scenario.

Results and Discussion: The study included 60 residents who agreed to participate. Before the training, groups C and R did not significantly differ in their self-assessment scores in perioperative emergency and critical incident management skills (p > 0.05). After passing the 2-day simulation training, group R had significantly better results in passing the post-test (p < 0.00001), and a significantly lower number of critical errors during the final simulation scenario (OR 0.19 [95% CI 0.05-0.78], p = 0.03) compared to group C.

Simulation training significantly improved the scores in the sections of pre-procedural planning (p = 0.012), clinical decisions (p = 0.001), clinical thinking (p = 0.03), resource management and work organization (p = 0.00001), professionalism (p = 0.028), and emergency work (p = 0.00001).

Conclusion(s): In this study, simulation training was significantly more effective for acquiring competencies in the management of perioperative emergencies and critical incidents by resident anesthesiologists when compared to the traditional lecture-based training.

18AP02-01 The importance of applying a “management algorithm for complications” to improve communication between team members for patient safety: a case report

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Background: Scalp block is a method aimed at reducing morbidity, employed to attenuate hemodynamic response, incisional pain across various indications particularly during craniotomy procedures. The present case aims to highlight an unnecessary radiologic examination as a result of an inadequate communication between team members.

Case Report: A 48-year-old female patient with no comorbidities was scheduled for intracranial meningioma excision. After induction of general anesthesia, a total of 75 mg 0.5% bupivacaine was applied to appropriate anatomical points for scalp block. After an uneventful post anesthesia recovery, her neurologic examination revealed no abnormal finding. However, after transfer to the ICU, she was diagnosed with right peripheral facial nerve paralysis.

Subsequent radiologic imaging (CT and MRI) revealed no additional intracranial pathology. The anesthesia team members were informed after all these interventions. The anesthesiologists highly suspected from auriculotemporal nerve paralysis as a complication of scalp block.

Notably, the patient’s complaints completely resolved eight hours after the block application.

Discussion: Complications linked to scalp block include facial paralysis may ensue due to nerve involvement, contingent upon factors drug concentration, volume, and application depth. McNicholas et al.’s patient series reported a 8.6% incidence of facial nerve paralysis following auriculotemporal nerve block. Typically, the effects of the administered drugs dissipate within 24 hours(f).

The lack of communication between surgeons and anesthesiologists regarding the scalp block complications may result in unnecessary patient imaging, distress among the patient’s relatives, and decrease manpower among healthcare professionals. Therefore, it is imperative to use management algorithm for complications after surgery to decrease inaccurate decisions.

Reference:

Learning Points: Sharing procedural steps and potential complications between team members is imperative. Beyond standard patient safety documentation, it’s advisable to create personalized protocols which are specific to procedures and outlining steps to manage complications. These protocols should be incorporated into patient’s file enhancing overall patient safety.
18AP02-02
Tacrolimus interaction with radio-contrast media hypersensitivity pneumonitis confounded as anaphylaxis in a post Liver Transplant Intensive care Patient- A case report

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Background: Immediate hypersensitivity reactions following injection of radio-contrast media (RCM) iohexol, occur soon after use. Tacrolimus after organ transplant for immunosuppression aids successful outcomes. Tacrolimus has a narrow therapeutic index, and levels can be altered by administration either CYP3A or P-glycoprotein inhibitors.

Case Report: 52-year-old female Presented to A&E with right cheek swelling 24 hours following application of cream. Developed worsening cellulitis, tachycardia and bilateral crackles. Worsening breathlessness, wheeze and desaturation followed by hypoxic respiratory arrest. Resuscitated as an anaphylactic reaction to the RCM in ICU. IV antibiotics, Fluid resuscitation, hydrocortisone, chlorphenamine and adrenaline. Intubation for airway support, IV magnesium , nebulised Salbutamol for bronchodilatation.

Pt had Background of liver transplantation 2021, asthma and nebulised Salbutamol for bronchodilatation. Intubation for airway support, IV magnesium , nebulised Salbutamol for bronchodilatation.

Discussion: Hypoxia was considered due to a hypersensitivity from RCM due sudden onset. High Levels of tacrolimus were co-incidental as IgE levels after the event were normal excluding an IgE mediated allergic reaction. Therefore, interaction between high levels of tacrolimus and RCM caused respiratory changes. Iodinated RCM are known to be P-glycoprotein inhibitors.

References:

Learning Points: 1. Tacrolimus needs monitoring prior to RCM use.
2. Interactions of Tacrolimus should be considered in Differential Diagnosis.

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18AP02-03
Acute pulmonary edema following the use of topical phenylephrine during Adenotonsillectomy

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Background: Unlike in the inpatient hospital ward setting, perioperative medication administration often bypasses standard safety checks, such as electronic physician prescription with decision support or pharmacy approval. Furthermore, the high-stress, time-sensitive nature of operating room care may lead to both higher rates of medication errors.

Case Report: A 6-year-old boy diagnosed with obstructive sleep apnoea was proposed for an Adenotonsillectomy. Anesthesia was induced with propofol, fentanyl and rocuronium without complications. During tonsillectomy surgical bleeding was significant, hence the surgeon asked for topical phenylephrine to help control the hemorrhage. Phenylephrine nasal drops was not available.

When searching for the medication, phenylephrine for ophthalmic drops was found and given to the surgeon with the same intent. During tonsillectomy surgical bleeding was significant, hence the surgeon asked for topical phenylephrine to help control the hemorrhage. Phenylephrine nasal drops was not available.

Discussion: In this case it was found that phenylephrine was given in a wrong medication/syringe.

Learning Points: As the operating room is often a high-stress and fastpaced environment, there are many variables during surgery that can result in errors. In this case, phenylephrine was given in a much higher concentration. Effective team communication and bar code systems (alerting for drug concentration) reduce the chances of administering the wrong medication/syringe.
**18AP02-04**

**EBUS on spontaneous ventilation with Visionmask Laryngeal Mask®**

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**Background:** Sedation reduces anxiety, agitation, and pain in endoscopic procedures, increasing the safety of the test and the patient's tolerance, and providing greater peace of mind for both the patient and the medical team. In those patients in whom it is contraindicated, the alternative is to perform general anaesthesia, intubation, and mechanical ventilation, requiring endotracheal tubes of adequate diameter for the fibrobronchoscope with a suction channel to be used. Airway management, in both cases, confronts the anaesthesiologist with an additional problem: having to share it with the rest of the medical team.

**Case Report:** We present the case of a 63-year-old male patient who was scheduled for Endo Bronchial Ultra Sound (EBUS) for a biopsy of mediastinal adenopathies. A flexible bronchoscope with an ultrasound transducer was introduced through the ventilation channel, with the patient maintaining spontaneous breathing through a T-connection. Technique was performed without incident, maintaining safe control of the airway without intubation of the patient.

**Discussion:** Complications of sedation during bronchoscopy include respiratory depression with desaturation and haemodynamic compromise. Laryngeal mask (LMA) allows airway control without the need for tracheal intubation. New video-assisted supraglottic airway devices (SAD) visionmask® allow spontaneous ventilation with CPAP, allowing right upper lateral access and free outflow of gases.

**References:**

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**18AP02-05**

**Motor Evoked Potential (MEP) monitoring was useful in removing a central venous catheter erroneously inserted into the epidural space: a case report**

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**Background:** When a central venous catheter (CVC) is inserted incorrectly, especially in the internal jugular vein, there are various risks associated with its removal. In this case, motor evoked potential (MEP) monitoring was useful during removal of a catheter that had been inserted into the spinal canal.

**Case Report:** An 80-year-old woman (152 cm, 54 kg) had a CVC inserted under echo guidance into the left internal jugular vein before thoracic aortic aneurysm stent-graft surgery. The catheter was inserted and secured without discomfort, and was used by another anaesthetist after confirming reverse bleeding from the catheter.

An x-ray later revealed that the catheter was malpositioned, and a CT scan revealed that the catheter had penetrated the left internal jugular vein and left vertebral artery, and had strayed into the epidural space. In a multi-disciplinary discussion to address bleeding due to removal, anaesthetists proposed the use of MEP monitoring.

First, the neurosurgical team determined by vertebral arteriography that the catheter did not penetrate the artery. Next, the oto-laryngology team carefully removed the catheter, but the bleeding was arterial and difficult to stop. Immediately thereafter, the MEP disappeared, suggesting rapid spinal cord compression, and contrast revealed bleeding from the vertebral artery into the spinal canal.

Vertebral artery coil embolization was performed to stop the bleeding; the MEP improved slightly, and the spine surgery team performed hematoma removal and posterior decompression. There was a large amount of epidural hematoma in the spinal canal and persistent bleeding from the venousplexus, which required time for hemostasis. MEP improved with decompression. The patient had no neurological complications and recovered well.

**Discussion:** It was later discovered that the basic technique for CVC insertion was not perfect and that the CVC was malpositioned. However, the anaesthetist assumed that the CVC was in the correct position, which was problematic.
Reference:

Learning points: All staff members should review the CVC checklist not cursorily, but thoroughly. Fatal complications can be prevented by preoperative conferences with multiple departments and multidisciplinary staff, and by MEP monitoring.

18AP02-06
The mother and fetus survived emergency on-pump cardiac surgery in the first trimester of pregnancy - a case report

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Background: We present a woman with diagnosed thrombosis of the mechanical aortic valve in the 12th gestational week (GW). She underwent surgery, and she successfully completed her pregnancy.

Case Report: A 35-year-old woman at the 12th GW, comes for a cardiology check-up visit. Two years ago, the patient underwent aortic valve replacement due to a stenotic bicuspid aortic valve. Following surgery, she was on anticoagulant therapy with acenocumarol. Administration of acenocumarol was discontinued during the fifth GW, just after the pregnancy was confirmed. Acenocumarol was replaced with low-molecular-weight heparin. Echocardiography revealed an evident mechanical aortic valve malfunction. One of the leaflets of the mechanical valve was obstructed with what seemed to be a thrombotic mass. The maximum gradient over the aortic valve was 89 mmHg. At our regular Heart team meeting, including the gynecologist, a decision was made to reoperate.

An arterial catheter was placed in the left radial artery. After pre-oxygenation, anesthesia was induced with sufentanil, propofol, and succinylcholine. Neuromuscular block was maintained with rocuronium.

A central venous catheter was placed in the right internal jugular vein, along with a transesophageal echocardiography probe and a urinary catheter.

Thirty minutes before the surgical incision, cefazolin was intravenously administered. Anesthesia was maintained with sevoflurane, and analgesia with a continuous infusion of sufentanil. Heparin (300 IU/kg) was administered, and cardiopulmonary bypass (CPB) was started. Non-pulsatile CPB was performed using a membrane oxygenator. The flow rate was maintained between 3 and 3.5 l/min/m², and the mean arterial pressure was about 80 mmHg. During CPB, the patient was cooled to 34°C. Antegrade blood cardioplegia was used to arrest the heart. Thrombectomy of the aortic valve was performed.

The patient was discharged on the 11th postoperative day in good condition. In the 37th GW, a healthy baby was delivered by a cesarean section.

Discussion: During CPB, there is a coagulation disorder, a change in the function of the cell and protein components of the blood, the release of vasoactive substances from the activation of the leukocyte complement, particles and air embolism, non-pulsatile flow, hypotension, and other unwanted events, all of which endanger the fetus.

Learning points: On-pump cardiac surgery in early pregnancy does not necessarily mean the death of the fetus.

18AP02-07
Extraction of a migrated vascular guidewire from a MIDLINE device from the aortic arch: a case report

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Background: The insertion of midline devices is one option for patients requiring mid-term intravenous therapy but are not free of complications.

Case report: 30-year-old female, allergic to amoxicillin, without any pathological medical history. Admission due to complicated acute pyelonephritis requiring a venous access through a midline device for IV antibiotic therapy.

After insertion, the patient presented atypical chest pain with a chest X-ray showing the guidewire of the device between the innominate vein and the inferior vena cava, but it went unobserved. Persistent chest pain with imaging tests showing the guidewire in different positions, misinterpreted as a central catheter.

A CT was performed for a left cervical “tap,” showing an intra-aortic migrated guidewire with impaction/perforation of the aortic arch (upper laterocervical end) and lower end in the left hypogastric artery.

Endovascular surgical extraction of the device was performed through the right femoral artery using a loop catheter without any other incidents.

Discussion: The midline device is a peripheral access venous catheter inserted using the Seldinger technique and does not require radiological confirmation unless there are difficulties or subsequent clinical repercussions.

In this case, an X-ray was requested, but the vascular guidewire was not detected. Subsequent tests interpreted it as a femoral central line.

The symptoms were misinterpreted as mechanical pain and/or anxiety. In this case, a series of diagnostic errors and misinterpretations led to a life-threatening situation for the patient.

Reference:

Learning points:
- This case underscores the importance of personnel qualification and the verification of imaging tests in the event of complications during the procedure (!).
- The insertion of midline catheters requires specific protocols and specific staff training to minimize errors.
- Checking and evaluating imaging tests allows the detection of technique-related complications.
- Defense mechanisms in the system are mandatory to avoid such human errors in the future.
New bridges in communication during awake intubation, when speech is not an option

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Background: In an awake intubation, adequate anesthesiologist-patient communication is vital during all the process. When the patient's circumstances make this impossible, we must look for alternative ways to achieve it.

Case Report: A 53-year-old man scheduled for cochlear implantation due to bilateral profound sensorineural deafness. He presented difficult airway parameters: - Squamous cell carcinoma of the tongue operated in 2009. Recurrence in 2018, then treated with surgery + chemotherapy and Radiotherapy. Currently the patient cannot communicate verbally. - Severe oropharyngeal dysphagia that had caused recurrent pneumonias. At this moment, he requires chronic home oxygen due to hypoxic respiratory failure. From the Anesthesia Consultation, he was informed in writing of the need to perform an awake intubation.

Due to the impossibility of verbal communication, a card system was designed to establish communication. They were placed in the patient field of vision while the procedure was being carried out. The result was a silent and calm procedure without any reported incidents.

Discussion: Once the difficult intubation scenario has been declared and the intubation plan has been established with the patient awake, the strategies to carry it out are initiated. Communication with the patient during preparation and procedure takes a main role, in parallel to airway preparation¹.

It is necessary to ensure patient could collaborate as much as possible, adjusting the anxiolytic medication to a minimum.

Different tools have been described in the literature to overcome language barriers in awake intubation as mobile applications with simultaneous translation².

On the other hand, visual aids like screens or posters/blackboard are often used in intubated patients in critical care areas³.

We decided to use a written line of communication to achieve our goal.

References:

Learning Points: The use of visual aids in awake intubation can be another tool for those circumstances in which verbal communication is not possible.
18AP02-10
Hypotension prediction index hemodynamic monitoring improves comprehension and intraoperative hemodynamic management in laparoscopic adrenalectomy: a case report

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Background: Adrenalectomy for pheochromocytoma presents a challenge due to the risk of hemodynamic instability (HI), often unpredictable. The Hypotension Prediction Index (HPI) is a recently developed tool obtained from the arterial pressure waveform. It reports on hemodynamic variables related to preload, afterload, contractility, and vasomotor tone, aiding anesthesiologists in anticipating and managing hypotensive episodes. This case report aims to emphasize the effectiveness of the HPI algorithm in detecting hemodynamic instability during laparoscopic adrenalectomy.

Case Report: We describe the case of a 55 years-old-female with a history of taquycardia and Incidentaloma during endocrine follow-up. Elevated urinary metanephrines secretion was observed in laboratory tests. The patient had received prior treatment with alpha and betablocker therapy and Laparoscopic adrenalectomy was performed.

An invasive arterial line connected to Hemosphere monitoring system with the HPI-software was achieved. Due to hemodynamic parameters, we combined expansion volume and norepinephrine infusion to avoid Hemodynamic instability. The Hypotension Prediction Index immediately before removing the mass, HPI increased to > 80% with MAP 65 mmHg and VVS 12 % and Elastance <1 ; a norepinephrine infusion was then started before MAP low down 65 mmHg.

After tumoral removal, dynamic variables as Elastance measure > 1.4 and VVS > 15% took us to manage volume expansion with crystalloids.

Discussion: Understanding the catecholamine-induced alterations and hemodynamics changes during tumor resection is crucial for minimizing risks. Advanced hemodynamic monitoring tools like HPI, which predicts intraoperative hypotension based on high-fidelity arterial pressure, can optimize patient care.

References:
1. Intraoperative haemodynamic optimisation using the Hypotension Prediction Index and its impact on tissular perfusion: a protocol for a randomised controlled trial. Juan Victor Lorente,1,2 Ignacio Jimenez,3 Javier Ripollés-Melchor,4 Alejandra Becerra,5 Wilbert Wesselinck,6 Francesca Reguant,2,7 Irene Mojarro,1 Maria de los Angeles Fuentes,3 Ane Abad-Motos,4 Elizabeth Aguado,5 Francisco Herrero-Machancoses,8 Paula Callejo,9 Joan Bosch,2 Manuel Ignacio Monge. BMJ Open 2022;12:e051728. doi:10.1136/bmjopen-2021-051728

18AP02-11
Accidental intra-arterial rocuronium administration: an approach to the management of inadvertent injections

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Background: Intra-arterial drug injections (IADI) are rare events with significant potential morbidity. IADI may occur due to the administration of drugs in an arterial line or through a venous cannula mistakenly placed. Although the pathophysiology is not clear, thrombosis is a common and serious end result.

Case Report: A 48-year-old woman was electively admitted to undergo a total laparoscopic nephrectomy as a living donor. ASA II, General balanced anesthesia with standard ASA plus neuromuscular blockade and depth of anesthesia monitoring was proposed. Non-invasive pressure monitoring was not possible after several attempts, so invasive pressure monitoring was placed on the left radial artery under local anesthesia. During the induction of anesthesia, a 70 mg bolus of rocuronium was inadvertently administered intra-arterially. The error was immediately detected and an aspiration was made. Following that, a flush was detected in the left arm up to the elbow, sparing a central pale area. After securing the patient’s airway, 8 mg of dexamethasone, 200 mg of hydrocortisone, 2 mg of clemastine and 2 mg of isosorbide dinitrate intravenous were administered. The arm was warmed and surgery was uneventful.

At the end of surgery, an ultrasound of the radial artery was performed, showing reduced pulsatility, and an ultrasound guided administration of 12.5 mg of sodium nitroprusside was taken on the affected area. Additionally, the arterial catheter was heparinized. The flush had already disappeared when the patient was leaving the OR and no signs of ischemia or pain were present. She was then admitted to the post anaesthetic care unit, ensuring surveillance of the affected arm. On the first day postoperative, no signs of ischemia were detected, plus pulse and capillary time refill were normal. The arterial catheter was then removed and the patient was discharged to nursery. Hospital discharge occurred on day 5 postoperative.

Discussion: It is important to immediately detect an IADI and act. If there’s a progress to ischemia despite initial treatment, other exams may be considered accordingly, as well as early referral to vascular surgery and/or interventional radiology.

Clinical vigilance and follow-up are crucial.
Reference:
Learning Points: Early identification IADI. Clear visual identification and labeling of arterial lines. Different syringe adapters may provide additional safety.

18AP02-12
Do “opioid prescription stickers” enhance prescribing compliance with HSE Guidelines in tertiary Irish Hospital

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Background and Goal of Study: Opioids are effective medications that have been used extensively for in-hospital management of acute pain. Worldwide including Ireland, numbers of opioid prescriptions are increasing, although many reports encourage controlled usage and warned against the potential health, economic and social hazards involved in opioid usage. To address this problem and to increase knowledge and safety regarding opioid usage, The HSE has issued guidelines for opioid prescribing for in hospitals management of acute pain.

We aimed to answer the following questions: Do “opioid stickers” with documented stop dates improve compliance with HSE guidance?, Are staff compliant with using the stickers?, Do we consider multimodal analgesia to minimize opioid consumption?

Materials and Methods: Retrospective random selection (100 healthcare records) of opioid naïve surgical patients in Beaumont hospital.

Results and Discussion: 100 patients prescribed a postoperative opioid were reviewed in the re-audit period. 3 patients were prescribed long-acting opioids, compared to 12 in our previous audit. 52 had a documented opioid stop date, 16 of which had an “opioid sticker” in their chart. This compares to 6 patients in our previous audit.

However, 21 of the 52 patients who had a documented stop date, still received opioid beyond this period. In terms of multimodal analgesia, the majority of the sample received regular/PRN paracetamol however NSAIDs were generally under-used, only prescribed for 23 patients.

Conclusion(s): The introduction of an “opioid prescription sticker” with a mandatory stop date of 4 days does improve compliance with national HSE guidelines and influence the documentation of stop dates even if the sticker is not used.

However, consistent documentation of stop dates and ward staff compliance with such, remains an issue. There is still a lot of work to do to achieve 100% usage and compliance with opioid stop dates.

References:

18AP03-01
The efficacy of lower extremity warm blanket for preventing postoperative hypothermia in transurethral surgery

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Background and Goal of Study: Postoperative hypothermia is common during transurethral surgery due to large volume of irrigation fluid use. In this study, we examine whether covering the patients’ lower extremities with warm blankets during surgery, in addition to standard precautions, a heated air warmer applied to the upper body, and warm irrigation fluid, would reduce intraoperative heat loss and, therefore, prevent postoperative hypothermia during Holmium Laser Enucleation of the Prostate (HoLEP).

Materials and Methods: This prospective randomized controlled trial compared the efficacy of a warm blanket (3M™ Thinsulate™) on their lower extremities during HoLEP.

From January 2019 to June 2020, 165 patients undergoing elective HoLEP under spinal anesthesia were enrolled (UMIN000043699). They were randomly assigned to receive lower extremity warm blankets (Intervention) or not (Control).

Core body temperature was monitored with a forehead sensor (3M™ Bair Hugger™) before anesthesia. Distilled water for irrigation was maintained at 38°C, the operating room was set to 25°C, and a forced heated air warmer (The WarmTouch™) was provided for all patients during the surgery. Hypothermia was defined as the postoperative temperature dropping below 36.0°C.

The primary outcome was the incidence of hypothermia after surgery. Univariate analysis was conducted using the chi-squared test for categorical variables, and t-tests for continuous variables were performed with R (version 3.4.1). A two-tailed p-value of <0.05 was considered statistically significant.

Results and Discussion: Out of the 165 enrolled patients, 149 met the inclusion criteria for analysis. Among these, 71 patients received warm blankets (Intervention) during surgery. The incidence of hypothermia was 8.5% (6/71) in the Intervention group and 15.4% (12/78) in the Control group.

However, no statistically significant difference was observed in the incidence of hypothermia between the Intervention and Control groups (8.5% vs. 15.4%, p=0.30).

Conclusion(s): Covering the lower extremities with a warm blanket in addition to standard preventive measures did not show a significant difference in preventing hypothermia during transurethral HoLEP surgery.

Our results suggest that adding a warmer blanket to the lower extremities may have little contribution to preventing postoperative hypothermia.
18AP03-02
Deployment of an early warning system for early detection of postoperative complications: a pilot study in a French Military Teaching Hospital

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Background and Goal of Study: Acute deterioration in hospitalized patients is often preceded by signs of decline 48 hours before intensive care admission or death. Early Warning Systems (EWS) generate early alerts for impending failures, triggering appropriate medical responses. These systems, based on the Early Warning Score, are associated with a decrease in adverse events like unplanned intensive care admissions, in-hospital cardiac arrests, and deaths.

This study aims to describe the implementation of an EWS, using the MEWS score in a thoracic, visceral, and vascular surgery department, comparing MEWS scores between the general patient population and those admitted to intensive care.

Materials and Methods: This was a single-center survey from March 2021 to March 2022. MEWS scores were collected for patients in a surgery department after deploying an EWS. This system included semi-automated vital parameter collection, MEWS usage, and medical responses based on severity levels.

Results and Discussion: The study included 1295 patients, with 38 non-scheduled admissions to intensive care. In the general population, the MEWS score remained low (<5) on days 1, 4, and 7 post-surgery in 97%, 87%, and 80% of patients, respectively. In contrast, intensive care-admitted patients had a MEWS score ≥5 on days 1, 2, 3, and 7 in 18%, 28%, 45%, and 34% of cases, respectively.

The average MEWS score was significantly higher in the intensive care-admitted population from the first postoperative day (difference 1.1 [CI: 0.75-1.475], p<0.0001). The findings highlight that a higher MEWS score postoperatively is associated with intensive care admissions.

Conclusion(s): Implementing an EWS in a surgical department is feasible and enables monitoring of hospitalized surgical patients. A high postoperative MEWS score is linked to the likelihood of intensive care admission, indicating its utility in early detection and intervention.

18AP03-03
Throat pack checklist in paediatrics theatre at Tallaght University Hospital: a multidisciplinary approach

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Background and Goal of Study: Throat packs are used to collect blood, bodily or external fluids and other material that may collect in the oropharynx during dental and ENT procedures. Its the responsibility of the anaesthetist surgeon who inserts a throat pack at the start of a procedure to remove it at the end of that procedure.

If a throat pack has been inserted but not removed at the end of a procedure, it may cause severe airway obstruction. Unintentionally retained throat packs are a “Never Event”. The risk of a “Never Event” is approximately 1:17,000 operations as per the Association of Anaesthetists.

In Tallaght University Hospital, approximately 100 cases per year require the use of a throat pack. These are mainly paediatric dental procedures.

Materials and Methods: A 5 question survey was conducted among the Paediatric Theatre team in TUH, 19 individuals participated in Survey of which 16 were anaesthetists and 3 were nurses.

A five-step checklist was developed to ensure the safe insertion and removal of throat packs. These steps included a verbal announcement during time out and sign out, applying and removing the throat pack sticker over the Endotracheal Tube (ETT) and forehead, and checking the box on the anaesthetic sheet.

Throat Pack specific stickers were designed and made available in theatre.

An infographic was created and displayed in the theatre.

The effectiveness of the checklist will be assessed by monitoring its implementation and gathering feedback from the Multidisciplinary Team (MDT).

Results and Discussion: 100% participants agreed on the introduction of checklist and adding it to the timeout and sign out. 2/19 participants had observed a “NEVER EVENT” related to a throat pack in the last 10 years. 1/19 participants wished to make it a part of nursing swab count.

This quality improvement project aimed to create a concise multidisciplinary checklist to minimize complications associated with unintentionally retained throat packs.

We implemented several measures including: Providing laminated checklists in theatre, conducting staff education and awareness programs, supplying throat pack stickers in theater, and having throat pack safety as part of our time out process.

Conclusion(s): In conclusion, effective communication and meticulous checklist documentation are indispensable for patient safety. Ongoing education, training and audit are crucial for compliance and minimizing complications.

18AP03-04
Evaluation of a computerized massive hemorrhage protocol

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Background and Goal of Study: A hospital-based multidisciplinary protocol for Massive Hemorrhage (MH) is essential, as proposed in the patient safety Declaration of Helsinki (2010).

This study aims to evaluate outcomes from the computerized MH protocol in a Second-level Hospital (HUSLL, Palma de Mallorca, Spain) serving a population of over 200,000.
Materials and Methods: Data were extracted from medical records of patients with activated computerized MH protocol, including demographics, bleeding origin, transfusion, length of stay, critical care admission, mechanical ventilation, and mortality at admission and at thirty days. Descriptive analysis was performed.

Results and Discussion: From late 2018 to April 2023, annual activations were below 10 cases, totaling 25. Bleeding origins: obstetric (40%), digestive (24%), surgical interventions (24%), severe trauma (8%), and unknown (4%). Transfusions: PRBC 3.20±0.346, FFP 382.56 ml ± 112.16. Most patients were male (72%, avg. age 50.83±7.56), with a 7.04 days ± 1.38 average hospital stay. Admissions to critical care: 68%, requiring mechanical ventilation (36%). Overall admission mortality was 20%, 0% at 30 days.

Developing a multidisciplinary MH protocol is challenging, particularly in implementation at the hospital level. Low activation rates were observed, notably during the Covid-19 pandemic.Despite extensive dissemination in text format, posters, and laminated cards with the algorithm (cognitive aids) placed in cardiac arrest carts, emergency rooms, and obstetrics, protocol activation has been lower than expected. Proposed measures include training sessions, practical simulations, debriefing, expanding activation to specialists, and biannual evaluation.

Conclusion(s): A multidisciplinary MH protocol reduces morbidity and mortality, optimizes response time, and enhances quality and safety of care. Achieving this patient safety goal requires the involvement of all professionals in the relevant services over time, implementing continuous training measures, conducting practical case simulations, and performing a constructive analysis of each case (debriefing).

Reference:

18AP03-06
How to make the Operating Room (OR) a calmer and less loud work environment - PART I

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Background and Goal of the Study: Since the publication of “To Err is Human” in 2000, the focus on improving safety in the healthcare system has shifted towards addressing the system itself rather than solely relying on the technical abilities of individuals.

In December 2020, the American Society of Anesthesiology (ASA) issued a statement on distractions in the operating room, including a list of mitigation strategies and interventions, one of which is the implementation of “no-interruption zones” or “sterile cockpit” protocols.

In this two-part project, we first developed a cost-effective, easy-to-use, and reproducible method to assess the noise levels in the OR (observational part of the study). Secondly, we will implement a series of strategies aimed at improving the environment to ensure a safer OR.

Materials and Methods: Our goal was to measure the loudness in our OR using the most affordable means possible. We tested different apps available for Android smartphones to find a free decibel meter.

Ultimately, we used the “@Sound meter” app. We recorded sound levels during various stages of surgery, including induction, maintenance, and emergence, for both elective and emergency procedures.
Results and Discussion: Our study examined the noise levels in the operating room (OR) over a period of two weeks. The collected data reveals that the noise levels in our OR are significantly higher than the recommended limits set by the World Health Organization (WHO)\(^1\).

During induction, the mean noise level recorded was 67.25 dB, with a maximum level of 97.53 dB. Similarly, during the maintenance phase, the mean noise level was 70.65 dB, with a maximum level of 98.54 dB. Finally, during the emergence phase, the mean noise level reached 71.63 dB, with a maximum level recorded at 108 dB.

Conclusions: The registered noise levels in our OR exceeded this threshold. Excessive noise levels can have detrimental effects on both patients and healthcare staff, including increased stress levels, impaired communication, and compromised patient safety. In the second part of this study we plan to address this matter with a systematical approach based on available publication and to measure the impact of this intervention.

18AP03-07
Verification of the correct insertion of a supradiaphragmatic central venous catheter by a single echocardiographic plane

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Background and Goal of Study: Central venous catheter (CVC) placement is a frequent procedure. Incorrect positioning of the catheter tip with subsequent damage is one of the adverse effects that can occur. Chest radiography has been classically used to corroborate the correct positioning of the catheter tip. However, chest X-ray is not free of risks. Different studies have shown that the visualization of turbulence in the right atrium after infusion of saline through the line confirms adequate positioning of the CVC, although they do not agree on echocardiographic planes and do not verify it in patients connected to mechanical ventilation.

What we propose is to verify that a single plane of echocardiography and the infusion of physiological saline through the distal catheter orifice can determine whether the line is normally positioned and that it can also be performed in a shorter time, with less impact on the patient and lower cost to the system.

Materials and Methods: We propose a prospective diagnostic validity study in which the correct location of the central venous catheter will be verified by ultrasound and then verified by radiography in the same patient, without modifying the usual clinical practice criteria.

The inclusion criteria will be patients over 18 years of age with the need to place a supradiaphragmatic central venous catheter. The exclusion criteria will be patients with devices that may interfere with the ultrasound images, patients with poor ultrasound window and patients with superior vena cava syndrome.

Results and Discussion: Forty patients were included in our study. The average of our population was 71 years. 95% of the patients were ASA II-III. The CVC were mainly jugular (80%) and the rest of them were subclavian. Catheters were misplaced in 7.5% of the cases, and 100% of them were diagnosed by echocardiography even before the X-ray could be performed. In all cases, echocardiography was performed and interpreted in a shorter time than radiography.

Conclusion(s): Echocardiography can check the position of the catheter tip with less risks than X-ray. We believe that echocardiography, if proven to be equivalent to radiography, could in the future replace the gold standard chest x-ray for determining the location of the catheter tip, which would allow us to irradiate the patient less, save time and money.

18AP03-09
Telemedicine in the anaesthesiology departments in Spain

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Background and Goal of Study: The use of Telemedicine has increased in the last years (1). The aim of this study was to analyse remote consultations in the specialty of anaesthesiology in Spain. These are possible in the Pre-operative Evaluation Consultation (PEC), the Pain Management Unit (PMU), and the Intensive Care Unit (ICU) when informing patients’ relatives (2).

Materials and Methods: A survey was designed following the Delphi method of an expert panel and then directed to 566 Spanish anaesthesiologist and 846 patients o relatives with experience in anaesthesia remote consultations. Two dimensions were defined which included other variables: previous beliefs (Telemedicine perceived advantages for the doctor and the patient or relative, accessibility, communication quality, forecast) and actual experience (doctor and patient identification, privacy, technical difficulties, communication quality). Demographic data and satisfaction with the remote consultations were also collected.

Results and Discussion: Telephone calls were the most commonly used method, and most healthcare professionals did not receive any specific training. Overall satisfaction with Telemedicine was higher for patients younger than 30 years old (P<0.001) and more experienced physicians (P<0.001).

The less satisfied were the PMU patients (P<0.001) and the PEC professionals (P<0.001). Professionals predicted more difficulty than patients and family members. However, in accordance with the literature, after the experience all the groups found it easier than expected (3).

Conclusion(s): Our experience supports remote consultation within the practice of anaesthesiology in the PEC, PMU, and ICU from the perspective of patient and provider satisfaction. Economic, legal, technical, organizational, and training concerns must be solved before implementing these circuits (3).

References:

Acknowledgements: ATELAN group

18AP03-10
Vascular navigation error: misplacement of an epicutaneo-caval catheter in an infant

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Background: Unintentional arterial cannulation with a venous catheter is a rare but potentially dangerous complication. This case report describes the accidental cannulation of an artery with an epicutaneo-caval catheter (ECC) in an infant. We aim to highlight the importance of early identification of clinical signs suggestive of arterial cannulation for prompt diagnosis and adequate management.

Case report: A 3-month-old female was admitted to the Pediatrics department with the diagnosis of epilepsy. She acquired an invasive bacterial infection requiring intravenous antibiotic therapy. Due to difficulties in placing peripheral venous catheters, the collaboration of pediatric surgery was requested to place an ECC in the operating room (OR).

In the OR, an ECC was believed to be placed in a vein in the right cubital fold and acetaminophen was administered. After the intervention, marbling and diminished temperature of the right hand and color differential between the hands alongside the absence of a pulse wave on the oximeter were observed. This raised suspicion of inadvertent arterial placement of the catheter. Therefore, a blood sample was collected from the catheter for blood gas analysis (BGA), confirming it was indeed arterial blood.

After confirmation, the catheter was removed and arteriorrhaphy was performed, with resolution of the clinical condition. Subsequently, the catheter was relocated to a vein, confirmed by BGA without immediate complications. The infant remained under observation for 24 hours.

Discussion: Inadvertent arterial catheterization is a rare complication of ECC but can result in life- and/or limb-threatening complications. Strategies to prevent and recognize this situation can mitigate potential damage. In this case, early recognition of clinical signs and BGA allowed for the immediate and safe removal of the catheter, without any consequences.


Learning points: Early recognition of ECC misplacement is key to take appropriate action. Proper training in catheter insertion techniques, the use of imaging guidance, and adherence to established protocols can help prevent such complications. Regular monitoring and assessment of catheter placement during and after insertion are essential components for patient safety.

18AP03-11
EpiFaith CV syringe avoided arterial dilation during central venous catheterization

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Background: Inadvertent arterial placement of a large-bore catheter during attempted placement of a central venous catheter (CVC) may result in hemorrhage, pseudoaneurysm, stroke, or death. Therefore, ultrasound guidance and manometry are recommended to enhance patient safety. Epifathith CV syringe provides built-in auto-aspiration and pressure detecting mechanism, which allow the operators to easily focus on needle control and avoid arterial dilation. It induces a negative pressure automatically and allows for high pressure warning without disconnecting the needle for manometry (Figure 1).

Figure 1.

Here we present a case using EpiFaith CV syringe to identify arterial puncture despite real-time ultrasound guidance.

Case report: A 51-year-old man, 168 cm, 105 kg (body mass index 37.3), presented for wide excision of his buccal cancer and free flap reconstruction surgery. Femoral CVC was performed with the aid of EpiFaith CV syringe. During central venous catheterization, difficult localization of the femoral vein was noticed and real-time ultrasound scanning was performed. Although femoral vein was identified successfully under ultrasound and the color of the blood reflux was dark, the high pressure indicator of the EpiFaith CV suggested an arterial cannulation (Figure 2).

Figure 2.
Further disconnection of the syringe confirmed an inadvertent puncture through from the vein to a small artery, which was not clearly visualized on ultrasound. **Discussion:** Epifath CV detected an inadvertent arterial cannulation despite real-time ultrasound guidance and avoided arterial dilation during central venous catheterization. **Reference:** Ezaru CS, et al. Eliminating arterial injury during central venous catheterization using manometry. Anesth Analg. 2009. **Learning points:** EpiFaith CV may enhance patient safety by providing high pressure warning signals without the need to disconnect the syringe.

18AP03-12
Takotsubo cardiomyopathy during transsphenoidal prolactin secreting hypophysial macroadenoma resection

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**Background:** Hypophysial macroadenoma may be often an indication for neurosurgical removal. The reason for neurosurgical removal may be due to tumor mass effect and/or if excessive hormone secretion is verified. **Case report:** A 22-year-old woman was diagnosed of prolactin secreting hypophysial macroadenoma based on her clinical signs and on IMR examination. A high prolactin level was verified. Cabergoline was unsuccessfully administered, making neurosurgical procedure the only option. Previous medical and anesthetic history were uneventful. The induction of anesthesia and endotracheal intubation were uneventful. The neurosurgeon administered intranasal spray of oxymetazoline. Immediately after this unexpected hypertension 170 mmHg/110 mmHg was verified. The patient developed classic pulmonary edema, and immediate treatment was instituted, the surgery was postponed, and the patient was transferred in ICU. Chest CT-scan examination confirmed the diagnosis due to the presence of characteristic floccular opacities of pulmonary edema. Transthoracic echocardiography was performed reporting a decreased cardiac function of EF 35%, basal and septal hypokinesia, and typical ballooning left ventricle sign. Takotsubo cardiomyopathy was diagnosed. 12 h later EF was 45%, and the day after 60%. The patient was successfully extubated the next day. **Discussion:** This rare case presents an unusual situation of a cabergoline combination with oxymetazoline. Both drugs can induce hypertension having pharmacodynamic synergism, excessive adrenergic response inducing Takotsubo cardiomyopathy. The anesthesiologist must be aware of oxymetazoline administration and the possible side effects with other drugs combination. **References:**

**Learning points:**
1. Even transsphenoidal hypophysial resection is often uneventful, the anesthesiologist must be alert when a decongestion drug is to be administered by the neurosurgeon.
2. Takotsubo is rare reported but can be fatal, and knowing drug combinations side effect is crucial for the anesthesiologist.
Responsive Intraoperative Exhaled Breath Volatile Organic Compounds to Open versus Laparoscopy-guided Surgery

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Background and Goal of Study: Exhaled breath volatile organic compounds (VOCs) have been widely investigated for potential of diagnosing and screening of different pathological conditions. However, how intraoperative breath volatile organic compounds may respond to different surgery types still remains obscure.

Materials and Methods: We got approval from the Ethics Committee of West China Hospital of Sichuan University on June 2, 2022, and registered at the China Clinical Trials Registry (ChiCTR2200062188) on July 28, 2022. All participants gave written informed consent before study inclusion.

The primary outcome of this study is the characteristic change of volatile organic compounds in breath, while the secondary outcome includes change of clinical traits.

We finally enrolled 105 participants and recorded their basic information and clinical traits. Intraoperative exhaled breath of each patient was collected with Tedlar PVF sampling bags (500ml) 2 hours after the start of surgery, and analyzed within 48 hours with UVP-TOF-MS 2000 PLUS in laboratory. MetaboAnalyst 5.0 and IBM SPSS 22.0 were used for data analysis.

Results and Discussion: Multivariate statistical analysis including principal component analysis (PCA), partial least squares discriminant analysis (PLS-DA) and orthogonal projection to latent structures-discriminant analysis (OPLS-DA) showed that exhaled VOCs failed to show good discriminating ability to different surgical types.

Permutation test was performed to evaluate the overfitting of PLS-DA and OPLS-DA, respectively, and demonstrated the same results (P=0.94 for PLS-DA; P=0.75 for R\textsuperscript{2}, P=0.2 for R\textsuperscript{2}Y for OPLS-DA). Models based on VOCs were all overfitted. Consistently, all clinical traits showed no statistically significant difference between open and laparoscopy-guided surgery group (all P>0.05).

Conclusion(s): Our study poses a challenge to the use of exhaled breath VOCs for perioperative monitoring. Thus, more clinical studies are needed in the future.

Table of Clinical traits of the participants between groups

Direct patient feedback on postoperative pain: a randomized controlled trial at the ward

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Background and Goal of Study: Undertreated postoperative pain in the nursing ward can lead to patient discomfort, increased morbidity, impaired ambulation and chronic pain. Underregistration of pain events and misjudging the severity of pain by nursing staff may result in suboptimal pain treatment and poor outcomes. Patient self-report of pain can help in more timely management of postoperative pain and ease nurses’ workload in an increasingly understaffed workplace.

We developed an app that allows patients to self-report postoperative pain scores (NRS 0-10) and other pain related outcomes while at the ward.

This study aims to determine whether prompt alerting of nursing staff to patient self-reported severe pain (NRS > 3) allows a more timely (pharmacological) pain treatment and less time in severe postoperative pain for patients.

Materials and Methods: 138 patients scheduled for elective surgery with postoperative admission to a surgical ward were included in a double-blind randomized controlled trial. Patients were randomized to the control (n=68) and intervention (n=70) group. All patients were invited via a text phone message every 2 hours to report a pain score and could also report spontaneously. In the morning, patients received a more extensive pain questionnaire. In the intervention group, nursing staff received an alert on their phone when patients reported pain scores NRS > 3. In the control group, no alerts were sent.

Primary outcome was time in severe pain until first morning after surgery. Secondary endpoints were differences between groups in reported pain scores and time-to-treat after reported severe pain (NRS > 3) for 36 hours after admission to the ward.

Results and Discussion: Time in severe pain until the first morning after surgery, 33% vs. 35% did not differ significantly (N.S., n=100) for intervention versus control group.
Reported pain scores up to 36 hours after admission to the ward, ΔNRS: -0.8 vs. -0.4 (n=138, p<0.01)** and time-to-treat severe pain, 122 vs. 157 min. (p=0.014*) differed significantly between groups.

**Conclusion(s):** Direct Patient Feedback with nurse messaging for severe pain shows no effect on reported time in severe pain from end of surgery until the first morning. We suggest to broaden the period to 36 hours after admission to the ward in future research since our secondary endpoints show a positive effect on pain scores and treatment in that period.

19AP01-05
Effect of remimazolam on pain perception and opioid-induced hyperalgesia in patients undergoing laparoscopic urologic surgery: a prospective, randomized, controlled study

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**Background and Goal of Study:** The effects of midazolam, a benzodiazepine, on pain perception are complex on both spinal and supraspinal levels. It is not yet known whether remimazolam clinically attenuates or worsens pain. The present study investigated the effect of intraoperative remimazolam on opioid-induced hyperalgesia (OIH) in patients undergoing general anesthesia.

**Materials and Methods:** The study included 108 patients aged 20-65, undergoing general anesthesia (ASA class I - III). The patients were randomized into three groups: group RHR (6 mg/kg/h initial dose followed by 1 mg/kg/h remimazolam and 0.3 g/kg/min remifentanil), group DHR (desflurane and 0.3 g/kg/min remifentanil) or group DLR (desflurane and 0.05 mg/kg/min remifentanil). The primary outcome was mechanical hyperalgesia threshold, while secondary outcomes included area of hyperalgesia and clinically relevant pain outcomes.

**Results and Discussion:** In terms of mechanically evoked pain, After 24 hours of surgery, the mechanical hyperalgesia threshold was considerably lower in group DHR as compared to the other two groups (P < 0.01). The area of hyperalgesia around the surgical incision at 24 hours postoperatively was significantly greater in group DHR than in the other two groups (P < 0.01). However, there was no difference in the area of hyperalgesia around the surgical incision at 24 hours postoperatively between group RHR and DLR (P > 0.05). In terms of clinically relevant pain outcomes, the time to first rescue analgesia was significantly longer in group DLR and RHR than in group DHR (P < 0.01). There was no significant difference in the time to rescue analgesia between group RHR and DLR (P > 0.05).

**Conclusion(s):** Group RHR which received remimazolam attenuated OIH, including mechanically evoked pain and some clinically relevant pain outcomes caused by a high dose of remifentanil. Further research is essential to determine how meaningful and important the small differences observed between the two groups are clinically.

**References:**

19AP01-07
Identifying predictive factors for postoperative delirium in elderly patients undergoing spine surgery

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**Background and Goal of Study:** Delirium is a sudden disruption in cognitive and conscious functions, which is particularly common among the older population. Identifying predictive factors for postoperative delirium is crucial for developing targeted prevention and management strategies to improve patient outcomes.

**Materials and Methods:** A prospective observational study was conducted at a single hospital from November 2019 to May 2023. Patients aged >= 70 years and scheduled for spine surgery were included. Patients’ general characteristics, preoperative assessment and clinical characteristics, and intra- and postoperative characteristics were collected. A risk factor analysis was performed, with postoperative delirium as outcome, by conducting a backward stepwise logistic regression analysis.

**Results and Discussion:** Of the 536 patients, 95 (17.7%) developed postoperative delirium. Factors that showed significant differences between patients with and without delirium included age, delirium history, number of daily medications, preoperative benzodiazepine medication use, Mini-Mental State Examination-Dementia Screening and Montreal Cognitive Assessment score, limitations in activities of daily living and instrumental activities of daily living, frailty, nutritional status, Charlson Comorbidity Index score, the levels of red blood cell count, hemoglobin, hematocrit, total protein, estimated glomerular filtration rate, and red blood cell distribution width, American Society of Anesthesiologists score, operation level, and admission to an intensive care unit after surgery.

After multivariate logistic regression analysis, risk factors for postoperative delirium were number of daily medications, operation level >=3 (OR= 3.38, 95% CI= 1.55-7.45), delirium history (OR= 6.78, 95% CI= 1.82-25.15), preoperative systolic blood pres-
Perioperative copeptin: predictive value and risk stratification in patients undergoing major noncardiac surgery: a prospective observational cohort study

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Background and Goal of Study: Biomarkers can aid in perioperative risk stratification. While preoperative copeptin has been associated with adverse events, intraoperative information is lacking and this association may rather reflect a baseline risk. Knowledge about correlations between postoperative copeptin concentrations and clinically relevant outcomes is scarce. We examined the association of perioperative copeptin concentrations with postoperative all-cause mortality and/or major adverse cardiac and cerebrovascular events (MACCE) at 12 months and 30 days as well as with perioperative myocardial injury (PMI).

Materials and Methods: We conducted a prospective observational cohort study of adults undergoing noncardiac surgery with intermediate to high surgical risk in Basel, Switzerland, and Düsseldorf, Germany from February 2016 to December 2020. We measured copeptin and cardiac troponin before surgery, immediately after surgery (0 hr) and once between the second and fourth postoperative day (POD 2–4).

Results and Discussion: A primary outcome event of a composite of all-cause mortality and/or MACCE at 12 months occurred in 48/502 patients (9.6%). Elevated preoperative copeptin (> 14 pmol·L−1), immediate postoperative copeptin (> 90 pmol·L−1), and copeptin on POD 2–4 (>14 pmol·L−1) were associated with lower one-year MACCE-free and/or mortality-free survival (hazard ratio [HR], 2.89; 95% confidence interval [CI], 1.62 to 5.2; HR, 2.07; 95% CI, 1.17 to 3.66; and HR, 2.47; 95% CI, 1.36 to 4.46, respectively). Multivariable analysis continued to show an association for preoperative and postoperative copeptin on POD 2–4. Furthermore, elevated copeptin on POD 2–4 showed an association with 30-day MACCE-free survival (HR, 2.15; 95% CI, 1.16 to 3.91). A total of 64 of 489 patients showed PMI (13.1%). Elevated preoperative copeptin was not associated with PMI, while immediate postoperative copeptin was modestly associated with PMI.

Conclusion(s): Postoperative delirium is common after spine surgery in older patients. This study found that a greater number of daily medications, an operation level of 3 or higher, a history of delirium, higher preoperative systolic blood pressure, malnourished status, increased age, lower total protein, and a lower cognitive function were risk factors for the development of postoperative delirium.
Conclusion(s): Preoperative MCI was seen in ~20% of surgical patients aged > 70 years. POCD was seen in ~20% of patients with pre-existing MCI, and ~10% of those without. Benzodiazepine use, significant comorbidities, pre-existing MCI, and depressive tendencies were risk factors for POCD.

19AP01-10
Multimodal prehabilitation program: sharing implementation difficulties in a tertiary university hospital

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Background and Goal of Study: Multimodal prehabilitation (MP) nowadays is and should be the gold standard for preoperative optimization (fit for surgery) of high-risk frail patients scheduled for high risk surgeries. Frequently it is difficult to convince hospital directors to support MP programs when more resources are needed.

Materials and Methods: Aim is to share our experience after analysing the difficulties when implementing a new MP project in our setting.

Results and Discussion: It is crucial to define primary/secondary objectives of MP, to identify frail high risk patients and high risk surgeries (with postoperative deterioration of functional capacity and immediate postoperative ICU admission), to convince hospital director and to inform patients about the importance of MP for reducing postoperative complications, to calculate staff and materials needs for MP, to define timing and roles of all staff members, to implicate surgeons, anaesthesiologists, nursery, psychologist, nutritionist, physiotherapeutic, rehabilitators, geriatrician, social worker and secretary staff in the project.

To guarantee a minimum of 4 weeks preoperatively to prehabilitate and to collect process and results indicators for prehab impact measurement are important. Scales for physical activity, frailty, malnutrition, anxiety/depression are mandatory.

Anaemia correction (Hb < 13 g/dL) circuit must be created; dishabitation of toxic habits and individualising physical activity every week and diet supervision are a must!

Anxiety/depression reduction techniques must be learnt. Strong leadership and nursery role must be pointed out by information (feedback) providing and problem solving (adding value).

Minimising the number of hospital visits by organising one afternoon prehab meeting on a weekly basis is important. Smartphone App for patient contact and feedback is strongly recommended.

Conclusion(s): Implementing MP is not easy. An excellent MP program should be based on multidisciplinary teamwork; inclusion of high-risk patients, exact distribution of workload/roles, sufficient material and staff needs should be guaranteed and objectives and process/result indicators must be well defined. Demonstration of positive impact of MP by reduction of LOS, postoperative complications and costs is crucial for institution financial support. Main leitmotiv should always be: better in, better out!

Acknowledgements: I thank all my team for the excellent teamwork we do every day together.

19AP02-01
Preoperative anemia as a risk factor for the development of periprosthetic joint infection

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Background and Goal of Study: The incidence of deep periprosthetic joint infection (PJI) after primary total hip and knee arthroplasty ranges from 0.5% to 2% (1). Management of modifiable risk factors can reduce the likelihood of developing periprosthetic infection. A comprehensive analysis of patients data was carried out to identify risk factors for the occurrence of periprosthetic infection.

Materials and Methods: To conduct the study, we collected data from an electronic database. Patients were selected randomly. The main group included patients with PJI, the control group included patients who underwent total joint arthroplasty without PJI. CBC, biochemistry, and inflammatory markers data were analyzed.

<table>
<thead>
<tr>
<th>Data</th>
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<th>Control group (19)</th>
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<td>Gender</td>
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<tr>
<td></td>
<td>Male-6</td>
<td>Male-5</td>
</tr>
<tr>
<td>Age</td>
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<td>65.4 ± 8.7</td>
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<tr>
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<td>1</td>
</tr>
<tr>
<td>hypothyroidism</td>
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</table>

Table 1. Patients data information

Results and Discussion: As expected, inflammatory markers confirmed the presence of PJI. There was no significant difference in biochemistry. The odds ratio for anemia data showed that the incidence of anemia among patients with PJI was 21 times higher than in patients without the PJI. The results are statistically significant with 95% CI. These findings are supported by several other studies (2-3).

Conclusion(s): Preoperative anemia is an independent risk factor for periprosthetic joint infection. Further RCT for the correction of preoperative anemia is required.

References:
19AP02-02 Evaluation of the regional tract analgesia using ropivacaine for the postoperative pain management after percutaneous nephrolithotomy. A prospective study

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Background and Goal of Study: The aim of the current study was to evaluate regional tract analgesia (RTA) using ropivacaine regarding the management of postoperative pain for patients undergoing percutaneous nephrolithotomy (PCNL).

Materials and Methods: It is a prospective study including patients who underwent PCNL. The patients were stratified into 4 groups based on the used analgesic means: The ordinary analgesic regimen group including the intravenous use of paracetamol and tramadol (if needed), the paracetamol pump group, the tramadol pump group and the RTA group using 2% ropivacaine pump. The time needed to achieve maximum analgesia and the comparison of the efficacy of the used analgetic methods were the primary endpoints of this study.

All the patients were evaluated every 6 hours postoperatively until the completion of 24 hours. The pain assessment was conducted with the use of the Numerical Rating Scale (NRS) 0-10 score.

Results and Discussion: A total of 80 patients were divided into 4 groups of 20 patients each. The RTA was superior to the ordinary analgesic regimen and to the paracetamol pump in all the postoperative evaluations regarding the efficacy of pain relief. The differences between RTA and tramadol pump groups were not statistically significant.

Moreover, in terms of time needed to achieve the maximum analgesia, the difference between the ordinary regimen and RTA groups was statistically significant (15.6±4.92 hours vs 21.6±4.08 hours, p=0.0013) (Table 1).

Conclusion(s): The use of regional tract analgesia with 2% ropivacaine pump seems to be a more efficient and faster method of postoperative pain management in patients who underwent PCNL compared to the ordinary analgesic regimen and paracetamol pump. It was also proven that it is not inferior to the tramadol pump, besides avoiding the adverse effects of tramadol.

<table>
<thead>
<tr>
<th>Tract Analgesia</th>
<th>Ordinary Analgesic regimen</th>
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<tr>
<td>Hours (mean±SD)</td>
<td>15.6±4.92</td>
<td>21.6±4.08</td>
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<tr>
<td>Paracetamol Pump</td>
<td>15.6±4.92</td>
<td>18.6±5.80</td>
</tr>
<tr>
<td>Tramadol Pump</td>
<td>15.6±4.92</td>
<td>16.5±5.46</td>
</tr>
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Table 1.
Incidence of and risk factors for postoperative nausea and vomiting in patients receiving intravenous patient-controlled analgesia using fentanyl, droperidol and a histamine H$_2$ antagonist after laparoscopic gynecological surgery: a retrospective analysis of 4,277 patients

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**Background and Goal of Study:** This study investigated the incidence of and the risk factors for postoperative nausea and vomiting (PONV) in patients receiving intravenous patient-controlled analgesia (IVPCA) containing fentanyl, droperidol and a histamine H$_2$ antagonists (H$_2$A) after laparoscopic gynecological surgery under general anesthesia.

In our clinical experience, both IVPCA containing droperidol (PCA-D) and IVPCA containing H$_2$A (PCA-H) were effective to reduce PONV. Then, we assumed concurrent use of droperidol and H$_2$A in IVPCA (PCA-DH) would further reduce PONV. Simultaneously, we hypothesized an intraoperative use of droperidol or H$_2$A would not have additive effect in reducing PONV when it is concurrently used in IVPCA (PCA-DH).

Furthermore, in our clinical insights, the factors associated with PONV in PCA-DH were different from those with PCA-D and PCA-H. Therefore, we explored the incidence and related factors for PONV in patients receiving PCA-DH.

**Materials and Methods:** The incidence of PONV was investigated in 4,277 patients undergoing laparoscopic gynecological surgery who received fentanyl-droperidol-H$_2$A IVPCA (PCA-DH). Patient characteristics, anesthetic factors, and intraoperative prophylactic antiemetics were explored by multiple logistic regression analysis to determine their relationships with PONV. Then, we compared the results with previous studies of PCA-D and PCA-H.

**Results and Discussion:** Among 4,277 patients, 4,136 (96.7%) received propofol-based anesthesia, and 4,236 (99.0%) received prophylactic antiemetic. The overall incidences of nausea, vomiting, and postoperative antiemetic use were 14.0%, 3.9%, and 5.4%, respectively, all of which were lower than those of PCA-D or PCA-H. Factors related to PONV were different from those of PCA-D or PCD-H. Intraoperative use of droperidol or an H$_2$A, which were used in IVPCA were not effective.

**Conclusion(s):** PCA-DH more effectively suppressed than did PCA-D or PCA-H. PCA-DH may offset or even reduce the risk of PONV accompanying postoperative opioid usage. The risk factors in PCA-DH varied from those with PCA-D or PCA-H. Even within the same facility, changing a single parameter such as antiemetics contained in PCA easily can alter the incidence of PONV and its risk factors. This suggested that there would be no universal and accurate method for predicting PONV.

Early postoperative copeptin to predict new onset disability after cardiac surgery – a multicenter prospective cohort study

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**Background and Goal of Study:** In-hospital mortality after cardiac surgery ranges from 2–6% depending on the type of surgery performed. Early postoperative risk re-assessment is crucial to identify patients at risk for complications. Copeptin – a neurohumoral marker resulting from the same precursor as vasopressin – has been shown to be associated with major adverse events in multiple settings. After cardiac surgery, data are scarce. The hypothesis of this study was that early postoperative copeptin predicts new onset disability one year after cardiac surgery.

**Materials and Methods:** This multicenter prospective cohort study included adult patients undergoing elective on-pump cardiac surgery. Main exposure was copeptin measured immediately after arrival on the intensive care unit. The primary endpoint was new onset disability as defined by the World Health Organization Disability Assessment Schedule 2.0 (WHODAS 2.0; threshold: >25% disability one year after surgery with an increase ≥5% as compared to preoperative status). Secondary endpoint was one-year mortality. Statistics: Receiver Operating Characteristic (ROC) curves were calculated and multivariate logistic regression models were conducted.

**Results and Discussion:** In total, 353 prospectively recruited patients (71% male, mean age: 64±11 years) could be included. One year mortality was 3% (10/343) and 32/288 (11%) patients presented with new onset disability after one year. The area under the ROC curve (AUC) for copeptin and new onset disability after one year was 0.57 (95% Confidence Interval (CI) 0.46-0.67). Youden Index-derived cut-off was 38.5 pmol/l.

Multivariate logistic regression analysis showed an odds ratio (OR) for the association between copeptin and new onset disability of 2.66 (95% CI 1.27-5.56). The AUC for copeptin and one-year mortality was 0.70 (95%CI 0.58-0.85). Youden Index-derived cut off was 49.5 pmol/l. The adjusted OR for the association between copeptin and one-year mortality was 7.03 (95%CI 1.45-34.04).

**Conclusion(s):** Early postoperative copeptin is independently associated with new onset disability and mortality one year after cardiac surgery. However, discrimination is weak so that routine measurement of copeptin to date cannot be recommended.
**19AP02-07**
Assessment of anxiety in parents of children undergoing tonsillectomy under general anaesthesia

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**Background and Goal of the Study:** Surgery in the paediatric age group entails a significant amount of anxiety for parents. Due to anxiety, parents are unable to take care of and support their child which could affect the child's well-being and contributes to poor outcomes.

The primary objective of this study was to determine the frequency of preoperative anxiety in parents before the tonsillectomy of their children.

**Materials and Methods:** It was a cross-sectional descriptive study that included either parent of 147 children of ASA I & II, aged 1-12 years undergoing tonsillectomy. Each parent's demographic data were recorded and requested to answer a proforma containing Amsterdam Preoperative Anxiety Information Scale (APAIS) for assessing anxiety on a 5-point Likert scale. Mean ± standard deviation, median (IQR), and frequency (%) were used to report the normal, skewed, and categorical variables. APAIS anxiety and information scores were either compared by using the Mann-Whitney U-test or the Kruskal Wallis test.

Further, anxiety scores were grouped (present/absent) with a cut-off score of 11 for the presence of anxiety and multivariate logistic regression was performed to explore the relationship between potential risk factors and the parent's anxiety.

**Results:** Overall, anxiety was present in 59 (40.1%) respondents with 20 (33.9%) being fathers and 39 (66.1%) mothers. The median (IQR) for APAIS anxiety and information score were 9±5 and 5±2 respectively.

A statistically significant difference between median anxiety scores was observed in the child's age, respondents' gender, mother's age, father's age, and education of the mother. Respondents' gender (AOR=0.3, 95% CI=0.1-0.8, p-value 0.01), and the education of the mother (AOR=0.2, 95% CI=0.1-0.6, p-value 0.006) were found to be statistically significant predictors.

**Conclusion:** It is observed that there is a significant disparity in anxiety levels between the child's mother and father, with mothers showing significantly higher anxiety levels than fathers. Moreover, among mothers, those with higher education levels demonstrated significant levels of anxiety.

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**19AP02-09**
Comparison of preoperative NT-proBNP and the Gupta Surgical Risk Calculator for predicting heart failure-related morbidity after non-cardiac surgery with intermediate or high surgical risk

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**Background:** Heart failure (HF) is a common clinical condition in elderly patients undergoing non-cardiac surgery and is associated with adverse outcomes. Preoperative identification of patients with known or unknown HF is crucial and could be improved by the measurement of cardiac biomarkers, such as NT-proBNP. Additionally, risk scores, such as the Gupta Surgical Risk Calculator, also known as Myocardial Infarction or Cardiac Arrest risk score (MICA), are used for risk stratification.

The aim of this analysis was to evaluate the value of preoperative NT-proBNP and MICA for the prediction of postoperative heart failure-related morbidity and to assess whether the combination of both parameters could improve risk stratification.

**Methods:** Routine preoperative NT-proBNP measurement was conducted in 199 consecutive patients older than 65 years undergoing elective intermediate- or high-risk non-cardiac surgery. MICA score values were calculated for each patient and included age, functional status, ASA class, creatinine, and type of procedure.

The primary composite morbidity endpoint (CME), comprising the incidence of rehospitalisation, acute decompensated heart failure, acute kidney injury, and any suspected or proven bacterial infection requiring treatment until POD 30.

**Results:** Twenty-one patients (10.6%) had known history of HF, and 90 CME events were observed. Receiver operating characteristics indicated that both NT-proBNP and MICA predicted the CME (NT-proBNP: AUC 0.679, p<0.001, cut-off: 443 pg/ml, sensitivity: 55.6%, specificity 80.7%; MICA: AUC 0.657, p<0.001, cut-off: 5.22, sensitivity 58.9%, specificity 71.6%).

Logistic regression revealed that patients above the calculated cut-offs had a significantly increased risk of postoperative HF-related morbidity (NT-proBNP: odds ratio (OR) 5.24, p<0.001; MICA: OR 3.84, p<0.001).

Subsequently, a new score was calculated, assigning one point each for NT-proBNP and MICA values above their respective cut-offs. The new score demonstrated enhanced risk stratification compared to NT-proBNP and MICA alone (AUC 0.731, p<0.001, cut-off 1, sensitivity 77.8%, specificity 62.4%; vs. MICA alone: 0.003; vs. NT-proBNP alone: 0.103; OR 5.81, p<0.001 for CME).

**Conclusion:** Preoperative routine measurement of NT-proBNP, combined with the MICA risk score, enhances risk stratification of postoperative HF-related morbidity. Strategies targeting these patients to reduce morbidity should be evaluated in further trials.
Background and Goal of Study: Cardiovascular disease is often concomitant with chronic kidney disease and metabolic syndrome. In October 2023, the American Heart Association (AHA) defined the cardiovascular-kidney-metabolic syndrome (CKM) as a new entity to address the complex interaction between heart, kidneys, and metabolism. In the non-cardiac surgery setting, cardiovascular-kidney-metabolic diseases are also highly prevalent and associated with increased morbidity and mortality.

The aim of this study was to quantify the association between different stages of the newly defined CKM syndrome and post-operative adverse events in patients undergoing non-cardiac surgery.

Materials and Methods: This is a secondary analysis of a prospective international cohort study that recruited patients in >150 centers in 25 countries worldwide (MET-REPAIR; ESAIC CTN study). Patients ≥ 45 years with increased cardiovascular risk undergoing elective non-cardiac surgery were included.

The primary endpoint was a composite of major adverse cardiovascular events (MACE; defined as: cardiovascular mortality, non-fatal cardiac arrest, acute myocardial infarction, stroke, or congestive heart failure) within 30 days after primary surgery. Secondary endpoints included all-cause mortality and non-MACE complications.

Statistics: Multivariate logistic regression models with adjustment for age, sex, and surgical risk according to the ESAIC definition.

Results and Discussion: The final analysis included 15,157 patients with complete data out of 15,984 patients (94.8%).

MACE occurred in 319 (2.1%) of patients and 335 (2.2%) patients died. MACE incidence by CKM stage was: CKM 0: 5/367 = 1.4% [Confidence Interval (CI) 0.4–3.2%]; CKM 1: 3/367 = 0.8% [CI 0.2–2.4%]; CKM 2: 102/7440 = 1.4% [CI 1.1–1.7%]; CKM 3: 27/953 = 2.8% [CI 1.9–4.1%]; CKM 4: 173/5538 = 3.1% [CI 2.7–3.6%]; CKM 4a (GFR<15): 16/4457 = 0.4% [CI 0.2–0.7%]; CKM 4b (GFR<15): 7/150 = 4.7% [CI 1.9–9.4%].

Multivariate logistic regression indicated an independent association between CKM stage ≥ 3 and MACE, mortality, and non-MACE complications, respectively (MACE: adjusted OR (adjOR) = 2.26 [95%CI: 1.78–2.87]; mortality: adjOR = 1.42 [95%CI: 1.13–1.78]; non-MACE complications: adjOR = 1.11 [95%CI: 1.03–1.20].

Conclusion(s): This analysis suggests that the risk of adverse postoperative outcomes increases with increased CKM stages in patients undergoing non-cardiac surgery.
Intradermal injection versus topical patch application of local anesthetic for peripheral venous catheter insertion in adults

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Background: Venipuncture for peripheral venous catheter insertion (PVC) is a painful procedure associated with anesthesia management. In adults, intradermal injection of local anesthetic has been reported to have greater analgesic effect for PVC than topical application. However, a previous study suggested the EMLA® topical anesthetic patch, containing a mixture of lidocaine and prilocaine, provided greater pain relief than intradermal injection of 1% procaine. In this study, we compared the analgesic effect of EMLA® patch with intradermal injection of 2% lidocaine on pain intensity at the time of analgesia and PVC insertion in adult surgical patients.

Methods: In a prospective observational study with IRB approval, we recruited adult patients scheduled for surgery expected to have PVC in the operating room. Per institutional routine, patients had an EMLA® patch applied to the PVC site 1-2 hours prior to their scheduled call time. If the EMLA® patch could not be applied as directed, or if the anesthesiologist selected a PVC site outside the patch area, patients received an intradermal injection of 2% lidocaine in the operating room using a 26G needle. Patients were recruited until 35 subjects were accrued in each group. Perceived pain intensities for the local anesthetic procedure and the insertion procedure itself were measured by VAS (visual analogue scale: 0-100 mm) at the time of insertion.

Results: Of 151 patients approached, 148 patients consented to participate. 70 received PVC insertion in the operating room. Of the 70 patients, one was excluded due to missing data and two from each group due to ineligible size and site of PVC (not the dorsal hand with a 20G catheter), for a total of 65 patients analyzed. The patch group included 34 patients (21 Male, 13 Female, Age 61 [Median], IQR45-69), and the intradermal injection group included 31 patients (22 Male, 9 Female, Age 60 [Median], IQR45-69). The median VAS score for PVC insertion was 2 in the intradermal injection group (IQR 0-16) and 4 in the patch group (IQR 0-14) (p=0.707). VAS scores for the local anesthetic procedure were 16 in the intradermal injection group (IQR 0-0) (p<0.001).

Conclusions: Topical application of local anesthetic by EMLA® patch appears to be as effective as intradermal injection of 2% lidocaine for PVC insertion. VAS scores for anesthetic application were significantly lower in the patch group.

Evaluating the impact of digital health interventions on paediatric anxiety and pain in the perioperative period: a network meta-analysis

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Background and Goal of Study: Pediatric surgical patients commonly experience anxiety and pain, and traditional methods yield inconsistent results. Through a network meta-analysis, we aimed to assess the effectiveness of digital health interventions in relieving perioperative anxiety and pain in children.

Materials and Methods: On October 26, 2023, a thorough search for English articles was conducted across PubMed, Embase, CENTRAL, Web of Science, and CINAHL. The focus was on RCTs involving pediatric patients (0-18 years) who underwent surgery, with digital technology as a distraction intervention. Two reviewers independently screened records, finalizing inclusions through consensus. Primary outcomes: preoperative anxiety and postoperative pain. Secondary outcomes: emergence delirium and procedural compliance. Risk of bias was evaluated using the RoB 2 tool.

Network analysis was conducted using Stata 18.0, employing random-effects modeling for standardized mean difference (SMD) and 95% confidence intervals (CI). Inconsistency was assessed. Interventions were ranked via SUCRA, and the GRADE method was applied to determine uncertainty in each comparison.

Results and Discussion: We included 38 out of 3835 RCTs, involving 3546 children and assessing seven different methods (VR, 2D games, 2D videos, robots, midazolam, control (standard of care), and enhanced control, e.g., educational booklet). The overall risk of bias was deemed low in only 24% of the studies. For anxiety reduction, compared to the control group, certainty of evidence was high for VR (SMD -1.29; 95% CI: -1.83 to -0.74), Game (SMD -1.23; 95% CI: -1.81 to -0.64), Video (SMD -0.99; 95% CI: -1.47 to -0.52), and moderate for Midazolam (SMD -0.92; 95% CI: -1.60 to -0.25).

In reducing postoperative pain, compared to the control group, certainty of evidence was high for VR (SMD -0.94; 95% CI: -1.59 to -0.28) and Game (SMD -0.90; 95% CI: -1.75 to -0.06). The ranking of interventions for reducing anxiety and pain is depicted in Figure 1.
Conclusion(s): Integrating digital health interventions as perioperative preparation tools innovatively addresses anxiety and pain in children.

19AP03-04
Incidence of postoperative pulmonary complications in Emergency Abdominal Laparotomy/laparoscopy. Descriptive analysis from an prospective international cohort study

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Background and Goal of the study: Emergency abdominal surgery is a high-risk surgery usually undergoing to high-risk patients where the risk of death is up to five-time higher. Postoperative pulmonary complications (PPCs) are the most frequent, but its real prevalence is not well-defined ranging from 5% to 48%. The aim of this study was to describe the incidence of PPCs during the first 7 postoperative days in patients who underwent emergency abdominal surgery.

Materials and Methods: The Postoperative pulmonary complications in Emergency Abdominal Laparotomy/laparoscopy (PEAL) study is a prospective international cohort study enrolling all adult patients above 18 years old undergoing emergency abdominal surgery. From April to June 2023 each hospital selected a single 7-day period for the recruitment with a 7-day follow-up from recruitment.

The primary outcome was a composite of PPCs during the first 7 postoperative days. Population baseline characteristics, anesthetic and ventilatory management were also described.

Results and Discussion: A total of 507 patients were included in the analysis. The mean age was 55 y/o with no differences between gender (247 males vs 244 females). 232 (54%) patients had moderate-to-severe risk of PPCs based on ARISCAT score and 294 (59%) of the surgeries were laparoscopic. During the immediate postoperative period, out of the 507 total patients 29 (6%) developed an acute hypoxemic respiratory failure. A total of 114 (22.5%) patients developed at least one PPC during the first 7 postoperative days and 38 (7.5%) developed severe PPCs. When stratified to surgery level, from the second level, the incidence of PPCs were around 40%. The most common PPC were atelectasis and acute respiratory failure.

Conclusion: In this study we observed that 22% of patients were diagnosed of at least one PPC and close to 40% from surgery level 2 during the first seven postoperative days. Previous studies have reported a heterogeneous proportion of patients (from 5% and up to 48%) developing PPCs, justified by several factors such as the included population, the number of PPCs reported or the definition of PPCs used.

References:

19AP03-05
Machine learning-based prediction of postoperative nausea and vomiting: model development and validation

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Background and Goal of Study: Postoperative nausea and vomiting (PONV) significantly impact patient satisfaction, prolong length of post-anesthesia care unit (PACU) stay, and raise healthcare costs. Existing prediction scores like the Apfel and Koivu-ranta scores exhibit suboptimal performance. This study aimed to develop and validate machine learning model for predicting early (during PACU stay) and delayed (first 24 post-operative hours) PONV risk. The performance of the proposed model was compared to that of currently utilized prediction scores.

Materials and Methods: The retrospective data of adult patients admitted to the PACU after undergoing surgical procedures under general anesthesia at the Sheba Medical Center, Israel, between September 1, 2018, and September 1, 2023, were used in this study. The study population was split into a training cohort and a validation cohort and k-fold cross-validation method was used.

The importance of the model's parameters was evaluated using the information gain method. In addition, SHapley Additive exPlanations (SHAP) analysis was used to gain insight into the influence of various features on the obtained prediction tool. The accuracy, recall, precision, and F1-score metrics for the proposed prediction tool were determined subsequently and compared with the classical scores.

Results and Discussion: Among the 54848 patients, early and delayed PONV were observed in 2706 (4.93%) and 8218 (14.98%) patients, respectively. The analysis revealed complex, multidimensional correlations among variables and the risk of PONV, emphasizing the necessity of machine learning techniques. The proposed prediction model demonstrated excellent discriminative performance, with AUC scores 0.917 and 0.855 for predicting early and delayed PONV, respectively. The proposed prediction model achieved an accuracy of 0.840 and 0.773 for predicting early and delayed PONV, respectively, outperforming traditional scores.

The study confirmed known predictors of PONV (including anesthesia duration, specific procedure type, and opioid administration) and uncovered the unexpected influence of intraoperative crystalloid volume on PONV.

Conclusions: The developed machine learning model offers a robust and accurate prediction of early and delayed PONV, surpassing the performance of conventional scoring systems. These models provide a valuable tool for personalized risk assessment, enabling proactive interventions and potentially improving patient outcomes.
**19AP03-06**
The efficacy and safety of perioperative use of melatonin for postoperative delirium in patients undergoing surgery: a systematic review and meta-analysis

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**Background and Goal of Study:** Studies on the perioperative use of melatonin or melatonin agonist to prevent postoperative delirium (POD) have reported conflicting results. This review assessed the efficacy and safety of the perioperative use of melatonin and melatonin agonist for POD prevention.

**Materials and Methods:** We conducted a systematic search for randomized controlled trials that investigated the perioperative use of melatonin or melatonin agonist to prevent POD until December 2022.

The primary outcome assessed was the efficacy of melatonin and melatonin agonist by measuring the incidence of POD (POD-I).

The secondary outcome evaluated was the efficacy and safety of melatonin and melatonin agonist based on the length of hospital stay or intensive care unit stay, in-hospital mortality, and incidence of adverse events. We systematically analyzed using Revman.

**Results and Discussion:** This systematic review included 16 RCTs involving 1,981 patients. The POD-I was lower in the melatonin and melatonin agonist group (the Mel-agonist group) (RR, 0.57; 95% CI, 0.40 to 0.81; P = 0.002) than in the control group (placebo or no drug).

Subgroup analyses for POD-I were based on the type and dose of the drug (low dose; high dose; ramelteon), postoperative period (early period; late period), and type of surgery (cardiopulmonary surgery with high POD risk; other surgery).

The POD-I was lower in the high-dose melatonin group (RR, 0.41; P = 0.001); however, there was no difference between the low-dose melatonin or ramelteon groups and the control group. POD-I was also lower in the early period melatonin group (RR, 0.35; P < 0.001) and cardiopulmonary surgery melatonin group (RR, 0.54; P = 0.01).

However, there were no differences in secondary outcomes between the Mel-agonist group and the control group. POD can be triggered by circadian rhythm disturbance and brain inflammation. The perioperative use of melatonin may prevent POD by regulating the circadian rhythms and offering anti-inflammatory and antioxidant effects.

**Conclusion(s):** Perioperative use of melatonin or melatonin agonist reduces the incidence of POD-I, particularly in the early postoperative period (within 3 days), and when administered at higher doses (≥ 5 mg), particularly in cardiopulmonary surgeries, without adverse events.


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**19AP03-07**
Cognitive training to reduce memory disturbance associated with post-operative cognitive impairment after elective non-cardiac surgery: experimental study

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**Background:** Memory impairment and cognitive dysfunction in the postoperative period are frequent and underestimated complications. These lead to a negative impact on the quality of life of the patients and their families. Consequently, this places a significant burden on the health system.

To evaluate the effectiveness of a cognitive training program, it was designed a prospective study in patients between 55-75 years old undergoing non-cardiac elective surgery of moderate-major complexity to optimize cognitive reserve and reduce impairments in memory.

**Materials and Methods:** An experimental RCT study with 80 patients who underwent surgery at Teknon Medical Center in Barcelona, from April-18 to June-21. The experimental group underwent an Artificial Intelligence-based Cognitive Training (AICT) for ten days prior to surgery, and the control group received standard care. All subjects had cognitive function and memory assessed one week, and one month after surgery. The sieve tests used were: Mini-Cog, T@M, MFE or subjective memory failures. The Goldberg anxiety and depression test were also used.

**Results and Discussion:** Significant differences were found between the groups at 30 days after surgery regarding the Mini-Cog, T@M, MFE or subjective memory failures. The intervention group had fewer cognitive and memory alterations during the postoperative period.

Neither age, hypertension nor diabetes were correlated with cognitive or memory changes preoperatively. In the experimental group, obesity and high anesthetic risk (ASA III) were correlated with a higher risk to develop postoperative cognitive changes.

The type of anesthesia was not an independent factor for postoperative cognitive dysfunction.

**Conclusions:** An AICT program performed by anesthesia nurses may have a positive impact on increasing cognitive reserve and decreasing memory impairment in patients between 55-75 years old undergoing elective non-cardiac surgery of complexity grade II-III.

This intervention may be a prehabilitation strategy for patients with high risk of cognitive dysfunction to enhance the recovery after surgery.

The cognitive training program should be initiated during the pre-anesthetic nursing evaluation.
19AP03-08
Is sedation a better alternative to manage epidermolysis bullosa patients for an interventional endoscopy?

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Background and Goal of Study: Epidermolysis bullosa (EB) is a low-prevalence genetic disorder that results in the loss of mucocutaneous barrier integrity (1).
The increasing life expectancy have appointed new anaesthetic challenges on their interventions (2).
We describe fluoroscopy-guided esophageal balloon dilation procedures performed in these patients under sedation (S) or general anaesthesia (GA) and its complications.

Materials and Methods: A descriptive, observational and retrospective study was conducted. 40 anaesthetic procedures have been performed in 13 patients with EB from 2018 to 2023 at La Paz University Hospital in Madrid. Descriptive parameters were recorded as m (SD) and n (%) and chi-square statistical test was also used to compare qualitative parameters.

Results and Discussion: 82.5% of the cases were recessive dystrophic epidermolysis bullosa. GA was the technique in 25% of the patients (10% with endotracheal tube, 15% with laryngeal mask), and the remaining 75% received S. Mean age 34 (SD 13) yrs and 80% were females. 81.6% had a mouth opening of less than 6 cm. Complications occurred in 45%.
Group GA: dental injury 1(10%), oesophageal tear 2 (20%), mucosal laceration 2 (20%), hypotension 1(10%), bradycardia 1 (10%); Group S: hypotension 6 (20%), bradycardia 1 (6.6%), bronchospasm 1(3%). No bronchoaspiration was recorded.
Complications were more frequent in the GA group (70%) than in S group (30%). Only 7.5% of patients had VAS >3 at 2 h post-procedure.

Conclusion: Our experience shows that sedation is preferred in these procedures, avoiding manipulate airway and with fewer complications.
Nevertheless, due to the low frequency of this condition established protocols are necessary in the anaesthetic management based on experience from referral groups.

References:

19AP03-09
Frequency and reasons for cancellation of elective surgeries on the day of operation in a general hospital in Greece. Data from the last five years

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Background and Goal of Study: The cancellation of a surgery on the scheduled day is a problem that negatively affects both the hospital because it affects its planning and resources, as well as the patients, causing them disruption, dissatisfaction, and stress that could probably be avoided.
The purpose of our study is to record the frequency and reasons for cancellations in order to propose possible solutions to the problem.

Materials and Methods: In this retrospective observational study, we reviewed the data files of the hospital’s anesthesia department and recorded all scheduled surgeries canceled on the day of surgery from January 2018 to October 2023.
We also recorded the most important reasons for cancellation, distinguishing between two main categories: 1. Reasons unrelated to medical conditions, and; 2. Reasons due to uncontrolled preoperative medical conditions.

Results and Discussion: In the study period we covered, a total of 24,008 surgeries were scheduled, of which 1,334 were canceled (5.6% rate).
Of those that were canceled, 182 (13.6%) were due to non-medical reasons (refusal or non-appearance of the patient, overtime, lack of a necessary ICU bed), while the majority of cancellations involving 1152 patients (86.4%) were due to insufficient preoperative preparation related to the following:
• cardiologic problems: 380 patients (33%)
• pulmonary problems: 363 patients (31.5%)
• non-discontinuation of anticoagulants: 114 patients (9.9%)
• endocrinological issues (mainly dysregulated thyroid function): 114 patients (9.9%)
• abnormal laboratory findings: 59 patients (5.1%)
• other medical problems (unknown etiology fever, runny nose on the morning of the operation, etc.): 122 patients (10.6%).
In contrast to previous studies1, the majority of cancellations in our hospital on the day of the operation are due to insufficient pre-operative preparation of the patients and less to other causes that cannot be corrected.

Conclusion(s): Closer cooperation of anesthesiologists with the doctors of the surgical clinics and the implementation of specific pre-operative preparation protocols and detailed instructions for patients are needed in those hospitals where the existence of a pre-operative anesthesia clinic is not possible (due to a lack of time and staff) and the patients come for a pre-operative check-up the day before surgery, so there is not enough time for adequate preparation.

Reference:
19AP03-10
Preoperative eyes-closed parieto-occipital electroencephalogram (EEG) spectral analysis and postoperative delirium (POD) in cardiac surgery with cardiopulmonary bypass (CPB): a secondary analysis of a prospective cohort study

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Background-Goal of Study: Preoperative cognitive impairment is a leading predisposing risk factor for POD. However, assessing patients’ cognitive status remains challenging in a busy surgical setting. Resting-state EEG spectral analysis, such as increase in θ power or decrease in α power and in peak α frequency (PAF), has been studied for the diagnosis and the prognostication of dementia.

Here, we aimed to determine whether these parameters were associated with the occurrence of POD in cardiac surgery, and evaluated their correlation with preoperative cognitive scores.

Material-Methods: Preoperative eyes-closed 2-min 32-channel EEG recordings from 220 adult patients who underwent cardiac surgery with CPB were analysed (NCT03706989). For each patient, a cognitive z-score was calculated from a battery of neuropsychological tests the day before surgery. Spectral analysis was performed using MATLAB® and focused on parieto-occipital mean θ power, mean α power and PAF. EEG data are expressed in dB and as means ± SD. Patients were screened for POD using CAM-ICU, CAM and a chart review until hospital discharge. Comparisons between groups were performed using Student t-test or Chi-square. Linear regression analysis assessed the correlation between EEG parameters and cognitive z-score.

Results-Discussion: POD incidence was 29.5%. POD (+) patients were significantly older (P<0.001) and had lower cognitive z-scores (Table 2). There was no significant difference regarding education level (P=0.163) or number of patients who had received premedication with alprazolam between both groups (P=0.820). There was no significant difference in mean θ and α power or in PAF between both groups (Table 1). Only PAF was significantly correlated with preoperative cognitive z-scores (Table 2).

Table 1 - Parieto-occipital spectral analysis data.

<table>
<thead>
<tr>
<th></th>
<th>POD(-) (n=155)</th>
<th>POD(+) (n=65)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean θ power, dB</td>
<td>-18.51 ± 4.40</td>
<td>-18.75 ± 4.34</td>
<td>0.715</td>
</tr>
<tr>
<td>Mean α power, dB</td>
<td>-14.20 ± 5.28</td>
<td>-15.26 ± 5.36</td>
<td>0.183</td>
</tr>
<tr>
<td>Peak α frequency, Hz</td>
<td>9.28 ± 0.89</td>
<td>9.17 ± 0.81</td>
<td>0.375</td>
</tr>
</tbody>
</table>

Table 2 - Dependent variable = Cognitive z-score.

<table>
<thead>
<tr>
<th></th>
<th>β</th>
<th>95% CI for β</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean θ power, dB</td>
<td>-0.02</td>
<td>-0.05 – 0.01</td>
<td>0.233</td>
</tr>
<tr>
<td>Mean α power, dB</td>
<td>0.02</td>
<td>-0.01 – 0.04</td>
<td>0.170</td>
</tr>
<tr>
<td>Peak α frequency, Hz</td>
<td>0.17</td>
<td>0.02 – 0.32</td>
<td>0.026</td>
</tr>
</tbody>
</table>

Conclusions: Preoperative parameters from parieto-occipital EEG power spectrum could not discriminate patients at risk of POD in our study. Lower posterior PAF was significantly correlated with lower cognitive scores and might indicate brain vulnerability.

Reference:
Meghdadi et al. PLoS One (2021)

19AP03-11
Opioid free versus opioid based multimodal analgesia during laparoscopic gastric bypass surgery: a randomised double-blind trial

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Background: Opioid free anaesthesia (OFA) during bariatric surgery may reduce opioid-induced side-effects, but there is a lack of double-blind trials on the subject. Furthermore, the efficacy and safety of this approach is debated. Since multimodal analgesia has become standard of care in many centres, we aimed to determine if such a strategy coupled with either dexmedetomidine (OFA) or remifentanil with a morphine transition (opioid based anaesthesia (OBA)), would reduce postoperative morphine requirements and opioid-related adverse events.

Methods: This prospective randomised double-blind superiority study included 172 patients randomised to receive either sevoflurane-dexmedetomidine anaesthesia with a continuous infusion of lidocaine and ketamine (OFA) or sevoflurane-remifentanil anaesthesia with a morphine transition (OBA). Both groups received at induction a bolus of magnesium, lidocaine, ketamine, paracetamol, diclofenac and dexamethasone.

The primary outcome was 24-hour postoperative morphine consumption. Secondary outcomes included postoperative quality of recovery, incidence of hypoesthesia, and postoperative nausea and vomiting (PONV).

Results: Eighty-six patients were recruited in each group (predominantly women, 70% had obstructive sleep apnoea). There was no difference in total morphine consumption at 24-hours after surgery (median [IQR]: 16 [13–26] vs. 15 [10–24] mg, difference -2; 95%CI [-5 to 1], p = 0.183). There was no significant difference in QoR-40 and postoperative hypoxemia between groups, but PONV was less frequent in the OFA group (37% vs 59%, P=0.005).

Conclusion: During laparoscopic gastric bypass, OFA did not decrease postoperative morphine consumption when compared to OBA. OFA was, however, associated with a lower incidence of PONV.
19AP04-01
Relationship between self-reported functional capacity and preoperative spirometry parameters – a nested cohort study

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Background and Goal of Study: With non-cardiac surgery volume on the rise and an older and frailer population, preoperative cardiovascular risk assessment becomes more important. For preoperative cardiovascular risk assessment, guidelines suggest the use of self-reported functional capacity. It is, unclear, whether these measures can be interpreted equally across all cohorts of patients, especially in those with pulmonary comorbidities. We hypothesize that changes in spirometric parameters do not affect self-reported functional capacity reported in metabolic equivalents of task (METs).

Materials and Methods: This was single-center cohort study nested in an international cohort. From 2017 to 2019 patients who underwent non-cardiac surgeries and were at elevated cardiac risk were included.

Self-reported functional capacity was assessed using the METREPAIR Questionnaire that assessed the following: METs, stair climbing ability in number of floors, self-perceived cardiopulmonary fitness compared to peers or level of regular physical activity.

Main exposures were percentage FEV1 of the predicted value of FEV1 (FEV1%) and percentage inspiratory vital capacity (VCIn) of the predicted value of VCIn (%VCIn%) as measured using spirometry. Correlation between spirometry measures and self-reported functional capacity was analysed using Pearson’s r or Spearman’s rho.

The discriminatory ability of spirometry measures for METs <4 was calculated using receiver-operating characteristics (ROC) curves. Kruskal-Wallis-test was used to check for difference in mean %FEV1 variance between MET ≥4 vs <4.

Finally, we performed a quantile regression using METs as dependent and %FEV1 (%) as independent variable, to test for association. A p-value <0.05 was considered statistically significant.

Results and Discussion: 207 were enrolled. No correlation was found between %FEV1 or VCIn% and any self-reported functional capacity measure. %FEV1 or VCIn% values did not show any discrimination for METs <4 as indicated in the ROC-analysis and quantile regression.

Conclusion: In this study, spirometry measures did not influence self-reported functional capacity measures assessed using the METREPAIR questionnaire. As such the questionnaire appears to be a suitable tool to assess cardiovascular risk in patients with pulmonary comorbidities but unfit to assess perioperative pulmonary status.

19AP04-02
Ultrasound assessment of optic nerve sheath diameter during surgery in the Trendelenburg position

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Background and Goal of Study: Ultrasonographic measurement of the optic nerve sheath diameter (ONSD) is helpful in the assessment of intracranial pressure[1]. The aim of this study was to determine whether the Trendelenburg position during laparoscopic urological surgery changed the ONSD and whether changes correlated with postoperative complications.

Materials and Methods: In this prospective study, we measured ONSD before patients were placed in the Trendelenburg position. Then the Trendelenburg position was established by tilting the operating table to 20-25 degrees. After surgery, the patients were placed in a horizontal position, and the second measurement of ONSD was obtained.

Results and Discussion: The study included 69 patients. The average preoperative ONSD in the right eye was 5.8 ± 0.7 mm and 5.8 ± 0.8 mm in the left eye. The average postoperative ONSD in the right eye was 6.6 ± 0.8 mm and 6.6 ± 0.7 mm in the left eye. The differences between postoperative and preoperative values in the right and left eyes were statistically significant (p <0.000001). (table 1)

Table 1. The average ONSD before and after procedure.

<table>
<thead>
<tr>
<th></th>
<th>ONSD in the right eye [mm]</th>
<th>ONSD in the left eye [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preoperative</td>
<td>5.8 ± 0.7</td>
<td>5.8 ± 0.8</td>
</tr>
<tr>
<td>Postoperative</td>
<td>6.6 ± 0.8</td>
<td>6.6 ± 0.7</td>
</tr>
<tr>
<td>p-value</td>
<td>p &lt;0.000001</td>
<td>p &lt;0.000001</td>
</tr>
</tbody>
</table>

Conclusion(s): ONSD increased in patients who underwent surgical procedures performed in the Trendelenburg position, but the increase did not correlate with postoperative complications.

References:
19AP04-03
Development and validation of a simplified machine-learning model for postoperative acute kidney injury following total joint arthroplasty: a multicenter prospective study

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Background: Acute kidney injury (AKI) is a significant postoperative complication following total joint replacement (TJA). This study aims to identify preoperative and intraoperative risk factors and develop a simplified AKI predictive model.

Methods: This was a multicenter, prospective, cohort study conducted in three hospitals. Patients undergoing total hip or knee replacement were included, and variables related to preoperative and intraoperative outcomes were collected. We compared the performance of logistic regression (LR), random forest (RF), extreme gradient boosting (XGBoost), and recurrent neural network (RNN) models regarding the area under the receiver operating characteristic curve (AUROC).

Key predictors were extracted using SHapley additive explanation (SHAP) and recursive feature elimination (RFE) and were manually finalized. The Youden index was used to identify the optimal ROC curve threshold.

Results: A total of 10,264 patients were enrolled, of whom 114 (1.11%) developed AKI. The incidence of AKI was 1.12% (92/8211) for the training set and 1.07% (22/2053) for the test set. The XGBoost model using all 118 features showed the best performance in the external validation (AUROC=0.944).

After feature screening, we identified 11 key predictors of postoperative AKI, of which 4 were associated with intraoperative characteristics.

The simplified XGBoost model based on the key predictors showed good performance in the external validation cohort (AUROC=0.905). With a threshold set at 0.005, external validation yielded a sensitivity of 0.842 and a specificity of 0.855.

Figure 1. ROC and PRC for the four machine-learning models

Conclusion: Our study concludes that the XGBoost model outperforms the LR, RF, and RNN models in predicting AKI after TJA surgery. Intraoperative predictors have an important impact on postoperative AKI.

19AP04-04
Assessment of the prognostic value of preoperative B-type natriuretic peptide for myocardial injury and long-term mortality following noncardiac surgery: a retrospective cohort study

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Background: To compare the predictive value of different preoperative N-terminal pro-B-type natriuretic peptide (NT-proBNP) thresholds on non-cardiac surgery outcomes, and to provide external validation for the superior prognostic value of multi-threshold NT-proBNP.

Methods: The study enrolled patients who underwent non-cardiac surgery at Sichuan University West China Hospital. The primary outcome was all-cause mortality within one year after surgery. The performance of the extended model with different thresholds of preoperative NT-proBNP was compared.

Table. Performance statistics between the extended models and old ones.

<table>
<thead>
<tr>
<th>Models and Extended models</th>
<th>AUROC</th>
<th>AUPRC</th>
<th>Brier score</th>
<th>AIC</th>
<th>Hosmer-Lemeshow x²</th>
<th>Prob x²</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASA</td>
<td>0.801</td>
<td>0.415</td>
<td>0.054</td>
<td>2792</td>
<td>1.2</td>
<td>0.996</td>
</tr>
<tr>
<td>ASA plus NT-proBNP(300pg/ml)</td>
<td>0.825</td>
<td>0.390</td>
<td>0.063</td>
<td>2762</td>
<td>2.5</td>
<td>0.963</td>
</tr>
<tr>
<td>ASA plus NT-proBNP(100,200,1500pg/ml)</td>
<td>0.833</td>
<td>0.388</td>
<td>0.063</td>
<td>2744</td>
<td>4.2</td>
<td>0.839</td>
</tr>
<tr>
<td>CCI</td>
<td>0.465</td>
<td>0.071</td>
<td>0.076</td>
<td>3612</td>
<td>22.3</td>
<td>0.004</td>
</tr>
<tr>
<td>CCI plus NT-proBNP(300pg/ml)</td>
<td>0.646</td>
<td>0.113</td>
<td>0.074</td>
<td>3457</td>
<td>31.0</td>
<td>4.101</td>
</tr>
<tr>
<td>CCI plus NT-proBNP(100,200,1500pg/ml)</td>
<td>0.677</td>
<td>0.149</td>
<td>0.064</td>
<td>3410</td>
<td>4.1</td>
<td>0.848</td>
</tr>
<tr>
<td>SORT</td>
<td>0.823</td>
<td>0.332</td>
<td>0.056</td>
<td>2891</td>
<td>27.3</td>
<td>0.001</td>
</tr>
<tr>
<td>SORT plus NT-proBNP(300pg/ml)</td>
<td>0.825</td>
<td>0.330</td>
<td>0.056</td>
<td>2877</td>
<td>17.8</td>
<td>0.023</td>
</tr>
<tr>
<td>SORT plus NT-proBNP(100,200,1500pg/ml)</td>
<td>0.827</td>
<td>0.344</td>
<td>0.055</td>
<td>2855</td>
<td>19.5</td>
<td>0.012</td>
</tr>
<tr>
<td>RCRI</td>
<td>0.510</td>
<td>0.078</td>
<td>0.066</td>
<td>3437</td>
<td>9.4</td>
<td>0.961</td>
</tr>
<tr>
<td>RCRI plus NT-proBNP(300pg/ml)</td>
<td>0.657</td>
<td>0.128</td>
<td>0.068</td>
<td>3277</td>
<td>9.4</td>
<td>0.307</td>
</tr>
<tr>
<td>RCRI plus NT-proBNP(100,200,1500pg/ml)</td>
<td>0.689</td>
<td>0.153</td>
<td>0.067</td>
<td>3229</td>
<td>7.1</td>
<td>0.528</td>
</tr>
</tbody>
</table>

Model performance was assessed by a combination of the AUROC, AUPRC, Brier score (lower values = higher predictive accuracy) and the AIC (lower score = better model fit). Abbreviations: ASA: American Society of Anesthesiologists Physical Status, CCI: Charlson Comorbidity Index, SORT: Surgical Outcome Risk Tool, RCRI: Revised Cardiac Risk Index, AUROC: the area under the receiver operating characteristic curve, AIC: Akaike Information Criterion.

Results and Discussion: The study included 7156 patients, of which 4299 (60.1%) were men, and the mean age was 61.0 [49.0-71.0] years. Within one year after surgery, 500 deaths (7.1%), 644 myocardial injuries after noncardiac surgery (MINS) (9.0%), and 2099 ICU admissions (29.3%) were recorded.

When compared to the reference group (NT-proBNP<100 pg/mL), patients with NT-proBNP measurements of 100 to less than 200 pg/mL had an adjusted hazard ratio (aHR) of death of 1.11 (95% CI, 0.83 to 1.49), 200 to less than 1500 pg/mL had an aHR of 1.31 (CI, 1.02 to 1.68), and 1500 pg/mL or greater had an aHR of 2.17 (CI, 1.61 to 2.89).

The prediction value of the extended RCRI model with multi-threshold NT-proBNP was better than that with single-threshold NT-proBNP, with greater AUROC [0.687 vs 0.689], AUPRC [0.128 vs 0.153], lower AIC [3211 vs 3229], higher NLR [0.283; p<.001], and Brier [0.064 versus 0.067] scores.

Our study demonstrated that multi-threshold NT-proBNP is a stable and effective tool for improving the performance of clinical models. We found that NT-proBNP with multiple thresholds...
19AP04-06
Psychometric evaluation of the modified quality of recovery score for the postanesthesia care unit (QoR-PACU) – a prospective validation study

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Background and Goal of Study: Caring for patients in the early postoperative period is a key aspect of anesthesiologic management. The Standardized Endpoints in Perioperative Medicine (StEP) initiative has emphasized the importance of standardizing outcomes to ensure comparability in research and to facilitate evaluating the effects of changing clinical practice. To date, there is no instrument to adequately assess self-reported QoR in the PACU.

Therefore, we developed and validated a questionnaire applicable specifically in the PACU. Subsequently we modified and re-evaluated the psychometric properties of the questionnaire.

Materials and Methods: The QoR-PACU is a 15-item questionnaire applicable specifically in the PACU. We administered the QoR-PACU before surgery and postoperatively at the time of decision to discharge from the PACU to adult patients, scheduled for elective non-cardiac, non-intracranial surgery under general anesthesia. We assessed feasibility, validity, reliability, and responsiveness of the QoR-PACU. Inter-rater and intra-rater reliability were assessed in different subsets of patients.

Results and Discussion: Of 381 enrolled patients, 307 (96.8%) completed the QoR-PACU postoperatively at a median of 70 minutes [IQR 50, 93] after admission to the PACU.

Construct validity: Of 11 a priori defined hypotheses, nine were confirmed. Postoperative QoR-PACU sum scores differed across categories of sex, perioperative and surgical risk, and modes of airway management and inversely correlated with the duration of anesthesia and surgery, maximum pain intensity and analgesic requirement in the PACU, and length of PACU stay.

Reliability: Cronbach’s alpha 0.70 (95%CI: 0.66 to 0.75), intra-class correlation coefficient 0.86 (95%CI: 0.70 to 0.94, p<0.001) for intra-rater reliability (n=24) and 0.94 (95%CI: 0.90 to 0.97, p<0.001) for inter-rater reliability (n=31).

Responsiveness: Cohen’s effect size 0.68, standardized response mean 0.57.

Conclusion(s): Measures of feasibility, validity and reliability were consistently high. Measures of responsiveness were moderate, which might be attributable to the heterogeneity of the study population.

We conclude that the QoR-PACU, in its current form adequately reflects self-reported QoR after surgery in the PACU. This represents a further stepping stone to the implementation of the QoR-PACU in clinical practice and research. Future studies should include aspects of timing and cross-cultural applicability.

19AP04-07
Intraoperative goal-directed hemodynamic therapy targeting both arterial pressure and flow parameters using uncalibrated pulse contour techniques is associated with reduced postoperative complications in abdominal surgery

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Background and Goal of Study: Goal-directed hemodynamic therapy (GDHT) using uncalibrated pulse contour (uPC) techniques has been shown to be effective in optimizing stroke volume and limiting fluid overload, leading to a reduction in postoperative morbidity. However, the impact of GDHT targeting both arterial pressure (AP) and flow parameters using uPC techniques remains unclear.

This meta-analysis aimed to evaluate the effects of intraoperative GDHT targeting both AP and flow parameters using uPC techniques on postoperative outcomes in patients undergoing abdominal surgery.

Materials and Methods: A comprehensive literature search was conducted in PubMed and Embase, to identify relevant randomized controlled trials (RCTs) comparing intraoperative GDHT targeting both MAP and flow parameters using uPC techniques to other GDHT or no GDHT in adult patients undergoing abdominal surgery. The primary outcome was the incidence of postoperative complications. Secondary outcomes included postoperative acute kidney injury and mortality.

Results and Discussion: 12 RCTs (n=1367 patients) were included in the meta-analysis. The results showed that GDHT targeting both MAP and flow parameters using uPC techniques was
associated with a significant decrease in the incidence of postoperative complications (8 studies, 927 patients: (RR 0.78; 95% confidence interval [CI], 0.65 to 0.94), (Figure 1-2) but not to a reduction of postoperative mortality (9 studies, 1188 patients: (RR 0.97; 95% CI, 0.52 to 1.83) nor postoperative AKI (8 studies, 951 patients: (RR 0.7; 95% CI, 0.49 to 1.02).

Conclusion(s): Intraoperative GDHT targeting both MAP and flow parameters using uPC techniques was associated with a significant reduction in postoperative complications in patients undergoing abdominal surgery.

19AP04-08
The validity of the estimated aortic pulse wave velocity in the prediction of the anaerobic fitness measured with the 6 min walk test before major non-cardiac surgery

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Background and Goal of Study: Aortic pulse wave velocity (AoPWV) is a simple, non-invasive measure of arterial stiffness. A higher AoPWV indicates stiffer arteries, which can reduce blood flow and increase the risk of cardiovascular events. The 6-minute walk test (6MWT) is a measure of functional capacity. A shorter 6MWT distance indicates a lower functional capacity and increased risk of postoperative complications. The purpose of this study was to assess the efficacy of AoPWV in predicting 6MWT distance in patients awaiting major non-cardiac surgery.

Materials and Methods: This was a prospective observational study of 133 patients awaiting major non-cardiac surgery. AoPWV was measured using a pulse wave velocity device, and the distance walked during a 6MWT was recorded. Receiver operating characteristic (ROC) curve analysis was used to derive cut-points for AoPWV that were predictive of 6MWT distance

Results and Discussion: The ROC curve analysis for the < 427 m distance revealed an area under the curve (AUC) of 0.68 (95% confidence interval, 0.56–0.79) and an AUC of 0.72 (95% confidence interval, 0.61–0.83) for > 563 m. (Figure 1)

Patients with an AoPWV > 10.97 m/s should be considered at higher risk, while those patients with values < 9.42 m/s can be considered as low risk.AoPWV was found to be a useful predictor of 6MWT distance in patients awaiting major non-cardiac surgery (Figure 2). Patients with higher AoPWV were more likely to have a shorter 6MWT distance, indicating a lower functional capacity and increased risk of postoperative complications. This suggests that AoPWV may be a useful tool for identifying patients who may benefit from further assessment or intervention before surgery.
**Conclusion(s):** AoPWV is a simple, non-invasive and useful clinical tool to identify and stratify patients awaiting major non-cardiac surgery. In situations of “clinical uncertainty” additional measures should be taken to assess the risk.

**19AP04-10**  
Should the STOP Bang questionnaire for obstructive sleep apnea screening be a part of routine preoperative examination

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**Background and Goal of Study:** Obstructive sleep apnea (OSA), is observed as periods of complete apnea or hypopnea during sleep following oxygen desaturation and hypercapnia leading to severe cardiovascular and respiratory disturbances. Adequate screening for OSA prior to surgery helps reducing risks associated with postoperative complications. STOP Bang questionnaire might be proper tool for that aim.

**Materials and Methods:** Patients were categorized into 3 groups according to OSA risk which was obtained by preoperative STOP Bang questionnaire. We monitored postoperative complications, as well as length of hospital stay (LOS).

**Results and Discussion:** 198 patients, age 21-88, ASA I-IV, were surveyed. 103 (52.02%) were men and 95 (47.98%) women. Average BMI was 27.79 (SD=4.96) kg/m². Patients underwent different elective procedures at four surgical departments. 120 patients were hospitalized at the department of urology, 45 at gynecology, 17 at ENT and 16 at abdominal surgery. According to the STOP Bang questionnaire there were 71 (35.86%) low, 54 (27.27%) intermediate and 73 (36.87%) high-risk patients (Figure 1).

Among all the patients five had already been diagnosed with OSA syndrome and were using CPAP device as a therapy. Among 105 endotracheally intubated patients, 16 were intubated using McCoy spatula and 3 patients by videolaryngoscopy using D-blade spatula.

According to the LOS, low risk patients were hospitalized for 6.17 days, intermediate risk patients for 7.33 and high risk patients for 7.93 days (Figure 2).

**Conclusion(s):** Considering high percentage of not only high-risk patients, but also intermediate-risk patients for OSA syndrome development, the STOP bang questionnaire should be incorporated as a part of preoperative routine. Further researches are required to highlight the importance of STOP Bang questionnaire on hospitalization duration and postoperative complication.

**19AP04-11**  
Blood volume and hemodynamics during treatment of major hemorrhage with Ringer solution, 5% albumin, and 20% albumin. A single center randomized controlled trial

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¹University Hospital of Bern, University Clinic for Anesthesiology and Pain Medicine, Bern, Switzerland, ²Danderyds Hospital / Karolinska Institutet, Department of Clinical Science, Anesthesiology and Intensive Care, Stockholm, Sweden

**Background and Goal of Study:** Volume loading with crystalloid fluid is the conventional treatment of major hemorrhage. We challenged whether a standardized amount of 5% or 20% albumin could be a viable option.

**Materials and Methods:** In this single-center randomized controlled trial, fluid replacement therapy to combat hypovolemia during hemorrhage was allocated in 42 patients to be either 5% albumin (12 mL/kg) or 20% albumin (3 mL/kg) over 30 min, both completed by a Ringer-lactate replacing blood loss in a 1:1 ratio, or Ringer-lactate alone to replace blood loss in a 3:1 ratio. Measurements of blood hemoglobin for 5 hours were used to estimate the effectiveness of each fluid to expand the blood volume. Hemodynamics were monitored via esophagus Doppler, arterial and central venous cannulation.

**Results and Discussion:** The median hemorrhage was 848 mL. A regression equation showed that Ringer-lactate expanded the plasma volume by 0.18 times the infused volume while the cor-
responding power of 5% and 20% albumin was 0.74 and 2.09, respectively. The Ringer-lactate only fluid program resulted in slight hypovolemia (mean, -313 mL) and increased the pulse pressure variation (PPV). The 5% and 20% albumin programs were more effective in filling the vascular system; this was evidenced by blood volume changes of only +63 mL and -44 mL respectively, long-lasting plasma volume expansion (median half time of 5.5 h and 4.8 h respectively), unchanged or decreased PPV and an increase of the central venous pressure.

Results and Discussion: The median hemorrhage was 848 mL. A regression equation showed that Ringer-lactate expanded the plasma volume by 0.18 times the infused volume while the corresponding power of 5% and 20% albumin was 0.74 and 2.09, respectively. The Ringer-lactate only fluid program resulted in slight hypovolemia (mean, -313 mL) and increased the pulse pressure variation (PPV). The 5% and 20% albumin programs were more effective in filling the vascular system; this was evidenced by blood volume changes of only +63 mL and -44 mL respectively, long-lasting plasma volume expansion (median half time of 5.5 h and 4.8 h respectively), increased the mean circulatory filling pressures, unchanged or decreased PPV, and an increase of the central venous pressure.

Conclusion: The power to expand the plasma volume was 4 and almost 12 times greater for 5% albumin and 20% albumin than for Ringer-lactate, and the duration was longer. The clinical efficacy of albumin during major hemorrhage was quite similar to previous studies with no hemorrhage.

Background and Goal of Study: Volume loading with crystalloid fluid is the conventional treatment of major hemorrhage. We challenged whether a standardized amount of 5% or 20% albumin could be a viable option. Analyzes of the hemodynamic biomarkers (Pro-BNP, Pro-ANP, ProADM and Copeptin) in the peri-operative settings of these volume therapies during major hemorrhage situations have never been assessed.

Materials and Methods: In this single-center randomized controlled trial, fluid replacement therapy to combat hypovolemia during hemorrhage was allocated in 42 patients to be either 5% albumin (12 mL/kg) or 20% albumin (3 mL/kg) over 30 min, both completed by a Ringer-lactate replacing blood loss in a 1:1 ratio, or Ringer-lactate alone to replace blood loss in a 3:1 ratio. Measurements of hemodynamics cardiovascular biomarkers Pro-BNP, Pro-ANP, ProADM and Copeptin were made at time 0min, 60min, 300min from the start of the bleeding phase and at post operative day 1, and were used to evaluate the hemodynamic parameters response of each fluid.

Conclusion(s): The power to expand the plasma volume was 4 and almost 12 times greater for 5% albumin and 20% albumin with long-lasting effect than for Ringer-lactate. Results of Biomarker analyze will follow.
and via patient controlled analgesia (PCA) in the 24 hours postoperatively as well as visual analogue scale (VAS) scores at specific time intervals. A two-sided T-test was performed on the mean VAS scores and mean morphine consumption to compare the TIVA group and the sevoflurane-based anaesthesia group.

**Results and Discussion:**

<table>
<thead>
<tr>
<th></th>
<th>Mean VAS PACU</th>
<th>Mean VAS 6h</th>
<th>Mean VAS 12h</th>
<th>Mean VAS 24h</th>
<th>Mean morphine consumption (mg) PACU</th>
<th>Mean morphine consumption (mg) PCA (24hr postoperatively)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sevoflurane</td>
<td>3.6</td>
<td>5.7</td>
<td>3.4</td>
<td>3.3</td>
<td>5.1</td>
<td>33.7</td>
</tr>
<tr>
<td>TIVA</td>
<td>3.0</td>
<td>4.0</td>
<td>3.1</td>
<td>2.4</td>
<td>2.9</td>
<td>22.6</td>
</tr>
<tr>
<td>Tmax p value</td>
<td>0.17</td>
<td>0.06</td>
<td>0.17</td>
<td>0.18</td>
<td>0.13</td>
<td>0.003</td>
</tr>
</tbody>
</table>

Table 1: Mean VAS scores and mean morphine consumption in TIVA group and the sevoflurane-based anaesthesia group.

Our audit demonstrated consistently higher VAS scores and morphine consumption for the sevoflurane group compared to the TIVA group. Of note all 14 patients received 10mg of morphine intraoperatively. The average PCA morphine consumption for the sevoflurane group was 33.7mg (range 26mg-50mg) compared to 22.5mg (range 18mg-26mg) for the TIVA group, this difference was statistically significant (P<0.05).

**Conclusion:** TIVA may be beneficial in reducing postoperative pain and opioid consumption in patients at our institution undergoing major gynaecological surgery.

**Reference:**

19AP05-03

**Impact of virtual reality (VR) with Hypnosis (VRH) and VR with Distraction (VRD) on anxiety and pregnancy rate before sedation for oocytes retrieval (OR): a double-blinded randomised study**

R. de Mahieu1, C. Pirard2, P. Laurent2, C. Watremez1, M. Momeni2, F. Roelants1

1UCLouvain, Anesthesiology, Woluwé, Belgium, 2UCLouvain, Gynecology and Andrology, Woluwé, Belgium

**Background and Goal of Study:** Anxiety can affect pregnancy rate following an in-vitro fertilization procedure1. Hypnosis reduces emotional distress associated with medical procedures2. VR is an immersive 3D experience, created using a visual headset and headphones. The goal of this study was to evaluate the effect of VR session with and without hypnosis before sedation for OR on anxiety levels and on pregnancy rate.

**Materials and Methods:** After written informed consent, 353 women scheduled for OR under sedation were included in a prospective randomised double-blinded study (NCT03064061). A visual anxiety scale (VAS) before (t1) and after VR (t2) session and before leaving the hospital (t3) was realised. For OR, remifentanil (0.1 μg/kg/min) and ketamine (0.15 mg/kg) were used and propofol added as needed. VRD Group (n=178) received a VR session (underwater walk) and VRH group (n=164) received a VR session with hypnosis focus on breathing, slowing respiratory rhythm and suggestions of reusing the technique later to find well-being and calm as needed (AQUA Oncomfort®).

Primary endpoint was clinical pregnancy at 12 weeks by ultrasonography (US). To achieve a difference of 6% a total of 160 patients were needed in each group. Mann Whitney, Wilcoxon signed rank test and Chi-square tests were used; p<0.05 was considered significant.

**Results and Discussion:** 11 patients were excluded. There was no significant difference regarding anxiety scores, propofol consumption, nor positive pregnancy rate between groups, but the anxiety scores significantly decreased within both groups (p<0.001 t1 vs t2 and t1 vs t3).

<table>
<thead>
<tr>
<th></th>
<th>VRD (n=178)</th>
<th>VRH (n=164)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>VAS anxiety (0-100) median (P25-P75)</td>
<td>31 (24-53)</td>
<td>45 (26-58)</td>
<td>0.065</td>
</tr>
<tr>
<td>t1</td>
<td>19.5 (9.36)</td>
<td>20 (6.5-38)</td>
<td>0.786</td>
</tr>
<tr>
<td>t2</td>
<td>5 (0-20)</td>
<td>5.5 (0-20)</td>
<td>0.524</td>
</tr>
<tr>
<td>t3</td>
<td>156 (87.6%)</td>
<td>138 (84.1%)</td>
<td>0.353</td>
</tr>
<tr>
<td>Embryo transfer</td>
<td>30 (10-50)</td>
<td>30 (10-50)</td>
<td>0.924</td>
</tr>
<tr>
<td>Positive β-HCG</td>
<td>54 (30.3%)</td>
<td>46 (33.3%)</td>
<td>0.638</td>
</tr>
<tr>
<td>12 weeks pregnancy</td>
<td>28 (18.6%)</td>
<td>31 (22.4%)</td>
<td>0.411</td>
</tr>
</tbody>
</table>

**Conclusion(s):** Although both RVD and RVH session before sedation for OR reduce significantly women’s anxiety, type of suggestions used during hypnosis RV session do not statistically impact the pregnancy rate.

**Reference:**

19AP05-04

**A simple machine learning model for the prediction of acute kidney injury following noncardiac surgery in geriatric patients**

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1West China Hospital, Sichuan University, Anesthesiology, Chengdu, China, 2Southwestern University of Finance and Economics, Center of Statistical Research, School of Statistics, Chengdu, China

**Background and Goal of Study:** Acute kidney injury (AKI) is a common complication following noncardiac surgery, and is associated with increased mortality. Early identification of geriatric patients at high risk of AKI could facilitate preventive measures. This study used machine learning methods to identify important features and predict AKI following noncardiac surgery in geriatric patients.

**Materials and Methods:** A prospective study cohort was established with consecutively enrolling patients aged ≥65 years who received noncardiac surgery at the West China Hospital of Sichuan University from June 2019 to December 2021. Data were split into training set (from June 2019 to March 2021) and internal validation set (from April 2021 to December 2021) by time. The least absolute shrinkage and selection operator (LASSO) regularization algorithm and the random forest recursive feature elimination algorithm (RF-RFE) were used to screen important features associated with AKI.

Models were trained through extreme Gradient Boosting (XGBoost), random forest, and LASSO. Models’ performances were compared according to area under the receiver operating charac-
Attention algorithm was used to identify important variables. Models established by other machine learning methods. The Self-Attention algorithm was used to interpret the machine learning model.

**Results and Discussion:** The training set included 6753 geriatric patients. Of these, 250 (3.70%) patients developed AKI. The XGBoost model with RF-RFE selected features outperformed other models with AUPRC of 0.505, AUROC of 0.806, and Brier score of 0.025. The model incorporated ten predictors, including operation site, hypertension, and diabetes mellitus. The internal validation set included 3808 geriatric patients, and 96 (2.52%) patients developed AKI. The model maintained good predictive performance with AUPRC of 0.431 and AUROC of 0.845 in internal validation.

**Conclusion(s):** This study developed a simple machine learning model and a web calculator for predicting AKI following noncardiac surgery in geriatric patients, which could guide preventive measures and facilitate improving patient prognosis.

### 19AP05-05

**Deep learning prediction of postoperative pulmonary complications in geriatric patients using multi-type data**

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¹West China Hospital, Sichuan University, Anesthesiology, Chengdu, China, ²Chengdu University of Information Technology, College of Software Engineering, Chengdu, China

**Background and Goal of Study:** Postoperative pulmonary complications (PPCs) are major cause for postoperative morbidity, especially for geriatric patients. Early recognizing high-risk patients is of great value for preventing PPCs. Existing PPCs prediction models are based on structured data mainly, which might limit the predictive accuracy for the ignoring other important data. This study aimed to develop and validate a deep learning model based on combined natural language data and structured data for predicting PPCs in geriatric patients.

**Materials and Methods:** A prospective study cohort was established with consecutively enrolling patients aged ≥65 years who received surgery under general anesthesia at the West China Hospital of Sichuan University. Data were split into training set (from 25th June 2019 to 31st July 2021) and internal validation set (from 1st August 2021 to 31st December 2021) by time. A deep learning model was developed based on combined natural language data and structured data, and model performance was compared with models established by other machine learning methods. The Self-Attention algorithm was used to identify important variables.

**Results and Discussion:** The training set included 13,904 geriatric patients. Our deep learning model outperformed other models with an area under the precision-recall curve (AUPRC) of 0.576, an area under the receiver operating characteristic curve (AUROC) of 0.862, and an F1 score of 0.606. Important variables included dyspnea, thrombin time, and operation time. The internal validation set included 3452 geriatric patients, and 303 (8.8%) patients developed PPCs. In internal validation, the model maintained good predictive performance with AUPRC of 0.617, AUROC of 0.860, and F1 score of 0.610.

**Conclusion(s):** The prediction of PPCs in geriatric patients could be improved by deep learning method based on combined natural language data and structured data. The analysis of important variables could facilitate the interpretation of prediction, thus to strengthen clinicians’ trust and support clinical decision-making.

### 19AP05-06

**Impact of preoperative Modified Frailty Index on postoperative quality of recovery in major abdominal surgery: a prospective observational study**

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¹National Taiwan University Hospital Hsin Chu Branch, Anesthesiology, Hsin Chu, Taiwan

**Background and Goal of Study:** Preoperative frailty, as assessed by the Modified Frailty Index (mFI), has been linked to poorer postoperative outcomes. However, postoperative patient recovery is also closely associated with patient-centered measurements. Yet, it remains unclear whether the mFI correlates with worse patient-reported outcome measures (PROMs). Hence, this prospective observational study aimed to explore the impact of preoperative mFI on postoperative quality of recovery. We measured this using the Quality of Recovery-15 (QoR-15), one of the most validated PROM indicators among patients undergoing major abdominal surgery.

**Materials and Methods:** 50 patients scheduled for major abdominal surgery were enrolled from two hospitals. Research nurses, independent of clinical care, measured preoperative mFI and QoR-15 scores at the preoperative stage and on postoperative day one. Patients were divided into two groups based on their preoperative mFI scores: mFI ≥ 2 and mFI < 2 (mFI = 0 or 1). The primary outcome was the change in Quality of Recovery-15 (QoR-15) scores from preoperative to postoperative day one.

**Results and Discussion:** Baseline characteristics were comparable between patients with mFI ≥ 2 and mFI < 2. Preoperative QoR-15 scores did not differ between the two groups (p = 0.26). However, patients with an mFI ≥ 2 experienced a significantly greater decrease in QoR-15 scores, with a median decline of -48 (95% CI: -63.3 to -38.3), compared to those with an mFI < 2, who had a median decline of -31 (95% CI: -40.2 to -24.8, p = 0.02).
Conclusion(s): The study revealed that preoperative mFI is a crucial predictor of worse postoperative PROM outcomes. Our pilot results indicate the critical value of mFI for preoperative risk stratification in patients undergoing major abdominal surgery.

References:

19AP05-07 Economic effects of the Enhanced Recovery After Surgery (ERAS) implementation in colorectal surgery in Taiwan National Health Insurance (NHI) system

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1Taichung Veterans General Hospital, Department of Anesthesiology, Taichung City, Taiwan

Background and Goal of Study: Enhanced recovery after surgery (ERAS) program consists of multidisciplinary and multimodal perioperative management which has been shown to reduce costs through less complications and shorter length of hospital stay. Reducing costs is a crucially important issue for the Taiwan National Health Insurance (NHI) system, a government-sponsored public health insurance covering 99.93% of the country’s population. This study aimed to assess the economic effects of a standard ERAS program for colorectal surgery in a tertiary medical center.

Materials and Methods: The ERAS program had been implemented in Taichung Veterans General Hospital, Taiwan since 2019. We retrospectively conducted an economic analysis of ERAS program in colorectal surgery. Patients undergoing colorectal surgery from June, 2019 to December, 2022 were analyzed and propensity-matched into two groups: ERAS group (n = 361) and control group with standard care (n = 361). Standard statistical testing (means, Mann-Whitney Fisher’s exact T test) was used to access the primary outcomes: length of hospital stay, overall costs, and the declared amount of Taiwan National Health Insurance (NHI) system. The effects of ERAS on health services utilization (72-hour emergency department re-attendance and 14-day readmission) were developed by conditional logistic regression analysis. All costs were reported in New Taiwan dollars (NT$, TWD).

Results and Discussion: The groups were well matched in terms of demographic details. The median length of hospital stay was significantly lower in the ERAS group (8.01 days versus 14.73 days; P < 0.01). Mean overall costs were NT$121,148 per patient in the ERAS group and NT$152,943 per patient in the control group (P < 0.01). Specifically, the net overall savings of ERAS program implementation were estimated at NT$ 101,795 per patient and at NT$ 98,723 per patient in Taiwan National Health Insurance (NHI) system. Overall mortality was lower in the ERAS group (OR, 0.24; 95% CI, 0.11-0.51; P < 0.01). There were no significant differences between two groups in 72-hour emergency department re-attendance and 14-day readmission.

Conclusion(s): The study showed promising results that the implementation of ERAS protocol was cost-saving in patients undergoing colorectal surgery. ERAS program significantly reduces overall costs and the declared amount in Taiwan National Health Insurance (NHI) system.

19AP05-09 Self-reported functional capacity for the prediction of postoperative pulmonary complications and major adverse cardiac events – a prospective observational study

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2University Medical Center Hamburg-Eppendorf, Institute of Medical Biometry and Epidemiology, Hamburg, Germany

Background and Goal of Study: Quantifying exercise capacity, for instance self-reported functional capacity, is a pivotal step in preoperative cardiac risk assessment. While a current multicenter study did not identify improved prediction of major adverse cardiac events (MACE) by self-reported functional capacity, it is unknown if it might predict postoperative pulmonary complications (PPC).1

Materials and Methods: After ethical approval consecutive patients scheduled for noncardiac surgery were included in the prospective observational single center PRESELECT study (ClinicalTrials.gov NCT04156594). Self-reported functional capacity was assessed by means of the Duke Activity Status Index (DASI). A multivariable regression ‘baseline’ model (age, BMI, sex, type of surgery) and a ‘functional capacity’-model (with additional self-reported functional capacity) were fitted and the areas under the receiver operating characteristic curve (AUC) for the prediction of the primary endpoints PPC and MACE were calculated.

Results and Discussion: 5,235 patients were included between April 11, 2019 and November 2, 2022. Incidences were 2.2% (117/5,235) for MACE and 5.0% (262/5,235) for PPC. The AUCs for the prediction of MACE were 0.77 (95%CI 0.73-0.82) at baseline and 0.79 (95%CI 0.75-0.83; p = 0.056) after functional capacity was included. The AUCs for the prediction of PPC were 0.82 (95%CI 0.80-0.85) at baseline and 0.87 (CI 0.84-0.89; p < 0.001) after functional capacity was included.

Conclusion(s): Self-reported functional capacity was an independent predictor for PPC in the ‘functional capacity-model’ (OR 1.39, 95%CI 1.29-1.50, p < 0.001).

References:
Perioperative Care

Figure: 19AP05-10
Association of intravenous neostigmine and anticholinergics or sugammadex with postoperative delirium: a retrospective cohort study

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1Cleveland Clinic, Department of Outcomes Research, Cleveland, United States, 2Cleveland Clinic, Department of Quantitative Health Sciences, Cleveland, United States

Background and Goal of Study: Administration of cholinesterase inhibitors in combination with anticholinergic drugs for reversal of neuromuscular blocks may precipitate delirium through impairment of central cholinergic transmission, which could be avoided by using sugammadex. Therefore, we tested the primary hypothesis that postoperative delirium is less common when neuromuscular block is reversed with sugammadex than with neostigmine combined with glycopyrrolate or atropine.

Materials and Methods: We conducted a single-center retrospective cohort study, analyzing all adult patients having general anesthesia for noncardiac surgery who received neostigmine or sugammadex from January 2016 to March 2022. Inverse propensity score weighting and propensity score calibration was used to adjust for appropriate confounders. Our primary outcome was presence of delirium within the first four days after surgery, defined as at least one positive brief Confusion Assessment Method (bCAM) screening. The secondary outcome was presence of early delirium within 24 hours of surgery.

Results and Discussion: Among 49,468 cases in our analysis, 6,881 received sugammadex and 42,587 received neostigmine. After propensity weighting, the incidence of delirium was 1.09% in the sugammadex group and 0.82% in the neostigmine group. The odds of postoperative delirium did not differ between the sugammadex and neostigmine groups, with an estimated odds ratio (95% confidence interval) of 1.33 (0.91, 1.95), P = 0.147. A sensitivity analysis restricted to only include cases with at least 6 bCAM measurements over POD 1 to 4 had consistent results, as sugammadex compared with neostigmine was associated with an estimated odds ratio for postoperative delirium of 1.20 (0.82, 1.77), P = 0.346. Sugammadex was significantly associated with an increased incidence of early postoperative delirium, with an estimated odds ratio of 1.71 (1.07, 2.72), P = 0.025. Further analysis showed no treatment-by-age interaction for either postoperative delirium (P = 0.637) or postoperative early delirium (P = 0.904).

Conclusion(s): Compared to sugammadex, use of neostigmine for reversal of neuromuscular block is not associated with increased risk of postoperative delirium. Though sugammadex was associated with statistically significant increased risk of postoperative early delirium, the difference was small and not clinically relevant, and may reflect the presence of unknown confounders.

Figure: Areas under the Receiver operating characteristic curve (AUC) illustrate the performance of two multivariable models (‘baseline’ without and ‘functional capacity’ with self-reported functional capacity) to predict postoperative pulmonary complications (PPC) and another two models to predict major adverse cardiac events (MACE). Abbreviation: 95%CI: 95%-confidence interval.

19AP05-11
Ischaemia time and postoperative evolution after total knee arthroplasty

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Background and Goal of Study: During total knee arthroplasty (TKA) surgery, using proximal limb ischaemia reduces perioperative bleeding. However, ischaemia has been linked to vascular damage, venous thrombosis, haemodynamic response, and reduced mobility. Our aim is to analyse the relationship between duration and pressure of intraoperative ischaemia and the postoperative outcomes in TKA. As secondary objective, we assessed the influence of other perioperative variables on postoperative pain.

Materials and Methods: Once the approval of the Ethics Committee was obtained, we conducted a prospective observational study in 50 patients undergoing TKA at the Hospital Universitario de GC Dr. Negrín from January to September 2023. Patients taking anticoagulants, those with coagulation disorders or peripheral nerve injuries, and those who refused to participate were excluded. Pre-, intra- and immediate postoperative variables that could influence recovery were collected. Immediate postoperative pain (using VAS), time to walk, rehabilitation time and satisfaction with rehabilitation were also recorded.

Results and Discussion: Fifty patients were included: 72% female, mean age 68 ± 8 years, BMI 27.6 kg-m-2. Peripheral nerve block was performed in 50% of cases. Mean ischaemia time was 97.1 minutes with a pressure of 293 mmHg. Postoperative analgesia was based on a combination of opioids and NSAIDs in 96% of cases. Postoperative VAS score at 24 h was 2.6 ± 1.1, with an
onset of walking of 3.1 ± 1.0 days. Rehabilitation time was 23.5 ± 16.8 days with a satisfaction score of 6.96 out of 10. No relationship was found between postoperative pain and ischaemia time (p=0.45) or pressure (p=0.77). There was also no relationship between the time of ischemia and the time to start walking (p=0.226), duration of rehabilitation (p=0.693) or satisfaction with rehabilitation (p=0.478). No perioperative variables were detected to influence greater postoperative pain.

**Conclusion(s):** In our study, we did not detect any relationship between ischemia time and pressure and postoperative pain or recovery after TKA. Pain is acceptably treated with the combination of opioids and NSAIDs.

**19AP06-01**  
*Impact of Machine Learning-based Clinician Decision Support Algorithms in Perioperative Care (IMAGINATIVE Trial) : Study Protocol*

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‘Singapore General Hospital, Anaesthesiology, Singapore, Singapore, ‘Duke-NUS Medical School, Health Services & Systems Research, Singapore, Singapore

**Background:** Annually, around 250 million people undergo surgery, with approximately 17% experiencing significant postoperative complications. Predictive Artificial Intelligence (AI) technologies, including Machine Learning algorithms, are expected to play a substantial role in the future as Clinical Decision Support (CDS) tools. However, the efficacy of AI-based CDS has not been clearly proven. Singapore General Hospital developed such a model, the CARES calculator, in 2023 to predict 30-day postoperative mortality rate, initially established at 3.5%. This metric captures the natural clinical outcomes will be observed.

**Materials and Methods:** This study utilizes a hybrid type 1 effectiveness-implementation Randomized Controlled Trial design. We aim to recruit 9100 patients, randomly assigned to either the CARES-guided group (unblinded to risk level) or the unguided group (blinded). In the CARES-guided group, scores will be calculated and integrated into the pre-anesthesia assessment form, which is reviewed by the nursing, anesthesiology, critical care, and surgical teams before and after surgery. The system will not dictate any other aspects of patient care, and the natural clinical outcomes will be observed.

**Outcomes:** The primary outcome is a reduction in the one-year mortality rate, initially established at 3.5%. This metric captures the long-term impact of predictive models in clinical decision-making. The secondary outcome is the reduction in avoidable postoperative ICU admissions. The tertiary outcome focuses on implementation aspects, including adoption, acceptability, and user experiences. This would be done via qualitative audits measuring adoption rates, with specific attention to CARES recommendation implementation across clinical professions.

**Discussion:** The trial’s conclusion will inform the potential scaling of CARES for predicting other vital outcomes like the length of hospital stay, myocardial infarction, and pulmonary complications, and if it effectively reduces mortality and optimizes ICU resources. More importantly, the implementation framework qualitative interviews will inform barriers toward the adoption of a machine learning model in clinical care, if any, which would be generalizable to other healthcare systems.

**19AP06-02**  
*Comparison of the change in total oxidant and total antioxidant capacities in low-flow and high-flow general anesthesia protocols*

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‘Duzce University Faculty of Medicine, Anesthesiology and Reanimation, Duzce, Turkey, ‘Duzce University Faculty of Medicine, Biochemistry, Duzce, Turkey, ‘Duzce University Faculty of Medicine, Biostatistics and Medical Informatics, Duzce, Turkey

**Background and Goal of Study:** Our study aimed to comparatively evaluate the effects of low-flow anesthesia (LFA) and high-flow anesthesia (HFA) on total oxidant and total antioxidant status (TOS, TAS). Primary hypothesis is that the oxidative stress level will decrease due to low inspired oxygen levels in LFA. 

**Materials and Methods:** 72 patients aged 18-65 with ASA I-II were included. Patients were divided into 2 groups, LFA (1 L/min) and HFA (4 L/min). Vitamin D (VitD) levels were determined preoperatively. Albumin (Alb), CRP values, TAS and TOS were determined preoperatively (T0), intraoperatively (T1) and postoperatively (T2). Comparison of data was tested with repeated measures ANOVA. Pearson correlation, Spearman’s rho was used in correlation analyses.

**Table 1. Comparison of TAS/TOS**

<table>
<thead>
<tr>
<th></th>
<th>LFA (n=36)</th>
<th>HFA (n=36)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAS T0</td>
<td>1,76±0.23</td>
<td>1,82±0.30</td>
<td>0.408</td>
</tr>
<tr>
<td>TAS T1</td>
<td>1,83±0.24</td>
<td>1,92±0.27</td>
<td>0.517</td>
</tr>
<tr>
<td>TAS T2</td>
<td>1,85±0.28</td>
<td>1,89±0.29</td>
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</tr>
<tr>
<td>TOS T0</td>
<td>19,82±11.82</td>
<td>21,48±14.01</td>
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</tr>
<tr>
<td>TOS T1</td>
<td>19,66±11.75</td>
<td>17,20±8.72</td>
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</tr>
<tr>
<td>TOS T2</td>
<td>22,49±11.99</td>
<td>21,38±15.64</td>
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</tr>
</tbody>
</table>

**Table 2. Comparison of CRP, Alb, VitD**

<table>
<thead>
<tr>
<th></th>
<th>LFA (n=36)</th>
<th>HFA (n=36)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRP T0</td>
<td>0,30±0.54</td>
<td>0,53±1,61</td>
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</tr>
<tr>
<td>CRP T1</td>
<td>0,31±0.56</td>
<td>0,52±1,36</td>
<td>0,604</td>
</tr>
<tr>
<td>CRP T2</td>
<td>1,41±2,58</td>
<td>1,37±2,31</td>
<td>0,911</td>
</tr>
<tr>
<td>Alb T0</td>
<td>4,24±0,30</td>
<td>4,15±0,24</td>
<td>0,258</td>
</tr>
<tr>
<td>Alb T1</td>
<td>4,05±0,38</td>
<td>4,02±0,39</td>
<td>0,775</td>
</tr>
<tr>
<td>Alb T2</td>
<td>3,96±0,36</td>
<td>3,97±0,40</td>
<td>0,968</td>
</tr>
<tr>
<td>VitD T0</td>
<td>7.5 (10.9) (3-22)</td>
<td>14.8 (13.0) (3-32)</td>
<td>0.001</td>
</tr>
</tbody>
</table>

**Results and Discussion:** There was no significant difference between the groups in TAS, TOS, CRP, Alb at T0, T1, T2. At T0 VitD was found to be significantly higher in the HFA group (p = 0.001). It was observed that TAS values at T1 and T2 increased significantly in both groups compared to TAS at T0 (p = 0.006), (p = 0.02).
We conclude that the high level of VtD in HFA group did not have any effect in the context of TAS. T1- and T2-Alb values were found to decrease significantly compared to T0 values (p<0.001), (p<0.001) in both groups. CRP increased significantly at T2 in both groups compared to T0 (p<0.001) and T1 (p<0.001) values.

Conclusion(s): Effects of LFA on TOS/TAS were similar to HFA. We consider that the increase in oxidative stress expected in HFA was suppressed due to an increase in TAS.

19AP06-03
New-onset postoperative hypotension in patients recovering from non-cardiac surgery: a prospective observational study

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Background and Goal of Study: About a fifth of patients recovering from non-cardiac surgery have mean arterial pressures below 65 mmHg at least one mean arterial pressure below 65 mmHg at least once in 113 of 249 patients (45%). However, it remains unknown whether postoperative mean arterial pressures below 65 mmHg constitute clinically important hypotension or are within the normal pressure range for some patients. We therefore aimed to determine how often postoperative mean arterial pressures below 65 mmHg constitute new-onset posthypotension in patients recovering from non-cardiac surgery on general wards.

Materials and Methods: We conducted a prospective observational study in patients having non-cardiac surgery with general anaesthesia. We measured arterial pressure using automated oscillometry (OnTrak, Spacelabs Healthcare, Snoqualmie, USA) at 30 minutes intervals before and after surgery. Preoperatively, arterial pressure was measured at home for a day and a night. Postoperatively, arterial pressure was measured during the remaining day of surgery and throughout the first postoperative night and day. We separately determined how many patients had at least one mean arterial pressure below 65 mmHg before and after surgery.

We defined new-onset postoperative hypotension as a postoperative mean arterial pressure below 65 mmHg when preoperative mean arterial pressure was never below 65 mmHg.

Results and Discussion: 249 patients with a median (range) age of 71 (66–77) years were included in the analysis. Most were designated ASA physical status II (139 [56%]) or III (95 [38%]). Preoperative mean arterial pressure was below 65 mmHg at least once in 113 of 249 patients (45%). Postoperative mean arterial pressure was below 65 mmHg at least once in 102 of 249 patients (41%). 71 patients (28%) had mean arterial pressures below 65 mmHg both before and after surgery. 31 of the 102 patients with postoperative mean arterial pressure below 65 mmHg (30%; 12% of all 249 patients) had new onset postoperative hypotension.

Conclusion(s): About 40% of patients recovering from non-cardiac surgery on general wards have at least one mean arterial pressure below 65 mmHg – but this constitutes new onset postoperative hypotension in only one-third of these patients (12% of all patients).

Reference:

19AP06-04
Protective effect of sugammadex against postoperative urinary retention: a systematic review and meta-analysis

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Background and Goal of Study: Postoperative urinary retention (POUR) is a common complication and is associated with the use of anticholinergics. Since sugammadex decreases the use of perioperative anticholinergics (e.g., glycopyrrolate, atropine), combined with anticholinesterases to antagonize their side effects, it also may affect the incidence of POUR. However, no previous studies have systematically dealt with this issue.

This review aimed to evaluate the effect of sugammadex versus anticholinesterase plus anticholinergic drugs on the risk of POUR.

Materials and Methods: A systematic literature review and meta-analysis of observational and randomized controlled trials (RCTs) were performed according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines. Searches were conducted in PubMed, the Cochrane Library, EMBASE and Scopus on December 4, 2023. We selected observational and randomized trials, comparing POUR incidence (primary outcome) after receiving sugammadex versus anticholinesterase plus anticholinergic (control group). Screening and data extraction were conducted by two independent reviewers.

Study quality was assessed using the Newcastle-Ottawa scale and Version 2 of the Cochrane risk-of-bias tool for RCT (Rob2), as appropriate. The pooled data were reported as odds ratio (OR) with 95% confidence intervals (CI). Heterogeneity among the studies was evaluated using the I² statistic.

Results and Discussion: The meta-analysis included 9 observational trials and 3 RCTs (total patients, n=165038). Results showed that patients treated with sugammadex reported a significantly lower incidence of POUR than those of the control group (OR: 0.45; 95% CI: 0.39,0.52; p<0.0001; I² =40% for meta-analysis from observational studies; OR: 0.16; 95% CI: 0.05,0.51; p<0.002; I² =0% for meta-analysis from RCT).

Conclusion(s): This review suggests that neuromuscular block reversal with sugammadex decreases the risk of POUR.
Reference:

19AP06-05
Multimodal analgesia after sternotomy for cardiac surgery: regional anesthesia improves postoperative pain, nociceptive control and opioid sparing

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Background and Goal of Study: Controlling efficiently postoperative pain after sternotomy, i.e. through opioid-sparing multimodal analgesia, improves patients’ outcome. We meant to audit the effectiveness of peripheral nerve blocks (parasternal and rectus abdominis block) practice on post-operative pain control and nociception.

Materials and Methods: We introduced the routine practice of parasternal and rectus abdominis block in May 2023, and then we retrospectively evaluated medical charts of 35 patients undergoing cardiac surgery with sternotomy. Thirteen patients were treated with multimodal pharmacological analgesia (group 0), twenty-two patients were treated with parasternal and rectus abdominis block plus the same intravenous analgesia (group 1) according to anesthesiologists’ decision.

Index of postoperative nociception level (NOL, measured at ICU arrival), time for extubating, pain intensity (at rest [S] and after deep inspiration [D]) with VAS scale and FPS scale, and the administered drugs were recorded postoperatively and for two days of hospitalization, and evaluated post hoc.

Results and Discussion: The two samples were homogeneous in terms of age, sex, type of surgery and BMI. Total amount of opioid drugs, measured as morphine equivalent dose (MED), administered in group 1 was 69.3% lower than in group 0 (P<0.001), and average time required for extubation was shorter (P=0.015). Intensity of pain on the second day was lower in group 1 compared to group 0 (P<0.05). NOL levels were significantly lower in group 1 (Table 1).

<table>
<thead>
<tr>
<th></th>
<th>M.E.D. (mg)</th>
<th>Extubation (h)</th>
<th>VAS II-S</th>
<th>VAS II-D</th>
<th>FPS II-S</th>
<th>FPS II-D</th>
<th>NOL</th>
</tr>
</thead>
<tbody>
<tr>
<td>GROUP 0</td>
<td>Median 60</td>
<td>Median 6</td>
<td>Median 20</td>
<td>Median 40</td>
<td>Median 1.00</td>
<td>Median 2.00</td>
<td>Median 13.2</td>
</tr>
<tr>
<td>GROUP 1</td>
<td>0</td>
<td>1</td>
<td>9.00</td>
<td>20.0</td>
<td>0.00</td>
<td>1.00</td>
<td>6.86</td>
</tr>
<tr>
<td>P-value</td>
<td>&lt; 0.001</td>
<td>0.015</td>
<td>0.012</td>
<td>0.015</td>
<td>0.021</td>
<td>0.012</td>
<td>&lt; 0.001</td>
</tr>
</tbody>
</table>

Table 1. Results.

Conclusions: Our audit confirmed that peripheral nerve blocks provide a benefit on opioid sparing, pain and nociception levels and extubation time, compared to pharmacological therapy alone.

19AP06-06
Unveiling variations in pre-operative fasting: a retrospective analysis across different patient categories

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Background and Goal of Study: To reduce the risk of aspiration of gastric contents, guidelines endorse 2 hours of fasting for clear fluids and 6 hours for solids in adults1. In children, the present regimen is 6-4-3-1 (6 hours for solids, 4 hours for formula + nonhuman milk, 3 hours for breast milk, 1 hour for clear fluids)2. Prolonged fasting may have negative effects on patient outcomes3. In this study, we analysed pre-operative fasting times for fluids and solids concerning age, ASA classification, emergency categories, year of surgery.

Materials and Methods: The investigation was conducted as part of a larger study on perioperative risk prediction (ethics number 253/19 S-SR). 116043 patients undergoing non-cardiac surgery between December 2017 and February 2022 at a German university hospital were included.

Data was derived from the anaesthesia patient data management system. Statistical analysis was performed using Fisher’s exact or Mann-Whitney U-test (significance level p<0.05).

Figure 1: Spine plots depicting pre-operative fasting times for fluids and solids. The height of the bars is proportional to the proportion of patients, the area is proportional to the total number of patients in the respective group.
Results and Discussion: More than 12 hours of fasting time was observed for about 25% of the patients for fluids, over 41% for solids. In total, the fasting time for fluids was shorter than for solids. Children fasted significantly shorter than adults. Fasting times in ASA IV patients were longer than in ASA I-III. Urgent patients fasted longer than elective patients. There was no tendency for a reduction in fasting over the years.

Conclusion(s): Pre-operative fasting times still seem very long. Our results underline that changes in clinical structure and process quality regarding pre-operative fasting times are overdue. Further analysis is necessary to show changes in children after implementing the 2022 ESAIC Guideline.

References:

Pre-operative fasting and the perception of thirst: patient’s perspective

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¹Centro Hospitalar Universitário de Santo António, Serviço de Anestesiologia, Porto, Portugal

Background and Goal of Study: Preoperative thirst is a common phenomenon, often worsened by extended periods of fasting and pre-procedure anxiety. The presence of thirst, commonly unrecognized, is associated with distress and a negative patient experience. This study aimed to determine the prevalence of thirst and associated discomfort in the preoperative setting.

Methods: A prospective, cross-sectional clinical audit was held in a tertiary hospital in Portugal. Adult inpatients undergoing elective general surgery procedures between October and November 2023 were included. Data collected prior to operating room admission included: age, gender, ASA-PS score, risk factors for aspiration pneumonia, surgical intervention and fasting time for liquids and solids. The thirst distress scale (TDS) and Visual analogue scales (VASs), validated in the Portuguese language, were then applied.

Results: Our sample included 73 patients, 61.6% male, mean age of 61 years and median time of admission before surgery of 1 day. The median fasting time for clear liquids was 11h (IQR 5) and for a full meal was 17h (IQR 9). The prevalence of thirst in our sample was 91.8%. The three most common complaints of patients related to thirst were sensation of dry lips, the desire to drink water and sensation of dry mouth. Only 10% of the patients inquired reported no symptoms on the TDS. As the intensity of thirst increased, the distress (TDS score) and discomfort (VAS question 2 score) experienced by the patient also increased (r=0.835, p<0.001). The effect of age on intensity of thirst and discomfort was not statistically significant. The correlation between fasting time and intensity of thirst was not statistically significant.

Discussion: The prevalence of thirst in our sample is very high and underscores the importance of addressing this issue. Most patients that reported thirst were uncomfortable with the sensation and presented symptoms associated with thirst. Therefore providing comfort to the patient must go beyond pain, nausea or hypothermia assessment and include thirst relief as a priority.

Ultrasound as a modality for screening sarcopenia: assessing muscle mass in preoperative settings

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Background and Goal of Study: Sarcopenia, characterized by a decline in muscle mass and function, has been associated with adverse surgical outcomes. This study aimed to evaluate the feasibility of employing ultrasound as a screening tool for sarcopenia in the elderly preoperative population. Ultrasound is a cost-effective and promising method for measuring muscle mass. Its high visual resolution and user-friendly design make it accessible to non-expert sonographers. It also proves valuable for assessing muscle mass in frail elderly individuals who may encounter challenges with functional assessments. Integration of ultrasound screening into pre-operative assessments facilitates the early identification of sarcopenia, particularly in elderly patients, allowing for timely interventions. This approach optimizes patient’s surgical outcomes, potentially reducing postoperative complications.

The study focused on evaluating the time efficiency of the procedure and establishing correlation measures between the anaesthesiasts and qualified sonographers. The study hypothesized that ultrasound could be a good way to measure sarcopenia preoperatively if it could be done in 20 minutes and had good test-retest reliability (intraclass correlation coefficient ICC > 0.8).

Materials and Methods: Ultrasound measurements, focusing on muscle thickness and rectus femoris (RF) cross-sectional area (CSA), were performed by both anaesthesiasts and sonographers. Each assessor conducted 2 measurements for each parameter,
...and the average values were taken to determine the inter-rater correlation. Additionally, procedure time and frailty status were assessed.

**Results and Discussion:** 27 elderly people were recruited. RF CSA exhibited the highest inter-rater correlation (0.866, p<0.001) between the anaesthetists and the sonographers. Sonographers completed the procedure in an average of 8.3 minutes while anaesthetists took 8.8 minutes. None of the patients were classified as frail.

**Conclusions:** Ultrasound assessment of RF CSA may be a viable method for preoperative sarcopenia screening, and it can be completed in under 10 minutes. To enhance the generalizability of these results, future studies with larger and more diverse sample sizes, including frail patients, are recommended. Furthermore, comparing ultrasound with other sarcopenia screening methods, such as functional tests like handgrip strength and gait speed for both upper and lower limbs, holds the potential to yield valuable insights.

19AP06-09
**Pilot randomised controlled trial (RCT) of peri-operative intervention for smoking cessation**

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**Background:** About 60 million smokers worldwide undergo surgery each year. The correlation between smoking and heightened risks of cardiorespiratory problems during the perioperative phase is a matter of public health concern. However, efforts for smoking cessation (SC) during the perioperative period are not regularly integrated into standard practice. Surgery is an impetus for SC and smoking is a modifiable risk factor. The perioperative period is an opportune moment for instigating long-term lifestyle changes to positively impact patients’ health outcomes.

A structured, individualized, and multi-modal SC intervention program could help people quit smoking permanently and reduce postoperative complications related to smoking.

**Materials and Methods:** This was a pilot and feasibility randomized controlled trial (RCT) study to examine the effectiveness of perioperative intervention for smoking cessation (SC). The table below lists interventions and follow-ups.

**Results and Discussion:** Out of 29 patients, 14 were randomized into the control group, and 15 into the intervention group. The intervention group had higher quit rates at both 3-month (mth) (40%) and 6-mth (26.7%) intervals compared to the control group, which demonstrated quit rates of 28.6% and 21.4%, respectively.

The reduction in the number of cigarettes smoked was pronounced in the intervention group at both 3 mth (11 cigarettes) and 6 mth (10 cigarettes), as opposed to the control group, where reductions were observed to be 8 cigarettes at 3 mth and 9 cigarettes at 6 mth.

Additionally, the usage of NRT was more prevalent in the intervention group (33.3%) compared to the control group (21.4%). Both groups exhibited similar levels of confidence in their willingness to quit smoking.

This study was not powered for statistical significance.

**Conclusion:** These preliminary findings suggest potential in the intervention program, reductions in cigarette consumption, and increased utilization of NRT among patients. However, the study had a small sample size and limited statistical power. Despite these constraints, these preliminary results provide valuable insights that can inform the planning of a full-scale, adequately powered RCT.

19AP06-10
**A cross-sectional observational analysis of preoperative fasting**

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**Background and Goal of Study:** Fasting, an essential prerequisite for surgical procedures, stands out as one of the most effective measures in averting aspiration pneumonia. Current guidelines advocate reducing fasting times to safe limits (8 hours for a full meal, 6 hours for a light meal and 2 hours for clear liquids) to protect the patient from adverse effects (discomfort, anxiety, dehydration, metabolic changes, delays in postoperative recovery and hospital discharge).

This study aims to assess the compliance with pre-operative fasting and ascertain whether it is not unduly prolonged.

**Materials and Methods:** A clinical audit held in a tertiary hospital in Portugal, included adults in patients undergoing elective, non-cardiac, non-obstetric surgery between October and November 2023. Data collected prior to operating room admission included: age, gender, ASA-PS score, risk factors for aspiration pneumonia, surgical intervention, fasting time for liquids and solids and blood glucose at induction.

**Results and Discussion:** Of the 73 results obtained, 61.6% were male, with a mean of 6yrs of age and 65.8% were classified as ASA-PS II. 52 (71.2%) patients had at least one risk factor for aspiration of gastric contents. All patients met the minimum fasting time. The majority of patients (68.5% and 52.1%) fasted for solids for 12-24 hours and for clear liquids for 10-14 hours, respectively. The median fasting time for clear liquids was 11h (IQR 5); for a light meal was 14h (IQR 5); for a...
full meal was 17h (IQR 9). Hepatopancreatobiliary surgery had the longest fasting time for clear liquids and colorectal surgery had the longest fasting time for solid foods (p<0.05). Prolonged fasting time was influenced by: days of pre-op hospitalization (p<0.05), afternoon surgery (p<0.05), and presence of risk factors for aspiration (p<0.05). As fasting times increase, blood glucose levels decrease (p<0.05).

**Conclusion(s):** The emphasis on patient safety should shift towards promoting the minimally required fasting time while ensuring adequacy, avoiding unnecessary prolongation.

Our patients have a very prolonged fasting time. Institutional improvement measures (ERAS protocols, carbohydrate drinks, optimization of meal times during hospitalizations) are necessary in order to minimize the harmful effects of prolonged fasting and optimize patient's recovery, thereby enhancing the quality of healthcare provided.

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**19AP07-02**

**New onset disability after cardiac surgery - Incidence and associated risk factors in a multicenter prospective cohort**

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**Background and Goal of Study:** Perioperative mortality risk models are frequently used to inform patients undergoing elective cardiac surgery and to guide therapeutic decisions. Besides of mortality, influence of perioperative factors on more patient centered outcomes might be equally important to patients¹. Disability-free survival is a patient centered outcome that has not been characterized in the elective cardiac surgery setting, yet.

This study investigated the incidence and associated risk factors of new onset disability in elective cardiac surgery patients.

**Materials and Methods:** This prospective cohort study included patients undergoing elective on-pump cardiac surgery in two German University Hospitals between 03/2021 and 08/2022. Disability status was assessed preoperatively and one year after cardiac surgery by the World Health Organization Disability Assessment Schedule 2.0 (WHODAS 2.0). Main outcome was new onset disability one year after surgery, with a disability threshold of ≥16 % or worsening of existing disability by ≥ 5% measured by WHODAS 2.0 ¹. Multivariable logistic regression was used to identify preoperative variables associated with new onset disability.

**Results and Discussion:** Out of 363 prospectively recruited patients 305 patients with complete data were included in final analysis (mean age: 64±11 years, 72% male). Prevalence of preoperative disability was 23.6% (72 patients: 56/72 = mild disability, 16/72 = severe disability). New onset disability occurred in 59 patients (19.3%) at 1 year after surgery (37/59 = mild disability, 11/59 = severe disability, 11/59 = deceased).

According to multivariate logistic regression, age, chronic pulmonary obstructive disease (COPD), extracardiac arteriopathy, triple surgical procedure and level of preoperative WHODAS 2.0 were independently associated with new onset disability or death at one year after cardiac surgery [age – OR: 1.04, 95%CI: 1.00-1.07; COPD - OR: 4.03, 95%CI: 1.47-11.01; extracardiac arteriopathy - OR: 2.14, 95%CI: 1.01-4.52; triple surgical procedure - OR: 3.64, 95%CI: 1.28-10.37; WHODAS 2.0 – OR: 1.03 95% CI: 1.01-1.06].

**Conclusion(s):** Impaired disability free survival is a frequent complication even up to 1 year after elective cardiac surgery and associated with preoperative comorbidities and disability status. Preoperative disability assessment might be useful as an additional risk assessment tool.

**References:**
1. Shulman MA et al. Anesthesiology 2020

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**19AP06-11**

**Evaluation of the diaphragm thickness in unexpected reintubation in the postoperative period**

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¹Prof. Dr. Cemil Taşçoğlu City Hospital, Anaesthesiology and Reanimation, Istanbul, Turkey

**Background and Goal of Study:** Diaphragm dysfunction can increase postoperative pulmonary complications. Assessing diaphragm function is beneficial during the weaning period and for evaluating the need for intubation.

We aimed to evaluate the correlation between postoperative diaphragm thickness(DT) and reintubation.

**Materials and Methods:** The prospective observational study, approved by the Ethics Committee at Prof. Dr. Cemil Taşçoğlu City Hospital, focused on postoperative ICU patients. Demographics, medical history, ASA and ICU scores, surgery duration, respiratory exercises, and lengths of stay were recorded.

On postoperative first 2 days, high-frequency linear ultrasound were used to measure DT at end-inspiration (DTei), end-expiration (DTee), and the diaphragm thickness fraction(DTf). The relationship between DT and reintubation was investigated.

**Results and Discussion:** 126 patients were included. There were no significant differences among height, weight, BMI, ASA scores, SOFA scores and operation duration. Four patients needed reintubation postoperatively. The APACHE 2 score was significantly higher in patients requiring reintubation (p=0.067).

On day 1, DTei (p=0.012) and DTee (p=0.013), were significantly lower in patients requiring reintubation.

On day 2, DTei was significantly lower (p=0.024) in patients who required reintubation, while no significant difference was found in DTee (p=0.104). There was no significant difference in DTf between reintubated and non-reintubated patients on both days.

DT, DTei and diaphragm excursion could predict failure in weaning. However, it had not been previously investigated to predict reintubation, there is only one study that shows DT measurement with Computed Tomography could predict intubation in COVID-19 patients.

Respiratory muscle exercises and early mobilisation improve respiratory function tests and DT. Reintubation needs were notably higher in patients skipping respiratory exercises (p<0.001) but lower in those mobilized early (p=0.048). Higher DT correlated with pulmonary exercising and early mobilization, lowering reintubation incidence during the post-operative phase.

**Conclusion(s):** Measuring DT using ultrasound predicts post-op reintubation needs, aiding in identifying at-risk patients for better preparedness and necessary precautions.

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19AP07-03
Breaking the fast: implementing a “Sip Till Send” policy in a tertiary major trauma centre setting

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Background and Goal of Study: Current European guidelines recommend 2h of fasting for liquids prior to surgery [1]. Prolonged oral fluid deprivation is associated with patient discomfort, nausea, electrolyte derangement and post-operative delirium and does not reduce gastric fluid volume [2]. “Sip Till Send” concept was introduced in Scotland in 2021 to reduce fluid fasting times without an increase in aspiration episodes by allowing patients to sip clear fluids until sent for theatre.

Our goal was to implement a “Sip Till Send” policy across all three hospitals in Glasgow South Sector, including our tertiary major trauma centre, and assess aspiration event incidence and patient satisfaction.

Materials and Methods: All elective and emergency patients, except obstetric and paediatric, were offered 150mls of water per hour until sent for theatre, unless deemed unsuitable by anaesthetist or surgeon. All relevant staff received formal training prior to policy introduction on 31st October 2022. Adverse incidents reports on DATIX system were monitored, and two two-week snapshot audits were conducted at 3 and 12 months post implementation through questionnaires filled out by anaesthetists for each patient.

Results and Discussion: There were 60 and 30 responses to the audits at 3 and 12 months, respectively, indicating 86.7% and 93.3% of patients deemed suitable for “Sip Till Send”. At 12 months, only 20% of patients had fluid fasting time >2h, compared to 38.3% at 3 months.

In one year since implementation there had only been one regurgitation episode related to “Sip Till Send”, not associated with significant morbidity or mortality. The audit at 12 months showed that all “Sip Till Send” patients felt it positively impacted their theatre experience.

Conclusion: “Sip Till Send” introduction led to reduced fluid fasting times and increased patient satisfaction without increase in regurgitation or aspiration episodes.

References:

19AP07-04
Preexisting cognitive impairment among cardiac surgical patients: If we don’t see it, it doesn’t exist

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Background and Goal of Study: Postoperative cognitive dysfunction (POCD) is common among cardiac surgical patients, with an incidence around 60%. Preexisting cognitive impairment (PCI) is a well-known risk factor for developing POCD. However, there is little evidence about the prevalence of PCI among patients waiting for cardiac surgery. We aim to assess the presence of PCI among patients waiting for cardiac surgery.

Materials and Methods: Prospective observation study in adult patients undergoing cardiac surgery. We included >50 y.o. patients, undergoing CABG and/or heart valve surgery.

We collected demographic and clinical characteristics, cardiovascular risk factors, tobacco and alcohol consumption, years of education, the clinical frailty scale of the Canadian Study of Health and Aging, and the Hospital and Anxiety Depression Scale. The cognitive assessment included the Memory Alteration Test, WAIS III Digit Span, the Trail Making Test A and B, Symbol Digit Modalities Test, the semantic and fluency tests, and the minimental (MMSE).

Our primary outcome was the presence of preexisting cognitive dysfunction defined as two or more abnormal tests (excluding MMSE) in comparison with normative data. We also asked patients for subjective cognitive complaints.

Results and Discussion: We cognitively assessed 134 patients. PCI was present in 30.6%. However, 65.8% of patients with PCI did not refer any cognitive complaint. The executive function was the most affected area (44%), followed by memory (17.9%). The combinations of tests with the best diagnostic precision included phonetic fluency, trail making test B, SDM, and direct WAIS, with a sensitivity of 92.7% and a specificity of 83.7%, with an AUC of 0.88. There was an association between previous medical history of stroke (p<0.01), the presence of aortic regurgitation (p=0.04), and a reduced left-ventricular ejection fraction (LVEF) (p=0.01).

Conclusion(s): Preoperative cognitive assessment is crucial since PCI is present in one third of patients waiting for cardiac surgery and in most cases PCI is not perceived by the patients themselves. The combination of phonetic fluency, trail making test B, SDM, and direct WAIS showed the best diagnostic accuracy. A reduced LVEF is the main associated risk factor suggesting that the type of heart disease itself is less important than its impact on the heart function.
19AP07-05
Antiemetic prophylaxis in laparoscopic cholecystectomy, do we follow the guideline recommendations? Our experience

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Background and Goal of Study: Postoperative nausea and vomiting (PONV) is a common adverse effect of anesthesia and can cause other postoperative complications such as suture dehiscence, prolonged hospital stay and increased costs. Even though there aren’t any sequels, the patient’s discomfort increases.

The general incidence of PONV is around 30%, even reaching 70% in patients undergoing laparoscopic cholecystectomy. This descriptive and retrospective study analyzes if our practice aligns with the latest guideline on PONV (2020).

In addition, we analyzed the most commonly used prophylactic antiemetic drugs and the incidence in the first 24 hours of PONV that required pharmacological rescue.

Materials and Methods: After acceptance by the ethics committee, 100 laparoscopic cholecystectomy surgeries were reviewed, due to the high incidence of PONV in this surgery. Within the work we have collected the following variables: age, ASA, Apfel score, antiemetics used intraoperatively and the incidence of PONV.

Results and Discussion: In the analyzed sample double antiemetic prophylaxis is routinely used in our hospital (in 85% of the patients) even for patients with a single risk factor (85.2%). To assess relationship between the risk factors and the number of drugs used as prophylaxis, we performed a Fisher test and we obtained a significance level of 1. Therefore, we can infer that the risk factors don’t modify our conduct in preventing PONV, and that we routinely administer 2 drugs, as indicated in the 2020 guidelines. Most of patients with double antiemetic prophylaxis received dexamethasone 8 mg (DXM) and ondansetron 4 mg (76%), possibly due to their safety profile and availability at our center. In cases where only one drug was used, it was DXM (78%), at a dose of 0.1 mg/kg during induction.

Finally, the general incidence of PONV in the sample is 31%, and in patients with only one risk factor (according to the Apfel score) is 18%. This result is lower than previously published records.

Conclusion(s): The current antiemetic prophylaxis management is carried out in a forceful manner, using two drugs in patients with a single risk factor. We have found a low relationship between risk factors and the number of prophylactic drugs used, even though we achieved current guidelines in our center, so greater individualization in their use would be recommendable. We also have found a lower incidence, than other published, series of PONV in laparoscopic cholecystectomy.

19AP07-06
Variable ventilation improves gas exchange following capnoperitoneum in a randomized crossover experimental model of laparoscopy

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Background and Goal of Study: Laparoscopic surgeries are gaining popularity, due to the decreased postoperative morbidity and mortality. However, the consequent cephalic shift of the diaphragm and the additional CO2 load induced by the mandatory application of capnoperitoneum requires adaptation of the ventilation parameters to ensure adequate gas exchange.

Although this challenge may be prevented with the setting of higher PEEP levels, higher intrathoracic pressures compromise haemodynamics and increase lung parenchymal stress and strain. Variable ventilation (VV), an alternative lung protective approach, may be beneficial in this context with dynamically changing lung compliance. Thus, we aimed at characterizing the effects of VV on gas exchange and respiratory mechanics before, during and following the application of capnoperitoneum.

Materials and Methods: Anaesthetized rabbits (n=11) were randomly assigned to pressure controlled (PCV) or VV using breath-by-breath variations in tidal volume and respiratory rate. Oxygenation index (PaO2/FiO2), arterial partial pressure of carbon dioxide (PaCO2) and respiratory mechanical parameters were assessed before, during and after capnoperitoneum.

According to a crossover design following the measurements the ventilation mode was changed and the whole measurement sequence was then repeated.

Results and Discussion: Abdominal insufflation with CO2 resulted in compromised respiratory mechanics, decreased oxygenation and CO2-retention compared to baseline measurements (p<0.05, for all). Compared to PCV, VV resulted in lower PaO2/FiO2 (405.5±34.1 vs. 370.5±44.9, p<0.001) and higher PaCO2 (48.4±5.1 vs. 52.8±6.0 mmHg, p=0.009) values during capnoperitoneum.

Following deflation of the abdomen and lung recruitment manoeuvre, unlike with PCV, VV proved beneficial for CO2 removal (44.6±4.3 vs. 41.0±2.3 mmHg, p=0.027).

There was no evidence for a difference in the respiratory mechanical and haemodynamic parameters between the ventilation modalities within the same conditions.

Conclusion(s): Detrimental effects of capnoperitoneum on gas exchange has been more pronounced with VV, however following the release of capnoperitoneum, VV improved CO2 clearance. Therefore, the application of VV may be considered as an alternative ventilation modality following but not during capnoperitoneum to restore physiological gas exchange.
Background and Goal of Study: In 100% of patients, general anesthesia eliminates the sigh reflex and causes atelectasis to develop quickly. Alveolar recruitment techniques enhance gas exchange, draw in collapsed alveoli, and raise arterial oxygenation. Alveolar recruitment maneuvers are supported by an extensive amount of literature, and nowadays, alveolar recruitment maneuvers are incorporated in mechanical ventilator settings. To evaluate the efficacy of alveolar recruitment maneuvers incorporated in GE Healthcare Carestation 750.

Material and Methods: All 18- to 60-year-old patients, ASAI-III, scheduled for surgical intervention under general endotracheal intubation without any known history of cardiac or respiratory disease, were included in this evaluation. After the induction of general anesthesia and tracheal intubation, patients were divided into three groups:

Group I: no intervention;
Group II: single-step recruitment (pressure hold of 40 mmHg for 20 seconds);
Group III: multiple-step recruitment (Step I: Pinsp 30/PEEP 10; breaths 3; Step II: Pinsp 40/PEEP 10; breaths 3; Step III: Pinsp 50/PEEP 15; breaths 3).

Recruitment maneuvers that are incorporated in mechanical ventilator settings. To evaluate the efficacy of alveolar recruitment maneuvers incorporated in GE Healthcare Carestation 750.

The primary outcome was pulmonary compliance changes; the secondary outcome was PaO\(_2\) and PaO\(_2\)/FiO\(_2\) changes. Arterial blood gas analyses were obtained before induction and after the recruitment maneuver. The FiO\(_2\) ratio was set at 50%.

Results and Discussion: For this evaluation, 60 patients were included (n = 20 each group). The alveolar recruitment maneuver groups showed higher pulmonary compliance (37% vs 24% Group III vs Group II) in comparison to the control groups. Intraoperative PaO\(_2\) increased in the groups that received alveolar recruitment techniques as well (P<0.05). PaO\(_2\)/FiO\(_2\) increased in the alveolar recruitment maneuver groups relative to the control groups. None of the patients had any issues during or following alveolar recruitment procedures. The present plethora of literature provides an update on alveolar recruitment approaches, taking into account the wide range of variations in their use as well as the various parameters influencing the response to movement.

Conclusion: Individuals undergoing the alveolar recruitment maneuver groups had improved oxygenation.
Conclusion(s): Uplift modelling has the potential to select subgroups of patients for which a given fluid-NE regime results in an AKI-free recovery after cystectomy and urinary diversion. In contrast to traditional prediction modelling, uplift modelling explicitly incorporates the cause-effect relationships of treatment choices on the outcome and allows moving towards a more personalized care delivery.

19AP07-09
Impact of the safe brain initiative on Reducing Postoperative Delirium: a study in Swiss perioperative care

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Background and Goal of Study: This research aimed to assess the effectiveness of the Safe Brain Initiative (SBI) in reducing postoperative delirium (POD) and enhancing patient satisfaction in perioperative care. We hypothesised that implementing the SBI care bundle would reduce POD incidence and improve patient outcomes in a Swiss hospital setting.

Materials and Methods: The SBI care bundle, encompassing 18 core recommendations, was implemented in January 2023. Over five months, 721 patients (51.6% female; average age 57.66 ± 17.3 years) were screened. Data were collected at three time-points (T0, T1, T2) covering demographics, orientation, communication, pain assessment, and patient satisfaction. Statistical analysis was performed using SPSS v27, with the primary outcome being the incidence of POD. Standard statistical tests like Mann-Whitney or Kruskal-Wallis and Chi-square or Fisher's exact tests were employed. P significant when <0.05.

Results and Discussion: No significant increases were observed in postoperative nausea and vomiting (PONV; p=0.9), pain (p=0.1), or thirst (p=0.06). Patient satisfaction rates were high across different stages of care. A significant reduction in POD incidence (p=0.04) was observed post-implementations.

These results indicate the effectiveness of the SBI in improving patient outcomes and suggest its potential applicability in other settings.

Conclusion(s): The study confirms the hypothesis, demonstrating that the SBI significantly reduces POD and enhances patient satisfaction in perioperative care. These findings justify the continued use and potential broader application of the SBI. Further research should explore the long-term impact of the SBI on patient outcomes and its applicability in diverse healthcare settings.

Reference:

19AP07-10
COVID-19 infection history influence on the perioperative outcome in elective cardiac surgery – a prospective study

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Background and Goal of Study: It is unclear whether a history of COVID-19 infection in patients scheduled for elective surgery alters perioperative outcome[1]. The current study aimed to determine whether prior COVID-19 infection is associated with a higher incidence of perioperative complications in elective cardiac surgery with cardiopulmonary-bypass (CPB).

Materials and Methods: We conducted a prospective observational study in a tertiary care, academic hospital. We included consecutive patients with elective cardiac surgery and CPB between 01.08.2022-30.10.2023. We collected relevant demographic data, as well as perioperative clinical and laboratory parameters pertaining to neurologic, respiratory, cardiac and renal complications. The data were analyzed using IBM SPSS Statistics – version 26 by using descriptive statistics and regression analyses, p<0.05 shows statistical significance.

Results and Discussion: There were 280 consecutive patients included in our study. Among them 101 (36.1%) had a confirmed history of COVID-19 disease at least 6 weeks before the elective surgery; 173 (61.8%) were vaccinated anti-SARS-CoV-2. Both groups had similar baseline characteristics and CPB duration. Postoperative acute respiratory failure (ARF) occurred in 45 (25.1%) of patients without COVID-19 history and 20 (19.8 %) patients with positive history (p = 0.377).

The incidence of perioperative acute cardiac failure (ACF), pneumonia, delirium, rhythm and conduction disorders and acute kidney failure (AKF) was also similar in the two groups.

In the multivariate logistic regression analysis, the COVID-19 history was not associated with postoperative ARF [OR = 0.735 (95% CI = 0.406, 1.332, p = 0.311)], with postoperative ACF [OR = 1.029 (95% CI = 0.469, 2.259, p = 0.943)], delirium [OR = 0.889 (95% CI = 0.323, 2.452, p = 0.821)], neither with the AKF [OR = 0.809 (95% CI = 0.521, 1.256, p = 0.345)]

Conclusion(s): In our prospective cohort of elective cardiac surgery patients, a history of COVID-19 disease was not associated with increased postoperative complications. Postoperative ARF occurred more frequently in patients without COVID-19 history, but the difference was not significant.

References:
19AP08-02
Perioperative complications, length of stay and 1-year mortality in elderly patients scheduled for colorectal surgery

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Background and Goal of Study: Aging of the population results in older patients with important comorbidities presenting to surgery, even for major surgeries such as colorectal procedures. Potential perioperative complications should be considered when evaluating these patients preoperatively. Our goal was to study the perioperative complications, length of stay and 1-year mortality of elderly patients over 80 years-old in comparison to patients aged 70-79.

Materials and Methods: Retrospective study of elderly patients ≥70 years-old scheduled for elective major colorectal surgery, between 2018 and 2020 at Hospital del Mar in an ERAS environment. We established 2 groups:
- Elderly (70-79 year-old patients).
- Super-Elderly (≥ 80 year old patients)

Data was retrieved from the electronic medical records:
- Demographic data (age, sex, ASA, BMI)
- Diagnosis (oncologic or not), type of surgery (right hemicolectomy, sigmoidectomy or rectal resection) and duration.

The outcomes we analyzed were:
- Intraoperative complications (any deviation from standard)
- Perioperative Complications using the Comprehensive Complication Index (CCI) that is a novel continuous scale to measure surgical morbidity based on Clavien-Dindo classification.
- Length of stay
- Mortality at 1 year

A statistical analysis was performed using Student-t test to compare means; X2 test was used for categorical variables. Statistical significance was determined if p<0.05.

Results and Discussion: The Elderly group (70-79 years-old) included 102 patients, whereas the Super-Elderly group (≥ 80 years) included 80 patients. No statistical differences existed between groups regarding demographic data, except for age and BMI. Surgery was shorter in the Superelderly group but the types of surgery, surgical approach, diagnosis were similar in both groups.

The main outcomes we analyzed are listed in table 1:

<table>
<thead>
<tr>
<th></th>
<th>ELDERLY</th>
<th>SUPER-ELDERLY</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraoperative Complications n (%)</td>
<td>17 (16.6%)</td>
<td>12 (15%)</td>
<td>0.83</td>
</tr>
<tr>
<td>Perioperative Complications CCI mean (SD)</td>
<td>17.45 (17.25)</td>
<td>19.30 (19.9)</td>
<td>0.503</td>
</tr>
<tr>
<td>Length of stay in days mean (SD)</td>
<td>9.3 (7.2)</td>
<td>9.5 (9.4)</td>
<td>0.86</td>
</tr>
<tr>
<td>Mortality after 1 year (%)</td>
<td>5 (4.9%)</td>
<td>12 (15%)</td>
<td>0.02</td>
</tr>
</tbody>
</table>

Table 1.

Conclusions: Patients over 80 years old seem to have a similar rate of perioperative complications and length of hospital stay but their 1-year mortality is higher. Studies about postoperative quality of life might be necessary to properly advise these patients about perioperative risks.

19AP08-03
Improved Perioperative Risk assessment and EDucation with Interactive Consultation Tool (ICT) – iPREDICT prospective, randomized, placebo-controlled clinical trial

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Background and Goal of Study: Preoperative anaesthesia evaluation plays a crucial role in preparing patients for surgery by addressing their concerns, providing information about anaesthesia options, and ensuring their overall well-being. An essential component of this process is patient empowerment, which involves educating and involving patients in decisions related to their anaesthesia care. However, in routine clinical practice, the anaesthesia assessment frequently occurs within a few minutes on the day preceding the surgical procedure.

The overall goal of this clinical trial is to investigate, if an Interactive Consultation Tool – ICT that is used by the patient preoperatively is a feasible way to improve patients’ knowledge and awareness of the risks associated with anaesthesia. In this first preliminary analysis, the acceptance of the ICT by the patient will be investigated.

Materials and Methods: Patients scheduled for surgery partake in online risk education using ICT prior to preoperative consultation visit (intervention group) or watch a video clip about general hospital information without anaesthesiological risk content (control group). All patients participate in ICT risk assessment and standard face-to-face preoperative consultation visits.

Results and Discussion: In the initial stage of patient recruitment for the study, 57.77% (n=119) of the 206 invited patients agreed to participate. A demographic breakdown of the initial study results exhibited an average age of 60.71 years (median 62, SD14.14) for men and 57.37 years (median 63, SD16.87) for women. It appears that the age difference between the included and excluded individuals was not statistically significant (p=0.643).

However, the results of the 57 patients who completed the premedication visit showed a clear preference for the combined method 66.66% (n=38) as the most effective method of preoperative anaesthesia preparation. Only 24.56% (n=14) opted for a face-to-face consultation, and only 8.77% (n=5) preferred online consent alone.

Conclusion(s): The significant preference for the combined method indicates a strong acceptance and positive preference for this approach among patients. If the positive evaluation of our study on the ICT continues, it paves the way for the future integration of this remote tool into clinical routines. Such integration could bring significant benefits for both patient outcomes and the efficient use of hospital resources.
The association of preoperative anxiety with postoperative outcome in patients with postponed surgery due to the COVID-19 pandemic in the Netherlands

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Background and Goal of Study: Preoperative anxiety, stress and mental health complaints have been amply reported in patients with postponed elective surgery due to the COVID-19 pandemic. However, the effect of preoperative anxiety on postoperative outcome in these patients has not often been described. This study aimed to investigate the association of preoperative anxiety with postoperative outcomes in patients undergoing postponed elective surgery due to the COVID-19 pandemic.

Materials and Methods: Data from TRACE II, an observational, multicentre, prospective cohort study amongst surgical patients in the Netherlands, who underwent postponed elective surgery due to the COVID-19 pandemic was used. Patients questionnaires at baseline and at 30-days postoperative were combined with data obtained from the electronic patient files.

Linear and logistic regression were used to analyse the association of preoperative anxiety (sum score Surgical Fear Questionnaire; SFQ) and the 30-day incidence of major complications, postoperative length of stay, and 30-day quality of life (EQ-5D-5L).

Results and Discussion: In the TRACE II cohort (N=1479) 152 (10%) patients had a major complication until 30 days after surgery. In crude analyses, preoperative anxiety (SFQ sum score) was not associated with major complications (12% in the 4th SFQ quartile compared to 10% in the 1st-3rd quartile, n.s.), but a higher SFQ score was associated with a longer hospital stay (median 4 days in the 4th SFQ quartile; median 3 in quartiles 1-3, p < 0.001) and a lower 30-day EQ-5D index score (median 0.70 in the 4th SFQ quartile; median 0.81 in quartiles 1-3, p < 0.001).

Final results will be presented at Euroanaesthesia 2024.

Conclusions: Preoperative anxiety is associated with a decreased 30-day quality of life, and a longer length of postoperative stay, but not with the incidence of 30-day major complications. These results imply that assessment of preoperative anxiety could help identify patients at risk of poorer postoperative outcomes.

Acknowledgements: We would like to thank the TRACE Study investigators and the participating centres for their support in conducting the TRACE and the TRACE II study.

19AP08-06
Prospective, observational, single-centre study on the incidence of postoperative nausea and vomiting and its perception among anaesthesiologists

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Background and Goal of Study: Postoperative nausea and vomiting (PONV) are within the most common postoperative complications, affecting 20-30% of the surgical population and up to 80% of at-risk patients. Although often overlooked, they can even increase hospital stay and cost. However, there is no evidence about the perception of the incidence of PONV by the professionals in charge of its prevention.

The aim of this study was to assess the knowledge on PONV among anaesthesiologists and anaesthesia nurses and their perceived incidence, and to compare it with the actual incidence.

Materials and Methods: Prospective observational study carried out on surgical patients requiring anaesthesia at our centre. We included in-hospital adult patients who were not admitted to a critical care unit. The presence of PONV and clinically relevant PONV using the impact scale was assessed at 24 postoperative hours.

At the same time, a survey was sent to all anaesthesiologists and nurse anaesthetists to assess their knowledge of the study topic (Apfel scale) and the perceived PONV incidence.

Results and Discussion: A total of 300 patients were recruited. The overall PONV incidence was 24%, with a 5% incidence of clinically relevant PONV. A total of 74 professionals answered the survey, 45 (61%) staff anaesthesiologist, 10 (13%) anaesthesia trainees and 19 (26%) nurse anaesthetists. 73 (99%) professionals confirmed on using prophylaxis. 68 (92%) respondents thought that PONV are an important complication. 52 (70%) claimed to know Apfel scale but only 26 (35%) confirmed to adjust the prophylaxis accordingly.

There were almost no differences in the percentages of each question between trainees, nurses and certified anaesthesiologists. Among professionals, the perceived PONV incidence was 25% similar to the real one (p = 0.963). However, the perceived clinically relevant PONV was 15%, 3 times the actual incidence (p < 0.000).

Conclusion(s): Professionals in charge of preventing PONV are aware of the real actual incidence, but they perceive it as more clinically relevant than how patients reported it. Although, clinicians showed an overall good knowledge on PONV management, the high use of prophylaxis and the overrated perception about clinically relevant PONV suggests an overuse in PONV prophylaxis.

References:
Background and Goal of Study: N-terminal pro-brain natriuretic peptide (NT-proBNP) and high-sensitivity troponin I (hs-TnI) have been shown to be related with a higher incidence of cardiopulmonary complications after thoracic surgery.

We aimed to evaluate the incidence and magnitude of hs-TnI and NT-proBNP in patients undergoing lung resection, their relationship with the occurrence of major adverse cardiovascular events (MACE) in the postoperative (POP) period, and the perioperative variables associated with the elevation of both biomarkers.

Materials and Methods: Prospective multicenter, observational cohort study at three Spanish University Hospitals including patients aged ≥45 years old and scheduled for elective thoracic surgery. Patients with severe heart failure, ventricular ejection fraction <30%, sepsis or those undergoing urgent procedures were excluded. All patients provided written informed consent.

NT-proBNP and hs-TnI were measured preoperatively and at POP days 1 and 2. NT-proBNP elevation was defined as ≥300 ng/L and hs-TnI as ≥ 45 ng/L.

We collected demographic variables and comorbidities. Collected data included intraoperative complications, type of surgery, surgical approach, and 30-day MACE and mortality. For the statistical analysis of the variables collected, frequency tables and the Chi-square test were used.

Results and Discussion: In our sample of 418 patients, NT-proBNP elevation on days 1 or 2 was more common (57.4%) than hs-TnI elevation (13.6%). The hs-TnI elevation was mostly associated with greater lung resection (45.5% of patients undergoing pneumectomy or bilobectomy vs 16% for lobectomy vs 9.3% for other types of resection; p = 0.001). In case of NT-proBNP no significant elevation was observed. We observed a low prevalence (5.3%) of MACE at 30 follow-up.

Conclusion(s): Troponin elevation appears to be proportional to the resected lung parenchyma. The combined determination of NT-proBNP and hs-TnI seems not to be so helpful to identify patients at risk of MACE after lung resection. Nevertheless, further large studies are still needed with more long-term follow-up.

Acknowledgements: This work is supported by a research grant number: ‘PI20/00154’ from the Instituto de Salud Carlos III.
Conclusion(s): The presented pragmatic implementation of a multidisciplinary care bundle, encompassing pre-, intra-, and postoperative measures alongside continuous outcome monitoring, has the potential to significantly reduce the incidence of POD and decrease the length stay and associated costs.

19AP08-09
Evaluation of Proenkephalin A 119-159 (penKid) for the detection of postoperative AKI after branched endovascular aortic repair

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Background and Goal of Study: Branched endovascular aortic repair (BEVAR) is associated with a high risk of acute kidney injury (AKI). The implantation of stent grafts with branches to main arteries may induce temporary impairment in renal perfusion, exacerbated by the impact of the contrast agent.

The current definition of AKI is based on deficient parameters, including serum creatinine (SCR) concentration and urine output. Novel biomarkers for renal injury, such as Proenkephalin A 119–159 (penKid), could shorten diagnostics and decision time for goal-directed therapy of AKI. The implantation of stent grafts with branches to main arteries may induce temporary impairment in renal perfusion, exacerbated by the impact of the contrast agent.

Materials and Methods: This prospective cohort study included 55 patients undergoing elective BEVAR. The study was conducted with the approval of the Bioethics Committee of the Medical University of Warsaw.

Blood samples were collected before the procedure and at three exact time points (tp) afterwards: postprocedural sample, 24h, and 48h. penKid was measured immediately after collection with the IB10 sphingotest® penKid®, a rapid point-of-care (POC) immunoassay by SphingoTec GmbH, Hennigsdorf, Germany.

Results and Discussion: Most patients (n=41) exhibited impaired eGFR before the procedure. Fourteen subjects (n=14) had normal kidney function before surgery, with eGFR considered >90 mL/min/1.73m².

The primary outcome was the occurrence of AKI in the perioperative period (n=12). The mean eGFR before the procedure was lower in the AKI group at 50.58 (±26.28) compared to the no-AKI group at 75.47 (±22.58).

Median penKid values in the AKI group during the 1st/2nd/3rd/4th tp were as follows (pmol/L): 87.3, 96.7, 109.5, 121.3, and in the non-AKI group (pmol/L): 69.1, 65.1, 55.0, 59.3.

Median SCR values in the AKI group during the 1st/2nd/3rd/4th tp were as follows (mg/dL): 1.53, 1.52, 1.73, 1.85, and in the non-AKI group (mg/dL): 1.05, 0.96, 0.86, 0.91.

A moderate-strength relationship between SCR and penKid was discovered (rho=0.518, p-value=0.00001).

Determining the significance of the effect of day on the degree of correlation between SCR and penKid showed no significant effect (p-value=0.75, two-way ANOVA).

Conclusion(s): Our findings suggest that penKid is a promising biomarker for diagnosing AKI after BEVAR. PenKid correlated well with creatinine levels, the current gold standard for determining AKI. We did not observe a prior perioperative increase in penKid levels relative to creatinine ones.

19AP08-10
Anaesthetic management guided by mitochondrial oxygen tension monitoring in abdominal surgery: a randomised controlled trial

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Background and Goal of Study: Surgical site infection (SSI) is a significant cause of postoperative morbidity and mortality. Low tissue oxygen tension is associated with an increased risk of SSI. The Cellular Oxygen METabolism (COMET) monitor enables the assessment of tissue oxygenation by monitoring the mitochondrial oxygen tension (mitoPO2). The COMET monitor is a non-invasive, bedside monitoring system that uses the protoporphyrin IX-triplet state lifetime technique.

Anaesthetic management guided by mitoPO2 monitoring may increase tissue oxygenation compared to conventional anaesthetic management.

Materials and Methods: In this randomised clinical trial, including adult patients undergoing abdominal surgery, anaesthetists in the intervention group were asked to strive and to maintain the mitochondrial oxygen tension monitoring in abdominal surgery: a randomised controlled trial.

Secondary outcomes included the SSI incidence and the effects of the interventions in mitoPO2.

Results and Discussion: The mean mitoPO2 during surgery was higher in the intervention group (38.9, SD 19.6 mmHg) than in the control group (33.6, SD 20.2 mmHg, p = 0.227). MitoPO2 values declined during surgery after an initial increase during anaesthetic induction (see figure below). SSI was four in each group. Balanced intravenous-solution administration and a decrease in administrated fraction inspired oxygen resulted in the highest mean increase of mitoPO2.
19AP08-11
The impact of common medications and bowel preparations on serum magnesium levels after major abdominal surgery

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Background and Goal of Study: Hypomagnesaemia is a complication of various surgeries, including vascular and cardiac surgery. Factors such as Proton Pump Inhibitors (PPI), Angiotensin Converting Enzyme Inhibitors/Angiotensin Receptor Blockers (ACEi/ARB) and Bowel Preparations, may contribute to this complication. This study aimed to assess the impact of PPI, ACEi/ARB and bowel preparation on serum magnesium levels following major abdominal surgery.

Materials and Methods: Adults scheduled for major abdominal surgery were identified from preadmission clinic lists. Eligible patients were approached and informed consent was obtained by a researcher. Patient data, preoperative and postoperative magnesium levels were extracted from their medical records. Paired two-tailed T-tests were used to detect differences between pre- and postoperative magnesium levels.

Results and Discussion: Of 270 eligible patients, 214 consented, 6 refused and 50 were uncontactable. Complete datasets were analysed from 153 patients. Mean (SD) age was 59 (15) years, 51% female. Mean (SD) postoperative serum magnesium level was significantly lower than preoperative mean (SD) level, (0.82 (0.10) vs 0.87 (0.08) mmol/L (p<0.001)). PPI or ACEi/ARB made minimal contribution to the reduction in serum magnesium levels (p = 0.088 and p = 0.142 between groups). Those administered bowel preparation had significantly higher postoperative serum magnesium levels than those not (0.86 (0.11) vs 0.81 (0.10) mmol/L (p<0.05)) as seen in Figure 1.

Conclusion(s): This study demonstrates a significant decrease in serum magnesium levels after major abdominal surgery but it was not possible to determine risk factors for this. A plausible explanation may be the surgery-induced stress response causing transfer of magnesium from blood to third or intracellular spaces.

19AP08-12
Assessment of carotid ultrasound parameters to predict hypotension and fluid responsiveness induced by lung recruitment manoeuvre during one-lung ventilation: a prospective ultrasound study

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Background and Goal of Study: Lung recruitment manoeuvre (LRM) is considered a key component of lung-protective ventilation strategy (1). Previous studies have demonstrated that LRM induces a decrease in stroke volume and hypotension, more pronounced in hypovolemic patients (1).

The role of carotid ultrasound in predicting hypotension has been promising in the last years (2). It also known to correlate with changes in SV, which as shown by Bias et al can predict fluid responders after LRM. Recent data suggests that it is not influenced by heart and lung interactions, which makes it a valuable tool during OLV.

Our study sought to investigate the diagnostic accuracy of common carotid artery (CCA) ultrasound parameters as predictors of hemodynamic response to LRM. We also sought to study if LRM-induced changes in CCA ultrasound parameters can predict fluid responsiveness.

Materials and Methods: 32 patients undergoing elective thoracic surgery were included into the study. Hypotension was defined by Hypotension Prediction Index (HPI) as any absolute value of MAP less than 65 mmHg. Carotid ultrasound-derived parameters (cFT, ΔVpeak) were obtained with portable ultrasound device.

Hemodynamic data was collected at specific timepoints: T0 - baseline (preoperative), T1- before LRM, T2 - at the end of LRM, T3 - before VE, T4- after VE.

Volume expansion (VE) was performed after LRM as 250 ml of balanced electrolyte solution infusion over 10 min. Patients were considered fluid responders if CO > 15%.

Results and Discussion: Baseline values were lower in “H” hypotension group (n=25) compared to “N” non-hypotension group (n=7): cFT (329+/-9; 340+/-8.8), MAP (100+/-8.9; 110+/-7.8) and CI (2.5; 2.7). However, ΔVpeak (13.4+/-1.8; 10.1+/-8) and HPI (46; 29) were higher in “H” group.

Figure 1 - shows postoperative serum magnesium levels, categorised by use of PPI, ACEi/ARB and Preoperative Bowel Preparation.
Baseline carotid cFT was an accurate predictor of LRM-induced hypotension (AUC 0.83) and correlated with HPI value. Carotid cFT increase at T2 was more statistically significant in “N” group. Carotid cFT and ΔVpeak predicted fluid responders via LRM-induced change (0.82, 0.78) and correlated with SV decrease by 30%.

**Conclusion(s):** Preoperative carotid cFT can accurately predict hypotension induced by LRM. Carotid cFT is also a reliable predictor of fluid responsiveness during OLV with superior diagnostic value over ΔVpeak. Further research is required to confirm the clinical utility of non-invasive predictors.

**Reference:**

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**19AP09-02**

**Utilizing wearable technologies for enhanced sepsis prediction in surgical ward settings**

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**Background and Goal of Study:** This study focuses on enhancing postoperative patient care in surgical wards by utilizing wrist-wearable devices for early sepsis prediction. Recognizing the high morbidity and mortality associated with delayed sepsis diagnosis, the study seeks to establish a real-time, non-invasive monitoring method to predict sepsis onset accurately and promptly.

**Materials and Methods:** We performed an extensive observational study. We included patients who underwent abdominal surgery and were then transferred to the surgical wards. We recorded vital signs via photoplethysmography wrist-wearable devices. The data from these devices was synchronized with data from Electronic Health Records such as lab results and demographics and were then used as features for sepsis prediction. Sepsis cases were identified based on Sepsis-3 criteria. We used the XGBoost algorithm, aiming to predict sepsis before clinical symptoms manifest.

We trained the AI model with data from the MIMIC IV database. We then validated the performance of AI to predict sepsis on prospectively collected data from the General University Hospital of Larissa.

This analysis was performed retrospectively on prospectively collected data. The results of the AI algorithm were not used for any clinical intervention.

**Results and Discussion:** The AI model was trained on data from ~40k patients. We prospectively collected continuous vital signs from 50 patients that were eligible to participate in the study and then used this data for the validation of the predictions. We predicted sepsis 6 hours before the onset with accuracy=97%, sensitivity=87%, and specificity=96%.

As such the findings may indicate that continuous vital sign monitoring via medical-grade wearables can predict sepsis onset with higher confidence than traditional methods that use sparsely collected data.

**Conclusion(s):** The integration of wearable technology and AI in patient monitoring at the general surgery wards marks a transformative step in postoperative care by improving patient outcomes and reducing the length of the hospital stay. This approach might elevate the standard of patient safety in surgical wards but also enables proactive healthcare measures for sepsis treatment.

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**19AP09-03**

**Development and implementation of an ERAS program in onco-gynecological abdominal surgery**

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**Background and Goal of Study:** Patients with gynecological cancer have a wide variability in their state of health at the time of diagnosis. It is necessary to elaborate a standardized, evidence-based and multidisciplinary action algorithm that unifies the set of strategies aimed at optimizing the surgical process.

The present study evaluates the safety and efficacy in the implementation of a rehabilitation program in abdominal onco-gynecology surgery following the ERAS (Enhanced Recovery After Anesthesia) recommendations.

**Materials and Methods:** Mixed retrospective cohort study with 192 patients divided into 2 groups, preimplantation (GP=101; January 2015-January 2017) and the group with care determined by the ERAS protocol (GE=91; February 2017- January 2019)

**Results and Discussion:** It was observed in the GE group a reduction in the conversion from laparoscopy to laparotomy from 7% to 1% (p=0.06), central venous accesses from 23.76% to 6.59% (p=0.01), drains from 15.8% to 8.79 (p=0.05), and number of transfused patients from 6.25 to 5%.

In the postoperative period level of blood glucose (p=0.01), PCR (C Reactive Protein) levels (p=0.28) and morphine consumption (p<0.01) were reduced, as well as the length of hospitalization in Post-Anesthesia Recovery Unit (p=0.02) admission and stay in the Intensive Care Unit.

The ERAS strategy allowed patients to recover basic vital functions without developing postoperative complications or re-entry after discharge, proving to be safe.

**Conclusion(s):** The ERAS program has proven to be safe and effective through the improvement in the clinical outcomes. Currently the sample is being expanded, including patients undergoing abdominal oncogyneecology surgery during 2019 to 2022
Eisenmenger syndrome due to intracardiac shunt in adults: perioperative morbidity and mortality

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Background and Goal of Study: A growing number of patients with Eisenmenger syndrome (ES) secondary to an intracardiac shunt are surviving into adulthood. As a result, many require noncardiac operations and anesthetic techniques. The purpose of this study is to determine the mortality and complications in the perioperative period of noncardiac surgery in this population.

Materials and Methods: A retrospective cohort study was conducted to all adult patients with ES due to intracardiac shunt undergoing noncardiac operations between January 1, 1995 and November 30, 2023 in a tertiary care university hospital. Medical records of all patients with ES who had had noncardiac surgery were reviewed. Collected data included perioperative complications, type of surgery, and 30-day mortality. Kaplan Meier survival curves and log-rank test were used to compare survival distributions between patients who sustained complications and those who did not during the study period.

Results and Discussion: Thirty-six adult patients (26 women, 10 men) had a total of 67 interventions, including mostly traumaticological (17.9%) and gynecological (11.9%). The mean age was 39 years (range: 20-68) and 66.6% of patients were in NYHA FC II or worse. The most frequent cause of ES was ventricular septal defects (41.6%). Seventeen anesthesic procedures (25.4%) were urgent. The preoperative hemoglobin mean was 18.1 (range: 10.7-25.6). There were 9 (13.4%) intraoperative adverse events and 10 (14.9%) postoperative complications. Two patients died during the first 48 hours. At 30 days follow up, the survival rate was 88.9%. Intraoperative and postoperative complications were associated with a reduction in 30 days survival rate (p=0.002).

Conclusion(s): Adult patients with ES are at particular risk when undergoing noncardiac operations. Complications and mortality are higher than in other congenital heart diseases. Anesthetic management of Eisenmenger patients should be performed by physicians experienced in managing these complex cases.

Noncardiac surgery outcomes in single ventricle adult population

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Background and Goal of Study: Patients with single ventricle physiology (SV), either palliated or not, have increased their survival in the last decades. A growing number of anesthetic procedures have been performed in these patients. Although their perioperative risk is known to be higher, it is not yet well quantified. The aim of this study is to review the outcome of anesthetics for patients with SV undergoing noncardiac surgery.

Materials and Methods: A retrospective cohort study was conducted to all adult patients with SV undergoing noncardiac operations between January 1, 1995 and November 30, 2023 in a tertiary care university hospital. Records were reviewed for any noncardiac procedure which required anesthesia. We collected demographic variables and comorbidities, intraoperative and postoperative complications, type of surgery and 30-day mortality. Categorical variables were analyzed using χ² and Fischer’s test. To study the relationship between a quantitative and a dichotomous qualitative variable, Mann–Whitney U test was used.

Results and Discussion: A total of 63 patients and 103 anesthesic procedures were recorded. Thirty-three (52.5%) were female. The mean age was 31.4±10.4 years and 68.8% of patients were in NYHA FC II or worse. Twenty-one procedures (20.4%) were urgent and the median total anesthesia time was 121 min (range 15–360 min). Most operations consisted in endoscopic (18.6%), arrythmia ablation (13.7%) and general surgery interventions (6.9%). From 1995 to 2023 a progressive increase in the number of anesthetics procedures was observed (p<0.001), as well as an increase in the age of the patients who required surgery. There were 2 intraoperative and 4 postoperative adverse events (n = 6, 5.6%). There were no significant differences in adverse events by type of surgery, demographic variables and comorbidities. Two patients (12.5%) of in NYHA FC IV had adverse events. There were no deaths at 48 h. After 30 days follow up only one patient died.

Conclusion(s): We observed a very low mortality after noncardiac surgery in adult patients with SV undergoing noncardiac surgery. However, the increasing number of surgical interventions will allow us to correctly stratify the perioperative risk of these patients.

Perioperative temperature monitoring: are we doing it right?

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Background and Goal of Study: A significant number of patients get their first temperature measured in Recovery and being hypothermic postoperatively. The goal of this project was to assess perioperative temperature monitoring practices in a District General Hospital.

Materials and Methods: 50 patients were reviewed pre- and intraoperatively to assess temperature monitoring practices. 91 patients were reviewed in recovery and their temperature was measured using tympanic and axillary probes. An online survey with a questionnaire designed to assess awareness of NICE guidelines was completed by anaesthetists, operating department practitioners (ODPs) and recovery nurses. Responses were limited to one institution.

Results and Discussion: Temperature was measured in the anesthetic room prior to induction of general anaesthesia in only 26% cases and measured intraoperatively every 30 min in only 30%. Postoperatively in Recovery, 67% of patients were hypothermic (temp<36.5) immediately post-surgery and 13.2% had temperatures <36.0 C. Using Wilcoxon Signed-Rank test, there was no
statistically significant difference between mean tympanic and axillary temperatures (p=0.541). Spearman’s R demonstrated no statistically significant correlation between length of procedure and postoperative temperature.

The survey was completed by 80 respondents: 53.8% by anaesthetists, 20% by ODPs and 26.2% by Recovery staff. 68.8% were aware of normal temperature targets and 80% knew when it should be measured throughout the perioperative period. 88.8% said they would warn the patient prior to induction if hypothermic but only 33.8% knew the correct setting on a forced air warmer. 68.8% agreed temperature was inappropriately monitored especially under regional anaesthesia. 47.5% felt a lack of motivation was to blame, 20% attributed it to a lack of equipment. The site and device used for temperature monitoring is to the discretion of anaesthetist. There are no clear-cut recommendations for non-invasive modes of temperature measurement, especially for patients undergoing regional anaesthesia.

Conclusion(s): Temperature is inadequately monitored in the perioperative period. There is a strong need for well defined guidelines for non-invasive ways to measure temperature, especially for regional anaesthesia cases. There is a need for better awareness, motivation, and equipment for perioperative temperature monitoring.

19AP09-09
Chronic kidney disease is associated with major adverse events on the ward after non-cardiac surgery

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Background and Goal of Study: Chronic kidney disease (CKD) is associated with increased morbidity and mortality after non-cardiac surgery. In the intensive care unit (ICU) setting, patients with CKD are closely monitored. However, ICU capacities are limited and some of these patients may go to the ward where monitoring of kidney function and other vital signs is often insufficient. The hypothesis of this study was that preoperative CKD is associated with major adverse events on the ward in patients undergoing non-cardiac surgery.

Materials and Methods: This is a secondary analysis of a multicenter prospective cohort study that recruited patients ≥ 45 years with increased cardiovascular risk in 150 centers and 25 countries worldwide. Main inclusion criterion was elective postoperative admission on the ward without ICU treatment. Main exposure was CKD defined as preoperative glomerular filtration rate (GFR) <30ml/h.

The primary endpoint was a composite of major adverse cardiovascular events (MACE) at 30 days. Secondary endpoints included 30-day mortality, renal complications and unplanned admission on ICU. Statistics: Multivariable logistic regression models with forced entry of 14 predefined covariables.

Results and Discussion: In total, 11,167/15,157 (74.5%) patients went from the recovery room to the ward postoperatively and had complete data regarding the variables of interest. 525 (4.7%) of these patients had preoperative GFR <30ml/h. MACE incidence was 118/10642 (1.1%) in patients with GFR ≥ 30 ml/h and 17/525 (3.2%) in patients with GFR <30ml/h. Multivariate logistic regression revealed an independent association between GFR <30ml/h and MACE [Odds ratio (OR) = 2.19 [95% Confidence interval (CI) 1.27 - 3.79].

There was an independent association between GFR <30 ml/h and each mortality (OR = 1.98 [95%CI 1.14 - 3.43]), renal complications (OR = 3.48 [95%CI 2.39 - 5.07]) and unplanned ICU admission (OR = 2.18 [95%CI 1.54 - 3.07]).

Conclusion(s): Chronic kidney disease in the non-cardiac surgery patient population is common and associated with major adverse events. High awareness on the prognostic importance of CKD in this setting is warranted and obligatory monitoring of these patients after surgery may be considered.

19AP09-10
Multimodal prehabilitation as a strategy for reducing postoperative complications in cardiac surgery: a randomized controlled trial

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Background and Goal of the Study: Prehabilitation has shown efficacy in reducing postoperative complications in abdominal surgery. However, the data in cardiac surgery are controversial.

The goal of this study was to determine whether a multimodal prehabilitation program before elective cardiac surgery can reduce postoperative complications.

Materials and Methods: Single-center, randomized controlled trial comparing standard of care (Control group) vs 4-6 weeks of a multimodal prehabilitation program (Prehab group), in patients scheduled for coronary artery bypass grafting and/or valve surgery.

The program included two weekly supervised high-intensity interval training sessions, along with psychological and nutritional support. The primary outcome was the incidence and severity of postoperative complications.

Results and Discussion: A total of 160 patients (mean age: 71±9 years, 74% men) were included, with 75 in the Prehab group and 76 in the Control group for intention-to-treat analysis. After 4±4 weeks of the program, patients in the intervention group showed a significant improvement in Endurance Time (ET) measured by a cycling constant work-rate exercise test by 91%, while it remained unchanged in the control group.

The mean 6-minute walk test (6MWT) distance significantly increased in the Prehab group compared to baseline values (pre- vs post-intervention, 479±78 vs 504±74 m, p<0.005), although there were no differences between groups at the pre-surgery assessment. Individual positive response to exercise was observed in 34% of patients, considering an increase in the distance covered in 6MWT of ≥30 m.

No significant differences were found in the primary endpoint of the study (rate of postoperative complications: Prehab vs Control, 1±0.8 vs 1±0.6 complications per patient, p>0.05), or any other
postoperative outcomes between groups, in both intention-to-treat and per-protocol analyses. A sub-analysis revealed that Prehab patients who showed a positive response to exercise measured by 6MWT had a positive effect in terms of reducing both the number and severity of postoperative complications compared to those who did not (responders vs non-responders, 11±0.9 vs 2±2 complications per patient, p=0.038; 16±15 vs 25±19 CCI score, p=0.044).

No patients experienced adverse events or complications attributable to physical training, neither during the sessions nor during the program period.

**Conclusion(s):** Prehabilitation effectively enhances functional capacity (ET) in patients undergoing elective cardiac surgery. However, this positive impact on postoperative outcomes was observed only in those with a significant response in the 6MWT.

**References:**

19AP09-11
**Causes of elective surgery procedures cancellation in a Portuguese General Hospital**

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**Background and Goal of Study:** Elective surgery cancellation is a source of patient dissatisfaction and improper resources allocation since it decreases working efficiency of the operating theatre and increases health care system costs. Knowing the causes behind cancellation can be helpful in establishing an action plan to prevent them from happening. In our centre we decided to analyse the causes for postponing elective surgery. (12)

**Materials and Methods:** Data regarding elective surgery cancellation from January to October 2023 was collected retrospectively. Details on the type of surgery, patient age, sex, ASA physical status, pre-anaesthetic assessment and the specific reason for cancellation were gathered.

**Results and Discussion:** During the period analysed, 6459 elective surgeries were scheduled. The global cancellation rate was 9.10% (n=588). Most of the postponed patients attended the preoperative anaesthetic evaluation (82.8%, n=536). The most frequent cause of cancellation was strike (54%, n=350) followed by lack of theatre time (23.3%, n=152) and “patient related factors - disease” (9.7%, n=63). By specialty, most cases were cancelled on Orthopaedics (25.8%, n=167) followed by General Surgery (21.2%, n=137). The cancellation rate was similar by gender (male 48.8%, n=316; female 51.2%, n=331) and more common in patients aged 13-65yo (49.4%, n=320).

**Conclusion(s):** Cancellations have an adverse effect on the concept of theatre ‘efficiency’. After “strike”, we found that “lack of theatre time” was the most important modifiable cause for elective surgical cancellation. In order to define the processes that can be improved an audit could be done, in the future, to assess problems of scheduling, over-booking or theatre over-utilisation. Future directions could also include a more profound analysis of the impact of multidisciplinary preoperative anaesthesia clinic evaluation on cancellation rate.

**References:**

19AP10-01
**Improved analgesia and decreased post-operative nausea and vomiting were observed following the implementation of Enhanced recovery after surgery (ERAS) for partial mastectomy with pectoral nerve block under intravenous anaesthesia with natural airway**

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**Background and Goal of Study:** Enhanced Recovery After Surgery (ERAS) pathways have been shown in breast surgery to improve outcomes. Under the ERAS society recommendations, general anaesthesia is the most frequently used modality of anaesthesia for breast surgery. Regional or local blocks minimize pain and sedation but not as primary anaesthesia. Although paravertebral block remains golden standard, pectoral nerve block (inter-pectoral-pectoserratus plane block) has emerged as a promising regional block applied to patients receiving breast surgery. We describe the implementation and efficacy of ERAS pathway with pectoral nerve block under intravenous anaesthesia with natural airway for partial mastectomy.

**Materials and Methods:** This is a retrospective study included 120 patients conducted partial mastectomy from 2018 to 2020. Our data set consisted of 60 ERAS cases which received pectoral nerve block combining intravenous general anaesthesia under natural airway with propofol and Remifentanil or alfentanil via TCI and 60 non-ERAS controls with propensity score-matched which received endotracheal intubated general anesthesia (GA) without regional block.

We compared numerical rating scale (NRS) within 24 hours after surgery, perioperative and postoperative opioid consumption and post-operative nausea and vomiting (PONV) incidence between ERAS groups and non-ERAS controls.

**Results and Discussion:** The mean ± SD of NRS pain scores at post-operative 8th, 16th, and 24th hour in the ERAS groups were 2.47 ± 2.3, 1.93 ± 1.23, 0.7 ± 1.2, being significantly lower than those in the GA groups which were 4.45 ± 2.73, 2.35 ± 1.04, 1.72 ± 1.35 (p= <0.001, 0.026, and <0.001 respectively). The percentage of patients received morphine in the post anaesthesia care unit and ward after surgery was lower in the ERAS groups compared to the GA groups (1.7% vs 8.3%, p=0.041).

**Conclusion(s):** Our results indicate that implementation of the ERAS protocol that incorporated pectoral nerve block in patients undergoing partial mastectomy is associated with decreased postoperative pain, reduced opioid requirement and lower PONV.
incidence. The findings can offer insights into anesthesia considerations for breast surgery, potentially improving the quality of care during the perioperative period.

19AP10-02
Preventive effects of prehabilitation on cognitive dysfunction after cerebral ischemia in rat

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Background and Goal of Study: In patients with vascular complications or unstable circulatory conditions, the brain is vulnerable to ischemic injury throughout the perioperative period. Brain ischemic events can trigger cerebral inflammation, thus potentially leading to severe brain damage and consequent cognitive impairment. Although postoperative exercise rehabilitation has shown promise for ameliorating cognitive impairment after cerebral ischemia, the impact of preischemic exercise on postischemic cognitive impairment remains unclear.

This study aimed to investigate whether preischemic exercise (prehabilitation) improves cognitive impairment after cerebral ischemia using rats as a model.

Materials and Methods: Six-month-old SD rats were categorized into three groups (prehabilitation (P) group) (global brain ischemia with prehabilitation for 2 weeks): 20 rats; sedentary (S) group (only global brain ischemia); 20 rats; and control (C) group: 20 rats). In rats in groups P and S, global cerebral ischemia was induced by occluding the bilateral carotid artery for 6 min and draining the blood from the jugular vein.

Cognitive function was assessed using passive avoidance testing, as described previously, during which the rats were exposed to aversive stimuli upon entering a dark chamber 1 day before the ischemic procedure.

Memory retention was evaluated 7 days after ischemia. Memory impairment was defined as entry into the dark chamber within 300 s.

Results and Discussion: Six of the 20 rats in group P, 13 of the 20 rats in group S, and 4 of the 20 rats in group C entered the dark chamber within 300 s. There was a significant difference between groups S and C (P = 0.009), whereas the level of significance was not reached between groups P and S (P = 0.056). There was no significant difference between groups P and (P = 0.716).

The mean entry latencies were no significant difference among the three groups (group S vs. group C: P = 0.031; group P vs. group S: P = 0.052; and group P vs. group C: P = 0.631).

Conclusion(s): In conclusion, in the prehabilitation group, there was a lower number of rats that entered the dark chamber within 300 s compared with the non-prehabilitation groups.

Although further study is required to confirm these findings, the present results suggest that prehabilitation preserves cognitive function after cerebral ischemia.

Reference:
Brain Res. 2019;1710:22–32

19AP10-03
Reduction of inappropriate perioperative neurology referrals for perioperative risk assessment and antithrombotic risk management by 15% at end of 6 months

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Our hospital's preoperative anaesthesiology clinic sees a total of 100-110 patients a day for optimisation of medical conditions prior to surgery, including those with history of stroke or on blood thinners. Perioperative stroke is a rare but serious complication of anesthesia. The incidence of clinically recognised stroke is 0.1-0.8%, and as high as 7% for clinically unrecognized stroke after non-cardiac, non-neurologic surgery. Causes include unnecessary or prolonged suspension of antplatelets or anticoagulants, lack of familiarity with management, and inappropriate neurology referrals resulting in unnecessary delays. Using a Fishbone Diagram, we engaged relevant stakeholders from anaesthesiology, surgical and neurology teams to identify the root causes. By using a Pareto Chart, we then identified 3 main root causes: fear of medical legal issues, avoiding postponement of surgery and lack of clear guidelines available. A prioritisation matrix was created to identify specific solutions to root causes.

We identified that an appropriate intervention would be to ensure that formal institution guidelines on this topic are made accessible to all relevant stakeholders. These easy-to-reference guidelines were selected in view of its feasibility and convenience. Standardised protocols for patients with previous ischemic strokes were instituted. Regular multidisciplinary sessions were conducted to increase awareness. From electronic medical records, we screened referrals made to the neurology clinic during the pre and post-implementation time periods. Referrals were considered appropriate if there was an occurrence of stroke within 6 months preceding the referral or if there was significant intracranial stenosis.

<table>
<thead>
<tr>
<th></th>
<th>Pre-Implementation</th>
<th>Post Implementation</th>
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<tbody>
<tr>
<td>Total Referrals</td>
<td>24</td>
<td>18</td>
</tr>
<tr>
<td>Appropriate Referrals</td>
<td>4 (16.7%)</td>
<td>6 (33.3%)</td>
</tr>
<tr>
<td>Inappropriate Referrals</td>
<td>20 (83.3%)</td>
<td>12 (66.7%)</td>
</tr>
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Figure 1.

These are our results (Figure 1). We performed an independent t test assessing the appropriateness of perioperative neurology referrals pre- and post implementation. This represents a statistically significant 16.6% (p = 0.04) reduction in inappropriate referrals after our interventions, exceeding our target of 15% reduction after 6 months. There is an estimated cost savings of $465.60 and an estimated time savings of 5 – 6.67 hours annually. In summary, we met our target of reducing inappropriate pre-operative neurology referrals.
**19AP10-04**

**Impact of postanesthesia care unit delirium on self-reported postoperative recovery after non-cardiac surgery: a prospective cohort study**

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**Background and Goal of Study:** Patients' perception of their healthcare outcome after surgery has become increasingly important in perioperative medicine. This study aimed to evaluate whether PACU delirium has a relevant impact on self-reported quality of recovery on the first postoperative day.

**Materials and Methods:** This prospective observational cohort study was conducted in a German tertiary care university hospital. Patients ≥60 years, scheduled for elective non-cardiac surgery were included. Patients were screened for the presence of delirium signs 30 minutes after arrival in the PACU using the 3D-CAM. Self-reported quality of recovery after surgery was assessed with the QoR-15GE, which patients completed preoperatively and on the first postoperative day. The association between PACU delirium and self-reported quality of recovery was analyzed using a linear multivariable regression model.

**Results and Discussion:** A total of 428 patients were tested for PACU delirium. Of these, 397 were assessed for self-reported quality of recovery on the first postoperative day. The incidence of PACU delirium was 32.94% (141/428). PACU delirium was significantly associated with lower QoR-15 sum scores one day after surgery (β = -12.21 [95% CI: -17.19; -7.24], p<0.001) and a higher difference between pre- and postoperative QoR-15 sum scores (β = 10.56 [95% CI: 5.80; 15.33], p<0.001).

**Conclusion(s):** In a heterogeneous cohort of elderly patients undergoing elective non-cardiac surgery, we found a significant negative impact of PACU delirium on self-reported quality of recovery on the first postoperative day. Our findings suggest that the presence of delirium symptoms in the postanesthesia care unit is an important determinant of patient-centered outcome after surgery.

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**19AP10-05**

**Predictors of perioperative vasoactive support during retroperitoneoscopic adrenalectomy for pheochromocytoma: a retrospective study**

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**Background and Goal of Study:** The one of the most common complication in pheochromocytoma (PC) surgery is postresection hypotension and perioperative vasopressor requirement (VR). The aim of study was to develop a prognostic equation for perioperative VR among patients with PC undergoing retroperitoneoscopic adrenalectomy.

**Materials and Methods:** Retrospective observational study. The Saint-Petersburg State University Hospital local ethics committee has confirmed that no ethical approval is required. The primary outcome: peak measure of intraoperative Vasodilator-Inotropic Score. Exposure variables: adrenergic activity (urinary or blood level of catecholamine metabolites level expressed in multiplicity of exceeding the upper limit of normal values), peak pre-hospital systolic blood pressure (SBP), daily dose of alpha-blockers (DAB), coronary artery disease (CAD), tumor size on tomography.

Inclusion criteria were: age≥18 years, unilateral adrenalectomy. Exclusion criteria: histological exclusion of PC.

**Results and Discussion:** 201 patients were included in the study, 39 patients with VR after the end of anesthesia. Univariate linear regression showed predictive value of DAB, CAD, SBP and adrenergic activity. After adjustment multivariate regression DAB's prognostic value became non-significant. Univariate and multivariate regression presented at table 1.


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**19AP10-06**

**Postoperative nausea and vomiting in a tertiary care hospital: incidence, risk stratification and prophylaxis. A prospective observational study**

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**Background and Goal of Study:** Postoperative nausea and vomiting (PONV) are common and distressing complication, affecting up to 30% of surgical patients and up to 80% of patients at high risk. Many risk scales are used to guide the different prevention strategies to reduce PONV incidence. Despite this, universal prophylaxis is often used.

This study aimed to assess the incidence of PONV and the adequacy of prophylaxis according to new PONV recommendation guidelines.

**Materials and Methods:** A prospective observational study was conducted on adult patients with a planned hospital stay of at least 24h, having non-cardiac surgery at Hospital Clinic Barcelona. Patients admitted to intensive care unit were excluded. De-
mographic, clinical, anaesthesia and surgery data were collected, including PONV prophylaxis. We calculated the Apfel scale for each patient, the proportion of patients who received antiemetic prophylaxis, as well as the proportion of patients with adequate, excessive or insufficient prophylaxis according to the Apfel risk scale.

Finally, we assessed the incidence of PONV and clinically relevant PONV using an impact scale at 24h after surgery.

**Results and Discussion:** 300 patients were enrolled over 5 months. Mean age was 60.2 (SD 16.6) years old, 161 (53.7%) being women. General anaesthesia was performed in 240 (80%) of the cases, regional anaesthesia in 55 (18%) cases and sedation alone in 5 (2%) cases.

The incidence of PONV was 24%, with a 5 % incidence of clinically relevant PONV. Most of the patients (284, 95%) received PONV prophylaxis, being the most common used drugs dexamethasone alone in 5 (2%) cases.

When PONV prophylaxis was assessed according to PONV risk stratification and new recommendations, 134 (45%) patients received adequate PONV prophylaxis, 87 (29%) patients received excessive prophylaxis, and 79 (26%) received insufficient prophylaxis.

Moreover, the incidence of PONV on these groups were, 7% in low-risk patients, 27% in medium risk and 31% in high-risk patients.

**Conclusions:** In this cohort of adult patients having noncardiac surgery, the incidence of PONV is around 25%. Although most patients received PONV prophylaxis, more than 50% were over- or under-treated according to current recommendations.

**References:**

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**19AP10-07**

**Does age influence the perioperative inflammatory response in patients undergoing cardiopulmonary bypass?**

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**Background and Goal of Study:** Cardiac surgery triggers systemic inflammation, which is associated with adverse postoperative outcomes. The aim of this study was to identify whether age is influencing the perioperative inflammatory reactions.

**Materials and Methods:** We conducted our analysis in a group of 185 patients undergoing cardiac surgery with cardiopulmonary bypass. Blood samples for interleukin (IL)-6 levels were taken at 12 time points to determine inflammation.

For further analysis, 4 age groups (age1 18-57 years (y), age2 58-68 y, age3 69-75 y and age4 >75 y) were formed based on the respective quartiles and compared. Additionally, univariate and multivariate analysis were performed.

**Results and Discussion:** The course of the measured IL-6 levels for groups is shown in Figure 1. After an increase in all groups the highest IL-6 level is found on postoperative day (POD) 1. None of the values differed significantly between the groups (Table 1). The univariate analysis revealed that frailty, PAOD, SOFA-Score and duration of surgery [OR 1.43 (95%CI 1.07-1.9); OR 5.21 (1.02-26.6); OR 1.28 (1.07-1.52), OR 1.01 (1.01-1.010), respectively] as individual factors had a significant effect on the peak of inflammation on POD1, whereas the multivariate analysis showed that only duration of surgery was significantly influencing the peak.

**Conclusions:** We could show that age does not influence perioperative inflammation, but rather that general health status, i.e. frailty, and duration of surgery have an impact on IL-6 expression.

**Reference:**

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**19AP10-08**

**Selecting an optimal cutoff point of STOP-BANG score for identifying severe sleep apnea-hypopnea syndrome in patients awaiting bariatric surgery**

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**Background & Aim of Study:** Unrecognized severe SAHS (sleep apnea-hypopnea syndrome) is known to increase perioperative morbimortality in patients undergoing bariatric surgery, and timely appropriate preoperative CPAP therapy could help reduce these complications.

Surgical patients should be screened for SAHS preoperatively with questionnaires such as STOP-BANG, but due to its low specificity, all moderate to high risk cases should be confirmed with polysomnography. In addition, higher STOP-BANG scores were shown to correlate well with likelihood of severe SAHS. Prior studies in the general surgical population have suggested that the probability of severe SAHS is 65% for a score of 7/8.

**Table 1. Comparison of IL-6 levels between the age groups.**

<table>
<thead>
<tr>
<th>Compared Group1 (IL-6 pg/ml)</th>
<th>Compared Group2 (IL-6 pg/ml)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age1 (265.26 ± 319.36)</td>
<td>Age2 (232.13 ± 266.66)</td>
<td>0.6124</td>
</tr>
<tr>
<td>Age1 (265.26 ± 319.36)</td>
<td>Age3 (280.12 ± 211.2)</td>
<td>0.7962</td>
</tr>
<tr>
<td>Age1 (265.26 ± 319.36)</td>
<td>Age4 (304.36 ± 223.84)</td>
<td>0.5149</td>
</tr>
<tr>
<td>Age2 (232.13 ± 266.66)</td>
<td>Age3 (280.12 ± 211.2)</td>
<td>0.3753</td>
</tr>
<tr>
<td>Age2 (232.13 ± 266.66)</td>
<td>Age4 (304.36 ± 223.84)</td>
<td>0.2041</td>
</tr>
<tr>
<td>Age3 (280.12 ± 211.2)</td>
<td>Age4 (304.36 ± 223.84)</td>
<td>0.6086</td>
</tr>
</tbody>
</table>

Values are presented as mean ± standard deviation. Abbreviations: IL-6, Interleukin 6.
We aimed to determine if there is a different and a more discriminative cut-off point for severe SAHS in a high-risk population such as morbidly obese patients, as they are our target to optimise preoperatively with CPAP.

**Materials & Methods:** 39 patients awaiting bariatric surgery were retrospectively studied. Information on STOP-BANG and polysomnography was collected. SAHS was defined as apnea-hypopnea index (AHI)>10 events and severe SAHS as AHI>30.

To assess the performance of the STOP-Bang for the diagnosis of severe SAHS in our group, we calculated the sensitivity, specificity, positive predictive values (PPVs), negative predictive values (NPVs), and area under the curve (AUC).

**Results & Discussion:** A total of 36 (92.3%) obese patients had SAHS and 15 (38.4%) had severe SAHS. Our study reported STOP-BANG score has an excellent AUC of 0.9 in detecting severe SAHS in the patients and the cut-off point with best performance is 4 points with sensitivity of 93.3% and specificity of 75%.

In terms of clinical relevance, we found that STOP-Bang cut-off score≥3 has excellent sensitivity (100%) and NPV (100%) but poor specificity (33.3%) and PPV (48.4%) values for diagnosing severe SAHS, and this less restrictive cut-off point could allow the physician to conveniently exclude confirmatory diagnosis with polysomnography, with no or minimal risk of misdiagnosing patients with severe SAHS, which could lead to fatal intraoperative events.

**Conclusion:** STOP-BANG is a suggestive screening tool for the detection of severe SAHS in morbidly obese patients, and when the score is less than 3, confirmatory polysomnography may be unnecessary to save cost and time. Nevertheless, a future study with a larger sample size and more statistical power should be conducted to validate our hypothesis.

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19AP10-09

Peripartum anesthetic management and complications in patients with Gaucher disease: a retrospective-cohort study

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**Background and Goal of Study:** Gaucher disease is a rare lysosomal storage disorder that may complicate anesthesia and delivery due to hematological and systemic abnormalities, particularly anesthetic procedural success, hemodynamic stability, and postpartum complications. Limited data exists on anesthetic outcomes in large cohorts.

Our goal was to study anesthetic management difficulty and complications incidences.

**Materials and Methods:** Data from parturients with this disease delivering between 1997 - 2019 at our institution were reviewed. Demographic, delivery, and anesthetic management data, hematological parameters, and outcomes were collected from patient medical records after obtaining local Research Ethics Board approval.

Descriptive variables were reported as frequency (%), and mean ± SD. Qualitative variables were analyzed using the chi-square test or Fisher’s exact test.

**Results and Discussion:** 72 deliveries were identified from 32 patients. Mean age was 31.5±5.8 years. Enzyme Replacement Therapy was started in most patients (74.2%). The majority of deliveries (65.3%) had a normal vaginal delivery.

For Cesarean section, neuraxial anesthesia was employed in 75% of cases, with first-attempt spinal anesthesia success reported in all cases and without complications. No general anesthesia associated complications nor significant hemodynamic instability were reported. Mean intraoperative Hemoglobin change was 1.6 g/dL. Two cases required extended Post-Anesthesia Care while none Intensive Care admission.

Labor Analgesia was administered in 77.5% with a rate of Epidural Analgesia administration of 16.3%. Blood products administered during active labor before neonatal delivery were Platelets as the most common (7,1%), followed by Packed Red blood Cells (9%).

These results did not describe significant complex anesthesia management incidences nor complications.

**Conclusion:** In the largest retrospective-cohort study to date of parturients with Gaucher disease, outcomes remained favorable when managed at a specialized center with appropriate multidisciplinary care and hematological optimization.

No significant anesthetic nor hemodynamic complications were observed. A long 22-year study period was required due to the illness rarity, and may carry risk of bias from changes over time. Larger prospective studies are still needed to validate these findings and further optimize multidisciplinary management for parturients with Gaucher disease.

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19AP10-10

Risk factors for Post-Anesthesia Care Unit (PACU) delirium

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**Background and Goal of Study:** Delirium in the post-anaesthesia care unit (PACU) is an important post-operative complication that is challenging to manage, with significant postoperative consequences.

This retrospective audit aimed to evaluate the risk factors for PACU delirium in our local tertiary institution in Asia.

**Materials and Methods:** 460 patients were recruited over 3 months from July – September 2023. Inclusion criteria were patients age ≥18 years undergoing non-neurological surgery, admitting to PACU postoperatively. PACU delirium was identified with the validated Nursing Delirium Screening Scale (NuDesc), defined as a NuDesc >2. Known and exploratory risk factors for PACU delirium were collected throughout the perioperative period [1].

Data was analysed via univariate analyses as appropriate.

**Results and Discussion:** Overall incidence of PACU delirium was 7.9%, in line with globally reported incidence of 1.3% to 45% [1].

PACU delirium was strongly associated with the use of general anaesthesia (p=0.002) and postoperative pain (p=0.006). Interestingly, presence of a bladder catheter (p=0.013), and not using hearing aid (p=0.012) were also found to be significant risk factors.

Age, gender, ASA status, surgical specialty, emergency surgery, and length of surgery were not found to be significance risk factors in our study. Patients with PACU delirium stayed on average 37mins longer in the PACU (97min vs 60min).
Conclusion(s): In our local population, general anaesthesia, post-operative pain, bladder catheterisation, and hearing impairment are significant risk factors for PACU delirium.

Reference:

Acknowledgements: We would like to thank the Safe Brain Initiative for their support.

19AP11-01
Recurarization in post-anesthesia care unit: an unexpected case report

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Background: We report a case of venous catheter extravasation after induction. Applying cold can mitigate extravasation-related damage, but in our case, it led to late recurarization.

Case Report: A 72-year-old woman (160cm; 60 kg), ASA III, was proposed for abdominal wound debridement. We started a rapid sequence induction with 150µg fentanyl, 130mg propofol, and 70mg rocuronium. After 1min30seg the patient was drowsy but easily aroused. We checked the venous access and noticed extravasation, so, ice was applied to the area. A new catheter was inserted into the opposite arm and we gave more 50µg fentanyl, 50mg propofol, and 50mg rocuronium. The surgery lasted one hour. In the end, we gave 240mg sugammadex (PTC of 4), and the patient was extubated after a rTOF >0.9. In the post-anesthesia care unit (PACU) the ice application was discontinued and the patient was warmed. One hour later she started developing para-doxical breathing, SpO2 dropping to 80%, and diminished muscle tone. We administered oxygen. TOF monitoring showed recurarization. After 200mg of sugamadex the symptoms were reversed. The remaining time at the PACU occurred without complications.

Discussion: We applied local cold therapy to prevent injuries related to the extravasation of propofol. However, the cooling process led to vasoconstriction delaying the reabsorption of rocuronium. After ice removal, vasodilation ensued, prompting re-absorption of the extravasated rocuronium, resulting in muscle paralysis. In a similar case, rocuronium infiltration happened after absorption of the extravasated rocuronium, resulting in muscle tone. We administered oxygen. TOF monitoring showed recurarization. After 200mg of sugamadex the symptoms were reversed. The remaining time at the PACU occurred without complications.

References:

Learning points: Cold therapy following pharmacological venous extravasation can mitigate propofol-induced lesions, yet may result in recurarization.

19AP11-02
Rare bilateral pneumothorax post tracheostomy closure: an anaesthetic challenge

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Background: Tracheostomy closure is a commonly performed procedure in an elective setting. The primary cause of patient's respiratory compromise may not be immediately identified, and the diagnosis of pneumothorax may be challenging in the peri-operative.

Case Report: A 35-year-old man, ASA II, scheduled for elective closure of a tracheostomy performed 15 years ago due to a polytrauma episode. The procedure went without complications. Postoperatively, the patient develops shortness of breath, subcutaneous facial emphysema, and peripheral desaturation, but normotensive with normal lung auscultation. Because of a predicted difficult airway, orotracheal intubation (OTI) was performed in spontaneous ventilation via videolaryngoscopy. Imaging studies, via CT, revealed subcutaneous emphysema, pneumomediastinum, and bilateral pneumothorax with compressive atelectasis. A laminar gas track was identified in the tracheostomy closure site, along with linear collections of air contiguous to the bronchovascular interstitium. Bilateral chest tubes were inserted, and the patient was transferred to the intensive care unit.

Figure 1. Subcutaneous emphysema (green arrow); Macklin effect (blue arrow).

Discussion: The initial diagnostic hypothesis was tracheal injury, leading us to immediate airway patency assurance. In this case, the likely mechanism for pneumothorax development was the influx of high-flow air through the tracheal injury into the mediastinum and then into the pulmonary bronchovascular interstitium centrifugally, causing atelectasis. Our case reflects a “reverse” mechanism of the Macklin effect since there was no evidence of direct pleural injury, and protective mechanical ventilation was employed throughout the procedure. For this patient, OTI effectively controlled the air entry mecha-
After being taken out of the operating room, she was observed to have ventricular extra beats and pulmonary edema. ECG returned to normal, and she was started with the diagnosis of acute hyponatremia. According to blood results and clinical observations, 20mg furosemide was checked with ultrasonography. Blood analysis was sent considering hyponatremia. The lower abmained stable.

Intraop 48. 7.13 126 44 84
Postop 3. 7.14 59 40 95
Postop 15. 7.16 55 38 100

Discussion: Early management is essential because the hypoxia and respiratory distress that are the result of pulmonary edema, may aggravate the course of acute symptomatic hyponatremia.

Learning Points: This case aims to raise awareness of a rare occurrence, emphasizing the importance of perioperative patient monitoring, vigilance for potential complications, and the anesthesiologist's ability to act accordingly.

19AP11-04
Peri-operative management of Myotonic dystrophy type 1: a case report

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Background: Myotonic dystrophy type 1 (DM1) is a rare autosomal dominant neuromuscular disease with an incidence of 2.1 to 14.3 per 100,000. Myotonia is only a minor characteristic, with muscle wasting, cataracts, cardiac arrhythmias, cardiomyopathy, diabetes and dysthyroidism also present. A peri-operative complication rate of 8.2% has been reported, making these challenging cases for the anaesthesiologist.

Case report: A 56-year-old female, ASA III; underwent mastectomy with sentinel node biopsy. History of DM1, with moderate distal and axial muscle wasting, AFib, cardiac insufficiency, obstructive sleep apnoea and restrictive respiratory syndrome. A combined technique was performed: PECS I and profound sedation anterior blocks, followed by TIVA with TCI of Propofol. Processed EEG monitoring BIS® was used. Only 0.15 mg of fentanyl were used, before airway manipulation, and no other opioid was administered. A modified RSI was performed with 0.6 mg/kg of rocuronium for Muscle relaxation and successfully reversed (confirmed by TOF ratio >90%) with 4 mg/kg of sugammadex during preparation for awake extubation. The surgery was uneventful. Normothermia maintained with a forced air-warming blanket and warmed IV fluids. Post-operative monitoring for 24 hours in the ICU was undertaken with no complications. Pain was effectively controlled with the analgesic plan of paracetamol and ketorolac.

Discussion: A thorough pre-anesthetic evaluation of all systems involved is essential in DM1 patients. They are susceptible to IV hypnotics and opioids, and so titration to effect was followed and monitored with BIS®. Except for airway manipulation, no opioids were used intra or post-operatively, with the effective use of opioid-sparing regional techniques. Hypothermia, which causes myotonia, was actively avoided. Due to gastroparesis, a modified RSI was performed, and non-depolarizing NMB was used, as succinylcholine is known to precipitate myotonia and hyperkalaemia. Slow awakening and weak bulb reflexes were foreseen, so an awake extubation was chosen.

Learning points: The anaesthetic management of DM1 is challenging, with many grey areas in the pre-, intra and post-operative management. This case report presents a safe and successful anaesthetic approach to this rare syndrome.

Reference:

Learning points: Realizing that hyponatremia developed during the operation prevented postoperative problems.
19AP11-05
A sight for sore eyes: a case of post-operative bilateral proptosis after Valsalva manoeuvre and general anaesthesia

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Background: We present a case of bilateral proptosis following general anaesthesia (GA) and application of intra-operative Valsalva manoeuvre (VM) in a patient who underwent elective surgical resection of liver. He was positioned in slight reverse Trendelenburg and VM was utilised to check for haemostasis. There are no prior reports of bilateral proptosis resulting from GA and VM to the best of our understanding.

Case Report:
A 59-year-old Indian gentleman underwent elective surgical resection of newly diagnosed hepatocellular carcinoma in August 2023.

He has a history of prior stroke in 2013, hypertension and type 2 diabetes mellitus on Insulin and oral hypoglycaemic agents. Surgery was done under total intravenous general anaesthesia (TIVA) using TCI propofol and remifentanil, guided by processed electroencephalography (pEEG) monitoring, with intermittent paralysis using atracurium.

His eyes were taped closed with micropore at the start of surgery. After heptectomy was completed, 4 separate VM was performed as requested by surgeons, up to 30–40cm H2O for about 10 to 20 seconds at later stages to check on haemostasis. The eye tapes were removed at the end of surgery and patient was found to have significant bilateral proptosis with reactive pupils.

There was difficulty in opposing the eyelids to re-apply eye tape. He was kept intubated post-operatively in intensive care and an urgent CT brain was done in view of the new bilateral exophthalmos.

Ophthalmology opinion was sought and patient was diagnosed with bilateral proptosis, non-congested with mild lagophthalmos possibly VM-related proptosis after discussion with the anaesthesiologist.

Subsequent ophthalmology follow up revealed resolution of the exophthalmos and lagophthalmos, with retention of vision and ocular movement.

Discussion: Ocular complications are well emphasised in anaesthesia but related extra-ocular complications related are not well documented.

This case highlights possible under diagnosed post-operative proptosis related to VM from the lack of literature available and the potential for missed extra-ocular complications.

Learning Points: Unintended effects or proptosis results in possible diplopia, corneal damage from inability to complete eye closure as well as psychoemotional effects due to pronounced aesthetic changes.

We should be mindful of potential eye complications which may result from excessive episodes and pressure achieved during VM especially in patients under GA.

19AP11-06
Involuntary rhythmic movements of the upper extremities after general anaesthesia - a case report

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Background: Involuntary rhythmic movements after general anesthesia in a healthy individual without history of neurological disorder is uncommon. In most literatures, these involuntary movements are reported to occur after emergence from general anesthesia, however, prolonged duration of abnormal movements can occur with delayed onset, making it potentially dangerous for the outpatient surgery patients.

Case Report: We present a case of a 55-year-old female who underwent general anesthesia for outpatient surgery of vitrectomy, phacoemulsification, and aspiration of cataract due to endophthalmitis. Induction of anesthesia was achieved using total intravenous anesthesia (TIVA) with propofol and remifentanil, and rocuronium 50 mg was given after confirming loss of consciousness.

Total surgery time was 80 minutes. Complete emergence was achieved after administration of sugammadex 200mg. The patient was then transferred to the postanesthesia care unit (PACU). However, the patient started to show abnormal involuntary motion of her upper body that started 10 minutes after arriving in the PACU. She was alert and verbally cooperative, however she could not control her uncoordinated “vomiting-like” upper body motions and rhythmic jerking of the upper extremities.

Neurological exam was performed by a neurologist in the PACU and did not show any abnormalities suggestive of neurological disorder other than mildly increased deep tendon reflex.

Involuntary upper extremity movements were consistent and rhythmic for total duration of 30 minutes, until midazolam 3 mg was administered intravenously and the jerking movements of the upper extremities subsided into tremor-like movements. Additional midazolam 2 mg was administered 15 minutes after the first dose; subsequently, the involuntary movements completely stopped. The patient, being moderately sedated, was transferred to the intensive care unit (ICU) for close observation.

Discussion: While acute involuntary rhythmic movements can be associated with antidopaminergic and antiemetic medications, they are known to occur with drugs such as propofol and fentanyl, which are commonly used during induction and maintenance of general anesthesia.

Reference:

Learning Points: Involuntary rhythmic movements can be particularly concerning and dangerous for patients undergoing outpatient surgeries as they are expected to go home after anesthetic recovery.
**19AP11-07**

Anesthetic management of a patient with autophagic vacuolar myopathy

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**Background:** Autophagic vacuolar myopathy is an inherited muscular disorder characterized by the histopathological presence of autophagic vacuoles in skeletal muscles resulting from abnormal autophagy. Clinical manifestations include limb weakness, progressive cardiomyopathy, and intellectual disability.

**Case Report:** A 36-year-old woman, diagnosed with autophagic vacuolar myopathy at age 21, was referred to our hospital for surgical treatment of an ovarian tumor. She had limb weakness of MMT3 and was confined to a wheelchair. She had previously undergone general endotracheal anesthesia for surgical treatment of a femur fracture and a mammary mass.

An echocardiogram showed preserved left ventricular function (67% ejection fraction). However, her respiratory function had declined (vital capacity reduced by 0.3L to 1.64L) over the past three years, and a CT scan showed diaphragm atrophy.

Blood tests indicated elevated CK (400 IU/dl) and K levels (5.3 mEq/L). Clinical progression of myopathy with declining respiratory function prompted management by epidural anesthesia combined with general anesthesia.

Pre-anesthetic ABG was normal. Epidural catheter insertion at Th10/11 preceded total intravenous anesthesia (TIVA) with propofol via LMA preserving spontaneous respiration. Ventilation rate decreased with sedation, and pressure support was added as needed.

Post-surgical ABG indicated normal respiratory status, and extubation followed. Temporary PaCO₂ increase resolved within half an hour. Postoperative progress was uneventful, and discharge occurred on postoperative day 5.

**Discussion and Learning Points:**
1. Preserving respiratory and cardiac function is the foremost consideration in anesthetic management of autophagic vacuolar myopathy.
2. Maintaining spontaneous ventilation, while preferred, requires vigilant monitoring of respiratory function and arterial blood gases.
3. Autophagic vacuolar myopathy is a progressive disease, necessitating careful evaluation and re-evaluation of respiratory and cardiac function.

**References:**

**19AP11-08**

Hereditary angioedema: when the surgical site is the airway

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**Background:** Hereditary angioedema (HA) encompasses three types, with Type I constituting 85% of cases, marked by low levels of C1-INH antigen. Angioedema (AE) linked to procedures typically manifests in the surgical site.

**Case Report:** A 9-year-old male with Type I HA was scheduled for tooth extraction, diagnosed at 18 months with no identified triggers. The patient experienced recurrent AE episodes and was medicated with tranexamic acid (500 mg/day) and icatibant (15 mg as needed).

One hour before extraction, 20 U/Kg of Berinert was administered.

**Discussion:** The primary concern is GA-induced upper airway edema through direct mucosal irritation by the endotracheal tube (ETT). To prevent this, select an ETT of adequate size, minimize intubation duration, and regularly measure cuff pressures. HA edema follows a predictable course, involving prodromal signs. Swelling progresses slowly over the first 24h, followed by a gradual decline over 48-72h. HA lacks histamine-mediated responses, limiting steroid or antihistamine efficacy.

Perioperative management involves prophylactic C1-INH production increases and on-demand C1-INH or Fresh Frozen Plasma administration. Consensus guidelines recommend 20UI/kg of Berinert as short-term prophylaxis th before the procedure to prevent severe AE.

Teamwork is essential for successful HA management, necessitating collaboration between immunologists and the anesthesia and surgical teams.


**Learning Points:** The approach to HA in surgical settings involves measures to prevent AE and the necessity for extended postoperative monitoring.
19AP11-09
Anesthetic challenges in refractory immune thrombocytopenic purpura: a case report

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Background: Immune thrombocytopenic purpura (ITP) is an autoimmune disorder causing platelet destruction, particularly in the spleen. Laparoscopic splenectomy (LS) is established for ITP refractory to medical therapy, offering benefits like reduced blood loss and morbidity. LS permits thorough exploration for accessory spleens, minimizing disease recurrence. Despite performing LS with low platelet counts, the safe threshold and necessity of platelet transfusion remain unclear.

Case report: A 42-year-old male, ASA physical-status IV, due to consistent platelets below 1x10^9 U/L, and lacking other significant medical history, is scheduled for laparoscopic splenectomy following unsuccessful medical treatment of ITP with corticosteroids, and immunoglobulin. Etorbopag and rituximab yielded no response, maintaining platelet counts <1x10^9 U/L.

In a multidisciplinary approach involving hematology, general surgery, and anesthesiology, high-dose corticosteroids and human immunoglobulin were administered the day before surgery, raising platelet counts to 41x10^9 U/L. A platelet pool was administered before balanced general anesthesia was induced. The main concerns included avoiding airway trauma during intubation. An arterial line was placed with ultrasound guidance to minimize complications, allowing invasive blood pressure monitoring and point-of-care blood testing.

Another platelet pool was administered before the surgical incision, with two additional pools held in reserve. Other considerations involved avoiding NSAIDs and platelet-lowering drugs and vigilant monitoring for bleeding complications. The blood count taken immediately after splenic artery ligation revealed a platelet count of 82x10^9 U/L, with an overall intraoperative blood loss of less than 50 ml.

Discussion: Managing severe ITP cases with LS in low platelet counts presents challenges due to the lack of clear guidelines. This case highlights successful multidisciplinary strategies in perioperative care.

Reference:

Learning points: Recognize the complexities in LS for severe ITP, emphasizing the importance of multidisciplinary teamwork. Grasp essential perioperative strategies for optimal patient care. Contribute insights to LS safety in challenging cases.

19AP11-10
Iatrogenic left common iliac artery injury during lumbar spine surgery: a case report

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Background: Despite the low possibility, vascular injuries during spine surgery is life-threatening. Early recognition and timely intervention are crucial for preventing subsequent serious complications.

Case report: A 42-year-old woman underwent lumbar laminectomy, microdiscectomy for a L4-5 disc herniation (Fig.1). The surgery was performed under general anesthesia with the patient in the prone position. In the process of the surgery, hypotension, bradycardia and a sudden reduction in end-tidal carbon dioxide developed. No bleeding was observed from the operative field. As aggressive fluid management and 14 mg ephedrine stabilized her hemodynamics, no episodes of unstable hemodynamics were observed.

Upon arriving at the recovery room, the patient experienced severe flank pain, soreness and progressing weakness in the left lower extremity. Hypotension, tachycardia, and a decrease in hemoglobin level from 14.5 g/dl preoperatively to 6.2 g/dl were observed.

Computed tomography revealed a ruptured left common iliac artery with pseudoaneurysm and active bleeding (Fig.2). Emergent repair with an endograft was performed under angiography (Fig.3).

The patient successfully recovered and was discharged 26 days later.

Discussion: With 15-65% mortality rate, vascular injuries in spine surgery are rare but lethal depending on the size of injured vessels, timing of diagnosis, and control of bleeding(1).

Clinical signs include hypotension, tachycardia, unexplained bleeding from disc space, acute anemia, abdominal distention and weak pulsation over lower extremities. However, these signs may be obscure due to factors such as compensation in young patients, temporary vascular compression from the prone position, and the self-sealing effect of the anterior longitudinal ligament(2).

In addition to surgical exploration, endovascular stent graft serves as a minimal invasive alternative for bleeding control.

References:
2. Int Orthop. 43:2191-2198, 2019

Learning points: For anesthesiologists and surgeons, timely recognition and management of vascular complications in lumbar spine surgery would make a significant impact on the prognosis.
Development of extensive subcutaneous emphysema during a retroperitoneal adrenalectomy – case report

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Background: Adrenalectomy is a commonly performed surgical procedure for the removal of adrenal tumours.1,2 Two minimally invasive techniques, transabdominal laparoscopic and retroperitoneoscopic approaches, are widely used for this purpose.1 The latter offers many advantages, such as minimizing intestinal manipulation and the risk of post-operative ileus and enabling higher insufflation pressures (IP) without significant cardiovascular effects.1 However, complications such as subcutaneous emphysema (SE) can occur.1,2

Case report: A 57-year-old woman, ASA III, with a non-functioning adenoma of the left adrenal gland, was scheduled for an adrenalectomy.

Retroperitoneal approach was performed, with patient lying prone in a knee-chest position. The IP was 21mmHg. Sixty minutes after beginning the procedure, peak airway pressure (PIP) unexpectedly rose to 42cmH2O, and end-tidal carbon dioxide (EtCO2) levels increased, reaching 93mmHg. Further physical examination revealed an extensive SE.

Ventilation management included change to pressure controlled–volume guaranteed ventilation plus tidal volume and respiratory rate increase. These resulted in a reduction of PIP to 32cmH2O, but EtCO2 levels remained elevated at 70mmHg. This issue was deliberated with the surgical team and jointly agreed to decrease the IP.

Subsequent blood gas analysis revealed severe respiratory acidosis (RA) with pH<7 and pCO2 of 116mmHg. Surgery had a total duration of 110 minutes and the patient was transferred to the intensive care unit where she was extubated in the following day, once RA and SE were resolved.

Discussion: When hypercarbia persists despite hyperventilation, clinical signs of SE should be looked for. If SE is identified, the surgeons should be informed and may need to adapt their surgical approach.2 In most cases, SE resolves following pneumoperitoneum deflation, and no specific intervention is required.1 When it occurs in the upper body, upper airway obstruction should be excluded before extubation.2 Furthermore, hypercarbia and RA can result in hemodynamic changes, necessitating close postoperative monitoring.2


Learning points: This case emphasizes the importance of being vigilant and prepared for unexpected complications associated with laparoscopy.

Unusual complication of ultrasound-guided central venous catheter placement: superior thyroid artery pseudoaneurysm: a case report

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Background: Ultrasound-guided central venous catheter (CVC) placement in the internal jugular vein (IJV) is a well-established and generally safe procedure [1]. However, rare complications may arise.

Case Report: We present the case of a 68-year-old female, ASA physical status III, 155 cm in height and 47 kg in weight, who underwent mitral valve plasty due to severe mitral valve regurgitation.

During anaesthesia induction, a CVC and a 7.5 Fr sheath catheter were placed into the right IJV under real-time ultrasound guidance. The surgery and the postoperative course were uneventful. However, on POD2, a small haematoma developed at the CVC placement site following CVC removal despite adequate compression. On POD3, after removing the scab of the haematoma, pulsatile bleeding was persistent.

Thus, surgical ligation was performed to achieve haemostasis. On POD8, after stitch removal, a small skin bulge appeared at the site (Figure 1).

CT angiography revealed a pseudoaneurysm of the right superior thyroid artery (STA) (Figure 2).

The patient underwent successful endovascular coiling embolization and was discharged.
Perioperative Care

Discussion: Pseudoaneurysm of the STA following ultrasound-guided CVC placement in the IJV has not been previously reported. In this small female patient, the challenge arises in securing sufficient space for two catheters, leading to a higher placement where the STA courses. To prevent this rare complication, a more cautious assessment of potential artery courses using colour Doppler ultrasound is necessary.

Reference:

Learning points: Ultrasound-guided central venous catheter placement carries the potential risk of injuring small arteries, such as the superior thyroid artery, leading to pseudoaneurysm formation. Cautious should be taken to minimize the risk of pseudoaneurysm formation.

Laparoscopic surgery in regional anaesthesia

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Background: Laparoscopic surgery is conducted under GA as pneumoperitoneum can cause respiratory compromise and muscle relaxation aids surgical access. A laparoscopic approach offers smaller less painful wounds, meaning patients can recover more quickly with lower risk of chronic pain and possibly hernia recurrence[1]. Frail patients that do not tolerate a GA are denied the advantages of laparoscopy.

Case Report: An 81 year old man with COPD and a lung cancer treated with radiotherapy, presented for elective repair of his large inguinal hernia that contained his sigmoid colon. The lung tumour was slowly progressive and due to the fragility of the patient, no further treatment was planned. He used home oxygen, walking sticks inside and a wheelchair outside the home. He had residual weakness from four strokes and used pregabalin and oxycodone daily for chronic pain. The hernia was recurring causing problems with bowel movements, urination and pain. A CSE was used with 2ml heavy bupivacaine 0.5% and 20mcg fentanyl. Unfortunately, the patient had fasted for 12 hours and initially required a fluid bolus and noradrenaline. Sedation was started with a combination of 1mcg:1mg dexmedetomidine and s-ketamine, without a bolus until RASS -2/3. Highflow nasal oxygen was used to maintain his habitual saturation of 89-91%. An uncomplicated laparoscopic TEP hernia repair was performed with an abdominal pressure of 12mmHg providing good surgical access. The patient was haemodynamically stable and required no support. The epidural was started post operatively and he was discharged home the next morning.

Discussion: When presented with a frail patient where a GA is deemed unsafe, usually an open surgical technique, combined with regional anaesthesia is performed. However, laparoscopy is a better choice in this patient group. Not only have feasibility studies (2) shown that laparoscopy is possible in regional, but that awake patients tolerate the haemodynamic changes better. The use of sedation that preserves respiratory drive and airway reflexes in combination with highflow nasal oxygen further aids the preoperative period.

References:
1: Open versus laparoscopic repair of inguinal hernia: an overview of systemic reviews of randomised controlled trails; Surg Endosc. 2022; 36(7): 4685-4700

Learning points: Laparoscopy is feasible in regional anaesthesia for colon cancer surgery

Anesthetic management of a patient with Isaacs' syndrome and Myasthenia gravis for colon cancer surgery

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Background: Isaacs' Syndrome is a rare acquired autoimmune neuromyotonia disorder characterized by continuous muscle twitching and myokymia, muscle hypertrophy, weight loss, and hyperhidrosis.[1] This case report presents a unique clinical challenge in which Isaacs Syndrome and Myasthenia gravis coexist.

Case report: A 64 year old female, ASA III, was scheduled for elective colectomy due to colon cancer. She was 80kg, 159cm with medical history Myastenia Gravis and Isaacs Syndrome (receiving azathioprine, carbamazepine and pyridostigmine). Physical examination showed a moderate generalized muscle weakness (upper limbs showed weakness 3/5 in all muscle groups) and no respiratory problems were reported. Electrocardiogram, laboratory and screening tests were normal. Pulmonary function tests showed a mild restrictive pattern. ECG, invasive blood pressure, pulse oximetry, BIS and TOF were monitored. The patient was not premedicated with midazolam, anaesthesia was induced with lidocaine 80 mg, fentanyl 80mcg, propofol 160mg and atracurium 25mg and patient was entubated. General anesthesia was maintained continuous infusion of remi-
fentanyl and propofol. Doses of anesthetic agents were modified according to the clinical assessment of the depth of anesthesia. When the TOF value was 0.8 of 5-10 mg atracurium was administered. Tenoxicam 20mg, paracetamol 800mg and bilateral TAP block were applied for postoperative pain control. The patient was remained hemodynamically stable and the duration of surgery was 3 hours. When spontaneous breathing was observed to be sufficient, the patient was extubated. The patient was transferred to the intensive care unit and with stable hemodynamics, no respiratory complications and discharged from the intensive care unit one day later.

**Discussion:** The major anaesthetic concern was the use of neuromuscular blocking agents for this patient. Hofmann elimination of atracurium and the short duration of action of remifentanil provide satisfactory anesthetic conditions in this patient.

**Reference:**

**Learning points:** Anesthesiologists should consider the potential difficult intubation, pulmonary aspiration and requirement for postoperative ventilation in Isaacs' Syndrome Myasthenia Gravis coexist. Careful neuromuscular monitoring is recommended during general anesthesia.

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**19AP12-04**

**Anesthesia for a patient with BOR syndrome – keeping it simple and safe**

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**Background:** BOR syndrome is a rare autosomal dominant disorder that presents with various features including branchial cysts, retrognathia, auricular fistulas, hearing impairment, congenital heart disease, and renal dysfunction [1]. Anesthesia in BOR patients can be challenging due to potential airway difficulties and multiple organ involvement, necessitating meticulous preoperative assessment for anesthesia planning.

**Case Report:** 43-year-old female with hypertension, HIV without AIDS, worsening reflux esophagitis and BOR, underwent inferior turbinectomy and bilateral pre-auricular sinus excision. Airway assessment revealed retrognathia, a 3 cm mouth opening with prominent incisors and an ogival palate. Informed consent was obtained for balanced general anesthesia under ASA standard monitoring, using 150 mcg of fentanyl, 60 mg of lidocaine, 180 mg of propofol, and 80 mg of rocuronium. McGrath videolaryngoscopy was used for rapid sequence intubation, and sevoflurane was used for anesthesia maintenance. Antibiotic and antiemetic prophylaxis were administered, and analgesia was achieved with 1 mg of intravenous paracetamol and 5 mg of morphine. Due to stage II chronic kidney disease, anesthetic drugs were cautiously administered and nephrotoxic agents such as nonsteroidal anti-inflammatory drugs were avoided. Procedure was successful and urine production remained normal in the postoperative period. The patient was discharged the following day.

**Discussion:** Evidence primarily addresses anesthesia challenges in pediatric cases, mentioning bradycardia requiring treatment, particularly in procedures where anesthesia maintenance is carried out using sevoflurane [2].

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**19AP12-05**

**Is fluid overload exclusive to the past and TURP? A captivating case report**

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**Background:** Fluid overload is a well-recognized syndrome during TURP but it can also occur during hysteroscopic procedures. It results from fluid absorption by open vessels and uterine tubes into the peritoneal cavity. It is influenced by several factors such as enlarged uterine cervices in the postpartum period. Treatment involves loop diuretics and correction of electrolyte imbalances.

**Case Report:** A 39-year-old ASA I women 1-month postpartum presented for an urgent uterine resectoscopy of placental remains. The patient underwent ASA standards and Bis monitorig. Anesthesia was induced with fentanyl and propofol and after LMA insertion was maintained with sevoflurane. After 80 minutes, BP and oxygen levels decreased, wheezes and crackles were heard on auscultation, and facial edema was evident. Although no trigger was identified, an allergic reaction with bronchospasm was assumed and treated with no improvement. Shortly after, the surgical team observed vaginal edema. After a brief discussion, the diagnosis of fluid overload was hypothesized and 20mg of furosemide was administered with a successful diuretic and ventilatory response.

We attempted to awaken the patient, but due to severe agitation upon regaining consciousness and risk of airway compromise from edema, sedation and intubation using videolaryngoscope were performed. Diuresis and invasive BP was monitored. Following blood gas results, we initiated electrolyte correction and stimulated diurese. After 4 hours, with 6 liters of diuresis and reduced edema, extubation was performed without complications. The patient returned to baseline neurological status and the remaining hospitalization was uneventful.

**Discussion:** This case highlights a rare case of fluid overload during a postpartum resectoscopy. As this patient was submitted to a general anesthesia we were not able to immediately identify the typical clinical features. This case demonstrates the need for vigilance, fluid balance monitoring, high level of suspicion and teamwork in managing this rare complication effectively.

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**Learning Points:** This case underscores the significance of assessing anesthetic implications in BOR syndrome and individual patient peculiarities through comprehensive pre-anesthetic evaluations for ensuring a safe perioperative course.
Insights from a case: EBUS-TBNA, anesthesia and complication management

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**Background:** Endobronchial ultrasound-guided transbronchial needle aspiration (EBUS-TBNA) is a minimally invasive procedure essential for diagnosing mediastinal and hilar lymphadenopathy and staging lung cancer. Anesthesia is pivotal for patient safety and procedural success. Respiratory complications are associated with pre-existing patient factors, direct trauma from the scope and the need of anesthesia.

**Case Report:** A 58-year-old woman, ASA II, with type 2 Diabetes Mellitus was scheduled for EBUS-TBNA to investigate suspected sarcoidosis. Her symptoms included fatigue and a dry cough, with normal auscultation findings. No allergies or respiratory issues were recorded. The CT scan showed pleural solid nodules and mediastinal lymphadenopathy. For the elective EBUS-TBNA she underwent Total Intravenous Anesthesia (TIVA) with remifentanil and propofol infusions, and rocuronium boluses. An iGel laryngeal mask was successfully used for airway maintenance.

The procedure lasted approximately one hour, with the only incident being an increase in FiO2 from 33% to 50% to maintain SpO2 at 98%.

Post-procedure, she experienced acute respiratory distress, characterized by dyspnea, tachypnea and desaturation necessitating 60% oxygen therapy. Respiratory sounds were symmetrical and clear. No hemoptysis occurred.

An x-ray and enhanced CT scan showed reduced transparency in the right middle lobe, suggestive of alveolar hemorrhage. Pulmonary embolism and pneumothorax were excluded.

She was admitted for observation. Her symptoms resolved within 24 hours without ventilatory support, and she no longer required supplemental oxygen. Blood gas analysis showed normalization.

She was discharged with a scheduled pulmonology follow-up.

**Discussion:** This case highlights the journey of a patient undergoing EBUS-TBNA and anesthesia, emphasizing the necessity of careful patient assessment and vigilant monitoring to manage complications effectively in minimally invasive procedures. Despite significant clinical and radiological findings, the patient course was benign with rapid resolution.

**Reference:**

**Learning Points:** Reporting and analyzing complications following EBUS-TBNA under general anesthesia can provide valuable insights about the causes and best management strategies.
Anesthetic management of a thoracoabdominal paraganglioma: a challenging case report

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Background: Sympathetic paragangliomas, rare tumors deriving from paravertebral ganglia are uncommon causes of secondary hypertension. Diagnosis relies on clinical, biochemical and imaging findings. Surgery is key and careful preoperative management is crucial to avoid complications.

Case report: A 19-year-old female with a history of hypertension and headaches for 2 years was assessed to rule out secondary causes. Laboratory tests showed a high normetanephrine level and the CT scan revealed a 7.5 cm latero-aortic mass in the thoracoabdominal transition suggesting a paraganglioma. Surgery via thoracotomy was proposed but had to be postponed due to a newly discovered 6-week pregnancy. Considering risks, a medical abortion was performed per the patient's decision without complications.

To meet the Roizen criteria, phenoxybenzamine and bisoprolol were started 4 weeks before surgery. Preoperatively, α and β blockers were administered and volume overload managed with crystalloids.

In the OR, monitoring included ASA standard, anesthetic depth, NMB and cardiac output. An epidural catheter was placed at T8 level with sufentanil administration before surgery. Induction was achieved with fentanyl 200 μg, propofol 120 mg, esmolol 25 mg and rocuronium 80 mg.

A left double-lumen tube was placed with fibroscopic confirmation and lung exclusion with ventilatory adjustments were made. Magnesium sulfate was administered and TIVA with propofol through TCI maintained anesthesia.

During surgery, episodes of hypertension and tachycardia occurred due to tumor manipulation requiring control with esmolol and nitroglycerin infusions. After tumor removal, a hypotensive episode (69/34 mmHg) led to norepinephrine infusion, discontinued before the end of the surgery.

Postoperative analgesia was multimodal including epidural bolus of ropivacaine 0.2%. After surgery, the patient spent 24 hours in the ICU with no complications reported, made an uneventful recovery with stable blood pressure and heart rate and was discharged home 5 days later.

Discussion/Learning points: The tumor's location and noradrenaline secretion posed significant anesthetic challenges. Despite adequate preoperative α-blockade, the anesthesiologist must anticipate potential cardiovascular instability during intraoperative stress and tumor manipulation. It's challenging to predict whether a patient well-controlled at rest will maintain stability during these stress events.
Anesthetic approach for total arthroplasty in a patient with Churg-Strauss syndrome – a case report

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Background: Churg-Strauss syndrome (CSS), also known as Eosinophilic Granulomatosis with Polyangiitis (EGPA), is a rare immune disease with small vessel necrotizing vasculitis. Its anesthetic management is challenging due to perioperative pulmonary complications, multiorgan involvement and increased risk of cholinesterase enzyme deficiency.1,2

Case report: We are reporting a 65-year-old male known for having EGPA who underwent left total arthroplasty. He had asthma, nasal polyposis, elevated body mass index and motor-sensitive polyneuropathy (mononeuritis multiplex). He was controlled with adequate medication for his symptoms and disease. Preoperative tests were normal. He presented signs of likely difficult airway. Regional anesthesia was chosen to minimize respiratory hyperactivity and potential complications. The surgery was uneventful and the patient was discharged 5 days later.

Discussion: Successful perioperative management needs a thorough understanding of the disease pathophysiology, careful preoperative assessment, and close multidisciplinary collaboration. Even though spinal approach is not without concern in patients with previous neurological impairment, given the patient's disease complexity, likely difficult airway, and the desire to minimize systemic effects/ potential complications, subarachnoid anesthesia block was chosen. Nevertheless, successful general anesthesia in patients with EGPA has been reported.3 This case report highlights the successful management of a patient with Churg-Strauss syndrome, emphasizing the importance of careful preoperative evaluation, intraoperative monitoring, and postoperative care to achieve optimal outcomes.

References:

Learning points: Churg-Strauss syndrome is a multiorgan disease that may confer an anesthetic challenge. Anesthesiologist should be able to structure a plan based on the specificities of the presenting patient.
Comparison between opioid free anesthesia versus opioid general anesthesia in submucosal resection of the deviated septum under nociception monitoring guidance

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Background and Goal of Study: Opioid analgesic drugs have been the most commonly used perioperative pain-relieving medications for a very long time. Opioid addiction is currently an epidemic in the United States and overdose deaths from synthetic opioid drugs have been skyrocketing over the last decade. Many powerful non-opioid analgesics are currently available that have more favorable side effect profiles and a lower potential for developing addiction.

However, these medications are currently not used as often in routine clinical practice as they should be. Opioid free anesthesia is a great anesthetic choice in most of the surgical procedures and there are many studies which support this.

The goal of this study is to compare opioid free anesthesia versus opioid general anesthesia in submucosal resection of the deviated septum under nociception monitoring (NOL) guidance, not only in the perioperative period but also in the postoperative period.

Materials and Methods: Patients were divided into 2 groups randomly. Team A includes patients who received classic analgesic regimens with opioids intraoperatively, while Team B includes patients who received opioid free multimodal anesthesia. Each patient was being monitored with NOL and the analgesia provided was based on this.

Results and Discussion: 52 patients included in this study, 26 in each team. Some of the results were the following: The analgesic effect of Team B was superior in every patient and the referred VAS score of this team was 0 to 1 postoperatively. Also, the side effects of opioids were minimized and the patients were very pleased. Something very important is that some patients of Team B who had an opioid general anesthesia in the past, described our opioid free anesthesia as better and more efficient.

Finally, there was no statistical difference in postoperative complications between the 2 teams.

Conclusion(s): Opioid free anesthesia is a very modern anesthesia and analgesia plan and very favorable between newer generation of Anesthesiologists. It is described as the next frontier in surgical patient safety.

Comparison of recovery times in electrophysiology-monitored spine surgery: volatile anesthetics (sevoflurane and desflurane) following total intravenous anesthesia (TIVA) vs. TIVA alone

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Background and Goal of Study: This study aimed to compare the recovery times in elective spine surgery with electrophysiological monitoring between total intravenous anesthesia (TIVA) alone and TIVA followed by volatile anesthetics (Sevoflurane and Desflurane).

Materials and Methods: Forty-six patients, aged 18 to 70 years and classified as ASA classes I and II, were included. They were randomly assigned to either TIVA alone (T Group), TIVA followed by Sevoflurane (S Group), or TIVA followed by Desflurane (D Group).

Anesthesia induction was standardized using target-controlled infusion (TCI) of propofol, remifentanil, and rocuronium and maintained to ensure a bispectral index (BIS) between 40 and 60. While the T Group received TIVA throughout, the S and D groups switched to volatile anesthetics post-electrophysiological monitoring.

Results and Discussion: The study found no significant differences among the three groups in terms of demographic data, operation times, anesthesia times, and total requirements of propofol, remifentanil, and rocuronium. (Table 1).

Table 1. Total Drug Requirements.

<table>
<thead>
<tr>
<th></th>
<th>S Group (n=16)</th>
<th>D Group (n=15)</th>
<th>T Group (n=15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propofol, mg</td>
<td>1949.7 ± 638.7</td>
<td>2018 ± 472.4</td>
<td>2193.8 ± 619.3</td>
</tr>
<tr>
<td>Remifentanil, μg</td>
<td>1603.8 ± 842.3</td>
<td>1714.5 ± 689.0</td>
<td>1683.4 ± 704.0</td>
</tr>
<tr>
<td>Rocuronium, mg</td>
<td>60 ± 4.5</td>
<td>61 ± 5.0</td>
<td>65.5 ± 3.5</td>
</tr>
</tbody>
</table>

However, recovery times, including tidal volume recovery, eye-opening, and extubation, were notably slower in the T Group compared to the S and D groups. (Figure 1)
There was no statistical difference in the incidence of nausea and vomiting in the post-anesthesia care unit (PACU) among the groups. (Table 2)

<table>
<thead>
<tr>
<th></th>
<th>S Group (n=16)</th>
<th>D Group (n=15)</th>
<th>T Group (n=15)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nausea [n (%)]</td>
<td>3 (18.8)</td>
<td>2 (13.3)</td>
<td>3 (20.0)</td>
<td>0.569</td>
</tr>
<tr>
<td>Vomiting [n (%)]</td>
<td>0 (0)</td>
<td>1 (0.07)</td>
<td>0 (0)</td>
<td>0.418</td>
</tr>
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Table 2. PONV in PACU.

Conclusions: In spine surgery, utilizing volatile anesthetics (Sevoflurane or Desflurane) after TIVA at the endpoint of electrophysiological monitoring results in a faster recovery time than using TIVA alone, without increasing the incidence of postoperative nausea and vomiting in the PACU.

19AP03-12

Intraoperative ventilation in oncologic patients: towards a tailored approach

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Background and Goal of Study: Many types of abdominal cancers require surgical excision through a laparoscopic approach. Open abdominal surgery bears several postoperative complications potentially increasing hospitalization times and costs. Frequent complications include respiratory diseases. We investigated the possible role of different ventilation settings in the prevention of respiratory complications in patients with and without preexisting lung infiltrates, comparing two different strategies. In particular two groups of a small cohort of patients were ventilated respectively with a low level of PEEP and “tailored PEEP” corresponding to a low level of driving pressure, to assess safety and possible benefits

Materials and Methods: We conducted a retrospective cohort study including 46 patients with different types of cancer scheduled for open abdominal surgery (> 2 hrs) in our department between 09-2020 and 10-2023. The patients had ASA status 3, had high-intermediate risk of developing PPCs (ARISCAT score ≥ 26 points) and underwent preoperative chest X-ray or CT. Patients with history of lung surgery were excluded. Twentyone patients were ventilated with PEEP = 5 cmH2O and the remaining 24 with PEEP calculated with a decremental PEEP trial to identify the highest level of PEEP associated with the lowest level of driving pressure. Outcome included: development of mild respiratory failure, or other respiratory complications in the first 5 postoperative days. Statistical analysis was performed using a χ2 test.

Results and Discussion: Overall, the only observed complication was mild respiratory failure with a lower incidence in patients undergoing ventilation with adjusted PEEP (N =1/24), compared those who received a PEEP =5 cmH2O (N=4/21). Eight patients had pulmonary infiltrates in the preoperative imaging; six patients had mono-lateral infiltrates, and two patients had bilateral chest infiltrates. Among these, three patients developed early postoperative mild respiratory failure, requiring ventilatory assistance.

Conclusion(s): Our findings suggest the use of adjusted PEEP levels with lower values of driving pressure is safe and potentially beneficial in oncologic patients undergoing open abdominal surgery. Our study is limited by the small sample size and the benefits of this ventilatory approach should be further explored on a larger cohort of patients.

19AP11-12

Orbital emphysema associated with laparoscopic hepatectomy: a case report

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Background: Subcutaneous emphysema (SCE) following laparoscopic procedures is a well-recognized complication1. Rarely, air can progress through the cervical fascia and extend to face and periorbital areas.

Case report: A 55 year old woman, ASA 2, presented for a laparoscopic removal of an hepatic segment due to hepatolithiasis. Additional past medical history was irrelevant. Patient was placed in reverse trendelenburg position with slight left tilt. The insufflation pressure to induce pneumoperitoneum was 15 mmHg. Surgery lasted 270 minutes and was uneventful besides a sudden increase in the etCO2 levels (below 50 mmHg) without any changes in ventilatory parameters. Postoperatively, left periorbital/visual, cervical and anterior thoracic crepitation was noticed. ABG analysis was normal. Emergence and extubation occurred uneventfully. In the post-anesthetic care unit (PACU), she mentioned blurred vision without any impairment of ocular motricity. No respiratory or neurologic symptoms were reported and chest examination was normal. A chest x-ray was performed in PACU, showing ESC without pneumothorax/pneumomediastinum.

Orbital emphysema and visual disturbance gradually and completely disappeared 3 days after and the patient was discharged at day 5.

Discussion: Orbital emphysema is a rare manifestation of ESC. The induction of pneumoperitoneum (and possible leakage of carbon dioxide from trocar sites) can cause the gas to dissect the tissue and move to an area with low resistance, spreading along the facial planes and causing palpebral emphysema2.

References:

Learning points: Dissection time below 200 minutes, with a slow induction of pneumoperitoneum and insufflation pressures below 12 mmHg help to prevent SCE. Patients with SCE should be monitored closely for cardiorespiratory changes and positive pressure ventilation should be continued until establishment of normocarbia, acid-base equilibrium and impaired ventilation parameters without signs of upper airway obstruction. Orbital emphysema usually is asymptomatic and resolve rapidly with no adverse sequelae. If there are any signs of orbital compartment syndrome, emergent decompression is necessary3. To our knowledge, this is the first description of an orbital emphysema associated with a laparoscopic liver resection.
**Regional Anaesthesia**

**20AP01-01**

Comparison of the effects of external oblique intercostal fascial plane block on postoperative acute pain in laparoscopic sleeve gastrectomy

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**Background and Goal of Study:** Laparoscopic sleeve gastrectomy (LSG) is a popular obesity treatment, often associated with moderate to severe postoperative pain. Our objective was to assess the impact of the external oblique intercostal fascial plane block (EOIB) on acute postoperative pain in LSG patients.

We hypothesized that there would be a significant difference in 24-hour postoperative morphine consumption between patients who received EOIB and those who did not.

**Materials and Methods:** Our prospective, randomized, single-blinded study enrolled 60 patients with ASA II-III classification, aged 18-65, and BMI >35 kg/m² scheduled for LSG. Patients were randomly allocated in a 1:1 ratio to receive bilateral ultrasound-guided EOIB (30 ml 0.25% bupivacaine per side) or serve as a control group.

The primary outcome was the cumulative morphine use in the 24 hours post-surgery through patient-controlled analgesia. We also evaluated pain scores during rest and activity using the NRS, from the Turkish Version of the American Pain Society Revised Patient Outcomes Questionnaire (APS-POQ-R) during the 24-hour postoperative period.

We hypothesized that there would be a significant difference in postoperative 24 hours and NRS pain scores at rest/activity.

**Results and Discussion:** Cumulative morphine consumption in the postoperative 24 hours and NRS pain scores at rest/activity were significantly lower in the EOIB group [median (IQR), 22.6 (7.4) vs. 10.4 (4.3) mg, p <0.001] (Fig 1). However, the need for rescue analgesia was comparable in both the control and EOIB groups [n (%),13 (43.3%) vs. 7 (23.3%), p =0.1, respectively]. The total score of APS-POQ-R was higher in the control group [mean ± SD, 4.42 ± 0.81 vs. 2.91 ± 0.52, p <0.001].

These findings suggest that EOIB can provide analgesia in the upper abdominal wall by blocking the lateral and anterior cutaneous branches of the T6-T10 intercostal nerves.

**Conclusion(s):** Our study showed that the EOIB group had reduced cumulative morphine consumption and lower NRS and APS-POQ-R scores.

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**20AP01-02**

Efficacy of the blended general anaesthesia and QL block in perioperative pain treatment for abdominal hysterectomies: a prospective cohort observational study

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**Background and Goal of Study:** Regional anesthesia has been shown to effectively manage acute pain. The aim of our study was to assess whether adding QL block 1 (lateral) preoperatively could reduce intraoperative and postoperative opioid consumption and reduce pain after abdominal hysterectomy.

The study hypothesis was that QL block bilaterally before the start of a surgery has no impact on perioperative pain relief and can't reduce the need in intraoperative opioids.

**Materials and Methods:** We examined the data of 26 patients 40-55 years old, who needed abdominal hysterectomy and randomly divided them into two groups. Both groups underwent general anesthesia, and in addition patients in the I group before start of surgery received QL 1 block bilaterally (via lateral access) with ultrasound navigation with total 50-60 ml of 0.25% bupivacaine. Perioperatively all patients received multimodal analgesia with dextroprofen and paracetamol, in case of severe pain morphine was added. The data was checked for normal distribution and the result is presented as Me [Q1; Q3]. The stages of the study were 30 minutes (m30), 6 hours (h6), 12 hours (h12), 24 hours (h24), 48 hours (h48) after surgery.

We made the analysis of pain level (with visual analogue scale - VAS), intraoperative need in fentanyl, daily requirement of morphine after surgery, heart rate and mean arterial pressure.

**Results and Discussion:** It was found that the level of pain according to VAS in the I group reached its maximum values on the stages m30 and h6 and was 4.5 [3.2; 5.5] and 4.0 [3.0; 5.0] points, while in the II group - 6.2 [4.5; 9.0] and 6.0 [4.0; 8.1] points, respectively (p > 0.05). On the stages m30 and h6 heart rate and mean arterial pressure were higher in the II group (p > 0.05). The daily requirement of morphine on h24 stage was 1.5 [1.0; 2.2] mg/day in the I group, and 3.5 [1.5; 5.0] mg / day in the II group (p>0.05). The total amount of fentanyl perioperatively during abdominal hysterectomy was higher in the II group (700 [550; 850] mcg), while in the I group it was 500 [425; 750] mcg (p<0.05).
Stage | I group | II group | P
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Conclusion(s): Adding QL block 1 (lateral) before the abdominal hysterectomy was associated with a lower need in fentanyl during surgery, lower pain level, and lower need in morphine after surgery.

20AP01-04
Comparison of the analgesic effects of intrathecal morphine and Erector Spina Plan Block in elective cesarean section: a prospective randomized controlled trial

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Background and Goal of Study: Providing effective analgesia in cesarean section operations is important in terms of patient comfort, early mobilization, thromboembolic disease control, hospital stay, infant care and mother-baby communication. According to PROSPECT Elective Cesarean Section Guideline (2021), intrathecal morphine is one of the methods providing effective analgesia at doses of 50-100 mcg in multimodal analgesia. In our study, we compared the postoperative analgesic effects of intrathecal morphine (ITM) and bilateral erector spina plan block (ESPB) in pregnant women undergoing cesarean section under spinal anesthesia.

Materials and Methods: 82 patients with an ASA (American Society of Anesthesiology) score of 2 were randomized and 2 patients were excluded from the study. 80 patients were included in the study and divided into ITM and ESPB groups. Both groups underwent spinal anesthesia with 10 mg heavy bupivacaine. In the ITM group, intrathecal 100 mcg morphine was administered in addition to heavy bupivacaine. ESPB group underwent bilateral ESPB with 0.25% bupivacaine 20 ml at T10 level postoperatively. Postoperative pain control was provided with 5mg/cc tramadol, 1cc bolus, intravenous patient-controlled analgesia (PCA) with lock setting for 20 minutes and rescue analgesia with diclofenac 75mg intramuscularly when NRS (Numeric Rating Scale)≥4. NRS score at 0, 6, 12, 24 hours, tramadol consumption, side effects and complications were followed in all patients.

Results and Discussion: NRS scores were similar between the groups at 0, 6, 12 and 24 hours. In both groups NRS<4 was achieved for 24 hours in and no rescue analgesia was needed. Tramadol consumption was similar between groups at 0-6 and 6-12 hours. At 12-24 and 0-24 hours, tramadol consumption was significantly higher in the ESPB group (39.87±42.58 mg and 96.32±75.08 mg) than in the ITM group (19.17±20.54 and 57.62±49.25) (p=0.005, p=0.008). In the ITM group, 2 patients had postoperative nausea and 1 patient had itching.

Conclusion(s): Both methods provided effective pain control after cesarean section. Tramadol consumption was higher in the bilateral ESPB group. Bilateral ESPB may be preferred in cases where ITM cannot be applied in cesarean section surgery.

20AP01-05
The influence of Erector Spinae Plane (ESP) block on intraoperative opioid consumption in posterior spinal fusion surgery. A prospective, randomized, case-control study

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Background and Goal of Study: Posterior spinal fusion surgery is highly painful and usually requires essential amounts of opioids to achieve adequate intraoperative analgesia, which is commonly associated with adverse effects of opioids. Novel opioid-sparing regional anaesthesia techniques such as erector spinae plane (ESP) block have become part of the multimodal analgesic regimen for better pain control and reduced opioid-related side effects, however, the evidence from controlled studies is still limited.

The goal of this study is to evaluate the effect of ESP block on intraoperative opioid consumption in posterior spinal fusion procedures in adult patients.

Materials and Methods: After obtaining the approval of the institutional ethics committee and patients' informed consent 102 consecutive patients in a tertiary care academic hospital requiring elective posterior spinal fusion surgery at thoracic and lumbar levels were enrolled in this prospective study and randomly divided into two groups. In the first group 50 patients received general anaesthesia (GA) in combination with additional bilateral ultrasound guided ESP block after induction of GA, and in the second (control) group 52 patients were operated under GA only. Fentanyl was the only opioid used intraoperatively in all patients. Comparison of intraoperative fentanyl usage between two patient groups was performed by the independent samples t-test and a p-value of < 0.05 was used to confirm statistical significance. Statistical analysis was performed by IBM SPSS for Windows version 25 software.

Results and Discussion: Intraoperative fentanyl consumption was significantly lower in ESP group than in control group: 78.2 ± 28.8 mcg vs. 196.2 ± 64.4 mcg (mean values and standard deviations respectively), P < 0.001. All patients in the control group required additional doses of fentanyl intraoperatively, in contrast, only 3 patients required additional fentanyl doses in the ESP group.

Conclusion(s): ESP block significantly reduces intraoperative opioid consumption in posterior spinal fusion surgery. Further studies are necessary to investigate other variables describing the outcome of opioid-sparing effect of ESP block in this type of surgery including blood loss, quality of postoperative analgesia and opioid related side effects.
20AP01-06
Erector spinae block, the future of regional anesthesia in thoracic surgery?

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Background and Goal of Study: Thoracic Surgery (TS) stands out as one of the most evident cases for utilizing regional anesthesia. Ensuring adequate pain control is crucial to facilitate prompt awakening, diminish postoperative complications – both pulmonary and otherwise-, reduce opioid consumption, alleviate the risk of chronic pain, support respiratory physiotherapy, and enable early discharge. As surgical techniques progress towards less invasive procedures, anesthesia must align with this trend by employing safe, effective techniques with minimal complications.

The objective of this descriptive and prospective study is to evaluate the use of Erector Spinae Plane (ESP) block for thoracotomy.

Materials and Methods: We present a descriptive prospective study to assess the standard practice at our center regarding regional anesthesia and analgesia techniques in lung resection surgery through thoracotomy.

Our analysis includes evaluating analgesic needs, pain assessment using the Verbal Numerical Rating Scale (VNRS), time to discharge, and satisfaction of 20 operated patients.

Results and Discussion: While the thoracic epidural (TEB) has traditionally been considered the gold standard, and the para-vertebral block (PVB) is currently regarded as the technique of choice, especially in open surgery, our experience supports ESP as a valid analgesic technique for all thoracotomies.

Utilizing an ultrasound-guided technique, with volumes of 15-20 ml and concentrations of 0.25% and 0.125% of local anesthetic (LA) for intraoperative and postoperative anesthesia, respectively, we achieve a rapid and predictable awakening. This method provides high-quality analgesia, facilitating respiratory physiotherapy and early mobilization, enabling discharge to the ward within the first 12 hours, and hospital discharge as early as possible.

Various data were analyzed through a review of medical records.

ESP is supported by 85% of VNRS scores ≤ 6 in the immediate postoperative period, 99% of VNRS scores ≤ 5 at 24 and 48 hours, an average hospital length of stay of 4 days, and a 75% assessment of analgesic quality as “very good.”

Conclusions: ESP proves to be a safe, easy-to-perform, and effective block for thoracic surgery anesthesia. Although the quality of the technique is considered to be strictly lower than that of PVB or TEB, it is more than sufficient to meet all the requirements expected of any analgesic technique in TS.

20AP01-07
FICB catheters for post-operative pain management in patient with fracture neck of femur: unveiling the barriers

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Background and Goal of Study: Fascia iliaca compartment block (FICB) has an opioid sparing role for managing pain in patients with neck of femur (NOF) fractures, minimising significant side-effects such as delirium. National hip fracture database reported an annual average of 66,860 cases, till end of July ’22. There is no report on receiving continuous FICB catheters as a means of maintaining effective pain control in post-operative period. We at L&D believe post-op pain is a key performance indicator having significant bearing on post-op recovery and length of stay. Hence, we are promoting the use of FICB LA catheters as a pivotal move towards reshaping the way post-op pain is managed in these patients.

We designed a survey to understand the barriers of putting a FICB catheter and how to address them to help incorporate placement of FICB catheters into NOF management pathways.

Materials and Methods: A survey was conducted to understand level of experience, comfortability and limitations of performing a FICB catheter in fracture NOF patients, at our district hospital. Questionnaire included: number of FICB and catheters placed, technique used, comfortability score of performing FICB and catheter (1-3=not comfortable; 4-7=comfortable; 8-10=very comfortable), and if they want to watch a FICB catheter placement video.

Results and Discussion: Overall, 29 responded, 17 consultants and 12 staff grade/clinical fellows/ST4+. 48% had done less than 10 blocks, 47% can use both ultrasound and landmark technique. 38 % of respondents were not comfortable performing the FICB block. Whereas, 55% were not comfortable to place a FICB catheter. 68% of respondents had never placed FICB catheter, and 12% had only seen the procedure. 79% would be interested in watching a video of placement of catheter.

Conclusion(s): FICB catheters is an underutilized modality for post-op pain relief in patients with hip fractures. Our survey has highlighted various reasons including culture of practice, expertise with performing the block, and having a dedicated service to do so.

We at L&D are working towards promoting the uptake of FICB catheters by training workshops and making a video to demonstrate the placement of catheters.

References:
Incidence of tissue coring with epidural Tuohy needle

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Background and Goal of Study: When performing a spinal subarachnoid puncture, thin hollow needles are used. When using such hollow needles, it is known that tissue coring occurs within the needle. This coring has been reported to have the potential to occlude the needle. It has also been reported that cored tissue can migrate into the spinal subarachnoid space and cause tumor development. The epidural Tuohy needle used for epidural anesthesia is a hollow needle that is thicker and has a different tip shape than the spinal subarachnoid needle. To our knowledge, there are no reports on the incidence of tissue coring when an epidural Tuohy needle is punctured to patient. Therefore, the main objective of our study was to determine the incidence of tissue coring with epidural Tuohy needles. As a secondary evaluation, we investigated the types of cells that were cored. We also evaluated the influence of patient background, puncture operator skill, and number of punctures on the incidence of tissue coring.

Materials and Methods: This study has been approved by the Local Ethics Committee. Patients undergoing scheduled surgery for which epidural anesthesia was indicated were included in the study after written informed consent was obtained. The subjects were adults aged 20 years or older, ASA 1-2. Patients who refused or for whom epidural anesthesia was not indicated (e.g., under anticoagulation treatment, presence of abnormal coagulation function, etc.) were excluded. The incidence of tissue coring in a total of 100 cases was investigated.

Results and Discussion: The incidence of tissue coring was 65/100 (65%): 58 cases had anucleated squamous cells, 19 cases had nucleated squamous cells, and 9 cases had leukocytes. No bacteria were found in any of the samples. There were no statistically significant differences between the two groups (n = 65 in the tissue coring group and n = 35 in the no tissue coring group) in terms of patient background, performer’s skill, or time of the procedure. On the other hand, more punctures were performed in the group with tissue coring than in the group without tissue coring (Mean (SD) 1.71 (0.93): 2.34 (1.70), p = 0.0465).

Comparison of efficacy of ultrasound-guided Erector Spinae Plane block versus Thoracolumbar Interfascial Plane block in patients undergoing lumbar surgeries: a systematic review and meta analysis

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Background and Goal of Study: Managing perioperative pain in lumbar surgeries is intricate. The Erector Spinae block (ESP) and Thoracolumbar interfascial plane block (TLIP) are emerging techniques to alleviate reliance on opioids. This systematic review and meta-analysis aim to discern their efficacy and safety.

Materials and Methods: This meta-analysis encompassed RCTs comparing ESP and TLIP in lumbar surgeries were analyzed for primary outcome: “24hr opioid consumption” and secondary outcomes: VAS scores (1hr, 24hrs), and complications. PubMed, CENTRAL, SCOPUS, EMBASE, and references were searched. Data was extracted independently by two authors, cross-checked, and analyzed using RevMan 5.4. Binary outcomes were presented as odds ratios (OR), while continuous outcomes were presented as standardized mean differences (SMD) accompanied by 95% confidence intervals (95% CI). I² was used to test the heterogeneity. Funnel plot was created to explore the possibility of publication bias. The quality of evidence obtained regarding each outcome was assessed using GRADE considerations.

Results and Discussion: Among 1106 articles, four RCTs (364 patients) were included. ESPB demonstrated lower 24hr opioid consumption (SMD-0.38[95%CI {(-0.59) -(-0.16)}]; p= 0.0005; I² = 87%). At 1hr and 24hrs, ESPB yielded significantly lower VAS scores compared to TLIP (1hr: SMD - 0.34 [95% CI -0.55 to -0.13]; p = 0.002; I² = 87%; 24hrs: SMD -0.48 [95% CI -0.69 to - 0.27]; p = 0.00; I²= 70%). No significant difference in adverse events was noted. ESPB demonstrated clear benefits but TLIP block can still be considered as a reasonable option for analgesia during minor lumbar spine surgeries. Small sample size, clinical heterogeneity requires us to interpret these results carefully, further studies with larger sample size are needed to establish efficacy of one over other.

Conclusion(s): In comparison to TLIP block, ESPB has significantly lower 24hr opioid consumption, and VAS scores at 1hr and 24hrs, in patients undergoing lumbar spine surgery. The incidence of adverse effects is similar with both modalities.
20AP01-10
Outcomes in patients with rib fractures receiving regional analgesia at a major trauma centre

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Background and Goal of Study: Rib fractures are a common injury and are associated with significant pain, morbidity and mortality (1). Implementation of evidence-based bundled rib fracture pathways improve patient outcomes (1). Our centre has an established guideline for rib fractures which stratifies management guided by STUMBL score (2).

We evaluated outcomes of patients receiving regional analgesia (RA) after blunt chest injury as a benchmarking component of a service evaluation.

Materials and Methods: Patients who received RA for rib fractures between 01/01/2021 - 31/12/2022 were retrospectively identified from our trauma database. Data were collected from electronic records. Outcomes assessed were mortality, length of hospital stay (LOS), respiratory complications (pneumonia, respiratory failure, empyema, effusion), and ICU admission for respiratory complications.

Results and Discussion: 997 patients presented in the period. 260 (26.1%) had a STUMBL score >15 and were eligible for RA. Epidural (154, 57.2%) and erector spinae plane (ESP; 110, 40.9%) catheter infusions were most frequently used. In patients receiving RA with STUMBL score >15, respiratory complications affected 183 (68.0%) of whom 43 (15.9%) were admitted to ICU and 17 (6.6%) died. Median length of stay was 11 days [IQR 8 – 17]. Increasing age (see figure 1) and STUMBL score were associated with worse outcomes.

Figure 1: Outcomes by age decile.

Conclusion(s): Used as part of bundled care, RA results in lower mortality and morbidity in rib fracture patients than older outcomes data (2).

Our results are consistent with large modern international datasets (3) though with notably lower ICU admission rates but longer inpatient stays. Further work is needed to understand these differences.

References:

20AP01-11
36-hours follow up of pericapsular nerve group block effectiveness in total hip arthroplasty

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Background and Goal of Study: Implantation of the total hip joint is not an obstacle for the patient to stand up and walk immediately after the operation. The most common obstacles to early mobilization and physical treatment are postoperative pain, hemodynamic instability and PONV. Total hip arthroplasty (THA) is performed worldwide and has become one of the most frequently performed and successful surgeries.

Our principal goal was to study the effectiveness of ultrasound-guided combined pericapsular nerve group block (PENG) and lateral cutaneous nerve block (LFCN) with spinal anesthesia on postoperative analgesia and functional recovery in patients referred for hip surgery under spinal anesthesia.

Materials and Methods: We conducted a prospective randomized study over six months (May to November 2023) for THA surgery in 60 patients. Patients were randomized into two groups: group SA (spinal anesthesia group; n 32) and group SRAB (spinal with regional analgesia block- PENG+LFCN; n 28).

Exclusion criteria were infection at the site of regional block injection, allergy to local anesthetics, systemic anticoagulation, rheumatoid arthritis, chronic kidney disease, impaired cognitive function, chronic opioid use. Our hospital anesthesia protocol for THC favors spinal anesthesia. For the SRAB group, before entering the operating room and spinal anesthesia, we performed PENG and then LFCN (branch of the femoral nerve) under ultrasound control.

The SA group received only spinal anesthesia in the operating room. Spinal anesthesia was performed with 2.5 ml of 0.5% levobupivacaine and a regional block with 20 + 10 ml of 0.25% bupivacaine with 0.1 mg/kg dexamethasone parenterally. Postoperative management for all patient continued in the orthopedics department.

Results and Discussion: There is a significant difference between the two groups of patients in the time of onset of postoperative pain (p<0.01) and the total amount of prescribed analgesics in the first 36 postoperative hours (p<0.01).

There was no significance between sex, age, ASA score, intraperative and postoperative hypotension, PONV, postoperative transfusion, unsuccessful physical therapy. Discharge to home was 5(12) versus 5(7) days between groups.

Conclusion(s): Spinal anesthesia with PENG and LFCN blockade leads to opioid-free THC in a multimodal approach with parental NSAIDs, anticholinergics, and a cyclooxygenase-2 inhibitor in the first 36 postoperative hours.
Erector spinae plane block versus superior trunk block: effects on diaphragm function and efficacy for postoperative pain control in arthroscopic shoulder surgery - a randomized controlled trial

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Background and Goal of Study: Arthroscopic shoulder surgery can induce substantial pain that interferes with postoperative recovery. The superior trunk block (STB) effectively alleviates perioperative pain but a 25% incidence of hemidiaphragmatic paresis may occur. The erector spinae plane block (ESPB) is an alternative analgesic technique with less influence on diaphragm motion, but studies comparing STB and ESPB are currently lacking in literature.

We hypothesized that ESPB is non inferior to STB for perioperative analgesia and has reduced risk of hemidiaphragm paresis.

Materials and Methods: Patients undergoing arthroscopic shoulder surgery were randomly assigned to receive either ESPB at T2 level (n= 10) or STB (n= 13). Postoperative pain intensity was evaluated by the 100mm-visual analogue scale (VAS) at 1-hr and 24-hr after surgery. Diaphragm excursion was assessed by M mode ultrasonography during deep breathing preoperatively and 1-hr after surgery.

The Quality of Recovery-15 (QoR-15) was measured preoperatively and 24-hr after surgery. Morphine equivalent dose (MED) within the first 24 hours postoperatively was also compared.

Results and Discussion: Patients in the ESPB group had worse VAS score at 1-hr (p=0.0006) but not at 24-hr after surgery. (p=0.127), and experienced significantly lesser degree of reduction in diaphragm excursion than patients in the STB group did. (p=0.0137).

The incidence of hemidiaphragmatic paresis was 30.7% in the STB group and 0% in the ESPB group. No significant difference was revealed in perioperative QOR-15 score or MED between the two groups.

Conclusion(s): ESPB is non inferior to STB in providing perioperative analgesia for arthroscopic shoulder surgery and has reduced risk of hemidiaphragm paresis, making it an excellent alternative in patients who can’t tolerate compromised pulmonary function.
Conclusion(s): Immunocompromised patients are at greater risk to develop high infection grades, while time to first infection signs is similar to immunocompetent patients.
Antibiotic prophylaxis is almost 4-fold more effective to prevent regional analgesia catheter-related infections in immunocompromised versus immunocompetent patients.

References:

20AP02-02
To compare diaphragmatic thickness fraction in patients undergoing video assisted thoracoscopic surgery with erector spinae plane block vs with port site infiltration

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Background and Goal of Study: Video assisted thoracoscopic surgery (VATS) is a commonly performed minimally invasive procedure that has led to lower level of pain, as well as procedure related mortality and morbidity. Although minimally invasive, significant amount of pain is associated with VATS which leads to increased opioid consumption, increased risk of POPCs and an increased hospital stay.

The objective of the study was to compare the effect of ESPB and port site infiltration on diaphragmatic function and their analgesic efficacy in patients undergoing VATS.

Materials and Methods: In this prospective study, 40 patients aged 18 years and above who underwent elective VATS were randomly allocated to one of the two groups: Group I (General anaesthesia [GA] with ESPB single shot at T5 level) and Group II (GA with port site infiltration). 20ml of 0.375% ropivacaine with 5 mics/ml adrenaline was used in both the groups. DTF was measured preoperatively and 2 and 24 hours postoperatively. Perioperative opioid consumption and VAS scores at rest and movement were recorded @ 0, 2, 4, 6, 12 and 24 hours after the surgery.

Results and Discussion: Decrease in DTF at 2hr and 24 hr (from preoperative DTF values) was significantly less in group I as compared to group II. DTF at 2 hours is decreased by 17.1% (14.7-19.1%) in Group I as compared to 39.5% (32.4-47.2%) in Group II [P<0.001].

At 24 hours postoperatively, DTF decreased by 22.9% (Range 17.25-26.75%) in Group II as compared to 38.8% (Range 32.24-46%) in Group II [P<0.001].

Perioperative opioid (morphine) consumption was significantly less in Group I (Mean 7.75mg) as compared to group II (mean 23.1) [P<0.001]. VAS scores @ 0,2,4,6,12 and 24 hours post-surgery were also significantly lower in Group I (P<0.001) at all points. Our study showed that there was significantly less decrease in DTF from preoperative values at both 2 and 24 hours in Group I. Also, the morphine consumption and VAS score was significantly lower in the block group.

Conclusion(s): ESPB is an effective analgesic method in patients undergoing VATS. It is also effective in decreasing the diaphragmatic dysfunction on POD1 in VATS patients and may improve the postoperative outcomes in these patients in term of POPCs.

20AP02-04
ESP block in robotic cardiac surgery – feasibility and preliminary results

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Background and Goal of Study: Robotic cardiac surgery (RCS) is increasingly popular, potential benefits include less complications, earlier discharge from ICU and reduced hospital length of stay. Locorregional analgesia in RCS may optimize pain control, decrease opioid consumption and enhance recovery. The erector spinae plane (ESP) block is a relatively new and easy-to-perform technique with low complication rate but there is little experience in RCS. Therefore, we propose a study to assess feasibility and effectiveness of ESP block for RCS.

Materials and Methods: A single-center randomized clinical trial analyzing data from patients underwent RCS collected between the years 2022 and 2023. The inclusion criteria were: patients >18 years old eligible for RCS on atrial septal defect reparation, cardiac tumor resection, mitral and tricuspid surgery.

Patients were randomized to control group (treated with iv morphine PCA) and the intervention group (iv morphine PCA and ESP block with ropivacaine 0.16% continuous infusion during 24h). Data collected included Visual Numeric Scale (VNS) at 6,12 and 24 hours, opioids requirements at 12, 24 hours and in total, and postoperative complications.

Results and Discussion: 38 patients were included, however 19 were excluded. Main reasons were: inability to assess analgesia due to delayed extubation (n=5), seizures (n=3), others (n=11, including accidental catheter removal, reconversion to sternotomy, postoperative bleeding). Results from 19 patients were analyzed with STATA15. ESP block could be done in all intervention arm.

No side effects were seen. In the comparison between groups the VNS was 2.7±2 in the control group vs 2±2 in the intervention group at 6 hours of the surgery, 1.5±2 vs 2.8±2.7 at 12 hours and 2.1±2.1 vs 2.6±2.1 at 24 hours and no significant statistical differences were found.

Although lacking statistical significance, the morphine consumption was 12±5.8 mg in the control group vs 8.4±6.6 in the intervention group at 12 hours of the surgery, 16.6±7.5 vs 12.4±9.9 at 24 hours and 17.5±7.6 vs 12.8±9.8 in total dose.

Conclusions: Continuous ESP block for RCS seems feasible and no significant side effects were observed. Our preliminary results found no difference in pain scores or opioids consumption during the first 24h.

However, a trend was found in reducing the dose of morphine in the ESP group. Larger sample is needed to assess analgesic and opioid sparing effect.
20AP02-05
Complete and partial failure rates of spinal anesthesia and determination of related factors: a cross-sectional, prospective, observational study

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Background and Goal of Study: Although spinal anesthesia is a simple and an effective method of regional anesthesia techniques, failure rates of 3-4% have been reported. Failure in spinal anesthesia may be complete or partial, and their causes, perception by the patient and subsequent management are different. Mostly in the literature, factors associated with total failure of spinal anesthesia have been investigated, but no distinction has been made between complete and partial failure.

We aimed to investigate complete and partial failure rates of spinal anesthesia and related factors independently.

Materials and Methods: Consecutive spinal anesthesia procedures between May 2019 and May 2020 were included. Primary endpoint was the calculation of complete and partial failure rates of spinal anesthesia. Characteristics of patients and practitioners, features of performed spinal anesthesia techniques, drugs used and their doses which may cause spinal anesthesia failure and subsequent patient management were investigated.

Results and Discussion: Five patients were excluded from the analysis because the subarachnoid space could not be identified, 1426 patients were included in the study. Complete failure and partial failure rates were 2.6% (37 patients) and 6.2% (89 patients), respectively. Factors associated independently with failures were presented in Table 1.

<table>
<thead>
<tr>
<th>Complete Failure</th>
<th>Partial Failure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR Adjusted (95% CI)</td>
</tr>
<tr>
<td>Height</td>
<td>1.06 (1.02-1.10)</td>
</tr>
<tr>
<td>Paresthesia during puncture</td>
<td>3.36 (1.27-8.91)</td>
</tr>
<tr>
<td>Free flow cerebrospinal fluid (CSF) after injection</td>
<td>2.71 (1.30-5.65)</td>
</tr>
<tr>
<td>Loss of injectate</td>
<td>3.97 (1.24-12.74)</td>
</tr>
<tr>
<td>Coughing after injection</td>
<td>4.67 (1.44-15.11)</td>
</tr>
<tr>
<td>Patient positioning after injection</td>
<td>3.11 (1.02-9.51)</td>
</tr>
<tr>
<td>Head down</td>
<td>2.96 (1.33-6.57)</td>
</tr>
<tr>
<td>Lateral</td>
<td>3.87 (1.55-9.06)</td>
</tr>
</tbody>
</table>

Table 1. Multivariate logistic regression analysis of factors associated with complete and partial spinal anesthesia failure and subsequent management.

Conclusion(s): The patient’s height, paresthesia during puncture, doing free flow CSF after injection, the loss of injectate during injection were independent risk factors associated with complete failure. We observed in the subsequent management of complete failure, the patients are made to cough, placed in a head down or lateral position and testing of sensory block. At the same time, the patient’s height, female sex, operations of general surgery and duration of surgery were independent risk factors associated with partial failure of spinal anesthesia.

20AP02-07
The effect of epidural analgesia combined with general anaesthesia on burst suppression in electroencephalography based anesthesia management

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2Marmara University/Faculty of Sport Sciences, Sport Coaching, Department of Sports and Health Sciences, Istanbul, Turkey

Background and Goal of Study: The primary outcome of this study was to assess whether the administration of epidural analgesia (EA) combined with general anesthesia (GA) resulted in a reduction of electroencephalogram (EEG) burst suppression (BS).

The secondary outcome was incidence of postoperative delirium (POD) within the initial 48 hours following surgery.

Materials and Methods: In this prospective, double-blind, randomized and controlled study, we enrolled 64 patients aged > 60 years with ASA I-III who underwent total knee and hip surgery. Group A received EA and GA, whereas Group C received only GA with monitored processed EEG-guided anesthetic management to maintain the Patient State Index between 25-50, computed by the SEDLine Monitor (Masimo, Inc, Irvine, CA).

For Group A, a 20 ml bolus injection of 2 mcg/ml fentanyl + 0.125% bupivacaine through the epidural catheter was administered 30 minutes before anesthesia induction, followed by a 5 ml per hour infusion of 2 mcg/ml fentanyl + 0.125% bupivacaine after intubation.

In contrast, Group C received a 20 ml bolus injection of 0.9% saline via the epidural catheter 30 minutes before anesthesia induction, followed by a 5 ml per hour infusion of 0.9% saline after intubation throughout the operation.

Four-channel EEG recordings were obtained during four distinct time periods: prior to epidural catheter insertion for 5 minutes, during the 30 minutes between epidural drug application and induction, intraoperatively, and postoperatively for 5 minutes. The recorded EEG data were evaluated for waveforms relative power and BS duration.

Results and Discussion: Four patients were excluded from the EEG analysis because of machine malfunction (4 due to corrupted data).

There was no statistically significant difference in BS rate (median [IQR], 2.34 % [4.91%] and 3.58% [7.22%]) and duration (median [IQR], 211.49 [339.8] and 341.06 [604.21]). Propofol (p=0.028) and remifentanil (p=0.001) consumption was statistically significantly low in Group A.

In the preoperative period a statistically significant difference was observed in the power of the beta waveform between the groups (p = 0.036). The incidence of POD was not found to be different between group A (6.67%) and the group C (6.67%)(p=1.00).

Conclusion(s): Our findings indicate that EA resulted in reduced consumption of anesthetic agents while maintaining an adequate depth of anesthesia. However, this reduction in consumption did not have a noticeable effect on BS.
20AP02-08
Catheter length placement close loop audit of labour epidural in University Hospital Galway, Ireland

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Background and Goal of Study: Neuraxial analgesia, and epidural infusion for Labour analgesia, in specific, utilizing low concentrations of local anaesthetic combined with an opioid, is considered to be the most effective method of Labour analgesia causing the least side effects. Catheter placed too deep into epidural space can cause unilateral block, incomplete analgesia, and intravenous placement. While if length is too short can cause migration out of epidural space. Epidural catheter length has prime importance in epidural success rate.

The epidural catheter length is clinically relevant measure that can contribute to accidental dural puncture. Epidural space appears shallower at the lumbar region as compared to thoracic and cervical region.

This distance is largest in the lumbar region at L3-L4, decreases in thoracic region and absent in cervical region.

Studies shows that catheter should be kept no more than 5-6 cm and suggest 5cm is ideal length in laboring women for Analgesia.

Goal: This Retrospective Audit will focus on Catheter Placement Length in Labouring women and will compare it to Standard guidelines.

Materials and Methods: Data was reviewed retrospectively at UCHG, Ireland and 50 patient’s charts were included.

Proposed standard or target for best practice:
- Catheter length should be in between 3-5cm
- Catheter should be placed no more than 5-6cm
- L3-L4 is the best site for epidural insertion during labour.

Results and Discussion:
- Parturient Median age was 35 (range 20-41 years), with 0 Mode of Parity (Range 0-2)
- Cervical dilatation when epidural was request was 2cm (range 0-8cm).
- Mean of loss of resistance (LOR) was 5.5cm.
- While Mean length of catheter placement was 5.2cm, with 62% of epidural catheters placed 5cms from the LOR.
- The Length of catheter placement Mean was 5.2 (range 4.5-6cm).

It was a retrospective audit to assess epidural catheter length left at skin from the point where LOR was achieved. It was observed that our centre comply with standard guidelines as 62% catheter were placed at 5cm.

Further education is required to stress the importance of catheter length to avoid epidural failure, as there were 26% (13) epidural catheter were placed at 5.5cm and 6% (3) epidural were placed at 6cm and 6% (3) were placed at 4.5cm respectively.

Conclusion(s): Partial adherence to the guidelines was observed. Continuous education, Regular Audits and feedback can reduce catheter placement error and improve results in future.

20AP02-09
Efficacy of Thoracic Paravertebral Block with methylene blue visual confirmation in the management of postoperative pain after video-assisted thoracoscopic lobectomy

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Background and Goal of Study: Thoracic paravertebral block (PVB) is an effective strategy for controlling postoperative pain after video-assisted thoracoscopic (VATS) lobectomy, but it may be subjected to a high rate of failure due to incorrect identification of the site of local anesthetic injection.

Herein we reported a new technique using methylene blue as a visual confirmation of the correct anesthetic diffusion during PVB. Then, we compared the efficacy of methylene blue PVB with thoracic epidural anesthesia (TEA) for the management of postoperative pain in patients undergoing VATS lobectomy.

Materials and Methods: We conducted a prospective randomized controlled trial on patients undergoing VATS lobectomy for lung cancer. A total of 120 patients were randomly assigned in a 1:1 ratio to receive either PVB or TEA. The end points were to evaluate differences between the two study groups regarding 1. Time to perform TEA and PVB, 2. Postoperative pain recorded at 1, 12, 24, 48 hours using Postoperative Numeric Rating Scale, 3. Total opioid consumption, 4. Postoperative outcomes.

Results and Discussion: Of the 120 patients, 110 completed the study; 55 were enrolled in PVB group and 55 in TEA group. The two study groups were balanced regarding preoperative, operative and pathological variables. PVB was associated with a reduction of local anesthesis performance time compared with TEA (p<0.0001).

In two cases methylene blue showed that the block was not well performed, thus it was repeated at the end of the surgery. No significant differences were found regarding postoperative pain, opioid consumption and postoperative outcomes (Table 1).

<table>
<thead>
<tr>
<th>Variables</th>
<th>Paravertebral Block (n=55)</th>
<th>Thoracic Epidural Analgesia (n=55)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time of local anesthesia performance (min)</td>
<td>8.5 ± 2.0</td>
<td>15.3 ± 3.2</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>NRS Pain Scores:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1st hour</td>
<td>3 (0-7)</td>
<td>3 (0-8)</td>
<td>0.29</td>
</tr>
<tr>
<td>12th hour</td>
<td>2 (0-6)</td>
<td>2 (0-6)</td>
<td>0.31</td>
</tr>
<tr>
<td>24th hour</td>
<td>2 (0-6)</td>
<td>2 (0-5)</td>
<td>0.27</td>
</tr>
<tr>
<td>48th hour</td>
<td>1 (0-3)</td>
<td>1 (0-3)</td>
<td>0.41</td>
</tr>
<tr>
<td>Total opioid consumption in 24h (mg)</td>
<td>14.2 ± 2.8</td>
<td>13.7 ± 3.6</td>
<td>0.34</td>
</tr>
</tbody>
</table>

Table 1.

Conclusion(s): Paravertebral block with methylene blue was as effective as TEA for controlling postoperative pain but it was easier to perform, resulting in a reduction of anesthesia performance time. The use of methylene blue could be helpful in the learning curve of thoracic anesthesiologists to reduce the failure of PVB.
**20AP02-10**

**Effects of mixing short-acting with long-acting Local Anaesthetics on the duration of a Lateral Infraclavicular nerve block: a retrospective cohort study**

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**Background and Goal of Study:** Mixing of short- and long-acting local anaesthetics (LA) for peripheral nerve blocks may alter the characteristics of the block resulting in a shorter onset and altered block duration. This cohort study aimed to investigate the effect of mixing either lidocaine 2% or mepipvacaine 2% with ropivacaine 0.5% on characteristics of a lateral infraclavicular (LIC) block.

**Materials and Methods:** In a retrospective cohort, 109 patients undergoing ambulatory hand or wrist surgery were assessed in a quality assurance project (service evaluation). Patients received a LIC block with either lidocaine or mepipvacaine combined with ropivacaine (MIX group) or ropivacaine alone (Control group). The primary outcome was block duration (time to breakthrough pain). Secondary outcomes were partial block duration (time to start of pain); pain immediately after complete block cessation; pain immediately after complete block cessation; and post-operative satisfaction of the block resulting in a shorter onset and altered block duration.

**Results and Discussion:** Total and partial block duration were significantly shorter in the MIX group. Total block duration (unadjusted) was 399.4±126.5 minutes in the MIX group and 398.7±126.5 minutes in the Control group; p = 0.61. Partial block duration (unadjusted) was 399.4±126.5 minutes in the MIX group and 420.1±126.5 minutes in the Control group; p = 0.027. There was no difference in median pain immediately after complete block cessation; 5.0 (IQR: 3.0, 7.3) in the MIX group and 6.0 (IQR: 4.0, 7.0) in the Control group; p = 0.61. All adjusted analyses showed similar results.

The results suggest that mixing of LA may result in a block with shorter duration than purely long-acting LA without affecting postoperative pain but improving patient satisfaction.

**Conclusion(s):** A mix of short- and long-acting LA resulted in an approx. five-hour shorter nerve block compared to a block performed with long-acting LA. The median NRS after block cessation was moderately high in both groups with no significant difference. Finally, the patient-evaluated block quality was significantly higher among patients in the MIX group.

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**20AP02-11**

**Comparison of the effects of spinal and epidural anesthesia techniques on optic nerve sheath diameter (ONSD) measurements by ultrasound in patients undergoing total knee replacement procedures: a prospective randomized controlled study**

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**Background and Goal of Study:** We aimed to compare the effects of spinal and epidural anesthesia methods on optic nerve sheath diameter (ONSD) measurements by ultrasound in patients undergoing total knee replacement procedures.

**Materials and Methods:** After ethical committee approval and oral informed consent were taken, sixty patients aged between 18-75 with American Society of Anesthesiologists (ASA) I-II-III score, were included in the study. The patients were divided into two groups: spinal (N=30) and epidural anesthesia (N=30). All patients were monitored and recorded before and every ten minutes after the anesthetic. ONSC values were recorded before and after the 10th (t1) and 40th minute(t2) of anesthesia and the 24th hour of the postoperative period (t3). For statistical analyses, the Mann-Whitney U test was used for intergroup comparisons and the Friedman test was used for intragroup comparisons. Pearson chi-square, Yates-corrected Chi-square test, and Fisher-Freeman-Halton test were used in comparisons of categorical variables between groups. SPSS 26.0 program was used and p<0.05 was taken as statistically significance.

<table>
<thead>
<tr>
<th></th>
<th>Epidural Anesthesia (n=30)</th>
<th>Spinal Anesthesia (n=30)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-anesthesia ONSD</td>
<td>4.10 (3.30 - 5.60)</td>
<td>4.38 (3.20 - 5.10)</td>
<td>0.328</td>
</tr>
<tr>
<td>Post anesthesia 10th min ONSD</td>
<td>4.40 (3.30 - 5.40)</td>
<td>4.25 (3.40 - 5.10)</td>
<td>0.044</td>
</tr>
<tr>
<td>Post anesthesia 40th min ONSD</td>
<td>4.60 (3.70 - 5.50)</td>
<td>4.15 (3.30 - 5.00)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Post-op 24th-hour ONSD</td>
<td>5.10 (4.10 - 5.90)</td>
<td>4.00 (3.50 - 5.10)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

**Table 1: ONSD Measurements between 2 groups**

**Results and Discussion:** While, in the epidural anesthesia group ONSD measurements were being increased at the 10th minute, 40th minute, and 24th hour. In the spinal anesthesia group, they decreased or did not change. However, the changes in the spinal anesthesia group were not statistically significant. Although this increase in pressure is insignificant in healthy people, epidural anesthesia should be used with caution in patients with intracranial pathology or at increased risk of ICP. Spinal anesthesia seems to be relatively safe in those patients. The limitation of this study is the number of patients.

**Conclusion:** As a result, even if the changes mentioned before is insignificant in healthy people, epidural anesthesia should be used with caution in patients with intracranial pathology or at increased risk of ICP. Spinal anesthesia seems to be relatively safe in those patients. It should be kept in mind that more valuable results can be reached with future studies with more patients and in different procedures measuring ONSD in central regional anesthesia.
Three regional anesthetic techniques in arthroscopic knee ligamentoplasty. A comparative study

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Background and Goal of Study: Arthroscopic knee ligamentoplasty is associated with severe postoperative pain and delay to the patient’s working life. Multimodal analgesia in this surgery includes peripheral nerve blocks, reducing the need for opioids, and allow early discharge from the hospital, with fewer undesirable effects. The study goal was to compare the efficacy and safety of three anesthetic techniques in this surgery. Our hypothesis is the combination of Hunter’s canal block (Adductor block) + IPACK (Interspace Between the Popliteal Artery and Capsule of the Knee) would be associated with better analgesia and lower opioid consumption.

Materials and Methods: A prospective and descriptive trial was carried out, involving patients undergoing anterior cruciate ligament (ACL) reconstruction through knee arthroscopic ligamentoplasty, as an outpatient surgery, randomized between December 2022 and November 2023 to get intra-articular injection or Hunter’s canal block or Hunter’s canal block + IPACK. Visual Analogue Scale (VAS) upon waking, upon admission to the recovery room, at 30 minutes, 60 minutes, at discharge, and at 24 hours, were evaluated. Complications of anesthetic technique, rescue analgesia, side effects, and satisfaction level of patient with the anesthesia were assessed.

Results and Discussion: The study had a sample size of 19 patients. Regarding pain, VAS at discharge was 0, with only 11% requiring rescue femoral block (50% in intra-articular group, which led to the withdrawal of this group from the study). When comparing different anesthetic techniques, it was evident that patients undergoing Hunter’s canal block no required rescue femoral block and had lower total opioid consumption compared to other groups.

Conclusion(s): There is insufficient evidence about the superiority between analgesic techniques in arthroscopic knee ligamentoplasty.

Regional hemodynamic changes after spinal anesthesia

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Background and Goal of Study: Pinprick test, cold application and motor examination are routinely performed to evaluate the level of block after spinal anesthesia. Interpretation of these tests is very difficult in patients with impaired cooperation. Sympathectomy can be used as a criterion to evaluate the success of the block after spinal anesthesia. Sympathectomy in the lower extremities after spinal block increases arterial blood flow, which can be detected via the pulsed-wave (PW) Doppler feature of ultrasonography (USG).

Our aim in this study was to evaluate PW Doppler measurements of the posterior tibial artery in patients under spinal anesthesia. We hypothesized that systolic and diastolic blood flow velocities increase after spinal anesthesia.

Materials and Methods: After ethics committee approval, patients aged 18-65 years with American Society of Anesthesiologists (ASA) I-II physical status who underwent spinal anesthesia at a university hospital were included. Patients with peripheral vascular disease were excluded. Informed consent was obtained.

After routine monitoring spinal anesthesia was performed, and 3 mL 0.5% bupivacaine intrathecally was used as a standard. Hemodynamic parameters were measured by PW Doppler USG from the tibialis posterior artery (mostly left) before, five and ten minutes after the spinal block.

Peak systolic velocity (PSV), end-diastolic velocity (EDV), mean velocity (Vmean), PSV/EDV ratio, pulsatility index (PI), resistive index (RI) and artery diameter were measured. A pinprick test and motor examination were performed as well. Failed spinal blocks were excluded. Data were analyzed with SPSS software. The change in parameters over time was evaluated by Friedman test. P<0.05 was considered significant.

Results and Discussion: Thirty patients with a mean age of 52 years (22-65) were included. After spinal anesthesia, patients developed various degrees of sensory and motor blocks at 5th and 10th minutes. PSV, EDV and Vmean measured by PW Doppler increased significantly, while PI, RI and PSV/EDV decreased significantly (P<0.001). Reverse flow disappeared. Vessel diameter increased (P<0.001).

Conclusions: Marked hemodynamic changes after spinal anesthesia are observed in the posterior tibial artery that can be measured by PW Doppler USG. These measurements can be used to assess the success of the block, especially in patients with communication problems but with serious indications for spinal anesthesia.
20AP03-03
The effects of Diabetes Mellitus on spinal anesthesia with hyperbaric prilocaine

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Background and Goal of Study: There is some evidence that diabetes mellitus alters spinal block times due to hyperglycemia and/or vulnerability of the nerves to topical anesthetics.12

We compared the duration of sensory and motor block produced by spinal anesthesia with hyperbaric prilocaine between diabetic and non-diabetic patients who underwent elective transurethral surgery.

Materials and Methods: We included 20 diabetic patients without diabetic neuropathy and 36 non-diabetic patients. All were administered 40–60 mg hyperbaric prilocaine intrathecally. Sensory block times were recorded until regression to L1 dermatome and motor block times were recorded until total regression. Blood pressure and heart rate recordings were also compared as a secondary endpoint. All statistical analyses were performed using STATA 13.1.

Results and Discussion: No statistical significance was observed between diabetic and non-diabetic sensory and motor block regression times. However further analysis on the subgroup of patients who received 50 mg prilocaine (n=12 diabetics and n=16 non-diabetic patients), showed statistically significant prolongation of motor regression time in the diabetic group (123.3±48.3 min vs 81.2±26.8 min with p=0.01 and 95% CI (27.6-219.9) for the diabetic group and 95% CI (27.6-134.8) for the non-diabetic group).

Conclusion(s): This study shows that diabetes mellitus prolongs motor block after spinal anesthesia with hyperbaric prilocaine. This may affect fast-track management of patients, particularly in the context of ambulatory surgery.

Since diabetics are a heterogenous group of patients, further study is required to investigate the clinical extent of this finding and point out risk factors for such a complication.

References:

20AP03-04
The effect of nerve blocks on postoperative pain in pediatric patients undergoing photodynamic therapy for port wine stains in head and neck: a pilot study

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Background and Goal of Study: Hemoporf-in-mediated photodynamic therapy (PDT) is an effective treatment for port wine stains (PWS) in head and neck. However, severe pain during and after PDT treatment is a great challenge for patients, especially for pediatric patients. Nerve block (NB) has been used for pain management in pediatric patients undergoing craniotomy. This study is to investigate the effect of nerve blocks on postoperative pain in pediatric patients undergoing PDT for port wine stains in head and neck.

Materials and Methods: Pediatric patients aged between 2 and 7 years who was scheduled for PDT for PWS in head or/and neck were randomized into two groups: the intervention group (Group NB) and the control group (Group C). All patients received a standardized general anesthesia.

After anesthesia induction and intubation, an expert of nerve block performs related nerve blocks (supraorbital, infraorbital, mental, superficial temporal, greater occipital, lesser occipital nerve or/and superficial cervical plexus) with 0.25% ropivacaine (in Group NB) or saline (Group C).

Postoperative pain score, intra- and postoperative total fentanyl consumption and complications were compared between the two groups. The Face, Legs, Activity, Cry, and Consolability (FLACC) scale was used for pain assessment.

Results and Discussion: The intraoperative and postoperative total consumption of fentanyl was (3.22±0.49 ug/kg) in Group NB and (4.04±0.87 ug/kg) in Group C (p=0.018).

Compared with Group C, lower FLACC scores at 15 minutes (2.5±3.4 vs 4.6±4.8, p=0.28) and 45 minutes (2.1±1.9 vs 3.0±3.3, p=0.47) in the PACU were observed in Group NB, but they were not significant. No significant difference of postoperative complications was observed between the two groups.

Results in this study demonstrated that, NB could significantly reduce the opioid consumption to achieve similar analgesic effect as that in Group C.

Small sample size might be one of those reasons which contribute to no difference in pain score at 15 minutes in the PACU. Further study with bigger sample size is needed

Conclusion(s): Nerve blocks with 0.25% ropivacaine significantly reduced intraoperative and postoperative total consumption of fentanyl in PDT for pediatric patients with PWS in head or/and neck.
20AP03-06
Epidural anesthesia performed under general anesthesia: an audit of practice in a single center

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Background and Goal of Study: Traditionally epidural anesthesia (EA) is performed in conscious patients even if it is to be combined with general anesthesia (GA). Whilst this may be unpleasant for the patient, it is considered to be the safer option. However, whether this common wisdom is actually true is unknown. Recently, thoracic anesthesiologists at our institution have started performing EA under GA to avoid patient discomfort. We hypothesised that there would be no difference in safety or efficacy between EA performed before or during GA.

Materials and Methods: We performed a retrospective analysis of prospectively collected data recorded in the electronic anesthesia records of all patients who had thoracic EA from 01/01/2022-31/12/2022. Our primary outcome was the attainment of effective thoracic EA. EA was deemed ineffective if it was reported as such, removed in the OR, or if the patient required more than 5mg IV Morphine at the post-anesthesia care unit (PACU).

Our secondary outcomes were the number of EA attempts and reported complications during EA placement.

Results: A total of 298 thoracic EAs were included. 114 in anesthetized, intubated adults and 184 performed on awake patients. 78.9% and 83.15% were considered effective in the anesthetized vs awake patients, respectively.

These groups did not differ significantly (p=0.36). 18% and 15% of EAs required three or more attempts to insert an epidural catheter in the anesthetized vs awake patients, respectively.

In both groups, there were only two reported complications (bloody taps and an accidental spinal puncture, 1.75% and 1.08%). Neither of these differences were significant (p=0.39 and p=0.62).

Conclusions: EA performed in anesthetized patients had similar success rates to those performed prior to GA induction, with no increase in adverse events. We suggest that EA after GA should be considered a valid option that may improve the comfort of both the patient and the anesthetist.

20AP03-07
Programmed intermittent bolus decreases local anesthetic use for interscalene catheter after total shoulder arthroplasty compared to continuous infusion

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1UColouvain, Medical School, Brussels, Belgium, 2Tulane, Medical School, New Orleans, United States, 3Stanford, Anesthesia, Palo Alto, United States

Background and Goal of Study: Interscalene nerve catheters (ISC) are widely used for analgesia after total shoulder arthroplasty (TSA). Although continuous nerve blocks offer better analgesia with higher patient satisfaction, there lacks evidence in comparing continuous infusion (CI) versus programmed intermittent boluses (PIB) for post-operative pain management after TSA. This study aims to assess opioid use, pain scores and recovery profiles when comparing CI with PIB.

Materials and Methods: After Institutional Review Board approval, 50 patients scheduled for elective TSA consented to participate in this study and were randomized for either CI (Group A; n=24) or PIB (Group B; n=26) for post-operative pain management. An ultrasound guided interscalene nerve catheter was placed and loaded with 10mL of 0.5% ropivacaine prior to surgery.

In the recovery room, an electronic pump was programmed to deliver either a continuous infusion of 5 mL/hour of 0.2% ropivacaine or a programmed infusion rate of 5 mL boluses of 0.2% Ropivacaine with hourly intervals, as well as patient-controlled boluses of 5 mL with a lockout time of 30 min for both groups.

The total volume of local anesthetic (LA) connected to the pump was set to 500 mL. Patients were discharged home with the pump within 24hrs. We assessed pain scores, opioid usage on Post-Operative Day (POD) 0, 1 and 2, and used a Quality of Recovery (QoR15) questionnaire on POD1 and POD2. We also compared the total amount of rescue LA boluses given. Statistical analysis was performed with a student t-test for parametric data, a Mann Whitney U test for non-parametric data, and a Chi-square or Fischer’s exact test for categorical data. Statistical significance was considered for a p value of < 0.05.

Results and Discussion: Our analysis shows no differences in pain scores, opioids usage or quality of recovery between the 2 groups. Interestingly, the number of patients using more than one rescue bolus of LA is significantly higher in group A compared to group B on POD1 and POD2 (p=0.028 and p=0.0003 respectively).

<table>
<thead>
<tr>
<th></th>
<th>Continuous Infusion (n=23)</th>
<th>Programmed Intermittent Bolus (n=24)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients using &gt; 1 bolus of LA (POD1)</td>
<td>15 (65.2%)</td>
<td>8 (33.3%)</td>
<td>P=0.028</td>
</tr>
<tr>
<td>Patients using &gt; 1 bolus of LA (POD2)</td>
<td>16 (69.5%)</td>
<td>6 (25%)</td>
<td>P=0.0003</td>
</tr>
</tbody>
</table>

Conclusion(s): This study shows no significant effect on pain scores, opioid use or quality of recovery but reveals a significant decrease in patient-controlled LA boluses in the PIB group compared to the CI group. These findings suggest that PIB reduces the risk of local anesthetic toxicity and is an indirect marker of pain control quality. Furthermore, it could be used as a better method to improve partially dislodged or less accurately placed catheters. Some other benefits of this reduced need for LA are the facilitated weight bearing ambulation of the pumps and the possibility for prolonged analgesia with our current 500 mL of LA.
20AP03-08
Incidence of accidental epidural catheter displacement according to fixation method
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Background and Goal of Study: Accidental dislodgement of the epidural catheter is a rare yet possible event, which may lead to patients' severe postoperative pain and even risk for epidural hematoma depending on patients' anticoagulant therapy. Aim of this retrospective study was to compare two techniques for stabilization of epidural catheters.

One technique involves simple fixation with a Lockit Plus® type device (self-adhesive, opaque, foam pad with a hole for the passage of the catheter and then locked with a plastic cover) while the second, in addition to the forenamed pad, involves the fixation of the catheter with a suture at the entry point.

Materials and Methods: For this purpose, the records of the anesthesiology department from January 2021 to December 2022 (2 years) were retrospected for cases in which an epidural catheter was placed for postoperative analgesia. Patients were divided into two groups according to presence or absence of subcutaneous fixation sutures, and then the incidence of accidental catheter displacement was compared. Comparison of percentages was performed with the chi-square test using the STATA 13.1 statistical package.

Results and Discussion: Three hundred and nineteen patients were encountered, 163 men (51.1%) and 156 women (48.9%), from 20 to 100 years old (mean 67.2 years) who underwent various types of operations. From the recorded catheters, 258 (83.2%) were unsewn and 52 (16.8%) were sutured. Of the total catheters, 41 were removed accidentally (13%). Of the non-sutured catheters, 38 were accidentally dislodged (14.7%) while of the sutured ones, 3 were accidentally dislodged (5.8%).

A marginally statistically significant difference is observed with P value = 0.08, perhaps due to the great numerical heterogeneity of the two groups.

Conclusion: The addition of a stabilizing suture appears to reduce the accidental displacement of epidural catheters. For more reliable results, the design of a prospective randomized study with numerically homogeneous groups and a larger number of patients is required.

20AP03-09
Stellate ganglion block improves intestinal barrier dysfunction and gut dysbiosis induced by sleep deprivation
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Background and Goal of Study: Recently, sleep deprivation has become a widespread social public health problem which may lead to a variety of intestinal disorders. The aim of this study was to explore whether stellate ganglion block can improve the intestinal barrier dysfunction and gut dysbiosis induced by sleep deprivation.

Materials and Methods: The permeability of intestinal vascular barrier was observed by Evans blue staining, and the pathological changes of colon were observed by HE staining. 16SrRNA sequencing and non-targeted metabolomics technology were used to understand the composition and diversity of gut microbiota and its metabolites.

Results and Discussion: Evans blue was significantly exudated from the intestinal tissues of rats on the fifth and seventh day of sleep deprivation(p<0.05) (Fig.1A). The colonic mucosa of rats in all groups of sleep deprivation showed different degrees of lesions, which were progressively aggravated with the increase of sleep deprivation (Fig.1B).

PCA showed that the gut microbial composition of the SD+SGB group was closer to that of the Control group than SD group (Fig.2A). The proportion of Firmicutes decreased and Bacteroidetes increased in the SD group, which could be reversed by stellate
ganglion block (Fig. 2B). In addition, the levels of beneficial bacteria, such as lactobacilli, were elevated in the SD and SGB groups (Fig. 2C, D). A significant decrease in butyrate in the SD group compared with the Control group and SGB group (Fig. 2E). Intestinal ZO-1 and Occludin levels were decreased (p<0.05) and PVT levels were increased in the SD group, suggesting that sleep deprivation may lead to intestinal barrier damage which can be improved by stellate ganglion block (Fig. 3).

Conclusion(s): Stellate ganglion block improves intestinal barrier dysfunction and gut microbiota dysbiosis due to sleep deprivation.

20AP03-10
Time to regional analgesia (RA) in rib fractures in a Major Trauma Centre

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Background and Goal of Study: Rib fractures are a common injury and are associated with significant pain, morbidity and mortality. Time to optimal pain management is debated: UK guidelines recommend access to RA within 6 hours but more recent evidence suggests a benefit threshold at 48 hours.

We assessed our practice against current guidelines and the latest evidence as part of a quality improvement programme.

Materials and Methods: Patients who received RA for rib fractures between 01/01/2021-31/12/2022 were retrospectively identified from our trauma database. Data were collected from electronic records. Time to block from CT diagnosis was recorded. Reasons for delay were identified. Adverse outcomes (pneumonia, respiratory failure, empyema, ICU admission) were compared against time of block insertion. Values are median [inter quartile range].

Results and Discussion: 997 patients presented in the period. 269 (26.9%) received a block; epidural (154, 57.2%), ESP (110, 40.9%), other (5, 1.9%). 256 (95%) of patients who received a block had a STUMBL score >16. Median time to block from CT diagnosis was 12hr 37min (IQR 4h 08min – 12h 08min). 92 (34.3%) received regional analgesia in <6 hours, 179 (66.8%) in <24hrs and 230 (85.8%) in <48 hours. Delays were most frequently due to initial patient refusal (30; 16.9%), other injuries (23; 12.9%) and transfer from another hospital (22; 12.4%).

There was no association between pulmonary complications and time to RA insertion at 6 hours (p = 0.19) or 48 hours (p = 0.11), but patients who received RA in <24 from CT diagnosis had higher pulmonary complication rates (x2 7.86, 1 d.f. p = 0.005).

Conclusion(s): Most patients received RA within evidence-based time frames following our blunt chest injury pathway. Patients who received early blocks were appropriately identified as high risk of lung morbidity but early block did not appear to prevent complications in our study, contradicting other work.

Reasons for delay were multifactorial and suggest individual patient focussed decisions, including initial refusal by the patient and ICU admission due to other injuries.

Further work should assess the effect of block timing on outcomes in further detail and the optimal duration of RA.

References:
2. NHS England TQuINS trauma standards for Trauma Units

20AP03-11
Influence of epidural analgesia on short- and medium-term outcomes of renal transplantation

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Background and Goal of Study: Renal transplant is the preferred treatment for end-stage kidney disease. General anesthesia is typically the most common anesthetic management, ensuring stability during surgery, and a proper graft perfusion. There are other described anesthetic alternatives, a common option is combined general anesthesia with epidural analgesia. There is controversy regarding the use of epidural analgesia for analgesic management in renal transplantation. Some studies suggest an association with acute renal failure due to sympathetic blockade, vasodilation, and hypotension. Uremic platelet dysfunction and residual heparin from dialysis complicate regional analgesia use. Yet, epidural analgesia is considered a suitable alternative for postoperative pain management, avoiding nephrotoxicity associated with NSAIDs. Therefore, we question if epidural use in renal transplantation affects graft quality and outcomes. Hence, we investigate if epidural use in renal transplantation impacts graft quality. A retrospective study is ongoing, assessing outcomes in patients with combined general and epidural techniques, comparing to conventional anesthia

Materials and Methods: Between 2013-2023, kidney transplant registrations included anesthesia analysis at our center. Experimental group: 18 patients had general anesthesia+epidural; three excluded due to missing mid-term data. Control group (general anesthesia, no epidural) selected after epidural case. Short and medium-term outcomes analyzed using STATA 12.0. Shapiro-Wilk test evaluated variable normality. Parametric(Student’s t-test) and non-parametric (Mann-Whitney U test) studies conducted

<table>
<thead>
<tr>
<th>Variable</th>
<th>No epidural (95% CI)</th>
<th>Epidural (95% CI)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICU stay (days)</td>
<td>1.97</td>
<td>1.80</td>
<td>0.3924</td>
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<tr>
<td>Hospital stay (days)</td>
<td>9.63</td>
<td>9.07</td>
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<td>Diastolic day 1 (mmHg)</td>
<td>120.1</td>
<td>120.2</td>
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<tr>
<td>Creatinine day 1 (mg/l)</td>
<td>2.08</td>
<td>2.07</td>
<td>0.9993</td>
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<tr>
<td>Urea Day 2 (mg/l)</td>
<td>94.5 (77.12 – 111.89)</td>
<td>85.6 (74.1 – 97.3)</td>
<td>0.2680</td>
</tr>
<tr>
<td>GFR Day 1 (ml/min/1.73m²)</td>
<td>12.6</td>
<td>12.6</td>
<td>0.8017</td>
</tr>
<tr>
<td>Creatinine Day 2 (mg/l)</td>
<td>5.03</td>
<td>5.09</td>
<td>0.2605</td>
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<tr>
<td>GFR Day 2 (ml/min/1.73m²)</td>
<td>24.5</td>
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<tr>
<td>Creatinine Day 7 (mg/l)</td>
<td>4.22</td>
<td>4.65</td>
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</tr>
<tr>
<td>GFR Day 7 (ml/min/1.73m²)</td>
<td>31.9</td>
<td>46.4</td>
<td>0.2624</td>
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<tr>
<td>Creatinine 1 month (mg/l)</td>
<td>1.69 (1.42 – 1.98)</td>
<td>1.61 (1.32 – 1.99)</td>
<td>0.2184</td>
</tr>
<tr>
<td>GFR 1 month (ml/min/1.73m²)</td>
<td>47.1 (38.9 – 55.3)</td>
<td>49.8 (39.3 – 59.3)</td>
<td>0.7254</td>
</tr>
<tr>
<td>Creatinine 6 Months (mg/l)</td>
<td>1.62 (1.41 – 1.86)</td>
<td>1.48 (1.24 – 1.72)</td>
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</tr>
<tr>
<td>GFR 6 months (ml/min/1.73m²)</td>
<td>44.9 (39.4 – 50.2)</td>
<td>51.7 (43.9 – 59.9)</td>
<td>0.1268</td>
</tr>
<tr>
<td>Creatinine 1 Year (mg/l)</td>
<td>1.58 (1.29 – 1.97)</td>
<td>1.46 (1.23 – 1.70)</td>
<td>0.5142</td>
</tr>
<tr>
<td>GFR 1 Year (ml/min/1.73m²)</td>
<td>50.5 (40.8 – 60.2)</td>
<td>50.9 (44.6 – 52.4)</td>
<td>0.6258</td>
</tr>
</tbody>
</table>
Conclusions: No significant differences in ICU/hospital stay or short to medium-term renal graft function between patients with or without epidural analgesia. Despite no statistical significance, the experimental group showed slightly better outcomes in the first postoperative week. This may be due to higher analgesic drug use in the control group. However, limitations, including a small sample size, affect the study’s external validity. An expanded, randomized multicenter study is recommended to confirm these findings.

20AP03-12
Pericapsular nerve group block (PENG) versus supra-inguinal fascia iliaca (SIFI) block for proximal femoral fracture surgeries in Ghana
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Background and Goal of Study: Proximal femoral fractures are a major contributor to mortality, morbidity, chronic pain, and increased health care cost in trauma patients. Approximately half of patients with a femoral fracture experience moderate-to-severe pain within the first three days following surgery, with the highest pain scores usually in the first 24 hours. The Pericapsular Nerve Group (PENG) block has been shown from initial case series to offer good analgesia for hip surgeries but is yet to be compared with a standard peripheral nerve block for hip surgeries such as the supra-inguinal fascia iliaca block (SIFI).

The goal of the study was to determine the effectiveness of a unilateral PENG block as a postoperative analgesic technique compared with a SIFI block after proximal femoral fracture surgery.

Materials and Methods: A prospective randomized double blinded study was performed. Sixty patients with proximal femoral fractures scheduled for a hemiarthroplasty with Austin Moore prosthesis, Dynamic Hip Screw (DHS), and proximal femoral nail (PFN) insertion were randomized to receive a PENG or SIFI after which a spinal anaesthetic was done. The NRS (static and dynamic) were assessed at 1, 4, 8, 12, and 24 hours postoperatively. Statistical analyses included Kruskal-Wallis tests.

Results and Discussion: Pain scores in all groups generally increased from about the 4th hour and peaked at the 12th hour and began to decline. Patients who had PFN for subtrochanteric fractures reported worst pain at 8 hours as compared to AMP and DHS which occurred at 12 hours. The study revealed no statistically significant difference in the static and dynamic pain scores at various time measurements except at the 8th hour (p = 0.019, 0.022) where SIFI had lower static and dynamic pain scores and the 12th hour (0.040, 0.041) where PENG had lower static and dynamic pain scores.

Conclusions: In this study, the effects of PENG and SIFI on postoperative pain after proximal femoral fracture surgery were significantly different. SIFI had lower static and dynamic pain scores at the 8th hour and PENG at the 12th hour.

20AP04-01
Costoclavicular vs Lateral Sagittal infraclavicular continuous brachial plexus block for postoperative analgesia in patients undergoing upper limb orthopaedic surgery: a randomised controlled trial
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Background and Goal of Study: Continuous catheters are inserted to prolong analgesic effect of a block even after the surgery. Lateral sagittal (LS) approach to infraclavicular block is the gold standard for continuous catheter technique for upper limb surgeries. Lately, a newer approach called the costoclavicular technique has been described.

Aim: This randomized trial compared continuous ultrasound-guided costoclavicular (CC) block with LS infraclavicular block for perioperative analgesia. We hypothesized that postoperative 24-hour local anaesthetic (LA) consumption and pain scores would be lesser in the CC group with no increase in complications.

Methods: Eighty ASA I/II patients scheduled for upper limb orthopaedic surgery randomly received: a continuous CC block or continuous LS block. Ultrasound guided block was given and the catheter was threaded and secured. Postoperatively, all patients received patient-controlled regional analgesia: 0.125% bupivacaine 6 cc with a lock-out interval of 20 minutes.

The primary outcome was the difference in 24-hour local anaesthetic (LA) consumption, use of rescue opioids (0.5 mcg/cc fentanyl, if NRS> 4), time of activation of PCRA, Patient satisfaction score and any block-related complications.

Results: Patients receiving continuous CC block had lesser LA consumption in the postoperative period, increased time of activation of PCRA (patient-controlled regional analgesia) and an earlier onset of sensory analgesia. (P value <0.05). Patients requiring rescue analgesia were more in the LS group. The patient satisfaction score was higher in the CC group.

Conclusions: Compared with continuous LS block, CC block provided better postoperative analgesia. Further studies are required to validate our findings.

3. Ilfeld BM, Morey TE, Enneking FK. Continuous infracavicular brachial plexus block for postoperative pain control at home: a randomized, double-blinded, placebo-controlled study. Anesthesiology. 2002;96:1297–304
Comparison of analgesic efficacy of modified plain thoraco-lumbar interfascial plane block (mTLIP) vs modified thoraco-lumbar interfascial plane block with dexmedetomidine as adjuvant in patients undergoing lumbar disc surgeries: a comparative, randomized controlled trial

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Background and Goal of Study: Spine surgeries often involve extensive dissection, leading to significant postoperative pain. Advancements in regional anesthesia offer promising pain management solutions. This study investigated the analgesic efficacy and opioid-sparing effect of adding dexmedetomidine to modified thoraco-lumbar interfascial plane block (mTLIP) in patients undergoing lumbar spine surgery.

Materials and Methods: Sixty patients aged 18 to 70 years undergoing elective lumbar surgeries were recruited into this randomized double-blind study. All patients received general anesthesia and were randomly allocated to either modified TLIP block with only 0.25% Ropivacaine (group 1) or block with 0.25% Ropivacaine+Dexmedetomidine as an adjuvant (group 2).

Postoperative and intraoperative fentanyl consumption, postoperative pain scores, and any adverse events were recorded.

Results and Discussion: Patients in group 2 experienced a significantly longer delay in requesting their first dose of pain medication (median (IQR) 180(97.5-233) vs 90(45-120) minutes; p<0.00). Additionally, VAS scores at wake-up were lower in group 2 (median (IQR) 1.50(0-2.0) vs 3.0(2.0-4.75); p<0.00). However, VAS scores at other time points and overall 24-hour opioid consumption did not differ significantly between groups (mean (SD) 482(257.33) vs 590.83(225.55); p<0.1).

In our study, dexmedetomidine primarily extended the duration of the block, with no significant impact on overall opioid consumption. This effect may stem from the interaction between dexmedetomidine and local anesthetics, and vasoconstriction around the injection site thereby delaying local anesthetic absorption. At the dorsal horn level, it is known to inhibit nociceptive neurotransmission by reducing the release of substances like substance P and glutamate. Dexmedetomidine itself possesses analgesic effects and analgesic-sparing properties.

Conclusions: Dexmedetomidine added to mTLIP block as an adjuvant prolonged block duration and reduced pain at wake-up in patients undergoing spinal surgery.

Effect of virtual reality therapy on anxiety of patients undergoing hand surgery under locoregional anesthesia

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Background and Goal of Study: Virtual Reality (VR) is a computer-generated simulation in which patients use special glasses with a screen and a headset to distract patients from reality. It may have the potential to relieve stress and anxiety of patients undergoing invasive medical procedures. We aimed to assess the effect of perioperative VR glass application on anxiety levels of patients during the performance of regional anaesthesia (RA) and subsequent hand surgery.

Materials and Methods: In this randomized controlled, superiority trial, 120 patients undergoing elective ambulatory hand surgery with tendon repair were randomised to receive VR therapy (n=60) or no VR therapy (n=60) during RA block placement and surgical procedure between January 2022 and September 2023. Patients were stratified for type of regional anaesthesia (axillary or distal peripheral nerve block) was applied as one technique can be more stressful compared to the other. Baseline surgical fear was measured with the Dutch version of the surgical fear questionnaire. Mean anxiety scores, measured with an 11-point numerical rating scale (NRS) with 0 indicating no anxiety at all, and 10 indicating worst anxiety imaginable, were recorded during ultrasound-guided RA block placement and during surgery. Outcome measures were analysed with the Mann Whitney U test for non-normal distributed data. A p-value <0.05 is considered statistically significant and a p-value <0.1 is considered a trend toward significance.

Results and Discussion: In total, 118 patients were included in the final analysis because one patient of the control group and one patient in the experimental group were lost to follow-up. Baseline and perioperative characteristics of all included patients are presented in Table 1. The mean NRS anxiety score during placement of US-guided upper limb nerve blocks was not significantly different between both groups: No VR: 2.00 (0.00, 5.00) vs VR: 1.50 (0.00, 4.00), p=0.07. The mean NRS anxiety score during surgery was significantly lower in the VR group: No VR: 1.50 (0.00,4.00) vs VR: 0.00 (0.00, 2.00), p<0.01.

Conclusions: The use of VR therapy during ambulatory hand surgery under locoregional anaesthesia results in lower anxiety levels. VR therapy during RA block performance showed a trend toward lower anxiety levels. We advocate for the implementation of VR therapy during surgery under locoregional anaesthesia, especially in those patients with high surgical fear.
20AP04-04
Comparison of the analgesic efficacy of IPACK (interspace between the popliteal artery and capsule of the posterior knee) block alone and IPACK block combined with genicular block in patients planned for total knee arthroplasty

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Background and Goal of Study: In cadaveric studies, anterior spread of local anaesthetic in IPACKB application has been demonstrated. We aimed to compare the postoperative analgesic efficacy of the combined application of IPACKB and genicular nerve block (GNB) and IPACKB applied alone with equal volume in a prospective, double-blind and randomised controlled study in patients planned for total knee arthroplasty (TKA).

We investigated the hypothesis that the local anaesthetic solution may spread from the IPACKB area to the GNB area in blocks performed with equal volume in total.

Materials and Methods: Patients undergoing TKA were prospectively evaluated. 40 patients were randomised into 2 equal groups. Group 1 received IPACKB with 20 ml local anaesthetic solution, Group 2 received IPACKB with 12 ml and anterolateral and anteromedial GSB with 4 ml each.

Spinal anaesthesia was applied to the patients. 24h postoperatively pain scores were measured with visual pain scale. Analgesic needs and mobilisation time were recorded. Surgeon and patient satisfaction was measured with a 5-point Likert scale. Statistically, p value less than 0.05 was accepted as the significance limit.

Results and Discussion: There was no statistically significant difference in resting VAS scores between IPACK and IPACK+GNB groups except at 12th and 24th hours. At rest at 12th and 24th hours postoperatively, VAS score in IPACK+GNB group was significantly lower than IPACK group (p<0.03, p=0.028).

There was no statistically significant difference in postoperative 45° knee flexion VAS score between IPACK and IPACK+GNB groups. The time to mobilisation was found to be significantly lower in the IPACK+GSB group compared to IPACK (p=0.009).

Surgeon satisfaction was similar in the two groups, while patient satisfaction was significantly higher in the IPACK+GSB group compared to the IPACK group (p=0.043).

Conclusion(s): Adding GSB to IPACKB didn't statistically cause a significant difference in pain scores except for the resting pain score at 12 and 24 hours.

The improvement in the satisfaction scores and mobilisation times of the patients was thought to be related to the addition of GNB to the anterolateral and anteromedial involvement, which wasn't affected in all patients in IPACK block.

Considering that GNB is more complicated with the addition of more injections, it was thought that more studies are needed in terms of benefit and harm between increasing the volume of IPACKB and adding GNB to IPACKB.

20AP04-05
Erector spinae plane block in VATS: comparing programmed intermittent bolus versus continuous infusion on quality of recovery, a randomised controlled trial

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Background: Video Assisted Thoracoscopic Surgery (VATS) has been shown to reduce postoperative pain and contribute to better postoperative quality of life compared to open thoracic surgery. Regional anaesthesia techniques including the erector spine fascial plane block (ESP) reduce postoperative pain after VATS.

Case reports of ESP catheters describe improved analgesia using programmed intermittent boluses (PIB) instead of continuous infusion (CI) of similar doses of local anaesthetic. Because fascial plane blocks, including ESP, rely on spread of local anaesthetic between chest wall muscle layers, intermittent boluses might increase their effectiveness.

We tested the hypothesis that postoperative ESP analgesia and quality of recovery after VATS with PIB is better than ESP via continuous infusion.

Methods: We undertook a prospective, double-blind, randomised, controlled trial between June 2022 - August 2023. Sixty patients undergoing VATS, all received ESP block catheters and were randomly assigned to a continuous infusion or programmed intermittent bolus of local anaesthetic regimen for postoperative analgesia.

The primary outcome was the Quality of Recovery (QoR-15) score 24h after surgery. Secondary outcomes included postoperative respiratory function recovery, opioid consumption, verbal rating pain score, time to first mobilisation, nausea & vomiting and length of hospital stay.

Results: Overall QoR-15 score at 24h after VATS were similar: PIB 115 (107-125) versus the continuous infusion: 110 (93-128) (∆<6, p=0.29). The only QoR descriptor showing a significant difference was nausea & vomiting, which was favourable in the PIB group: 10 (10-10) vs 10 (7-10) (P=0.03).

Requirement of rescue antiemetics up to 24h after surgery was lower in PIB group, 4 (14%) vs 11 (41%), p=0.04. There was no difference in any other secondary outcome between the two groups.

Conclusion: Delivering ESP block analgesia after VATS via a programmed intermittent bolus regimen resulted in similar QoR15 scores at 24h when compared to a continuous infusion regimen.

Acknowledgements: R Lynch and A Hassett both contributed to this study. This study was funded in part by an ESRA research grant.
20AP04-06  
Mixing short- and long-acting local anaesthetics in peripheral nerve blocks - on the duration of block analgesia – a systematic review with meta-analysis

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A. K. Nørskov¹, L. H. Lundstrøm¹  
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Background and Goal of Study: Clinicians often combine short- and long-acting local anaesthetics to achieve a briefer onset time. However, this may come with a prize, namely a shorter total duration of the block. This review aims to clarify the effect of mixing short and long-acting local anaesthetic short- and long-acting local anaesthetics in peripheral nerve blocks on the duration of block analgesia.

Materials and Methods: This is a systematic review with meta-analysis of randomised controlled trials conducted according to the PRISMA guidelines, the Cochrane Handbook and GRADE guidelines.

The primary outcome is the duration of block induced analgesia. We included adults having received a peripheral nerve block in the upper or lower extremities or truncal regions. The intervention was combined use of a short-acting and long-acting local anaesthetic for a peripheral nerve block. The comparator was the use of long-acting local anaesthetics.

Results and Discussion: In total 24 trials met the inclusion criteria. Of these 13 trials with a total of 713 participants were eligible for meta-analysis of the primary outcome. When mixing short and long-acting local anaesthetic the overall duration of block analgesia was reduced with 136 min (95% CI: 204, 69, p >0.001, I²=98%, 13 trial, 713 participants). The overall risk of bias was considered low in one trial while in all remaining trials the risk of bias was high.

Conclusion(s): Mixing short- and long-acting local anaesthetics significantly reduces the duration of analgesia by approximately 2 ½ hours. However due to risk of bias, high degree of clinical and statistical heterogeneity the quality of evidence should be considered low.

20AP04-07  
Virtual Reality (VR) in patients undergoing regional anaesthesia: a randomised controlled superiority trial

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Background and Goal of Study: Ultrasound-guided nerve blocks are routinely used for hand surgery. Being awake during block placement and surgery can cause stress, which can exacerbate pain perception. In these cases, virtual reality (VR) treatment is a potential solution in which patients use glasses with a screen and a headset to engage with a computer-generated world as digital sedation provides a distraction from reality. Hence, our aim is to assess the effect of perioperative VR glass application on pain levels during the performance of regional anaesthesia (RA) and surgery.

Materials and Methods: After ethics committee approval, a total of 120 patients admitted for elective hand surgery in ambulatory setting were randomised to receive VR therapy (n=60) or no VR therapy (n=60) during RA block placement and surgical procedure. Stratification for the type of RA (axillary or distal peripheral nerve block) was applied as one technique can be more painful compared to the other.

Primary outcome was mean pain score during ultrasound-guided RA block placement expressed as an 11-point numerical rating scale (NRS). Secondary outcome was mean pain score during surgery. The Mann-Whitney U test was used for two-sided testing. A p-value <0.05 was considered statistically significant.

Results and Discussion: 118 patients were included in the final analysis. Baseline characteristics in Table 1. Both groups statistically significantly differed in mean body mass index (BMI) while they were comparable for all other characteristics. The mean NRS pain score during placement of US-guided RA was not significantly different between both groups: no VR 3.00 (2.00, 6.00) versus VR 3.00 (2.00, 5.00), p=0.59. The mean NRS pain score during surgery was also not significantly different: No VR: 0.0 (0.0, 2.0) vs VR: 0.0 (0.0, 1.0), p=0.15.

Table 1: Patient demographics

<table>
<thead>
<tr>
<th></th>
<th>No VR group (n=60)</th>
<th>VR group (n=60)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age in years, mean (95% CI)</td>
<td>52.50 (45.25, 59.00)</td>
<td>55.50 (45.25, 59.00)</td>
<td>0.63</td>
</tr>
<tr>
<td>Male gender (%)</td>
<td>23 (38.3%)</td>
<td>25 (41.7%)</td>
<td>0.71</td>
</tr>
<tr>
<td>BMI, mean (95% CI)</td>
<td>25.50 (22.71, 28.53)</td>
<td>27.51 (24.83, 30.30)</td>
<td>0.04</td>
</tr>
<tr>
<td>ASA, mean (95% CI)</td>
<td>1.00 (1.00, 2.00)</td>
<td>1.00 (1.00, 2.00)</td>
<td>0.76</td>
</tr>
<tr>
<td>Axillary block, number (%)</td>
<td>16 (26.7%)</td>
<td>16 (26.7%)</td>
<td>0.80</td>
</tr>
</tbody>
</table>

Conclusion(s): The use of VR therapy during placement of US-guided RA in ambulatory hand surgery does not result in lower pain scores. Patient constitution (BMI) could have made block performance more challenging, diminishing NRS outcome differences, as it could have resulted in a more painful block placement.
20AP04-08
Remimazolam versus propofol for continuous intraoperative sedation in patients undergoing spinal anesthesia

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Background and Goal of Study: For continuous intraoperative sedation for patients undergoing spinal anesthesia propofol has been so far the most used sedative, although it has several adverse events. Remimazolam is a new short-acting GABA-A receptor agonist that has fast onset (1–3 mins) but more rapid recovery after intervention. The purpose of our study was to compare two drugs for sedation in non-healthy patients.

Materials and Methods: 40 non-healthy subjects ASA status II or III undergoing spinal anesthesia were studied. First the spinal anesthesia was given and assessed for adequate effect. Before the surgical procedure, continuous infusion of sedative was started, one half of patients was given propofol and the other was given remimazolam. We aimed for target BIS values 60-80 and used Richmond sedation scale (RASS) and Modified Observer’s Assessment of Awareness/Sedation Scale (MOAA/S) as monitors of sedation. All values were noted every 5 minutes. Also we monitored for side effects (hypotension, bradycardia, hypoxia, apnea, movement and memory of events).

Results and Discussion: In the remimazolam group (n=20) mean age was 66.85 ± 13.64 (60% male) and 30% were ASA status III. In the propofol group (n=20) the mean patient’s age was 66.00 ± 11.77 (55% male) and 40% were ASA III status. Time for remimazolam to reach targeted BIS values of 60-80 was 2.00 mins [1.00-3.00] and for propofol 2.00 [1.40-2.35]. After cessation of infusion, median time to BIS recovery to values above 80 was 3.63 ± 2.31 mins for remimazolam, but 6.33 ± 2.20 for propofol, p=0.001. There was no statistically significant difference in the frequency of side effects between groups. Results have been graphically represented in Figure 1.

Figure 1.

20AP04-09
The effect of regional anesthesia method on tissue oxygenation in patients who will undergo percutaneous transluminal angioplasty

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Goal of Study: We aimed to investigate the effects of popliteal block on tissue oxygenation, extremity skin temperature, intraoperative analgesic requirement and intraoperative skin temperature in patients undergoing elective unilateral percutaneous transluminal angioplasty (PTA).

Materials and Methods: We included 70 patients who underwent PTA. Demographics, comorbidities, procedure details were recorded. Patients were randomly divided into popliteal block group (Group P) and no block group (Group B). In Group P, block was performed with 30 ml solution containing 2% lidocaine, 0.5% bupivacaine and 0.9% NaCl in 1:1:1 ratio with nerve stimulator and USG. Hemodynamics, VAS scores, tissue oxygenation values and skin temperatures in both extremities, were recorded before and 30 min after the block. Sensorial and motor block was evaluated on the blocked side. Hemodynamic parameters, tissue oxygenation values and skin temps in bilateral lower extremities were recorded during the procedure. Post-procedure satisfaction levels were evaluated with Likert scale.

Results: In group P, VAS score was found to be significantly lower than the initial value at all measurements starting from the 5th min after the block. In group P, NIRS values were found to be significantly higher in the blocked extremity compared to the unblocked at 15 min after the block, skin temps were found to be significantly higher at 20 min after the block, and ΔNIRS were found to be significantly higher at all measurements. When the NIRS values on the treated side were compared between the groups during the procedure, there was no statistically significant difference in the first admission; however, it was found to be significantly higher in Group P from the beginning of the PTA until the 20th min. Although the elevation in NIRS values on the treated side continued at the end of the PTA, it was not found to be significant. NIRS values on the treated side at the end of PTA were significantly higher in both groups compared to the initial admission and baseline values.

No significant difference between the groups in terms of surgeon satisfaction, whereas patient satisfaction was statistically significantly higher in Group P.

Conclusion(s): Popliteal block application in PTA increases the comfort of the procedure for the patient and surgeon with its analgesic efficacy and increases tissue oxygenation. Further studies are needed to determine the contribution of this positive effect in the treatment of PAD.
20AP04-11
The impact of anaesthetic technique in reducing length of stay for elective hip and knee replacement patients. Getting it right every time

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**Background and Goal of Study:** Intrathecal opioids have traditionally been utilised to provide analgesia for patients undergoing total hip replacement (THR) and total knee replacement (TKR) at our trust. A 2022 Trust audit revealed 61 (93.8%) of 65 patients undergoing THR or TKR received intrathecal opioids, with a mean length of stay (LOS) of 3.76 days. The March 2023 Getting it Right First Time (GIRFT) guidelines on ambulatory care for THR/TKR patients recommend opioid-free spinals to enable early mobilisation and reduce LOS1. This prompted a change to our elective joint replacement pathway in June 2023, to align with GIRFT guidelines.

We investigated whether the new guidelines reduced LOS whilst maintaining post-operative analgesia and outcomes.

**Materials and Methods:** Patients undergoing primary TKR and THR between June and July 2023 were included. Patient demographics, peri-operative notes, prescriptions, and anaesthetic charts were obtained via our Trust patient information system. Data collected on anaesthetic technique included intrathecal drugs, LOS and post-operative opioid requirements.

**Results and Discussion:** 51 patients were included (33 TKR and 18 THR), 49 (96.07%) received spinal, whilst two (3.93%) underwent general anaesthesia without neuraxial blockade. Of the former, 32 (65.3%) were opioid free and 17 (34.7%) utilised opioids, commonly 20mcg fentanyl (n = 13) or 100mcg morphine (n = 4). Mean overall LOS was 2.49 days (cf. 3.76 days in 2022) and mean 24-hour oral morphine consumption was 16.67mg (cf. 6.34mg in 2022).

**Conclusions:** Early results are encouraging, with a significant (1.27 day) reduction in LOS when compared with 2022 data. Compliance with GIRFT guidelines is fair, since most spinals (65.3%) were opioid free. Utilisation of longer acting intrathecal opioids has significantly reduced, as only 4 (8.1%) of the 49 spinals contained morphine (cf. 69% in 2022).

Of note is an increase in oral morphine consumption, although it is unclear whether this impacted patient satisfaction and quality of recovery.

Overall, there is scope for further improvements to GIRFT compliance in reducing LOS.

Future studies should consider patient reported outcomes and satisfaction as markers of successful improvement.

**References:**

20AP04-12
Comparison of analgesic efficacy of erector spinae plane block at different levels in laparoscopic cholecystectomies: a randomized controlled trial

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**Background and Goal of Study:** Erector Spinae Plane (ESP) block is employed as a component of multimodal analgesia in Laparoscopic Cholecystectomy (LC) procedures. The objective of this study is to assess the impact of ESP blocks performed at different levels during LC operations on postoperative pain scores and opioid consumption.

**Materials and Methods:** 103 patients undergoing LC were divided into three groups: Group Th7 (ESP blocks were administered at 7th thoracic vertebra level), Group Th9 (ESP blocks were administered at 9th thoracic vertebra level) and the control group. Patients were evaluated at 30 minutes, 1, 4, 8, 12, and 24 hours postoperatively. Resting and dynamic Numeric Rating Scale (NRS) scores, morphine consumption within the first 24 hours postoperatively and complication rates were assessed.

**Results and Discussion:** In Group Th7 and Group Th9, the resting NRS scores at 30 minutes, 1, 4, and 24 hours, as well as all dynamic NRS scores outside of the 8th hour, were significantly lower compared to the control group. However, there was no significant difference between Group Th7 and Group Th9. Regarding morphine consumption, during the 31-min-1-hour, 1-4-hour and 8-12-hour intervals, significantly lower consumption was observed in patients who received ESP blocks compared to the control group. However, no significant difference was found between Group Th7 and Group Th9 (Table I).

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean SD</th>
<th>Mean SD</th>
<th>Mean SD</th>
<th>F*</th>
<th>p</th>
<th>Difference (Tukey)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group Th7 (n=35)</td>
<td>0.06 0.24</td>
<td>0.06 0.23</td>
<td>0.06 0.25</td>
<td>0.008</td>
<td>0.992</td>
<td>-</td>
</tr>
<tr>
<td>31 min - 1 h</td>
<td>0.03 0.17</td>
<td>0.08 0.37</td>
<td>0.50 0.67</td>
<td>11.143</td>
<td>&lt;0.001*</td>
<td>C&gt;Th7,Th9</td>
</tr>
<tr>
<td>1-4 h (3)</td>
<td>1.23 1.66</td>
<td>1.56 1.70</td>
<td>3.59 3.44</td>
<td>9.649</td>
<td>&lt;0.001*</td>
<td>C&gt;Th7,Th9</td>
</tr>
<tr>
<td>4-8 h (4)</td>
<td>2.09 1.95</td>
<td>1.36 2.00</td>
<td>2.16 2.46</td>
<td>1.481</td>
<td>0.232</td>
<td>-</td>
</tr>
<tr>
<td>8-12 h (5)</td>
<td>0.94 1.30</td>
<td>1.25 0.97</td>
<td>1.78 1.54</td>
<td>3.642</td>
<td>0.030*</td>
<td>C&gt;Th7</td>
</tr>
<tr>
<td>12-24 h (6)</td>
<td>1.66 1.80</td>
<td>2.89 2.94</td>
<td>2.41 2.30</td>
<td>2.362</td>
<td>0.096</td>
<td>-</td>
</tr>
<tr>
<td>F=p</td>
<td>8.262&lt;0.001*</td>
<td>12.331&lt;0.001*</td>
<td>23.343&lt;0.001*</td>
<td>-</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

F*: One-way analysis of variance (ANOVA) P*: Repeated measures analysis of variance

Table I: Comparison of Morphine Consumption between and within Groups.

**Conclusion(s):** In LC surgeries, ESP blocks administered at the Th7 and Th9 levels exhibited similar analgesic efficacy. ESP blocks applied at the Th7-9 levels can be utilized as part of multimodal analgesia, but Th7 may be preferred due to better sonoanatomy.

**Acknowledgements:** We believe that the ESP block can be safely used as an effective analgesic method for opioid-free analgesia.
**20AP05-01**
Gastrosomy under ultrasound-guided bilateral rectus sheath block (RSB) and unilateral subcostal transversus abdominal plane (SCTAP) block in a patient with esophageal adenocarcinoma and Wells syndrome: a case report

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**Background:** Wells syndrome is a rare form of Acute Coronary Syndrome (ACS) manifested by ECG changes highly specific for left anterior descending coronary artery occlusion. Gastrosomy was successfully performed under sedation and ultrasound-guided peripheral nerve block (PNB).

**Case Report:** A 67 year old hypertensive male presented with dysphagia to solid food. Work up revealed esophageal adenocarcinoma and Wells syndrome on ECG at the antero-lateral lead. Echocardiography revealed heart failure with 40% ejection fraction, and hypokinesia on the anterolateral myocardium. The patient was high-risk for intraoperative mortality. Risks and benefits to the patient was explained.

Patient was positioned supine. Ultrasound-guided bilateral RSB and unilateral SCTAP block were performed through an “in-plane” approach with 3ml increments of Ropivacaine 0.25%, total of 20mL injected. Sedation maintained with low dose propofol infusion 0.3 mcg/mL. The operation was successful without significant hemodynamic changes.

**Discussion:** Sudden hemodynamic changes could trigger a vasospasm or dislodgment of a plaque causing potentially fatal outcomes. Gastrosomy was necessary for sustenance given the rapidly encroaching esophageal mass. An RSB was deemed appropriate because it provided somatic anesthesia, suppressed excessive incision stimulation and reduced the overall anesthetic requirement.

Supplementation with unilateral SCTAP block to cover T7-T10 dermatomes enabled us to cover a larger surface area, and avoid stimulation from retraction pain through sensory nerve blockade.

**References:**

**Learning Points:** More than provision of adequate post-operative pain control, PNB should be considered an optimal technique for critically ill patients because it can reduce the overall anesthetic requirements the patient will be subjected to, thereby improving patient safety and quality of life.

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**20AP05-02**
Combination of saphenous and popliteal sciatic nerve block for below-knee amputation

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**Background:** Lower limb amputation is a high-risk surgery with estimated 30-day risk for cardiac events of >5% (1). Patients usually have a high burden of different comorbidities with ASA status of 3 or more. Therefore, regional anesthesia is a method of choice in this patient population.

**Case Report:** A 70-years old patient with a type II diabetes complications was scheduled for below-knee amputation. Spinal anesthesia was a procedure with high risk of hemodynamic instability and relatively high risk of spinal hematoma due to therapy with LMWH and acetylsalicylic acid and chronic renal disease.

The optimal anesthetic method was sciatic (popliteal fossa) and saphenous nerve anesthesia (0.75% ropivacaine 15ml + 10ml, respectively) and subsequent peripheral neural catheter placement in sciatic nerve fascia. Patient was sedated with midazolam 2.5mg and propofol 40mg intravenously.

Following surgery patient was checked regularly every 2 to 3 hours. Patient received analgetic boluses 12 and 24 hours post-operatively. During second bolus catheter migrated out of neural fascia, bolus dose was inadequate, catheter was taken out and analgesia was continued intravenously.

Follow up: Three months after surgery patient was pain free most of the time and had episodes of phantom pain usually during weather changes.

**Discussion:** Lower limb amputation is a high-risk surgery due to hemodynamic repercussions, bleeding risk and inadequate post-operative pain management. Regional anesthesia with peripheral neural catheter placement is optimal anesthetic and analgetic therapy in patients with serious underlying medical conditions and risk of subsequent cardiac events. Catheter placement in sciatic nerve fascia in popliteal fossa is optimal analgetic and anesthetic method for below-knee amputation.

Although saphenous nerve wasn’t blocked, patient was pain-free and no additional analgesia was necessary on first postoperative day. Catheter misplacement out of nerve fascia could be a potential downside of this technique.

**Reference:**

**Learning Points:** Sciatic and saphenous block combination is an optimal anesthetic combination for below-knee amputation and sciatic nerve catheter placement in popliteal fossa is a method of choice for subsequent postoperative analgesia.
20AP05-03
Enhancing Safety and Efficacy: Regional Anesthesia for Bicanalicular Intubation in a High-Risk Patient - A Case Report

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Background: Bi-canalicular intubation, a practiced procedure for managing lacrimal drainage disorders, is typically conducted under general anesthesia (1). However, in high-risk patients with multiple comorbidities, this approach can escalate postoperative complications and levels of care. This case report presents a transformative approach, using regional anesthesia for bicanalicular intubation.

Case Report: We present a bi-canalicular intubation procedure carried out on a 71-year-old male classified as ASA IV, who had an extensive medical history including COPD, Hodgkin’s lymphoma treated with chemotherapy, squamous cell carcinoma of the esophagus, and radiation esophagitis. He also presented with stigmas of a difficult airway, with restricted neck mobility and a Mallampati IV classification. The patient sought treatment for recurrent epiphora.

Our approach involved a medial peribulbar, lacrimal canal, and nasal block, this one done by direct visualization. The peribulbar and lacrimal canal blocks featured a solution consisting of 7 ml of 0.75% ropivacaine and 1:100,000 epinephrine, and nasal block 2 ml of the same solution. To ensure patient comfort, mild sedation was administered.

No events were reported during the surgery (30 minutes) or in the post-anesthesia care unit, where the patient stayed until discharge on the same day.

Discussion: This case report introduces a different approach to bi-canalicular intubation, employing regional anesthesia, to reduce risks associated with general anesthesia, the technique predominantly supported in the literature (1). Although previous studies reported lacrimal tubes placed under local anesthesia and with inferomedial peribulbar injection (1), in our patient, the combination of the three blocks resulted in full anesthesia of the medial aspect of the eyelids and the lateral nasal wall (2), providing a painless procedure.

This technique permitted a same-day discharge, optimizing healthcare costs and avoided a difficult airway approach.

Reference:

Learning Points: This approach offers a promising avenue for improving patient care and reducing the risk and healthcare costs associated with general anesthesia, by utilizing regional anesthesia in bi-canalicular intubation for high-risk patients.

20AP05-04
Low Ejection Fraction (EF), Chronicle Kidney Failure (CKF), Challenges of Maintaining Hemodynamic Stability: All in One Patient. Isn't That Enough Reason for Anesthesia Management Performing by Peripheral Nerve Blocks (PNBs)? A Case Report

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Background: The aim of the patients with low EF is to preserve the systolic functions of the heart, prevent arrhythmia and ensure normovolemia with targeted fluid therapy.

Case Report: 32-year-old kidney transplant candidate male, suffering from Type1DM, HT, dilated cardiomyopathy and CKF came up for arthrodesis surgery due to right foot deformity. A biventricular ICD was inserted in the preop period to the patient, whose cardiological evaluation revealed an ECG of 93 beats/min, T negativity in the lateral leads, an EF of 20% and PAP of 45 mmHg in the ECHO.

A popliteal sciatic NB was performed using 20 ml of solution prepared with 10 ml of 0.5% bupivacaine, 5 ml of 2% lidocaine, 5 ml of physiological saline, under the guidance of USG and neurostimulator in the prone position and in order to avoid pain due to the tourniquet, he was placed in the supine position and a femoral NB was performed with the same technique.Surgery was initiated by placing a magnet on the ICD battery to avoid monopolar cautery interaction.

During the operation (90 min) 50 ml of bleeding occurred, he was given 300 ml of 0.9% isotonic sodium chloride, did not need inotropic treatment and remained hemodynamically stable. He was kept under observation for 1 hour in the postop recovery unit, had no nausea or vomiting, and the 1st hour VAS was 3 and he was transferred to the orthopedic service. At 6th hour VAS was 5, at 12th hour VAS was 7. He received iv tramadol and paracetamol on postop days 2 and 3 and discharged without complications on day 4.

Discussion: By using USG and neurostimulators, PNBs provide more hemodynamic stability than general anesthesia or central neuraxial blocks, minimize the risk of nerve damage, reduce morbidity and mortality in high-risk patients, reduce postop opioid consumption and prevent complications such as nausea and vomiting.

References:

Learning Points: We think that anesthetic management with PNBs is safer in patients with comorbidities who will not tolerate hemodynamic instability.
**20AP05-05**

**“To the Rescue”: Sphenopalatine ganglion block in trigeminal neuralgia management**

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**Background:** Trigeminal neuralgia (TN) is a chronic pain condition, which can be episodic or constant in nature, characterized by orofacial pain that is sudden and shock-like, stabbing or burning in character. Acute TN exacerbation is a common reason for frequent emergency department visits, but evidence on effective drugs in acute TN attacks is scant and no option is considered the gold standard up to now (1).

Medical management often proves insufficient, and sphenopalatine ganglion block (SPGB) provides an innovative, adjunctive treatment option in alleviating symptoms.

**Case Report:** We present a case of a 43 years old woman who visited the neurology emergency department suffering from headache and orofacial pain secondary TN exacerbation, with a Neuropathic Pain Scale (NPS) score of 48 points, refractory to traditional medical management (carbamazepine, pregabalin and baclofen).

Collaboration with Anesthesiology service was requested. After informed consent, a transnasal SPGB was performed. Nasal cotton-tipped swabs impregnated with ropivacaine 0,75% were introduced in both nasal fossae.

The patient was positioned in slight Trendelenburg (10º) for 10 minutes. She had immediate relief of her symptoms, with a NPS score of 25 points and was discharged home the same day.

**Discussion:** Hypersensitivity of the sphenopalatine ganglion (SPG) is suspected to be a key culprit in the etiology of migraine and orofacial pain symptoms. The nature of the SPGB, with its flexibility and procedural ease, offers a quick and effective single-target technique, with a low incidence of adverse effects and the opportunity for repeat treatment as needed.

Due to its effectiveness, the role of the SPGB in the treatment of various conditions causing headache and orofacial pain, such as TN, continues to expand providing relief and restoring functionality.

**References:**

1. Zhou X, et al. Lidocaine aerosol sprayed on oral and/or nasal mucosa for the rescue of acute trigeminal neuralgia exacerbations: A retrospective study. Cephalalgia. 2023 May;43(5)


**Learning Points:** This case highlights the growing significance of integrating anesthesia-led interventions, in the multidisciplinary management of complex pain conditions. This improves patient care by expanding treatment options for those with unresponsive orofacial pain disorders.

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**20AP05-06**

**Clavipectoral fascial plane block for anesthesia in a patient with pneumothorax**

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**Background:** Clavicle fractures are common orthopedic injuries that often require surgical intervention. Peripheral nerve blocks like interscalene brachial plexus block (ISBPB) with superficial cervical plexus block (SCPB) are frequently performed as regional analgesia for clavicular surgery. However, these blocks, are associated with phrenic nerve paralysis, which can cause or worsen any prior respiratory compromise.

As an alternative, clavipectoral fascial plane block (CPB) could provide adequate surgical anesthesia, with less respiratory complications.

**Case Report:** We report the case of an 81-yo polytraumatized woman, ASA III, with a pneumothorax with a chest tube in place, and an open clavicle fracture, scheduled for urgent midshaft clavicular surgery.

The patient was deemed unfit for general anesthesia and, alternatively, CPB and SCPB were performed. CPB was performed, using a high-frequency linear probe parallel to the anterior surface of the clavicle, with a 50mm needle, in-plane, advancing lateral to medial; 24ml of 0,5% Ropivacaine were administered. SCPB was performed with 6ml of 0,5% Ropivacaine.

The procedure was performed under moderate sedation with propofol TCI, without complications. Tramadol 100mg and Paracetamol 1000mg were given as a multimodal analgesia strategy. The immediate postoperative period was uneventful.

**Discussion:** This case reports the successful use of CPB with SCPB for anesthesia and pain management for clavicular surgery in a patient with pneumothorax.

By avoiding positive-pressure ventilation and phrenic nerve paralysis, this approach provided adequate surgical anesthesia with less respiratory complications. Notwithstanding, further research and larger studies are needed to establish its efficacy and safety in this specific patient population.

**References:**


**Learning Points:** The CPB holds promise as a valuable alternative to general anesthesia in selected cases and should be considered in the perioperative management of patients requiring clavicle surgery.
Use of clavipectoral fascial plane block in clavicle fracture repair

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Background: The clavipectoral fascial plane (CPB) is a locoregional technique based on the injection of local anaesthetic into the fascia that completely envelops the clavicle. This structure is penetrated by the clavicular nerve endings. This avoids the motor block of other locoregional brachial plexus techniques and the phrenic nerve palsy of the interscalene block.

Case Report: We present a case series of 8 patients who underwent clavicle osteosynthesis surgery and received CPB block with 15 mL of Ropivacaine 0.2% and Mepivacaine 1%. If the fracture was located in the medial third, the block was performed on both sides. If the fracture site was distal, a single puncture was performed medial to the site. A superficial cervical block was also performed with 5 mL of 1% Mepivacaine. This was followed by conventional general anaesthesia with laryngeal mask. Conventional analgesia with paracetamol and dexketoprofen was administered during surgery.

No incidents were recorded during surgery or in the postoperative period. With regard to postoperative pain control, only one patient presented pain during his stay in the recovery room with an intensity according to the Numeric Rating Pain Scale (NRS) of 4.

He was also the only patient who required rescue analgesia with tramadol. At 24 hours, only 3 patients had pain, all of them mild according to the NRS (1 - 3).

Discussion: CBP blockage is a locoregional technique aimed at controlling pain in the clavicular region avoiding motor block of other techniques. In our case series, it was decided to use this locoregional technique together with intravenous analgesia for postoperative pain management. Patients presented good pain control in the recovery room and at 24 hours without the need for analgesic rescue in most cases.

References:

Learning points: CBP blockage is a simple, safe and effective option for the perioperative anaesthetic and analgesic management for clavicle osteosynthesis surgery.

Difficult subarachnoid block using Taylor’s approach – case report

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Background: Subarachnoid block (SAB) is commonly used as the sole anesthetic technique for surgery below the umbilicus, but anatomical abnormalities of the spine might make it difficult or impossible to achieve. The Taylor’s approach (see picture attached) is an alternative to typical median and paramedian techniques, and it’s performed at the L5-S1 interspace, which is the larger interspace, and it depends less on the positioning of the patient.

Case Report: A 75-year-old female patient with grade 3 obesity, severe obstructive sleep apnea and a recent pneumonia was proposed for total knee replacement.

First, a continuous peripheral nerve block at the proximal adductor canal and a single shot iPACK block were performed. Then, two trained anesthesiologists attempted to perform a SAB using the median and paramedian approaches, in different positions and interspaces, with no success.

Anatomical references were difficult to identify, and the patient had scoliosis and difficulty in flexing the spine. It was decided to attempt a SAB with the Taylor’s approach, with success at the second try.

Discussion: The surgery lasted for 1 hour and a half, with no complications. The patient had complete analgesia at 24 and 48 hours with this combined regional technique and there were no reported complications associated with the SAB.

Learning Points: Performing a SAB might be extremely difficult in patients with characteristics like obesity, scoliosis, arthritis, or prior spinal surgery. Taylor’s approach provided a reliable and less traumatic alternative for this patient, suggesting that learning this technique might make it possible to achieve surgical conditions without general anesthesia.

Multimodal analgesia using ultrasound-guided bilateral lateral transversus abdominis plane block and bilateral rectus sheath block in an achondroplastic patient undergoing open myomectomy under general anesthesia: a case report

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Background: Achondroplasia, the most common cause of dwarfism, results from a genetic mutation in the fibroblast growth factor receptor 3 gene, hindering cartilage proliferation and causing premature ossification.1 Anesthetic challenges in patients with achondroplasia involve risks in both general and neuraxial anesthesia due to their unique anatomical features. This case presents a dilemma in anesthetic management for a patient with achondroplasia and NSAID allergy for open abdominomyomectomy.
Case Report: A 36-year-old female with achondroplasia underwent an elective open abdominal myomectomy due to severe anemia from uterine myomas. General anesthesia with video laryngoscopy and manual in-line stabilization was employed. Postoperative ultrasound-guided bilateral lateral transversus abdominis plane (TAP) blocks and bilateral rectus sheath blocks (RSB) were performed as this combination provides excellent analgesia for abdominal surgery.(2) She had a smooth postoperative recovery with adequate pain control and no complications.

Discussion: This case underscores the complexities in anesthetic decision-making for an elective open abdominal myomectomy in a patient with achondroplasia. While general anesthesia involves airway challenges, technical difficulties of neuraxial anesthesia are exacerbated by the patient’s spinal deformities. The significance lies in adapting management to the anatomy of achondroplasia and successful integration of peripheral nerve blocks (PNB) as an adjunct to general anesthesia. This tailored approach ensures enhanced recovery, optimal patient outcomes, and avoids potential complications with neuraxial techniques in this population.

References:
2. Webster, K. (2010). Ultrasound guided rectus sheath block with bupivacaine and 1ml of iohexol 240mg.ml-1 (Omnipaque 240TM), resulting in a 0.4% bupivacaine solution. In the CT scan (CT), the patient is positioned in IDP for a blank (T0) CT. Two minutes after, the initial 0.5ml bolus of dye is injected, and the first CT (T1) is performed under identical conditions (Fig.1). Subsequently (±7min), the second 0.5ml is injected, and the second imaging sequence is acquired (T2).

Results and Discussion: Once the first bolus of dye solution was injected (T1), all patients showed lateralization ipsilateral over a maximum of one spinal segment (consistent with the position of the CSA catheter tip). After the second bolus (T2), the mean CT extent of the radio-opaque hyperbaric anaesthetic dye is 3.3 ±0.5 spinal segments still lateralized on the ipsilateral side (Fig.1). On the other side, there was almost never any opacification. There was no correlation observed between the CT distribution of the dye solution and the patient’s age, height, or weight.

Conclusion(s): The CT study shows a distribution of the hyperbaric solution on the ipsilateral side. The CT also reveals a dispersion across one spinal segment following the injection of 0.5 ml and across 3.3 spinal segments after the administration of the second bolus.

References:

20AP05-10
Continual spinal anesthesia with a microcatheter: CTscan study of the spinal distribution of bupivacaine 0.5% hyperbaric

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Background and Goal of Study: Continuous spinal anaesthesia (CSA) is an underused regional anaesthesia technique with several advantages compared to standard anaesthesia. Recent advancements in equipment with significant evolution of equipment towards microcatheter sets and better understanding of subarachnoid space physiology, making CSA worth reconsidering in clinical practice(1). Materials and Methods: 11 ASA 1-3 patients were scheduled for lower limb surgery. Using the classic medial approach (L3-L4 or L4-L5) with the patient in an ipsilateral decubitus position (IDP), a maximum of 20mm of 28G CSA catheter through 23G Crawford needle. A radio-opaque dye solution, intended for injection into the CSA catheter, is composed of 4ml of hyperbaric 0.5% bupivacaine and 1ml of iohexol 240mg.ml-1 (Omnipaque 240TM), and avoids potential complications with neuraxial techniques in this population.

Learning Points:
Tailored Anesthesia Approach: Individualized anesthesia planning is crucial for patients with achondroplasia undergoing major surgery
Successful Integration of PNB: TAP and RSB as adjuncts to general anesthesia provide effective postoperative analgesia after open abdominal surgery, minimizing opioid use and complications.
Adaptation to Unique Anatomy: Anesthesia strategies should be adapted to the specific anatomical features of achondroplasia, ensuring safe and effective perioperative care.

20AP06-01
Periarticular vasoconstrictor infiltration technique for total knee arthroplasty: report of two cases

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Background: Intraoperative local infiltration anaesthesia (LIA) performed by surgeons has been widely adopted as it provides good analgesia with no motor impairment. The use of tourniquet reduces intraoperative bleeding although it has been associated with postoperative pain, neuromuscular injuries and delayed re-
habilitation. Recently, Roques described the periarticular vasoconstrictor infiltration (PVI) technique in orthopedic surgery, analogue to the WALANT (wide awake local anesthesia no tourniquet) described by Lalonde for hand surgery. PVI is an ultrasound-guided technique that involves injecting a dilution of epinephrine and local anesthesia into deep periarticular planes before surgical incision.

**Case Report:** We present 2 cases of patients undergoing TKA under spinal anesthesia. Both received tranexamic acid before first incision, and 16mg dexamethasone, ibuprofen and paracetamol in the intraoperative period. No tourniquet was used.

<table>
<thead>
<tr>
<th>Sex</th>
<th>Age</th>
<th>ASA</th>
<th>Preoperative haemoglobin (g/dl)</th>
<th>Intraoperative bleeding (ml)</th>
<th>Postoperative bleeding (ml)</th>
<th>Postoperative haemoglobin (g/dl) day +1</th>
<th>Visual analogue scale (VAS) PACU day +1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pat 1</td>
<td>Male</td>
<td>65</td>
<td>II</td>
<td>16.4</td>
<td>100</td>
<td>1080</td>
<td>13.8</td>
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<tr>
<td>Pat 2</td>
<td>Female</td>
<td>69</td>
<td>II</td>
<td>13.7</td>
<td>50</td>
<td>300</td>
<td>12.7</td>
</tr>
</tbody>
</table>

Neither of them received morphine as rescue analgesia in the postoperative period. Length of stay was 4 days for both, with no postoperative complications.

**Discussion:** PVI produces chemical vasoconstriction and analgesia by infiltration of a total of 150ml of levobupivacaine 0.125% with epinephrine (1:200,000) into the superior and inferior genicular nerves, posterior capsule, surgical site, and the intra-articular site. Infiltration before incision could decrease blood loss in comparison with traditional LIA, which is performed before insertion of the components.

We have performed PVI as described by Roques and colleagues in 2 patients so far, uneventfully, achieving good pain control and surgeon (willing to perform surgery without tourniquet) and patient satisfaction. Randomized trials lack to prove benefits of this novel technique.

**References:**

**Learning Points:** The recently described PVI can be safely performed in patients undergoing TKA.

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**20AP06-02 Two cases of unintended epidural anesthesia following one-side intertransverse process block**

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**Background:** Intertransverse process block (ITPB), which involves injection into the retro superior costotransverse ligament (SCTL) space, may spread local anesthetics (LA) to adjacent spaces, including erector spinae plane (ESP), retrolaminar, intercostal, paravertebral space and neuraxis. However, transitioning from ITPB to epidural anesthesia can cause complications.

**Case report:** A 67-year-old woman (153 cm, 45 kg) underwent video-assisted thoracoscopic surgery (VATS) lobectomy. Ultrasound-guided right ITPB at T4-5 with 30 mL of 0.3% ropivacaine was performed for perioperative pain control. 5 mins after injection, nausea was accompanied with a drop in vital signs (HR 40 bpm, BP 56/27 mmHg, SpO2 100%). After the administration of 1 mg atropine and 12 mg ephedrine, vital signs were restored (HR 101 bpm, BP 117/64 mmHg) (Fig.). The ITPB resulted in a rapid onset of bilateral loss of sensation to cold, extending from C5 to T11 dermatomes with upper limb weakness (Right 4/5, Left 3/5). A 58-year-old woman (149 cm, 59 kg) had VATS segmentectomy with right ITPB at T4–5. After injecting 30 mL of 0.3% ropivacaine, she felt bilateral hand numbness and nausea. HR dropped to 51 bpm, BP to 71/51 mmHg. The ITPB produced bilateral upper limb weakness and loss of sensation to cold, extending from C5 to T10 dermatomes. Both patients required few anesthetics during surgery without additional analgesics.

**Discussion:** The ITPB may induce ipsilateral sensory blockade or bilateral symmetrical thoracolumbar anesthesia due to varying degrees of epidural space spreading. Our smaller-sized patients suggested a reduced retro-SCTL space (small body size, low fat composition) potentially increasing the likelihood of epidural spreading. To reduce the risks of hemodynamic instability, decrease the total injection volume and closely monitor patient after injection. The absence of pleural descent or spread resembling ESPB may imply inadvertent entry of drug into epidural space.

**Reference:**
Anesth Analg 137:458-465, 2023

**Learning points:** Administering a larger volume increases the risk of epidural spreading potentially causing complications. Observing LA distribution during injection is crucial.
20AP06-03
Spontaneous subarachnoid hemorrhage in the postoperative period after spinal anesthesia: case report

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Background: Spontaneous subarachnoid hemorrhage (SAH) has been rarely reported as one of the complications of dural puncture(1). While the most common cause is known as intracranial aneurysm rupture (51-80%), 5-10% of cases classified as idiopathic.

In the current case report, a patient who developed intracranial hemorrhage in the postoperative period after femur stabilization under spinal anesthesia is presented.

Case Report: A 69-year-old female patient with known diagnoses of essential hypertension was admitted to the emergency department due to femur fracture. Cranial MR imaging of the patient, who had suspected loss of strength in the left extremities, showed an area compatible with acute ischemia in the right periventricular area and no aneurysm was observed.

During preoperative assessment, her state of consciousness was normal. Following standard anesthesia monitoring, the subarachnoid space was inserted at the first attempt using a 25G-Quincke needle from the lumbar 3-4 intervertebral space in a sitting position.

Spinal anesthesia was achieved by administering 2.5 ml of 0.5% bupivacaine. Hemodynamic parameters remained stable during the intraoperative period.

The patient, whose GCS decreased on the first postoperative day, was intubated due to the development of acute respiratory failure. Cranial CT scan performed subsequently showed that acute hemorrhage in the lateral ventricles (Image 1).

Image 1.

The patient, who could not be weaned during the follow-up in intensive care unit, underwent percutaneous tracheotomy on the 15th day after intubation. The patient was provided with home ventilator and was discharged to the palliative service and then home, uneventfully.

Discussion: SAH can be cause of serious morbidity and mortality. The state of unconsciousness that develops following dural puncture should be considered as intracranial hemorrhage until proven otherwise.

Reference:

20AP06-04
Remarkable post-hepatectomy analgesia - a case-report of the external oblique intercostal-plane block

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Background: The External-Oblique Intercostal (EOI) plane block is a recently explored peripheral block aimed at controlling pain in upper abdominal surgery. This report details a case of successful postoperative analgesia utilising a continuous EOI plane block for hepatic surgery.

Case Report: A 55-year-old male with Klatskin IIIb cholangiocarcinoma was scheduled for a left hepatectomy. His clinical and surgical history and pre-operative exams were unremarkable. An EOI plane catheter was placed before induction. Intraoperative combined anaesthesia included a 200 µg morphine single-shot subarachnoid block, two 10 mL boli of Ropivacaine 0.2% and total intravenous anaesthesia with Propofol and Remifentanil perfusions.

Multimodal analgesia was administered throughout (40 mg Parecoxib, 1g Paracetamol, 2g Metamizole, 150 mg Tramadol). The surgery time was seven hours. The patient’s stay in the post-anaesthetic care unit was uneventful, and he was transferred to an intermediate care unit. Postoperative analgesia included 1g Paracetamol 3x/d and 2g Metamizole 2x/d. 10 mL of 0.2% Ropivacaine solution were administered 4x/d through the EOI catheter. The patient’s postoperative resting pain remained below 4/10 on Visual Analogue Scale assessment.

After postoperative day 3, the patient reported no resting pain and did not require Metamizole, permitting Ropivacaine tapering and catheter removal on day 5. IV morphine was prescribed for breakthrough pain but never necessary. No adverse effects or complications relating to the catheter were noted or reported.

Discussion: Epidural analgesia remains popular in upper abdominal surgery, but recent studies have shown sparse superiority when compared with peripheral blocks, especially when considering risks and complications. The EOI plane block has been shown to achieve anaesthetic spread over the upper abdominal wall, while being distant from major vascular structures.

Our report highlights a case of remarkable pain control using a continuous EOI block, displaying its potential for use in patients where coagulation status or post-operative considerations would discourage other options.

Learning Points: The EOI plane block is a simple and safe peripheral nerve block useful in upper abdominal surgery, capable of providing excellent pain control.

This case illustrates its usefulness in controlling post-operative pain, therefore encouraging its use in situations where other alternatives may be less advantageous.
Background: Interscalene brachial plexus block (ISPB) is widely performed for shoulder surgery, providing superior postoperative analgesia and shorter hospital stay. Due to anatomical proximity of the phrenic nerve, complications like phrenic nerve block and hemidiaphragmatic paresis (HDP) were barely inevitable.

Case Report: A 67-year-old female (BMI 39 kg/m²) was scheduled for right arthroscopic shoulder impingement surgery. Awake interscalene block was performed 30 minutes before surgery. Ultrasound-guided in-plane needle approach was used with 20 ml of 0.3% ropivacaine injected. After 10 minutes, she complained of chest tightness and difficult breathing. Oxygen saturations were 96–99% via simple mask. Auscultation found no wheeze or stridor. Portable CXR revealed significant rise in the right diaphragmatic dome. Then she was intubated and underwent the surgery. Afterwards, she was successfully extubated when TOF ratio is 93%.

Discussion: The incidence of transient HDP after ISPB is nearly 100%.

It has been reported that in obese patients receiving ISPB, HDP is more likely to lead to dyspnea, hypoxic episodes, and even failure of ambulatory procedures.

Despite the fact that opioid-sparing analgesia is beneficial for obese patients to prevent respiratory depression, conduction of ISPB should still be carefully deliberated. Strategies to avoid HDP include low volume of local anesthetics or use of alternative blocks. Carrying out the block awake may also provide clinicians chances to promptly alert the occurrence of HDP.

References:

Learning Points: Dyspnea and hypoxia can occur after implementation of ISPB, especially in patients with compromised lung function. Awake patients may allow earlier detection and management.

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20AP06-07
Neuraxial anesthesia’s role in laparoscopic approach to incarcerated hernia in patients with respiratory comorbidities

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Background: General anesthesia (GA) is the most acceptable technique for abdominal surgery. In certain populations, regional anesthesia (RA) may present benefits, enabling hemodynamic and ventilatory stability, as respiratory control mechanisms remain untouched and fewer changes in arterial blood gas are expected.

This approach requires certain adjustments in the laparoscopic technique and a cooperative patient.

Case Report: A 67-year-old woman, 61 kg, 155 cm, ASA III with history of lung adenocarcinoma with pleural spread stage IV and recurrent malignant pleural and pericardial effusion, chronic myeloid leukemia, mild aortic stenosis, hypertension and obesity presented to the emergency service with inguinal pain. The patient had shortness of breath on little exertion and trepopnea. A femoral incarcerated hernia was diagnosed and emergent open surgical correction was indicated. The anesthetic plan proposed was lumbar epidural anesthesia combined with sedation. The technique was uneventful, performed at level L3-L4 and an initial bolus of 60 mg ropivacaine and 10 mcg of sufentanil were given. After the pin-prick assessment of blockage level, T3-T4, the surgery started and the possibility of intestinal ischemia emerged.

A mini laparoscopy along with a suprapubic median incision was conducted and confirmed an ischemic intestinal area. A segmental enterectomy and fixation of a femoral plug was performed. Respiratory stability was maintained during the procedure adding supplemental oxygen by nasal cannula and hemodynamic control was ensured with phentylephrine boluses.

The patient was then transferred to the ward. Multimodal analgesia ensured a good postoperative pain control.

Discussion: Laparoscopic procedures are usually performed under GA. Despite that, several reports showed that RA, spinal or epidural, may have an efficacious role, maintaining ventilation and hemodynamic function with minimal side effects and reducing stress response to surgical stimulus.

References:

Learning points: RA can be an option in laparoscopic procedures, preserving respiratory function of a patient with severe pulmonary disease and low lung reserve, at risk for difficult wean from mechanical ventilation.
**Background:** Pycnodysostosis (PD) is a rare autosomal-recessive condition (incidence: 1.7/1 million births) caused by a cathepsin K mutation, leading to osteosclerosis. Anesthetic challenges include difficult airway, obstructive sleep apnea (OSA) history and fragile bones prone to fractures with minor trauma. Limited information is available.1,2

**Case Report:** A 41-year-old woman with congenital PD underwent tibial nailing for a pathological fracture. She had a history of severe migraines and OSA. A pre-anesthetic assessment revealed a predictable difficult airway due to micrognathia, mandibular hypoplasia, large protruding tongue and Mallampati score 4. No apparent spinal abnormalities were found, and epidural anesthesia at L3-L4 level was performed without complications. Anesthesia was achieved with Ropivacaine. Due to anxiety, a titrated propofol infusion was administered for moderate sedation.

During drug infusion, the patient experienced hypoventilation, requiring assistance with a facial mask, which was easily managed and resolved after reducing the propofol infusion. The rest of the surgery was uneventful. Intra and postoperative multimodal analgesia was administered.

**Discussion:** PD patients have craniofacial abnormalities, leading to a difficult airway, and higher risk of fractures during airway manipulation, especially in the cervical spine. Regional anesthesia was performed, anticipating a higher likelihood of uneven spinal block due to lumbar column deformities. Epidural anesthesia was preferred over spinal anesthesia to minimize the risk of post-dural puncture headache (PDPH) and enable incremental dosing of local anesthetics.

As the patient became anxious, a propofol infusion was started. Sedation can be challenging as it involves striking a balance between desired and adverse effects, such as hypoventilation and apnea. Managing the airway under suboptimal conditions may become necessary.

**References:**
1. Hansen NS et al; Anaesthetic Considerations in a Patient with Pycnodysostosis undergoing Caesarean Delivery. Case Rep Anesthesiol 2018
2. Puri R et al; Pycnodysostosis: an anaesthetic approach to this rare genetic disorder. Case Rep Anesthesiol 2013

**Learning points:** For these patients, it is advisable to prioritize regional anesthesia whenever feasible. This technique is considered safe, minimizes airway interventions and offers superior, opioid-free analgesia. It is imperative to closely monitor and titrate sedation drugs to prevent complications.

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**Background:** Inguinal hernias (IH) are more common among premature infants.1 Spinal Anesthesia (SA) is an established technique in ex-premature infants (EPI), 2 however it is has not yet become routine. We report the anesthetic management of IH repair in an EPI in a non-tertiary center.

**Case Report:** A boy born prematurely at 31 weeks of gestation was referred for surgical repair of an IH in a non-tertiary hospital. Since the nearest central hospital was only accessible by 2-hour aeromedical transport, the surgery was conducted locally after multidisciplinary discussion. He had a postconceptional age of 37 weeks and weighted 2270g. Two experienced Anesthesiologists and a Neonatologist were present in the operating room. An awake SA was successfully performed, ensuring an uneventful intraoperative course, with no sedation required. The infant was then transferred to the NICU with uneventful postoperative course.

**Discussion:** SA significantly reduces respiratory complications and bradycardia when compared to general anesthesia. Infants with history of prematurity should be managed by Anesthesiologists with specific pediatric training, 2 however our hospital doesn’t have a specialist in pediatric anesthesia. Nevertheless, current guidelines recommend against aeromedical high-altitude travel for infants less than 6 weeks of age. 3 With experienced Anesthesiologists and Neonatologists, an equipped NICU and proficient team, decision was made to conduct the procedure within our institution, foregoing the need for infant and family transfer.

Our case highlights that SA in EPI is still a challenge for many Anesthesiologists and the need to balance between guidelines recommendations and local factors, advocating for an individualized approach in every case.

**Learning Points:**
1. Awake SA has a significant role in the management of infant IH repair;
2. Defining an age threshold for neonatal referral to centers with specialized pediatric anesthesiologists remains under debate;
3. The risks related to an aeromedical transport of an ex-premature infant are considerable.

**References:**
Cerebrospinal fluid cutaneous fistula in the obstetric patient: managing uncertainty with caution

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Background: Cerebrospinal fluid cutaneous fistulas (CSFCF) are rare and potentially serious complications of neuroaxial techniques. Little is known about its pathophysiology and management. With this case we aim to report the uneventful employment of conservative measures and no antibiotic prophylaxis in a patient who developed a CSFCF after epidural analgesia.

Case report: We report the case of a 33-year-old female who developed a CSFCF after epidural catheter placement for labor analgesia. The catheter was removed 24 hours after birth and a compressive bandage was placed. Shortly after, anesthesia was called because the bandage was wet. On examination of the puncture wound, a constant leak of clear fluid was observed. A fluid sample was positive for proteins, hemoglobin, and glucose. The patient was otherwise asymptomatic. Based on the findings, a CSFCF was assumed. The case was discussed in a multidisciplinary meeting with anesthesia and neurosurgery and it was decided that prophylactic antibiotic therapy was not indicated at the time. The leakage resolved after 72h of conservative measures (compressive bandage, oral hydration and bed rest). The patient never developed signs of intracranial hypotension (IH) and was discharged on day 5.

Discussion: CSFCF usually become evident after epidural catheter removal. Clinical presentation varies, from no symptoms to signs of IH to meningitis or subdural hematoma. Due to the rarity of this condition, there is no standardized treatment. Management ranges from conservative strategies to invasive approaches like cutaneous stitching or epidural blood patch.

While some case reports suggest antibiotic prophylaxis, this decision must be pondered and discussed in a multidisciplinary meeting setting as there is limited evidence supporting it and antimicrobial resistance is a rising challenge.

References:

Learning points: The management of CSFCF must be tailored to the patient, and conservative measures should be considered.

Efficacy and safety of lateral IPACK block in knee arthroplasty: a case series

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Background: IPACK block is a regional anesthetic technique that involves an ultrasound-guided infiltration of local anesthetic between popliteal artery and posterior knee capsule. This technique provides analgesia for the posterior knee, including articular branches of obturator nerve, common peroneal nerve, and tibial nerve. The lateral approach is a relatively uncommon technique that is performed with the patient in the supine position and the knee laterally flexed. The ultrasound transducer is placed in a transverse orientation over the medial aspect of the muscle, 2-3 cm above the patella.

Case report: Report of 10 cases of adult patients undergoing total knee arthroplasty. The anesthetic strategy was lateral IPACK block and lateral adductor canal block, both under ultrasound guidance, followed by spinal anesthesia. The efficacy of the block was assessed using the visual numeric scale (VNS) of pain during the stay in the post-anesthesia care unit (PACU) and the first 12 postoperative hours. The safety of the block was assessed by evaluating the motor block of the lower extremity and the occurrence of associated nerve or vascular complications.

Discussion: Lateral IPACK block associated with adductor canal block provided optimal postoperative pain control (VNS < 3) during the stay in PACU and first 12 postoperative hours in nine patients (90%). One patient required a rescue dose of Tramadol. No patients evaluated presented motor block of lower extremity or associated nerve or vascular complications.

Learning points: Lateral IPACK block appears to provide effective postoperative analgesia in knee arthroplasty. This approach is a simple and safe regional technique that can be performed with the patient in the supine position.
Background: Limb-girdle muscular dystrophy comprises genetic disorders impacting muscles in pelvic and shoulder girdles, causing progressive degeneration, weakness, and functional loss. Anesthetic challenges in these patients involve heightened susceptibility to cardiovascular, respiratory, and muscle weakness-related complications, often linked to rhabdomyolysis and hyperkalemia, with a predisposition to malignant hyperthermia and prolonged recovery from non-depolarizing muscle relaxants.

Case report: A 52-year-old female, ASA III, diagnosed with autosomal recessive limb-girdle muscular dystrophy at age of 15, was admitted for surgical correction of distal right femur fracture and proximal left tibia fracture. She had a 90% functional disability, flaccid tetraparesis areflexia with daily periods of non-invasive ventilation (NIV), Crohn's disease, hepatic cirrhosis. Preoperative assessment showed hemoglobin at 9.5 g/dL, without other significant abnormalities, including electrocardiogram and transthoracic echocardiogram.

Sequential neuroaxial blockade was performed at L3-L4 using 9 mg bupivacaine and 2 mcg sufentanil. Episodes of hypotension after neuraxial anesthesia was managed with phenylephrine boluses (50 mcg), totaling 300 mcg. The transfusion of 1 unit of red blood cells was needed due the blood loss. Dyspnea and O2 saturation at 92-93% were alleviated by the use of the patients NIV. The surgical procedure proceeded without complications.

Post operative analgesia was provided with a patient-controlled epidural analgesia (PCEA) with programmed intermittent epidural analgesia. A bilateral ESB with catheter insertion for prolonged analgesia was preferred, owing to its easy administration and minimal risk of complications. Regional analgesic techniques are useful, but it is important to acknowledge their contraindications.

Discussion: In this case, effective analgesia was crucial to mitigate pulmonary complications secondary to multiple rib fractures. Although thoracic epidural block is considered the standard of care, a thoracic vertebral body fracture is an absolute contraindication to this technique. This led us to choose an alternative first-line regional technique with documented efficacy and safety in the literature - the ESB with catheter insertion for prolonged analgesia.

References:

Learning points: Effective analgesia is imperative in patients with multiple rib fractures in order to prevent secondary pulmonary complications and mechanical ventilation. Regional analgesic techniques are useful, but it is important to acknowledge their contraindications.
20AP07-04
Acute limb ischemia following total knee arthroplasty: diagnostic challenges following regional analgesia

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Background: Total knee arthroplasty (TKA) is a common surgical procedure for patients suffering from severe osteoarthritis. (1) Acute limb ischemia (ALI) following TKA is a rare event, with a reported rate of 0.03%–0.17%, and can lead to amputation if left untreated. (1,2) Prompt recognition and intervention to prevent limb loss and associated morbidity are essential. (1,2)

Case Report: An 81-year-old male, ASA III, with a history of right gonarthrosis, was scheduled for a TKA. The anesthetic approach consisted in general anesthesia combined with a continuous femoral block (ropivacaine 2mg/ml at 6ml/hour) and a single-shot sciatic popliteal block (ropivacaine 3.75 mg/ml). The TKA proceeded without significant intraoperative complications. The tourniquet ischemic time was 106 minutes, at a pressure of 330mmHg, and the total operation time was 110 minutes. Intraarticular tranexamic acid was administered by the surgeon. Postoperative blood loss was 200mL.

During a visit by the acute pain team, 15 hours after the surgery, the patient referred no post-operative pain. However, a thorough examination revealed the patient’s right foot was notably colder than the contralateral limb and the absence of dorsalis pedis artery pulse, suggesting ALI.

A CT angiography was performed, confirming occlusion of the right popliteal artery. The patient was promptly transferred to a hospital with vascular surgery capabilities, where he underwent thrombectomy and bypass surgery, successfully restoring blood flow.

Discussion: ALI following TKA is an uncommon but serious complication. Contributing factors included the patient’s advanced age, prolonged tourniquet ischemic time and trauma from surgical manipulation. (2)

Additionally, the patient’s inability to perceive pain due to the peripheral nerve block (PNB) and reddish leg coloration from chlorhexidine application hindered prompt problem identification.

References:

Learning Points: This case highlights the importance of vigilance and early detection of complications in elderly patients with multiple comorbidities undergoing TKA. PNB, though beneficial for pain control, may mask potential ischemia.

20AP07-05
Facial trauma and bilateral subtalar dislocations, a case report of the use of multiple regional anesthesia techniques

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Background: A 46 year old male presented to the emergency department following a high energy motor accident. His injuries included an open midline mandible fracture with dental trauma, splitting tongue injury with active bleeding, bilateral subtalar dislocations and an open left-sided talus fracture. He had known hypertension and chronic alcohol misuse.

Case Report: He was subsequently taken to theatre for mandibular fixation, tongue and facial suture, fixation of the left subtalar dislocation as well as left talus fracture. The right subtalar dislocation required closed reduction only. The patient had significant bleeding from his tongue, the first goal was to secure the airway. An initial plan to perform a retrograde intubation was abandoned due to lack of appropriate equipment.

An awake nasal fiberoptic intubation was thus carried out with a temporary clip on his tongue in order to reduce airway soiling with blood. Prior to surgical incision, we performed a single-shot left popliteal-sciatic nerve (PSN) and an adductor canal block under ultrasound guidance (USG) using 10 and 7mL of 0.25% bupivacaine. ENT surgeons performed bilateral inferior alveolar nerve blocks using 1.8ml 0.2% ropivacaine on each side. Anaesthesia was maintained using Sevoflurane (MAC 0.8), remifentanil infusion (Cet 1ng/ml) was used for analgesia. Upon completion of surgery a left PSN catheter was placed using USG, loaded with an additional 10 mL of bupivacaine 0.25%, and attached to a continuous infusion of bupivacaine 0.125% at 6ml/hr. He was extubated successfully. Using a verbal rating scale, he reported 2/10 oral cavity pain and 0/10 lower limb pain.

Discussion: After two hours of postoperative observation he was discharged to the ward without any discomfort. In the first 24 hours following surgery, his peak pain score was 3/10, relating to his oral cavity. After 72 hours his PSN catheter was removed, he reported no pain in his left lower limb and had no opioid requirement throughout this period.

References:
AJ Short et al: Intermittent bolus vs continuous infusion popliteal sciatic nerve block following major foot and ankle surgery: a prospective randomized comparison RAPM 2019 Sep 29

Learning Points: The effectivity of the combined regional anesthetic techniques judged by low pain scores and high patient satisfaction.
**20AP07-06**

Ultrasound-guided supraclavicular brachial plexus block under general anaesthesia for a child with Conradi-Hünermann Syndrome

B. Büyükgebiz Yeşil1, İ. Güngör1, G. Emmez1, H. Sarı1, R. Santaş1, D.B. Günyaydın1

Gazi University, Anaesthesiology and Reanimation, Ankara, Turkey

**Background:** Conradi-Hünermann Syndrome (CHS), which is a X-linked autosomal Chondrodysplasia Punctata, is presented with musculoskeletal deformities, multi-organ involvement, and airway complexities.

We aimed to present management of supraclavicular brachial plexus block under general anesthesia in a child with CHS scheduled for radial head excision.

**Case Report:** After obtaining written consent from the parents, an 11-year-old girl weighing 45 kg with CHS having craniofacial deformities (flattened face and saddle nose) was preoperatively evaluated for possible difficult airway.

Following intravenous (IV) induction with 100 mg of propofol, 25 mg of rocuronium, and 50 µg of fentanyl, endotracheal intubation with auffed size-6 tube was facilitated using videolaryngoscopy successfully.

Then, ultrasound-guided supraclavicular brachial plexus block with 20 mL of 0.25% bupivacaine was performed. Additionally, 5 mL of 0.2% bupivacaine was infiltrated around the tourniquet area. Anaesthesia was maintained with sevoflurane in 50% oxygen-air and IV remifentanil (0-0.2 µg kg⁻¹ min⁻¹).

Postoperative pain relief was provided with IV 600 mg of paracetamol. The operation lasted 50 minutes. Verbal numeric pain rating scores (NPRS) were recorded as 2, 3, and 5 in the recovery room, postoperative 6th, and 12th-hours, respectively. Intraoperative and postoperative general and regional anaesthesia courses were uneventful.

**Discussion:** The classic symptoms of CHS involve the skeleton, skin, and eye; with intelligence usually being unaffected as in our case. This case underscores the complexities of managing CHS during anaesthesia, tailored approaches employing multimodal strategies are crucial for successful outcomes.

Notably, in case of a potentially difficult airway, caution with opioid use is essential, considering the risk of respiratory failure. To our knowledge, this is the first reported case with CHS underwent surgery with supraclavicular brachial plexus block under general anaesthesia.

**References:**

**Learning Points:** Anaesthesia choice and management might be challenging in a child with CHS. However, ultrasound-guided relevant brachial plexus block under general anaesthesia could be a successful anaesthesia/analgesia option by providing opioid-free analgesia.

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**20AP07-07**

Intertransverse Process Block (ITPB) for thoracic analgesia: a case report with imaging insights

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**Background:** The intertransverse process block (ITPB) is a paraspinal thoracic nerve block technique targeting the retro-superior costotransverse ligament (SCTL) space. In this case, we aim to analyze the ITPB using ultrasound and cone beam computed tomography (CT) imaging.

**Case report:** A 48-year-old female patient (156cm, 50kg) underwent left lower lobe wedge resection. After induction, the patient was positioned laterally and underwent the first CT scan. We performed the left T5/6 ITPB with 0.3% ropivacaine (30ml) using a curved array transducer (8-2 MHz) in a transverse orientation and an in-plane technique from lateral to medial.

The injectate spread posteriorly to the erector spinae plane and the retrolaminar space, anteriorly to the paravertebral space, and laterally to the 5th intercostal space, with pleura descent observed (video 1).

The post-ITPB CT scan showed soft tissue thickening from at least T4-7 (Figure 1, A-C). Unilateral loss of cold sensation from T2-T8 was noted on the left side was noted, and the patient reported a numeric rating scale of 0 in the recovery room.

![Figure 1](image_url)

**Figure 1.** CT images before ITPB (A) and after ITPB (B) at the T5/6 level in the sagittal plane just lateral to the IAP of T5. (C) Soft tissue thickening from at least T4-7 is observed by comparing the pre-injection images (highlighted in orange) with the post-injection images (in the original color). The cross-sectional CT images from T5 to T6 (D-F) highlight the possible location of the SCTL in red. Through this image, it is observed that if the needle (yellow arrow) is laterally positioned to the IAP, it may land in the lateral part of the retro-SCTL space. The dotted line represents the sagittal plane of the lateral edge of the IAP, CT, computed tomography; IAP, inferior articular process; ITPB, intertransverse process block; SCTL, superior costotransverse ligament; TP, transverse process.

**Discussion:** The transverse orientation proved beneficial in observing the drug distribution of ITPB within the segment. However, difficulties in recognizing the SCTL made precise positioning in the retro-SCTL space challenging. CT images revealed that the needle lateral to the inferior articular process likely lands in the lateral part of the retro-SCTL space (Figure 1, D-F).

In sagittal orientation, probe tilting allowed for a clear view of the SCTL and retro-SCTL space, targeting the medial side of the retro-SCTL space.

However, confirmation of the drug spreading into the intercostal space or epidural space could not be ascertained. Due to the limited range of the ultrasound scan, complementing intraoperative CT imaging provides preliminary insights into vertical distribution, aiding in anticipating the effect of the ITPB during surgery.
Reference:

Learning points: Selecting the needle insertion point based on the intended effect and closely observing drug distribution is crucial for a better understanding of the effects of ITPB.

20AP07-08
Innovative anaesthetic approach for high-risk patients: ultrasound-guided rectus sheath block as sole anesthetic technique

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Background: Rectus sheath block (RSB) has been proposed as a unique anesthetic technique for umbilical hernia repair. Several studies have also demonstrated RSB anesthesia as an option for peritoneal dialysis catheter placement, showing improved intraoperative hemodynamic stability and analgesic effects compared to spinal anesthesia.

Case report: 56-year-old male, personal history of dilated cardiomyopathy with depressed left ventricle ejection fraction due to severe mitral regurgitation (NYHA III), implantable ICD for secondary prevention, atrial fibrillation, chronic liver disease, portal hypertension and cardio-renal syndrome. Medicated with oral anticoagulation and a subcutaneous furosemide pump. Scheduled for elective umbilical herniorrhaphy and peritoneal dialysis catheter insertion.

Two weeks before, the patient was admitted due to cardiac decompensation secondary to leg cellulitis. Preoperatively, he was eupneic, with SpO2 at 99%, although with refractory congestion (bilateral pleural effusion with discreet bibasal crackles on auscultation). Arrhythmic cardiac sounds and a grade II systolic murmur. Ascites, ankles edema and reddened legs with skin fragility and active drainage.

Patient was positioned in decubitus position, with standard ASA monitoring. RSB was performed, under ultrasound guidance, a total of 30 mL of 0.5% ropivacaine was injected. Complemented with injection of 8 mL of 1% lidocaine prior to incision. Sedation with Dexmedetomidine (4 mcg/ml, maximum 5 mL/h). During incision, 5 mL of 0.5% Ropivacaine injected to each level, followed by a 15-minute time interval for block installation. Light sedation produced by low-dose benzodiazepines, requiring non-invasive ventilation, partially reversed with flumazenil. Admitting the possibility of a paraneoplastic syndrome, a left quadrantectomy was proposed.

Pre-operatively, patient was conscious, polipneic with limited chest expansion, decreased breath sounds at the left base and requiring oxygenotherapy. Due to high anaesthesiologic risk, TVPB was proposed. The procedure was explained and consented by the patient.

Patient positioned in right lateral decubitus, under standard monitoring. A 3 level TPVB (T3-T5) with ultrasound guidance was performed, 5 mL of 0.5% Ropivacaine injected to each level, followed by a 15-minute time interval for block installation. Light sedation with Dexmedetomidine (4 mcg/ml, maximum 5 mL/h). During incision, 6 mL of 1% Lidocaine was injected. No opioids used in intra or postoperative periods. No complications.

Discussion: Awake breast surgery should be an option in elderly and frail patients, as it has been proven to be associated with better outcomes and a faster recovery. In these cases, TPVB surpasses fascial blocks, ensuring a predictable local anaesthetic propagation and consistent block pattern.

References:

Learning points: In patients contraindicated for general anesthesia, TPVB is a viable alternative for awake-patient surgery.

20AP07-09
Enhancing safety and recovery in elderly breast cancer patients: thoracic paravertebral block for awake tumorectomy in a high-risk case

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Background: In elderly woman, breast cancer surgery is often delayed, due to greater morbidity and anaesthesiologic risk. Awake breast surgery has been associated with reduced incidence of delirium, leading to a faster recovery and shorter hospitalization. We present a case of a high-risk patient, submitted to a tumorectomy under thoracic paravertebral block (TPVB).

Case report: 87-year-old female, medical history of hypertension, cerebellar stroke (no sequelae) and left breast papillary carcinoma under hormonotherapy. Rapidly progressive parkinsonism syndrome, spanning 8 months of evolution (supranuclear palsy, dysphasia, dysphonia, dysarthria and mild left hemiplegia), associated with weight loss and depression.

Admitted due to altered mental state and respiratory failure induced by low-dose benzodiazepines, requiring non-invasive ventilation, partially reversed with flumazenil. Admitting the possibility of a paraneoplastic syndrome, a left quadrantectomy was proposed.

Patient positioned in right lateral decubitus, under standard monitoring. A 3 level TPVB (T3-T5) with ultrasound guidance was performed, 5 mL of 0.5% Ropivacaine injected to each level, followed by a 15-minute time interval for block installation. Light sedation with Dexmedetomidine (4 mcg/ml, maximum 5 mL/h). During incision, 6 mL of 1% Lidocaine was injected. No opioids used in intra or postoperative periods. No complications.

Discussion: Awake breast surgery should be an option in elderly and frail patients, as it has been proven to be associated with better outcomes and a faster recovery. In these cases, TPVB surpasses fascial blocks, ensuring a predictable local anaesthetic propagation and consistent block pattern.

References:
Glossopharyngeal nerve block via intraoral approach for upper gastrointestinal endoscopy

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**Background:** Anesthetizing the glossopharyngeal nerve (GPN) is a crucial element for achieving effective airway block anesthesia and is commonly employed for awake tracheal intubations. However, GPN block can also be highly beneficial for awake upper gastrointestinal endoscopy (UGIE).

We present a case where GPN block this was a valuable tool for awake UGIE.

**Case report:** A 67-year-old patient, ASA physical status IV, was scheduled for urgent upper gastrointestinal endoscopy (UGIE) due to suspected biliary-enteric fistula following gastrojejunostomy for gastric body adenocarcinoma. The patient had a history of vomit aspiration during a previous UGIE within the same hospitalization and was clinically unwell. It was decided to perform the procedure with the patient under minimal sedation and bilateral glossopharyngeal nerve block using a 1 mL injection of 2% lidocaine at the base of the anterior tonsillar pillar.

The procedure proceeded without complications, and the patient remained comfortable without exhibiting a gag reflex.

**Discussion:** Glossopharyngeal nerve block is an anesthetic technique that can be considered to provide comfort during upper gastrointestinal endoscopy, given that the GPN innervates the posterior third of the tongue, epiglottis, and the soft palate. The consideration of the GPN block for UGIE aligns with an understanding of its neuroanatomy and its role in modulating sensory input from the oropharynx.

By selectively blocking the GPN, afferent signals from the targeted regions are interrupted, minimizing discomfort and reflex responses during the endoscopic procedure. This approach is particularly pertinent in cases where the patient's clinical condition necessitates a cautious and tailored anesthesia plan to ensure patient safety.

**References:**

**Learning points:** Glossopharyngeal nerve block facilitates a reduction in the gag reflex while preserving the cough reflex.
**21AP01-02**

**An audit on the consumption of inhalational anaesthetic agents at Mater Dei Hospital, Malta**

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**Background and Goal of Study:** Inhalational anaesthetic agents carry a considerable cost, both economic and environmental. Consumption of such medications is related to the fresh gas flow, which is controlled by the attending anaesthetic team.

**Materials and Methods:** Data was collected over a period of twelve weeks from September 2022 to December 2022. Intermittent, random observations of fresh gas flow rate and anaesthetic agent concentration was performed by an investigator not being actively involved in the anaesthesia delivery. The type of procedure performed, time from induction, age of the patient and the type of airway device used were also collected.

**Results and Discussion:** In total, there were 383 visits of which 244 visits were done during maintenance of anaesthesia with a volatile agent. The median time of visit from the start of induction was 49 min. The median Fresh Gas Flow (FGF) used at the time of the observation was 2L/min (IQR 1.5 – 2 L/min), with a maximum of 9 L/min in one case. The most used inhalational anaesthetic agent was Sevoflurane, used in 205 cases (84%), followed by Isoflurane in 32 cases (13%) and Desflurane in 7 cases (3%).

The median FGF used for each gas was not statistically different (see table below). The mean Minimum Alveolar Concentration (MAC) for each agent was not different between agents.

There was no difference between the choice of airway and FGF (both 2L/min, p-value = 0.099). There was no relationship between the FGF employed and the time from induction when sevoflurane was used.

**Conclusion(s):** The recorded fresh gas flows from Mater Dei Hospital show responsible use of anaesthetic agents and are comparable to other centres. However, improvement can be made by employing minimal-flow methods. We propose that a concerted effort should be made to reduce wastage and costs. An educational campaign targeting anaesthetists may be prepared, together with visual cues to remind anaesthetists to lower the fresh gas flows. It would be worthwhile to conduct a follow-up audit in the future to assess the effect of these findings on fresh gas flow usage.

**21AP01-03**

**Importance of disconnecting CONTRAfluran™ during total intravenous anesthesia**

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¹University Hospitals Leuven, Department of Anaesthesiology, Leuven, Belgium, ²AZ Sint-Jan Brugge Oostende AV, Department of Anaesthesia and Critical Care, Brugge, Belgium

**Background and Goal of Study:** CONTRAfluran™, an activated carbon-based capture technology for volatile anaesthetics (VA), captures a significant fraction of consumed VA from the exhaust system, thereby preventing the release of these potent greenhouse gases into the atmosphere. A sensor indicates when a CONTRAfluran™ canister is saturated and requires replacement. Captured sevoflurane can subsequently be destroyed or recycled with a recovery of 90%. Guidelines for sustainable anaesthesia favour Total Intravenous Anaesthesia (TIVA) for most procedures, reserving sevoflurane for specific cases.

Sevoflurane anaesthesia is typically performed with minimal fresh gas flow (FGF) to limit VA consumption, while for TIVA, a higher FGF is usually recommended to prevent unnecessary wastage of sodaline.

This study investigated sevoflurane loss from a partially saturated CONTRAfluran™ during TIVA with a FGF of 8L/min.

**Materials and Methods:** Over 8 consecutive days, with sevoflurane used in the initial anaesthesia hours and TIVA in the subsequent hours, the canister weight was intermittently measured using a precision scale before commencing TIVA and at various time intervals. Mean(SD) ml loss of sevoflurane per hour was calculated, together with CO₂ equivalent emissions (CO₂ee) (taking into account a global warming potential with a 20-year time horizon of 702, and including production emissions)¹².

**Results and Discussion:** The mean(SD) recording duration and total sevoflurane loss were 353(122)min and 32(17)ml. The mean(SD) loss was 6.4(4.7)ml of sevoflurane per hour, equivalent to 13.7(10.1) kg of CO₂ee per hour.

**Conclusion(s):** CONTRAfluran™ significantly reduces sevoflurane emissions, but decoupling the canister from the anesthesia system when TIVA with high FGF is subsequently used is crucial to prevent re-release into the atmosphere. Additional research is required to identify the factors determining the amplitude of re-release. Automated decoupling in the absence of sevoflurane could optimize efficiency."
21AP01-04
Sustainable savings: a financial and environmental success - comparison and replacement of ethyl chloride with CoolStick® for use in sensory block assessment following regional anaesthesia at Dartford and Gravesham (DGT) NHS Trust

E. Cooney¹, J. Phillips¹, D. Lake¹
¹Dartford and Gravesham NHS Trust, Anaesthetics and Critical Care, Dartford, United Kingdom

Background: Assessing the level of neuroaxial block in regional anaesthesia is crucial to ensure adequate anaesthesia and rule out potential complications. Traditionally, ethyl chloride spray (Cryogesic®) has been used, however, its use comes with economic and environmental repercussions. Ethyl chloride, a greenhouse gas, is present in the atmosphere for 1-2 months before breaking down and catalysing ozone depletion. It is also classified as a substance hazardous to health owing to ophthalmic, respiratory and dermatological irritation. Additionally, Cryogesic® is manufactured in the Czech Republic and imported to the UK, further increasing its carbon footprint.

We introduced CoolStick®, a cold metal reusable rod, as an alternative. Manufactured in the UK, it is reusable, complies with infection control and is stored in theatre fridges to retain its cold sensation. CoolStick® is proven to be as effective as Cryogesic® in assessing the level of neuroaxial block.

Methods: We conducted a retrospective cost and CO2 emissions analysis and compared to projections of exclusive CoolStick® use. We made and distributed to the Anaesthetic department video and written educational material on CoolStick® use, cleaning and storage. We piloted exclusive CoolStick® use for one week in two theatres (Trauma and Obstetrics). Contemporaneous feedback from anaesthetists was gathered.

Results and Discussion: 10 responses were included, 0 were excluded. 100% of respondents administered a spinal anaesthetic for orthopaedic (60%), obstetric (20%), and gynaecological procedures (20%). 100% expressed satisfaction with the CoolStick® for sensory assessment, finding it user-friendly and easy to maintain. 100% were willing to substitute Cryogesic® with CoolStick®. Cost analysis showed in 2022-23 DGT purchased 670 Cryogesic® cans, costing £13627.80 pa. CoolStick® are sold in pairs for £60. 17 pairs would be required to stock theatres, ICU, Pain team and obstetrics across two hospitals at DGT, at a one-off purchase cost of £1020.

This results in a saving of £13627.80 pa., with minimal on-going costs. CO₂ emissions analysis suggested savings of 84.1 tonnes of CO₂ emissions pa. with exclusive CoolStick® use, discounting additional transportation emissions savings.

Conclusions: CoolStick® is a viable substitute for Cryogesic® at DGT with significant economic and environmental benefits. DGT theatres are now Ethyl Chloride free, with a view to removing Ethyl Chloride trust-wide by late 2024.

References:
1. IPCC. 2021. Climate Change 2021: The Physical Science Basis; Chapter 7
2. Hu et al. Resour Conserv Recycl 2021; 167: 105411

21AP01-05
Efficiency of CONTRAfluran™ in mitigating the environmental impact of volatile anaesthetics in mask anaesthesia

J. Braem¹, H. Bossant¹, H. Mulier², H. Vereecke¹, A.F. Kalmar¹
¹AZ Sint Jan, Anaesthesia and Critical Care, Brugge, Belgium, ²University Hospitals Leuven, Department of Anaesthesiology, Leuven, Belgium

Background and Goal of Study: Minimizing sevoflurane use is crucial due to its significant greenhouse effect. CONTRAfluran™ captures exhaust anaesthetics, mitigating pollution and potentially enabling recycling with a 90% recovery rate. An unanswered question remains what proportion of the consumed sevoflurane is captured during mask anaesthesia and the resulting extent of pollution reduction.

This study aims to quantify sevoflurane consumption and the efficiency of CONTRAfluran™ in reducing pollution during mask anaesthesia by different anaesthetists.

Materials and Methods: In 30 consecutive cases of mask anaesthesia for ENT procedures at Sint-Jan Hospital, Brugge, Belgium, the fresh gas flow(FGF), and FGFₙₑₑ concentration were recorded every 30 seconds and the average value per procedure was calculated. The total sevoflurane consumption and total amount captured per procedure were measured using a precision balance. The CO₂ equivalent emissions (CO₂ₑₑ) from sevoflurane, including production emissions, were calculated for each case using a 20-year time horizon in three scenarios: without capture, with capture and destruction, and with capture and recycling.

Results and Discussion: Patient characteristics and main outcome variables are shown as Mean(SD) or median(25th percentile-75th percentile; minimum-maximum):

<table>
<thead>
<tr>
<th>Age</th>
<th>37 (522) months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>15 (5) kg</td>
</tr>
<tr>
<td>Total anaesthesia time</td>
<td>10.8 (9.1-13.6; 7.0-22.5) minutes</td>
</tr>
<tr>
<td>Average FGF per case</td>
<td>1.3 (0.8-6.0; 0.7-8.0) L/min</td>
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<td>Average FGFₑₑ per case</td>
<td>7.6 (6.8-8.0; 6.1-8.0) %</td>
</tr>
<tr>
<td>Total sevoflurane consumption</td>
<td>8.2 (5.2-25.4; 3.7-46.1) ml</td>
</tr>
<tr>
<td>Total sevoflurane consumption rate</td>
<td>40.0 (26.4-160.6; 16.6-345.7) ml/hour</td>
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<td>Total sevoflurane captured</td>
<td>2.7 (1.4-12.0; 0.2-34.7) ml</td>
</tr>
<tr>
<td>Fraction sevoflurane captured</td>
<td>32.6 (23.0-74.0; 4.0-90.0) %</td>
</tr>
<tr>
<td>CO₂ₑₑ without capture</td>
<td>17.5(11.5-54.2; 7.9-98.4)kg CO₂ₑₑ/case</td>
</tr>
<tr>
<td>CO₂ₑₑ with capture and destruction</td>
<td>14.6(9.6-41.4; 7.7-61.4)kg CO₂ₑₑ/case</td>
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<tr>
<td>CO₂ₑₑ with capture and recycling</td>
<td>11.7(8.1-28.6; 7.5-24.3)kg CO₂ₑₑ/case</td>
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Fig 1 shows the CO₂ₑₑ assuming destruction of captured sevoflurane.

CONTRAfluran™, both with and without recycling, reduces the median CO₂ₑₑ by 16.7% and 31.0%, respectively. The average FGF varied significantly among cases, serving as the key factor impacting total sevoflurane consumption and pollution. Despite higher capture rates at higher FGF, total CO₂ₑₑ were much lower at the lowest FGF.

Efficiency of CONTRAfluran™ in mitigating the environmental impact of volatile anaesthetics in mask anaesthesia

J. Braem¹, H. Bossant¹, H. Mulier², H. Vereecke¹, A.F. Kalmar¹
¹AZ Sint Jan, Anaesthesia and Critical Care, Brugge, Belgium, ²University Hospitals Leuven, Department of Anaesthesiology, Leuven, Belgium

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Conclusion: Lowering FGF is key to reducing sevoflurane consumption and pollution, with CONTRAfluran™ providing additional significant reduction.

21AP01-06
Anaesthesiologists and anaesthetic nurses support sustainability in anaesthesiology - results from a questionnaire study at a German university hospital

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Background and Goal of Study: During Euroanaesthesia 2023 the ESAIC launched “The Glasgow Declaration on Sustainability in Anaesthesiology and Intensive Care”. It encourages physicians to increase environmental sustainability [1]. We hypothesise that anaesthesia nurses are as aware of climate change as anaesthesiologists and feel a responsibility to mitigate climate change.

Materials and Methods: In October 2023 we conducted an online-based survey study using evasys survey tool (evasys GmbH, Lüneburg, Germany). Questions of the recently published Provider Education and Evaluation Project (PEEP) questionnaire were included [2]. All physicians and nurses of the anaesthesia department at the University Medicine Greifswald were invited by email. A reminder was sent after two weeks. Statistical analyses were performed using R. We applied Fisher’s exact test and considered a p-value less than 0.05 as statistically significant. Multiple testing was corrected applying the Benjamini-Hochberg procedure.

The local ethics committee approved this study (ref: BB 131/23).

Results and Discussion: A total of 43 anaesthesiologists and 14 nurses responded (response rates 64% and 33%). Almost all participants agreed that environmental protection and sustainability are important (nurses/doctors: 93%/95%). Most felt threatened by the climate crisis or feared negative consequences affecting themselves or their children (71%/79% and 79%/91%). Tendentious less nurses think their personal behaviour could mitigating the climate crisis (64%/79%). While both professions agreed that environmental protection and sustainability should be part of the medical decision process (71%/79%) more doctors stated that health care professionals have an ethical responsibility to do so (71%/95%; p=0.03; adj. p=0.12).

Adverse effects to health by climate change in Germany were seen by 79% of doctors and 43% of nurses (p=0.02; adj. p=0.12). Although nurses play an essential role in reducing the climate impact of anaesthesia not all of them are aware of the climate crisis, their role in and their power to mitigate the crisis.

Conclusion(s): Doctors feel a higher ethical responsibility and are more aware of adverse effects to health by climate change than nurses. However, successful and safe anaesthesia is a team effort and so is the fight against the climate crisis.

References:
1. 10.1097/EJA.0000000000001862
2. 10.1016/j.zefq.2022.05.013

21AP01-07
Does previewing the explanatory video reduce anaesthesiologists’ workload?

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Background and Goal of Study: Patient safety and effective anesthesia require thorough preoperative evaluations and clear patient explanations. However, anaesthesiologists often face time constraints, hindering in-depth preoperative interviews. To address this, our clinic introduced an anesthesia-explanatory video preview system in December 2022. This system includes concise video clips tailored to each patient’s specific anesthesia needs, viewed on a tablet before the preoperative consultation. This study aims to assess the impact of this video system on anaesthesiologists’ workload and patient satisfaction.

Materials and Methods: Between October 27 and November 20, 2023, we administered questionnaires and interviewed certified anaesthesiologists. Those with prior preoperative consultation experience were interviewed to assess the impact of the video preview system. We surveyed both anaesthesiologists and patients about their experiences, including system operation, content relevance, viewing duration, significance, and the timing of video clip access. All respondents provided written consent.

Results and Discussion: Out of 20 anaesthesiologists and 121 patients surveyed, we received responses from 14 anaesthesiologists and 100 patients. Among the participating anaesthesiologists, 13 indicated that the explanatory videos effectively reduced their workload, resulting in an average time reduction of 3.4 ± 2.9 minutes per patient compared to before the introduction of the preview system. Additionally, 13 anaesthesiologists reported improved patient understanding. Among the patients, 95 found the video content “easy to understand.” However, three patients mentioned difficulty comprehending all the details, while two did not provide a response. Notably, two patients who found “some parts of the video clip difficult to understand” required explanations for both general anesthesia and epidural anesthesia. Our anesthesia-explanatory video preview system has successfully alleviated the workload of anaesthesiologists during preoperative consultations. However, a subset of patients may encounter challenges in understanding the reasons behind anesthesia method choices. Therefore, further clarification and explanation of anesthesia choices are deemed necessary.
Background and Goal of Study: Climate change is considered as the greatest global health threat of the 21st century. However, healthcare has a significant environmental impact through waste production, use of resources, and pollution. It is crucial that medical students (MS) understand the impact of medical practice in the environment, while also being able to utilize the principles of sustainability.

The aim of this study was to explore the beliefs of MS at the University of Thessaly regarding sustainable healthcare.

Materials and Methods: An anonymous survey, based on the questionnaire created by Gupta et al. (1), was conducted during the first class of anaesthesiology core rotation (October 2023) for the 4th year undergraduate MS. Apart from participants' demographic data, the survey consisted of 11 questions concerning the environmental impact, current teaching and future teaching of education for sustainable healthcare, scored in a 5 point Likert scale. Descriptive statistics and frequencies were used for statistical analysis while data are presented as numbers and percentages.

Results and Discussion: A total of 97 MS completed the survey (response rate 88%). The majority of the students agree that climate change is a significant concern in modern society and believe that they are conscious of their environmental impact (92% and 66% respectively). Moreover, the majority believe that sustainable healthcare is important (90%) since healthcare negatively impacts the environment (66%). Unfortunately, most students have not been taught about the principles of sustainable healthcare (82%), or any existing environmentally friendly protocols in our country (65%). Interestingly, although 81% of MS believe that environmental planning should be included in their education, only a quarter of them believe that there is adequate time and space in their curriculum (27%).

Conclusion(s): While MS are aware that sustainable healthcare is crucial, their training in the environmental aspects of medicine is inadequate. Furthermore, most agree that sustainability issues should be addressed by their curriculum but they believe that their educational program does not easily allow their integration.

References:

21AP01-09 Ephedrine: a noteworthy source of waste on daily anaesthetic practice

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Background and Goal of Study: Prophylactic preparation of emergency drugs is a common practice in daily routine, but in many procedures these drugs are not administered, leading to drug waste and associated costs. We conducted a service evaluation to evaluate if pre-filled ephedrine syringes are cost effective.

Materials and Methods: We conducted a study in the Outpatient Surgery Service of São João University Hospital Center (CHUSJ) from September to October of 2023.

In this study we examine the number of ephedrine prepared and the quantity of ephedrine administered. Costs including medication, syringes and needles were calculated. It didn’t involve the retrieval of patients’ personal data or intervention in the course of drug administration therefore it obviates the need for a review by the Ethics Committee.

Results and Discussion: During 2 months, 595 surgeries were conducted, where 183 syringes of ephedrine were prepared and only 55 were administered (30%), which means that 128 syringes (70%) were discarded. According to our current knowledge, a vial of ephedrine costs 2.30€, with the additional costs for both the syringe (0.023€) and the needle (0.017€) used for drug aspiration. In comparison, the pre-filled syringe of ephedrine is priced at 5.99€.

The 128 prepared syringes incurred a cost of 428.22€, of which 299.52€ were discarded. Through the utilization of pre-filled syringes, opened as needed, it is estimated that the cost of ephedrine under these circumstances would have been 329.45€. In other words, if instead of preparing 128 syringes at a cost of 428.22€, 55 syringes had been employed as needed at a cost of 329.45€, not only would 70% of the prepared drug not have been wasted, but also an approximate reduction of 98.77€ in expenditure would have been realized.

Our study has limitations, primarily due to its confined scope to a single department within CHUSJ, confined to a short period of time. Moreover we may lack access to data on certain doses of ephedrine that were administered or prepared and not registered.

Conclusion(s): In our perspective, the systematic preparation of ephedrine entails unnecessary economic and environmental costs. Pre-filled syringes emerge as a viable alternative to the systematically unnecessary preparation of ephedrine syringes. Furthermore, it is an alternative that ensures the prompt availability of the drug while maintaining the quality of care.
21AP01-10
Sustainability in the operating room: the perspective of the anesthesiologists and anesthetics nurses of a tertiary hospital

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Background and Goal of Study: Sustainability in the operating room (OR) and in anesthetic practice is a growing concern in healthcare. The authors aimed to characterize the environmental sustainability practices and concerns of anesthesiologists and anesthetist nurses in the OR.

Materials and Methods: Two online questionnaires were addressed via email to the anesthesiologists and anesthetist nurses of tertiary hospital. A total of 125 anesthesiologists and 69 nurses were eligible to answer the questionnaire, which was available from July to October 2023.

Results: A total of 60 anesthesiologists (67% senior anesthesiologists and 33% residents) and 33 nurses responded the survey. Regarding the use of inhaled anesthetics, 93% of anesthesiologists recognized desflurane as the agent with the worst environmental impact. Twenty-three percent of them always use sevoflurane and 65% choose the inhaled anesthetic depending on the patient and the surgery. Of those, 54% used desflurane less than once a month, but 23% used it daily. Ninety-two percent recognized the environmental impact of nitrous oxide (NO) and 67% did not include NO in their clinical practice. Concerning total intravenous anesthesia (TIVA), 27% of anesthesiologists used this type of anesthesia more than once a day and 53% more than once a week. When performing a TIVA, 7% of anesthesiologists always used 2% propofol and 22% never used that concentration. The reasons pointed for the selection of this propofol concentration included economic (32%) and ambiental concerns (19%).

Concerning the anesthetic nurses, 55% recognized desflurane as the agent with the worst environmental impact, and 21% never used 2% propofol. The indication of the anesthesiologist was the main reason for the preparation of 2% propofol. Concerning propofol discharge, 58% of nurses reported that 10-20ml of propofol is wasted by surgery, especially in TIVA. However, the majority (82%) indicated that the syringes were prepared and not used were distributed by other ORs. Most of the inquiries were open to change their clinical practice in favor of sustainability.

Conclusion(s): In conclusion, most of the anesthesiologists acknowledge the environmental impact of their clinical practice. Most of them do not usually use desflurane and NO, and TIVA is routinely selected. However, it is necessary to review, together with the anesthetic nurse team, the strategies to reduce the anesthetic drug waste.

21AP01-11
Detection and quantification of Nitrous Oxide leakage

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Background and Goal of Study: There is growing awareness of the environmental impact of Nitrous Oxide (N2O). Most hospitals maintain a reticulated N2O system, where every component is a potential source of leak. International standards lack an adequate pathway for detecting leaks in established systems. This audit presents a modified weighing technique to detect and quantify N2O leaks.

Materials and Methods: At each site, periods of ‘zero usage’ of N2O were achieved by utilising Entonox for labour analgesia and monitoring zero use in operating theatres. N2O loss was determined by the change in weight of an isolated cylinder on the active side of the manifold. The cylinder was placed on a scale connected to a computer, producing a weight-vs-time graph. A linear decline confirmed leak whilst excluding episodic use. At the 290-bed Armadale Hospital, a scale sensitive to 2g was placed under a C-sized N2O cylinder. At the 134-bed Albany Hospital, a scale sensitive to 50g was placed under a G-sized N2O cylinder. CO2 equivalents (CO2e) were calculated by multiplying kilograms of N2O loss by the GWP100 for N2O (265). Environmental cost was calculated by multiplying the CO2e by the EU spot carbon offset price (£77.38/tonne).

Results and Discussion: Armadale had a leak of 48g over 3 hours, annualised to 140kg. This represents 14.4% of the 97kg annual N2O purchase. The annual leak equates to 37 tonnes of CO2e, representing an annual environmental cost of £2874, significantly more than the purchase cost of £790. Albany had a leak of 500g over 24 hours, annualised to 183kg. This represents 22% of the 830kg annual N2O cylinder. The presented method enables cheap, rapid and reliable detection and quantification of N2O leaks. Significant leaks were discovered in both sites. We hope that this will lead to subsequent isolation and rectification of N2O leak, minimising its associated impacts.

Conclusion(s): The presented method enables cheap, rapid and reliable detection and quantification of N2O leaks, deserving of rectification due to both environmental and financial costs. The systemic nature of N2O leak in hospital systems warrants additional testing to ensure pipelines are adequately sealed.

References:
21AP01-12

The evaluation of the knowledge and awareness of the effects of anesthetic gases on global warming in anesthesiologist

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Background and Goal of Study: Currently it is proven that climate changes are occurring due to the greenhouse effect. Anesthetic gases with known harmful effects are intensely used by anesthesiologists (1,2). In our study, we aimed to assess the knowledge and awareness about the greenhouse effect of anesthetic gases among anesthesia professionals.

Materials and Methods: Number of approval for ethics committee: 3843-GOA. During the study, Questionnaires containing 16 questions and demographic data were sent to all anesthesiologists in the country and their answers were recorded.

Results and Discussion: 244 anesthesiologists participated in our study. 110 (45%) of the participants were male, with an average age age of 43.90±8.30; 134 (54.9%) were women. The average number of years that anesthesiologists have been working as doctors for an average of 19.62±8.21 years is 12.86±8.58 years. The average number of actively working halls in hospitals varies between 4-25 (average 15.00±10.74). The rates of answers given to the questions asked are shown in Table 1.

The answers given by anesthesiologists to the questions regarding the recycling issue are summarized in Table 2.

Conclusion(s):
1. Of participants 60% stated that they wished to receive training about this topic.
2. It will be appropriate to organize seminars about this topic during medical education programs.
3. Knowing about the greenhouse effects of anesthetic gases will contribute to awareness and knowledge of these interactions and as a result, this will have an important place in protecting public health.
4. Management of total intravenous anaesthesia may instead volatile anesthetics for the appropriate patients.

References:

Keywords: Global warming

21AP01-13

Does informing about green anesthesia preoperatively affect the patient’s preference of anesthesia type? A pilot study

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Background and Goal of Study: Collaboration between patients and healthcare providers is vital for fostering sustainability in operating rooms and promoting environmental consciousness. We hypothesized that incorporating information about green anesthesia in preoperative patient interviews could potentially impact the choice of anesthesia.

Our aim was to assess whether highlighting green anesthesia initiatives during preoperative discussions would alter anesthesia preferences.

Materials and Methods: This study was performed on fifteen patients who had both regional and general anesthesia alternatives for urological procedures. All patients were given additional information emphasizing the environmental aspects of two different anesthesia methods, including their carbon footprints. Following the provision of informed consent, demographic profiles and educational backgrounds of the patients were documented. The change in anesthetic technique preference of each patient compared to their initial choice after counseling was recorded. Additionally, all participants were requested to evaluate their satisfaction regarding the information provided about the environmental effects of the anesthetic methods.

Results and Discussion: Based on preliminary findings of ongoing study, among the 15 patients, 13 were male (86%). Regarding their educational background, only 2 of them had university degrees. In operating room, the spinal and general anesthesia were preferred in 20% and 80% of the population, respectively. However, after detailed counseling about environmental effects of the anesthetic methods, 4 of the 12 patients (33%) changed their choice of anaesthetic technique. However, due to the limited sample size, a formal statistical analysis to determine significance was not feasible. Despite this limitation, it’s noteworthy that all patients expressed satisfaction with the opportunity to learn about environmentally friendly anesthesia practices during the preoperative discussions.
Conclusion(s): While this initiative represents a modest stride toward sustainability, our findings suggest that incorporating environmental awareness into preoperative patient discussions might not directly alter anesthesia preferences. However, this effort sets a precedent for encouraging similar sustainable policies in healthcare practices.
Development and validation of prediction models for postoperative delirium after noncardiac surgery

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Background and Goal of Study: Postoperative delirium is associated with morbidity and mortality, but the incidence varies widely after surgery. Identification of high-risk patients may ease postoperative screening and facilitate early intervention. Using widely reported predisposing and precipitating factors associated with delirium, we aimed to develop a postoperative delirium prediction models for noncardiac surgery patients.

Materials and Methods: We retrospectively analyzed all adult patients who had noncardiac surgery at the Cleveland Clinic Main Campus from January 2016 to January 2022. We trained and validated two static prediction models and one dynamic delirium prediction model.

For the static models, we used random survival forests and traditional Cox proportional hazard models to predict postoperative delirium from preoperative variables, or from a combination of preoperative and intraoperative variables.

We also used landmark modeling to dynamically predict postoperative delirium using preoperative, intraoperative, and postoperative variables before onset of delirium.

Results and Discussion: Our January 2016 to June 2020 training dataset included 51,677 patients of whom 2,795 patients had delirium. Our July 2020 to January 2022 validation dataset included 14,438 patients of whom 912 patients had delirium.

In the validation analyses, the static random forest model had an overall c-index of 0.84 (95% CI: 0.83, 0.85). The corresponding Cox models had similar discrimination metrics with slightly better calibration. The dynamic model - using all available data, i.e., preoperative, intraoperative and postoperative data - had an overall c-index of 0.84 (95% CI: 0.83, 0.85).

Conclusion: Using preoperative and intraoperative variables, simple static models performed as well as a dynamic delirium prediction model that also included postoperative variables.

Baseline predisposing factors thus appear to contribute far more to delirium after noncardiac surgery than intraoperative or postoperative variables. Improved postoperative data capture may help improve delirium prediction and should be evaluated in future studies.

Association between PACU delirium and postoperative delirium in surgical wards (The CIPOD QI Project)

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¹Tel Aviv Sourasky Medical Center, Anesthesia, Intensive Care and Pain Management, Tel Aviv, Israel

Background and Goal of Study: The ESAIC recommends assessing postoperative delirium (POD) in elderly surgical patients during their stay in the post-anesthesia care unit (PACU). As part of an institutional quality improvement initiative, we routinely screen elderly patients for POD during PACU stay and throughout their postoperative hospitalization.

We aimed to examine the association between PACU-delirium and subsequent delirium in the surgical ward.

Materials and Methods: We conducted a retrospective cohort study in a single, large volume, tertiary center between 2020 and 2021, of patients ≥70 years having elective non-cardiac surgery. PACU-delirium was defined as a positive 4A's test (4AT, score ≥4) during PACU stay.

Ward-delirium was defined as a collapsed composite outcome including a positive 4AT during the initial 2 postoperative days starting after PACU discharge, and/or delirium identification using the Chart-based Delirium Identification Instrument (CHART-DEL) during the entire postoperative stay. The association was evaluated using multivariable regression models, adjusting for potential confounding variables.

Results and Discussion: Out of 2,984 eligible patients, 2,781 (93%) underwent delirium screening in PACU (median age [inter-quartile range, IQR] 76 [73, 81] years). POD screening was conducted on median [IQR] 45 [30, 75] minutes from PACU admission.

Overall, 242 patients (9%) tested positive for PACU-delirium. PACU-delirium was independently associated with subsequent ward-delirium (adjusted odds ratio [aOR] 4.6, 95% confidence interval [CI] 3.1-6.7, p<0.001). PACU-delirium was also independently associated with post-operative 1-year mortality (aOR 17, 95% CI 1.1-2.8, p=0.02).

Conclusion(s): Almost one tenth of elderly patients undergoing elective non-cardiac surgery had positive screening for PACU-delirium, which was associated with recurrence of POD during the postoperative ward stay and with other poor outcomes. Implementation of POD screening using 4AT in PACU enables early identification of high-risk patients, providing an opportunity for early intervention and improved resource management.
**22AP01-04**  
**The association between intraoperative hypotension and postoperative delirium: a retrospective cohort analysis**

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**Background and Goal of Study:** Intraoperative hypotension might contribute to the development of postoperative delirium through inadequate cerebral perfusion. However, evidence regarding the association between intraoperative hypotension and postoperative delirium is equivocal. We therefore tested the hypothesis that in patients >70 years having elective non-cardiac surgery, intraoperative hypotension is associated with postoperative delirium.

**Materials and Methods:** We conducted a retrospective cohort analysis of patients >70 years who underwent elective non-cardiac surgery in a single tertiary academic center between 2020 and 2021. Intraoperative hypotension was quantified as the area under a mean arterial pressure (MAP) threshold of 65 mmHg. Postoperative delirium was defined as a collapsed composite outcome including positive 4A's test during the initial 2 postoperative days, and/or delirium identification using the Chart-based Delirium Identification Instrument.

The association between hypotension and postoperative delirium was assessed using multivariable logistic regression, adjusting for potential confounding variables. Several sensitivity analyses were performed using similar regression models.

**Results and Discussion:** In total, 2352 patients were included (median age 76 years, 1112 (47%) women, 1166 (50%) ASA score≥3, and 698 (31%) having high-risk surgeries). The median [IQR] intraoperative AUC of MAP<65 mmHg was 28 [0,103] mmHgmin. The overall incidence of postoperative delirium was 14% (327/2352). After adjustment for potential confounding variables, hypotension was not associated with postoperative delirium.

Compared to the 1st quartile of AUC of MAP<65 mmHg, patients in the 2nd, 3rd, and 4th quartiles did not have more postoperative delirium, with adjusted odds ratio (aOR) of 0.94 (95% confidence interval CI) 0.64-1.36; P=0.73, 0.95 (0.66-1.36; P=0.78), and 0.95 (0.65-1.36; P=0.78), respectively. Intraoperative hypotension was also not associated with postoperative delirium in any of the sensitivity and sub-group analyses performed.

**Conclusion(s):** To the extent of hypotension observed in our cohort, our results suggest that intraoperative hypotension is not associated with postoperative delirium in elderly patients having elective non-cardiac surgery.

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**22AP01-05**  
**The incidence of cognitive dysfunction after regional anesthesia in elderly patients**

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**Background and Goal of Study:** Postoperative cognitive dysfunction (POCD) is a transient decline in memory, learning, concentration, and information processing speed, which may develop in a postoperative period. The incidence of POCD among the population older than 65 in the first seven days post-surgery ranges from 41-75%. The efforts to prevent this disorder are aimed at avoiding total anesthesia. This study aimed to determine the incidence of POCD after total hip arthroplasty in regional anesthesia.

**Materials and Methods:** The study encompassed 60 participants older than 65. Cognitive evaluation was performed using the Montreal Cognitive Assessment (MoCA) Test. The patients were tested several days before surgery and then four weeks post-surgery. Statistical analysis of the obtained data was performed using a Student T-test and Chi-square test.

**Results and Discussion:** At first testing, 42 patients demonstrated decreased MoCA values. Out of the total participant population, 18 did not manifest preoperative cognitive deficiency. Four weeks post-surgery, the achieved score suggested cognitive dysfunction in 36 (60%) patients, with an average decrease in the number of points being 1-6. Several studies of cognitive dysfunction reported variations in the detection associated with different test types, criteria, and testing times.

**Conclusion(s):** Our study revealed a decline in cognitive function in a significant number of participants. There were no statistically significant differences between the patients who manifested preoperative cognitive dysfunction and those who did not. Moreover, we did not establish any statistically significant differences associated with sex, education level, and geographical background.


**22AP01-06**  
**Dexametomidine as adjuvant to sevoflurane-based general anesthesia in the emergence of post-operative delirium in patients over 65 of age who undergo repair of intertrochanteric fracture**

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¹'G.H.A. “G. Gennimatas”, Anaesthesiology, Athens, Greece

**Background and Goal of Study:** Post-operative delirium is the sudden change in mental function post-operatively. It occurs more often in patients above 65 years of age and increases mortality and morbidity. Prevention is of paramount importance. We studied the effect of dexametomidine as adjuvant to sevo-flurane-based anesthesia in the emergence of post-operative delirium in patients over 65 of age who undergo repair of intertrochanteric fracture.

**Materials and Methods:** 96 patients were included in the study. We included patients over 65 years of age undergoing nailing repair of intertrochanteric fracture. We excluded patients with any form of dementia or pre-existing delirium. We assessed delirium using the Nu-DESC scale, sedation the RASS scale and pain the NRS (0-10) scale. Anesthetic techniques used are described in Table 1.

**Table 1. Anesthetic techniques used**

<table>
<thead>
<tr>
<th>GROUP A (N=46)</th>
<th>GROUP B (N=50)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INDUCTION</strong></td>
<td></td>
</tr>
<tr>
<td>propofol 2mg/kg IV, 50-100mcg</td>
<td>propofol 2mg/kg IV, 50-100mcg</td>
</tr>
<tr>
<td>fentanyl IV</td>
<td>fentanyl IV</td>
</tr>
<tr>
<td>0.6mg/kg rocuronium IV</td>
<td>0.6mg/kg rocuronium IV</td>
</tr>
<tr>
<td><strong>MAINTENANCE</strong></td>
<td></td>
</tr>
<tr>
<td>sevoflurane 0.7 MAC</td>
<td>sevoflurane 0.3-0.4 MAC</td>
</tr>
<tr>
<td>(titrated for PSI values 25-50)</td>
<td>(titrated for PSI values 25-50)</td>
</tr>
<tr>
<td>remifentanil 0.01-0.12 mcg/kg/min</td>
<td>remifentanil 0.01-0.12 mcg/kg/min</td>
</tr>
<tr>
<td><strong>NERVE BLOCK</strong></td>
<td></td>
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<tr>
<td>femoral nerve block (0.5% ropivacaine 15ml with U/S guided technique)</td>
<td>femoral nerve block (0.5% ropivacaine 15ml with U/S guided technique)</td>
</tr>
<tr>
<td><strong>INTRA-OPERATIVE</strong></td>
<td></td>
</tr>
<tr>
<td>paracetamol IV</td>
<td>paracetamol IV</td>
</tr>
<tr>
<td>0.05mg/kg morphine IV, 1gr</td>
<td>0.05mg/kg morphine IV, 1gr</td>
</tr>
</tbody>
</table>

**Table 2. Post-operative delirium emergence (Nu-DESC ≥2)**

Post-operative pain levels, major CVS events requiring intervention (e.g. use of central vasopressors, cardiac arrest) and blood transfusion rates are presented in Table 3. No significant difference is observed.

**Table 3. Post-operative pain levels, major CVS complications requiring intervention and blood transfusion rates.**

<table>
<thead>
<tr>
<th></th>
<th>NRS (MEAN)</th>
<th>NRS (MEAN)</th>
<th>CVS Complications (% N)</th>
<th>Blood Transfusion (% N)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PACU – DAY 0</td>
<td>DAY 1 – 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group A</td>
<td>1</td>
<td>2</td>
<td>17%</td>
<td>53%</td>
</tr>
<tr>
<td>Group B</td>
<td>1</td>
<td>3</td>
<td>14%</td>
<td>55%</td>
</tr>
</tbody>
</table>

**Conclusion(s):** Patients over 65 years of age undergoing nailing repair of intertrochanteric fracture and receive sevoflurane-based general anesthesia have a lower chance of developing early post-operative delirium, when dexametomidine is used as an adjuvant.

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**22AP01-07**  
**Prevalence and complications of potentially inappropriate medication use in the elderly**

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**Background and Goal of Study:** The American Geriatrics Society maintains a list known as the Beers Criteria for potentially inappropriate medications (PIMs) not recommended for use in people over 65 years of age to avoid complications such as postoperative delirium or an increased hospital stay. Our main objective was to describe the prevalence of PIM administration in our hospital and its association with postoperative adverse events.

**Materials and Methods:** Observational study of patients undergoing major surgery at our university and third level hospital from 1997 to 2013. A descriptive analysis of the cohort and a bivariate analysis were performed, the main variables were the administration of PIM and the adverse effects.

Commonly used PIM in the perioperative period were included: Midazolam, dexamethasone, metoclopramide, meperidine, tramadol, atropine, ACE inhibitors, amiodarone, and ibuprofen.

**Results and Discussion:** A sample of 90 patients aged 74.2±7 years, 59 (65%) male and 61% ASA 3. 100% of the patients received at least one PIM being eight PIM the highest number. Midazolam (83.3%), metoclopramide (46.7%) and dexamethasone (43.3%) were the most frequently used. Although the use of PIM was not related to the type of surgery or anesthetic technique used, differences in anesthetic risk were observed and ibuprofen (p=0.001) and tramadol (p=0.007) were avoided in patients with ASA greater than 2. The mean hospital stay was 5.8±7 days and was longer in patients administered midazolam (p=0.004). In contrast to those reported by other authors, our results reflect that the use of PIM was not associated with increased postoperative complications, although our small sample size is a limiting factor.

We observed that the use of these drugs remains a common practice in our hospital, suggesting that anesthesiologists are not familiar with the Beers criteria. A training session on the subject would be beneficial to avoid its administration in future interventions.

In our hospital, anxiety prevention is usually carried out with oral midazolam; however, its use has shown a longer mean hospital stay, suggesting reconsidering its routine premedication adminis-
22AP01-08
Effect of low-dose dexmedetomidine on postoperative delirium in elderly patients undergoing elective major surgery: a prospective, randomized, placebo-controlled, double-blind, clinical study

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Background and Goal of Study: Delirium is defined as a condition characterized by an acute cognitive decline, a fluctuating mental status, disturbance of consciousness, inattention, or disorganized thinking and has a profound impact on postoperative outcomes in surgical patients. We investigated whether prophylactic low-dose dexmedetomidine, a highly selective α2 adrenoceptor agonist, could safely decrease the incidence of delirium in elderly patients after elective major surgery.

Materials and Methods: Sixty elderly patients scheduled for major surgery under general anesthesia were randomly allocated into two groups. In the control group (n=30), patients received normal saline. In the dexmedetomidine group (n=30), patients received dexmedetomidine 0.5 μg/kg over 20 minutes, then continuous infusion at a rate of 0.2 μg/kg/h until the end of surgery. The primary outcome was the number of patients who developed delirium assessed twice daily with the Confusion Assessment of 30 patients; p=0.004. The occurrence of hypotension and tachycardia did not differ between groups.

Results and Discussion: The incidence of postoperative delirium was significantly lower in the dexmedetomidine group (4 [13.3%] of 30 patients) than in the placebo group (9 [30%] of 30 patients; odds ratio [OR] 0.35; 94% CI 0.21-0.50; p=0.0003). The incidence of hypertension was higher with placebo (6 [20%] of 350 patients) than with dexmedetomidine (4 [13.3%] of 30 patients, p=0.002). Tachycardia was also higher in patients given placebo (8 [26.2%] of 30 patients) than in patients given dexmedetomidine (3 [10%] of 30 patients; p=0.004). The occurrence of hypotension and bradycardia did not differ between groups.

Conclusion(s): For elderly patients admitted to the intensive care unit after major surgery, prophylactic intraoperative administration of low-dose dexmedetomidine significantly decreases the occurrence of delirium during the first seven days after surgery.

22AP01-09
Intermittent analysis of an ongoing prospective double blinded randomized control study on opioid-sparing anesthesia in post-operative cognitive dysfunction among elderly patients undergoing laparoscopic surgery

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Background and Goal of Study: Postoperative cognitive decline (POCD) affects up to 40% of non-cardiac surgery patients. Opioids, crucial for anesthesia, raise concerns about cognitive effects, prompting a shift towards opioid-free anesthesia (OFA). Extensive surgeries are linked to delayed neurocognitive recovery, emphasizing the need for exploration. Elderly patients undergoing laparoscopic gastrointestinal surgeries face heightened cognitive risks. Opioid-sparing analgesia need of the hour, using the studies linking cognitive impairment to opioid dosage. OFA, using non-opioid adjuncts, shows feasibility in reducing morphine consumption and improving postoperative well-being.

To compare the incidence of post operative cognitive decline and delirium with opioids and OFA using Addenbrook Cognitive Examination-3 scale and Delirium Rating scale-R-98

Materials and Methods: Preoperatively, cognitive dysfunction and delirium assessed using ACE-3 and DRS-R-98 scale of patients over 60 years undergoing laparoscopic abdominal surgeries and randomised into two groups, in group A, where fentanyl and morphine was used and group B, where lignocaine and dexmedetomidine used intraoperatively, with paracetamol and NSAIDs common in both groups for analgesia. Post operative delirium was assessed twice, immediately and 24 hours post operatively, and POCD assessed 24-48 hours and 30 days post surgery respectively. Intermittent analysis has been done for 50 patients in total, 25 from each group.

Results and Discussion:

<table>
<thead>
<tr>
<th></th>
<th>Group A (N=25)</th>
<th>Group B (N=25)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>68.49±4.94</td>
<td>65.24±6.42</td>
<td>0.116</td>
</tr>
<tr>
<td>DR3 R 96</td>
<td>9.76±7.13</td>
<td>5.64±1.09</td>
<td>0.061</td>
</tr>
<tr>
<td>DR3 R-96 hr post ep</td>
<td>2.06±4.5</td>
<td>2.12±3.69</td>
<td>0.120</td>
</tr>
<tr>
<td>ACE3 24-48 hrs post ep</td>
<td>84.88±6.77</td>
<td>88.8±4.11</td>
<td>0.006</td>
</tr>
<tr>
<td>ACE3 30 days post ep</td>
<td>89.8±7.05</td>
<td>91.56±4.24</td>
<td>0.003</td>
</tr>
</tbody>
</table>

Conclusion(s): Opioids and opioid sparing anesthesia shows no significant difference in post operative delirium whereas the latter has shown a significant difference in post operative cognitive dysfunction. Further studies need to be done on larger populations to imply the cognitive effects of opioids in anesthesia.

Reference:

Acknowledgements: I am grateful to my guide Dr Puneet, parents and my wife Dr Keerthi for guiding me throughout the process.
EEG markers for POCD risk assessment and rehabilitation

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Background: Postoperative neurocognitive cognitive decline (POCD) occurs in up to 30% of elderly patients undergoing surgery. It is diagnosed by reduced postoperative performance in cognitive tests. The test performance can be affected by both cognitive effort and stress effect. Cognitive effort is the allocation of mental resources to a task. Too little cognitive effort can lead to an underestimation of cognitive abilities. Motivation and volition, are considered as major factors influencing cognitive effort. Too much stress can also mask cognitive performance. Despite the significant impact of cognitive effort and stress effect, they are difficult to assess.

Over the years, we have developed, single-channel, real-time EEG markers for cognitive effort (Cognitive Effort Index, “CEI”) and task-related stress (Tension Index, “TensI”). Here, we aim to evaluate the impact of pre- and postoperative cognitive effort and stress effect (measured by CEI and TensI) on POCD diagnosis.

Methods: Adult patients who underwent elective cardiac surgery at Rambam Center in 2021-2022 were recruited. Their evaluation involved EEG recording and analyzing CEI and TensI, during Montreal Cognitive Assessment (MoCA) test, both before and after surgery on discharge.

EEG markers – CEI assesses mainly delta activity and was described previously. TensI is based on real-time changes in higher beta activity, measured relative to a baseline level extracted from periods of effective sustained attention.

Results: A total of 117 patients were evaluated; 17 had a preoperative MoCA score in the normal range (≥26), 69 had a MoCA score in the mild cognitive impairment range (MCI, 21-25), and 31 had a MoCA score in the dementia range (≤20). The major findings were that (1) MCI patients who develop POCD exhibit significantly higher CEI during the preoperative MoCA, (2) MCI patients who develop POCD exhibit significantly higher TensI during the postoperative cognitive MoCA; (3) Reduction of postoperative task-related stress leads to swift improvement in cognition.

Conclusions: 1. MCI patients who rely on high cognitive effort during the preoperative assessment, are at greater risk of suffering POCD; 2. High stress level during the postoperative assessment is associated with POCD, and might be rehabilitated swiftly; 3. Objective monitoring of cognitive effort and stress effect could help prevent misdiagnoses of cognitive abilities that may be masked by reduced effort or enhanced stress effect.

Four preoperative phenotypes of physical frailty and cognitive impairment

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Background and Goal of Study: The ESAIC recommends preoperative evaluation of cognition & frailty for adults (IB). (DeHert et al, 2018).

The Mini-Cog is a validated tool for cognitive screening ≥age 65. (Borson et al. 2002). The Clinical Frailty Scale (CFS) is a validated tool for frailty screening ≥age 65. (Rockwood et al. 2008).

Since 2022, all elective surgical patients aged≥70 have been screened using the Mini-Cog & CFS as a pre-anesthesia evaluation in the Tel-Aviv Medical Center, Israel. In this study, we propose a four-phenotype approach based on both tests to predict a patient’s risk for POD.

Materials and Methods: A retrospective single-center cohort study was conducted between January 2022 and November 2023.

All elective non-cardiac / cranial surgical patients ≥70 years old without documented dementia were included. The pre-anesthesia clinic team screened patients for cognitive impairment using the Mini-Cog test, and for frailty using the CFS. The post-anesthesia care unit (PACU) nursing team screened all patients for delirium using the 4A’s Test (4AT) starting one-hour from admission.

During the first and second postoperative days, interns screened patients in the wards for subsequent delirium events using the 4AT.

We divided the patients into four phenotypes according to their pre-anesthesia screening results - phenotype-1 (P-1) cognitive intact (Mini-Cog≥3) & non-frail (CFS<=3), P-2: cognitive intact & frail (CFS>3), P-3: cognitive impaired & non-frail, and P-4: cognitive impaired & frail (double hit).

Postoperative delirium was defined as a 4AT test score ≥4 during PACU stay and onto the 2nd postoperative day.

Results and Discussion: Of 4,092 eligible patients, 65% (2,646) were screened for all required tests (Mini-Cog, CFS, 4AT) and included in the study. P-1 was the largest, with 58% of the patients (1,538), P-2 at 23% (605), P-3 at 11% (287), and P-4 at 8% (216). The P-4 group is at the highest risk for delirium (22%) with 95% CI OR=3.5 (2.4-5.3). On the other hand, P-1 is the lowest risk (5%) OR=0.3 (0.2-0.4).

The P-2 - P-3 groups have similar delirium risk (12-13%) OR=1.5 (1.1-2.2) and OR=1.6 (1.1-2.4), respectively.

Conclusion(s): The 2-minute frailty and cognitive assessments were feasible and practical within the context of pre-anesthesia clinic visit by non-geriatricians. “The Four-Phenotypes” highlight patients at the highest risk for delirium and at whom intervention should be aimed.
22AP02-03
The smell of frailty? Association between preoperative olfactory dysfunction (OD) and poor postoperative outcome in older patients: preliminary findings of a prospective observational study

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Background and Goal of Study: Previous studies have suggested that preoperative OD may be associated with increased morbidity and mortality after surgery in older patients. We aimed to further explore this link and the potential underpinning mechanisms, including frailty.

Materials and Methods: In a prospective observational study, we have included 185 patients aged 65+ scheduled for elective lower limb revascularization surgery or orthopedic procedures under general anesthesia.

We assessed preoperative olfactory function with the Sniffin’ Sticks extended test which provides a composite olfactory TDI score (measuring Threshold, Discrimination, and Identification modalities).

Patients were categorized as normosmic (TDI score >30.5/48), hyposmic (≤16.5 and ≤30.5), or anosmic (<16.5). We collected 1-year outcome data using the Clavien-Dindo classification, considering class II to V complications as poor outcome.

Frailty was assessed with the Edmonton Frail Scale (EFS) and baseline cognition with the MoCA score. Statistical analyses were carried out with chi-square tests and multivariable binary logistic regression models (age and sex-adjusted).

Results and Discussion: At 1 year, 48 (26%) patients developed a postoperative complication and 3 (1.6%) died. Normosmic patients had a significantly better outcome (p=0.003), with a 4-fold difference in complications and mortality compared to anosmic patients (10.6% vs. 46.2%) (Fig.1).

A 1-point decrease in the olfactory TDI score resulted in an 11% higher probability of a poorer outcome in regression analysis (OR:1.11, 95%CI 1.04-1.18, p=0.001). The association remained significant in models involving the type of surgery (OR:1.10, 95%CI 1.03-1.17, p=0.002) or the Charlson comorbidity index (OR:1.10, 95%CI 1.03-1.17, p=0.003). The analyses adjusting for the MoCA score (OR:1.09, 95%CI 1.03-1.17, p=0.005) or for the EFS score (OR:1.08, 95%CI 1.02-1.15, p=0.012) had greater impacts on the models.

Conclusion(s): Our initial findings show a strong, dose-dependent association between OD and poor postsurgical outcome in older patients. We also provide new evidence for the role of brain and physical frailty in this relationship.

22AP02-05
Frailty in hip fracture patients treated with surgery; the role of simple inflammatory biomarkers. Preliminary results from an observational study

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Background and Goal of Study: Frailty (F) is a prevalent syndrome among elderly patient with hip fractures (HF) and has been linked to poor prognosis. Inflammatory biomarkers have been used as prognostic indexes in patients with HF. We ought to investigate if HF patients suffering from F have higher inflammatory burden according to simple inflammatory biomarkers.

Materials and Methods: Consecutive HF patients treated with surgery during 2023 were included. Inclusion criteria were; age >65 years, ASA PS I-III, non-institutionalized, able to communicate patients. Patients with severe cognitive dysfunction, those treated conservatively, those with pathological fractures and patients who refused to participate were excluded. Demographics and time to surgery were recorded. Frailty was categorized based on the validated Groningen Frailty Indicator (GFI) as non-frail (NF, score 0), pre-frail (PF, score 2, 3) and severe frail (SF, score >4).

Upon admission and immediate before surgery upper limits of white blood cells (WBC) within normal range (WBC >8 10^3/μL), NLR (neutrophils/lymphocytes), PLR (platelets/lymphocytes), CRP (C-reactive protein), were recorded. Continuous variables were assessed with the student’s t-test and the Post-hoc analysis and Bonferroni correction. P-values <.05 were considered significant. Data were analyzed using the Statistical Package for the Social Sciences (SPSS) (version 28.0, IBM, Armonk, USA).

Results and Discussion: Forty patients, mostly females (88%) with a mean age of 78 (±7.7) were included. According to GFI, only nine patients were non-frail (22.5%). Almost half patients suffered from severe frailty (n=19, 47%), while twelve patients from pre-frail (30%). Mean time to surgery was 2.5 days and did not differ between different frailty groups. Although non statistically significant, on admission SF and PF group had higher WBC values (14 and 10 vs 6 10^3/μL), NLR values (9.2 and 7.8 vs 5.7) and PLR values (257 and 205 vs 166), when compared to NF, respectively. Accordingly, before surgery SF group had higher CRP values (5.9 vs 3.7 mg/L) and higher CLR values (6.1 vs 2.9) when compared to NF, respectively.
Conclusion(s): Our preliminary data show that the majority of elderly patients with HF suffered from frailty. These patients presented with a higher inflammatory burden, according to simple biomarkers.

### 22AP02-07

**Association between preoperative biomarkers and postoperative morbidity of elderly patients undergoing spine surgery: retrospective cohort study**

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**Background and Goal of Study:** Spine surgeries for degenerative diseases are increasing as the population ages. If the occurrence of morbidity in elderly patients undergoing spinal surgery can be predicted at the preoperative stage, the quality of recovery and outcome can be improved through intensive monitoring and management for high-risk patients.

We aimed to determine preoperative biomarkers that may predict postoperative outcomes in these elderly patients.

**Materials and Methods:** Data were collected from the electronic medical records of patients aged 70 years or older who underwent spine surgery at the department of spine neurosurgery for 2-year period. Patients were categorized into two groups depending on whether they had 1-year morbidity or not. Univariate and multivariate regression tests were performed to identify variables affecting the postoperative 1-year morbidity; variables with p-values < 0.05 were further subjected to multivariate analysis, following which odds ratio (OR) and the associated 95% confidence interval (CI) were calculated.

We also conducted propensity score matching analysis for sensitivity test to assess the robustness of our findings regarding the association between variables and 1-year morbidity, and conditional logistic regression analyses were additionally adjusted for several confounding factors.

**Results and Discussion:** Ultimately, Data from 1,092 patients were analyzed. A total of 359 patients (32.9%) had the 1-year morbidity after undergoing spine surgery. The higher albumin level as well as total protein, the lower a risk of postoperative 1-year morbidity after undergoing spine surgery. The higher albumin level as well as total protein, the lower a risk of postoperative 1-year morbidity after undergoing spine surgery. The higher albumin level as well as total protein, the lower a risk of postoperative 1-year morbidity after undergoing spine surgery.

The reduction of 1-year morbidity in elderly patients undergoing spine surgeries was expected through preoperative correction of albumin and total protein levels.

<table>
<thead>
<tr>
<th>Univariate analysis</th>
<th>Odds ratio (95% Confidence Interval)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPT</td>
<td>1.014 (1.004-1.024)</td>
<td>0.008</td>
</tr>
<tr>
<td>NLR</td>
<td>1.096 (1.028-1.168)</td>
<td>0.005</td>
</tr>
<tr>
<td>C-Reactive Protein</td>
<td>1.011 (1.001-1.021)</td>
<td>0.026</td>
</tr>
<tr>
<td>Albumin</td>
<td>0.445 (0.310-0.640)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Total protein</td>
<td>0.623 (0.488-0.797)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Table 1. Conditional logistic regression analysis

**Conclusion:** The reduction of 1-year morbidity in elderly patients undergoing spine surgeries was expected through preoperative correction of albumin and total protein levels.

### 22AP02-08

**Systemic inflammation index as a prognosis biomarker after radical cystectomy**

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**Background and Goal of Study:** An excessive systemic proinflammatory state increases the risk of tumor progression in cancer patients. However, there is uncertainty regarding whether specific inflammation biomarkers can affect 90-day outcomes in the surgical setting.

We aimed to investigate the potential prognostic value of systemic immune-inflammation index (SII) in patients after radical cystectomy.

**Materials and Methods:** A retrospective observational study using data from a prospective filled up database was performed. The analysis encompassed preoperative characteristics, operative factors, and postoperative outcomes. All patients underwent prehabilitation including home physical exercise and nutritional advice/support.

Univariable and multivariable logistic regression models were used to identify independent predictors of 90-day major complications, defined by a Clavien-Dindo grade >3 (primary outcome); 90-day hospital readmission and 90-day mortality (secondary outcomes). Predictors to be included in the multivariable model were selected based on univariable analysis (p < 0.05 or suggestive, i.e. p < 0.10).

**Results and Discussion:** A total of 220 patients were included in the analysis. Seven (3.2%) patients had 90-day major complications, 84 (38%) were readmitted to hospital and 3 (1.4%) died within 90 days of cystectomy. SII was identified as an independent predictor of 90-day major complications (p=0.04), together with body mass index (BMI) (p=0.01), and intraoperative blood loss (p=0.02). SII (p=0.01) predicted also 90-day hospital readmission together with BMI (p=0.03). SII was only associated with 90-day mortality (p=0.01) but was not an independent predictor in the multivariable analysis (p=0.05).

**Conclusion(s):** SII predicted 90-day major complications and hospital readmission after radical cystectomy. This supports that formal incorporation of pre-operative SII calculation improves team-based decision making.

**Reference:**
Mortality predictors in elderly frail patients under emergency major abdominal surgery

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Background and Goal of Study: Elderly frail patients under emergency major abdominal surgery had a higher complications and mortality according to evidence. Previously published metaanalysis showed that only emergency surgery is an independent mortality predictor in these patients. For this reason, we aimed to described mortality predictors in elderly frail patients under emergency major abdominal surgery for potentially improved its perioperative management.

Materials and Methods: We retrospectively reviewed medical records of patients older than 80 years old underwent emergency major abdominal surgery in Infanta Leonor University Hospital. Age, sex, history of high blood pressure, diabetes, vascular disease, cognitive disorders, chronic pulmonary and kidney disease, ASA score, frailty score, Bartel score, type of emergency surgery (exploratory laparotomy or laparoscopic approach, primary anastomosis, colostomy or ileostomy), time between begin of symptoms and surgery, sepsis, septic shock, lactic acid higher than 2, coagulopathy (INR higher than 1.5), length of surgery, need to vasopressor treatment, hemorrhage requiring blood products transfusion, fluid resuscitation volumes, urine output, anesthesia type, Intensive Care and hospital length of stay, complications (hemodynamic, pulmonary, kidney, thrombosis and hemorrhage), need to reintervention, mortality at 30 days and 1 year, Bartel score at discharge and 1 year later was include. Multivariate analysis was performed to describe mortality predictors using SPSS software. p value less than 0.05 was considered statistically significant.

Results and Discussion: 52 patients were included. We found that age higher than 85 years old, ASA IV, time between begin of symptoms and surgery higher than 2 days, vasopressor treatment using norepinephrine, primary anastomosis, acute kidney failure and need to reintervention were mortality predictors (p < 0.01). Based in our results, older patients under emergency surgery with hemodynamic instability requiring vasopressor therapy, acute kidney failure and primary anastomosis leak are targeting population to improve results.

The use of minimal invasive hemodynamic monitoring showed a mild but not statistically significant mortality reduction but little size sample of our study warrants further investigation.

Poor postoperative outcomes after non-palliative surgery in octogenarians and nonagenarians – beyond crude morbidity and mortality

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Background and Goal of Study: Most studies evaluating surgical outcomes in the elderly focus on postoperative mortality, overlooking more holistic patient-centered aspects. In a retrospective trial, we assessed the incidence of a broader definition of poor postoperative outcomes by utilizing the patient-centered tool Days Alive and Out-of-Hospital during the initial 90 postoperative days (DAOH) among patients ≥80 years having non-palliative surgery.

Materials and Methods: We analyzed data from patients ≥80 years having non-cardiac surgery in a single tertiary academic center from January 2017 to July 2021. Palliative procedures were excluded. The primary outcome was DAOH ≤45 days. Mortality within 90 postoperative days was scored as DAOH =0. Multivariable logistic regression models were used to identify independent risk factors for DAOH ≤45. Multiple imputations were used to address missing data.

Results and Discussion: Among 3,683 included patients (median [IQR] age 84 [82, 87] years, 52% women, 66% with ASA score ≥3), 640 patients (17%) had DAOH ≤45 days. The most significant risk factor for DAOH ≤45 was surgical urgency, with an adjusted odds ratio of 2.42 (95% CI 1.97-2.98). Other surgical factors and patients’ comorbidities were also independently associated with the primary outcome.

Conclusion(s): Octogenarians and nonagenarians have a non-trivial rate of poor postoperative outcomes, reflected by DAOH ≤45 days. Several baseline comorbidities and surgical factors are associated with an even greater risk. DAOH is an appealing patient-centered tool that can possibly overcome the limitations of postoperative mortality as a sole measure of poor postoperative outcomes and aid perioperative physicians when advising patients and families regarding the harm-benefit balance of surgery in extreme ages.
Effect of two different intraoperative inspired oxygen concentrations on postoperative pulmonary atelectasis in geriatric patients undergoing elective surgery under general anaesthesia: a randomized control trial

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Background and Goal of Study: Intraoperative high FiO2 can have harmful effects on lung physiology and increase the chances of postoperative pulmonary complications. However, High FiO2 is beneficial in reducing the incidence of PONV and SSI. Aging decreases pharyngeal muscle tone, lung compliance & response to hypoxia making the geriatric population prone to atelectasis and PPC. The present study was planned to study the effect of two different intraoperative FiO2 on postoperative pulmonary atelectasis in geriatric patients undergoing elective surgery.

Materials and Methods: Fifty patients >60 years of age being operated under GA were randomly divided into two groups of 25 each using computer-generated random number tables. GroupI received FiO2 0.3 and GroupII received FiO2 0.8. The patients were ventilated using LPV with a TV of 6-8 ml/kg & PEEP of 5. Postoperatively CT thorax was done to assess the incidence and severity of postoperative atelectasis within 24h after surgery. PaO2 was noted in all patients before preoxygenation, and postoperatively at 1-h, 6-h, and 12-h. The incidence of PONV was compared till 24h postoperatively and SSI was compared at postoperative day 5 in all patients.

The requirement of postoperative respiratory support (oxygen supplementation/ mechanical ventilation) and the incidence of postoperative pneumonia at day 3 were also compared in the two groups.

Results and Discussion: The incidence of atelectasis (mean ±IQR) in GroupI & GroupII was 1.40(1.20-1.7) & 1.45(1.20-1.75) respectively, and the difference was statistically insignificant. The gaseous exchange at different time intervals, and incidence of PONV, SSI or pneumonia were similar in both groups. No PPC, requirement of oxygen or MV was seen in any of the patients of either group.

Conclusion(s): No difference between lower (30%) and higher (80%) FiO2 was seen in terms of postoperative atelectasis, gaseous exchange, PPC, PONV and SSI. We conclude that intraoperative inspired oxygen concentration had no significant effect on postoperative atelectasis in geriatric patients posted for elective surgeries. High FiO2 can be safely administrated to geriatric population without the added risk of PPC.

None of the patients in either Group experienced PONV, SSI suggesting a weak association of hyperoxia in preventing PONV & SSI.

A care bundle for elderly patients undergoing emergency laparotomy reduces 30-day mortality

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Background and Goal of Study: The risk of complications and mortality is high in elderly patients undergoing emergency laparotomy and there is a need to improve the care. Therefore, we prospectively evaluated whether a prespecified perioperative care bundle developed by surgeons, anaesthetists, intensivists, and geriatricians for elderly patients undergoing emergency laparotomy improved 30-day mortality.

The results were compared with a historical cohort of the same patient group, using 30-day mortality as the primary endpoint.

Materials and Methods: Inclusion criteria: Patients ≥ 75 years undergoing emergency laparotomy. Exclusion criteria were vascular surgery, previously known inoperable gastrointestinal malignancy, laparoscopic appendectomy, or hernioplasty.

The core elements of the care bundle were preoperative communication between the surgeon and anesthetist, frailty assessment, perioperative specialist involvement, perioperative fluid therapy and blood pressure management plans, and anesthetic depth monitoring. For the frailest patients, palliative care instead of surgery was an option.

Results and Discussion: Intervention group: Of the 210 screened patients between January 2020 and April 2021, 154 were included.

Control group: Of the 266 screened patients treated between January 2016 and December 2017, 170 were included.

There were no significant differences in ASA class, age, or comorbidities between the groups. Postoperatively, the 30-day mortality was significantly lower in the intervention group (13%) than in the control group (22%; p = 0.04; Figure I).

Figure 1: 30-day mortality

Pulmonary complications (intervention group, 44%; control group, 69%; p=0.001), gastrointestinal complications (intervention group, 39%; control group, 52%; p=0.02), and median length of stay (intervention group 10 [IQR 7-15], control group 11 [IQR 8-17] days,
22AP03-06
Comparison of analgesic efficacy of intraperitoneal administration of dexamethasone versus bupivacaine in elderly patients after laparoscopic cholecystectomy - a prospective randomized controlled, double-blind study

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Background and Goal of Study: While laparoscopic cholecystectomy offers several advantages, such as quick recovery and a reduced hospital stay, there is still a significant occurrence of issues like postoperative nausea and vomiting (PONV) and postoperative pain (POP). In elderly patients, these surgeries require additional precautions due to their increased risk of hemodynamic instability post-anesthesia, stemming from reduced cardiac reserve and sympathetic tone.

We planned this randomized, double-blind clinical trial with the primary goal of comparing the effectiveness of intra-peritoneal dexamethasone versus bupivacaine for pain relief after surgery in elderly patients undergoing laparoscopic cholecystectomy.

Materials and Methods: After approval from the institutional ethics committee, this prospective, randomized, double-blind clinical trial was conducted on a study population of 60 patients, more than 60 years of age, scheduled for laparoscopic cholecystectomy and randomized into two groups: group (D) (received 40 mL:36 ml saline and 4 ml solution containing 16mg dexamethasone), and bupivacaine group (B) (received 40 mL of 0.25% bupivacaine intra-peritoneally).

The patients were followed for postoperative analgesia, comparing time to the first rescue analgesic, total rescue analgesic dose, and the time points. This prolonged analgesic effect can be attributed to steroids’ ability to decrease pain through their anti-inflammatory property.

The mean (SD) time for the requirement of the first dose of rescue analgesic was significantly more in the D group (408.7 [252.0] min) compared to the B group (207.3 [206.8] min) with a mean difference of 188.7 (95% confidence interval [CI] 75.3,320) min, P = 0.002.

Conclusion(s): Intraperitoneal instillation of 16 mg dexamethasone in elderly patients during laparoscopic cholecystectomy significantly reduces postoperative pain and requirement of rescue analgesic compared to 0.25% bupivacaine alone.

22AP03-08
Peripheral nerve block under dexmedetomidine and propofol sedation for intertrochanteric femur fracture in a 99-year-old patient: a case report

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Background: Hip fractures are the commonest cause for emergency surgery amongst elderly people. Advanced age, comorbid frailty and frailty of these patients increase the perioperative morbidity and mortality.

Case Report: A 99-year-old man (62kg, 170cm, ASA-PS IV) was admitted to hospital due to intertrochanteric fracture of the right femur. He had a history of arterial hypertension, severe aortic stenosis (AVA 0.4 cm2), moderate pulmonary hypertension (RVSP 60mmHg) with EF 60%, prostatic hyperplasia and dementia. Open reduction and internal fixation was performed. The anaesthetic method included ultrasound-guided femoral nerve block (20 ml of ropivacaine 0.5%) and lateral femoral cutaneous nerve block (10ml of ropivacaine 0.5% under dexmedetomidine (0.2 mcg/kg/h) and propofol sedation (30mcg/kg/min). Except for standard ASA monitoring, we inserted a radial arterial catheter for direct pressure monitoring and nasal capnography. The Observer’s Assessment of Alertness/Sedation scale was used in order to assess the sedation level. Intraoperatively, 1 unit of PRBC was transfused due to Hb=8 gr/dl. Throughout the surgery the patient was breathing spontaneously and he was hemodynamically stable. After surgery, the patient was transferred to the orthopaedic ward and had an uncomplicated recovery.

Discussion: Anaesthetic options for hip fracture repair include general and neuraxial anaesthesia. This case was a challenge, because both general and neuraxial anaesthesia had potential catastrophic complications for a super-old patient.

We avoided neuraxial anaesthesia due to severe aortic stenosis and did not opt for general anaesthesia either, due to potential respiratory, hemodynamic and cognitive complications. The case of a 97-year-old patient who underwent ORIF with PNB under dexmedetomidine has been reported1.

In our case, we added propofol infusion, in order to increase the sedation level and alleviate the patient's anxiety. Close monitoring for respiratory and hemodynamic stability was performed


Learning points: This 99-year-old patient had severe cardiovascular disease and dementia. Opting for a PNB under dexmedetomidine and propofol sedation provided safety and excellent surgical anaesthesia for intertrochanteric fracture fixation.
Urgent surgery under dexmedetomidine-ketamine-alfentanil sedation: a case series

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Background: Urgent surgical cases bring anesthetic challenges. We present three cases in which dexmedetomidine-ketamine-alfentanil sedation was employed due to medical risk factors and unsuitability for airway management and neuraxial anesthesia.

Case report: A 91-year-old woman with a past ischemic stroke, ongoing use of clopidogrel, and difficult airway stigmas underwent surgery for a trochanteric fracture. A dexmedetomidine perfusion was started at 0.2µg/kg/h, while a femoral and lateral cutaneous nerve block with ropivacaine 0.5% was performed. The infusion rate was adjusted up to 1.2 and she was given 0.25mg/kg of ketamine and 4µg/kg of alfentanil before incision. During the hour-long surgery, additional boluses of alfentanil and ketamine were administered.

A 78-year-old obese woman with sleep apnea and cirrhotic liver disease with coagulation abnormalities underwent surgical correction for an incarcerated umbilical hernia. Dexmedetomidine infusion was initiated at 0.2µg/kg/h and a bolus of 0.25mg/kg of ketamine and 4µg/kg of alfentanil were given. Local anesthesia with lidocaine 2% and ropivacaine 0.75% was injected. Perfusion was adjusted up to 0.9µg/kg/h and additional boluses of ketamine and alfentanil were given as needed during the hour-long surgery.

An 80-year-old frail man with COPD, dementia, and uncontrolled DM 2 underwent surgery for a stump infection after a lower limb amputation. 15 minutes before incision, a dexmedetomidine infusion was started at 0.7µg/kg/h and titrated until 1 µg/kg/h. During the hour-long surgery, boluses of 4µg/kg of alfentanil and 0.25mg/kg of ketamine were administered as needed.

All three patients had no response to vocal or painful stimuli. Hemodynamic stability and spontaneous ventilation were maintained and no respiratory depression was experienced.

Discussion: When using dexmedetomidine, ketamine, and alfentanil together, it is possible to achieve deep sedation and analgesia. The appropriate dose of each drug creates safe surgical conditions while providing hemodynamic stability and no respiratory depression.

Reference:

Learning points: Dexmedetomidine-ketamine-alfentanil sedation can be a successful alternative to general or neuraxial anesthesia in carefully selected cases.
A prospective randomized trial comparing bolus doses of Phenylephrine and Noradrenaline for treating maternal hypotension during cesarean section

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Background and Goal of Study: Maternal hypotension is a common and harmful complication during cesarean delivery after subarachnoid block. The objectives of this study were to evaluate the total bolus dose requirement of Noradrenaline and phenylephrine in treating maternal hypotension following spinal anesthesia during C-section, to compare the hemodynamics and to compare the effects of these vasopressors on neonatal APGAR score.

Materials and Methods: A total of 72 patients were randomly assigned to two groups. Group A received Noradrenaline 4 mcg and Group B received 50 mcg of phenylephrine if hypotension occurred, defined as > 20% fall in Systolic blood pressure [SBP] from the baseline. Non-invasive Blood pressure and heart rate were measured regularly, and intraoperative hypotension was treated with the same rescue doses of vasopressors for both groups. All patients underwent spinal anesthesia with Bupivacaine heavy 12 mg.

Results and Discussion: In most follow-ups, Group B exhibited a higher systolic blood pressure (SBP) than Group A, (p < 0.05 after four minutes). Meanwhile, the mean heart rate of Group B decreased throughout the follow-up period, (p < 0.05 after two minutes). At one minute, children in both groups had a moderate APGAR score of 4-6, (p-value > 0.05). However, by the fifth minute, all children in Group A and most in Group B had a moderate APGAR score of 7-9 (p =0.3139). Additionally, Group B, which used phenylephrine, required fewer boluses than Group A, (p <0.0001).

Conclusion(s): Noradrenaline is just as effective as phenylephrine for treating maternal hypotension during Caesarean section with a lower incidence of heart rate reduction. Although it requires more bolus doses, both medications result in comparable maternal and neonatal outcomes.

References:

Acknowledgements: None

A comparative study of optic nerve sheath diameter and lung ultrasound score in healthy and preeclampsia parturients

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Background and Goal of Study: Complications of preeclampsia include cerebral and pulmonary edema which strongly correlate with optic nerve sheath diameter (ONSD) and lung ultrasound score (LUSS) respectively. This study was conducted to compare ONSD and LUSS in healthy and preeclamptic parturients.

Materials and Methods: In this prospective observational analytical study, healthy pregnant women and preeclamptic women, 35 each, age ≥18 years and gestational age ≥34 weeks up to 24 hours of delivery, were included. Approval from institutional ethical committee was obtained and trial registered with clinical trial registry of India. Ultrasound assessment for ONSD and LUSS (12 region lung technique) was performed. Severity of preeclampsia was noted. Data was analysed using appropriate statistical tests. ROC analysis was performed to obtain a cutoff value for both ONSD and LUSS to predict complications of preeclampsia. A p-value of <0.05 was considered significant.

Results and Discussion: Mean ONSD and LUSS were higher in preeclamptic compared to healthy parturients (5.06 ± 0.46 vs 4.24 ± 0.38 mm (p<0.0001)) and [5 (1-12) vs 0 (0-1.5); p value <0.0001], respectively.

Mean ONSD in severe pre-eclampsia (5.36 ± 0.32 mm) was significantly higher as compared to mild pre-eclampsia (4.71 ± 0.35 mm; p<0.0001).

Women with severe preeclampsia had a higher LUSS as compared to the mild preclamptics and healthy parturients. However, no difference in ONSD and LUSS between mild pre-eclampsics and healthy parturients was observed.

A mean ONSD of >4.65 mm and LUSS of >2 could predict preeclampsia with a sensitivity of 77.14% and 68.57% and specificity of 91.43% and 85.71% with an AUC of 0.907 and 0.806 respectively.
**ONSD and LUSS in mild, severe preeclampsia and healthy controls**

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean ONSD (mm)</th>
<th>Mean SD</th>
<th>LUSS score</th>
<th>Median (IQR)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severe pre-eclampsia (n=19)</td>
<td>5.36 ± 0.32</td>
<td>4.71 ± 0.35</td>
<td>4.24 ± 0.38</td>
<td>11 (4.5-16)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Mild pre-eclampsia (n=16)</td>
<td>5.06 ± 0.46</td>
<td>4.24 ± 0.38</td>
<td>&lt;0.0001</td>
<td>1 (0-4.25)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Healthy controls (n=35)</td>
<td>4.24 ± 0.38</td>
<td>0 (0-1.5)</td>
<td>&lt;0.0001</td>
<td>0 (0-1.5)</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

S- Severe pre-eclampsia, M- Mild pre-eclampsia, H- Healthy patients

Table 2: ONSD and LUSS in mild, severe preeclampsia and healthy parturients

**Table 3: Receiver operating characteristic of ONSD and LUSS for predicting pre-eclampsia.**

<table>
<thead>
<tr>
<th>ONSD (mm)</th>
<th>LUSS score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area under the ROC curve (AUC)</td>
<td>0.907</td>
</tr>
<tr>
<td>Standard Error</td>
<td>0.0339</td>
</tr>
<tr>
<td>95% Confidence interval</td>
<td>0.813 to 0.963</td>
</tr>
<tr>
<td>P-value</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Cut off</td>
<td>&gt;4.65</td>
</tr>
<tr>
<td>Sensitivity (95% CI)</td>
<td>77.14% (59.9 - 89.6%)</td>
</tr>
<tr>
<td>Specificity (95% CI)</td>
<td>91.43% (76.9 - 98.2%)</td>
</tr>
<tr>
<td>PPV (95% CI)</td>
<td>90% (73.5 - 97.9%)</td>
</tr>
<tr>
<td>NPV (95% CI)</td>
<td>80% (64.4 - 90.9%)</td>
</tr>
<tr>
<td>Diagnostic accuracy</td>
<td>84.29%</td>
</tr>
</tbody>
</table>

**Conclusion(s):** ONSD and LUSS is an easy, bedside, noninvasive technique to assess complications, guide fluid therapy and monitor response to treatment in preeclamptic parturients. Thus, early intervention can help in reducing maternal/fetal morbidity and mortality.

**References:**

**23AP01-05 Evaluation of Basal rate infusion in intravenous patient-controlled analgesia for post-cesarean section pain management: a randomized pilot study**

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**Background and Goal of Study:** Administering opioids via intravenous patient-controlled analgesia (IV PCA/IVA) is a prevalent approach for managing postoperative pain. Nevertheless, due to concerns about opioid-related side effects and the potential for opioid tolerance, there is a growing emphasis on adopting opioid-sparing techniques for postoperative pain management. We aimed to investigate the effect of adding a basal rate infusion in fentanyl-based IVA following a cesarean section (CS).

**Materials and Methods:** 48 Patients, who received pain management through IVA after CS, were assigned randomly into three groups based on the background rate setting: Group 0 (0 mcg/hour, n = 16), Group 1 (15 mcg/hour, n = 16), and Group 2 (30 mcg/hour, n = 16).

We assessed the impact of the basal infusion rate on opioid consumption and the visual analog scale (VAS) scores during the first 48 hours post-CS and also investigated opioid-induced side effects and the requirement for rescue analgesics in the ward during the first 48 hours after CS.

**Results and Discussion:** In the initial 24 hours following CS, fentanyl consumption significantly increased in Group 2 compared with Group 0 and Group 1 (P = 0.037).

At 24 hours, VAS scores both at rest and during movement, exhibited a tendency to decrease, as the basal rate increased; however, no significant differences were observed between the groups (P = 0.218 and 0.827, respectively).

Between the first 24 and 48 hours post-CS, fentanyl consumption showed a marked increase in both Group 1 and Group 2 compared to Group 0 (P < 0.001).

At 48 hours, the VAS scores at rest displayed a trend towards reduction; however, no significant differences between groups were evident (P = 0.165).

Although the incidence of opioid-induced complications were noted, no statistically significant differences were recorded between groups during the initial 24 hours and subsequent 24-48 hours period (P = 0.556 and P = 0.345, respectively).

**Conclusion(s):** The inclusion of a basal fentanyl infusion in the IVA protocol did not provide any advantages over an IVA devoid of a basal rate infusion in managing acute pain following CS.
23AP01-06
Maternal morbidities and associated predictors following unnecessary general anesthesia for cesarean deliveries

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Background and Goal of Study: Compared with neuraxial anesthesia, women undergoing general anesthesia for cesarean section had a higher risk of adverse outcomes. This study aimed to investigate the potential association between unnecessary general anesthesia and peri-caesarean maternal adverse outcomes and examined risk factors for unnecessary general anesthesia.

Materials and Methods: Women undergoing cesarean delivery were selected from West China Second University Hospital between January 1, 2018 and May 31, 2020. The primary outcome was the risk of composite maternal adverse outcomes, including pulmonary embolism, pulmonary infection, deep vein thrombosis, severe neurological dysfunction, and death, between cesarean section with unnecessary general anesthesia and neuraxial anesthesia. The secondary outcomes were recorded as the length of hospital stay, medical expense, and risk factors for unnecessary general anesthesia. Propensity score-matched analysis was used to compare the odds of maternal morbidities between women receiving general and neuraxial anesthesia.

Univariate and multivariate binary logistic regression were used to identify risk predictors.

Results and Discussion: Totally 17299 parturients delivered with cesarean section were identified, among which 16153 received neuraxial anesthesia and 1146 received unnecessary general anesthesia. Propensity score matching yielded a comparable cohort with 2248 women receiving neuraxial anesthesia and 1139 receiving unnecessary general anesthesia. A significantly higher incidence of composite adverse events was observed among patients receiving unnecessary general anesthesia (1.41%) than neuraxial anesthesia (0.60%), with an odds ratio of overall 2.90 (95% CI=1.34-6.26). Intrathecal cholestasis of pregnancy (OR=1.51, 95%CI=1.01-2.25), abnormal placentia (OR=1.25, 95%CI=1.21-1.31), multiple gestations (OR=1.44, 95%CI=1.02-2.03), fetal distress (OR=1.97, 95%CI=1.35-2.86), cardiovascular disease (OR=2.47, 95%CI=1.42-4.31), unstable hemodynamic (OR=7.17, 95%CI=2.28-22.59), rheumatic diseases (OR=1.52, 95%CI=1.21-1.92), neuropsychiatric disorder (OR=1.69, 95%CI=1.04-2.75) and musculoskeletal disease (OR=1.03, 95%CI=1.01-1.12) were the predictors associated with increased likelihood of unnecessary general anesthesia.

Conclusion(s): Unnecessary general anesthesia is associated with a greater risk of maternal morbidities compared with neuraxial anesthesia.

23AP01-07
The effect of intravenous infusion of tramadol-ondansetron on recovery after caesarean section. A prospective, observational and non-inferiority study against epidural analgesia

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Background: Multimodal analgesia is required to allow the post-partum woman a functional recovery without pain after c-section. Currently, intravenous opioids are not recommended as the first analgesic measure due to their side effects. However, we can achieve analgesia not inferior to epidural with an infusion of tramadol-ondansetron, avoiding the functional limitations of local anesthetics via epidural.

Our primary outcome is to assess the non-inferiority in terms of post-caesarean section recovery of the intravenous perfusion of tramadol + ondansetron(TRON) compared to the perfusion of local anesthetics through an epidural catheter(EPI). This primary outcome is measured with Quality of Recovery score 15 (QoR-15) and Obstetric Quality of Recovery (ObsQoR-10) at 24 hours after cesarean section.

Methods: This is a prospective observational cohort study. The target population is women undergoing cesarean section in the first 24 hours of puerperium. We will include patients who receive TRON or EPI following standard clinical practice after a C-section in the study centre.

We need a total N of 312 patients (156 in each group). The characteristics of the population and the procedure are exposed in Table 1.

Approved by the Ethics Committee “CEIm La Fe” in May 2023. We fitted Bayesian linear models with QoR and ObsQoR score as dependent variables respectively and the analgesia group, i.e. epidural and tramadol, as the main independent variable. We fitted the model with standard skeptical priors from the brms package for R (version 4.0.3).

Results and Discussion: Preliminary data are presented. The posterior distribution showed that tramadol analgesia is associated with a higher mean total QoR 9 [95% Credible interval, CrI, 3-15, probability of effect 99%] and a higher mean total ObsQoR 19 [95%CrI 14-23, probability of effect 100%].

Conclusions with preliminary results: Intravenous tramadol infusion may be non-inferior in the quality of recovery after C-section.
23AP01-09
Impact of interoception on pain and quality of recovery following caesarean delivery

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Background: Quality of recovery following caesarean delivery (CD) is dependent on obstetric and anaesthetic factors, but also influenced by patient related aspects. There is increasing interest in the concept of interoception, which is described as the awareness of the physiological condition of the body. Specifically, interoception describes in what way an individual perceives internal physical sensations such as changes in heartbeat, gastric signals and other inputs. We hypothesized that patients with increased interoceptive awareness experience more pain and a poorer quality of recovery following CD.

Materials and Methods: Following ethical approval, we performed a single-centre observational cohort study between December 2022 and August 2023. Patients who underwent CD under neuraxial anaesthesia were approached approximately 24 hours (range: 18-36) after CD. Exclusion criteria were the inability to fill out a Dutch questionnaire and exceptionally poor maternal or neonatal outcomes. Participants completed the previously validated Obstetric Quality of Recovery (ObsQoR-10) (0-100) questionnaire and the Private Body Consciousness Scale (PBCS) (0-25), which is designed to assess the patients’ level of interoception. PBCS scores in our cohort were compared with a control group consisting of colleagues in the anaesthesia department. Differences between low (PBCS ≤ 15.3) and high (PBCS > 15.3) interoception were assessed using Chi-square test and t-test.

Results and Discussion: We included 78 patients. The level of interoception (PBCS score) was significantly higher in our CD cohort compared to controls; 23.7 ± 7.2 vs 15.3 ± 3.4, p < 0.001. Moderate to severe self-reported pain (numeric rating scale (NRS) > 4) following CD was significantly more frequent in patients with high interoception than in patients with low interoception: 35/40 (87.5%) vs 20/38 (52.6%), p < 0.001. Quality of recovery (ObsQoR-10 score) was significantly poorer in patients with high interoception than in patients with low interoception: 64.2 ± 17.3 vs 70.7 ± 13.8, p = 0.04. Our results suggest that patients with increased interoceptive awareness may benefit from different analgesic strategies and non-pharmacological interventions in order to optimise personalized therapy after CD.

Conclusion: Increased interoceptive awareness is associated with more pain and poorer quality of recovery following caesarean delivery and may therefore be a future marker to tailor anaesthetic management in the individual patient.

23AP01-10
A national audit on the use of regional anaesthesia in the febrile parturient

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Background and Goal of Study: Maternal pyrexia occurs in approximately 3 to 7% of labour cases and can be attributed to various causes. These can be secondary to pregnancy or unrelated to pregnancy. While there is a consensus amongst anaesthetists that localised infection is a contraindication to the insertion of neuraxial anaesthesia, there is insufficient evidence regarding the indication of neuraxial blockade in the present of systemic infection. Currently, the decision relies on an individualised risk-to-benefit discussion with the patient.

The aim of this audit was to determine what the current practice is in Malta and explore variation in practice amongst anaesthetists when faced with this clinical dilemma.

Materials and Methods: A questionnaire was distributed to all members of the anaesthesia department. The responses were collected anonymously over a period of six weeks, and analysed using Microsoft Excel.

Results and Discussion: A total of 106 questionnaires were distributed amongst anaesthetists of varying seniority, with a response rate of 53%. 50% of the respondents reported that they would not perform regional anaesthesia with a CRP between 50 mg/L and 100 mg/L, 82% would refrain from this with a WCC between 20x10⁹/L and 30x10⁹/L, while 36% would avoid this with a lactate of less than 3 mg/dl. This indicates excessively cautious practice, especially since leucocytosis is common in labour. In 80% of respondents, the administration of the first dose of antibiotics in these patients prior to neuraxial anaesthesia did not influence the decision to go ahead with inserting an epidural catheter. However respondents appeared to be more lenient with single short spinals, but this difference was not statistically significant.

Conclusion(s): To date there are no well-established guidelines in the choice of anaesthetic for the febrile parturient. In these cases, management should be based on an individual risk-to-benefit ratio, obstetric indications, urgency, and route of delivery. These results highlight a disproportionate fear amongst anaesthetists when administering regional anaesthesia in the febrile parturient.
23AP02-01
Impact of epidural labour analgesia with low concentration of local anaesthetics on assisted vaginal birth and non-elective caesarean section: a propensity-matched analysis

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Background and Goal of Study: Although obstetrical epidural with low concentrations of local anaesthetics (EA) is currently considered the most effective method of relieving pain associated with childbirth, its impact on the second stage of labour remains debated.

This retrospective study assessed the impact of EA on assisted vaginal birth and non-elective caesarean section in a maternity unit with a large birth cohort.

Materials and Methods: After IRB approval, data of women who gave birth to a full-term singleton pregnancy from 12/2017 to 09/2020 were reviewed using the hospital's computerized medical record. Local protocol for EA included a bolus of 6 mL of ropivacaine 0,2% + sufentanil 5 mcg, followed by a continuous infusion of ropivacaine 0,15% + sufentanil 0,1 mcg/mL.

Patients having received an EA were compared to those who did not. Need for assisted vaginal birth or caesarean section were the 2 co-primary outcomes.

A propensity score was applied based on 23 selected covariates including mother's age, BMI, medical and surgical history, gestation, parity, and gestational age. An absolute standardized difference less than 10-15% was considered to support the assumption of balance between the groups.

The survey R package (software version 4.2.0) was used to perform two by two group comparisons with the help of logistic regressions for binary outcome variables and linear regressions for continuous outcomes. Statistical significance was considered at p<0.025 to consider the 2 co-primary endpoints.

Results and Discussion: Among 4,344 singleton deliveries, 3,627 patients received an EA while 717 other patients had no EA. Second stage of labour was significantly affected using EA (Table). Despite the use of low concentrations of local anaesthetics1, continuous infusion might still be associated with significant motor block.

<table>
<thead>
<tr>
<th>Variable</th>
<th>No epidural (n = 717)</th>
<th>Epidural (n = 3,627)</th>
<th>Adjusted p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assisted vaginal birth</td>
<td>4,51%</td>
<td>17.00%</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Caesarean section</td>
<td>34,65%</td>
<td>6,39%</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Conclusion(s): In the conditions of our study, EA is associated with a higher incidence of assisted vaginal births and a lower incidence of caesarean sections. Application of EA with intermittent boluses instead of continuous infusion might reduce the incidence of assisted vaginal delivery.


23AP02-02
Intravenous patient-controlled remifentanil versus intermittent epidural boluses for labor analgesia: respiratory side-effects

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Background and Goal of Study: Epidural analgesia is a gold standard for labor analgesia, but remifentanil can be a very good alternative. The fear of respiratory side effects is always present when remifentanil is used.

The goal of this study is to compare the respiratory side effects between two different types of labor analgesia.

Materials and Methods: This study included 125 parturients in term, admitted for spontaneous labor. All parturients were primiparous, ASA I or II, divided into two groups.

First group (60 patients) received intravenous remifentanil on PCA pump.

Second group (55 patients) received intermittent epidural boluses.

Our primary outcome was maternal safety, we evaluate pulse oximetry (SpO₂) and respiratory rate continuously during the analgesia. Supplementary oxygen was administered if SpO₂ fell less than 95%.

Results and Discussion: Results are presenting significantly lower SpO₂ in the RG and significantly more respirations per minute in the EG in all time points after the start of analgesia. Mean SpO₂ was 97.02 ± 1.3 in the RG and 98.18 ± 0.7 in the EG (p<0.00001) and the average number of respirations was 17.58 ± 0.9 in the RG and 20.76 ± 1.3 in the EG (p<0.0001). 33 patients (55%) in the RG needed O₂ support, patients on average received oxygen for 75 minutes. No respiratory depression (respiration rate <9 or SpO₂ <90%) was found in both groups.

Conclusion(s): Patients receiving PCA remifentanil for labor analgesia have lower SpO₂ and respiratory rate, without any serious side effects. It could be a viable alternative to epidural analgesia, but continuous monitoring and oxygen supply is mandatory.

23AP02-03
Quantitative and calculated estimated blood loss in caesarean sections: a retrospective comparative analysis between twin and singleton pregnancies

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Background and Goal of Study: Twin pregnancies are known to have a higher risk of postpartum haemorrhage than singletons. There is no consensus for estimating blood loss, and the evaluation may be influenced by the estimation method employed. This study retrospectively evaluated the differences in blood loss patterns between twin and singleton pregnancies undergoing caesarean sections, employing two different estimation methods.
Materials and Methods: We included women with twin or singleton pregnancies of ≥ 34 weeks of gestation who underwent scheduled caesarean sections between May 2019 and October 2023. Blood loss was estimated using two methods: intraoperative quantitative measurements (including amniotic fluid) and calculations using the formula: weight (kg) × 85 × (difference between preoperative and postoperative haematocrit levels)/preoperative haematocrit level.

Welch's t-test was performed for comparison between the two groups, multiple regression for multivariate analysis, and Pearson's correlation coefficient for bivariate relationships.

Results and Discussion: A total of 416 cases were included, comprising 45 twins and 371 singletons. Intraoperative quantitative blood loss was significantly higher in twins compared to singletons (1181 [611] mL vs. 720 [403] mL, p <0.001). There were no significant differences between the two groups in haematocrit-based blood loss on the day following caesarean sections (506 [694] mL vs. 518 [524] mL, p = 0.907). However, on postoperative days 4-5, twins exhibited significantly higher haematocrit-based blood loss than singletons (724 [858] mL vs. 448 [566] mL, p = 0.041). Multiple regression analysis, accounting for age, BMI, placenta previa/low-lying placenta, diabetes, gestational hypertension, and assisted reproductive treatment, confirmed these trends.

In singletons, there was a moderate correlation between intraoperative quantitative blood loss and haematocrit-based blood loss (r = 0.474, p < 0.001), while no significant correlation was found in twins (r = 0.158, p = 0.299).

Conclusion(s): Despite twin pregnancies showing higher intraoperative quantitative blood loss than singletons, haematocrit-based calculations revealed no significant differences in blood loss on the day following caesarean sections. Notably, a continuous decline in haematocrit levels over postoperative days was observed in twin pregnancies, leading to an increased disparity in estimated blood loss compared to singletons.

23AP02-04
‘Rate of change’ in core temperature and shivering during neuraxial blockade for caesarean section

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Background: Shivering is a common, unpleasant side effect of neuraxial blockade.1 During elective caesarean section, it is thought to be a thermoregulatory response to decreased core temperature, triggered by activation of cold-sensitive thermoreceptors.1 Thermoreceptor firing rates are influenced to a greater degree by the ‘rate of change’ in temperature, rather than the ‘absolute’ value.2 This study aimed to establish if ‘rate of change’ in core temperature is a driver of shivering during elective caesarean section.

Methods: Core temperature (SpotOn, 3M Medical, Saint Paul, USA) was recorded continuously in 25 women during elective caesarean section and for one hour afterwards. 5-minutes' baseline data was collected before neuraxial blockade initiation. Women reported shivering intensity, temperature sensation and thermal pleasantness with visual analogue scales at 5-minute intervals. Additionally, a researcher graded shivering intensity with a 5-point scale. Times are expressed relative to neuraxial blockade. Values are mean (SD).

Results: 4 (16%) women received spinal anaesthesia whilst 21 (84%) received combined spinal-epidural anaesthesia. 14 (58%) women shivered. Onset of shivering occurred at 21 (18) min and offset at 60 (34) min. Temperature sensation and thermal pleasantness did not differ from baseline at the onset or the offset of shivering (p >0.05).

Figure 1: Mean (SD) (A) core temperature (Tc), and (B) rate of core temperature change at neuraxial blockade initiation, and the onset and offset of shivering.

*indicates p <0.05. NS = non-significant (p >0.05).

Conclusion: It is implausible that the ‘absolute’ value of core temperature is the only driver of shivering, as core temperature was lower at the offset of shivering than at the onset. ‘Rate of change’ may be an additional driver because at the onset of shivering core temperature was decreasing, whereas at baseline and the offset of shivering core temperature was static.

References:

Acknowledgements: 3M Medical for providing the temperature monitoring system
23AP02-05
A prospective analysis of respiratory depression following intrathecal morphine administration in elective cesarean deliveries

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2Stanford University School of Medicine, Department of Anesthesiology, Perioperative and Pain Medicine, Palo Alto, United States

Background and Goal of Study: Concerns about respiratory depression (RD) after long-acting neuraxial opioids (reported incidence 0-32%) means many women miss out on this optimal post-cesarean delivery analgesia.

Materials and Methods: Prospective observational study examining RD after intrathecal morphine (ITMO) administration in healthy women undergoing planned cesarean delivery. Women could select ultra-low ITMO (50mcg), low dose ITMO (150mcg), or ultrasound-guided Transversus Abdominis Plane (TAP) block. Women received continuous SpO2 heart rate, and respiratory rate (RR) monitoring up to 12 hours postoperatively using Masimo Radius 7 wearable patient monitor, in addition to routine postpartum 2-hourly nursing assessments of RR and/or sedation (if awake no RR was measured). The primary aim was rate of respiratory rate (RR) ≤ 8 breaths/min at any time point. We also report additional postpartum analgesia received, supplemental O2 administration, postoperative airway interventions, naloxone administration, and intensive care unit admission.

Results and Discussion: 80 women were enrolled; 33 chose 50mcg ITMO, 46 chose 150mcg ITMO; 1 chose TAP block (not reported here). Patient characteristics and preoperative vital signs were similar. The bradypnea rates, duration of bradypnea, apnea events, and hypoxemia events were similar for ultra-low ITMO (50mcg) and low-dose ITMO (150mcg), see table. Postpartum analgesia received and numerical pain scores at all time points were similar in both groups. At all-time points postpartum, nursing assessed RR was above 13 bpm and women were awake or easily rousable at all assessed time points. One woman received supplemental O2 in PACU (underwent relaparotomy under general anesthesia). No women required airway interventions, received naloxone, or were admitted to the ICU.

Conclusion(s): Although the continuous respiratory monitor revealed RR ≤ 8 bpm after cesarean delivery regardless of ITMO dose, there were no clinically significant respiratory depression events.

Acknowledgments: The authors thank J. Rozeznik, C. Greenberger, Department of Anesthesiology, Intensive Care and Pain, Tel Aviv Medical Center for their contribution.

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23AP02-06
Audit of prophylactic protocol for accidental dural puncture headache in epidural labor analgesia

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Background and Goal of Study: Our preventive protocol for post-dural puncture headache (PDPH) recommends, after accidental dural puncture (ADP) by catheter, injecting 10 ml of saline solution (SS) intrathecally before its removal. In all ADP cases, the protocol recommends repeating the epidural technique and injecting 20 ml of epidural dextran after delivery, followed by conservative postpartum treatment involving hydration, paracetamol, and NSAIDs. The efficacy of using epidural dextran or intradural SS for preventing PDPH remains uncertain. This audit assesses the effectiveness of the PDPH protocol employing these techniques in pregnant women experiencing ADP during Epidural Labor Analgesia (ELA).

Materials and Methods: We conducted a retrospective analysis, encompassing all pregnant women with ADP during ELA at Hospital del Mar from January 2006 to September 2023. Prospectively recorded variables included PDPH risk factors, the preventive protocol received, PDPH incidence, the need for a Blood Patch (BP), and delayed hospital discharge. As not all women received the complete treatment, we performed a comparative study between those who underwent the entire preventive protocol and those who only received conservative treatment. Statistical analysis utilized DATAtab Team, incorporating descriptive and inferential statistics, including distribution tests for two samples, independence tests, Chi-square tests for categorical variables, and independent samples T-test for quantitative variables. Statistical significance was set at p < 0.05.

Results and Discussion: A total of 179 patients were included, revealing a 61.45% incidence of PDPH, with 5.6% requiring a BP and 10.6% experiencing delayed hospital discharge. Inferential
The Obstetric Patient

The Kaplan-Meier cumulative incidence curve was as shown in the figure, with a hazard ratio of 0.4739 [0.4061 to 0.5529], p<0.01 for the LEA group versus non-LEA group. The hazard ratio excluding cases with negative indications for epidural analgesia was 0.3647 [0.2979 to 0.44464], p<0.01. Even if we assume that 50% of the cases in the non-LEA had negative indications for LEA, the hazard ratio was 0.6519 [0.5683 to 0.7477], p<0.01, a robust result. LEA group and non-LEA group may have different risk profiles, thereby affecting the timing and incidence of cesarean sections. The Kaplan-Meier curve deals with censored data, in this study, that is vaginal delivery, which may affect the shape of the curve.

Since the LEA group has only about 20% of the cases compared to the non-LEA group, the estimates are less stable and may be more sensitive to fluctuations.

Conclusion(s):
On-demand labor epidural analgesia decreases the ratio of emergency cesarean sections.

23AP02-08
Labor epidural analgesia decreased the ratio of emergency cesarean sections in the mature period

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Background and Goal of Study: The existing reports on how labor epidural analgesia (LEA) influences the incidence of emergency Cesarean sections (eCS) are controversial. We hypothesized that the duration since the introduction of LEA at individual facilities have varying impact on the mode of delivery. The aim of this study is to investigate the effect of the duration since the introduction of on-demand LEA at a single facility on the incidence of eCS.

Materials and Methods: With the approval of the local ethics committee, 11792 cases delivered at our hospital between 2015 and 2021 were retrospectively studied to examine temporal changes in the ratio of LEA and eCS. Furthermore, a difference in differences analysis was conducted to examine changes in the proportion of eCS performed during the introduction of on-demand LEA (August-October 2018: cradle period) and August-October 2021 (mature period), and point estimates, 95% confidence intervals, and p-values were obtained.

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Table 2: Inferential Statistics.

<table>
<thead>
<tr>
<th></th>
<th>Complete Prophylaxis</th>
<th>Incomplete Prophylaxis</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>117</td>
<td>62</td>
<td>0.647</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(years Mean +/- SD)</td>
<td>30.628 (+/- 6.15)</td>
<td>31.05 (+/- 5.72)</td>
<td>0.047</td>
</tr>
<tr>
<td>IC 95%</td>
<td>(-1.44, 2.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anesthesiologist</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experience</td>
<td>&gt;5 years 48</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Resident 3-4</td>
<td>58</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Resident 1-2</td>
<td>21</td>
<td>17</td>
<td>0.180</td>
</tr>
<tr>
<td>Air</td>
<td>99</td>
<td>53</td>
<td></td>
</tr>
<tr>
<td>Loss of Resistance</td>
<td>Saline Solution 18</td>
<td>9</td>
<td>0.878</td>
</tr>
<tr>
<td>Technique</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Position</td>
<td>Sitting 103</td>
<td>56</td>
<td></td>
</tr>
<tr>
<td>Lateral Decubitus</td>
<td>7</td>
<td>3</td>
<td>0.638</td>
</tr>
<tr>
<td>Single</td>
<td>69</td>
<td>42</td>
<td></td>
</tr>
<tr>
<td>Number of Attempts</td>
<td>2-3</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>&gt;3</td>
<td>12</td>
<td>9</td>
<td>0.153</td>
</tr>
<tr>
<td>Fluid Leakage</td>
<td>Needle 84</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Catheter 33</td>
<td>42</td>
<td>0.5</td>
</tr>
<tr>
<td>PDPH</td>
<td>73/117 (63.9%)</td>
<td>48/62 (57.9%)</td>
<td>0.112</td>
</tr>
<tr>
<td>Blood Patch</td>
<td>35/117 (29.9%)</td>
<td>22/62 (35.5%)</td>
<td>0.447</td>
</tr>
<tr>
<td>Delayed Discharge</td>
<td>(+/- 1.88)</td>
<td>(+/- 1.26)</td>
<td>IC 95%</td>
</tr>
<tr>
<td></td>
<td>(-0.77, 0.98)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Conclusion(s): Based on this analysis, we propose a modification to the PDPH prophylaxis protocol, excluding these techniques. Other alternatives, such as an intradural catheter for intradural labor analgesia, have been proposed.

23AP02-07
On-demand labor epidural analgesia decreases the ratio of emergency cesarean sections

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Background and Goal of Study: The effects of on-demand labor analgesia on the mode of delivery have presented a multifaceted subject and have led to contradictory conclusions. The aim of our study is to examine whether the ratio of emergency cesarean sections performed with or without labor epidural analgesia (LEA) differs after the launch of on-demand labor analgesia at our facility since August 2018.

Materials and Methods: Upon the approval of the institution's ethics committee, information on mode of delivery was collected from the electronic medical record. 5009 cases (including 1433 LEAs) delivered at our institution since August 2018 were included, excluding absolute indications for cesarean section.

Results and Discussion: In the non-LEA group, 796 patients underwent emergency cesarean section, while in the LEA group, 203 patients underwent emergency cesarean section. The Kaplan-Meier curve deals with censored data, in this study, that is vaginal delivery, which may affect the shape of the curve.
Results and Discussion: The ratio of eCS in the mature period was significantly lower than in the cradle period, and the intervention effect was 0.194 [0.093 to 0.280], p<0.01, and the 3-year period since cradle period significantly explained 19.4% of the eCS reduction (combined bar plot). Sensitivity analyses were also performed incorporating cases that did not undergo LEA as part of the LEA group, and the results were robust. These results may be due to better identification of LEA cases as institutions become more proficient.

Conclusion(s): Labor epidural analgesia decreased the ratio of emergency cesarean sections performed over time. Future studies will examine the difference in the ratio of labor epidural analgesia and emergency Cesarean sections performed over time using a larger data set.

23AP02-09
Utilization of ultrasonography in central block applications in obstetric anesthesia

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Background and Goal of Study: The aim of our study is to evaluate the relationship between skin-subdural distance (ultrasonographic depth) and needle depth in pregnant women undergoing cesarean section with epidural and intrathecal anesthesia. We aim to assess the accuracy of ultrasound in determining the needle entry site, with fewer attempts when using ultrasound.

Materials and Methods: One hundred pregnant women, with ASA I-II classification, at gestational weeks 37-42, undergoing elective cesarean section with neuroaxial block, will be included following their consent. The classical anatomical landmarks, including palpation of spinous processes and iliac crests, were identified, and the line connecting the peaks of iliac crests in the horizontal plane was defined as the Tuffier line.

All ultrasound assessments and the regional block procedure were performed in the seated position, targeting the most suitable level within the L3-L4-L5-S1 interspinous space. Ultrasound, using a convex probe, was conducted in both paramedian and transverse planes, and images were recorded. Neuroaxial anesthesia was administered by entering the identified lumbar space with ultrasound guidance, and drugs and procedures commonly used in standard neuroaxial anesthesia protocols were implemented. In statistical analysis, descriptive statistics will present continuous variables as mean ± standard deviation (range), and categorical variables as count (%).

The correlation between skin-subdural distance (ultrasonographic depth) and needle depth will be evaluated using Pearson's correlation test. Statistical analyses will utilize SPSS 15.0, with p-values < 0.05 considered statistically significant.

Results and Discussion: We found a strong correlation between the levels identified by manual palpation and ultrasound in accurately determining the needle entry site, with fewer attempts during pregnancy. Patients are familiar with ultrasound, and the technique poses no adverse effects on the mother or fetus.

Conclusion(s): We believe that reducing the number of attempts in neuroaxial blocks, especially in obese pregnant women and patients with anatomical deformities or difficulties (such as a history of previous surgeries), will increase the success rate of the procedure.

23AP02-10
Information about obstetric analgesia and anaesthesia audit in OLOL Hospital Drogheda, Ireland

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Background and Goal of Study: The Changing Childbirth report made explicit the right of women to make informed decisions about their care during pregnancy and childbirth. Changing legal and public expectations demand that we provide evidence-based information, timely and in multiple languages to enable women to make these decisions.

Women should have access to information antenatally about all types of analgesia and anaesthesia available. Women in labour should receive this information before consenting to an anaesthetic procedure. Information regarding caesarean section should be given when CS is booked.

Written material should not replace discussion between women and clinicians. Written information and verbal information from other health professionals may be adequate for some women, but women who wish for more detailed responses should have access to an anaesthetist.

Anaesthetists should place emphasis on the process of consent and tailor the process to the circumstances. The women should have the opportunity to ask any questions. All information given should be clearly documented.

This audit will evaluate antenatal education and written information on analgesia, unit information cards, language-specific materials for non-English speakers, interpreter availability, and overall satisfaction levels among women during labor and antenatally. Examine notes and epidural/anaesthetic chart for documentation of information given antenatally.
Materials and Methods: Prospective Audit over the period of 3 months at OLOL hospital Drogheda, Ireland

Results and Discussion: Out of 81 patients: Only 64% were explained about analgesia and anaesthesia antenataly. Written information was given to only 21%. There were only 7 patients who had poor understanding of English, none of them recieve education in their native language antenataly and interpreter was not arranged as well. 73% of total patients were happy with the information they received antenataly and during labour.

Conclusion(s): Audit reveals suboptimal compliance with standard guidelines, we recommend antenatal information, ensuring interpreter availability across antenatal, labor, and delivery phases, and translating unit cards for non-English speakers during antenatal visits. These measures will bridge existing gaps, aligning practices with standards, and significantly enhance patient education, satisfaction, and inclusivity in antenatal care.

23AP02-11
Pain relief after caesarean section in our Lady of Lourdes Hospital Drogheda, Ireland

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Background and Goal of Study: Adequate pain relief should be provided after caesarean section (CS) to improve patient experience and reduce morbidity. Pain relieving drug viability is significant for persistent comfort yet this must be adjusted against maternal side effects and medication transference to the neonate by means of breast milk. Narcotics give great help with pain relief and can be given by numerous courses including subarachnoid, epidural, intravenous, intramuscular, subcutaneous and oral. Narcotics are shockingly connected with undesirable reactions, specifically pruritus, sedation, sickness, regurgitating and respiratory Distress. Help with discomfort gave by NSAIDs has been appeared to lessen narcotic requirement. However, this group of drugs also has unwanted side effects.

Goals: Compliance with prescribing Nsaids and follow guidelines, 2) Post op day 1 satisfactory pain relief.

Materials and Methods: Prospective Audit of 50 patients includes Post op patients with C/S under regional Anaesthesia. Proposed Standard or target for best practice:
- 95% women to be satisfied with analgesia on day 1 post-caesarean section.
- 100% women received subarachnoid or epidural opioids if CS performed by regional anaesthesia.
- Unless contraindicated, 100% women to be prescribed regular NSAIDs.

Results and Discussion: Out of 50 patients 98% requested pain relief on day 1 postoperatively, 100% received subarachnoid or epidural opioids. Opioids were prescribed and given to 50 patients postoperatively (100%), Only 78% were prescribed for regular NSAIDS, out of which only 72% received NSAIDS. On the first day post operatively, only 56% were happy with pain relief and remaining patients complained of pain with pain score (7-9/10). For pain relief oxynorm, paracetamol and ibufen was used.

Conclusion(s): Suboptimal prescription and use of NSAIDS postoperatively was alarming, which causes increase pain score postoperatively on D1. NSAIDS prescription should be re-enforced by department, and opioids should be reviewed by department on regular basis. Regular audits and continuous monitoring of post op analgesia is crucial for compliance with standard guidelines.

References:

23AP03-01
Retrospective single tertiary center study to investigate the incidence and management of accidental dural puncture and Postdural Puncture Headache in parturients

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1Tel Aviv Sourasky Medical Center, Anesthesia Critical Care and Pain, Tel Aviv, Israel, 2Tel Aviv University, Tel Aviv, Israel

Background and Goal of Study: The most commonly reported complication of neuraxial blocks (NB) is post-dural puncture headache (PDPH) after intentional/accidental dural puncture (IDP/ADP). Treatment with an epidural blood patch (EBP) is recommended if conservative management fails. (1)

Objectives: Primary: to estimate ADP rate and PDPH rate in a tertiary medical center, 13, 000 annual deliveries, after NB (labor epidural analgesia (LEA); spinal/CSE anesthesia for cesarean delivery).

Secondary: to examine outcomes after ADP/PDPH according to whether IDP/ADP was known at the time of NB, ADP suspected at the time of NB or ADP identified only postpartum; and to report performance of epidural blood patch (EBP).

Materials and Methods: Cases of ADP/PDPH were identified from the dedicated reporting system; data were collected from hospital medical records including demographics, PDPH management and treatment, EBP.

Results and Discussion: A total of 311 cases (ADP/PDPH) were identified; 280 cases after LEA; 31 cases of PDPH after NB for cesarean delivery (spinal/CSE). The rate of labor epidural (LEA) performed between January 2018 to April 2022 was 33,032/49,827 deliveries (66.3%). The incidence of ADP among all LEA performed was 280/33,032 (0.85%). In total, 109 (35%) of women with ADP/PDPH underwent EBP during the study period; 99 (91%) after LEA; 7 (6%) after spinal; 3 (3%) after CSE. Other outcomes are presented in the Table.

Conclusion(s): Our data confirm that EBP may be required after any NB for parturients, not just LEA. Not all ADP are identified during LEA procedure; the EBP rate was significantly higher among women with ADP identified postpartum. EBP was performed on average a day after first discussion with patient, suggesting women deliberated about undergoing EBP and whether PDPH might improve without EBP. Almost 1:10 wom-
en with ADP/PDPH visited the emergency room after discharge, most frequently when ADP was identified postpartum. Our data reinforce that a robust follow-up system of all women who receive NB is required to identify and treat ADP/PDPH.

Reference:
Uppal V. http://dx.doi.org/10.1136/rapm-2023-104817

Table. Intentional/accidental dural puncture and postdural puncture management for total cohort and according to whether intentional/accidental dural puncture was known or suspected at the time of the neuraxial block or identified postpartum.

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Known at time of NB</th>
<th>Known at time of EA</th>
<th>Thought known at time of EA</th>
<th>Identified after EA (post punctum)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headache (%)</td>
<td>16(3)</td>
<td>2(3)</td>
<td>14(3)</td>
<td>1(3)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Anaesthesiologist noted as headache at DPPH in electronic medical record (%)</td>
<td>15(3)</td>
<td>1(3)</td>
<td>14(3)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Fever noted in postdural injury visit no. days after labor</td>
<td>7.08</td>
<td>1.86</td>
<td>5.32</td>
<td>4.54</td>
<td>1.64</td>
</tr>
<tr>
<td>Pain scale (VAS) after delivery (headaches)</td>
<td>5(3-6)</td>
<td>5(4-6)</td>
<td>5(5-5)</td>
<td>5(5-6)</td>
<td>1.09</td>
</tr>
<tr>
<td>No. day's EA was discussed after DOR</td>
<td>23.3(5)</td>
<td>2.1(5)</td>
<td>2.5(5)</td>
<td>2.1(5)</td>
<td>0.57</td>
</tr>
<tr>
<td>No. day's EA was performed after Anesthesia visit</td>
<td>1.24</td>
<td>1.4(5)</td>
<td>1.5(5)</td>
<td>1.3(5)</td>
<td>0.8</td>
</tr>
<tr>
<td>No. day's EA was performed after DOR</td>
<td>3.4(5)</td>
<td>3.3(5)</td>
<td>3.5(5)</td>
<td>3.6(5)</td>
<td>0.73</td>
</tr>
<tr>
<td>No. days second EA was performed after first EA</td>
<td>2.76</td>
<td>2.7(5)</td>
<td>2.7(5)</td>
<td>2.5(5)</td>
<td>0.76</td>
</tr>
<tr>
<td>Effect of EA was helpful (%)</td>
<td>79(5)</td>
<td>62(5)</td>
<td>100(5)</td>
<td>100(5)</td>
<td>0.34</td>
</tr>
<tr>
<td>No. women requiring ERMF complications after discharge</td>
<td>2(9)</td>
<td>2(9)</td>
<td>0</td>
<td>7(19)</td>
<td>0.004</td>
</tr>
</tbody>
</table>

Key: NB = neuraxial block; EA = labor epidural anesthesia; DOR = Intentional/Accidental Dural Puncture; EA = Intentional/Dural Puncture; DOR = Post Dural Puncture Headache; VAS = Visual Analog Scale; DOR = Epidural Blood Loss

Materials and Methods: The ACCESS registration survey gathered: contact details for National Coordinators (NC); Lead Investigators (LI) in each center; center annual CD volume; expected no. of CD during each 2-week snapshot window; center practice information; data collection language. The ACCESS registration survey was launched Sept 2022 (Google Forms, Google Inc., Mountain View, CA, USA) and distributed through personal connections, national and international societies, social media networks, during Euroanaesthesia 2023, through the ESAIC Newsletter.

After registration, each participating center selects a 2-week window within the 12-month study period to collect outcomes in 24 study questions for consecutive CD cases. The ACCESS study is ongoing from 1/9/23 until 31/8/24.

Results and Discussion: The ACCESS registration survey identified NCs for 31 European countries and LIs registered for 423 centers, representing anticipated no. of 17, 042 CD cases over the 12-month study period. A median (range) of 20 (9 to 400) CD cases are anticipated per center during the 2-week window (Table).

Registered centres report that in 35% centres mostly specialist obstetric anaesthetists perform CD anaesthesia, mixed residents/attendings and specialist obstetric anaesthetists in 34% centres, mostly attending non-specialist in 19% centres, mixed practice of residents/attendings in 8% centres, and unsupervised residents in 3% centres.

Conclusion(s): The ACCESS registration survey revealed variability in volume and CD practice among European countries. The ACCESS study (https://www.access-study.org/) should generate practice data to guide CD anaesthetic management strategies.


23AP03-02
Study registration survey of participating centers in the ACCESS study (snapshot multinational multicentre study to assess anaesthesia management for caesarean delivery)

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Background and Goal of Study: In order to identify participating centres for the ACCESS study, a registration survey was created. The ACCESS study is a European multicentre cross-sectional study to describe anaesthesia management for caesarean delivery (CD) using a snapshot (2-week) study design.

The aim of the current study is to describe the ACCESS study participating centers.

23AP03-03
Epidural Related Maternal Fever (ERMF) – Further investigation & questions

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Background: This study aims to identify factors influencing the occurrence of ERMF and assess its subsequent impacts. Additionally, the analysis includes the use of antipyretics/analgesics during labour epidurals and their potential masking effects.

Methods: After identification patients with a temperature >37.5°C, their medical records were examined. Data collected: Body temperature before epidural catheter insertion + at 2-hour intervals, Inflammatory markers (WBC, CRP). Delivery method; Interval between ROM until birth; Use of antipyretics/analgesics; Use of antibiotics for mother/new-born.
Blood culture (BC) results + placental histopathology with the aim of eliminating inflammation as a causative factor of intrapartum hyperthermia.

**Results and Discussion:** Among 113 cases of EA administered during labour over a period of 4 months, our observations revealed the occurrence of intrapartum hyperthermia in 4 patients, i.e. 3.6% of observed cases.

In 2 patients, hyperthermia was attributed to an undetermined infectious source as evidenced by elevated WBC/CRP. (Tab.1) Chorioamnionitis was not diagnosed.

Patients denoted as “#1” and “#4” experiencing intrapartum hyperthermia did not exhibit increased inflammatory markers or signs of infection. (Table 1)

Based on these findings and a definition of ERMF, this study identified 2 instances of ERMF in the study cohort.

<table>
<thead>
<tr>
<th>Delivery mode</th>
<th>Patient #1</th>
<th>Patient #2</th>
<th>Patient #3</th>
<th>Patient #4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Emergency C-section</td>
<td>Emergency C-section</td>
<td>Emergency C-section</td>
<td>Emergency C-section</td>
</tr>
<tr>
<td>Interval between ROM to birth</td>
<td>9h 23 min</td>
<td>15h 6min</td>
<td>8h 35min</td>
<td>14h 18min</td>
</tr>
<tr>
<td>WBC</td>
<td>13.9 - 16.1-14.4</td>
<td>16.6 – 27- 15</td>
<td>8.2-24.6- 16.9</td>
<td>7.5-10.4- 15.4</td>
</tr>
<tr>
<td>CRP</td>
<td>8.2</td>
<td>5.2-16.7- 93</td>
<td>AST, GGT, Bilirubin normal</td>
<td>19.7- 17.9</td>
</tr>
</tbody>
</table>

**Table 1.** New-borns of mothers experiencing intrapartum hyperthermia did not exhibit any complications.

Antibiotics were administered to all mothers but not in any of the neonates.

Figures 1-4 show the progression of temperature variations in patients, concurrently outlining the cases of Paracetamol/Diclofenac administration. The timing of C-sections is annotated.

**Fig.1-4:** Paracetamol; D- Diclofenac sodium; T0...T2...T10- Temperature measured before EA and 2, 4...10 hours after EA; +C-section

**Conclusion:** The potential impact of antipyretic/analgesic administration on ERMF during our short-term observation is questionable. Our findings did not substantiate overuse of antibiotics or adverse effects on neonates.

**23AP03-04**

**Post-dural puncture headache: experience of a tertiary Hospital. A retrospective observational study**

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**Background:** Post-dural puncture headache (PDPH) results in significant peripartum morbidity and develops in 50-88% of accidental dural punctures (ADP) in the obstetric population. Its management, from conservative to epidural blood patch (EBP), depends on the institution.

This study aims to evaluate the incidence of PDPH in the obstetric population after ADP at our center.

Secondary objectives include examining the relationship between PDPH and obstetric/anesthetic factors, and reporting our approach to PDPH.

**Methods:** This retrospective observational study included all pregnant patients who underwent neuraxial labor analgesia/anaesthesia, between October 2013 and 2023, and were diagnosed with ADP or PDPH (when ADP was undetected). All relevant data were obtained from electronic medical records’ review. Data analysis was accomplished using the IBM™ Statistical Package for the Social Science system.

**Results:** A total of 74 ADP were identified. The majority of births (82.4%) occurred at term, mostly through vaginal delivery (68.9%), while 27% were via cesarean section. 81.1% ADPs involved the epidural technique, at L3-L4 (58.1%). CSF was identified through the needle in 73% of cases. The main approach (78.9%) involved attempting a different interspace, while 7.0% were managed with continuous spinal analgesia.

Among the 74 ADP, 82.4% experienced PDPH, 55.7% occurring within the first 24 hours, and 31.1% between 24 and 48 hours. Regarding severity of PDPH, 50.8% were moderate and 31.1% severe.

Conservative management was employed in 90.2% of cases, and 63.9% cases received an EBP (none performed within the first 24 hours, and only 10.3% between 24 and 48 hours). EBP was repeated in 2 patients. Age significantly associated with the development of PDPH after ADP, with patients within the PDPH group being significantly younger (p <0.05). BMI, delivery type, parity, and technique were not significantly associated with either the development, timing or intensity of PDPH.

**Conclusion:** In 10 years at our center, 74 ADP were identified, 82.4% experienced PDPH, and 63.9% received an EBP, which is concordant with a recent international cohort study. Our study was unable to establish a significant association between the incidence of PDPH and BMI, delivery type, parity, and technique, which may be related to the small sample of patients included in the study. Larger population studies are needed to enhance these findings.
Recall of neuraxial procedural risks for caesarean section: elective vs emergency

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Background and Goal of Study: In Malta, patients receive fairly standardised information describing the risks of neuraxial procedures as part of routine obstetric anaesthesia practice immediately before the intervention. The pain and stress of labour make informed consent challenging. This study aims to compare patient recall of the risks of neuraxial anaesthesia between elective and emergency caesarean sections (CS).

Materials and Methods: Survey analysis following routine intervention. Ethics and Data Protection Office approvals were obtained before the start of data collection. Patients were asked to recall risks of neuraxial blockade at least 24 hours post-delivery. Initially, they were asked to state any risks, unprompted. Subsequently, they were asked to answer true or false to a presented list.

Some items on the list were true neuraxial procedure risks and some were false. A comparison between elective and emergency cases of recall was made using simple proportions.

Results and Discussion: 52 mothers were interviewed over 1 month. 44% were elective and 56% were emergencies. All cases were done under neuraxial block, 70.6% under spinal, and 29.4% under epidural top-up. 48% experienced labour pain during the consent but only 36.5% had used analgesics before the consent. 77% of the mothers had prior knowledge of neuraxial anaesthesia risks, mostly from previous CS or through word of mouth.

In both elective and emergency groups, nerve damage was the most common unprompted recalled risk, followed by headache. Though unprompted mentions of nerve damage were common, a significant portion of respondents were unable to accurately identify paralysis as a true statement on the list. Meningitis was the least recalled prompted risk among both groups.

<table>
<thead>
<tr>
<th>True Risks</th>
<th>% Correct in Elective CS</th>
<th>% Correct in Emergency CS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pruritus</td>
<td>95.65</td>
<td>72.42</td>
</tr>
<tr>
<td>Headache</td>
<td>95.65</td>
<td>79.31</td>
</tr>
<tr>
<td>Paralysis</td>
<td>52.17</td>
<td>65.52</td>
</tr>
<tr>
<td>Meningitis</td>
<td>20.09</td>
<td>34.48</td>
</tr>
<tr>
<td>Constipation</td>
<td>73.91</td>
<td>68.97</td>
</tr>
<tr>
<td>Harms Baby</td>
<td>100</td>
<td>93.10</td>
</tr>
</tbody>
</table>

Conclusion: Generally, both prompted and unprompted risk recall were somewhat better in the elective CS group. It would be interesting to see if written information, together with verbal information, would change the results overall, or the observed findings between elective and emergency CS patients.

Prophylactic ondansetron for prevention of spinal anesthesia induced hypotension in patients undergoing cesarean section: a double blinded randomized clinical trial

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Background and Goal of Study: Spinal anesthesia (SA) has become the standard anesthesia technique for cesarean section (CS). Major side effects of SA are hypotension, bradycardia, nausea and shivering. Spinal anesthesia-induced hypotension (SAIH) can cause severe maternal and fetal adverse effects. Ondansetron, a 5-HT3 receptor antagonist, has been studied as a potential preventive drug of SAIH. Despite the promising effects in some studies, much literature recommends further study before applying ondansetron as a routine measure to prevent SAIH. The goal of our study was to determine whether the prophylactic administration of ondansetron can attenuate SAIH in patients undergoing CS.

Materials and Methods: A double-blinded randomized clinical trial was conducted on 41 full-term parturients from June to September 2023, after approval from the institutional research ethics board. Patients were randomly allocated into two groups: Group O (n=22) received ondansetron 4 mg and Group C (n=19) received normal saline. Solutions were given five to ten minutes before the SA.

All the patients were monitored for blood pressure, heart rate, vasopressor requirement and side effects. The data analysis was carried out with independent samples T-test and Chi-square test. P value < 0.05 was considered significant.

Results and Discussion: Fourteen patients in group C (73.6%) and twelve patients in group O (54.5%) had intraoperative hypotension, but the difference was not statistically significant (P = 0.164). The total phenylephrine requirement in group C was significantly higher than in group O (P = 0.030). Also, the ephedrine dose required in group C was higher than in group O, but the difference was not statistically significant (P = 0.309). There was no statistical difference in mean HR, SBP, DBP and MAP values from minute 0 to minute 40 between the two groups at all time intervals. The incidence of nausea was significantly higher in group C than in group O (P=0.013). Incidence of vomiting was superior in group C, but the difference was not statistically significant (p=0.141). Shivering and pruritus were found in only one patient in group C.

Conclusion(s): In our study, prophylactic ondansetron was not effective in reducing the incidence of hypotension in parturients undergoing cesarean section, but it did reduce significantly the amount of vasopressor used and the incidence of nausea. Further research is necessary with a larger sample size.
23AP03-07
Use of Remifentanil PCA for obstetric analgesia in a QI initiative at DGH leads to high levels of patient satisfaction

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Background and Goal of Study: Remifentanil is a ultra short acting synthetic opioid, which does not accumulate and its metabolism is not dependent on liver and kidney. Because of this, Remifentanil may be an alternative to neuraxial analgesia and other opioids for labour analgesia. Total carbon footprint of Remifentanil may be an alternative to neuraxial analgesia and other

Materials and Methods: Retrospective data analysis of completed paper feedback form from patients who used remifentanil PCA as labour analgesia (October 2016 to October 2023) was performed. Overall, 132 patient feedback forms were analysed. During this study, remifentanil dose used was 40 μg bolus with a 2-minute lockout without any loading dose or background remifentanil infusion.

Results and Discussion: Most common reasons for R-PCA use were patient choice (40.9%) followed by failed epidural (18%). Other reasons were sepsis, deranged clotting and spinal anatomical abnormalities. Analgesia was thought to be excellent or good with R-PCA by 94.2% patients during the Intrapartum period and 75.3% patients during delivery. Average reduction of pain score was 66.6%. 97.1% of patients who received R-PCA were either satisfied or very satisfied and would recommend this analgesia method to others. 63.3% of these patients delivered vaginally, while 25.9% and 10.8% needed forceps and Caesarean section respectively.

Conclusion(s): While R-PCA was shown to be an effective alternative to neuraxial analgesia with high levels of patient satisfaction, further steps of education of midwives, increasing awareness of expecting women about obstetric analgesia options, needs to be taken to increase the uptake of R-PCA.

References:

23AP03-08
Interest of the Nociception Level Index (NOL Index) for the nociception and sensory block assessment in the parturient in labour under epidural analgesia: a prospective cohort pilot study

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Background: Labour pain is an intense pain, related to sympathetic nervous system (SNS) activation, potentially harmful for the uteroplacental perfusion. Its assessment remains difficult relying on observed behaviour and subjective self-evaluation. The NOL Index (PMD100™-Medasense), a non-invasive multiparametric nociception monitoring based on SNS activation, has shown benefits in anesthetics sparing and reducing postoperative pain. This study aims to assess NOL Index variations during epidural analgesia in labour and its relationship with parturient self-evaluation, sensory block, and hemodynamic parameters.

Methods: After institutional committee approval and signed informed consent, 27 parturients in labour were enrolled upon epidural analgesia demand, in a prospective, repeated measures, observational study (B0762023230305; NCT05898737). NOL Index recordings were conducted for 1 hour after the loading dose. Self-reported pain intensity, using the Numeric Rating Scale (0-10; NRS), was noted on the paper record at each contraction.

The primary outcome was NOL index variation between nociceptive (contraction) and non-nociceptive (rest) periods. Secondly NOL index association with somatosensory block, parturient’s self-reported pain intensity and hemodynamic parameters. Statistical analysis was realised by Wilcoxon signed-rank test for paired data, Kruskal-Wallis One-Way ANOVA, Friedman’s Rank variance analysis, Dunn’s, Shapiro-Wilk and Mann-Whitney tests. Data are presented as mean and standard deviation–median (Q25-Q75), and P value <0.05 was considered significant.

Results: 23 parturients completed the follow-up. NOL values during contractions did not statistically differ from rest periods (26.2±11.3 – 25 [18.9–32] vs 26.5±10.1 – 25.1 [19.2-32.9]; p=0.89). No significant association was found between NOL and NRS values (p=0.46). The mixed model analysis of variance showed a reduction in self-reported pain with the gradual extension of sensory block in all patients (P<0.000001). As for the relationship NOL-sensory blockade we found that a higher number of blocked dermatomes th post-loading dose was correlated with a lower Time-weighted mean NOL value (R²=0.37).

Conclusion: In our study, NOL index monitoring failed to distinguish between nociceptive and non-nociceptive periods and was not associated with parturient self-reported pain. However, it showed a correlation with the extension of the somatosensory block under epidural analgesia.
Accidental dural puncture and post-dural puncture headache in the obstetric population - an 11-year retrospective audit

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Background and Goal of Study: Accidental dural puncture (ADP) is a rare yet significant complication of neuraxial labor analgesia (NLA). Post-dural puncture headache (PDPH) may occur, exerting a negative effect on recovery and psychological well-being in early puerperium, along with increased duration of hospital stay and healthcare costs. Thus, prompt diagnosis and therapeutic measures should be implemented. The author's aim is to compare their hospital's incidence rates and management experience with the reported in the literature.

Materials and Methods: A retrospective audit was conducted at our secondary hospital, covering the period from 2013 to 2023. Records from NLA procedures were reviewed. Neuraxial anesthetic procedures were excluded. Descriptive and comparative analysis was performed using Excel and R statistical software.

Results and Discussion: NLA was performed in 9327 cases (mean 847.9/year), 86.4% of which were epidural analgesia, followed by combined spinal-epidural analgesia (13.2%) and spinal analgesia (0.3%). Recognized ADP was recorded on 56 occasions (0.6%). Trainees accounted for 35.7% of these. PDPH was reported in 55 cases, mainly after recognized ADP (n=36, 64%). The majority of PDPH (76.4%) exhibited their onset within 24 hours. Most cases presented with moderate intensity (67.3%), followed by severe (20%) and mild intensity (12.7%). All patients with PDPH received conservative management (CM), which was effective in 56% of cases.

When CM proved ineffective, sphenopalatine ganglion block or epidural blood patch (EBP) were proposed. A total of 21 EBP (38.2%) were performed, resulting in complete symptom relief in 31.5% initially trained with the 3-D model and performed 6,838 (22.0%) LEA; training with the model was not significantly associated with ADP (adjusted OR 1.17, 95% CI 0.9 - 1.53, p=0.24). 17 resident LEA performed by a resident was not significantly associated with ADP (aOR 2.76, 95% CI 2.44 - 3.11, p<0.001), but patient position and level of insertion were not.

An ADP rate inferior to 1% was found, which is within the lower range of previously reported incidence. These results corroborate the known association between ADP and PDPH, reinforcing the need to monitor patients after ADP.

Considering its low risk profile, CM still demonstrates a commendable efficacy. The EBP proves highly effective in PDPH treatment, although the risk/benefit ratio should be considered on an individual basis.

Conclusions: The incidence of ADP and PDPH recorded in this audit aligns with the reported in the literature. Given its success rate, low risk profile and ease of implementation, CM should always be considered. EBP remains the most effective strategy in the treatment of PDPH.

Association between accidental dural punctures after labor epidural analgesia and anesthesia provider related factors

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Background: Many factors, are associated with risk of accidental dural puncture (ADP) and post dural puncture headache (PDPH) after labor epidural analgesia (LEA).

In April 2019 we introduced a 3-D printed lumbar spine model to train anesthesia residents prior to first LEA. Primary study outcome was to assess incidence of ADP among residents who did versus did not train with the model. Secondary outcomes: to investigate other risk factors for ADP.

Methods: Single center retrospective cohort study, all LEA, April 2018 to April 2022. Cases of ADP (observed or suspected during the procedure, or identified later presenting as PDPH) were recorded in a dedicated registry. Patient characteristics, obstetric data, procedural and anesthesia - related data were collected. Odds ratios (OR) were calculated for ADP risk factors; multivariate modelling controlled for potential confounders. For continuous variables that were significantly associated with ADP, we calculated a binary cutoff that would be clinically meaningful and interpretable as an OR.

Results: In total, 31,048 epidurals were included: patient mean ± SD age, 31.9 ±4.7, BMI 22.1 ±5.7. Overall, 277 (0.89%) patients had ADP, 15,288 (49.2%) LEA were done by anesthesia residents; LEA performed by a resident was not significantly associated with ADP (adjusted OR 1.17, 95% CI 0.9 - 1.53, p=0.24). 17 resident (31.5%) initially trained with the 3-D model and performed 6,838 (22.0%) LEA; training with the model was not significantly associated with ADP (aOR 1.009, 95% CI 0.68 - 1.5, p=0.97).

No patient related and obstetric variables (age, body mass index, gravidity, parity, and estimated cervical dilation at the time of the procedure) were associated with ADP. Among procedure related variables, number of attempts was significantly associated with ADP (aOR 2.76, 95% CI 2.44 - 3.11, p<0.001), but patient position and level of insertion were not.

Among residents, experience, time in anesthesia career, time in obstetric anesthesia, and number of epidurals previously performed were not significantly associated with ADP.

A gap of at least 1 month (95th percentile) since prior labor ward shift had a likelihood, aOR 1.8, 95% CI 1.2 - 2.69, p=0.004 of ADP. LEA performed between 4:00 and 7:00 AM had a likelihood, aOR 1.44, 95% CI 1.06 - 1.96, p=0.02 of ADP. Performing <10 LEA in the past month (20th percentile) had a likelihood aOR 1.497 (95% CI 1.12 - 2.01, p=0.007) of ADP. Number LEA performed in the past month (but not the total number of LEA performed overall) was also associated with ADP.

Conclusions: In our cohort, training on a spine model was not associated with reduced likelihood of ADP. We report two previously unreported variables: LEA performed between 04:00 to 07:00 and a gap >1 month since the last shift were associated with increased likelihood of ADP. We speculate that that skill fade and frequency of performance may play a significant role in LEA success.
Factors affecting the occurrence of fetal bradycardia after neuraxial labor analgesia: a retrospective observational study

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Background and Goal of Study: Fetal bradycardia occurs after the introduction of neuraxial labor analgesia. A previous study showed that some anesthetics and analgesics induce fetal bradycardia (Anesthesiology 1994;81:1083). We hypothesized the presence of potential and unknown risk factors for fetal bradycardia after neuraxial labor analgesia. The goal of the present study was to identify unknown risk factors for fetal bradycardia in a large-scale cohort.

Materials and Methods: We retrospectively evaluated 1,708 parturients who received labor analgesia at Aiku Hospital, Tokyo between January 2022 and December 2022. The choice of analgesia technique (e.g., spinal, or dural puncture epidural) depends on anesthesiologist. Medical information for the patients was obtained from medical records. Fetal bradycardia was defined as a decrease of at least 15 bpm in the baseline of fetal heart rate lasting more than two minutes.

The primary outcome was the occurrence of fetal bradycardia 30 minutes after labor analgesic induction for the parturients. A multivariate logistic regression model was built incorporating age, height, weight, primiparity, use of oxytocin, elective induced delivery, cervical dilatation before labor analgesic induction, pain score before labor analgesic induction, total amount of intrathecal drug administration, and dose of intrathecal fentanyl administration as explanatory variables. Odds ratios were used to assess the significance of explanatory variables included in the model. P values < 0.05 were considered to be statistically significant.

Results and Discussion: The overall rate of occurrence of fetal bradycardia was 10% (171/1,708). Table 1 shows the odds ratios for each factor in the model. We identified four novel predictors: primiparity, cervical dilatation before labor analgesic induction, pain score before labor analgesic induction, and total amount of intrathecal drug administration.

<table>
<thead>
<tr>
<th>Explanatory Variable</th>
<th>Odds Ratio</th>
<th>95% CI</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>0.97</td>
<td>0.95−1.02</td>
<td>0.21</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>0.98</td>
<td>0.95−1.02</td>
<td>0.33</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>1.08</td>
<td>0.96−1.03</td>
<td>0.64</td>
</tr>
<tr>
<td>Primiparous women (y/n)</td>
<td>2.67</td>
<td>1.24−5.70</td>
<td>0.007</td>
</tr>
<tr>
<td>Use of oxytocin (y/n)</td>
<td>0.42</td>
<td>0.32−0.51</td>
<td>0.64</td>
</tr>
<tr>
<td>Elective induced delivery (y/n)</td>
<td>0.42</td>
<td>0.32−0.51</td>
<td>0.63</td>
</tr>
<tr>
<td>Cervical dilatation before labor analgesic induction (cm)</td>
<td>1.13</td>
<td>1.02−1.25</td>
<td>0.042</td>
</tr>
<tr>
<td>Pain score before labor analgesic induction (cm)</td>
<td>1.28</td>
<td>1.07−1.56</td>
<td>0.002</td>
</tr>
<tr>
<td>Total amount of intrathecal drug administration (mg)</td>
<td>1.49</td>
<td>1.33−2.03</td>
<td>0.007</td>
</tr>
<tr>
<td>Dose of intrathecal fentanyl administration (mg)</td>
<td>1.11</td>
<td>0.74−1.64</td>
<td>0.64</td>
</tr>
</tbody>
</table>

Table 1. Logistic regression model for occurrence of fetal bradycardia after neuraxial labor analgesia.

Conclusions: The findings suggested that primiparous women with intense labor pain, followed by a large amount of spinal anesthesia, may be at higher risk for fetal bradycardia following neuraxial labor analgesia.

Efficacy of terlipressin in high-risk pregnant women (TerliBleed): a multicenter cohort study

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Background and Goal of Study: Terlipressin is a powerful vasoconstrictor, which is the drug of choice in the treatment of bleeding from the gastrointestinal tract and during operations on the liver and pelvic organs. In obstetrics, there are no studies assessing the effectiveness and safety of terlipressin in patients at risk of bleeding.

In this multicenter, cross-sectional cohort study, we assessed the effect of topical terlipressin in high-risk patients for the prevention of postpartum haemorrhage.

Materials and Methods: 5 perinatal centers from Russia took part in the study. 578 pregnant women were examined, including those with hypertensive disorders at risk of developing bleeding. Delivery by cesarean section.

Two groups were compared: 1 retrospective group, 400 women who received standard bleeding prevention according to national clinical guidelines, and 2 prospective study group, which included 178 patients who, in addition to standard therapy, received terlipressin at the site of the incision on the uterus, in the thickness of the myometrium, at a dose of 0.4 mg, diluted to 10 ml with a solution of 0.9% sodium chloride. Statistics methods included: descriptive statistics methods; Student’s T-test; χ2 test and Fisher test.

Results and Discussion: In group 2, such pathologies as placenta accreta and hemostasis pathology were statistically significantly more common. In group 1, ligation of the uterine arteries was more often carried out in group 1 in 10.5%, in group 2 in 7.8%. Application of compression sutures to the uterus in 13.1% and 7.8%, respectively, the use of balloon tamponade of the uterus in 2.3% and 0% respectively. The need for hysterectomy was more often noted in the control group.

Estimated volume of blood loss (gravimetric method) in group 1 was 800.0 ml, group 2 was 700.0 ml (p=0.002). Assessment of hemodynamic parameters did not show significant differences. Assessment of laboratory parameters of haemoglobin, platelets, lactate, and hemostatic system had a number of statistical differences, but had no clinical significance.

Conclusion: The use of terlipressin in obstetric practice is an effective and safe method for the prevention of postpartum haemorrhage.

**23AP04-03**

No effect of tetracosactide for treatment of Postdural Puncture Headaches in postpartum — randomized controlled study

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**Background and Study Goal:** Post-dural puncture headache (PDPH) is a prevalent complication of neuraxial anesthesia, particularly impactful in obstetrics during the postpartum period. The established treatment for PDPH is an epidural blood patch (BP). Previous evidence suggested the potential efficacy of adrenocorticotropic hormone (ACTH) administered intravenously for alleviating PDPH symptoms. However, the growing clinical experience was conflicting, warranted a comprehensive trial. This study aimed to evaluate the efficacy and safety of tetracosactide, a synthetic ACTH analogue, in treating PDPH among postpartum patients benefiting from neuraxial analgesia during labor.

**Materials and Methods:** A randomized, double-blind, placebo-controlled, parallel-arm trial was conducted in two large obstetric hospitals in France. Eligible patients suffering from PDPH were randomly assigned to receive either 1 mg of tetracosactide IV over 20 minutes or 0.9% saline (placebo). The primary endpoint was the incidence of epidural BP administration within a 15-day follow-up period.

**Results and Discussion:** Initially planned for 88 patients, the study was prematurely halted after an interim analysis involving 50% of the intended population due to futility. The incidence of epidural BP within 15 days was 91% (treatment) vs. 86% (placebo), not statistically different (p=0.658). No significant disparities were noted in the number of BP performed, or the duration of headache.

However, a one-day difference in hospital stay was observed, with the treatment group experiencing a longer stay (5.0 [4.0-6.0] days vs. 4.0 [3.7-5.0] days), reaching statistical significance (p=0.049). No serious adverse effects related to tetracosactide administration were identified. These outcomes align with recently published retrospective data.

**Conclusion(s):** Our study doesn't support the use of ACTH analogues for the management of neuraxial analgesia-associated PDPH in postpartum patients. Apart from the lack of clinically relevant effects, the utilization of tetracosactide in this context resulted in a one-day increase in hospitalization. Consequently, ACTH analogues should be excluded from PDPH management protocols.

**References:**
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**Acknowledgements:** Authors thank our medical team from obstetric anesthesia departments of Croix Rousse et Femme-Mère-Enfant Hospitals for their help.

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**23AP04-04**

An approach to prevention and treatment of hypotension in elective caesarean sections under spinal anaesthesia: a survey of practices from a developing nation

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**Background and Goal of Study:** Hypotension is a frequent issue that occurs after spinal anesthesia in obstetric patients, affecting around 74% of elective cesarean deliveries. Several preventative and treatment measures have been reported, but there seems to be no agreement on which is the most successful. This study was carried out with the aim to find out the current practices among the anaesthetists across the country for preventing and treatment of hypotension.

**Materials and Methods:** We conducted a planned electronic survey in India from October to December 2022 to find out the preferences for preventing and managing spinal-induced hypotension in elective caesarean sections under spinal anesthesia. A questionnaire comprising 20 questions was sent to 1000 anaesthesiologists using Google form, which was shared via email among anaesthesiologists in India.

The survey remained accessible for a total of 60 days. The data that followed a normal distribution and was continuous was presented using the mean and standard deviation. Categorical data, on the other hand, was described using frequency and percentage.

**Results and Discussion:** The survey had a response rate of 27.7% (277/1000). Most respondents were from academic institutions, accounting for 46.5% of the total. Moreover, 50% of the anesthesiologists surveyed reported having more than 10 years of experience.

More than half (52%) of anesthesiologists had over 30% of their professional duty dedicated to obstetric anesthesia. Regarding prophylaxis, out of the 277 participants, 82 (30%) reported regularly using fluid co-loading in combination with vasopressors, while 20% continue to use fluid preloading. Among the individuals using vasopressors for prophylaxis, 48% administered mephentermine, 18% used phenylephrine, and 17% employed ephedrine. For treatment, 53% used mephentermine, 24% used phenylephrine, 21% used ephedrine, and 65% used agent based on heart rate.

Anesthesiologists with > 30% of clinical responsibility to obstetric anesthesia were less likely to use fluid preloading only and more likely to use fluid co-loading and vasopressors.

**Conclusion(s):** We conclude that there was significant heterogeneity in the strategies used to prevent and manage spinal-induced hypotension in cesarean patients. Despite evidence of their poor effectiveness, fluid preloading with crystalloids and mephentermine usage are still common in developing countries.
23AP04-05
Comparison of the effect of KETOFOL and KETODEX as procedural sedation and analgesia for oocyte retrieval during in-vitro fertilisation procedures - a randomized controlled pilot study

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Background and Goal of Study: Infertility affects 10-15%. IVF’s oocyte retrieval induces pain, impacting oocyte quality. Common anaesthetic agents have drawbacks, harming fertilization. Our study suggests KETODEX (ketamine with dexmedetomidine) for improved IVF pain relief, minimizing fertility and cleavage effects compared to KETOFOL (ketamine with propofol).

The primary goal is to compare pain scores, evaluating impacts on oocyte quality, fertility, cleavage, and pregnancy rate. Aiming for opioid-free analgesia during IVF oocyte retrieval.

Materials and Methods: All India Institute of Medical Sciences, Anaesthesiology Pain Medicine and Critical Care, New Delhi, India, Department of Obstetrics and Gynaecology, New Delhi, India, Institute of Medical Sciences, Department of Obstetrics and Gynaecology, New Delhi, India, 2All India Institute of Medical Sciences, Department of Obstetrics and Gynaecology, New Delhi, India

Results and Discussion:

improvements in IVF procedures and patient experiences.

30 each), evaluating anaesthetic efficacy for opioid-free analgesia during IVF oocyte retrieval.

on oocyte quality, fertility, cleavage, and pregnancy rate. Aiming for improved IVF pain relief, minimizing fertility and cleavage effects compared to KETOFOL (ketamine with propofol).

The Kolmogorov-Smirnov test was used for data normality. Nonparametric tests, including the Mann-Whitney Test and Independent t-test, were used to assess the variables. In the KP group, propofol doses [in milligrams] (mean±SD: 242±52, median: 250) and rescue boluses (mean±SD: 97.33±30.5, median: 95) surpassed the KD group. Ketamine dose [in milligrams] (mean±SD: 32.33±7.74, median: 30) and surgery duration [in minutes] (mean±SD: 24.17±7.44, median: 20) showed no significant differences.

Lower fertility rates were observed in KP (p<0.0007), with comparable cleavage rates on days 2 and 3 but higher in KD. Intraperoperative rescue anesigic need (60%) and complications (53.33%, p<0.0001) were higher in KP. KP exhibited a shorter time to awakening (mean 3.8±1.37, median 4 [3-4.75], p<0.195).

Although postoperative pain scores showed no significant difference, mild pain (VAS) occurred in KP at 10 and 30 minutes, contrasting with KD’s pain-free status until 2 hours postoperatively.

Conclusion(s): In the KD group (ketamine with dexmedetomidine) for IVF procedures, stable hemodynamics, no respiratory distress, and comparable oocyte grades were observed. Cleavage rates on days 2 and 3 were higher than in the KP (ketamine with propofol) group, indicating improved pregnancy outcomes.

KD had minimal pain, contrasting with 60% of KP patients needing fentanyl and reporting mild pain. KD had fewer complications (PONV) and higher satisfaction among surgeons and patients.

23AP04-07
Correlation of Rotational Thromboelastometry (ROTEM) derived parameters with severe obstetric haemorrhage

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Background and Goal of Study: Rotational thromboelastometry (ROTEM) parameters may predict severe postpartum haemorrhage. We investigated the correlation of these parameters with severe haemorrhage defined as: 1. Drop in haemoglobin concentration >4g.dL-1 within 48 hours; 2. Red blood cell transfusion of >1L; (3) angiographic embolisation, arterial ligation, hysterectomy; or (4) death.

Materials and Methods: We retrospectively analysed patients whom ROTEM was utilised between 2013 to 2021 at KK Women’s and Children’s Hospital with data obtained from the electronic medical record. Biserial correlation was calculated for severe haemorrhage and other continuous variables, while Pearson’s correlation was calculated between secondary outcomes and other continuous variables.

Results and Discussion: Data from 36 patients were analysed, and 29 (80.6%) developed severe haemorrhage. FIBTEM A5, A10, and A20 were highly correlated (r = +/-0.7), while EXTEM A5, A10, A20, maximum clot firmness, maximum lysis, and lysis index-30 were moderately correlated (r = +/- 0.5 to 0.7) with severe haemorrhage, consistent with studies reporting associations between fibrinogen concentration, EXTEM A10, and FIBTEM A10 with severe haemorrhage [1,2]. We acknowledge limitations such as the retrospective design and small sample size.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Severe haemorrhage</th>
<th>Correlation coefficient</th>
<th>Lowest haemoglobin concentration within 48hr</th>
<th>Estimated blood loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIBTEM A5</td>
<td>-0.827</td>
<td>0.036</td>
<td>0.055</td>
<td></td>
</tr>
<tr>
<td>FIBTEM A10</td>
<td>-0.774</td>
<td>0.040</td>
<td>0.046</td>
<td></td>
</tr>
<tr>
<td>FIBTEM A20</td>
<td>-0.855</td>
<td>0.031</td>
<td>0.051</td>
<td></td>
</tr>
<tr>
<td>EXTEM alpha angle</td>
<td>-0.535</td>
<td>0.263</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>EXTEM A5</td>
<td>-0.609</td>
<td>0.228</td>
<td>0.007</td>
<td></td>
</tr>
<tr>
<td>EXTEM A10</td>
<td>-0.591</td>
<td>0.248</td>
<td>0.012</td>
<td></td>
</tr>
<tr>
<td>EXTEM A20</td>
<td>-0.544</td>
<td>0.225</td>
<td>0.021</td>
<td></td>
</tr>
<tr>
<td>Clotting time</td>
<td>0.289</td>
<td>-0.400</td>
<td>0.188</td>
<td></td>
</tr>
<tr>
<td>Maximum clot firmness</td>
<td>-0.524</td>
<td>0.270</td>
<td>0.008</td>
<td></td>
</tr>
<tr>
<td>Clot formation time</td>
<td>0.495</td>
<td>0.266</td>
<td>0.038</td>
<td></td>
</tr>
<tr>
<td>Maximum lysis</td>
<td>-0.593</td>
<td>-0.040</td>
<td>-0.122</td>
<td></td>
</tr>
<tr>
<td>Lysis index at 30min</td>
<td>0.555</td>
<td>-0.125</td>
<td>-0.004</td>
<td></td>
</tr>
<tr>
<td>Lowest fibrinogen within 48hr</td>
<td>-0.577</td>
<td>0.223</td>
<td>0.089</td>
<td></td>
</tr>
</tbody>
</table>

Conclusion: FIBTEM A5 and A10 are highly correlated with severe haemorrhage.

References:
23AP04-08
Maternal cardiac output during spinal anesthesia in supine compare with left uterine displacement position determined by echocardiography

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Background and Goal of Study: Post-spinal hypotension is a common maternal complication during cesarean section. Supine hypotensive condition due to aortocaval compression during spinal anesthesia has been assumed as a precipitating factor. Although left uterine displacement (LUD) has been recommended to prevent aortocaval compression, the effectiveness has been debated and made operation more difficult. The cardiac output will affect blood pressure and the position might be affected in cardiac output. Objective to compare maternal cardiac output (CO) determined by transthoracic echocardiography undergoing elective cesarean section under spinal anesthesia in supine with LUD position.

Materials and Methods: A randomized controlled non-inferiority trial was conducted from June to November 2021. Healthy term pregnancy aged between 18-34 years undergoing elective cesarean section under spinal anesthesia were randomized to supine (S) and LUD (L) groups. Demographic data and cardiac output measured by transthoracic echocardiography (TTE) before and 5 min after spinal anesthesia in both groups were recorded.

Results and Discussion: Fifty pregnancy were enrolled. (n=25, each group) The cardiac output of S and L group before spinal anesthesia were 7.22 LPM and 7.52 LPM respectively, the result was not significantly different (p-value 0.430). The CO of both groups at 5 min after spinal anesthesia were 7.33 LPM and 8.23 LPM respectively (p-value 0.101).

Difference CO between before and 5 min after spinal anesthesia were 1.21 in S and 1.52 in L group (95%CI; -0.51-1.13), the result was not significantly different between the groups (p-value 0.448). Hypotension was found in 28% and 44% parturients in S and L group respectively.

Conclusion(s): Supine position was not effect on cardiac output of pregnant women under spinal anesthesia when compare with LUD position.

References:

23AP04-09
Preferred techniques for obstetric anaesthesia and analgesia in Czech and Slovak Republic in the year 2022: prospective observational survey

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Background and Goal of Study: In the year 2011 and 2015 the studies OBAAMA-CZ and OBAAMA-INT described anaesthesiological practice for obstetric anaesthesia and analgesia in the Czech Republic (CZ) and Slovak Republic (SR).

The aim of the OBAAMA-COV study performed in the year 2022 was to describe preferred techniques and evaluate the impact of the COVID-19 pandemic on the obstetric anaesthesia and analgesia.

Materials and Methods: OBstetric Anaesthesia nad Analgesia Month Attributes COVID (OBAAMA-COV) was held on anaesthetic departments throughout the CZ and SR. With Ethical Committees Approval we aimed to enroll all obstetric departments in CZ and SR to monitor every case of anaesthetic care in peripartum period during November 2022. Data were recorded to Case Report Form with two parts (Demography 2021 and Case Report) into CLADE-IS (Masaryk University, CZ). The data were described descriptively. Fisher’s exact test was used in case of categorical variables (R software).

Results and Discussion: During the study period, we enrolled 86 participating centers (64 in CZ, 22 in SR) and 3513 cases. At the time of statistical analysis 3435 were valid. Cesarean Section (CS) rate was 27.2 %; in CZ 27.1 %, in SR 27.5 % (24.0 % in 2015, 24.3 % in 2011). The most preferred type of anaesthesia for CS was neuraxial anaesthesia in 66.9 %; 66.1 % in CZ, 68.6 % in SR (62.9 % in 2015, 52.4 % in 2011); spinal in 86.7 % (87.8 % in 2015, 76.0 % in 2011).

Postoperative analgesia after CS was provided mostly with opioid or non-opioid analgesics (40.6 %; 61.0 %) solely or in combination. Epidural analgesia rate was 15.8%; in CZ 15.5 %, in SR 16.4 % (10.7 % in 2015, 12.1 % in 2011). COVID-19 positivity was recorded in 15 patients (7 with symptoms), 13 of them had CS, 2 epidural analgesia.

Conclusion: Compare to previously published Czech and Slovak national data, there is a positive trend in preference of neuraxial anaesthesia for CS and epidural analgesia. COVID-19 may have been an accelerator of this, although in November 2022 COVID-19 was marginal for obstetric anaesthesia.

Reference:

Acknowledgements: This research was supported by Specific University Research provided by MŠMT (I/MUNI/A/1105/2022, MUNI/A/1109/2022), supported by MH CZ – DRO (FNBr, 65269705). ClinicalTrials.gov ID: NCT04912791
Background and Goal of Study: General anesthesia (GA) is sometimes the only option for emergency caesarean section (CS) or when a neuraxial anesthesia (NA) is contraindicated. Our goals were to monitor the incidence of GA for CS and to know the main causes of GA in CS in a tertiary hospital along a one-year period.

Materials and Methods: A 12-months internal audit was conducted in a tertiary national referral hospital between December 2022 and November 2023. The mode of delivery was assessed: vaginal birth (VB), instrumental delivery (ID) and CS. Among CS performed under GA, we collected: the level of urgency (Emergency CS -Categories 1 to 3- and Scheduled CS -Category 4-), the presence of previous NA, intrapartum CS and the indication for GA. The indicators were analysed using a X² test. p<0.05 was considered significant.

Results and Discussion: During the audit, 5005 women delivered in our hospital, 3097 (61.9%) by VB, 614 (12.3%) by ID and 1294 (25.8%) by CS, with no significant variation between months. 931 (71.9%) CS were emergent and 363 (28.1%) scheduled. GA was required in 60 (4.6%) CS.

Among all CS in the one-year period, the incidence of GA in emergency CS was 52 (5.6%), and 8 (2.2%) in scheduled CS (p=0.01; OR=2.63 [1.23;5.58]), following the current recommendations of international guidelines.

The grades of urgency in the CS performed under AG were: Category 1 in 40 (66.7%), Category 2 in 11 (18.3%), Category 3 in 1 (1.7%) and Category 4 in 8 (13.3%) patients.

The main causes of GA were: Cat.1 CS in 31 (51.7%), contraindication for NA in 20 (33.3%) and failure of NA in 8 (13.3%) cases. 16/60 (26.7%) patients had a NA before GA, which failed in 8 (50%) or couldn’t be used due to extreme emergency in 8 (50%). Of all CS performed under GA, 15 (25%) were intrapartum CS: in 10 (66.7%) cases the indication for GA was an extreme emergency, in 4 (26.7%) a failed block and in 1 (6.7%) a contraindication to neuraxial block.

Conclusion(s): The incidence of GA for CS was similar to that described in the recent literature, despite the high risk pregnancies treated in our tertiary hospital. The most frequent indications for GA in CS were life-threatening emergencies and contraindication for a regional technique. There is room for improvement in failed NA during intrapartum CS.

References:
23AP05-01
Spinal anaesthesia in primigravida with long QT syndrome for urgent section delivery: a case report

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¹University Hospital of Split, Department of Anesthesiology and Intensive Care, Split, Croatia, ²University Hospital of Split, Department of Gynecology and Obstetrics, Split, Croatia, ³University Hospital of Split, Department of Cardiology, Split, Croatia, ⁴General Hospital Sibenik, Department of Gynecology and Obstetrics, Sibenik, Croatia

Background: Long QT syndrome (LQTS) is a congenital disorder manifested by a prolongation of the QT interval on electrocardiogram and tendency to ventricular tachyarrhythmias, which may lead to syncope, cardiac arrest, or even sudden death.

Case Report: A 32-yr-old woman, gravida 1, with congenital LQTS type 2 and mutations in the KCNH2 gene, was hospitalized in the 37 + 6/7 week of pregnancy. She was aware of her illness since childhood, and had experience syncope when she was 11. At age 16, an automatic implantable cardioverter-defibrillator was inserted in her chest and beta-blocker metoprolol was introduced in therapy.

Given that numerous medications may prompt ventricular tachyarrhythmias and provoke sudden death, cardiologist advised vaginal delivery. However, during hospitalization prelabor rupture of membranes occurred so an urgent Cesarean section (CS) was inevitable.

We performed a spinal anaesthesia (SA), in the sitting position, using a 27G pencil point needle at the L3 to L4 interspace with 10 mg of hyperbaric 0.5% bupivacaine and 10 µg of fentanyl. CS was done in standard fashion with an administration of 5 IU of oxytocin in bolus following child delivery.

The patient was monitored using pacemaker programmer during the procedure and no significant arrhythmias were registered. Hemodynamic stability intraoperatively was maintained only by fluids. Furthermore, no arrhythmias, hypotension episodes nor electrolytes imbalance were noted till hospital discharge. Male child had Apgar scores 10 at 1 minute and 5 minutes, respectively. At gynecological examine 1.5 month after CS the patient did not report any health issues, while genetic testing excluded LQTS in childhood, and had experience syncope when she was 11. At age 16, an automatic implantable cardioverter-defibrillator was inserted in her chest and beta-blocker metoprolol was introduced in therapy.

Discussion: By reviewing the literature many medications are associated with QT prolongation, in particular those used in general anaesthesia. Several medications are strictly forbidden to administer, such as dexamethomidine, ketamine, sufentanil, succinylcholine, panceuronium, atropine and epinephrine.

In our patient, we did not observe rapid onset hypotension following SA which could lead to a ventricular arrhythmia and cardiac arrest.

Our case further supports safe usage of SA for urgent CS in parturient with LQTS.

Reference:

Learning Points: SA may consider in parturient with LQTS as a safe option for urgent CS, if necessary.

23AP05-02
HELP syndrome or acute liver failure (ALF) in early postpartum period?

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¹National Scientific Center of Surgery and Transplantation named by Shalimov, Anaesthesiology and ICU, Kyiv, Ukraine, ²Bohomolets National Medical University, Surgery, Anaesthesiology and Intensive Care of IPE, Kyiv, Ukraine, ³National Scientific Center of Surgery and Transplantation named by Shalimov, Liver Surgery and Transplantation, Kyiv, Ukraine

Background: HELLP syndrome (HELP) is rare and serious syndrome during pregnancy characterized by hemolysis, elevated liver enzymes and low platelet count. It occurs in 0.5-0.9% of cases and in 10–20% cases of severe preeclampsia.

HELP Class 2 and 3 of Mississippi classification may be misdiagnosed because of normal or slightly elevated ALT/AST levels. We present such a case of HELP/ALF for open discussion.

Case Report: Patient T. 21 y.o., admitted to intensive care unit (ICU) of Transplantation center (TC) with diagnosis of ALF and coagulopathy on Day 5 after urgent cesarean section (CS). Patient was in sopor, T. 38.0°C, NIBP-112/68 mm Hg, HR - 100 bpm, SpO₂ – 93% on room air.

Laboratory data: total bilirubin 124.3 µmol/l; direct bilirubin 90.7 µmol/l; AST 40 U/L; ALT 48 U/L; platelets 55×10⁹/L; LDH 1211 U/L; fibrinogen 0.65 g/l; PT 29.1 sec; INR 2.1. The rest of the parameters were normal.

Anamnesis: Toxemia of pregnancy and dysadaptation since week8 of gestation (W8), quetiapine 100 mg/day prescribed and took continuously. At W33 patient was hospitalized to perinatal center with periodic attacks of vomiting and abdominal pain at upper quadrant. Because of placenta abruption and fetus distress, urgent CS was performed at W35 of gestation. On Day 1 after CS patient became agitated and aggressive following by sudden loss of consciousness. Before transfer to TC - platelets 55×10⁹/L; fibrinogen 0.65 g/l; PT 29.1 sec; INR 2.53; LDH 1197 U/L; AST 46,67 U/L; ALT 36,05 U/L.

After admission to TC 2U of FFP and 2U of platelet concentrate were transfused. Quetiapine was cancelled, anxiolytic therapy with haloperidol started. Patient was discharged from the hospital at Day 8 after admission to TC. All the symptoms disappeared in late postpartum period.

Discussion: HELLP is a multisystem disease with generalized vasospasm, micro-thrombois and coagulopathy. One of the symptoms-epigastric pain caused by stretching of Glisson’s capsule due to sinusoidal obstruction of blood flow. However, symptom is nonspecific and may lead to diagnostic delay.

Absence of all typical signs of preeclampsia (normal levels of ALT and AST) made it tuff to diagnose HELLP in peripartum period. Continues usage of quetiapine can hid the signs of HELLP.

References:

Learning points: HELLP is rare but life threatening condition. Early suspicion and diagnosis can improve patient’s outcome.
23AP05-03
Who to save first? A Dilemma in managing Intracerebral Hemorrhage in the Third Trimester: a case report

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Background: Anesthesiologists face a dilemma when emergent neurosurgery (NS) is required during the third trimester: delay in NS risks irreversible deficit, while performing NS before Cesarean section (CS) exposes the fetus to anesthesia, leading to neonatal sedation.

Case Report: A 39-year-old G2P1 woman at 37 weeks of gestation presented with drowsy consciousness and right hemiplegia, diagnosed with left temporal intracerebral hemorrhage (ICH) with midline shift and uncal herniation.

The proposed plan was left temporal craniotomy in lateral decubitus, followed immediately by CS in the lithotomy position. General anesthesia was maintained with propofol and remifentanil. During the 201-minute NS, the fetal heart rate declined from 120/min to 105/min.

Consequently, the neonate, appearing flaccid and without spontaneous crying, was intubated promptly upon delivery. Fortunately, he was extubated 11 hours later, showing no sequelae.

The mother’s condition was attributed to arteriovenous malformation (AVM) rupture secondary to hypertensive crisis of pre-eclampsia. She achieved partial independence in ambulation after rehabilitation.

Discussion: Preeclampsia and AVM are the leading causes of pregnancy-related ICH (12 per 100,000 deliveries). For third-trimester neurosurgical emergencies, the proposed rationale of performing CS before NS to avoid fetal anesthetic exposure right before delivery pertains primarily to subacute conditions, such as brain tumors [1].

However, in acute ICH and uncal herniation, any delay in NS may lead to progression of neurological deficit, threatening both lives. Therefore, CS should follow NS if not performed simultaneously due to different positioning.

During the NS, crucial considerations include application of continuous fetal monitoring, availability of a pediatric and obstetrician team, and administration of tocolytics and shortest-acting anesthetics.

While hyperventilation reduces intracranial pressure, avoiding overt hypocapnia is crucial to prevent placental vasoconstriction. Neonatal sedation following anesthetic exposure is inevitable, but timely resuscitation mitigates potential risks.

Reference: 1. doi:10.25259/SNI_1076_2022

Learning Points: In cases of acute ICH during pregnancy, the main focus is minimizing irreversible maternal deficit, taking precedence over concerns about neonatal sedation. Meticulous anesthetic planning is the key to achieving a favorable outcome for both the mother and her baby.

23AP05-04
Rare cause of three-stage delayed postpartum hemorrhage due to pseudoaneurysm of the uterine artery in a patient with a history of familial factor XIII deficiency is masked by standard therapy

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Background: Postpartum hemorrhage (PPH) is a common cause of maternal death. Obstetricians and anaesthetists are familiar with the most common causes of PPH, such as uterine atony, retention of placental fragments, birth injury, or consecutive coagulopathy [1,2]. However, rare causes such as pseudoaneurysms of the uterine artery can cause significantly delayed PPH which is difficult to diagnose and manage, especially if diagnosed late [3].

Case Report: A 34-year-old healthy woman (GI/P0) underwent an elective caesarean section without complications. The patient was discharged but was readmitted 12 days after the caesarean section for an emergency curettage and balloon placement for massive delayed PPH due to suspected placental fragments and uterine atony. After bleeding control the coagulation laboratory remained undetected. In addition, a rare coagulation disorder was considered and excluded after laboratory control. An unrecognised cause of secondary PPH can lead to life-threatening complications, such as the three-stage PPH in our case.

To avoid this, rare causes of PPH may need to be included in the diagnostic algorithms, especially in delayed PPH. Pseudoaneurysms often require angiography for detection and transarterial embolization to stop the bleeding potential [1,2,3].


Learning points: Standard treatment, especially if it works, can obscure the diagnosis of rare causes of PPH, such as uterine artery aneurysms, which are difficult to detect by ultrasound or CT/MRI.

Bleeding from pseudoaneurysms can occur even several weeks after vaginal delivery or caesarean section.
23AP05-06
Management of high-risk pulmonary embolism and ECMO therapy in a pregnant woman, case report

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Background: Treatment choice in high-risk pulmonary embolism (PE) in pregnant population is a challenge. Knowledge of the different therapeutic options and associated risks are crucial in an emergency scenario. We present the case of a 34-year-old female, nulliparous, 31th week of gestation, diagnosed with bilateral massive PE.

Case Report: Patient with no drug allergies, and no Medical history, referring recurrent syncope. On admission, haemodynamically stable, ECG with S1Q3T3 pattern. Thoracic angiography and echocardiography showed a massive bilateral PE. Maternal anticoagulation, pulmonary maturation and foetal brain protection were initiated.

Due to a rapid haemodynamic deterioration, a multidisciplinary team indicated a pulmonary mechanical thrombectomy. During the procedure, the patient presented a cardiac arrest. Under CPR manoeuvres, an emergent caesarean section was initiated, resulting in a foetal death. Extracorporeal cardiopulmonary resuscitation (ECPR) was applied, achieving a sustained return of spontaneous circulation (ROSC) after 50 minutes. Clinical improvement with ad integrum recovery after 48 hours.

Discussion: Pulmonary mechanical thrombectomy in PE is a reperfusion option for patients with high risk for bleeding, in settings with great technique experience. 100% survival, 20% of major bleeding and 25% of associated foetal deaths are described, however there are no randomised controlled trials comparing this treatment with fibrinolysis. ECMO therapy and ECPR have been described as concomitant therapy to any reperfusion treatment with great survival outcomes.

References:

Learning points: There is no scientific evidence to support a reperfusion therapy technique over others in high risk for bleeding patients. The availability and experience of the centre and team are crucial in decision-making. Foetal survival depends mainly on correct maternal resuscitation, raising the possibility of perimortem caesarean section in the first 5 minutes after cardiac arrest.

23AP05-07
Spasm of the musculus masseter (Trismus) after administration of succinylcholine. A case report

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Background: The prevalence of malignant hyperthermia (MH) is 1:10,000 to 1:100,000 of all general anaesthesia (fulminant course), of which 50% of cases are <15 years of age, preferably in males (♂). In 70% of all cases, a defect in the ryanodine receptor type 1 (RYR1) or mutation of the RYR1 gene on chromosome 19q13.2 is responsible for this autosomal dominant disease.

In addition to the known triggers such as succinylcholine, volatile anaesthetics, but also excessive alcohol consumption, psychological stress and heating can trigger the disease and may release an MH crisis[10].

Case Report: 42-year-old female patient (ASA 2, Re-re-re-Sectio, 95 kg, 185cm, BMI: 27.8 kg/m²) was intubated for emergency caesarean section due to intrauterine growth restriction with pathologic Dopplers in the 26th week of pregnancy. Immediately after succinylcholine administration, a muscle masseter spasm (Trismus) was observed, which led to significantly difficult intubation. Since an MH was suspected, the patient was immediately switched to trigger-free anaesthesia. In addition, the outpatient clarifications by MRI and the MH-Center were done.

Discussion: Although the prevalence of malignant hyperthermia is rare, attention should be paid to the symptoms of this disease. In our case, trismus was the only sign we observed after the administration of succinylcholine, which leads to a difficult intubation. In addition to the usual measures such as trigger-free anaesthesia the therapy is the inhibition of the of calcium release from the sarcoplasmic reticulum and interruption of skeletal muscle hypermetabolism by dihydropyridine-blockers[10]. In addition to the immediate intraoperative measures, further clarification is also important.

References:

Learning Points: This case report shows that rare anaesthetic complications such as trismus as an indication of subclinical myopathies can be potentially fatal. Early recognition, stop and avoidance of trigger exposure and, if necessary, initiation of therapy as well as supportive treatment of metabolic imbalances and further clarification are crucial.
Case report: 38-y.o. primigravida with MMD, essential hypertension, gestational diabetes and migraine. MMD was diagnosed in childhood after an ischemic stroke with left sided paralysis and she underwent encephaloduroarteriosynangiosis. BP goals during pregnancy were 130-150/80-90mmHg and treatment in childhood was aspirin 75mg x1, labetalol 100 mg x2 and nifedipine 30 mg x1.

At week 36+0 she was diagnosed with severe pre-eclampsia due to high BP (165-190/100mmHg) headache and vomiting. Intracranial hemorrhage was ruled out via CT before an acute caesarean section. In the OR we started invasive blood pressure and CO monitoring with Clearsight®. Labetalol and MgSO4 infusions were started before the neuraxial anesthesia: combined spinal epidural with bupivacaine 5mg, fentanyl 10µg and morphine 100µg and an epidural dose of ropivacaine 7,5mg/ml, 13ml over 38 min to reach a Th4 level. BP fell to 89/39mmHg 5 min after spinal administration and quickly recovered with a noradrenalin infusion at 0.05 µg/kg/min and remained stable.

After fetal extraction 5IU oxytocin were administered over 5 minutes and an oxytocin infusion started at 9 IU/h. Total bleeding was 620ml.

The patient was transferred to ICU, discharged to the ward after 20 hours and home after 7 days with labetalol 100 mg x2 and nifedipine 30mg x1, without neurological complications.

Discussion: This patient had two vascular diseases that can lead to significant morbidity and can have contradicting treatment goals. In both the goal is to maintain perfusion and an adequate BP, but MMD patient benefit of fluid loading while pre-eclampsia benefits from fluid restriction.

References:

Learning Points:
- Advanced hemodynamic monitoring before initiating anesthesia allows faster reaction to BP changes.
- A slowly toped CSE helps manage BP more precisely in patients with tight BP goal margins.
- A multidisciplinary team lead by an obstetric anesthesiologist can help reduce morbidity in patients with complex vascular disease during pregnancy.
23AP05-10
Megaloblastic anemia in pregnancy leading to urgent cesarean section: a case report

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Background: Severe deficiency of B12 in pregnancy have been associated with neural tube defects, preterm birth and intra-uterine deaths. It may also manifest with microangiopathic hemolytic anemias, low platelets, elevated liver enzymes and hyperbilirubinemia.

Case Report: A 31-year-old Indian woman, G2P1, 40+2 weeks pregnant, vegetarian, presented for obstetric consultation with aggravated anemia and new-onset thrombocytopenia. She reported dizziness and asthenia. Blood laboratory data were as follows: leukocytes 3,89x10³/μl, hemoglobin 7,9g/dL, MCV 91,9fL, platelet count 70x10³/μl, AST 31U/L, ALT 14U/L, serum lactate dehydrogenase 1444U/L. After consultation with the hematology department, it was established a significant risk of small vessel thrombosis. Thus, considering the risk of fetal death, a cesarean section was performed, under general anesthesia. Intraoperatively, 1 unit of red blood cells was transfused. At the end of surgery, the patient was extubated and remained hemodynamically stable. She was then admitted to the ICU for continuous monitoring and additional research.

Over an uneventful 4-day period, she presented significant clinical improvement. She was discharged home 11 days after surgery with the diagnosis of megaloblastic anemia due to folate and vitamin B12 deficiency, promptly corrected and supplemented.

Discussion: While the patient remained hemodynamically stable, induction of labor was avoided due to a substantial risk of fetal death. Hence, opting for a prompt surgical delivery was the most prudent approach. Managing anesthesia in such cases presents a challenge for anesthesiologists.

General anesthesia carries a higher maternal-fetal anesthetic risk, while regional anesthesia, despite enhancing uteroplacental blood flow and neonatal outcomes, introduces coagulopathy-related risks. Given the patient’s severe thrombocytopenia, general anesthesia emerged as the optimal choice.

Learning points: This case report underscores the significance of screening for B12 deficiency in at-risk pregnant women, particularly those with unexplained anemia or thrombocytopenia, such as pure vegetarian women. In our multicultural era, pregnant women from diverse backgrounds pose unique challenges due to varied dietary practices. This highlights the need for early detection and collaborative treatment by hematologists, obstetricians, and anesthesiologists to reduce maternal-fetal morbidity and mortality.

23AP06-01
Anesthesia management in pregnant women with HELLP syndrome vs acute fatty liver of pregnancy syndrome: case report

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Background: There is considerable overlap between acute fatty liver of pregnancy (AFLP) and HELLP. Although the initial management is similar it is important to differentiate between the two disorders because patients with AFLP can rapidly develop liver failure, encephalopathy, and severe hypoglycemia.

Case report: A 33-year-old, G1P0, 33 weeks pregnant female, with a history of gestational diabetes, was admitted to the emergency department with complaints of nausea and vomiting since the day before. The investigation revealed changes in hepatic function and coagulation profile which wasn’t present in previous evaluation.

The patient’s admission blood laboratory data were: serum aspartate aminotransaminase 123U/L, serum alanine aminotransaminase 175U/L, serum lactate dehydrogenase 316U/L, hemoglobin 10,1g/dL, platelet count 118x10³/ml, prothrombin time 17,8s, activated partial thromboplastin time 59,7s, fibrinogen 0,98g/dL and creatinine 1,96mg/dL.

Due to these findings and risk of worsening, pregnancy was terminated and she underwent a cesarean section. Since the patient was hemodynamically stable it was possible to optimize the coagulopathy before the cesarean and, after discussing the case with hematology, 3 units of plasma and 1 gram of tranexamic acid and fibrinogen were administered. An arterial line was placed and a total intravenous anesthesia was decided.

After rapid sequence induction of anesthesia, tracheal intubation was performed under videolaryngoscopy. At the end of surgery, the patient was extubated, remaining stable and admitted to the ICU for surveillance.

During her stay there, the patient had a significant clinical improvement, with resolution of renal, hematological and hepatic dysfunction, being discharged from the ICU after 3 days and discharged home after 7 days.

Discussion: The decision on anesthesia for these patients depends mainly on an overall assessment of the benefits and risks that the anesthesia effect can cause both to mothers and babies. Due to the presence of coagulopathy, neuraxial anesthesia for labor and/or delivery may not be possible in these patients.

Learning points: The management of these patients requires multidisciplinary team. Regardless of the preferred anesthesia technique, it should be kept in mind that complications are still possible in the postpartum period, and most maternal deaths occur within the first postpartum week. Therefore, these patients should be followed up in the ICU after surgery.
Perioperative evaluation and anesthetic management of cesarean delivery in severe pulmonary hypertension

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**Background:** Pregnancy in women with pulmonary hypertension (PH) carries a very high risk for maternal and fetal cardiopulmonary complications. The risk of maternal death was identified to be in the range of 30-56% in the pre-prostacyclin era. Nearly all fatalities occur early post-partum and death is mainly due to heart failure. Anesthetic management during cesarean section and after that, is very important for the further prognosis of the patient.

**Case Report:** We present a case of a 23 year-old-woman primigravida who complains of shortness of breath, fatigue and palpitations at 15 weeks gestation. Her past medical history is notable for surgical closure of the ventricular septal defect at the age of four. She has been under sildenafil treatment for 9 years because of PH, which was then interrupted by a personal decision of the patient.

Physical examination is notable for low oxygen saturation on pulse oximetry (86-90%). The initial electrocardiogram showed a heart rate of 80 bpm, sinus rhythm, complete right bundle branch block (RBBB), atrioventricular block (AVB) grade II Mobitz I. The transthoracic echocardiogram (TTE) revealed dilated right cavities with Pulmonary Artery Systolic Pressure of 125 mmHg. Planned caesarean delivery with spinal anesthesia (L3-L4) was performed using bupivacaine 0.5% solution combined with 0.1 mg morphine. Initially 500 ml of crystalloid solution was administered. Arterial pressure was maintained at acceptable values with noradrenaline infusion, which continued for the first 24 hours post surgery. Prophylactic anticoagulation therapy, diuretics and sildenafil were given. No untoward incident occurred during the perioperative period.

**Discussion:** The biggest concern in the perioperative period for this patient is acute decompenation of the right ventricle from volume overload, PH crises and installation of a AVB. This is why vaginal delivery was avoided since she has limited capability to increase her cardiac output during contractions. Spinal anesthesia was performed to avoid the cardiodepression by volatile agents and increase of pulmonary vascular resistance during intubation and positive pressure ventilation in general anesthesia.

**Learning points:** Obstetric patients with very serious heart problems is not every day work for anesthesiologist attach in obstetric department. Multidisciplinary approach, including, cardio-anesthesiologist, cardiologist, is a key to the successful management of these patients.

Providing anesthesia for cesarean section surgery to a Pompe disease patient

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**Background:** Pompe disease (PD), alternatively recognized as an acid maltase deficiency (AMD) or glycogen storage disease type II (GSDII), is a genetic disease transmitted in autosomal-recessive way. It emerges due to a shortage of the enzyme acid-\(\alpha\)-glucosidase (GAA) within lysosomes \cite{1}. Consequently, PD leads to the buildup of glycogen in multiple body tissues, particularly in skeletal, cardiac, and smooth muscles. The morbidity of PD varies depending on patient’s age when the symptoms first appear, the degree of complexity of harm to skeletal, cardiac, and respiratory muscles, and the speed of disease progression. The occurrence rate for all types of PD is approximately 1 in 40,000 \cite{2}.

In general, the severity of the condition is linked to the GAA enzyme’s activity level in an inverse relationship.

**Case Report:** A 29-year-old pregnant woman (1.73 m/67 kg), on her 39th week of pregnancy, known to have juvenile Pompe disease, was admitted for a scheduled cesarean section. Her symptoms first emerged when she was 20 years old, experiencing difficulty while standing up from a squatting posture. The diagnosis was validated through leukocyte enzyme analysis and muscle biopsy. She commenced enzyme replacement therapy (ERT) with alglucosidase alpha, administered intravenously at a dose of 20 mg/kg over a 5-hour infusion every 2 weeks. The pregnancy was not planned, yet the patient consistently received enzyme replacement therapy (ERT) throughout the gestation period.

At 39 weeks, she was admitted for a secure delivery. Blood tests and echocardiography displayed normal results. However, pulmonary function tests conducted while standing and sitting indicated significant restrictions \cite{4}.

**Discussion:** In 1963, the connection between the inherited shortage of the lysosomal enzyme acid-alpha-glucosidase (GAA) and Pompe disease (PD) was initially established. This particular enzyme plays a vital role in breaking down glycogen into glucose. Insufficient GAA results in glycogen buildup within lysosomes, primarily within muscle cells, triggering a gradual decline in muscle function \cite{4,5}.

**References:**
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Nitu Puthenveettil, Jibina Susan Issac, Dilesh Kadapamannil, and Jerry Paul
23AP06-04
Anesthetic management of a spontaneous hemorrhagic stroke following severe preeclampsia: a case report

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Background: Hemorrhagic stroke (HS) is an infrequent but known complication of preeclampsia. In spite of the commonly high maternal and fetal mortality rates in these scenarios, we present an unique situation where both the mother and the infant had a positive outcome.

Case Report: A 39-year-old woman, gravida 8 para 4 presented at 32 weeks and 6 days of gestation with sudden onset of intense bilateral temporal headache with vomiting, blood pressure (BP) of 200/100 mmHg, inability to speak, right-sided hemiplegia and significant proteinuria.

Due to an altered mental status, she underwent sedation and intubation. As the fetal cardiotocography (CTG) tracing showed no abnormalities, we proceeded with cerebral computed tomography (CT) and magnetic resonance imaging (MRI), both of which confirmed the diagnosis of a left cerebellar vermis and left cerebellar hemisphere hemorrhage with evidence of marked mass effect and tonsillar herniation. Emergency decompression craniotomy with intracranial hemorrhage (ICH) evacuation was conducted followed by emergency c-section as non-reassuring CTG tracing was observed during the procedure. She fully recovered with no neurological impairments.

Discussion: Over 50% of pregnancy-related strokes are hemorrhagic, often linked to factors like vascular issues, hypertension disorders, and coagulopathies. In our case, preeclampsia or severe hypertension is the likely cause, since other causes were excluded by exams. Inadequate management of high blood pressure in pregnancy leads to preventable morbidity and mortality. Obstetric anesthesiologists play a vital role similar to intensivists, requiring extensive knowledge and skills for life-saving interventions such as real-time monitoring guided delivery decisions, prioritizing maternal and fetal safety. Enhancing prenatal education and interdisciplinary awareness of cardiovascular risks is crucial.

Reference:

Learning Points: This case emphasizes the importance of thorough neurological evaluation for pregnant women with neurological symptoms and highlights the critical role of effective communication and coordination among obstetricians, anesthesiologists, and neurosurgeons for successfully managing such challenging cases. Stabilization takes precedence, and if necessary, a lifesaving c-section by a skilled obstetrician should be considered.

23AP06-05
Prolonged neuromuscular block following succinylcholine administration in urgent c-section: a case report

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Background: Pseudocholinesterase (PChE) deficiency is an inherited or acquired condition in which the metabolism of succinylcholine (SCh) is potentially impaired, resulting in prolonged paralysis and apnea. Considering the well established risk of difficult airway and aspiration in pregnancy, SCh is still frequently used for rapid sequence intubation (RSI) in pregnant women. We report the case of prolonged neuromuscular block following SCh administration for urgent c-section.

Case Report: A 39-ye pregnant woman, ASA II, 41w+3d of gestation, OI 1011, was admitted for induction of labor. She had no medical or surgical priors. Due to non-reassuring fetal status on CTG, she was scheduled for urgent c-section. Epidural anesthesia was insufficient and the procedure was performed under general anesthesia - RSI with propofol 2mg/kg + SCh 100mg+ fentanyl 100mcg (following birth) and maintenance with sevoflurane. Following the end of the procedure, due to lack of spontaneous breathing and delay in anesthetic emergence, naloxone 100mcg was administered, with no effect. Given awake BIS, hypertension with tachycardia when stimulated, associated with ToF ratio 0, a PChE deficiency was suspected - the patient was sedated and transferred to the PACU for ventilator support.

She was extubated 5 hours later, after meeting the extubation criteria. Blood PChE levels were measured, confirming decreased serum level of 103 UI/L (NR 5300 - 12900 U/L). She was later discharged home with no further complications.

Discussion: Of the many acquired causes of PChE deficiency, pregnancy has been shown to lead to a reduction in the PChE levels. With the dissemination of sugammadex, rocuronium poses an alternative for SCh when RSI is indicated.

However, albeit the increased possibility of PChE deficiency in pregnant women, given the lack of evidence regarding the safety of sugammadex during breastfeeding, the best muscle relaxant for RSI in pregnancy is still controversial.

Reference:

Learning Points: Pregnancy is a known acquired cause of PChE deficiency, with increased probability of prolonged paralysis and apnea following succinylcholine (SCh) administration in this population.
Thrombocytopenia in pregnancy - Gestational or COVID induced?

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Background: Most common cause for thrombocytopenia in pregnancy is ‘Gestational’, followed by Idiopathic or immune thrombocytopenia purpura and PIH. Most cases are mild and usually above 70-80000 and rarely cause any problem.

Case report: A 30 year old female (G2) presented to PAC for elective LSCS. She had thrombocytopenia in first pregnancy (during the covid pandemic) and given platelet transfusions, before LSCS. Her platelet counts turned normal after surgery.

Now, Routine labs including cell counts were found normal initially. At third trimester, her platelets varied between 47000 and 125000 per cu.mm. It was 55000 at PAC. Other causes of thrombocytopenia are ruled out.

With platelets at 77000, no symptoms/ signs of thrombocytopenia, and with reserved platelets, Spinal Anesthesia was given with 27g Quincke needle in a single attempt by a Senior consultant and Surgery was uneventful.

The platelets were 90000 on first POD and no transfusions were given.

Discussion: Platelets are the mainstay of primary hemoastasis. Thrombocytopenia in covid infection is attributed to circulating immune complexes and usually have no recurrence. Gestational thrombocytopenia is an incidental finding in third trimester of pregnancy.

It comprises 75-80% of thrombocytopenia in pregnancy. It is usually benign and resolves postpartum, confirmed by platelet count at 6 weeks postpartum, but recurs in next pregnancy.

Pregnant mothers with thrombocytopenia may undergo epidural labour analgesia for vaginal delivery or spinal anesthesia or LSCS. Each has different threshold value with regard to platelet count.

Platelet count for Subarachnoid block is recommended as above 50000 in normal adults and 80000 in gestational thrombocytopenia, considering there are no platelet dysfunction or other disorders of coagulation. Platelet transfusions are not very helpful in immune thrombocytopenia. RCOG recommends platelet transfusions to maintain Platelet count > 50000 in an actually bleeding patient but not to attain any other goals.

PT, INR, aPTT don’t have any predictive value in absence of history of other coagulation abnormality in the patient.

References:
2. RCOG: Green top guideline no.47

Learning points:
1. Gestational thrombocytopenia resolves postpartum and recurs in next pregnancy.
2. Spinal anaesthesia and Labour Epidural analgesia can be given when platelet counts are above threshold values, with normal platelet function.

A case of postpartum pulmonary edema induced by trendelenburg position

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Background: The incidence of acute pulmonary edema in pregnancy and postpartum period has been estimated to be around 0.08%. Physiological hemodynamic changes occur immediately after birth. However, it can be catastrophic in those with other factors that suddenly increase venous return.

Case Report: A 37-year-old, G3P0, 40+4-week pregnant female, with no significant past medical history, presented for labor and delivery after an uneventful pregnancy. She underwent labor analgesia through an epidural catheter, placed at L3-L4 level, with an uneventful technique.

48 hours after delivery and removal of the epidural catheter, fluid compatible with cerebrospinal fluid (CSF) was drained from the puncture site and a CSF fistula was assumed. No post-dural puncture headache symptoms were present. As a conservative therapeutic measure, the patient remained at absolute rest, with compressive dressing at the puncture site and in Trendelenburg position for 18 hours. After that, dyspnea developed, accompanied by chest pain with pleuritic characteristics and acute hypoxemic respiratory failure, with SaO2 of 80% on room air, requiring supplemental oxygen therapy.

Upon evaluation, the patient was tachypneic and tachycardic with reduced breath sounds bilaterally. X-ray, transthoracic echocardiogram and CT angiography were compatible with acute pulmonary edema with bilateral pleural effusion, without cardiac dysfunction and no evidence of pulmonary thromboembolism. She was on diuretic therapy for 3 days, and her condition progressed favorably, being discharged home on the 8th day, with resolution of the acute edema and CSF fistula.

Discussion: The onset of pulmonary edema in the peripartum period requires consideration for a differential diagnosis that includes amniotic fluid/air embolism, preeclampsia, peripartum cardiomyopathy, administration of tocolytics or drug abuse. Considering the absence of these factors, the most likely cause for acute pulmonary edema in this case was iatrogenic volume overload due to prolonged Trendelenburg positioning.

References:

Learning points: Early recognition and management are important to avoid major dysfunction and maternal morbidity/mortality. It is important to have caution and adopt therapeutic measures in the postpartum period, considering maternal physiological changes.
23AP06-08
Maternal pulmonary edema after 38 h of administration fenoterol: a case report

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Background: Pulmonary edema caused by fenoterol is very rarely covered in literature, but it is a serious complication and a possible cause of death for the mother. Fenoterol is a selective b2-adrenoceptor agonist and its most important indications are bronchodilation and tocolysis during premature labor.

Case Report: A healthy 28-year-old woman pregnant with twins was hospitalised in the 31st week of gestation as a result of PTT symptoms. She developed dyspnea 38 hours after starting tocolytic administration of fenoterol with constant irritating coughing. SaO2 was 82-85%. Chest X-ray showed pulmonary edema. It was decided to proceed with an emergency cesarean section after which she was transferred to the ICU. Upon arrival in the ICU, severe bleeding was noticed. As a result, she was taken back to the OR and a large tampon was placed in her lower uterus. She was given three doses of blood. Since acid-base status was unsatisfactory, as well as her CT scan, we decided to stay on mechanical ventilation. She was hemodynamically unstable and we included norepinephrine. With mechanical ventilation and a consequent diuretic therapy with furosemide gas exchange improved and extubation was possible on the 2nd postoperative day. Still, there were crackles and wheezes on chest auscultation, decreased oxygen saturation and low PaO2. Transthoracic echocardiography showed mild mitral regurgitation. Her condition gradually improved, and she was discharged to the gynaecology department on the 5th postoperative day.

Discussion: Acute pulmonary edema in pregnant women is a rare but life-threatening event. In the recent literature, there are not many described cases of lung edema caused by tocolysis, especially by fenoterol. Fortunately, the mother and her two girls were saved by the timely removal of fenoterol and SC.

Learning points: The side effects of beta 2-mimetic tocolytic therapy are of importance for anaesthesiologists who administer anaesthesia for obstetric operations. Women who experience acute pulmonary oedema are at increased risk of cardiovascular complications in later life, including hypertension, ischaemic heart disease, stroke and renal disease.

23AP06-09
Acute lumbar subdural hematoma after labor analgesia

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Background: Spinal hematoma (SH) is a rare complication of central neuraxial blocks (CNB), but it may cause severe neurological damage. The incidence may range from 1:150,000 to 1:200,000 in obstetric patients, with 75% of SH being epidural and 4.1% subdural. We report a case of an acute lumbar subdural hematoma (SDH) after labor analgesia in a healthy parturient.

Case Report: A 23-year-old healthy parturient at 40 weeks gestation requested labor analgesia. Routine laboratory evaluation was normal, with no history of anticoagulation therapy. A combined spinal-epidural technique was performed uneventfully at L4-L5 level. Four boluses of levobupivacaine 0.1% were administered through the epidural catheter until the eutocic delivery. The epidural catheter was removed 3 hours later with no complications. The mother was able to walk and urinate during the first 8 hours. At 18 hours post-delivery she complained of back pain, progressive sensory and motor block of the lower limbs and bladder dysfunction requiring catheterization. A magnetic resonance imaging (MRI) was requested at that moment but was not available at the hospital. The symptoms kept worsening and at 24 hours after delivery she was unable to walk. Due to a high clinical suspicion of SH, she was transferred to a hospital with an emergency MRI and a neurosurgery team. The MRI showed an acute lumbar SDH so a L3-L5 laminectomy was performed with subtotal removal of the hematoma due to its strong adhesion to the nerve roots. The patient was able to walk with support 8 hours after surgery. She was admitted to a rehabilitation program and one month later she was walking independently and regained fecal sphincter continence. She remained with a bladder catheter for 5 weeks.

Discussion: Risk factors for SH include clotting disorders, anticoagulation, spinal vascular malformations or traumatic CNB. Our patient had no known risk factor for SH. Neurologic recovery is more likely if decompressive laminectomy is performed within 12 hours of symptom onset. In this case, the time between SH formation and surgery is not certain since the onset may have been during the technique or the catheter removal and the speed of SH formation is unknown.

Learning points: SH is rare but can occur in a healthy patient without any risk factor. In the absence of MRI there must be a high index of suspicion of SH and established protocols for referral to other hospitals. Early diagnosis and treatment improve the outcome.
23AP06-10
Management of labour analgesia in a pregnant woman with Beals syndrome: a case report

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Background: Congenital contractual arachnodactyly (CCA or Beals Syndrome) is an autosomal dominantly inherited, extremely rare, connective tissue disorder caused by a mutation in the fibrillin-2 gene (FBN2), characterised by flexion contractures, arachnodactyly, severe kyphoscoliosis, abnormal pinnae and muscular hypoplasia [1,2]. The authors describe a successful management of labour analgesia in a pregnant woman with Beals syndrome.

Case report: 21 year old, Beals Syndrome diagnosed at 3 months of age. Characteristic marfanoid habitus, facial dysmorphism, muscular hypoplasia, congenital muscle contractures, severe scoliosis, camptodactyly of hand fingers and bilateral club foot, without any cardiac features. She had previous bilateral astragalus and D9-L4 posterior spinal surgeries. She was referred to our hospital for genetic counseling and obstetric follow-up. Anesthesia consultation at 32 weeks showed no signs of difficult airway, good functional capacity, and echocardiogram unremarkable. She was admitted at 39 weeks of gestation in labour. A single puncture uneventful combined spinal/epidural technique was performed with intrathecal sufentanil administration, L3-L4 level (epidural space found at 5cm). During labour, ropivacaine 0.2% intermittent small (5 mL) top-ups were administered as needed. Eutocic delivery occurred 11 hours after admission: male newborn, Apgar 9-10-10.

Discussion: Little information is available in literature regarding Obstetric Anesthesia and neuraxial blockade in these patients. Severe scoliosis associated with difficulties in positioning due to contractures can pose a significant technical challenge. Previous back surgery can cause scarring of the epidural space and reduce the analgesia’s efficacy. Anesthesia consultation should be carried out prior to admission, including a careful airway assessment and exclusion of cardiac features through a recent echocardiogram. Local anesthetic spreading in the epidural space can be unpredictable and the lowest possible dose should be started, with incremental doses as needed.

Reference:

Learning points: Pregnant Beals Syndrome patients can present an obstetric anesthetic challenge given their facial abnormalities, difficult positioning and challenging neuraxial blockade technique. Management of these patients must include anesthesia consultation and individual titration of epidural local anesthetics.

23AP07-01
Call-Fleming syndrome “differential diagnosis for post-dural puncture headache (PDPH)”: About a case

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Background: Call-Fleming syndrome, described in 1988, is part of a group of reversible cerebral vasoconstriction syndromes. The pathophysiology is unknown. Its etiology is probably due to a dysfunction in the control of the tone of the arterial vessels as part of an inadequate response of the sympathetic system. Some authors have related it to the use of sympathomimetic drugs and it may also be related to pregnancy and exposure to certain medications.

Case Report: Woman of 27 years old, G3P2A1, history of previous cesarean section and uterine curettage, currently at 39 weeks of gestation with no significant morbidity history. After 39 weeks of gestation, an elective cesarean section was scheduled. The preoperative evaluation does not provide new information. At the time of cefazolin administration, and while in the supine position, the patient began to experience very intense paroxysmal headache, dizziness, nausea and vomiting. During the first postoperative day, and after the administration of 2 g of metamizole, she began to experience headache, dizziness, nausea and rash. Malar. associated with loss of muscle strength in the upper extremities, with left predominance, and intense neck pain. These symptoms led to a consultation with Anesthesiology and Neurology, who requested a CT angiography of the brain and neck, which ruled out SAH and was compatible with segmental and focal vasospasm of the basilar trunk. MRI showed no pathological findings, nor did immunological or cerebrospinal fluid studies. Fluid study: She was discharged after 1 week from the onset of symptoms feeling calm, headache-free.

Discussion: The actual incidence of Call-Fleming syndrome is unknown and probably underdiagnosed. The clinical manifestations of this syndrome are mainly thundervap headache (94%), sudden or rapid onset, nausea, vomiting and high blood levels, blood pressure (33%) or seizures (3%), which can be associated with neurological damage. Treatment consists of calcium channel blockers, with a good prognosis and a mean remission of 12 weeks: we consider it important to know this clinical condition, although it is rare during pregnancy and the postpartum period, and it should be among the differential diagnoses of CPPD.

Learning points: It is necessary to have a multi-professional approach to reversible cerebral vasoconstriction, which will allow for better results.

Reference:
Double trouble: management of Cesarean section complicated with massive hemorrhage and aspiration

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Background: Massive hemorrhage is one of the most common cause of maternal death, the rate is 27% [1]. Perioperative pulmonary aspiration is also associated with severe morbidity and death [2].

Case report: A 42 year old woman, gravida IV (35 weeks of gestation) was hospitalized for uterine contractions and excessive vaginal discharge. Patient had risk factors, such as gestational diabetes, polyhydramnion, low placental implantation. The situation was evaluated, Cesarean section was planned on 37th week. On surgery day, after third Misoprostol dose and cervical dilution check the massive hemorrhage occurred. Cesarean section became Urgency category I surgery and rapid sequence induction was performed. After induction the regurgitation and aspiration occurred. After that, Trendelenburg position, intubation and suction were performed. Bilateral dry, squealing cracles were heard, increased airway pressure was noticed. Urgent bronchoscopy was performed removing solid particles of food. Parturient was given 1 g of tranexamic acid, oxytocin 15 UI with crystalloid fluids, misoprostol 800 mcg rectally, then the bleeding stopped, uterine tonus stabilised. The total blood loss was 2500 ml. Hemodynamics remained stable. After surgery patient was transferred to intensive care unit for further monitoring and extubation. Laboratory findings showed anemia, then erythrocyte mass transfusion was performed. Therapeutic bronchoscopy was performed. The patient was extubated the next day after surgery and on the third day she was transferred to obstetrics unit without any poor outcomes.

Discussion: low placental implantation could cause abruption, which has a high risk of massive hemorrhage [3], therefore Urgency category I Cesarean section must be performed, despite of previous food consumption and even rapid sequence induction is powerless to prevent aspiration.


Learning Points: This case highlights the importance of early prenatal diagnosis and multidisciplinary collaboration in managing fetuses at risk of fetal airway obstruction. The EXIT procedure, with its specialized anesthetic and surgical techniques, offers a lifeline to these infants, potentially preventing life-threatening complications. It’s a multifaceted anesthetic technique, aiming to maintain maternal stability, provide adequate fetal anesthesia, and ensure placental gas exchange while the fetus is partially externalized.

EXIT procedure: a lifeline for fetuses with airway obstruction

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Background: Recent advancements in prenatal diagnosis have enabled the early identification of fetal airway obstructive disorders that warrant intrapartum intervention (1). The Ex-Utero Intrapartum Treatment (EXIT) procedure stands as a specialized surgical approach designed to address these scenarios. It involves partial fetal externalization during cesarean section, allowing for maintenance of fetoplacental circulation while securing the fetal airway. Anesthesiologists must be well-versed in these intricacies to ensure a favorable outcome (2).

Case Report: A 36-year-old female, G5P2, with gestational diabetes mellitus, presented at 34 weeks of gestation with antenatal ultrasound revealing a large solid cervical mass with a nodular structure occupying the entire cervical region. At 35 weeks, she was admitted by suspected preterm labor, and tocolysis was initiated. An MRI was performed to further characterize the cervical mass, revealing a narrowed airway. A cesarean section was then performed under comprehensive monitoring using the EXIT procedure. The challenge was to maintain hemodynamic stability by avoiding hypotension due to deep general anesthesia and minimizing the risk of bleeding. Newborn’s airway was secured on the first attempt using direct laryngoscopy while the cervical mass was manually dislodged.

Discussion: EXIT procedure has emerged as a valuable tool in the management of fetal airway obstruction, offering the potential to prevent life-threatening complications. While it is a complex and technically demanding procedure that requires collaboration between a multidisciplinary team of specialists, including maternal-fetal medicine physicians, anesthesiologists, neonatologists, and surgeons, its ability to secure the fetal airway while maintaining placental gas exchange has transformed the management of these challenging cases.


Learning Points: This case highlights the importance of early prenatal diagnosis and multidisciplinary collaboration in managing fetuses at risk of airway obstruction. The EXIT procedure, with its specialized anesthetic and surgical techniques, offers a lifeline to these infants, potentially preventing life-threatening complications. It’s a multifaceted anesthetic technique, aiming to maintain maternal stability, provide adequate fetal anesthesia, and ensure placental gas exchange while the fetus is partially externalized.
23AP07-05
Anesthetic challenges of big olfactory menigioma removal in a 33-rd weeks pregnant woman

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Background: It is often faced a pregnant women scheduled for non-obstetric surgery. Pregnant women have different pathophysiological changes affecting anesthesia care plan. Our case presents a pregnant woman (33 weeks pregnancy age) scheduled for basal anterior olfactory meningioma surgical removal. The neurosurgical indications were severe headache and profuse vomiting due to increased intracranial pressure.

Case report: A 25-year-old pregnant woman was diagnosed in the 33-th week of pregnancy of meningioma based on her clinical signs (headache and vomiting secondary to increased intracranial pressure) and on IMR examination findings. These examinations revealed an olfactory meningioma (massive expansive olfactory lesion probable meningioma). A multidimensional team (obstetrician, neonatologists, anesthesiologists, and neurosurgeons) consulted the patient, concluding of neurosurgical approach and strict fetal monitoring in perioperative period.

The woman did not give the permission to deliver the baby prior of term. Betamethasone, nifedipine, and magnesium sulfate) were pre/intraoperatively started. Careful baby monitoring was strictly realized. Fetus monitoring was perioperatively realized taking care of maintaining fetal heart rate over 120.

The procedure was uneventful, and the woman discharged from hospital without deficits and normal pregnancy course.

Discussion: This rare case presents an unusual situation of a pregnant woman undergoing non-obstetric surgery. Being in 33rd week of pregnancy the risk of anesthetic effects on organogenesis is unusual, but the risk of miscarriage and preterm delivery is obvious. The neurosurgical procedure was mandatory due to increased intracranial pressure.

Every anesthesiologist must have proper knowledges regarding both problems and must address pregnancy physiological changes, baby monitoring, and neurosurgical issues (1,2).

References:
1. Yimeng X, Xin M, Griffits B, Yan L. Medicine 2018; 97(37): pe12360

Learning points:
1. Neurosurgical procedures are challenging in pregnant women.
2. The anesthesiologist must be prepared to address both neurosurgical and pregnancy related problems.

23AP07-06
Pituitary apoplexy – an uncommon cause of postpartum headache

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Background: Headaches are common in postpartum and anesthesiologists should identify findings that warrant urgent evaluation. We report a case of postpartum pituitary apoplexy, a rare but emergent cause of postpartum headache.

Case report: A 31-year-old primigravida with pituitary adenoma was scheduled for a c-section. She received a combined spinal epidural anesthesia and apart from transient hypotension managed with a vasopressor bolus, the surgery was uneventful. On postoperative day 1 the patient developed a severe headache that worsened in the upright position and did not subside with analgescics, photophobia and nausea. Postdural puncture headache was suspected and besides a caffeine prescription, a sphenopalatine ganglion block (SGB) was performed with total pain relief. The next day SGB was repeated due to persistent headache even in supine. Later that day an epidural blood patch was performed due to a worsening severe pulsatile frontal headache, photophobia, phonophobia and nausea. There was no improvement.

The patient progressed to develop bradycardia and diplopia. She was diagnosed with left oculomotor nerve palsy. CT scan raised the suspicion of pituitary apoplexy and blood tests showed hypopituitarism. MRI revealed evidence of hemorrhage. Hydrocortisone in stress dose was initiated and on day 4 after c-section, the patient underwent sellar decompression. Postoperatively she was managed with hydrocortisone, levethyroxine and desmopressin. In two days all symptoms resolved and she was discharged.

Discussion: Pituitary apoplexy is commonly associated with a pituitary adenoma and pregnancy is a risk factor. In a literature review, the prevalence during pregnancy and postpartum was estimated to be 1 per 10,000 term pregnancies. Case reports are scarce. Differential diagnosis is challenging since symptoms overlap multiple conditions.

The diagnosis must be suspected in a patient with retro-orbital headache, decreased visual acuity, hemianopsia, diplopia, ptosis, nausea, vomiting and altered mental status.

Reference:

Learning Points: In women with pre-existing pituitary adenoma who report postpartum headache pituitary apoplexy should be considered as a main differential diagnosis. Any headache that changes in nature or severity and the development of focal neurological signs warrant prompt multidisciplinary evaluation and imaging consideration.
Background: Preeclampsia is a persistent high blood pressure (BP >140/90 mmHg) during pregnancy after the 20th week of gestation and up to the 12th week of the postpartum period. It is one of the primary causes of perinatal and maternal morbidity and mortality. Clevidipine is a drug with almost perfect pharmacokinetic characteristics. It acts as a selective level on L-type calcium channels. It has a rapid onset of action (2-4 minutes), an ultra-short half-life (15 minutes) and its metabolism is done by plasma esterases.

Case report: 27-year-old woman with preeclampsia during pregnancy. The patient was admitted during labor and a cesarean intervention was performed, resulting in the birth of a healthy newborn male. The patient had high blood pressure levels (174/101 mmHg) despite treatment with intravenous Labetalol. In addition, she presented worsening glomerular filtration rate (47 ml/min) and maintained associated proteinuria. Given these findings, the patient was transferred to the Intensive Care Unit for strict blood pressure control. She was admitted with triple antihypertensive therapy at maximum doses (Bisoprolol, Valsartan, Nifedipin). The patient's blood pressure levels were around 170/90, so Clevidipine perfusion was initiated (5 ml/h), achieving BP 130/70 mmHg 4 minutes after starting the perfusion. Another oral antihypertensive was added (Hidralazin). Clevidipine was retired 24 hours later. The patient remained asymptomatic. She was transferred to the hospitalisation room to continue with her care and treatment.

Discussion: Preeclampsia is a complication associated with pregnancy. The origin of preeclampsia is related to abnormal development of the placenta due to endothelial damage. Clevidipine is a drug included in the therapeutic arsenal of the anaesthesiologist, for the blood pressure control of patients. Its pharmacokinetic characteristics make it easier for us to achieve adequate blood pressure controls.


Learning points: • Clevidipine has a rapid onset of action and a rapid metabolism. • We can use Clevidipine as a treatment of preeclampsia.

23AP07-07
Postoperative management with Clevidipine of severe preeclampsia
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23AP07-08
Novel anesthetic approach in cesarean section: combined subarachnoid and erector spinae plane block in a patient with thrombosis history
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Background: This case report outlines the anesthetic management of a 39-year-old female with a complex obstetric and medical history, undergoing elective cesarean section (C-section) for a dichorionic diamniotic pregnancy, complicated by simple placental accretism.

Case Report: We present the case of a 39-year-old female (6G2P3A) with May-Thurner Syndrome and Schamberg Disease, admitted for a planned cesarean section at 36 weeks and 1 day of a dichorionic diamniotic pregnancy complicated by simple placental accretism. Due to a history of deep venous thrombosis leading to an abortion, the patient was under anticoagulation with enoxaparin. The patient declined an epidural catheter due to concerns about her thrombotic history and hemorrhagic risks.

A combined anesthetic approach was employed, involving a subarachnoid block (SAB) (27-gauge pencil point needle with levobupivacaine and sufentanyl) and bilateral erector spinae plane (ESP) blocks at L2-3 (ultrasound-guided, using ropivacaine). Tranexamic acid was administered intraoperatively. The procedure was uneventful, with effective post-operative (at 0h, 12h, 24h, and 48h) pain management using paracetamol and ketorolac.

Discussion: This case emphasizes the innovative use of combined SAB and ESP block for cesarean section anesthesia in patients with contraindications to epidural catheterization. This approach is particularly pertinent for patients with complex thrombotic histories, offering an effective alternative to traditional epidural anesthesia. The combination of SAB and ESP block provided effective anesthesia and pain control, highlighting its potential as a novel strategy for similar obstetric cases[1].


Learning points: The successful management of this case illustrates the importance of tailored anesthetic strategies in complex obstetric scenarios, especially when standard techniques like epidural anesthesia are contraindicated. The combined use of SAB and ESP block can offer an effective and safe alternative, ensuring patient comfort and optimal surgical conditions in high-risk cesarean sections.
Electrical cardioversion during pregnancy and cesarean section: a case report
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Atrial Flutter (AFI) is an uncommon arrhythmia during pregnancy and it is generally associated with structural cardiac alterations or electrolyte imbalances. The primary goal is to convert to sinus rhythm (RS), which is usually well tolerated. In cases of hemodynamic instability or maternal/fetal risk, electrical cardioversion (ECV) is preferable.

A 37-week primigravida with a medical history of conjoined twins with shared liver and mitral valve dysplasia replaced with a mechanical prosthesis, under chronic anticoagulation. At 16 weeks of gestation, two episodes of AFI with rapid ventricular response (RVR) necessitating ECV occurred.

Ultrasound evaluation revealed mild left ventricular dysfunction suggestive of tachycardiomopathy, initiation of rate control with bisoprolol was started. No other complications occurred during pregnancy.

Under Cardiology guidance, she was electively admitted for a scheduled cesarean section at 37 weeks. Upon admission, she complained of 12 hours of palpitations and chest pain. An electrocardiogram documented a new AFl with a RVR of ~150/min. Following anesthetic induction.

Balanced general anesthesia with rapid sequence induction was administered. Vocal cord topicalization was performed beforehand.

Due to challenging airway signs, videolaryngoscopy was initiated. Successful intubation was achieved on the 4th attempt. Following stabilization, a synchronized biphasic shock of 100J was administered, resulting in SR restoration associated with frequent supraventricular extrasystoles.

The remainder of the intraoperative period was uneventful, with an average heart rate of 80/min. A live-born female infant with APGAR scores of 8/9/9 was delivered.

The remainder of the intraoperative period was uneventful, with an average heart rate of 80/min. A live-born female infant with APGAR scores of 8/9/9 was delivered.
Cerebrospinal fluid cutaneous fistula: looking beyond the obvious

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Background: A cerebrospinal fluid (CSF) cutaneous fistula is a rare but potentially serious complication of neuraxial techniques. We report a CSF fistula case in a complex patient.

Case report: A 36-year-old pregnant woman with trigeminal neuralgia under carbamazepine was scheduled for a c-section due to pre-eclampsia (PE). After multiple attempts, an epidural catheter was placed. On postoperative (PO) day 1 the epidural catheter was found exteriorized.

The next day the epidural puncture site dressing was soaked with clear fluid, negative for glucose in the urine test strip. A compressive dressing was made. The patient also developed visual changes and hypertension and it was noted persistent hyponatremia since admission.

Posterior reversible encephalopathy syndrome (PRES) was suspected and she was transferred to the intensive care unit (ICU). On PO day 3 spontaneous clear fluid leakage persisted from the epidural puncture site and, following neurosurgery evaluation, a CSF cutaneous fistula was diagnosed and the leak site was sutured.

Fluid therapy and bed rest were started. In the following hours, she developed intense nausea, vomiting and dizziness. At this point, the clinical picture could be multifactorial considering the diagnosis of PE, suspicion of PRES, CSF fistula, recent increase in carbamazepine dose and hyponatremia.

An epidural blood patch was considered but given the lack of consistency of the symptoms with a post-dural puncture headache (PDPH), it was decided to maintain the ongoing treatment and reduce the carbamazepine dose.

In the following days, an MRI excluded PRES and the diagnosis of PE-associated retinopathy was made. She was further managed for hyponatremia and uncontrolled neuralgia. The symptoms progressively resolved and she was discharged after 10 days.

Discussion: The differential diagnosis was challenging. Regarding complications of the neuraxial technique, the patient presented a CSF cutaneous fistula but lacked the orthostatic component and had no typical symptoms of PDPH: Nausea, vomiting and dizziness could also be explained by the high carbamazepine dose/hyponatremia.

Reference:

Learning points: In a symptomatic patient, the absence of typical PDPH presentation or symptoms of intracranial hypotension after the neuraxial technique should lead to the search for differential diagnoses, especially in complex patients.

Knotting of the epidural catheter as a cause for failed labour analgesia

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Background: Knotting of the epidural catheter is a very rare complication of epidural anesthesia. The literature reveals few cases of failure of labor analgesia due to this complication. Several types of different knots have already been identified. We present a case with a tie knot, which is one of the rarest.

Case report: A 27-year-old pregnant woman, arrived at the Centro Hospitalar Universitário de Faro Emergency Department in active labor at 39 weeks of gestation. After she requested epidural analgesia, a catheter was inserted using a midline technique at the L3/4 level in the left lateral position. A 18-gauge Tuohy needle (Perifix, B.Braun) and a nylon catheter with three pairs of distal micro-holes were used. The epidural space was easily identified by a loss of resistance to saline. The skin-space distance was 6 cm and 5 cm of catheter was threaded. Epidural analgesia was initiated with ropivacaine 0.2% boluses. After one hour, she continued to experience pain without any sense of improvement. The anesthesiologist reported an increased pressure during the administration and catheter failure was considered. During the attempt to remove the catheter, an increase in resistance was noticed at approximately 3 cm of the tip. With slight manipulation the catheter was removed. This was achieved without pain or focal deficits. A new functional epidural was placed at the L2-L3 level and she had an uneventful vaginal delivery.

Discussion: Although this complication is very rare, the anesthesiologist should be trained to identify it as a possible cause of epidural analgesia failure. The case presented had a simple resolution with gentle catheter removal. There are cases in the literature where surgical removal was necessary and even associated with serious complications like epidural hematoma.

Reference:

Learning points: Knotting of the catheter as a cause of epidural analgesia failure.
Pain management for labor in a pregnant woman diagnosed with Brugada syndrome: a case report

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Background: Brugada syndrome is a rare disease caused by a mutation in the SCN5A gene that affects cardiac sodium channels. This alteration represents a decrease in the arrhythmogenic threshold, leading to an increased risk of triggering ventricular arrhythmias and even sudden death, with this disease being the cause of 20% of perianesthetic idiopathic ventricular fibrillations. Because it is a rare pathology, it is anecdotal in obstetric patients. Anesthetic management is a challenge because of the interaction of cardiac alteration, physiological changes of pregnancy and the use of local anesthetics.

Case report: A 29-year-old pregnant woman, primiparous, ASA II, comes for induction of labor. As a relevant medical history, she presents the diagnosis of brugada syndrome type 1 in the context of the paternal diagnosis. A birth plan was made in conjunction with the anesthesiology, cardiology and gynecology service. Upon admission, she had no electrocardiographic alterations, symptoms or implanted automatic defibrillator. Close monitoring of vital signs and laboratory tests were carried out from admission.

A combined intradural-epidural technique was performed and levobupivacaine was used as local anesthetic. During expulsion, patches for the defibrillator were attached and an arrest cart and an isoproterenol infusion were made available to the staff. In the immediate postpartum, she presented high blood pressure controlled with hydralazine.

Discussion and learning points: The triggers of arrhythmogenic events in patients with brugada syndrome frequently occur during peripartum (fever, hydroelectrolyte alterations, local anesthetics), which is why close monitoring of these factors is important. The use of a combined technique decreases the absorption of local anesthetics compared to other techniques. The use of levobupivacaine is justified by its lower cardiotoxicity. The anticipation of action measures for possible events, as well as multidisciplinary work, must be taken into account on these occasions.

References:

Anesthetic approach to a significant post-delivery hemorrhage in a multiparous patient with placenta previa and accreta

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Background: In obstetric cases involving parturients with placenta previa and accrete, there exists a significant predisposition to intraoperative and postoperative hemorrhage, thereby heightening the risk of major obstetrical complications, including cardiovascular collapse and increased mortality rates for such women.

Case report: We present the case of a 35-year-old parturient in her 5th pregnancy, at 32 weeks of gestation, with a history of 4 cesarean sections, who presented to our hospital’s emergency department with macroscopic hematuria. Diagnostic assessments, including U/S and MRI scans of the abdomen and pelvis revealed placenta previa and accrete infiltrating the bladder up to the serious wall. In response to worsening hematuria and a substantial decline in hemoglobin levels, an emergent cesarean section was performed under spinal anesthesia initially. Following the delivery of a premature female neonate, anesthesia was promptly converted to general anesthesia, and an obstetrical hysterectomy was conducted due to the severity of the condition. Hemodynamic monitoring, encompassing parameters such as SvO2 and CO, was employed. In the face of an exceedingly hemorrhagic surgical field and a progressive decline in SvO2, a massive transfusion protocol was initiated with a 1:1:1 ratio, involving 8 units of RBCs, 8 units of FFPs, and 8 units of PLTs. Vasoconstricting agents were administered in high doses to maintain an optimal mean arterial pressure. Thromboelastometry guided subsequent interventions, resulting in the administration of 4 additional units of FFPs and 4g of fibrinogen. Post a 5-hour surgery and successful stabilization, the patient was transferred to the ICU, where she remained intubated, sedated, under full hemodynamic monitoring. She was discharged from the ICU 2 days later, subsequently experiencing an uneventful postoperative course.

Discussion & Learning points: Obstetrical hemorrhage remains a prominent cause of mortality during pregnancy across diverse socioeconomic settings. Enhancing outcomes necessitates meticulous preoperative evaluation, heightened vigilance, and a nuanced understanding of intraoperative bleeding management through the judicious application of transfusion protocols and point-of-care coagulation testing.
Neurocardiogenic (vasovagal) syncope (NCS) is defined as a sudden and transient loss of consciousness normally caused by an hyperbolic autonomic response to a certain stimuli. It's associated with hypotension, bradycardia, heart block or at extreme, sinus arrest. This undervalued pathology may be deleterious during pregnancy. Pregnancy may be associated with higher risk for these events due to aortocaval compression by the gravid uterus. Additionally, labor's stress and high neuraxial block are well known trigger1.

Case report: A 33 year-old primipara with an uneventful term pregnancy was admitted for elective C-Section at 36 weeks due NCS. She was monitored following ASA standards plus transthoracic echocardiography (TTE). An epidural catheter was inserted with no complication and 2-3mL bolus of ropivacaine 0.75% were given until an adequate block level was obtained (15mL total in 40 minutes).

The surgery was uneventful and a healthy baby was delivered. In the postanesthetic care, TTE was again performed showing an inferior vena cava collapsibility superior to 50% and a less filling of left ventricle at end diastole. She received 500mL of crystalloid fluid, reversing the TTE findings. She was then discharged on the 2nd postoperative day.

Discussion: NCS is often an underlooked and undervalued condition that although mostly benign, can sometimes cause serious complications. No clear guidelines for anesthetic management of patients with this condition exist, especially in obstetric settings, which may be challenging to the anesthesiologist. This case shows a successful case of anesthetic management of a c-section in a patient with this condition where a special focus was made to avoid hypotension related to both anesthesia and hypovolemia. We also show a practical case of the utility of Point-of-Care Ultrasound (POCUS) in anesthesia care.

Reference: DOI: 10.1097/00000539:199806000:00024

Learning points: NCS is an undervalued condition that may be hazardous to both baby and mother and no clear anesthetic management guidelines exist. Normal pregnancy conditions as well as stress related to delivery may trigger this condition. Also, anesthesia technique may also be a trigger if no care is taken. Pain management, hypotension prevention (with adequate hemodynamic monitoring) and slow anesthesia titration are key for success. As such, POCUS for fluid status assessment may also be useful.

Maternal bradycardia after dexamethasone administration

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Background: Sinus bradycardia is a rare adverse effect of corticosteroids (COEs) and usually occurs without associated symptoms. Although some cases were reported in patients with autoimmune, inflammatory or oncological diseases receiving high doses of COEs, only one case of maternal bradycardia (MB) was reported.1

Case report: At 31 weeks of gestation, a 31-year-old woman with fetal intrauterine growth restriction was admitted to the maternity ward for fetal lung maturation with dexamethasone (6 mg every 12 hours for 2 days). Approximately 15 hours after the initial dose of dexamethasone, the patient's heart rate decreased from 60-70 bpm to 30-40 bpm without any symptoms or observable changes on physical exam.

An electrocardiogram, blood gas analysis and thyroid hormone measurement were performed and all the results were within normal ranges. Despite the absence of symptoms, precautions were taken in case a c-section became necessary, including ensuring the presence of a cardiologist during the birth.

An observational approach was implemented, and heart rate returned to normal values 30 hours after last dose of dexamethasone, with the bradycardia lasting a total of 52 hours. The following day, a c-section was performed under spinal anesthesia, without any complications.

Discussion: Maternal bradycardia, although self-limited when associated with corticosteroid administration, can pose a potential challenge for healthcare professionals. Given its rarity and limited documentation in pregnant women, it may be a challenging differential diagnosis to recall.

After excluding cardiac, hormonal and/or electrolyte disturbances, asymptomatic maternal bradycardia induced by corticosteroid can be managed with observation alone, resolving upon discontinuation of the drug.

Nevertheless, awareness of the case should be communicated to the cardiology service, ensuring their support in the event of progression of labor and hemodynamic potential instability.

References:

Learning points: Adverse effect of COEs administration should be considered in the differential diagnosis of MB. If asymptomatic, an observational approach is safe, as it is a self-limiting condition. Cardiology support must be guaranteed.
23AP08-08
High risk surgery in a 26-week pregnant woman refusing blood transfusion

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Background: Gallbladder cancer (GBC) is a rare, more frequent in women and associated to high mortality rates. Diagnosis during pregnancy requires optimized interdisciplinar management to achieve maximum safety for both mother and fetus. We report a case of GBC detected at 26 weeks of pregnancy proposed for exploratory laparotomy, cholecystectomy and possible IVB-V hepatic segmentectomy with complete lymphadenectomy. The pregnancy and religious beliefs (Jehovah’s Witness) of the patient interfered with the surgical management and represented a big challenge to the medical team.

Case report: A 39-year-old G5P4 pregnant woman, ASA II, 26 weeks of gestation, with GBC, proposed for an exploratory laparotomy, cholecystectomy and possible IVB-V hepatic segmentectomy with complete lymphadenectomy. In anesthetic evaluation, analysis found a Hb 10,1g/dL. The patient refused blood transfusion as she was Jehovah’s Witness. Multidisciplinary preoperative preparation included: fetal pulmonary maturation with corticosteroids and tocolysis with atosiban. Following ASA monitoring with invasive arterial pressure, TOF, BIS and urine output, GA was induced. The gallbladder was removed and an extemporary biopsy determined a tumoral stage of T2 among hepatic invasion. Due to the pregnancy and religious beliefs the surgical team decided to terminate the surgery and postpone the hepatic resection and chemotherapy for after the delivery. The procedure was completed after 2 hours and emergence of anesthesia occurred uneventfully. Fetal monitoring initiated in the PACU. A month later the patient concluded the treatment with complete tumor resection and adjuvant QT.

Discussion: This patient was diagnosed with GBC at 26 weeks of gestation, a rare malignancy needing prompt surgical intervention of high risk. We faced several concerns with this case: the impact surgery and anesthesia in maternal and fetal physiology; the higher risk of complications and more technically challenging surgery during a third trimester pregnancy; the additional problem of refusal of blood transfusion in a patient with anemia proposed for a surgery with high bleeding risk.

The multidisciplinary management allowed maximum safety for both mother and fetus and avoided adverse outcomes.


Learning points: High risk surgeries can considerably influence maternal and fetal outcomes, making a thorough preparation crucial for these patients.

23AP08-09
Double-block for cesarean section and hysterectomy in a patient with severe placenta accreta spectrum: are neuraxial blocks a better option nowadays? A case report

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Background: Placenta accreta spectrum (PAS) is an anomaly in the placenta that adheres to the uterus and fails to separate from it at delivery what can lead to massive hemorrhage. For the anesthesiologist the decision between general anesthesia (GA) (risks of pulmonary aspiration and difficult airway) or neuraxial block (NA) (worsening of hemorrhagic shock) is challenging (1). Since many years vascular surgeons can help reducing the bleeding with some techniques very efficient. Is it the moment to prefer neuraxial block?

Case report: A 27-year-old female was scheduled for her cesarean-section (C-section) followed by hysterectomy because of severe placenta percreta with invasion of the bladder. Because of the high risk of severe bleeding, placement of a bilateral hypogastric balloon was scheduled to reduce the arterial flux to the uterus. An epidural block + an epidural catheter at the L1-L2 lumbar level with morphine 2mg were injected and a spinal block with 3ml bupivacaine 0,5% for the C-section. Two hours and 20 minutes from the beginning of the surgery, the patient was complaining of pain and 5ml of ropivacaine 1% were injected through the epidural catheter what let her completely free of pain. Her blood gas analysis was ok but her hemoglobin was 5,0g/dl the day after the surgery and she received one red blood cells. Two days later she was tranferred to the ward without symptoms.

Discussion: Balloon-occlusion of the hypogastric arteries, embolization of the internal iliac artery or ligation of the hypogastric or uterine arteries are excellent measures for bleeding in PAS cases (2), but maybe the best method is the insertion of REBOA catheter under ultrasound control. Maybe this a good reason to use neuraxial anesthesia instead of general in most cases of patients and stop waiting for a catastrophic bleeding.

References:

Learning points: NA or GA in PAS after REBOA and other vascular devices?
The Paediatric Patient

24AP01-01
Pericapsular Nerve Group (PENG) Block vs. Erector Spinae Plane Block (ESPB) in pediatric hip surgery: a randomised, double-blinded, controlled trial

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Background and Goal of Study: The PENG block and ESPB have been successfully described in adult hip surgery. The PENG block and the lumbar ESPB performed at the 4th lumbar vertebra level provide sufficient analgesia following hip surgery in adults. However, the evidence in children of PENG block and lumbar ESPB is limited mainly to case reports. This study aimed to compare the effect of ultrasound-guided PENG block vs ESPB on pain scores, opioid requirements, and stress response to surgery expressed by the neutrophil-to-lymphocyte ratio (NLR) and platelet-to-lymphocyte ratio (PLR) in children scheduled for hip surgery.

Materials and Methods: After obtaining IRB approval and the patient's informed consent, 90 patients aged 2-7 years, ASA PS I-III were randomised into 3 equal groups, each receiving a PENG block (n=30), ESPB (n=30), or control group (n=30). In all groups, sedation was performed with continuous propofol infusion at 5mg/kg/h. Spontaneous ventilation was maintained with an oxygen mask at 2 L/min. Spinal anaesthesia (L3/4, PAJUNK, sprotte needle 27 G, 70 mm) was performed with 0.1ml/kg of 0.5% ropivacaine. After the spinal anaesthesia, the block was performed with 0.5/kg/h mL of 0.2% ropivacaine. The primary outcome was the pain scores (FLACC). The secondary outcomes included postoperative NLR, PLR, and cumulative opioid consumption expressed nalbuphine mg/kg. The Student's t-test or Mann-Whitney U and Fisher's exact test were used for variabilities, and p<0.05 was considered statistically significant.

Results and Discussion: The FLACC score was significantly lower in the ESPB and PENG groups compared to the control group (p<0.0001). However, the FLACC score was lower in the PENG group 30 (p=0.0433) and 90 (p=0.0370) minutes after surgery compared to the ESPB group. The NLR and PLR levels were significantly lower in the PENG and ESPB groups (p<0.0001) compared to the control group. There was no difference in NLR and PLR levels between the PENG and ESPB groups. The cumulative opioid consumption was significantly lower in the PENG and ESPB groups compared to the control group (p<0.0001). Also, 43% of children in the PENG group and 50% of children in the ESPB group did not require opioids postoperatively.

Conclusions: In pediatric hip surgery, the PENG block and ESPB block lower pain scores, provide better analgesia and lower cumulative opioid consumption. The PENG and ESPB blocks lower NLR and PLR after the surgery.

24AP01-02
Perioperative behavior changes in children with developmental disorder under general anesthesia

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Background and Goal of Study: When the children faced with the dental treatment, they often feel anxiety and fear due to pain of the treatment, the unknown and separation from their parents. A more anxious state may result in poor cooperation by children with developmental disorder (DD). It might be associated with postoperatively negative behavioral change. We investigated the behavior of perioperative period of children, and compared preoperative behaviors between children with and without DD.

Materials and Methods: Patients (1-6 yrs) undergoing for dental procedures were divided into four groups; children with DD and without DD with sevoflurane or isoflurane. The following data were collected prospectively: the modified Yale Preoperative Anxiety Scale score (m-YPAS); m-YPAS 1 (preoperative), m-YPAS 2 (induction of anesthesia), emergence agitation (EA) and the Pediatric Anesthesia Emergence Delirium scale (PAED).

Results and Discussion: A total of 100 patients were included: 25 in each group. The EA using isoflurane in children with DD and without DD was significantly lower than that using sevoflurane (P<0.01).

In addition, children with DD using sevoflurane were not significantly different in EA than children without DD (p=0.13), and both children using isoflurane were not significantly different. The m-YPAS 1, 2 in children with DD were significantly higher than those in children without DD (p=0.05). Moreover, m-YPAS 2 in both groups was significantly higher than m-YPAS 1. PAED were not significantly different in both inhalational anesthetics, sevoflurane (p=0.34) and isoflurane (p=0.13). Likewise, they were not significantly different between children with DD and children without DD, respectively (p=0.12, p=0.25).

Children with DD were more uncooperative on preoperative consultation and induction of anesthesia and are more likely to exhibit exaggerated maladaptive behavioral changes on EA with the use of sevoflurane. The finding is important with respect to the clinical management of these patients. Furthermore, isoflurane could reduce the incidences of EA compared to sevoflurane in both children groups (p=0.05). However, PAED using sevoflurane or isoflurane were not significantly different in the groups.

Conclusion: We found that isoflurane anesthesia could suppress the EA in children with DD undergone dental treatment, although children with DD showed significantly serious preoperative behavior disturbance compared to children without DD.
**24AP01-03**

The comparison of pericapsular nerve block and fascia iliaca compartment block in children with cerebral palsy or spina bifida for pain management in hip surgery. A pilot randomized controlled trial

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**Background and Goal of Study:** The aim of present pilot trial was to obtain the data for hypothesis that pericapsular nerve group PENG block is non-inferior to fascia iliaca compartment block FICB in term of rescue opioid analgesia requirement among children undergoing hip surgery.

**Materials and Methods:** A single blind, pilot randomized controlled trial was conducted between 01.11.2022 and 20.11.2023. Inclusion criteria were:

1. Reconstructive surgery on the hip,
2. Children with cerebral palsy or spina bifida,
3. Age between 3 to 18 years,
4. Agreement to participate in the study.

Exclusion criteria were:

1. Contraindications for local anesthetics,
2. Contraindications for invasive procedure,
3. ASA classification risk >3.

Both PENG block and FICB were ultrasound (US) guided and performed with 0.6 ml/kg of 0.5% ropivacaine. Postoperative analgesia included intravenous acetaminophen 15 mg/kg every 6 h, oral ibuprofen 10 mg/kg every 8 h. The primary outcome was the time to rescue opioid analgesia (promedol 0,3 mg/kg intramuscular) during the first 24 hours after the block.

**Results and Discussion:** Thirty-five children were randomly allocated into two groups: PENG block (n=17), and FICB (n=18). The time to rescue opioid analgesia was significantly higher in the FICB group compared to the PENG group (p=0.09) (Figure 1).

![Figure 1. The time to rescue opioid analgesia.](image)

**Conclusion(s):** The PENG block may be considered as effective and safety alternative to FICB for intraoperative analgesia in children undergoing hip surgery. However, the time to first analgesic requirement tends to lengthen among patients in FICB group.

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**24AP01-04**

Comparison of the effects of manual vs AutoFlow ventilation on cerebral oxygenation during intravenous anaesthesia induction in children

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**Background and Goal of Study:** Paediatric anaesthesia induction is achieved using manual or positive pressure ventilation modes. During positive pressure ventilation, the anaesthesiologist performing ventilation may inadvertently cause hyperventilation. Hypocarbia resulting from hyperventilation can impair cerebral oxygenation[1].

The aim of our study is to investigate the effects of manual ventilation and AutoFlow ventilation on cerebral oxygenation during anaesthesia induction in paediatric patients.

**Materials and Methods:** Fifty-one paediatric patients, who were scheduled for elective surgery and obtained parental and ethical committee consent, were enrolled in the study. Basic monitoring and NIRS monitoring were applied. Intravenous anaesthesia induction was performed, and two groups were formed: Group M (Manual ventilation) and Group A (AutoFlow ventilation). Hemodynamic parameters, cerebral regional oxygen saturation (rSO₃), end-tidal carbon dioxide pressure (ETCO₂), and peak inspiratory pressure (PIP) values were recorded. Statistical evaluation was conducted using t-tests, chi-square tests, Mann-Whitney U tests, Fisher tests, and Spearman correlation analysis.

**Results and Discussion:** At the 90th and 120th seconds of induction, ETCO₂ values were found to be significantly lower in Group M (p <0.001). In Group M, PIP, tidal volume (VT), and respiratory rate (RR) values were significantly higher throughout all time intervals (p <0.001). Cerebral rSO₂ measurements were similar between the groups. There were moderate and negative correlations found between respiratory rate and rSO₂ values.

**Conclusion(s):** It has been observed that the effects of manual ventilation and AutoFlow ventilation, applied with a face mask during paediatric anaesthesia induction, are similar regarding cerebral oxygenation, and they do not cause cerebral desaturation.

**References:**


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**24AP01-05**
The incidence of Neurological Adverse Events in pediatric patients with moyamoya angiopathy undergoing general anesthesia for non-revascularization procedures

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Background and Goal of Study: Moyamoya angiopathy (MMA) is a chronic, progressive steno-occlusive arteriopathy which is associated with high risk of arterial ischemic stroke (AIS), due to compromised cerebral blood flow and impaired autonomic function. Pediatric patients with MMA undergoing general anesthesia are considered to have an increased risk for ischemic events. We therefore aimed to assess the incidence of neurological adverse events (NAEs) among pediatric MMA patients undergoing general anesthesia for non-revascularization procedures.

Materials and Methods: We conducted a retrospective cohort study at a tertiary referral pediatric center, of MMA patients≤18 years, who underwent general anesthesia for procedures other than revascularization surgeries, between January 2014 and July 2023. Procedures that occurred in 30 days before or after revascularization surgery were excluded.

Post-anesthesia NAEs were defined as occurrence of acute neurological symptoms, including transient ischemic attacks, seizures, altered mental status, severe headache, or evidence of AIS on imaging in the 30 post-procedural days.

Results and Discussion: Among 149 procedures on 38 patients (mean age: 8.7 years; 57% female), 124 (83.2%) procedures were minimally/non-invasive procedures (imaging tests and cerebral angiographies), and 25 (16.8%) procedures were invasive surgical procedures. Pre-procedural hyperhydration treatment was administered before 111 (74.5%) procedures per our institutional MMA protocol.

The incidence of post-anesthesia NAEs was 0.67% (1/149), due to acute AIS in the third day after a ventriculo-peritoneal shunt revision surgery, which required chronic anti-platelet therapy cessation, in a patient with post-radiation MMA and panhypopituitarism resulting in uncontrolled diabetes insipidus. There were no NAEs after minimally/non-invasive procedures performed under general anesthesia.

Conclusion(s): We found a low rate of post-anesthesia NAEs in pediatric MMA patients undergoing general anesthesia for non-revascularization procedures, with no NAEs after minimally/non-invasive procedures.

As neuro-radiological follow-up is crucial in MMA patients, this information can be valuable for reassuring patients and their families. The role of hyperhydration prior to minimally/non-invasive procedures should be further examined.

**24AP01-06**
Survey on the use of remimazolam in pediatric patients – a single center retrospective study

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Background and Goal of Study: Remimazolam is a short-acting benzodiazepine type of general anesthetic agents that has been increasingly used mainly in the elderly and high-risk patients due to its small effect on cardiac function and short context-sensitive half-time. The small effect on cardiac function is a useful feature for pediatric patients. However, it is not clinically approved for use, there is few experiences with its use. Therefore, we investigated the use of remimazolam in pediatric patients at our hospital in this study.

Materials and Methods: From August 2020 to December 2022, the electronic medical records were collected for all pediatric patients who received remimazolam during anesthesia.

Results and Discussion: 119 cases were recorded. The median age was 1.17 years (IQR 2.28). The induction method included slow induction in 69 patients (58%), rapid induction in 48 patients (40%), and rapid sequence induction in 2 patients (1.7%). Other general anesthetic agents were used concomitantly in 93 cases (78%). Combination drugs included sevoflurane in 82 cases (68%), desflurane in 2 cases (1.7%), propofol in 2 cases (1.7%), dexmedetomidine in 5 cases (4.2%), and midazolam in 2 cases (1.7%).

The median induction dose was 0.26 mg/kg (IQR 0.19) and the median maintenance dose was 1.44 mg/kg/hr (IQR 0.84). Sedation monitoring included BIS™ (Medtronic-Covidien) in 10 cases (8.4%), SedLine® (Masimo) in 49 cases (41%), and no use in 35 cases (29%). Flumazenil was administered in 54 cases (45%).

Conclusion(s): The median age of the cases was low, approximately 1.2 years, due to the frequent emergency use of the drug in newborns who have unstable cardiac function. Other general anesthetic agents were often used in combination, and the induction and maintenance doses alone were both higher than in the general adult population. Sevoflurane is the most common combination anesthetic agents. Both BIS and SedLine values for the administration of benzodiazepines as sedation assessment are often unreliable. The low use of flumazenil use may be due to avoidance of the agitation associated with rapid awakening. Future large, multicenter trials are needed in order to determine how the contribution of remimazolam in pediatric patients.

References:
Influence of intraoperative nociception on postoperative pain and delirium in children aged 1 to 3 years

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Background and Goal of Study: To date, there is some uncertainty about the etiology of paediatric emergence delirium (PAED). However, pain and stress appear to increase the risk for PAED [1]. The nociception level (NOL) monitor is a relatively new and non-invasive tool for assessing intraoperative nociception [2]. While NOL-guided anesthesia led to less postoperative pain in adults, there are no corresponding studies in children [3]. The goal of the study was thus to investigate the influence of intraoperative nociception on postoperative pain and delirium in children.

Materials and Methods: 50 children aged 1 to 3 years scheduled for ENT-surgery were included in this prospective single-center observational study. During general anesthesia BIS™ (Medtronic) and NOL (PMD-200™, Medasense, blinded) were measured. In the PACU, pain and delirium were assessed every 20 minutes using the KUS- (Kindliche Unbehangens und Schmerz) and PAED- (Paediatric Anesthesia Emergence Delirium) scales. Statistical evaluation was performed using R.

Results and Discussion: After the start of surgery, the NOL increased significantly by 5.9 (paired t-test, 95% CI 1.9-9.9). Boys had significantly higher PAED values than girls (10.1 vs. 6.4, Mann-Whitney-U-test, p = 0.03). Intraoperative NOL values showed no influence on postoperative KUS or PAED values (linear regression).

A decrease in mean intraoperative BIS by 1 was associated with an increase of the postoperative PAED and KUS (linear regression, 0.12, p = 0.03 / 0.06, p = 0.03).

Conclusion(s): The NOL is able to detect intraoperative nociception in children aged 1 to 3 years. However, it showed no influence on postoperative pain or delirium. According to the initial evaluation, the depth of anesthesia may have a negative impact on postoperative pain and delirium in children.

References:
24AP01-09
Perioperative neuromuscular blocking agent and respiratory complications in neonates and small infants: a secondary analysis of NECTARINE data

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Background and Goal of Study: Respiratory adverse events are the leading causes of perioperative morbidity and mortality in children. Neuromuscular blocking agents (NMBA) are recommended to facilitate tracheal intubation in neonates and small infants undergoing general anaesthesia. We describe the current European clinical practice associated with patient outcomes following neuromuscular blockade in neonates and small infants.

Materials and Methods: This is a secondary analysis of the NEonate-Children sTudy of Anaesthesia pRactice IN Europe (NECTARINE), a multicentre prospective observational study performed in 165 centres in 31 European countries between March 2016 and January 2017. Infants up to 60 weeks postmenstrual age undergoing anesthesia with tracheal intubation for surgical or diagnostic procedures were recruited. Children admitted intubated to the intensive care unit after the procedure or with a missing data for NMBA were excluded.

The primary endpoint was the 30-day respiratory complication following the use of NMBA and its reversal (neostigmine or sugammadex). Statistical analysis was performed with weight and age-adjusted regression analysis.

Results and Discussion: The data included 5,609 patients undergoing 6,542 procedures. In total, 3,829 patients were eligible for this analysis. Most patients (n=2920, 76.3%) received a NMBA for tracheal intubation with more than half of those (n=2127, 55.5%) extubated without reversal and only 20.7% (n=793) monitored NMBA reversal at the end of anesthesia. Considering patients undergoing tracheal intubation without NMBA as the reference group, the regression analysis demonstrated an increased relative risk for 30-day respiratory complications for patients with NMBA without reversal of 1.45 (95%CI 1.10 - 1.90).

The relative risk for 30-day respiratory complications in patients with NMBA and subsequent reversal was lower at 0.33 (95%CI 0.19 - 0.55).

Conclusion(s): This analysis showed that the administration of NMBA for tracheal intubation of neonates and small children undergoing procedures in general anaesthesia is regularly practiced in Europe. However, only one-fifth of the patients received a reversal after NMBA administration. Reversal of NMBA for tracheal extubation was associated with a significantly lower relative risk for 30-day respiratory complications. This stark finding requires confirmation in a future prospective randomized controlled trial.

24AP01-10
General anesthesia with caudal block for inguinal hernioplasty - a randomized controlled study

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Background and Goal of Study: Caudal block is a type of regional anesthesia suitable for inguinal hernia surgery in children. Our goal was to determine the effectiveness of caudal block combined with general anesthesia in providing intra- and postoperative analgesia and its effect on hemodynamic stability and drug consumption.

Materials and Methods: Prospective, randomized controlled study included 78 boys, 3-5 years, with an indication for inguinal herniorrhaphy, divided into groups G (general anesthesia, n=39) and G+C (general anesthesia + caudal block, n=39).

We monitored hemodynamic parameters intraoperatively, postoperative pain, and total consumption of all medicaments in the perioperative period. Complications and side effects of drugs were monitored, also.

Figure 1.
Results and Discussion: Boys in group G had statistically significantly higher values of heart rate in the 5th minute ($p<0.01$), in the 25th minute ($p<0.01$), and after awakening from anesthesia ($p<0.01$). We obtained similar results with systolic and diastolic pressure values - in the 5th minute ($p<0.01$), 15th minute ($p<0.01$), 25th minute ($p<0.01$), before awakening from anesthesia ($p<0.01$) and after awakening ($p<0.01$) (Figure 1). They also had significantly statistically higher total consumption of propofol, fentanyl, and acetaminophen ($p<0.01$). Boys in group G+C had statistically significantly lower pain scores postoperatively: initially ($p<0.01$), after 2 hours ($p<0.01$), and after 5 hours ($p<0.01$) (Figure 2). There were no complications.

Conclusion(s): In children, the combination of general anesthesia with caudal block, compared to general anesthesia only, is more efficient in suppressing visceral pain, leading to better hemodynamic stability, and it reduces the consumption of medicines in the perioperative period.

24AP01-11
Child with Wilms tumor for nephroureterectomy: challenges for anesthesiologists

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Background and Goal of Study: Nephroblastoma is the most common renal tumour affecting children in the world contributing to 6% of all pediatric cancers. Treatment modalities include Chemotherapy (CT), radiotherapy and surgical excision based on the staging and extension of the tumour. Postoperative surgical complications occur in 20% of all resections. Anesthetic challenges include lengthy transabdominal retroperitoneal surgery, small children and infants, thermoregulation, fluid shifts, ventilation with raised intra-abdominal pressure, potential IVC compression, and major hemorrhage. Also, associated syndromes may present with difficult airway situations. Hence, detailed preanesthetic evaluation and planning is of paramount importance. This is a unique study observing the various outcome parameters and anesthetic implications in a group of children undergoing nephroureterectomy for Wilms tumor in a tertiary hospital in India.

Materials and Methods: This was a retrospective study, 63 case files were studied for the demographics, anemia status, number of chemo complications, blood transfusions and various outcome parameters in a postoperative period such as length of hospital and ICU stay, need for transfusions, surgical site infection and pain score. The results were analyzed using appropriate statistical tests.

Results and Discussion: Most common peri-operative complications included Lobar collapse and Hospital acquired pneumonia which were seen in less than 10% of patients. Pulmonary edema, SSTI, UTI, diarrhea and oxygen requirement post-op were the other complications noted. Significant positive correlation was seen between duration of ICU stay with the number of CT cycles with a correlation coefficient of 0.382. Patients with chest infection underwent a higher number of CT cycles compared to those without chest infection. No significant correlation was observed between pre-operative anemia and peri-operative transfusion or with length of hospital stay as well as between the number of CT cycles in patients with and without overall post-op infection.

Conclusion(s): Optimal anesthetic techniques combined with meticulous planning alleviated possible complications in nephroureterectomy surgeries for Wilms' tumor.
The secondary objective of the study is to evaluate the incidence of postoperative nausea and vomiting, postoperative pain, the need for opioid administration, and postoperative delirium.

Materials and Methods: The trial was designed as a prospective observational trial. Patients aged 0 to 14 years who were scheduled for surgery from July 1, 2023 to November 24, 2023 were included in the study. Exclusion criteria were: refusal to sign informed consent from parents, urgent or emergency surgery, age > 14 years, and paediatric population at high risk of aspiration.

Results and Discussion: We documented 87 patients, of which 50 (57.47%) were male, with a mean age of 6±3 years. 39 patients(44.82%) were ASA I and 48 patients (55.18%) ASA II. The average fasting times for clear liquids were 12.05±1.84 hours and for solids 12.65±1.84. We assessed preoperative thirst and hunger using EVA scales and obtained a score for hunger 6.5±2.28, and 6.85±2.43 for thirst. 12 patients received opioid administration in the immediate postoperative period. We observed that those who underwent surgery after 11:00 am, that is, with more hours of fasting, had greater postoperative pain measured with the EVA scale 3.72±1.43 compared to those who underwent surgery before 11:00 am 1.78±2.28, with less preoperative fasting. We did not observe episodes of nausea and vomiting in the immediate postoperative period or excessive agitation in our patients.

Conclusion(s): The actual preoperative fasting times in our centre are much longer than those recommended by the new guidelines, and prolonged fasting times may have an influence on postoperative pain. Measures should be introduced to reduce the time of fasting with clear liquids up to 1 hour before surgery, an intervention that has been shown to be a safe practice.

24AP02-02
Evaluation of postoperative pain in pediatric patients of different ages after minor-medium size or major surgery using Visual Analogue Scale and Numeric Rating Scale
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Background and Goal of Study: In our study, we aim to evaluate the child’s pain at the postoperative 2nd hour by the child, parent and nurse by using two different pain scales, the Visual Analogue Scale and the Numeric Rating Scale. It was aimed to determine the difference or compatibility of the child’s postoperative pain assessment after surgical procedures of different surgical sizes with two different pain scores, the parent and the nurse which of the nurse or parent will evaluate more closely to the child and to investigate the effect of 2 different pain scores on these factors.

Materials and Methods: Following ethics committee and family-child information approval, ASA 1-3 physical status to undergo elective surgery at Ankara University Faculty of Medicine Hospitals between January-December 2022. A total of 180 children between the ages of 7-12(n=90) and 13-18(n=90) were included in the studytaking into account data loss. Data from 172 children(44.82%) were ASA I and 48 patients (55.18%) ASA II. The average fasting times for clear liquids were 12.05±1.84 hours and for solids 12.65±1.84. We assessed preoperative thirst and hunger using EVA scales and obtained a score for hunger 6.5±2.28, and 6.85±2.43 for thirst. 12 patients received opioid administration in the immediate postoperative period. We observed that those who underwent surgery after 11:00 am, that is, with more hours of fasting, had greater postoperative pain measured with the EVA scale 3.72±1.43 compared to those who underwent surgery before 11:00 am 1.78±2.28, with less preoperative fasting. We did not observe episodes of nausea and vomiting in the immediate postoperative period or excessive agitation in our patients.

Conclusion(s): The actual preoperative fasting times in our centre are much longer than those recommended by the new guidelines, and prolonged fasting times may have an influence on postoperative pain. Measures should be introduced to reduce the time of fasting with clear liquids up to 1 hour before surgery, an intervention that has been shown to be a safe practice.

24AP02-02
Real fasting times in paediatric population in a tertiary hospital: a prospective observational study
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Background and Goal of Study: Currently, European guidelines recommend the intake of clear liquids up to 1 hour before the procedure, as prolonged fasting can have consequences both in the intraoperative and postoperative periods. The primary objective of the study is to evaluate actual preoperative fasting times in the paediatric population that undergoes a scheduled procedure under general anaesthesia, locoregional anaesthesia, or sedation.

The secondary objective of the study is to evaluate the incidence of postoperative nausea and vomiting, postoperative pain, the need for opioid administration, and postoperative delirium.

Materials and Methods: The trial was designed as a prospective observational trial. Patients aged 0 to 14 years who were scheduled for surgery from July 1, 2023 to November 24, 2023 were included in the study. Exclusion criteria were: refusal to sign informed consent from parents, urgent or emergency surgery, age > 14 years, and paediatric population at high risk of aspiration.

Results and Discussion: We documented 87 patients, of which 50 (57.47%) were male, with a mean age of 6±3 years. 39 patients(44.82%) were ASA I and 48 patients (55.18%) ASA II. The average fasting times for clear liquids were 12.05±1.84 hours and for solids 12.65±1.84. We assessed preoperative thirst and hunger using EVA scales and obtained a score for hunger 6.5±2.28, and 6.85±2.43 for thirst. 12 patients received opioid administration in the immediate postoperative period. We observed that those who underwent surgery after 11:00 am, that is, with more hours of fasting, had greater postoperative pain measured with the EVA scale 3.72±1.43 compared to those who underwent surgery before 11:00 am 1.78±2.28, with less preoperative fasting. We did not observe episodes of nausea and vomiting in the immediate postoperative period or excessive agitation in our patients.

Conclusion(s): The actual preoperative fasting times in our centre are much longer than those recommended by the new guidelines, and prolonged fasting times may have an influence on postoperative pain. Measures should be introduced to reduce the time of fasting with clear liquids up to 1 hour before surgery, an intervention that has been shown to be a safe practice.

24AP02-04
Evaluation of postoperative pain in pediatric patients of different ages after minor-medium size or major surgery using Visual Analogue Scale and Numeric Rating Scale
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Background and Goal of Study: In our study, we aim to evaluate the child’s pain at the postoperative 2nd hour by the child, parent and nurse by using two different pain scales, the Visual Analogue Scale and the Numeric Rating Scale. It was aimed to determine the difference or compatibility of the child’s postoperative pain assessment after surgical procedures of different surgical sizes with two different pain scores, the parent and the nurse which of the nurse or parent will evaluate more closely to the child and to investigate the effect of 2 different pain scores on these factors.

Materials and Methods: Following ethics committee and family-child information approval, ASA 1-3 physical status to undergo elective surgery at Ankara University Faculty of Medicine Hospitals between January-December 2022. A total of 180 children between the ages of 7-12(n=90) and 13-18(n=90) were included in the studytaking into account data loss. Data from 172 children(44.82%) were ASA I and 48 patients (55.18%) ASA II. The average fasting times for clear liquids were 12.05±1.84 hours and for solids 12.65±1.84. We assessed preoperative thirst and hunger using EVA scales and obtained a score for hunger 6.5±2.28, and 6.85±2.43 for thirst. 12 patients received opioid administration in the immediate postoperative period. We observed that those who underwent surgery after 11:00 am, that is, with more hours of fasting, had greater postoperative pain measured with the EVA scale 3.72±1.43 compared to those who underwent surgery before 11:00 am 1.78±2.28, with less preoperative fasting. We did not observe episodes of nausea and vomiting in the immediate postoperative period or excessive agitation in our patients.

Conclusion(s): The actual preoperative fasting times in our centre are much longer than those recommended by the new guidelines, and prolonged fasting times may have an influence on postoperative pain. Measures should be introduced to reduce the time of fasting with clear liquids up to 1 hour before surgery, an intervention that has been shown to be a safe practice.
The parent and the nurse were asked to evaluate the child’s pain with both scales and it was recorded, ensuring that they were unaware of each other and the child.

**Results and Discussion:** In this study, considering all age groups and different surgical dimensions, generally all children had both scores; Excellent agreement was found between the child and parent (VAS/NRS: ICC = 0.903, ICC = 0.900), good agreement was found between the child and the nurse (VAS/NRS: ICC = 0.852, ICC = 0.842). For VAS and NRS, fathers were found to be better at predicting children’s pain than mothers. In children who underwent major surgery, we found that as the age of the child increases, the compatibility between the child and the parent increases in terms of both scores. It was also observed that as the age of children increases in minor-medium surgeries, the compatibility between the child and the parent decreases in both scores.

**Conclusion(s):** The parents assessed very similar pain scores with their children with NRS and VAS. Nurses underestimated child’s pain with both scores. Self-reporting pain is gold standard for pain evaluation but if it’s impossible for any reason parent’s assessment both with NRS and VAS can guide pain treatment.

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**24AP02-06**

**Cryoanalgesia for children undergoing Pectus Excavatum repair. The COPPER randomized controlled trial**

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**Background and Goal of Study:** Patients undergoing Pectus Excavatum repair with the minimally invasive approach frequently report severe postoperative pain. Analgesia includes a thoracic epidural catheter and intravenous opioids. Recently, cryoanalgesia has been proposed as an alternative aimed at providing short- and long-term postoperative pain control. The study aims to determine if cryoanalgesia is superior to the standard of care for postoperative pain relief and return to a normal quality of life.

**Materials and Methods:** A randomized, actively controlled, parallel-group, trial (category IIb medical device) was designed for 88 patients older than 12 years undergoing Pectus Excavatum repair. Participants are randomly assigned to one of the two study arms: cryoanalgesia vs standard of care. Cryoanalgesia is administered bilaterally on 5 to 6 costal levels. The primary outcome is: Paediatric Quality of Life 14 days after surgery. Secondary outcomes include days of hospitalization, morphine consumption, severity of pain, and any complications.

Non-parametric analysis (Mann–Whitney U-test) for continuous variables and Chi square or Fisher’s exact test for categorical variables were used to measure differences between the groups. All values were based on two-tailed tests.

**Results and Discussion:** The Protocol has been approved by the Ethics committee (278/2021 – DB id 11421) and registered at clinicaltrials.gov (NCT0520182041). Forty-three patients enrolled in the study (9 in the epidural and 5 in the cryoanalgesia arm). A mean hospitalization length was 4.45 (1.0) days in the epidural arm and 3.30 (1.5) in the cryoanalgesia arm. (p = 0.001). The mean (SD) quantity of morphine consumption on the first operative day was 14.95 (12.41) mg versus 10.88 (5.61) mg in the standard vs. cryoanalgesia group, respectively. Postoperative complications occurred in 8 patients: 3 in the epidural and 5 in the cryoanalgesia arm.

**Conclusion(s):** Quality of life at day fourteen is not improved by cryoanalgesia. Cryoanalgesia significantly reduces hospitalization length and morphine consumption in the early postoperative period. The complications rate was comparable between the two arms.

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**24AP02-07**

**Cannulation of the radial artery versus ulnar artery for invasive blood pressure monitoring in paediatric patients: a prospective randomized study**

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**Background and Goal of Study:** In paediatric patients, the preferred arterial puncture site is the radial artery (RA) or the femoral artery (FA). FA puncture may be associated with a high risk of post-puncture complications. Therefore, other potential sites suitable for artery cannulation are currently being investigated. According to published studies, ulnar artery (UA) could be a potential alternative to RA. The primary aim of the study is to compare overall puncture success in two different possible arterial sites (radial and ulnar artery). The secondary aim is to compare the technical difficulty of arterial cannulation in two different possible arterial sites and the incidence of cannulation-related complications.

**Materials and Methods:** The trial is designed as a prospective randomized non-inferiority trial. Patients (age of 1 to 6 years) with indication for arterial cannulation undergoing surgery under general anaesthesia and patients admitted into the PICU are randomized into RA or UA group. Patients are enrolled in the trial from May 2022 to May 2024.

Ultrasound (US) measurement of both arteries is performed before the US-guided cannulation. The catheterization success rate and overall success rate are evaluated. The artery is cannulated under US control. The rate of complications in 24 hours after cannulation is evaluated.

**Results and Discussion:** There are currently 15 patients enrolled in the study (9 in UA group, 6 on RA group). The average age of the patients was 3.1 years, the average weight was 16.5 kg. The puncture was successful in all patients in the planned localization. The average puncture time was 5 minutes 34 seconds in the UA group and 6 minutes 9 seconds in the RA group. The mean diameter of the RA was 1.95 mm, the mean diameter of the UA was 1.98 mm. The mean depth of the RA (distance of the skin to the upper wall of the artery) was 3.1 mm, UA 3.0 mm. No complications associated with the presence of a catheter were noted in any group.

**Conclusion(s):** Cannulation of the UA in paediatric patients is non-inferior to cannulation of the RA in all parameters - success rate and incidence of complications. Anatomical parameters are
also comparable. Ulnar artery can represent an anatomically suitable alternative to the radial artery for cannulation in small children.

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24AP02-09
Making Every Contact Count – what should be the role of the anaesthetist in promoting healthy lifestyle behaviours in children?

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Background and Goal of Study: Obesity in children and young people is a growing problem. The PEACHY study found that one in four children attending hospital for a general anaesthetic in the UK were overweight or obese [1].

The study also found that most hospitals do not routinely offer dietary or lifestyle advice to children. The anaesthetic pre-assessment could provide a valuable opportunity to offer expert advice regarding healthy living to children and their care givers.

Materials and Methods: In our district hospital in the UK, we surveyed 63 children between the ages of 2 and 17 years and their parents regarding their exercise and diet over a week period, during their pre-operative anaesthetic assessment for elective surgery.

Results and Discussion: The survey revealed that 20% of participants were overweight or obese. Only 47% of children ate vegetables at least once a day, rising to 77% for fruit. 49% never had fresh fish, and 62% had sweets at least once a day. 83% of respondents had takeaway food at least once a week. 70% of the children surveyed spent at least one hour every day playing video games, with a third playing for more than three hours a day. 60% of respondents did not exercise every day.

The results of the survey suggest there is significant potential to improve healthy lifestyle behaviours in our paediatric population. Making every contact count is an approach that encourages healthcare staff to use the opportunities arising during their routine interactions with patients to have conversations that aim to make positive improvements to their patient's health and wellbeing. The Royal College of Anaesthetists have created a resource based on a popular comic book to help start the conversation.

‘Dennis has an anaesthetic, the A-team challenges’ helps children take active steps to improve their lifestyle ahead of surgery, with fun challenges to eat healthily, be more active, sleep well and look after their teeth.

Conclusion(s): As obesity becomes more prevalent in the paediatric population who present for elective surgery, preassessment provides a valuable opportunity to encourage children and their families to adopt more healthy lifestyle behaviours before their surgery.

References:
24AP03-02
Anesthetic management of one-staged surgical correction of aortopulmonary window and interrupted aortic arch

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Background: Aortopulmonary window (APW) with right pulmonary artery originating in aorta, associated with interrupted aortic arch (IAA) type B, is a rare congenital heart defect (0.046%) called as Berry syndrome. Due to its fatal prognosis, early diagnosis and surgery in neonatal period are mandatory.

Case Report: A 13-day-old girl, weighing 3,1 kg, was scheduled for correction of APW+IAA in one-staged surgery. The diagnosis was done postnatally, due to the presence of heart murmur. Anesthesia induction was done with sevoflurane, phentanyl and cisatracurium. After endotracheal intubation, low fraction of inspired oxygen (FIO2) and relative hypoventilation was applied. Pre and postductal monitoring was necessary. Thus, a pulseoximeter was placed in right arm and limb. Invasive blood pressure (BP) catheter was inserted in left femoral artery and BP cuff was placed in right arm.

Furthermore, regional hemoglobin oxygen saturation (rSO2, %) was monitored cerebrally and in renal region. Before deep hypothermic circulatory arrest (DHCA) to 18°C, barbiturates, magnesium and methylprednisolone, were administered as cerebral protection. DHCA lasted 46 minutes, and cerebral oxymetry fell from 73 to 47. The patient needed adrenaline 0,5mcg/kg*min and milrinone 0,5mcg/kg*min to ensure adequate perfusión pressures. Tromboelastometry indicated the need of fibrinogen and fresh frozen plasma, with no postoperative bleeding. After 3 days, the patient was extubated, with no apparent neurological disturbances.

Discussion: Pre-postductal monitorig are mandatory in this sort of complex operations, as well as closed cerebral monitoring in order to avoid neurological adverse events. Furthermore, coagulation analysis with tromboelastometry will allow us to prevent postoperative bleeding events.

References:
Habibie YA, Busro PW, Roebione PS, Fakhri D. Berry syndrome; a successful one-stage repair in neonate periods, evaluation result after 9 years, a case report. Ann Med Surg (Lond). 2021 Mar;4;64.

Learning Points: The knowledge of the fisiopathology of this congenital defects, along with close monitoring both neurological and systemic, is essential to ensure good results in this kind of patients.

24AP03-03
Anesthesia management in caudal regression syndrome

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Background: Caudal regression syndrome (CRS) is a rare congenital anomaly characterized by a developmental defect in the caudal segment of the spine and spinal cord. The syndrome is associated with numerous neurological and structural abnormalities(1). Severe forms of CRS can lead to cardiac, renal, and respiratory anomalies that can cause early neonatal death(2). It can be associated with maternal hyperglycemia(2).

In this case, we aimed to discuss the anesthesia management of our 13-year-old female patient with CRS who underwent rod revision.

Case Report: The patient with CRS had a short and thick neck, limited neck movements, pectus excavatum. She had aplastic nails and hypoplastic extremities. Premedication was not used. Her baseline vital signs were normal. After preoxygenation, induction was performed with propofol, fentanyl and rocuronium. The patient was successfully intubated with video laryngoscopy. The operation took place in the prone position.

Total intravenous anesthesia (TIVA) with remifentanyl and propofol was preferred due to the potential risk of malignant hyperthermia (MH). Vital signs remained stable during the operation and she was extubated smoothly after receiving sugammadex.

Discussion: Patients with scoliosis often have decreased lung function and short-thick necks with limited movements can make intubation challenging(3).

Despite having these abnormalities, intubation was successful. Several studies have shown an increased risk of MH in congenital myopathies and diseases affecting skeletal muscles(4). We used TIVA to mitigate the potential underlying MH susceptibility in our patient. CRS may be associated with developmental anomalies and joint contractures (1). In our patient, due to hypoplastic fingers and aplastic nails, the pulse oximeter probe was placed on the patient’s earlobe.

References:

Learning Points: Anesthesia management can be challenging with multisystem anomalies. Due to the limited data on anesthesia management in CRS, further case reports are needed to shed light on this topic.
24AP03-05
Anesthesia management in a pediatric patient with West syndrome: a case report

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Background: West syndrome (WS) is one of the epileptic syndromes seen in early childhood; it may develop due to genetic factors, ischemia, hemorrhage or central nervous system infections. Response to antiepileptic treatment and long-term prognosis are generally poor. Although epileptic spasms in various forms disappear over time, they are replaced by other resistant epileptic syndromes in most patients.

Case Report: A 5-year-old, 15 kg male patient diagnosed with WS at 6 months old was scheduled for bilateral orchiopexy. The patient had ASD, chronic bronchitis, microcephalus, micrognathia and strabismus. His last seizure was jerk-like and occurred 2 years ago.

Premedication was not applied for airway safety. Preparations were made for difficult intubation. Midazolam and propofol were administered during the induction. Mask ventilation was easy, LMA was placed. Caudal block was applied to the patient for analgesia.

Because the patient had strabismus, propofol infusion was used for maintenance. Before and during the surgery, jerk-like movements were observed and additional propofol and midazolam were administered.

There were no changes in hemodynamics and no complications occurred. No seizure-like activity was observed in the postoperative 24-hour period.

Discussion: WS patients require detailed preoperative evaluation due to comorbidities and side effects of the medications. In addition, difficulty in intubation should be taken into consideration. Although there are debates about the use of propofol due to its effect on the seizure threshold, its safe usage has been reported and since the diagnosis of strabismus creates concerns about the use of volatile agents, our first option for the induction and maintenance of anesthesia was propofol.

Midazolam was used due to its anxiolytic, sedative and anticonvulsive effects. Anesthesia approach supported by regional anesthesia, induced and maintained with midazolam and propofol, may be appropriate in patients with WS. Situations that will lower the convulsion threshold should be avoided.

References:

Learning points: Paediatric epileptic syndromes, total intravenous anesthesia, caudal block

24AP03-08
Navigating perioperative complexity: a case report on managing tetralogy of fallot in 9-year-old child with severe biventricular dysfunction and intraventricular thrombus

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Background: Tetralogy of Fallot (TOF) is a prevalent congenital heart defect. Surgical correction is typically performed in infancy due to challenges associated with addressing these alterations in older children. Severe cardiac dysfunction in TOF poses significant challenges in management, extending beyond the inherent complexities of congenital heart disease.

Case Report: A 9-year-old (25 kg, 120 cm) from Cameroon was diagnosed with TOF at the age of 4. At the arrival in our ICU, the preoperative assessment revealed eupnea with 51% oxygen saturation, Hb 22 g/dL, and Hct 70%.

Diagnostic evaluations indicated significant biventricular dysfunction (LVEF: 12%, SVi: 13 ml/m²) and an obstructive intraventricular thrombus (41 mm). The decision to undergo surgery involved a thorough assessment of risks and benefits, ultimately deeming surgical correction crucial, particularly due to the potential advantage of thrombus removal.

Despite initial promise post-surgery, the patient entered cardiogenic shock, requiring V-A ECMO assistance. Tailored anticoagulation following TEGs was pursued.

Over subsequent days, efforts to stabilize hemodynamics led first to the removal of right-sided assistance and then gradual weaning of ventricular support under Swan-Ganz catheter monitoring. Sixteen days into mechanical support, an abrupt halt in the VAD circuit occurred due to thrombotic deposition on the aortic cannula, requiring urgent surgical removal.

Pharmacological support was administered, and despite setbacks, echocardiography after 20 days showed improved ventricular function (LVEF: 45%). The patient was successfully transferred to the pediatric ward in good clinical condition after 37 days of ICU stay.

Discussion: Limited literature references exist regarding the treatment of comparable clinical cases. This case emphasizes the importance of a multidisciplinary approach in managing complex congenital heart conditions. The decision to implement postoperative ECMO proved critical in addressing complications and optimizing the child’s recovery trajectory.

References:

Learning points: Integration of ECMO into postoperative care, with the flexibility to adjust mechanical assistance based on evolving scenarios, underscores its role in the management of complex congenital heart conditions.
24AP03-09
Echinococcus granulosus pulmonary hydatid cyst excision in a 9 year old patient: a case report

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Background: The prevalence of Echinocecciosis (Ech) in Greece was 0.13/100,000/year (255 cases) between 2004-20221. Among them only 9 cases of children under 14 years old were reported.

We present a rare case of pulmonary hydatid cyst (HC) excision in a 9-year-old (y/o) patient and the anaesthesiologic considerations.

Case Report: A 9 y/o boy with known history of Ech receiving albendazole was scheduled for emergency cystectomy due to haemoptysis, cough and pleuropneumonia. General anaesthesia was implemented with propofol, FNT and rocuronium induction, sevoflurane and remifentanil for maintenance. A 5.5mm ID cuffed single lumen (SL) endotracheal tube (ET) was used and mechanical ventilation (MV) performed with low tidal volume (Vt 5ml/kg) and relatively high respiratory rate (RR 22bpm). After thoracotomy, surgeons suctioned the cystic content and rinsed cyst interior with hypertonic solution resulting in temporary hypernatremia (157mmol/l).

Air leak following cyst excision was restored by stitching the infiltrated 4th order bronchus. The overall duration of the operation was 3 hours without complications. Postoperatively, the patient was transferred to the intensive care unit and was extubated 3 hours later.

Discussion: Lung manifestation of HC is rare (25% of cases). Cyst position and dimensions (9 x 7.5 cm) occupying considerable part of middle and lower pulmonary lobe and limiting the gas exchange area, in concomitance with decreased compliance of dependent lung during anaesthesia, would cause difficulty in MV. Cystic content in case of accidental endobronchial drainage, would occupy the dependent lung, causing further MV difficulty. This could be avoided with either use of double lumen (DL) ET, bronchial blocker, or endobronchial intubation with SLET. However, there is no DLET corresponding to SL 5.5 size and cannulation of left main bronchus is difficult due to the acute detaching angle with the trachea. For the aforementioned reasons we used SLET and adapted MV, discontinuing it when needed, to facilitate surgeons’ work. In the unfortunate case of endovascular cystic content insertion, hypersensitivity reactions and even anaphylactic shock could be provoked. Thus, alongside with dexamethasone, patient received dimetindene (histamine receptor blocker).

Cyst infiltration at bronchus would cause air-leak following excision.

Reference:

Learning points: Thoracic Surgery constitutes a challenge in paediatric anaesthesia.

24AP03-10
Anesthetic management for a pediatric case for dissecting esophageal diverticulum with Fontan circulation: preoperative multidisciplinary conferences changed the surgical techniques

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Background: Fontan surgery is a palliative surgery for complex congenital cardiac diseases that are difficult to treat with biventricular repair. Fontan patients have more commonly other congenital anomalies which require surgical treatment often. We had a case with a candidate for dissecting esophageal diverticulum (ED) after Fontan repair.

Case report: A five-year-old boy. He had undergone Fontan surgery for pulmonary atresia and tricuspid atresia at three years old. He was diagnosed as ED by upper digestive endoscopy, and the endoscopic surgical dissection with one-lung ventilation (OLV) was planned. He had no symptoms with daily activity and SpO2 was 95% (room air).

Preoperative pulmonary artery balloon occlusion tests (PABOT) were performed with spontaneous respiration under sedation. During left PABOT, oxygenation was maintained without O2 admission, though ScvO2 and cardiac index (CI) dropped significantly with increased CVP (ScvO2; 54%–38%, CI; 3.3 L/min/m2–1.8 L/min/m2, CVP 7 mmHg–10 mmHg).

The surgery plan was changed to thoracotomy with bilateral respiratory after discussion among surgeons, pediatricians and anesthesiologists considering the test results. General anesthesia combined with epidural anesthesia was performed.

In addition to the standard monitoring, we monitored the patient with arterial pressure-based cardiac output and ScvO2. Inotropes, landiolol and Nitrous Oxide inhalation were administered.

The surgery was achieved without respiratory failure or circulatory collapse. The patient was extubated in the operating room and admitted to the ICU after the surgery. He was discharged from the ICU on postoperative day (POD) 2 and the hospital on POD 10 without any complications.

Discussion: The risk assessment and anesthetic management for non-cardiac surgery with Fontan physiology are challenging. For esophageal surgery, restricted ventilation, including OLV, is preferable.

However, the influence of OLV on Fontan circulation has not yet been clarified and there are no sufficient criteria to assess the Fontan patients’ durability for OLV.

Considering the PABOT results with various professions, surgical techniques were changed and the surgery could be achieved safely in this case.

References:
1. JR McNamara et al. J Cardiothorac Vasc Anesth, 36 (2022)

Learning points: Esophageal surgical techniques for Fontan patients should be determined after carefully considering preoperative multifaceted tests and multidisciplinary conferences.
Experience with remimazolam in pediatric surgery under general anesthesia: case series

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**Background:** Remimazolam is a promising drug for general anesthesia given its rapid onset, short duration, and short context-sensitive half-life. However, its use in pediatric patients remains off-label, and there remain limited data.

**Case Report:** We present four pediatric cases in which remimazolam was successfully administered for total intravenous anesthesia, which involved tracheostomy for Lennox-Gastaut syndrome, rigid bronchoscopy for an endobronchial mass, bronchoscopy for a tracheal poly, and tracheostomy for Leigh's syndrome. General anesthesia was induced using remimazolam, with flumazenil being used for reversal with rapid recovery.

**Discussion:** Remimazolam provides anesthesia in pediatric cases involving a risk of seizures or shared airway surgery. However, its off-label use, limited data regarding pediatric patients, risk of increased bispectral indices, and risk of anaphylaxis in patients allergic to dextran warrant further research. Nonetheless, remimazolam offers a valuable anesthetic alternative given its reduced risk of hypotension, bradycardia, and respiratory depression, especially in children with congenital disorders.

**References:**

**Learning Points:** Remimazolam offers advantages for pediatric anesthesia in scenarios with a risk of seizure or shared airway surgery because it has advantages such as less hypotension, bradycardia, and respiratory depression, particularly in children with various congenital diseases.

Plasmapheresis for hemolytic crisis in Wilson disease: case report

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**Background:** Wilson disease is an inherited autosomal recessive disorder of copper metabolism, which could be manifested with chronic liver disease or neurological complications. In some cases, acute liver failure and/or hemolytic crises are the first manifestations of the disease. Plasma exchange have been proposed to rapidly lower serum copper levels to control hemolysis and stabilize liver function.

**Case Report:** A 6-year-old girl was admitted to the clinic with manifestations of liver failure, jaundice syndrome, intoxication with the diagnosis of “hepatitis of undetermined etiology”. The first symptoms of the disease appeared two weeks before hospitalization in the form of asthenization, decreased appetite, one week before hospitalization there was periodic vomiting. On admission, jaundice of the skin and mucous membranes was noted, the liver was enlarged. Cytolysis, hyperbilirubinemia, moderate thrombocytopenia were noted on admission. On the 3rd day of hospitalization, the condition worsened due to increasing symptoms of intoxication, jaundice syndrome, laboratory - increasing hepatic parameters, hypoproteinemia, hypocoagulation. CT of the abdominal cavity showed diffuse changes in the liver parenchyma. Signs of hepatitis. Effusion in the abdominal cavity, pelvic cavity. The child was transferred to the PICU. On the 10th day of intensive therapy, there is some decrease in the level of transaminases in the laboratory, but clinically the child has manifestations of delirium - agitation, loss of verbal contact, with subsequent depression of consciousness.

**Discussion:** Plasma exchange in combination with chelation can be an effective method to control acute hemolysis and stabilize liver function. Rapid removal of copper may prevent the need for transplantation or, in more severe cases, provide a bridge to liver transplantation.

**Learning Points:** Due to the rarity and clinical polymorphism of Wilson's disease is difficult to diagnose, so any cases of severe, difficult to treat hepatitis should be considered for copper metabolism disorders, especially in pediatric practice.
24AP04-03
Ultrasound guiding of thoracic epidural via caudal access: a precise and safe approach for esophageal atresia surgery

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Background: The placement of an epidural catheter at the thoracic level via the caudal route, in an ultrasound-guided manner, is an advanced technique that uses ultrasound as a real-time visualization tool to guide its proper positioning.

Case Report: A 72-hour-old male (3.1 kg, 52 cm) admitted to the NICU, with a diagnosis of esophageal atresia with tracheal fistula and acute respiratory failure. He underwent scheduled surgery for repair via thoracotomy. Spontaneous orotracheal intubation was performed through direct vision with a video laryngoscope, after anesthetizing the airway with topical lidocaine. Subsequently, the appropriate caudal epidural space was identified via ultrasound and local infiltration was carried out. An 18G Tuho epidural needle was inserted caudally and the position of the catheter was verified by real-time ultrasound visualization until the space corresponding to T4 was reached. A bolus of 1.5 mg levobupivacaine and 3 mcg fentanyl was administered and fixation of the catheter was ensured by tunneling it. During the intervention, an infusion of 0.15% levobupivacaine was maintained at 0.2 mg/kg/h. Surgery was successful and the patient had a favorable postoperative evolution.

Discussion: Effective pain management after major surgery in neonates poses several challenges. Parenterally administered opioids are often used, along with anti-inflammatories leading to inadequate analgesia and excessive sedation. Although continuous thoracic epidural analgesia is highly effective, its implementation carries risks and requires specialized skills. Ultrasound-guided placement offers several advantages: greater precision in locating the epidural space, increasing the effectiveness of the procedure and an improvement of the overall safety by directly visualizing anatomical structures, avoiding accidental puncture of unwanted structures.

Reference:

Learning Points: The use of ultrasound as a method of placement of a caudal access thoracic epidural catheter in a neonate with esophageal atresia undergoing corrective surgery provided adequate periorperative pain management. This technique allowed effective and specific analgesic relief, improving comfort and facilitating early recovery. The use of the ultrasound-guided route was essential to guarantee precision and safety.

Figure 1. A, Separated part visible through tracheostomy site. B, Oxygen supplementation through the part in trachea. C, Separated part from the main attachment unit.

References:

24AP04-06
Fractured tracheostomy cannula in a 4-month-old infant: another challenge for an anaesthetist

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Background: Tracheostomy cannula fracture is a rare complication, where early recognition and appropriate management are crucial to avoid fatal airway obstruction (1,2).

We aimed to share the management of a fractured cannula of a 4-month-old infant scheduled for laser photoagulation and inguinal hernia repair in the same session.

Case Report: Our patient was a 4-month-old infant weighing 3500 g, followed-up since birth due to prematurity, retinopathy and severe bronchopulmonary dysplasia in need of oxygen support through a T-tube. On the day of the operation, the difficulty in respiration was recognised. Parents informed us about the recently developed bruises around the cannula in the last 2 days. The cannula was observed to be fractured and separated from the main attachment site, being visible through the tracheostomy port (Figure 1A). Due to respiratory distress, patient was immediately brought to the operating room for a replacement of cannula. Preventing it from falling towards the trachea, oxygen was supplemented through the separated cannula (Figure 1B,C). ENT surgeons changed the cannula, but unequally ventilated lungs on auscultation necessitated shortening of cannula. After confirming ventilation, sevoflurane was used for anaesthetic induction and maintenance.

Laser photoagulation and inguinal hernia repair were completed in 2 hours and 10 minutes time in the same session without any complication. During emergence, the patient was tachypnoeic and was intermittently fatigued and desaturated, so transferred to PICU.

Discussion: Tracheostomy cannula fracture should be suspected in all tracheostomy patients in respiratory distress. Tracheostomy tube fracture and displacement of the fragment into the tracheobronchial tree may become a fatal complication. Acute management is a life-saving procedure performed by a multidisciplinary team.

References:
24AP04-09

Adenoidectomy in a patient with self-limited epilepsy with autonomic seizures: a case report

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Background: Self-limited epilepsy with autonomic seizures (SeLEAS) is a benign childhood occipital epilepsy with an incidence of 13% in children aged 3 to 6 years old with afebrile seizures. It presents with autonomic symptoms like vomiting, pallor, mydriasis, tachycardia, hypotension, gastrointestinal and thermoregulatory alterations, incontinence and hypersalivation. Confusion, unresponsiveness, eye deviation and hemi/generalized convulsions are also possible. Remission occurs within 2 years from onset and without residual neurologic deficits. Therefore, treatment with antiepileptic drugs usually is unnecessary. Autonomic seizures can be potentially life-threatening in the rare context of cardiorespiratory arrest.

Case report: A 3 year old boy, ASA 2 presented for an adenoidectomy. He was diagnosed with SeLEAS due to recurrent episodes of hypoglycemia and syncope associated with stress and fasting (the last one happened when he was 2 years old). He was medicated with sodium valproate. Intraoperative monitoring included ASA standard and BIS™. For anesthesia induction, fentanyl and sevoflurane were used followed by intubation with a size 4 RAE ETT and maintenance of anesthesia was made with a mixture of air/oxygen and sevoflurane, with no complications reported. For analgesia, paracetamol was given and nausea and vomiting prophylaxis was made with dexamethasone and ondansetron. Anesthetic emergence also occurred uneventfully and the patient was extubated right after the procedure.

Discussion: SeLEAS is a rare syndrome presenting with seizures that can be prolonged and mimic non-epileptic disorders. Potentially life-threatening scenarios have been described. Anesthetic evaluation should focus on the cause, type of seizure activity and treatment. Antiepileptic drugs should be continued throughout the perioperative period. As this was a short surgery with minimum pain stimuli, these physiological stresses that can trigger seizure activity were not a problem.

References:

Learning points: Close peroperative monitoring of autonomic manifestations is required to evaluate possible seizure activity. To abort prolonged crisis, some experts recommend the use of benzodiazepines. To our knowledge, this is the only case report about anesthetic management of SeLEAS, highlighting the possible use of volatile anesthesia.

24AP04-08

Rare etiology of pleural effusion in a 2-year-old with polymalformative syndrome

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Background: Children with malformative syndromes pose an anesthetic challenge, especially when addressed in emergency situations. We report the case of a toddler with pleural effusion of rare etiology.

Case report: A 2-year-old male toddler, ASA III, with a polymalformative syndrome - probable Dandy-Walker syndrome (awaiting genetic study) - with global hypotonia, bell-shaped chest with marked scoliosis and plagiocephaly with facial asymmetry, was admitted with hypoxic respiratory failure due to complicated pneumonia with extensive left-sided pleural effusion.

Clinical deterioration required urgent chest tube placement. Upon arrival to the operating room, the child was obtunded, tachypneic, receiving supplemental oxygen by face mask (FiO2 0.28), and maintaining SatO2>95%.

Chest tube was placed under inhalatory sedation with local anesthetic, with immediate drainage of clear citric fluid (40ml), followed by serohematic fluid drainage of 300ml, which led to instant respiratory distress improvement.

Chest X-ray and CT on the following day revealed a VPS with intrathoracic distal tip and pleural fluid sample consistent with cerebrospinal fluid. The patient was submitted to surgical reposition of the VPS under general anesthesia with laryngeal mask airway without complications. Discharged after completing 7 days of antibiotic therapy with cefotaxime and vancomycin.

Discussion: This case highlights a child with a pleural effusion of rare etiology, emphasizing its consideration as a postoperative complication in patients with VPS placement.

Additionally, given the probable Dandy-Walker syndrome, we point out the potential difficulty in airway management, the importance of maintaining a stable intracranial pressure and the restrictive ventilatory syndrome secondary to marked scoliosis and pleural effusion.

References:
1. http://dx.doi.org/10.14740/jmc2255e

Learning Points: Anesthetic management of Dandy-Walker syndrome; Pleural effusion workup
24AP05-01
Cardiorespiratory arrest during neurosurgery intervention in an infant: a case report

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Background: Perioperative cardiopulmonary arrest in pediatric patients, particularly neonates and infants, demands swift and coordinated intervention to enhance survival rates (1). This report discusses a case involving a 4-month-old patient with a VPS, highlighting the challenges and successful management during a neurosurgical procedure.

Case Report: A 4-month-old patient with a VPS presented with increased fontanel size, valve area swelling, projectile vomiting, and partial refusal of feeds. Neurosurgery intervention was deemed necessary due to these symptoms and the patient’s complex medical history. During the surgery, a blood clot obstructing one of the ventricular connections was discovered. Careful release of the obstruction resulted in the forceful exit of approximately 30ml of CSF. Subsequently, the patient experienced immediate hemodynamic deterioration, necessitating resuscitation. Prompt resuscitation, involving the administration of two doses of atropine (0.01 mg/kg), led to rapid improvement within the first minute. The surgical procedure concluded successfully, and the patient was transferred to the Neonatal Intensive Care Unit. Extubation occurred 2 hours post-operation due to favorable respiratory recovery.

Discussion: Sudden intracranial pressure changes can lead to hemodynamic instability, potentially resulting in cardiac arrest (2). Understanding cerebrospinal fluid homeostasis can help grasp the impact of its imbalance on vital bodily functions (3). Anesthetic management in these patients must be cautious, utilizing medications that maintain stability.

References:

Learning Points: Cardiopulmonary arrest is a crisis situation that requires the presence of qualified personnel to organize the response and make it as effective as possible. The patient’s history and the type of intervention provide information related to the patient that can offer insights into their risk of experiencing intraoperative cardiac arrest, allowing us to anticipate and respond proactively. Understanding cerebrospinal fluid (CSF) homeostasis can assist us in anticipating a potential loss of hemodynamic stability in neurosurgical patients.

24AP05-02
Anesthetic management for genitoplasty in a 21-hydroxylase deficient patient: a case report

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Background: The treatment for newborns with adrenal hyperplasia advanced to a point of turning this patients’ survival high. Otherwise, there are a few standardized protocols for the anesthetic management of these patients so far.

Case Report: A female 1 year and 4 months old patient, with the classic virilizing form of congenital adrenal hyperplasia (CAH) was admitted for perineal vaginoplasty. The patient kept using fludrocortisone and hydrocortisone until the day of surgery as prescribed by the endocrinologist. The anesthetic technique was general anesthesia combined with a caudal epidural block with bupivacaine and morphine to optimize intra and postoperative analgesia. Hydrocortisone 50 mg was administered during intravenous induction and after 4 hours. Besides, a strict glycemic and electrolyte control was carried out during the procedure. The post-anesthetic recovery was uneventful and the patient was discharged from hospital after 6 days.

Discussion: Patients with CAH 21-hydroxylase deficiency present with elevated 17-hydroxyprogesterone due to defective conversion to 11-deoxycortisol, resulting in decreased cortisol synthesis, loss of negative feedback leading to increased production of ACTH. The adrenal stimulation increases the production of adrenal androgens resulting in atypical genitalia characterized by clitoral enlargement, labial fusion, and formation of a urogenital sinus in 46 XX females.

Anesthetic management is complex and includes glucocorticoids replacement and management of adrenal crisis, hypotension or shock, hypoglycemia, metabolic acidosis, hyponatremia and hyperkalemia.

References:

Learning Points: Multidisciplinary team should include endocrinologists. The surgery must be performed at an experienced medical center and the anesthetic plan must include early recognition and management of adrenal crisis and glucocorticoid replacement therapy. Caudal epidural may contribute to good pain control with hemodynamic stability.
24AP05-03
Anesthetic management of a child with Congenital Steinert syndrome: a case report

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Background: Congenital Steinert Syndrome (CSS) is an infrequent (1/10,000 births) severe form of myotonic dystrophy, characterised by general hypotonia and muscle wasting(1).

Case report: A 10-year-old boy with CSS was scheduled for an emergency surgery of left femur fracture osteosynthesis. He suffered from a first degree AV block. A general anesthesia (GA) was decided, and we initiated our hospital’s protocol for malignant hyperthermia: the ventilator was prepared with a 3 hour cycling, vaporizers were removed and we requested dantrolene to be ready for use. An external defibrillator was also prepared into the OR. We administered 0.1 mg/kg iv midazolam for anxiolysis and parental presence during induction was allowed. We performed an iv induction with 2 mcg/kg fentanyl and 2 mg/kg propofol and inserted a LMA. GA was maintained with TIVA (propofol and remifentanil infusion) without muscular relaxation. We administered paracetamol and ibuprofen. Standard ASA monitors and central temperature was monitored and a forced air warmer was used. The patient remained hemodynamically stable throughout. Surgeons working concurrently. Ge surgeons working concurrently. Ge infiltration to the incision sites. After ensuring the patient was fully awake and breathing spontaneously, LMA was removed and patient was transferred to the PACU.

Discussion: CSS is a rare multisystemic disease. With a multidisciplinary risk assessment, anesthesia plan can be formulated and many complications can be avoided. Due to potential increased pharmaco-sensitivity in patients with CSS, hypnotics and opioids should be carefully dosed by titration. Hypnotic agents with a short half-time are recommended(2). Volatile anaesthetics should be avoided. Myotonia can be precipitated intraoperatively by hypothermia, shivering, surgical stimulation, and electrocautery. It is important to maintain normothermia. A multimodal treatment for pain should be considered for the postoperative period.

Learning points: CSS represents a challenge for the anaesthesiologist. Generally, local or regional anesthesia is preferred. However, in children the use of general anesthesia can be safe without volatile agents and with adequate monitoring during the intra and postoperative period.

References:

24AP05-04
Apert syndrome – where does the complexity lie?

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Background: Apert syndrome is a rare autosomal dominant disease, resulting in craniofacial and limb malformation. These patients typically undergo numerous surgeries in order to improve quality of life.

Case Report: A 14-month-old girl with Apert syndrome, was proposed for bilateral myringotomy, cleft palate repair and bilateral hands synactyly release in the same surgical setting. The patient had delayed developmental milestones, obstructive sleep apnoea (requiring night CPAP) and evident Apert syndrome features—craniosynostosis, depressed nasal bridge, high-arched palate with posterior cleft. A multidisciplinary perioperative plan included varied airway strategies. After monitoring, inhalatory induction was performed with sevoflurane and peripheral access was easily obtained with subsequent administration of fentanyl, propofol and rocuronium. There were no difficulties in face mask ventilation and definitive airway was secured using videolaryngoscopy, with an uneventful orotracheal intubation. Anesthesia was maintained with propofol. Surgery began with myringotomy and proceeded to simultaneous correction of the cleft palate and syndactyly, with pediatric and orthopedic surgeons working concurrently. The surgery lasted 3.5 hours with no adverse events. Anticipating the requirement for CPAP, which was contraindicated due to the presence of palate sutures, it was decided to delay extubation and the patient was transferred to the ICU mechanically ventilated. On the 4th postoperative day, elective extubation was performed. However, reintubation was necessary due to sustained hypoxemia and signs of respiratory distress. This culminated in a longer than expected period of mechanical ventilation, subsequently transitioning to non-invasive ventilation, after which a slow yet favorable recovery ensued.

Discussion/Learning Points: Anesthetic management of Apert syndrome may be challenging, so preoperative evaluation, optimization, and planning are essential. Anticipating airway challenges, a meticulous strategy, considering airway approach and optimal extubation timing was devised due to the heightened risk of airway obstruction in these patients. In this case, a combined surgical approach was elected to minimize airway interventions, reduce the risk of postoperative complications and the number/time of hospitalizations, however this decision requires careful, case-specific decision-making due to potential increased morbidity.
Intraoperative tension pneumothorax during posterior arthrodesis in a child with neuromuscular scoliosis

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**Background:** Scoliosis, a common spinal deformity in children, often requires spinal arthrodesis for correction. However, this procedure poses risks of damaging nearby structures due to local anatomy distortion. Hypertensive pneumothorax (TPT) is a rare procedure poses risks of damaging nearby structures due to local anatomy distortion. Hypertensive pneumothorax (TPT) is a rare but severe complication during this surgery, requiring heightened suspicion.¹

**Case Report:** A 12-year-old with non-progressive chronic encephalopathy and thoracolumbar scoliosis (T4-L1) at an 84° Cobb angle underwent elective posterior arthrodesis. Routine anesthetic monitoring, along with neurophysiological monitoring, was employed.

About four hours into surgery, the patient suffered sudden and refractory hemodynamic instability without significant changes in breathing parameters. Estimated bleeding was 300-500ml, and shock was managed with volume expansion and two units of red blood cells administered alongside continuous infusion of norepinephrine.

Surgery was halted, and the patient moved to the intensive care unit. Later that night, a cardiac arrest occurred, with subsequent returns to spontaneous circulation after thirteen minutes. Post-cardiac arrest X-ray revealed TPT treated with thoracentesis followed by drainage, leading to an improvement in hemodynamic parameters.

**Discussion:** Scoliosis surgery, especially in neuromuscular scoliosis cases, carries high risks of severe complications.² TPT is extremely rare but can result from three mechanisms, including pre-existing pneumothorax, elevated inspiratory pressures, or, as in this case, inadvertent pleural tears during surgery, particularly relevant in neuromuscular scoliosis.³

**Learning Points:** Pulmonary complications, although infrequent, should always be considered in the differential diagnoses, especially in correcting severe neuromuscular scoliosis, as they may not always present immediate changes in ventilatory parameters due to these patients’ chronic impairment of respiratory compliance.

**References:**

Safe anesthesia practices in Stuve-Wiedemann syndrome: a unique case study

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**Background:** Stuve Wiedemann Syndrome (SWS) results from a mutation on chromosome 5p13, with autosomal recessive inheritance. Anesthesia challenges in SWS involve potential airway difficulties, uncertain malignant hyperthermia (MH) risks, and autonomic dysfunction (AD). This case report details our experience managing anesthesia in an SWS patient and potential secondary conditions arising from AD.

**Case Report:** The patient, a 4-year-old girl with SWS, underwent a bilateral intramedullary telescopic nail procedure. The operation was planned, and the intensive care setting was secured postoperatively due to potential complications.

Preoperatively, the anesthesia machine was flushed with a fresh gas flow of 10 L/minute, and the breathing circuit and carbon dioxide absorbent were replaced to minimize MH risk. Appropriate difficult airway tools were also prepared due to the potential for a challenging airway.

The patient was monitored according to ASA recommendations. An intravenous line was established. Following Fentanyl 0.5 mcg/kg, induction was achieved with Lidocaine 1 mg/kg and Propofol 3 mg/kg. After the patient’s spontaneous breathing ceased, the airway was secured with a size 2.5 LMA.

Anesthesia maintenance for the patient was provided through TIVA with Propofol (50 mcg/kg/minute) and Remifentanil (0.05 mcg/kg/minute) infusion. During the operation, sweating (recorded body temperature was 36.1 +/- 0.5) and unexpected bradycardia episodes were noted, possibly related to AD.

Bradycardic episodes began around the 15th minute of surgery and occurred a total of 5 times. In these episodes, the heart rate dropped to a minimum of 45 bpm, while blood pressure remained normal. The bradycardic episodes occurred and resolved spontaneously in 15 seconds.

No additional issues were encountered during the operation. After a successful removal from the LMA, the patient was discharged to the ward following 30 minutes of PACU observation.

**Discussion:** SWS poses challenges in anesthesia, including potential complications like difficult airway, MH, and AD. Our case emphasizes unexpected bradycardic episodes related to AD.

**Reference:**

**Learning Points:** In SWS, intraoperative events linked to AD may be the only findings, emphasizing the importance of vigilance for anesthesiologists.
24AP05-07
Anesthesia management of toxic epidermal necrolysis in a pediatric patient

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Background: The toxic epidermal necrolysis (TEN) is a rare, life-threatening, adverse reaction most induced by drugs. Clinical features include fever, prodromal symptoms, mucositis, and extensive epidermal detachment. Supportive care is the cornerstone of management and should be driven by an experienced multidisciplinary team. We present the anesthetic management of a 10-year-old female patient with TEN proposed to debridement surgery.

Case report: A 10-year-old female patient presenting a skin detachment >90% of body surface area, in the context of TEN induced by antibiotic therapy, was proposed for debridement surgery. The patient had a medical history of Crohn's disease and autoimmune hepatitis.

A balanced general anesthesia was induced with fentanyl (2 mcg/kg), propofol (3 mg/kg) and rocuronium (0,6 mg/kg). A video laryngoscope-assisted orotracheal intubation with a 6 mm Micro cuff® endotracheal tube was performed. Sevoflurane was used for the maintenance of anesthesia. Ultrasound-guided catheterization of the brachial artery and catheterization of a central vein were performed with special care to avoid further skin injury. ASA standards for anesthetic monitoring and invasive blood pressure were performed. Special attention was given to temperature control, fluid therapy, ionic replacement and hemodynamic stability. A period of difficult ventilation occurred during mobilization to ventral decubitus position. Intraoperative bronchofibroscopy was performed and a mucofibrinous cast identified as the cause of bronchial obstruction.

After 3 hours of surgery with application of Suprathel®, the patient was transferred to a pediatric intensive care unit under ventilation and sedoanalgesia. No further complications are to be reported. Following a period of 18 days of hospitalization, the patient was discharged home with favorable clinical recovery.

Discussion: TEN patients are prone to infection, heat loss and hydro-electrolytic imbalances. The anesthetic management should avoid further skin damage and the risk of complications.

The airway management and ventilation can be a challenge, on the one hand due to the possible presence of mucosal lesions and the need for aggressive fluid therapy, on the other hand by hypersecretion, bronchial flaking, and atelectasis, which may occur in these cases.

Regarding the concern of hypothermia, the operating room should be heated, and the duration of the surgical procedure should be as short as possible.

References:
Perioperative management of a child with hypoplastic left heart syndrome undergoing cryptorchidism surgery

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Background: Hypoplastic left heart syndrome (HLHS) is a complex congenital heart condition which includes abnormal development of the left-sided heart structures leading to inadequate systemic perfusion following postnatal closure of the patent ductus arteriosus (PDA). Surgical palliation may be accomplished through a 3 staged process known as the hybrid approach. Patients with HLHS may need to undergo other non-cardiac surgical procedures during the 1st years of life posing a real challenge to the anaesthesiologist, surgeon, and the medical team.

Case Report: We present the case of a 18-months old, 9 kg infant who presented for cryptorchidism surgery after performing the first surgical stage for the repair of HLHS. The main reasons for treatment of cryptorchidism include increased risks of impairment of fertility potential, testicular malignancy, torsion, and/or associated inguinal hernia. The intraoperative implications of the hybrid anatomy are discussed and options for anesthetic care presented.

Discussion: The primary goal in the management of patients with single ventricle physiology is optimizing systemic oxygen delivery and perfusion pressure. This is achieved by balancing systemic and pulmonary circulations (Qp: Qs).
It is important to avoid hyperventilation and hyperoxia because it would reduce pulmonary vascular resistance (PVR) and cause pulmonary “overcirculation;” hypoxia and hypercarbia will elevate PVR and cause pulmonary “undercirculation.” LMA showed to be effective in avoiding hyperventilation and hyperoxia.

References:

Learning Points: Children with palliated HLHS have anesthetic considerations that must be followed to reduce perioperative morbidity and mortality in this high-risk pathology.
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