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ORAL PRESENTATIONS I

OP 1

Flow-controlled ventilation improved gas exchange during one-lung ventilation: a randomised experimental crossover study

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Background: Application of a ventilation modality that ensures adequate gas exchange during one-lung ventilation (OLV) without inducing lung injury is of paramount importance. Due to its beneficial effects on respiratory mechanics and gas exchange, flow-controlled ventilation (FCV) may be considered as a protective alternate during OLV. We investigated whether this new modality provides benefits compared with conventional ventilation modality for OLV.

Methods: Ten pigs were anaesthetized and randomly assigned to be ventilated with FCV (FiO_2: 0.5, Flow: 15 l/min, Fr: 30-35/min, peak inspiratory pressure set to target a tidal volume of 7 ml/kg for whole lung and 5 ml/kg for one-lung ventilation, PEEP: 5 cm H_2O) or pressure-regulated volume control (PRVC, FiO_2: 0.5, Fr: 30-35/min, VT: 7 ml/kg for whole lung and 5 ml/kg for one-lung ventilation, PEEP: 5 cm H_2O) ventilation. Arterial partial pressure of oxygen (PaO2), carbon dioxide ($PaCO_2$), ventilation and hemodynamical parameters and lung aeration measured by electrical impedance tomography were assessed at baseline and one hour after the application of each modality during OLV using an endobronchial blocker. Following lung recruitment, the sequence was repeated in a crossover design and a new set of data was collected.

Results: Compared to PRVC, FCV resulted in increased PaO_2 (153.7 ± 12.7 vs. 169.9 ± 15.0 mmHg, p = 0.002) and decreased $PaCO_2$ (53.0 ± 11.0 vs. 43.2 ± 6.0 mmHg, p <0.001) during OLV, with lower respiratory elastance (103.7 ± 9.5 vs. 77.2 ± 10.5 cm H_2O/l, p <0.001) and peak inspiratory pressure values (27.4 ± 1.9 vs. 22.0 ± 2.3 cm H_2O, p <0.001). No differences in lung aeration or hemodynamics could be detected between the two ventilation modalities.

Conclusions: The application of FCV in OLV led to improvement in gas exchange and respiratory elastance with lower ventilatory pressures. Our findings suggest that FCV may offer an optimal, protective ventilation modality for OLV.

OP 2

Flow-controlled ventilation maintains gas exchange and lung aeration in a paediatric model of healthy and injured lungs: a randomized cross-over experimental investigation

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Background: Flow-controlled ventilation (FCV) is characterized by a constant flow that is applied through an ultra-thin endotracheal tube during inspiration and expiration. While the benefits of FCV on gas exchange have been demonstrated in preclinical and clinical studies, the value of this modality in a paediatric population is unknown. We compared the effects of FCV to pressure-regulated volume control ventilation (PRVC) on lung function in piglets before and after surfactant depletion.

Methods: Ten piglets (body weight: 10.4±0.2 kg) were anaesthetized and mechanically ventilated. Gas exchange, intrapulmonary shunt (Qs/Qt), airway resistance (Raw), respiratory tissue damping (G), tissue elastance (H) and lung aeration (by chest electrical impedance tomography (EIT)) were assessed before (BL) and after randomly assigning piglets to one-hour ventilation with FCV or PRVC. Following surfactant depletion by bronchoalveolar lavage and injurious ventilation, the measurements were repeated, using the same two ventilatory modes.

Results and discussion: FCV maintained sufficient CO_2 elimination both in healthy and surfactant-depleted lungs (39.56±7.1 mmHg and 46.2±11.4 mmHg, respectively) with no difference with PRVC (36.0±4.1 and 39.5±4.9 mmHg, respectively for healthy and injured lungs). While a difference was detected in PaO_2/FiO_2 and Qs/Qt in healthy lungs during FCV compared to PRVC (413.7±27 vs. 469.7±16.1 for PaO_2/FiO_2 and 30.0±6.3% vs. 21.3±4.4% for Qs/Qt respectively p <0.05), no difference was found in PaO_2/FiO_2 or Qs/Qt after surfactant depletion. No differences in Raw, G and H values were evidenced between the modalities under any experimental conditions. Compared to PRVC, lung aeration was significantly elevated at the end of expiration during FCV (p <0.05), but this difference was not evidenced in injured lungs.

Conclusion: The effects of FCV on gas exchange, respiratory mechanics and lung aeration are comparable to those of PRVC both in healthy and injured lungs. Therefore, FVC may be a promising ventilation modality in children with injured lungs. Furthermore, the ultra-thin endotracheal tube, may offer a unique solution in children with airway malformations.

OP 3

Assessment of lung recruitment with continuous negative extrathoracic pressure after one-lung ventilation: an experimental investigation

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Background: Lung recruitment manoeuvres following one-lung ventilation (OLV) increase the risk for the development of acute lung injury. The application of continuous negative extrathoracic pressure (CNEP) is becoming increasingly common both in intubated and non-intubated patients, however, there is still a lack of knowledge on the ability of CNEP support to recruit whole lung atelectasis following OLV. We investigated the effects of CNEP following OLV on lung expansion, gas exchange, and haemodynamics.

Methods: Ten pigs (45±0.5 kg) were anaesthetized and mechanically ventilated with pressure-regulated volume control mode (PRVC; FiO_2: 0.5, Fr: 30-35/min, VT: 7 ml/kg, PEEP: 5 cm H_2O) until a steady-state haemodynamic and ventilation condition, then as a set of baseline (BL) data, the arterial partial pressure of oxygen (PaO_2), carbon dioxide ($PaCO_2$), ventilation and hemodynamical parameters and lung aeration by electrical impedance tomography were assessed. Subsequently an endotracheal blocker was inserted, and OLV was applied with a reduced VT of 5 ml/kg. Following measurements after 1 hour of OLV, double-lung ventilation was initiated, combining PRVC (VT: 7 ml/kg) and CNEP (-15 cm H_2O)

without active recruitment of the collapsed lung beforehand and data collection was then repeated at 5 minutes and 1 hour.

Results: Compared to OLV, five minutes following initiation of CNEP oxygenation and CO_2 elimination improved (154.1±13.3 vs 173.8±22.1 mmHg and 52.6±11.7 vs 40.3±4.5 mmHg, p <0.05 respectively) and lung aeration increased in the non-collapsed lung (p <0.05). After an hour of CNEP, no additional improvement in gas exchange was noted despite increase in aeration of the collapsed lung (p <0.05). Haemodynamics and ventilation parameters remained stable under CNEP.

Conclusions: Application of CNEP in the presence of whole lung atelectasis proved to be efficient in recruiting the lung without inducing excessive airway pressures. Combining CNEP to positive pressure ventilation may offer beneficial effects at reducing atelectasis following lung collapse during thoracic procedures.

OP 4

Variable positive end-expiratory pressure (PEEP) improves lung function in a model of acute respiratory distress syndrome (ARDS): a randomized experimental study

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Background and goal of study: Mechanical ventilation in the presence of acute respiratory distress syndrome (ARDS) is often associated with gas exchange disturbances, atelectasis, and high risk of ventilator-induced lung injury. Physiologically variable ventilation (PVV), a mode that mimics the variability of spontaneous breathing, has proven beneficial to improve lung function in models of ARDS. We investigated if cycle-by-cycle variability in the positive end-expiratory pressure (PEEP) has benefits on lung function compared to constant PEEP in a model of ARDS.

Materials and methods: ARDS was induced in adult rabbits (n = 19) by combining iv lipopolysaccharide, surfactant depletion and injurious ventilation. The severity of ARDS was assessed through blood gas analysis (PaO_2/FiO_2). Animals were randomised to a 6-hour period of protective ventilation in pressure-controlled mode (PEEP 7 cm H_2O; tidal volume 7 mL/kg, titrated FiO_2), with either constant PEEP or variable PEEP (coefficient of variability 21.4%, standard deviation 1.5 cm H_2O, range 4-10 cm H_2O). Lung function was assessed by measurements of blood gas parameters, end-expiratory lung volume (EELV) using helium-dilution method and respiratory mechanics using forced oscillation technique after ARDS induction (H0) and every hour thereafter (H1 to H6).

Results and discussion: The triple-hit model elicited a moderate-to-severe ARDS in both groups at H0 (mean PaO_2/FiO_2 160 ± 124 vs 202 ± 117 mmHg in constant and variable PEEP groups, respectively, p = 0.21). After 6 hours of ventilation, comparing H0 to H6, the EELV increased in the variable PEEP group (+12.4 ± 19.3%) whereas it decreased with constant PEEP (-9 ± 12%), p = 0.049. In comparison to H0, the oxygenation was maintained in the variable PEEP group at H6 (-5.9 ± 28.7%), while a deterioration was observed in the constant PEEP group at H6 (-20.4 ± 16.4%), p = 0.06. Respiratory tissue compliance at H6 was significantly higher in the variable PEEP group compared to the constant PEEP group (p = 0.023).

Conclusions: Preliminary results demonstrate the value of cycle-by-cycle variability in PEEP during pressure-controlled ventilation in improving lung volume, respiratory mechanics and oxygenation in an experimental model ARDS. For the same levels of average driving pressure, variable PEEP likely improves lung compliance and recruitability in comparison to constant PEEP.

Ethics approval: Animal Welfare Committee of the Canton of Geneva, GE/144/20.

OP 5

Long-term use of opioids after surgery: Do we have a problem?

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Background: Persistent opioid prescriptions after surgery have increased, and are one of the factors contributing to the North American opioid crisis. Data on postoperative long-term opioid use are heterogeneous indicating rates of 2-41%. Opioid prescriptions have also increased in Switzerland, but data from the postoperative setting are sparse.

Methods: Ethics approval for analysis of PAIN OUT registry data. Endpoints: preoperative and postoperative opioid medication (morphine equivalents: ME), long-term use of opioids at 12 months after orthopaedic, gynaecological or visceral surgery, or neurosurgical spine surgery. Subgroups with or with pre-existing chronic (pre-CP) pain, with opioids before surgery, and with CPSP (chronic postsurgical pain) were compared. Statistics: X2 test, median (IQR), level of significance: p <0.05.

Results: Of 2594 patients, 1051 (41%) suffered from pre-CP either at the site of surgery or elsewhere, or had pain in several locations (site of surgery and elsewhere). Opioid medication before surgery was reported by 5.6% of the patients, with more frequent use in patients with pre-CP, compared to patients without pre-CP (11.9% vs. 1.3%; p <0.001). Reasons for preoperative opioid medication were back or joint pain, cancer pain, a chronic pain syndrome, or opioid abuse/addiction (0.3%). Postoperative opioid doses in the PACU (ME 14 (6-24) vs. 7 (4-15) mg; p <0.001) and during the first postoperative day (27 (13-46) vs. 10 (5-20) mg; p <0.001) were higher in patients with pre-CP.

One year after surgery, 3.3% had an opioid medication (without pre-CP 1.0%; with pre-CP 6.7%; p <0.001). Of the patients with preoperative opioids, 43% were taking opioids after one year, in contrast to 1.1% of the patients without opioids before surgery. Of 855 opioid-naive patients with chronic pain at 1 year, 26 were new opioid users. Reasons for opioid intake were continuing pre-CP elsewhere in the body (42%), pain at the site of surgery (26%), cancer pain (12%), opioid addiction (8%) and others (12%).

Conclusions: The study results underline that most patients with postoperative long-term opioid medication already had pre-CP with some of them taking opioids. Persistent use of opioids after surgery in prior opioid-naïve patients seems to be lower than in published studies, however, the public health problem of increasing opioid prescriptions should be watched closely. Opioids before and after surgery should be tapered off whenever possible.

ORAL PRESENTATIONS II

OP 6

Nociceptin regulates human leukocyte antigen-DR expression

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Background: High levels of nociceptin have been detected in blood of patients suffering from pain and inflammation.[1,2] The function of nociceptin in blood leukocytes has not been completely revealed. Human leukocyte antigen-DR (HLA-DR) expression has been frequently studied as a biomarker of sepsis, showing that decreased HLA-DR levels on monocytes is a hallmark of altered immune response.[3] However, no data on the influence of nociceptin on HLA-DR expression are available to date. In this study, we investigated the effects of nociceptin on the regulation of HLA-DR.

Methods: Dose-response experiments were performed to evaluate effects of lipopolysaccharide (LPS), nociceptin and phorbol myristate acetate (PMA) on HLA-DR protein and prepronociceptin *(ppNOC)* mRNA in human monocytic THP-1 cells. HLA-DR and nociceptin proteins were measured using flow cytometry. *PpNOC* mRNA was quantified by RT-PCR. To investigate effects of nociceptin on the regulation of HLA-DR, cells were stimulated with/without LPS 100 ng/ml, nociceptin 1 nM, or LPS+nociceptin for 24 hrs. Furthermore, the influence of endogenous nociceptin on HLA-DR was evaluated. Cells were treated with/without PMA 5 ng/ml, which induces nociceptin expression, nociceptin receptor antagonist UFP-101 100 nM or PMA+UFP-101 for 24 hrs.

Results: Cell surface HLA-DR proteins were increased after LPS stimulation in a dose-dependent manner ($p < 0.001$). PMA dose-dependently upregulated *ppNOC* mRNA ($p < 0.0001$). LPS had no effect on *ppNOC* expression. Compared to untreated controls, LPS 100 ng/ml significantly increased HLA-DR proteins [MFI with IQR: 60188 (52539/69855) vs. 29222 (26854/32363), $p < 0.0005$]. HLA-DR levels in the LPS+nociceptin samples were decreased to 89 (85/102)% compared to the LPS group ($p < 0.05$). Nociceptin alone had no impact on HLA-DR expression. In addition, PMA 5 ng/ml significantly upregulated *ppNOC* mRNA, intracellular nociceptin and cell surface HLA-DR proteins compared to untreated controls (all $p < 0.05$). A trend of increasing HLA-DR proteins was observed in the samples co-stimulated with PMA+UFP-101 compared to the PMA group.

Conclusions: Nociceptin exerted an antagonistic effect on HLA-DR protein levels in THP-1 cells under inflammatory conditions. Elucidating effects of nociceptin in leukocytes during immune response may shed new light on the treatment of inflammatory diseases.

References

1. Serrano-Gomez A. Br J Anaesth 2011

2. Stamer UM. Br J Anaesth 2011

3. de Roquetaillade C. Ann Intensive Care 2022

OP 7

Onset of regional diastolic dysfunction is co-localized to acute myocardial edema after transthoracic shocks in an experimental animal model

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Introduction: Electric defibrillation and cardioversion are standard interventions to terminate arrhythmia. Cardiovascular magnetic resonance feature tracking (CMR-FT) strain analysis can quantify myocardial contraction and relaxation on a regional level. In this study, we investigated the impact of acute myocardial injury related injury after serial transthoracic shocks on regional systolic and diastolic myocardial deformation.

Methods: Ten healthy anaesthetized swine were scanned in a 3 Tesla MRI with a standard short axis cine and a T1 mapping sequence in 3 short axis slices to detect myocardial edema. Five hours after five consecutive shocks with 200J each were applied the same images were re-acquired. Six control animals underwent the same protocol without shocks. Changes in regional peak strain as a measure of systolic function, and early diastolic strain rate as a measure of diastolic function were evaluated using CMR-FT analysis in circumferential orientation for both the left (LV) and right ventricle (RV). T1 maps of both ventricles were analyzed to investigate myocardial edema. Regional changes in strain were compared to the development of myocardial injury.

Results: Global circumferential peak strain worsened in both ventricles (LV: -15.6±3.3% to -13.0±3.6%, $p < 0.01$; RV: -16.1±2.3% to -12.8±4.8%, $p = 0.03$). Additionally, LV early diastolic strain rate slowed from baseline to the 5h timepoint (1.19±0.35/s to 0.95±0.37/s, $p = 0.02$) in shocked animals. No change was observed for any global strain parameters in the control group. In regional analysis, an increase in T1 was colocalized with a reduction in early diastolic strain rate ($p = 0.03$), where early diastolic strain rate slowed by -0.25/s every 100ms increase in T1. On the other hand, both RV systolic and diastolic function worsened in the presence of increased regional RV T1 with a change in peak strain of 2.7% and a deceleration of diastolic strain rate (–0.42/s) per 100ms increase in RV T1 ($p < 0.05$).

Conclusions: Serial transthoracic shock in a healthy swine model attenuate biventricular systolic function, but it is the development of regional diastolic dysfunction that is associated with the onset of colocalized myocardial edema. Future studies are warranted to assess these effects of electrical interventions in clinical settings.

OP 8

Investigating the Impact of Hyperoxia on Right Ventricular Function in Anaesthetized CAD Patients

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Introduction: Patients with coronary artery disease (CAD) undergoing general anaesthesia are at risk of perioperative complications. Hyperoxia is a known coronary vasoconstrictor. However, it is also a pulmonary vasodilator, reducing right ventricular afterload. Thus, there may be competing effects of hyperoxia on right ventricular function. In this study we investigated the effects of hyperoxia and normoxia on right ventricular (RV) function assessed by 3D transesophageal echocardiography (TEE) during general anaesthesia in CAD patients before elective coronary artery bypass graft surgery.

Methods: In this randomized clinical trial study participants (n = 106) were prospectively recruited using a crossover design. In anaesthetized patients the fraction of inspired oxygen (FiO_2) was titrated to a normoxic state ($FiO_2 = 0.3$) and a hyperoxic state ($FiO_2 = 0.8$). At both states TEE images were acquired to assess RV ejection fraction (RVEF) and global longitudinal free-wall strain (RVGLS).

Results: There was no difference between normoxia and hyperoxia in RVEF (46±6% vs. 45±8, $p = 0.504$) nor in RVGLS (-22.4±4.8 vs. -21.9±4.3, $p = 0.352$). However, RV function improved and worsened in some patients. ROC analysis shows that RVGLS at normoxia can better predict, which patients will worsen with excess oxygen.

With a cut-off of -20% for RVGLS (Sensitivity: 87%, Specificity: 49%), it was demonstrated that hyperoxia was beneficial for patients with a poor strain at normoxia (>-20%) but detrimental for those with normal strain at normoxia (<-20%), while RVEF with a cut-off of 40% (Sens: 88%, Spec: 33%) was unable to predict this response.

Conclusion: In CAD patients undergoing general anaesthesia, hyperoxia has heterogenous effects on the RV and the potential detrimental effects of hyperoxia were best predicted by RVGLS. Intraoperative strain analysis might be a tool to target oxygen levels based on individual needs.

OP 9

The effect of propofol on ropivacaine-induced central nervous system toxicity in pigs

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Background and aims: Ropivacaine is a long-acting local anesthetic, widely used in regional anesthesia. Although less toxic than bupivacaine, ropivacaine has been implicated in the occurrence of central nervous system toxicity. The primary objective of this study was to determine whether propofol at subanesthetic doses protects against ropivacaine induced central nervous system toxicity in pigs.

Methods: A preliminary study to determine the dose, rate of administration and the plasma concentration of ropivacaine, which induces paroxysmal electroencephalographic activity (PEA) without causing cardiotoxicity, was performed in five pigs. Thereafter 20 pigs were divided in 4 groups of 5 receiving intravenously either ropivacaine alone, ropivacaine+propofol, ropivacaine+intralipid or propofol alone. Electroencephalogram (EEG) was recorded continuously.

Results: For similar blood levels in 4 out of 5 animals in the ropivacaine and in all in the ropivacaine+intralipid group PEA were observed and recorded. Bursts of PEA occurred similarly in the ropivacaine+intralipid and ropivacaine group. EEG in the ropivacaine+propofol group showed slow delta wave, but no PEA. In the propofol group stage 2 sleep-like activity was observed without PEA.

Conclusions: Propofol in subanesthetic doses prevents in this model the occurrence of PEA induced by intravenous ropivacaine. A dose-response relationship of propofol on the occurrence of ropivacaine-induced paroxysmal electroencephalographic activity is likely. In patients receiving regional anesthesia, administration of a subanesthetic propofol dose could protect from ropivacaine-induced central nervous system toxicity.

OP 10

Circumferential diastolic strain rate may help differentiate physiologic aging versus coronary artery disease

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Introduction: Diastolic function is often overlooked in comparison to systolic function despite the fact it is known to decline with age. Diastolic dysfunction is also one of the earliest features in myocardial ischemia. Approximately half of all patients undergoing cardiac and high-risk non-cardiac surgery have diastolic dysfunction. The presence of diastolic dysfunction increases the risk of an adverse postoperative outcome. A newer potential parameter of diastolic dysfunction is the myocardial early diastolic strain rate (edSR) in myocardial deformation analysis. Although edSR in the longitudinal orientation is most commonly used, it has been proposed that left ventricular circumferential edSR is a stronger predictor of remodeling because it may be initially preserved to maintain cardiac function as longitudinal function decreases. Apart from echocardiography, diastolic function can now also be assessed by newer feature tracking strain analysis using cardiovascular magnetic resonance images (MRI). We utilized this technique to investigate left and right ventricular circumferential and longitudinal edSR in coronary artery disease (CAD).

Methods: Fifteen healthy younger controls (18-35 years), 15 healthy older controls (50-70 years) and 16 patients with CAD were recruited for an MRI study. Using strain analysis, circumferential and longitudinal edSR were analyzed in the left and right ventricle and compared between groups.

Results: Left ventricular circumferential edSR was significantly different between all three groups with 1.7 ± 0.3/s observed in younger controls, a diminished edSR was seen in older controls (1.1 ± 0.2/s, $p < 0.01$), and a further reduction in CAD patients (0.9 ± 0.3, $p < 0.01$). While younger controls had a higher longitudinal edSR (1.4 ± 0.4/s), there was no difference between older controls and patients (0.8 ± 0.1 vs. 0.7 ± 0.2, $p = 0.27$). For the right ventricle, there were no differences in circumferential edSR between any groups, and only younger controls had a higher longitudinal edSR in comparison to patients ($p = 0.02$).

Conclusion: In this limited sample, diastolic dysfunction in CAD patients was best distinguished from age matched controls by circumferential strain rates in contrast to the most commonly used longitudinal orientation. These findings will have to be confirmed in a patient setting with and without CAD using perioperative echocardiography. EdSR may prove to be a sensitive marker for perioperative ischemia in the future.

CASE DISCUSSIONS

Case 1

Negative pressure pulmonary oedema after laryngospasm

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Background: Negative pressure pulmonary oedema is a rare but severe complication usually occurring in young, healthy patients. Most frequent cause is laryngospasm. It may happen in up to 0.1% of all general anaesthetics and usually resolves within 24 hours.1

Case report: An otherwise healthy, 36-year old female of African origin underwent elective parathyreoidectomy at a tertiary teaching hospital for primary hyperparathyreoidism. During intubation, airway secretions mandated a second attempt, but surgery and extubation were uneventful. During transfer to PACU, the patient started to retch, which was interpreted as vomiting. At PACU arrival, the patient was unresponsive and saturation undetectable, but pulse was palpable. During mag mask ventilation, a subtle inspiratory stridor was audible. After application of naloxone, spontaneous ventilation resumed, saturation recovered to 90% and the patient regained consciousness without neurologic deficit. Chest X-ray showed pulmonary oedema, blood gas analysis marked hypoxaemia and hypercapnia. Assuming a negative pressure pulmonary oedema, the surprisingly asymptomatic patient was started on CPAP for 2 hours with good recovery. After cessation of CPAP, the patient experienced an episode of hypertension and haemoptysis. CPAP was restarted, i.v. furosemide given and a continuous infusion of nitro-glycerine started. After 2 more hours of CPAP, treatment was stopped after complete clinical recovery and normalised gas exchange. The patient was discharged to the ward the next day. Fibre-optic laryngoscopy revealed a hypo mobile left vocal cord. She left hospital the following day after full recovery.

Discussion: This patient suffered a rare but severe complication after general anaesthesia, requiring prompt recognition and effective treatment: negative pressure pulmonary oedema due to laryngospasm. Primary therapy is rapid relief of obstruction, using bag mask ventilation, gentle airway suctioning or muscle relaxation in severe cases. Thereafter, positive pressure ventilation (invasive or non-invasive) is the mainstay of treatment. Supportive measures are diuretics and vasodilators. It usually resolves within 24 hours without sequelae if treated adequately. The unilateral vocal cord palsy might contribute, but not be the only cause as bilateral vocal cord palsy is required for airway obstruction.

References

1. McConkey PP. Postobstructive pulmonary oedema--a case series and review. Anaesth Intensive Care 2000; 28:72-76.

Case 2

Spontaneous bilateral otorrhagia during laparoscopic surgery – a rare condition with multiple risk factors but unclear aetiology

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Case: A 73-year-old woman with a history of a progressive hearing loss and a Morbus Menière, treated with betahistine for many years, underwent laparoscopic surgery for adnexal masses. To avoid vertigo, anaesthesia was induced in a sitting position using fentanyl and rocuronium and target-controlled infusion with propofol and remifentanil. During surgery, a Trendelenburg position (20-30°) was chosen. A pneumoperitoneum was induced with an initial pressure of 24 mmHg, then reduced to 12 mmHg. The patient was always kept normotensive and normocapnic with a PEEP of 5 mbar. The surgery lasted for 1.5 hours. During emergence, the patient was found with bilateral otorrhagia with no sign of cerebral impairment. After uneventful extubation, the patient promptly reported a hearing loss in the recovery room wherefore written communication was used. Otoscopy performed by an otolaryngologist revealed multiple blood clots in the external auditory canal, and audiometric testing quantified bilateral hearing loss. This combined with a history of hearing loss resulted in a severe deafness. Nevertheless, the patient could be discharged home and was treated with anti-infective ear drops. The haematotympanum resorbed spontaneously over the next few weeks.

In the otolaryngologic follow-up, the reported conductive hearing was similar to the preoperative measurements. The patient, nevertheless, described incomplete recovery and recurrent vertigo and tinnitus. In addition, transient autophony, a feeling of fullness in the ears and headache were reported.

Discussion: Otorrhagia during laparoscopic surgery is very rare. In the 12 published cases, it predominantly occurred in female patients of older age. An increase in both arterial and venous blood pressure during Trendelenburg positioning is suspected to be the main cause of the rupture of the subcutaneous capillaries. Steep Trendelenburg position, application of high PEEP, forced pneumoperitoneum, hypertensive episodes, and hypercapnia further increase the risk. More unknown risk factors are suspected. It is unclear whether betahistine had a role in our case, as it increases the blood perfusion in the human brain and in the inner ear in animals.

Conclusion: Perioperative otorrhagia is a rare event during laparoscopy. Due to its unclear pathophysiology, it is not possible to fully prevent this complication. However, the risk can be reduced if contributing factors are tightly controlled.

POSTERS

P 1

Cardiac complications with volatile anesthetics versus total intravenous anesthesia for major noncardiac surgery: a propensity score matched analysis

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Introduction: Volatile anesthetics and total intravenous anesthesia (TIVA) may have different effects on the incidence and the underlying etiology of perioperative myocardial injury/infarction (PMI), as well as long-term cardiac complications following major noncardiac surgery.

Methods: Consecutive patients at increased risk undergoing in-hospital major noncardiac surgery were enrolled in a prospective diagnostic multicenter study and received active PMI surveillance and central adjudication of the PMI etiology. Propensity-score matching was performed to adjust for baseline differences among patients receiving volatile anesthetics (sevoflurane, isoflurane, desflurane) versus TIVA (propofol). PMI incidence and PMI etiology were primary endpoints. All-cause death, major adverse cardiac events (MACE) within 365 days and the amount of vasoactive agents were secondary endpoints.

Results: Among 4787 patients, 3241 (68%) received volatile anesthesia and 1546 (32%) TIVA. After propensity-score matching, 1111 patients receiving volatile anesthesia were well matched to 1111 patients receiving TIVA. PMI occurred in 118 (10.6%) patients with volatile anesthesia versus 98 (8.8%) patients with TIVA (p = 0.152), with a statistically significant association (p = 0.024) between the type of anesthesia and PMI etiology. Within 365 days, 83 (7.5%) patients died in the volatile group versus 76 (6.9%) patients in the TIVA group with a HR 1.04 (95% CI 0.76-1.43), MACE occurred in 139 (12.6%) versus 129 (11.7%) with a HR 0.99 (95% CI 0.736-1.332), respectively.

Conclusion: Volatile anesthetics and TIVA resulted in comparable rates of PMI, as well as death and MACE at 365 days. The difference in PMI etiology observed deserves further study.

P 2

Epidemiology of multimorbidity in perioperative patients – an international multicentre cohort study

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Introduction: The complexity of patients presenting for surgery has increased in recent decades with multimorbidity becoming the norm rather than the exception. This has been shown by the increase in American Society of Anesthesisologists (ASA) physical status classification system of patients over the same time period. The ASA classification is strongly associated with perioperative morbidity and mortality. It is, therefore, extensively used in clinical practice for risk stratification, to guide perioperative management and as a tool for healthcare billing. Despite several modifications to this classification, multimorbidity is still not considered. Thus, the aim of this study was to assess multimorbidity across the ASA classes and its influence on perioperative outcome.

Methods: We considered a subset of eight international centres that had participated in the prospective ClassIntra® validation study. Patients undergoing any type of in-hospital surgery were monitored for intra- and postoperative adverse events until hospital discharge and followed up until 30 days postoperatively. Type and severity of comorbidities were extracted from the electronic medical record. The primary endpoint was the number of comorbidities across the ASA classes. The secondary endpoint was the influence of the number and severity of comorbidities on perioperative outcome.

Results and discussion: Of 1421 enrolled patients, the mean number of comorbidities significantly increased with higher ASA class, with 1.5 (95% CI 1.1-1.9) in ASA I, 4.3 (95% CI 3.4-5.2) in ASA II, 8.2 (95% CI 6.6-9.9) in ASA III and 10.5 (95% CI 8.3-12.7) in ASA IV patients. Results from regression analysis showed that even after adjusting for ASA class, the number of comorbidities was strongly associated with postoperative complications measured by the Comprehensive Complication Index (CCI®) (mean increase per comorbidity = 0.83, 95% CI 0.40-1.26) and postoperative length of hospital stay (geometric mean ratio = 1.03, 95% CI 1.01-1.06). The results confirm the high prevalence of multimorbidity in a surgical population and its importance as a predictor of postoperative complications and postoperative length of hospital stay.

Conclusions: The rising complexity of multimorbid patients underlines the need for accurate preoperative risk assessment. As multimorbidity is an independent predictor of negative postoperative outcome, its integration in the ASA classification must be considered.

P 3

Benefits of pressure support on lung aeration and function in patients breathing spontaneously through a laryngeal mask airway: a randomized controlled trial

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Background: Postoperative respiratory complications are among the most common adverse events after general anaesthesia and

mechanical ventilation. Spontaneous breathing with or without pressure support is routinely used in clinical practice. We compared perioperative changes in lung function in patients breathing spontaneously through laryngeal mask airway with or without pressure support.

Methods: Forty adult female patients scheduled for elective gynaecological surgery in lithotomy position were randomly assigned to the continuous spontaneous breathing group (CSB, n = 20) or to the pressure support ventilation group (PSV, n = 20). Lung function measurements were carried out before anaesthesia and one hour postoperatively. Functional residual capacity volume (FRC) and lung clearance index (LCI2.5) was assessed by the multiple breath nitrogen washout technique. Respiratory mechanics were measured by the forced oscillations to assess parameters reflecting the peripheral airway properties (R5-19) and respiratory tissue stiffness (AX).

Results: The decrease in FRC as a primary outcome variable was more pronounced in the CSB than that in the PSV group (16.6±12.8% 8.2±11.1%, p <0.05), with no significant difference in the LCI2.5. The postoperative changes in R5-R19 and AX were significantly lower in the PSV than in the CSV group (p <0.05 for both).

Conclusion: These results suggest the benefit of pressure support ventilation over continuous spontaneous breathing via protecting from the postoperative lung volume loss in patients with increased risk for atelectasis development.

P 4

Impact of analgesic techniques on early quality of recovery after prostatectomy: a 3-arm, randomised trial

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Background: Prostatectomy is associated with relevant acute postoperative pain. Optimal analgesic techniques to minimise pain and enhance recovery are still under investigation. We aimed to compare the effect of three different analgesic techniques on quality of recovery.

Methods: This investigator-initiated, prospective, randomised, three-arm, parallel group, active controlled, interventional superiority trial was performed in a Swiss teaching hospital from 2018-2021. Consecutive patients undergoing open or robotic-assisted radical prostatectomy were randomised to spinal anaesthesia (SSS, bupivacaine 0.5% + fentanyl), bilateral transversus abdominis plane block (TAP, ropivacaine 0.375% + clonidine) or systemic administration of lidocaine (SA, lidocaine 1%) in addition to general anaesthesia. Primary outcome was Quality of Recovery 15 (QoR-15) score on postoperative day one compared to baseline. Secondary outcomes were QoR-15 at discharge, postoperative nausea and vomiting, pain scores, return of gastrointestinal function and use of rescue analgesia.

Results: From 133 patients, 40 received spinal anaesthesia, 45 TAP block and 48 systemic analgesia. QoR-15 scores did not differ on day 1 (P = 0.301) or at discharge (P = 0.309) when compared to baseline. QoR-15 changes where similar in all groups. At discharge, median QoR-15 scores were considered as good (>122) in all groups: SSS 134 [IQR 128 to 138]; TAP 129 [IQR 122 to 136] and SA 128 [IQR 123 to 136]. There were no significant differences in the other secondary outcomes.

Conclusions: Quality of recovery on postoperative day one compared to baseline did not differ if spinal anaesthesia, TAP block or systemic administration of lidocaine was added to general anaesthesia.

P 5

Comparison of Extra and Intracellular Cardiac Preservation Solutions on Early Outcomes Following Heart Transplantation

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Introduction: The choice of Cardiac Preservation Solution (CPS) for myocardial protection at the time of heart procurement remains controversial and uncertainties persist regarding its effect on the early Heart Transplantation (HT) outcomes. Thus, we retrospectively analyzed our adult HT performed with two different CPS, during a period of 11 years, in terms of hospital mortality, inotropic score, biventricular graft failure and rejection score.

Methods: From January 2009 to December 2020, 169 adult HT were performed in our hospital. Patients were divided in two groups according to the CPS used: St Thomas (n = 81, group I) and HTK-Custodiol (n = 88, group II). The choice of CPS was related to an institutional policy; from 2009 to 2015, St Thomas solution was exclusively used, and after that HTK-Custodiol alone.

Results: There was no significant difference between the two groups in terms of preoperative and intraoperative features. Postoperatively, the Custodiol group showed significantly lower inotropic score (p <0,001), mean rejection score (p = 0,045) and 30 days mortality (p = 0,044). At multivariate analysis, predictors of in-hospital death were biventricular graft failure (OR 43.3), inotropic score (OR 11.1) and extracorporeal circulation duration (OR 1.01). The use of HTK-Custodiol had, on the contrary, a protective effect (OR 0.20).

Conclusion: In our single center experience, using HTK-Custodiol as myocardial protection during heart procurement leads to a significant improvement of early outcomes after HT, including in terms of 30 days mortality.

P 6

UNDERSTANDING VENTRICULAR-AORTIC COUPLING USING 4D-HAEMODYNAMIC IMAGING

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Introduction: Ventricular-aortic-coupling (VAC) is a mechanism of growing interest in heart disease and aging. It has been postulated that aortic stiffness could lead to progressive systolic and indirectly diastolic dysfunction, however this is not well understood. Studies have reported anesthetic dose and rate of infusion are associated with ventricular-arterial uncoupling. This can be confounded further in patients with severe haemodynamic disorders such as septic shock. With 4D-flow cardiovascular magnetic resonance (CMR) imaging, the images of the thoracic cavity can be acquired in a single acquisition. Our goal was to investigate the relationship between intraventricular and aortic hemodynamics in a healthy population, using modern measures of 4D-Flow analysis and myocardial deformation.

Methods: Forty healthy participants were recruited to undergo a 3-Tesla CMR scan. A 4D-flow acquisition of the thoracic cavity was acquired and blood flow in the left ventricle was assessed for direct flow (blood that enters and is ejected the same heartbeat) and retained inflow (blood that enters during diastole but is not ejected the same cardiac cycle). From the same acquisition, 4D-pulse wave velocity (PWV) was calculated of the aorta. Systolic and diastolic

ventricular function were assessed by peak systolic global longitudinal strain (GLS) and early diastolic strain rate.

Results: Increasing age was related to three parameters: an increase in aortic stiffness (PWV, r = 0.415, p = 0.001), decrease in retained inflow (r = -0.575, p = 0.001) and decrease in early diastolic strain rate (r = -0.637, p <0.001). There was no association between systolic measures of GLS and direct flow fraction with age. When comparing flow results to ventricular strain, both a high aortic PWV (β = 0.615, p = 0.017) and reduced direct flow fraction (β = -0.06, p = 0.048) were independently correlated with attenuated GLS, even when accounting for age. Diastolic strain rate was also independently linked to a high aortic PWV indicating aortic stiffness (β = 0.024, p = 0.001),

Conclusion: Advanced measures of 4D-flow have shown that aortic PWV as a measure of aortic stiffness and intraventricular hemodynamics are associated with reduced diastolic and systolic left ventricular deformation in a healthy control population. These modern quantitative measures should now be implemented in patient cohorts to investigate the role of VAC in cardiovascular disease, and how it may be impacted in an anesthetic setting.

P 7

User-centered display of blood gas analysis results in virtual reality, leads to more correct diagnoses: a computer-based, multicentre, simulation study.

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Background: To promote fast and correct interpretation of blood gas values, we have developed Visual Blood. This 3-dimensional virtual reality technology optimizes the presentation of results while taking into account user-centered design principles. The visualization puts the user inside the blood vessel and lets them perceive the components and interactions needed to understand blood gas values and diagnose pathologies.

Methods: This computer-based, multicentre, multinational noninferiority simulation study compares Visual Blood with conventional arterial blood gas (ABG) printouts in terms of correct perception of individual blood gas parameters. We also examined correctly assigned clinical diagnoses, perceived diagnostic confidence, and perceived workload. We presented six scenarios to the anesthesiologists, once with Visual Blood and once as conventional ABG printouts. The primary outcome was the perception of ABG parameters. Secondary outcomes included correct clinical diagnoses, perceived diagnostic confidence, and perceived workload. We used mixed models and adjusted odds ratios to analyze the results.

Results: We analyzed 600 cases performed by 50 anesthesiologists. Visual Blood was found to be non-inferior to ABG printouts in terms of the rate of correctly perceived ABG parameters. In addition, the study found that the probability of making a correct clinical diagnosis was twice as high when using Visual Blood as when using ABG printouts. There was no or weak evidence of a difference in diagnostic confidence and perceived workload.

Conclusions: This study showed that participants did not perceive the ABG parameters better, but the use of Visual Blood resulted in more correct diagnoses than the use of conventional ABG printouts. This suggests that Visual Blood allows for a higher level of situational awareness beyond individual parameters' perception. However, the study also highlighted the limitations of current virtual reality headsets and Visual Blood.

P 8

The validity and tolerability of awake calibration of the TOF Watch SX® monitor: A prospective observational multicenter study

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Background: Acceleromyography is the standard method used for quantitative neuromuscular monitoring. Devices must be calibrated at baseline to obtain exact results. Usually this is done before administration of neuromuscular blocking agents, but after anesthesia induction. When using nondepolarizing neuromuscular blocking agents for rapid sequence induction and intubation, clinicians may opt to forego calibration, in order to shorten the time patients are at risk for pulmonary aspiration. We investigated the validity and tolerability of awake calibration of an acceleromyographic neuromuscular monitor compared to calibration in anesthetized patients.

Methods: Thirty-four patients aged 19 to 64 years undergoing elective surgery were enrolled. A TOF-Watch SX® monitor was placed on both wrists; awake monitor calibration was performed after intravenous administration of sufentanil 0.2 µg kg^{-1} or fentanyl 2 µg kg^{-1}, and pain was rated on a numeric rating scale (NRS) from 0 to 10. The other monitor was calibrated as a reference after anesthesia induction. Continuous train-of-four (TOF) stimulation then was started on both devices and intravenous rocuronium (0.6 mg kg^{-1}) was administered for tracheal intubation. The primary outcome was agreement between the two monitors in total recovery time (time in minutes from injection of rocuronium to spontaneous return of a normalized TOF ratio of 0.9). Secondary outcomes included pain scores during awake calibration.

Results: The primary outcome was analyzed in 33 patients. Mean total recovery time following awake calibration was 50.7 (standard deviation (SD) 13.8 min) and it was 51 (14.4 min) in anesthetized patients. There was no significant difference between the measurements (-0.37, 95% CI: -1.88-1.14, p = 0.624). The intraclass correlation between the measurements was 0.96 (95% CI: 0.92; 0.98). The mean NRS pain score during awake calibration was 3.2 (1.9).

Conclusions: There was excellent agreement of TOF Watch SX monitor results when calibrated before or after anesthesia induction. Awake calibration was well tolerated and might therefore be considered during rapid sequence induction.

P 9

Electroencephalogram in general anaesthesia- more than only bispectral index. A multicentre double-blind randomised controlled trial

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Background: The assessment of depth of anaesthesia using processed frontal electroencephalogram (EEG) such as the bispectral index (BIS®) monitor has led to a significant reduction in anaesthetic consumption and incidences of awareness. However, this index is susceptible to artefacts, and processing times can cause delays in assessing a patient's depth of anaesthesia. In addition to the processed number, the raw frontal EEG can be displayed as a curve on the same monitor. The aim of this study is to investigate whether quality of recovery of the patient can be improved and propofol consumption can be decreased if propofol is titrated by anaesthesia practitioners able to interpret the raw EEG curve.

Materials and methods: In this multicentre double-blind RCT (NCT04105660), anaesthesia practitioners (physicians and certified anaesthesia nurses) with >2 years of experience are being randomised to standard monitoring including BIS monitoring (control) or to standard monitoring including BIS and EEG monitoring (intervention). Anaesthesia practitioners in the intervention arm are being trained in the interpretation of EEG in a short tutorial, which has been shown to improve the skills of anaesthesiologists to assess anaesthesia depth using the information of the frontal raw EEG. Only patients aged ≥18 years undergoing elective laparoscopic procedures under general anaesthesia using propofol are eligible. The primary outcome is quality of recovery (QoR) 24 hours after surgery. The first secondary outcome includes propofol consumption. QoR and propofol consumption will be compared between both arms using a two-sample t-test. A total of 200 anaesthesia practitioners (and 200 patients) are required to have an 80% chance of detecting the minimum relevant difference for QoR-15 as significant at the 5% level.

Results: During the recruitment from July 2021 to June 2022, all planned 200 patients have been enrolled and followed until hospital discharge. The trial results will be available for presentation at SwissAnaesthesia 2022.

Discussion and conclusion: As variability in the effect-site concentrations of propofol to induce and maintain anaesthesia is high, titrating propofol to the optimal individual level may avoid complications of underdosage and overdosage. The additional information from the raw EEG may have an impact on titrating propofol during general anaesthesia in the future.

P 10

Incidence and demographics of perioperative cardiac arrests during anaesthesia care: a retrospective observational single-centre study

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Background: Scare evidence on the incidence of perioperative cardiac arrests is reported to be between 2-10 per 10'000 procedures for paediatric patients, and 0.5-3 per 10'000 for adult patients. Thus, we aimed to investigate the age-adjusted incidence of cardiac arrest patients in the operating room over seven years. Furthermore, the cardiac arrests' association with patients' demographics (sex, age, ASA physical status), urgency of the procedure, and non-cardiac surgery is reported.

Methods: After ethics committee approval, this retrospective observational single-centre study screened all patients with a cardiac arrest during anaesthesia care in the operating room from January 1, 2014 to December 31, 2021. Cardiac arrest was defined as the delivery of at least 5 chest compressions and/or defibrillation. We included all reported cardiac arrests during anaesthesia care in the operating room. We excluded all patients with a cardiac arrest outside of the operating room or planned cardiac arrest (e.g., extracorporeal circulation).

Results: We screened 243'982 anaesthesia procedures of which 209 met inclusion criteria. Most patients (n = 144, 68.9%) were male. Median [Q1; Q3] patients age was 68.9 [57.8;79.5] years, including six (2,9%) patients <1 y, seven (3,3%) patients between 1-15 y, and 196 (93,8%) ≥16y of age. Nearly two-thirds of patients with cardiac arrest were judged as ASA ≥4 (n = 139, 66.5%), compared to ASA 1 to 3 patients (n = 70, 33.5%). More than half of the cardiac arrests occurred during emergency procedures (n = 108, 51.7%), compared to elective procedures (n = 93, 48.3%). Over two-thirds of the cardiac arrests (n = 145, 69.4%) happened during non-cardiac surgery.

Conclusion: The overall incidence of perioperative cardiac arrest in this single-centre study was 8.6 per 10'000 procedures (95%-CI: 7.4–9.8). Incidence for patients under 1y of age was 12.5 (95%-CI: 4.6–27.1), for children between 1-16y of age 2.2 (95%-CI: 0.8–4.8), and for patients over 16y of age 9.3 per 10'000 procedures (95%-CI: 8.0–10.7), respectively, which is a comparable incidence to published data. Risk factors for a cardiac arrest were identified as: male sex, children under 1y of age, high ASA physical status, and emergency procedures. Further investigations out of this database will determine the special circumstances contributing to the patients' cardiac arrest and survival outcome data.

P 11

Development of an international postoperative delirium risk assessment model

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Background and goal of study: Postoperative delirium (POD) is recognized as the most frequent postoperative complication in the elderly, occurring in 10 to 50% of older patients after major surgical procedures. It is associated with postoperative cognitive decline and long-term dementia, poor functional recovery, prolonged hospitalization, increased nursing home admission, and increased mortality. Early identification of patients at risk for delirium is paramount

because adequate, well-timed interventions could reduce the occurrence of POD and the related detrimental outcome. We have developed a preoperative stratification tool aiming at predicting the risk of a patient developing POD based on individual patient data, such as medical history, lab values and information about the planned surgery.

Materials and methods: The test is based on patient data from eight independent clinical studies conducted in eight different hospitals using systematic assessment of POD. The dataset contained data from 2250 patients (1806 no POD, 444 with POD). The tool is based on statistical methods that aim at avoiding an overly optimistic estimation of the model performance. It is based only on data that is easily available in clinical practice, and clinicians have been consulted to assure the usability of the test. The test contains nine variables; age, BMI, ASA status, history of delirium, cognitive decline, medications, C-reactive protein, surgical risk and whether the operation is a laparotomy or a thoracotomy. The surgical risk estimation is based on a surgical risk assessment for cardiac events in non-cardiac surgery from the European Society of Cardiology and European Society of Anesthesiology joint guidelines.

Results and discussion: The cross-validation score was an AUC of 0.81. The test was externally validated on data from a ninth hospital on 293 patients (232 no POD, 61 POD). The validation data were missing two of the nine variables that were imputed. With imputation, the performance on the external validation was an AUC of 0.75.

Conclusion(s): We have shown that it is possible to use data from several studies in different hospitals to create a robust test for predicting POD and apply it to data from yet another hospital with good results.

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Interscalene catheter vs combined anaesthesia for total shoulder replacement in high risk patients

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Objective: This study compares the perioperative complication rates of interscalene brachial plexus catheters (ISC) alone compared to combination with general anaesthesia (GA) for total shoulder replacement in high risk patients.

Methods: 196 patients (ASA >III), undergoing elective total shoulder replacement between 2014 and 2020 were included retrospectively. The data of 107 patients scheduled for ISC were comparend to those of 89 patients with GA in addition to ISC. Cardiovascular complications are defined as a decrease in MAP >20% of preoperative MAP, hypertension and tachycardia requiring therapy. Differences between the groups were analysed using t- and chi squared-tests. Logistic regression analysis was used to calculate univariable and multivariable odds ratios (OR; 95% confidence interval).

Results: The ISC group showed a significantly better hemodynamic stability during surgery with less vasopressor consumption (Ephedrine-Bolus: 31% vs. 73% p <0.001, Norepinephrine/Phenylephrine Bolus: 7% vs. 35% p <0.001) and less volume supplementation (1069 ml ± 463 vs 1308 ± 501 p <0.001). Relevant hypotension occurred less frequently (35% vs 82% p <0.001). Regarding postoperative complications, we found a decreased risk of respiratory (4% vs. 12% p <0.02) as well as cardiovascular complications (15% vs. 38% p <0.001) in the ISC group. General anaesthesia remained an independent risk factor for cardiovascular complications after the adjustment for potential confounders (OR: 5.9; 95% CI 2.4–14.1).

Conclusion: ISC can be considered as superior to combined anaesthesia for total shoulder replacement even in cardiovascular high-risk patients.

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Stress factors and safety climate in the Intensive Care Unit (ICU) during the COVID-19 pandemic

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Background: The outbreak of the COVID-19 pandemic had, besides the huge impact on private lives for the individual, also a big impact on health care systems worldwide. [1,2] An association between healthcare workers` stress as a main component of wellbeing and patient safety has been shown in different studies. [3]

Aim/objective: The presented study is part of a project on "SUstainable PRofessional life under a pandEMic" (SUPREM) which includes standardized, validated instruments and has the aim to investigate stress factor perception and safety climate among coworkers in ICUs while caring for COVID-19 positive patients. This study was conducted at five Swedish hospitals and one German hospital during the pandemic. This abstract refers to the German data.

Methods: All participants (physicians, nurses, physiotherapists; n = 120) gave their written informed consent. A nine-item questionnaire was used to collect the self-reported perception of stress factors in which each proposal was rated on a five-point Likert-type scale from 'I strongly disagree' (1) to 'I strongly agree' (5). Data is presented in percent of participants answering, "strongly agree". Additionally, free text questions were used to provide the participants with the opportunity to add stress factors.

Results: The fear of infecting someone else was rated as a main stress factor in the German survey (45,0%). The fact that relatives were not allowed to visit the patients was also rated high (35,0%) together with the concern of making mistakes (29,2%).

Discussion/conclusions: The fear of infecting someone else as the main stress factor in this study might mirror the mix of a pandemic where so much knowledge was lacking in the beginning together with a potential lack of protection gear. Other top stress factors show a commitment to involve relatives and keep up patient safety. This study might contribute to improve conditions regarding times of exceeded workload, like in a pandemic and to maintain staff well-being by highlighting factors that contribute to perceived stress.

Ethical approval: The study is approved by the Swedish Ethical Review Authority (2020-02370) and by Ethics Committee University Hospital of Cologne, Germany (20-1717).

Funding: The study is funded by AFA försäkring.

References

1 Adams JG, Walls RM, JAMA. 2020;323(15):1439-1440.

2 Bohlken J et al, Psychiatr Prax. 2020;47(4):190-197

3 Hall LH et al, PLos ONE. 2016; 11(7): e0159015. doi:10.1371/journal.pone.0159015

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Pediatric Neck Rescue: Randomized Comparison of Two Emergency Approaches to the Trachea in an Advanced Simulated Rabbit Model

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Background: Two recent studies explored the emergency tracheotomy technique and the scalpel-bougie-tracheostomy technique as a neck rescue access for newborns and infants on a rabbit cadaver. Both studies lacked a key feature of real surgical access - bleeding during a true emergency. The study's objective was to comparatively assess the two techniques in a simulated environment with simulated bleeding and decreasing vital signs from the monitor like in real emergencies.

Methods: With ethical committee's approval we recruited for this cross-over trial pediatric anesthesiologists and intensivists. Emergency tracheotomy consists of four steps: vertical skin incision, strap muscles separation (2 Backhaus clamps), anterior luxation of the trachea with a 3rd clamp, and vertical puncture with tip-scissors of no more than 2 tracheal rings to insert the tube. The scalpel-bougie-tracheostomy involves separation of neck tissues to expose the trachea and tracheal incision both with a scalpel to insert the bougie to facilitate tracheal intubation. Participants were randomized to start either with emergency tracheotomy or scalpel-bougie-tracheostomy. They watched an instructional video and had four practicing attempts, followed by a fifth attempt which was assessed. Afterward, they crossed over to the other technique. Primary outcome was time-to-tube placement. Secondary outcomes were overall success and severe injuries.

Results: These preliminary results report 6 participants. Median time [Q1-Q3] was 59sec [51–61] for emergency tracheotomy, compared to 70sec [49–84] for scalpel-bougie-tracheostomy. The success rate for emergency tracheotomy was 100% (6/6) and 83% (5/6) for scalpel-bougie-tracheostomy. Emergency tracheotomy counted severe injuries in 67% (4/6), while scalpel-bougie-tracheostomy only 50% (3/6). More cases will be presented at the conference.

Conclusions: The emergency tracheotomy was faster with higher success, but more severe injuries. These preliminary results of a simulation study suggest the emergency tracheotomy is more suitable than the scalpel-bougie-tracheostomy in a "cannot intubate, cannot oxygenate" situation in infants.

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Calculated Aortic Age Increases After Administration of Oxygen and Coffee Consumption

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Introduction: European Society of Anaesthesiology guidelines suggest that coffee may be consumed up to 2h prior to the induction of anaesthesia. Yet, little is known about possible interactions of caffeine with other perioperative drugs, of which the most common administered agent is oxygen. Aortic elasticity is important to maintain a sufficient blood pressure in diastole for coronary perfusion and to reduce the afterload on the left ventricle. Aortic elasticity can be assessed non-invasively by measuring its distensibility in magnetic resonance imaging (MRI) cine images, defined by the change of aortic cross-section area in relation to its minimal area and the difference in systolic to diastolic blood pressure: $[A_{max}-A_{min}]/[A_{min}(P_{sys}-P_{dia})]$. Vascular age can additionally be estimated using aortic distensibility. We investigated the effects of caffeine on the healthy aorta and if there is any interaction with supplemental oxygen.

Methods: Healthy volunteers (n = 24) underwent a magnetic resonance exam to evaluate distensibility of the thoracic aorta at rest. The same images were acquired during oxygen inhalation (10L/min) through a rebreathing facemask. Participants then consumed 150mg of caffeine (equivalent to 3 shots of espresso), and the imaging was repeated two hours later with and without oxygen. The ascending aorta was measured using validated artificial intelligence software from which aortic distensibility and vascular age were calculated (ArtFun+, Imageens). Measurements were then compared to baseline.

Results: Participants had a mean age of 26±6 years (50%female). Baseline distensibility of the ascending thoracic aorta was $8.0\pm2.3*10^{-3}mmHg^{-1}$. This decreased to $7.1\pm3.0*10^{-3}mmHg^{-1}$ with oxygen (p = 0.03 vs. baseline), $7.2\pm2.1*10^{-3}mmHg^{-1}$ after coffee consumption (p = 0.03), and to $7.4\pm2.3*10^{-3}mmHg^{-1}$ with coffee and oxygen combined (p = 0.03). The calculated vascular age at baseline was 31.5y [25.5-37.8]. Oxygen, coffee and their combination all increased theoretical calculated vascular age (36.9y [32.6-42.7], 37.8y [31.7-40.2], 35.1y [31.1-39.8] respectively, p <0.05).

Conclusion: In healthy participants both caffeine and oxygen have an impact on vascular function resulting in a reduction of aortic distensibility, which corresponds to an older calculated vascular age. Since caffeine and oxygen are omnipresent agents, they may have an impact on the management of general anaesthesia by possibly altering of aortic compliance and afterload of the left ventricle.

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Resveratrol intravenously doesn't ameliorate renal function and inflammatory response in an ARDS model in pigs.

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Introduction: Resveratrol, a natural polyphenolic compound found in grapes and red wine, is reported to have beneficial effects on renal diseases.[1] It can be effective against ischaemia-reperfusion-related acute kidney damage developing during ruptured abdominal aorta surgery by reducing oxidative stress and apoptosis.[2] In ARDS, as often seen in COVID-19, patients develop acute kidney injury and failure with the need of renal replacement therapy.[3] Therefore, we investigated the proposed renal protective and anti-inflammatory effects of resveratrol in an ARDS model in pigs.

Material / methods: 20 domestic pigs (30±2kg; application G20-1-135), divided into three groups: 1. resveratrol high dose (HD; n = 8), single bolus of 20 mg/kg over 15 min. 2. resveratrol low dose (LD; n = 8), single bolus of 10 mg/kg over 15 min. 3. Vehicle (n = 4), with the carrier solution DMSO over 15 min. ARDS induction: using BAL/oleic acid and a subsequent test period of 8 hours. Measurement parameters: Hemodynamics and spirometry data were collected continuously, laboratory parameters repetitively. Post-mortem: analysis of renal inflammatory markers. Statistics: Two-way analysis of variance and Student-Newman-Keuls method.

Results: All animals survived the test period of 8 hours after ARDS induction. Resveratrol HD nor resveratrol LD influence the serum creatine and urea concentrations measured at baseline, 4 and 8 hours after ARDS induction compared to vehicle. A non-significant increase for both renal markers were observed in all groups compared to baseline. Further, IL-6 as well as TNF-alpha in the renal tissue showed no significant changes. The other laboratory chemical parameters (Hb, leukocytes, thrombocytes, lactate, glucose) showed no group differences. Only a significantly increased functional residual capacity (FRC) could be demonstrated for the HD

group at the end of the test ($p < 0.05$ for HD vs. LD). The remaining hemodynamic parameters showed no differences.

Conclusion: In this study, the proposed anti-inflammatory and protective renal effects of resveratrol could not be demonstrated in an ARDS model in pigs. It remains unclear if 1.) the two chosen doses of resveratrol or 2.) a different pathway in the complex pathophysiology of ARDS can explain these results.

References

1. Kitada M et al. Oxid Med Cell Longev. 2013

2. Hemsinli D et al. Hum Exp Toxicol. 2021

3. Zakynthinos GE et al. Aust Crit Care 2021

P 18

Actimetry documented periodic limb-movement under procedural sedation for TAVI as limiting factor for opioid-free sedation strategy.

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Transcatheter aortic valve implantation (TAVI) is often undertaken in procedural sedation, aiming at haemodynamic stability and less cognitive complications in frail patients. Dexmedetomidine has been used with success in this clinical situation and constitutes a valid alternative option to opioids as it maintains spontaneous breathing. Nevertheless, opioid-free sedation (OFA) and anaesthesia sometimes have a side effect in these patients: the emergence of periodic-limb movements (PLM). This also occurs with neuroaxial anaesthesia and was described in OFA GA of an octogenarian undergoing ophthalmic surgery. A sleep movement disorder, it is associated with restless legs syndrome, and characterized by limb movements occuring during sleep and cause sleep disruption. PLMs often are misinterpreted as inadequate anaesthesia. The extent of the movements with flexion in feet,hips and knees, sometimes interferes with TAVI interventions and prompts anaesthetists to deepen sedation or intubate patients.We followed 35 (18 men and 17 women, mean age 82 years, range 70-95 years) consenting TAVI patients, with anonymized data waived by the Cantonal Ethics Committee (Req-2021-01271). In addition to ASA monitoring, patients were observed clinically by invasive arterial pressure monitoring and central venous catheter and a 3-electrode frontal processed EEG (pEEG, Narcotrend, Hannover, Germany), attached to Fp1 Fp2 as well as reference electrode A2 (10:20 system). Dexmedetomidine was started at 0.5 mcg/kg/h and increased according to clinical need. Propofol and fentanyl bolus was administered at the anaesthetist`s discretion. 16/35 patients had PLMs at 2-6 Hz, the vast majority falling in the 3-5 Hz range. Intubation was performed in 4 of 16 patients as PLMs interfered with TAVI procedure. Of 12 patients, 8 had PLMs at 2 - 5 Hz at amplitude tolerable for the procedure. EEGs show pEEG indices of 40, correlating with alpha-delta raw EEGs and spectrograms during PLM episodes. Burst suppression invariably follows intubation. Occurrence of sleep motion disturbance during sedation and anaesthesia is an interesting phenomenon. Further studies are needed comparing EEGs from natural sleep with sedation EEGs during PLM episodes intra-individually.

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