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FM 1

Effect of thoracic epidural ropivacaine versus bupivacaine on lower urinary tract function: a randomized clinical trial

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Background: Thoracic epidural analgesia with bupivacaine resulted in clinically relevant postvoid residuals due to detrusor underactivity. This study aimed to compare the risk of bladder dysfunction with ropivacaine versus bupivacaine using postvoid residuals and maximum flow rates. Our hypothesis was that ropivacaine would result in lower postvoid residuals, because ropivacaine has been shown to have less effect on motor blockade.

Method: In this single-center, parallel-group, randomized, double-blind superiority trial, 42 patients undergoing open renal surgery were equally allocated to receive epidural bupivacaine 0.125% or ropivacaine 0.2%, and 36 were finally included. Inclusion criterion was normal bladder function. Patients underwent urodynamic investigations preoperatively and during thoracic epidural analgesia. Primary outcome was the difference in postvoid residual preoperatively and during thoracic epidural analgesia postoperatively. Secondary outcomes were changes in maximum flow rate between and within the groups.

Results: Median difference in postvoid residual (ml) from baseline to postoperatively was 300 (range, 30 to 510; $P < 0.001$) for bupivacaine and 125 (range, -30 to 350; $P = 0.011$) for ropivacaine, with a significant mean difference between groups (-175; 95% CI, -295 to -40; $P = 0.012$). Median difference in maximum flow rate (ml/s) was more pronounced with bupivacaine (-12; range, -28 to 3; $P < 0.001$) than with ropivacaine (-4; range, -16 to 7; $P = 0.025$) with a significant mean difference between groups (7; 95% CI, 0 to 12; $P = 0.028$). Pain scores were similar. No adverse events occurred.

Conclusions: Postvoid residuals were significantly lower using ropivacaine compared to bupivacaine for thoracic epidural analgesia reflecting less impairment of detrusor function with ropivacaine.

FM 2

Can early oral prolonged-release oxycodone with or without naloxone reduce the duration of epidural analgesia after cystectomy? A 3-arm, randomized, double-blind, placebo-controlled trial

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Background: Thoracic epidural analgesia (TEA) enhances recovery after major bowel surgery. Early postoperative prolonged-release oral formulation of oxycodone or oxycodone/naloxone is potentially useful as a second analgesic step to reduce the duration of TEA. We hypothesized that oxycodone would decrease the duration of TEA and combined with naloxone preserve gastrointestinal function.

Methods: Ninety patients undergoing open cystectomy and urinary diversion were enrolled in this randomized double-blind, three-arm, parallel-group, placebo-controlled single-center trial between September 2015 and February 2017. Exclusions criteria were known allergy to oxycodone/naloxone, severe pulmonary diseases, hepatopathy, analgesics non-naïve patients. From postoperative day 3, patients received batches with oxycodone, oxycodone/naloxone or placebo every 12h ($n = 30$ in each arm). Reduction of the epidural drug infusion rate was attempted with the goal to maintain a pain intensity <3 at rest and <5 (numeric rating score) while mobilization during 6h. Primary endpoint was duration of TEA and secondary endpoint return of gastrointestinal function.

Results: The median duration of TEA did not differ between patients treated with oxycodone/naloxone (6.7 [range 3.1–10.3] days), oxycodone (7.0 [3.0–9.1]) or placebo (6.4 [3.1–8.4]); $P = 0.95$. Time to first defecation was prolonged in the oxycodone group compared to the placebo group (difference 22.48 hours ± 8.95 ; $P = 0.037$). In the oxycodone group, we found 8/30 patients with ileus (27%) compared to 2/28 (7%) in the oxycodone/naloxone group and to 2/30 (7%) in the placebo group; ($P = 0.031$).

Conclusions: Oxycodone, with or without naloxone, did not reduce the duration of TEA. Oxycodone alone led to a delayed return of bowel function, whereas the combination was not different from placebo.

FM 3

Impact of intraoperative fluid and noradrenaline administration on early postoperative renal function after cystectomy and urinary diversion: An observational cohort study

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Background: The use of noradrenaline to enable a restrictive intraoperative hydration and avoid salt and water overload has gained increasing acceptance. However, concerns have been raised about the impact of this approach on renal function.

Objectives: To identify risk factors for acute kidney injury (AKI) in patients undergoing cystectomy with urinary diversion and determine whether administration of noradrenaline and intraoperative hydration regimes affect early postoperative renal function.

Design: Retrospective observational cohort study.

Setting: University hospital, from 2007 to 2016.

Patients: A total of 769 consecutive patients scheduled for cystectomy and urinary diversion. Patients with incomplete data and preoperative haemodialysis were excluded.

Main outcome measures: AKI was defined as serum creatinine increase $>50\%$ over 72 hours postoperatively. Multiple logistic regression analysis was performed to model the association between risk factors and AKI.

Results: Postoperative AKI was diagnosed in 86/769 patients (11.1%). Independent predictors for AKI were the amount of crystalloids administered (OR 0.79 [95%CI, 0.68 to 0.91], $P = 0.002$), antihypertensive medication (OR 2.07 [95%CI, 1.25 to 3.43], $P = 0.005$), preoperative haemoglobin value (OR 1.02 [95%CI, 1.01 to 1.03], $P = 0.010$), duration of surgery (OR 1.01 [95%CI, 1.00 to 1.01], $P = 0.002$), age (OR 1.32 [95%CI, 1.44 to 1.79], $P = 0.002$) but not the administration of noradrenaline (OR 1.09 [95%CI, 0.94 to 1.21], $P = 0.097$). Postoperative AKI was associated with longer hospitalisation (18 days [15–22] vs. 16 [15–19]; $P = 0.035$) and a higher 90 day major postoperative complication rate (41.9% vs. 27.5%; $P = 0.002$).

Conclusions: Noradrenaline administration did not increase the risk for AKI. An overly too restrictive administration of crystalloids was associated with an increased risk for AKI, particularly in patients treated with antihypertensive medication, older age and prolonged duration of surgery. As AKI was associated with longer hospitalisation and increased postoperative morbidity, these observations should be taken into account to improve outcome when addressing perioperative fluid management.

FM 4

Impact of packed red blood cells and fresh frozen plasma given during radical cystectomy and urinary diversion on cancer-related outcome and survival: An observational cohort study

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Background: The relationship between blood transfusion and cancer-related outcome and mortality is controversial.

Objective: To assess if perioperative administration of packed red blood cells (PRBC) and fresh frozen plasma (FFP) units affects disease progression and survival after radical cystectomy for bladder cancer.

Design, setting and participants: We conducted an observational single-centre cohort study of a consecutive series of 885 bladder cancer patients, between 2000 and 2015. Perioperative blood transfusion was defined as need for PRBC and FFP transfusion within the first 24h after the beginning of surgery.

Outcome measurements and statistical analysis: Disease recurrence-free, cancer-specific, and overall survival were estimated using the Kaplan-Meier technique and log rank test.

Results and limitations: A total of 267/885 patients (23%) were transfused; 187/267 patients (70%) received only PRBC (median 2 units [IQR: 1–2]) and 80/267 patients (30%) received PRBC (2 [2–3])

plus FFP (2 [2–2]). Receipt of PRBC or PRBC+FFP was associated with a higher 90d mortality (7.0% vs. 7.5% vs. 2.9%; $P = 0.016$), an inferior 5yr recurrence-free survival (no transfusion 92%, PRBC 74%; $P = 0.005$, PRBC+FFP 49%; $P = 0.002$), 5yr cancer-specific survival (no transfusion 74%; PRBC 60%, PRBC+FFP 49%, all $P < 0.001$) and 5yr overall survival (no transfusion 90%, PRBC 70%, PRBC+FFP 34%, all $P < 0.001$). In multivariate analysis, blood transfusion was predictive for all-cause mortality [PRBC (HR 1.610; $P < 0.001$) and PRBC+FFP (HR 1.640; $P = 0.003$)] and cancer-specific mortality [PRBC (HR 1.467; $P = 0.010$) and PRBC+FFP (HR 1.901; $P = 0.021$)]. Limitations include selection bias and lack of standardized transfusion criteria.

Conclusions: The administration of PRBC and FFP was associated with significantly inferior cancer-specific and overall survival. Relevant preoperative factors for receiving blood transfusion were neoadjuvant chemotherapy, preoperative anaemia, older age and ASA score ≥ 3 and emphasize the importance of preoperative optimization of patients undergoing cystectomy.

FM 5

The analgesic efficacy of tap block versus epidural analgesia: a systematic review and meta-analysis

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Background and aim: TAP block has gained popularity in regional anaesthesia to provide postoperative analgesia but its advantage over epidural analgesia is disputed. The objective of this meta-analysis was to compare the analgesic efficacy of both techniques.

Methods: We followed the PRISMA statement guidelines. Only trials comparing TAP block with epidural analgesia were included meta-analyses were performed following mostly a random-effects model. The primary outcome was pain score at rest (analogue scale, 0–10) on postoperative day 1 analyzed in subgroups according to the population (children and adults). Secondary outcomes included rate of hypotension, length of stay, and functional outcomes (time to first bowel sound, time to first flatus). Ten controlled trials, including 505 patients, were identified.

Results: Pain score at rest on postoperative day 1 was equivalent in TAP block and epidural analgesia groups in children (mean difference: 0.3; 95% CI: -0.1, 0.6; $I^2 = 0\%$; $p = 0.15$) and in adults (mean difference: 0.5; 95% CI: -0.1, 1.0; $I^2 = 81\%$; $p = 0.10$). The quality of evidence for our primary outcome was low according to the GRADE system, due to the risk of type II error. Rate of hypotension was higher in the epidural analgesia group (RR: 0.13; 95% CI: 0.04, 0.38; $I^2 = 0\%$; $p = 0.0002$), while hospital length of stay was reduced in TAP block group (mean difference: -0.6 days; 95% CI: -0.9, -0.3 days; $I^2 = 0\%$; $p < 0.0001$), without impact on functional outcomes.

Conclusions: There is low evidence that TAP block and epidural analgesia are equally effective in treating postoperative pain. Additional trials with robust methodology are required to better define the analgesic effect and the functional impact of each technique before recommending TAP block that is associated with less episodes of hypotension and reduced length of stay.

FM 6

Continuous optical blood pressure measurement in the perioperative setting

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Introduction: Obtaining accurate continuous blood pressure (BP) monitoring is mandatory in critically-ill, anesthetized patients or during long and challenging surgical procedures. The gold standard for continuous BP measurement – invasive arterial catheter – is complex and associated with morbidity. This study presents a simple way to measure non-invasive BP continuously without additional equipment in the operating room. To allow non-invasive beat-to-beat BP measurement, we used a commercially available pulse oximeter probe and analyzed its signals in order to assess the performance of optically acquired signals transformed into continuous BP values. The aim of the study is to prove the accuracy of the optical non-invasive blood pressure method compared to the invasive arterial measurement.

Methods: We included and obtained informed consent from 40 patients aged more than 18 years and scheduled for an elective surgery necessitating general anaesthesia and invasive BP monitoring at CHUV-University Hospital of Lausanne. An arterial catheter was inserted in the radial artery. The fingertip device was placed on the contralateral side. The optical signal was analyzed based on published pulse wave analysis algorithms to continuously estimate BP and compared to the invasive BP. We ran a scenario that simulates the clinical setting where the algorithms are used to continuously estimate BP in between two standard sphygmomanometer measurements as calibration with a 3-minute interval.

Results: We provide here results from 40 patients for continuously estimating mean arterial BP (MAP) and diastolic arterial BP (DIA). Data analysis on systolic BP is underway. The measured mean error for DIA is 0.44 mm Hg and the measured standard deviation of the error is 7.6 mm Hg. For MAP, the mean error is 0 mm Hg and the standard deviation error is 10 mm Hg. The correlation coefficient is 0.83 for DIA and 0.87 for MAP. This study shows a good correlation between the measured optical BP and the invasive BP. For such a simple optical measurement setup, these performances are already very close to the ISO81060-2 requirements.

Conclusion: Our results demonstrate feasibility of continuously estimating BP changes in the operating room via the analysis of pulse oximeter optical signals. Further studies are needed but this research validates a promising track towards non-invasive continuous monitoring of BP in the perioperative setting.

FM 7

Improvement of cerebral and muscular oxygen saturations following TAVI

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Introduction: Transcatheter aortic valve implantation (TAVI) is a new alternative for old and frail patients for whom open heart surgery is deemed too dangerous. In this high-risk population, exercise capacity is limited and, although symptoms are alleviated following TAVI, no study has documented hemodynamic changes during a standardized stress test. Our hypothesis is that TAVI-induced reduction in left ventricular afterload leads to improved exercise capacity owing to increased cardiac output and better oxygen distribution within muscles.

Methods: Twenty-three patients with severe aortic stenosis scheduled for TAVI performed a standardized cycle ergometry stress test (low resistance, 5 minutes duration with 5 minutes recovery) 1 day before as well as 3 to 5 days after TAVI. The study was approved by the ethics committee. Hemodynamic assessment was performed throughout exercise test and consisted in repeated measurements of heart rate (HR), mean arterial pressure (MAP), cardiac index (CI) by electrical cardiometry (ICON™) and cerebral (StcO₂) and muscular transcutaneous oxygen saturation (StmO₂) by near infra-red spectroscopy (NIRS, Fore-Sight™). Student's t-test or Wilcoxon signed rank test and analysis of variance were applied. Data were expressed as mean [standard deviation].

Results: Patients' age was 84 [4.5] years and Society of Thoracic Surgery risk score was 6.0 [2.3]. Before and after TAVI, patients performed a standardized stress test of similar duration (272 [58] vs 281 [38] seconds) and intensity (235 [112] vs 318 [156] Joules). After TAVI, CI at rest was higher (4.0 [0.6] vs 3.3 [1.0] l/min/m²; $P = 0.006$). Increases in CI, HR and MAP during exercise were similar before and after TAVI. StcO₂ and StmO₂ significantly improved during exercise in the post-TAVI period (+6 [5] % and +8 [9] %, respectively), whereas these parameters remained unchanged in the pre-TAVI period.

Conclusion: This study confirms an increase of CI at rest shortly after TAVI. For the first time, we report that TAVI increases both perfusion and tissular distribution of oxygen during exercise. Evaluation by NIRS and electrical cardiometry during a standardized stress test might be used to assess patient's frailty before a procedure, as well as early improvement in tissular oxygenation afterwards. Further studies should assess whether these parameters are associated with better prognosis and could predict a long-term increase in mobility and exercise capacity.

FM 8

Changes induced by the Airtraq Mobile app on handling and improving intubation ease with Airtraq in simulated difficult airways by novice usersBise Aline¹, Bathory Istvan¹, Schoettker Patrick¹¹Department of Anaesthesia, Centre Hospitalier Universitaire Vaudois, Lausanne, Switzerland

Background: The Airtraq Mobile app is a new intubation solution designed to combine any smartphone to a universal adaptor fitted on any Airtraq. High quality image resolution allows live image display and sharing, in addition to picture and movie recordings. This study was designed to assess the changes induced by adding the Airtraq Mobile to Airtraq SP intubations in simulated difficult airway scenario by novice users.

Methods: This prospective, single blinded, randomized study included 106 ASA I–III adults in which difficult airway was simulated using a rigid neck collar. All novice intubators were directly assisted by an experienced Airtraq user. Patients were randomly allocated for Airtraq SP (AS) vs Airtraq Mobile (AM) intubation. Success and number of attempts necessary were recorded, as well as times (expressed as median seconds [25th; 75th]) necessary for glottis identification, blocking of the cuff, ventilation and total procedure. Ventilation was defined as the observation of end-expiratory CO₂ curve on capnography, procedure time as the time from touching the Airtraq to ventilation. Timing and type of assistance by the supervisor were equally analyzed. Subjective ease of intubation was assessed on a scale from 1 to 5 and post-operative discomfort (sore throat, hoarseness, dysphagia) evaluated 24h after intubation.

Results: Demographics and anatomical characteristics were identical in both groups. The usage of the Airtraq Mobile solution increased the overall success rate of intubation by novice users (100% vs 94.3%) and shortened the total time necessary for tracheal intubation (63sec [50;84] vs 74sec [51;108]). The AM group generated more frequent supervisor assistance (77.4% versus 72%) and, in all those cases, was offered spontaneously by the supervisor. In the AS group, 58.3% of the novices had to ask for assistance. The timing of assistance was significantly later in the AS group. Post-operative airway discomfort was less frequent in the AM group, as 37.8% of the patients in the AS group had at least one item related to post-operative discomfort versus 20.8% in the AM group. Those discomforts were less frequent in the AM group for each individual item.

Conclusion: The use of the Airtraq Mobile solution to assist intubation by novice users in simulated difficult airway increases first pass success while reducing post-operative airway discomfort. Sharing the airway changes timing and type of assistance by an experienced user assisting to the procedure.

FM 9

Comparison of the TOF-Cuff® with the TOF Watch SX® in patients undergoing surgery. An observational studySfeir Machado Eve¹, Keli Barcelos Gleicy¹, Dupuis-Lozeron Elise², Tramèr Martin¹, Czarnetzki Christoph¹¹Department of Anaesthesia, University Hospital of Geneva, Switzerland; ²Division of Epidemiology, University Hospital of Geneva, Switzerland

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

Methods: Forty patients, ASA I to II, aged 18–65 years, undergoing elective surgery, were included into this single centre study. Each patient served as his own control. The TOF-Cuff® was installed on an upper arm and the electrodes of the TOF Watch SX® on the site of the ulnar nerve on the opposite wrist. After a standardised IV induction with propofol and sufentanil, the devices were calibrated, and simultaneous and continuous train-of-four (TOF) stimulations were commenced. Then, a single IV dose of rocuronium 0.6 mg kg⁻¹ was administered for intubation. Anaesthesia was maintained with a continuous propofol infusion and sufentanil boluses as needed. Primary outcome were the total recovery times (time in minutes from injection of rocuronium to a normalised TOF ratio of 90%) with both devices. Bias and limits of agreement between the two monitors were calculated as proposed by Bland and Altman.

Results: The primary outcome could be analysed for both monitors with data of 27 patients. With the TOF Watch SX®, average recovery time was 67.5 minutes (95%CI). With the TOF-Cuff®, total recovery time was on average 16.4 min shorter compared with the TOF Watch SX® (limits of agreement according to Bland and Altman –6.1 to 39). The

difference was increasing with increasing total recovery time, suggesting that the bias of the TOF-Cuff® was not systematic but relative.

Conclusion: Compared with the TOF Watch SX®, the TOF-Cuff® overestimated speed of recovery of a rocuronium-induced neuromuscular block. It is likely that patients who are extubated based on TOF-Cuff® values are at risk of residual neuromuscular blockade.

FM 10

Feasibility of right ventricular pressure volume loops: a physiological explorationVandenheuvél M.¹, Mauermann E.^{1,2}, Bouchez S.¹, Wouters P.¹¹Department of Anesthesiology and Perioperative Medicine, University Hospital Ghent, Belgium; ²Department of Anesthesiology, University Hospital Basel, Switzerland

Introduction: Perioperative right ventricular (RV) dysfunction results in significant morbidity and mortality in the cardiac surgery setting [1]. Furthermore, specific RV management is still ill-substantiated [2]. We believe that optimal RV diagnostics may offer the clinician unique pathophysiological understanding of the right ventricle and sought to evaluate the feasibility of 3D-echo based pressure-volume loops, the experimental gold standard.

Methods: In 20 adult patients undergoing coronary artery bypass grafting, we made a series of postinduction PVLs. Post-induction baseline data were acquired, and the effects of passive leg raise, sustained positive end-expiratory pressures (PEEP) of 20 mm Hg and opening of the chest were evaluated. The volume-time relationship was made from 3D-echo RV volumetry (image acquisition by tranoesophageal Philips Epiq 7, image analysis by TomTec software). Same time pressure-time relationships were obtained from a RV side port of a pulmonary artery catheter (Edwards Lifesciences, storage with Datagrabber). The volume-time and pressure-time relationships were combined and synchronized using a custom code in R (the R Foundation).

Results: Pressure-volume loops could be constructed in all patients and all states. Furthermore, passive leg raise resulted in a rise of end-diastolic and end-systolic volume from 82 ± 10 ml to 112 ± 13 ml, and 48 ± 16 ml to 63 ± 14 ml respectively. Stroke volume rose from 34 ± 9 ml to 49 ± 11 ml. Sustained PEEP of 20 mm Hg caused a more than three-fold increase in arterial elastance (from 0.6 ± 0.2 to 2.2 ± 0.4 mm Hg/ml), and after chest opening end diastolic volume dropped from 82 ± 10 ml to 71 ± 12 ml).

Discussion: This study demonstrates the feasibility of combining volume-time and pressure-time relationships to create perioperative RV pressure-volume loops. Furthermore, the results reflect what is expected from a physiological standpoint. Our research group is further exploring this path, including validation of our methodology versus conductance catheter pressure-volume loops in a pig model and the feasibility of the use of single-beat estimates of right ventricular function in this setting.

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2 Vandenheuvél M, Bouchez S, Wouters PF et al. A pathophysiological approach towards right ventricular function and failure. *EJA* 2013;30(7):386–394.

FM 11

Opioids in Europe: a comparison of the different nations' consumption between 1985 and 2015Ruchat D.¹, Suter M.¹, Fournier N.¹, Berna C.¹¹Centre d'antalgie, CHUV, Lausanne, Switzerland

Aim of Investigations: In North America the increase in opioid consumption has been well documented. However, in Europe only few studies using national databases exist, making comparisons difficult. We address this open question by examining the European consumption using a single database and comparing it with other developed countries according to the human development index.

Methods: The consumption data have been extracted from the International Narcotics Control Board for 22 European countries as well as 4 other countries of interest (Australia, Canada, Japan and the USA). Six opioids were included in this study. Data are calculated in mg per capita for each substance and in morphine equivalent for aggregate consumption.

Results: Opioid consumption in Europe was multiplied by an average of 38 times from 1985 to 2015. The average increase per year in Europe was 13.63% (SD = 12.88%). In North America, this increase has been of 8.73% per year (SD = 8.22%). There was a significant difference between those two progressions (p = 0.0266, two-sided). In 2015 the opioid consumption in morphine equivalent was 296 mg per

capita in Europe and 861 mg per capita in North America. Important disparities between European countries will be mapped out, with for example higher levels of consumption in the Northern than Eastern European countries. Some regional characteristics in the use of specific molecules will also be presented, such as the less frequent prescription of oxycodone and hydromorphone in Europe compared to North America.

Conclusions: Surprisingly, the increase in consumption in Europe surpassed the one in Northern America over the course of the studied period, however one should keep in mind that the North American consumption remained higher than the European one. Other hypotheses about this finding will be brought forward. The differences in European levels of current opioid consumption suggest differential regional issues: the high quantities of opioids used in Northern Europe could hint at possible over-prescription issues similarly to North America, while Eastern Europe's lower rates might indicate opioid under-access. This unified data on the use of opioids in Europe should help researchers, clinicians and policymakers to address the specific situation of each country.

FM 12

Rapid sequence induction with a magnesium – rocuronium combination compared with succinylcholine: a randomized controlled trial

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Background: Succinylcholine has serious side-effects, but remains the neuromuscular agent of choice for rapid sequence induction (RSI). As magnesium increases the onset time of rocuronium, a magnesium-rocuronium combination may be an alternative to succinylcholine.

Objective: To determine whether pre-treatment with IV magnesium before a standard intubation dose of rocuronium (0.6 mg kg⁻¹) provides superior intubation conditions compared with succinylcholine (1 mg kg⁻¹) for RSI.

Methods: Randomized double-blind controlled trial conducted at Geneva and Lausanne University Hospitals. In the magnesium-rocuronium (MR) group, patients received a short IV infusion of magnesium sulphate 60 mg kg⁻¹. RSI was then induced with propofol (2 mg kg⁻¹), sufentanil (0.2 mcg kg⁻¹) and rocuronium (0.6 mg kg⁻¹). The control (PS) group received a matching placebo infusion and succinylcholine 1 mg kg⁻¹ after anaesthesia induction. Intubation conditions were graded as excellent, good or poor 50 sec after administration of the neuromuscular agent using an internally-recognized score. Primary endpoint was the rate of excellent intubation conditions. Secondary endpoints were hemodynamic stability and adverse events.

Results: Among 280 randomized patients, intubation conditions were analyzed in 259 (133, MR; 126, PS). Intubation conditions were similar in both groups (excellent, 61 vs. 57; good, 51 vs. 46; poor, 21 vs. 23, respectively; $p = 0.863$). Hemodynamic stability and injection-related adverse events were also similar. However, significantly more PS patients complained of postoperative muscular pain (25 [29%] vs. 2 [2%], respectively; $p < 0.001$).

Conclusions: A combination of magnesium pre-treatment with a standard rocuronium intubation dose provides no better intubation for RSI, but has less adverse events.

FM 13

Satellite Glial cells activation in a mouse model of alcohol-induced neuropathic pain

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Neuropathic pain affects millions of people worldwide while Alcohol Use Disorder (AUD) affects about 4% of the world population. Clinical observations emphasized the strong comorbidity between these pathologies. The estimated prevalence of alcohol-related neuropathy is

about 25–66% among, with an estimated 1/3 of painful neuropathy. The neurobiological mechanisms responsible such comorbidity remain to be further elucidated. Recent studies suggested that a deleterious pro-inflammatory environment occurs after chronic alcohol exposure. Interestingly, the activation of satellite glial cells (SGC), major actors of inflammation regulation into the dorsal root ganglion (DRG), plays a significant role in the development of chronic pain. We hypothesized that the SGC activation would play an essential role to the development and maintenance of an alcohol-induced neuropathic pain condition. The fractalkine receptor CX3CR1 has been described as a specific marker of microglial cells. In this study, a total of 75 males and females adult CX3CR1-eGFP reporter mice were used to specifically visualize the microglia-like SGCs. 38 mice undergo intermittent alcohol exposure model, a diet of ethanol 6.5% for 5 days a week, while 37 mice were exposed to a control water diet for the whole week. The mechanical and thermal sensitivity was assessed once a week (Von Frey and Hargreaves tests). After 10 weeks, the number of CX3CR1-eGFP positive cells from hypersensitive animals were counted into the DRG and the spinal cord (SC). We observed a significant decrease of the pain threshold within 4 weeks of intermittent alcohol exposure suggesting the development of neuropathic pain, in the group exposed to alcohol in comparison with the control water group. Our data suggest that the high alcohol intake decreases the sensitivity at early stages but then is associated with an hypersensitive phenotype after a long-lasting exposure. A statistical increase of microglia- and astrocyte-like cells after alcohol intoxication, in comparison with water diet controls, was observed in the DRG. In the SC, no significant change in glial cells activation was measured between both diet groups. Although future experiment will be required to precisely define the role of SGC in the onset and maintenance of alcohol-induced neuropathic pain, SGC represent potentially major actors of the neurobiological process involved in this comorbidity:

FM 14

Patient and procedural features predicting early and mid-term outcome after radical surgery for non-small cell lung cancer

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Background: Postoperative cardiovascular and pulmonary complications (PCVCs and PPCs) are frequent and result in prolonged hospital stay. The aim of this study was to update the risk factors associated with major complications and survival after lung cancer surgery.

Methods: This is a post-hoc analysis of a randomized controlled trial that was designed to assess the benefits of preoperative physical training. After enrollment, clinical, biological and functional data as well as intraoperative details were collected. In-hospital PCVCs and PPCs were recorded and survival data were adjudicated up to 4 years after surgery.

Results: Data from 151 patients were analyzed. Thirty-day mortality rate was 2.6% and the incidence of PCVCs and PPCs was 15% and 33%, respectively. Stepwise logistic regression analysis showed that, PCVCs were mainly related to elevated plasma levels of brain natriuretic peptides (odds ratios (ORs) of 6.0 with 95% confidence interval (CI) of 1.3 to 27) and performance of a pneumonectomy (OR 9.6 with 95%CI and 95%CI 2.9 to 31) whereas PPCs were associated with the presence of chronic obstructive pulmonary disease (OR 5.9 with 95%CI 2.4 to 14.8), current smoking (OR 2.6 with 95%CI 1.1 to 6.5) and the need for blood transfusion (OR 5.2 with 95%CI 1.2 to 23). Preoperative physical training was a protective factor regarding PPCs (OR 0.13 with 95%CI 0.05 to 0.34). Cox proportional hazards regression analysis showed that ventilatory inefficiency during exercise (expressed by a ratio >40 of ventilation to carbon dioxide elimination), coronary artery disease, elevated plasma levels of brain natriuretic peptides and the occurrence of PPCs were all predictive of poor survival after surgery.

Conclusions: Besides smoking and the extent of lung resection, preexisting cardiopulmonary disease as evidence by increased brain natriuretic peptides and inefficient ventilation are associated with poor clinical outcome after lung cancer surgery.

FM 15

The anti-diabetic drug metformin regulates voltage-gated sodium channel NaV1.7 via the ubiquitin-ligase NEDD4-2

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Aim: Voltage-gated sodium channels (NaVs) expression/function in dorsal root ganglia (DRG) neurons is often found to be dysregulated in neuropathic pain. The ubiquitin-ligase NEDD4-2 is a potent post-translational regulator of NaVs and is downregulated in the spared nerve injury model (SNI) of neuropathic pain, leading to an increased sodium current (INa) in DRG neurons. The anti-diabetic drug metformin, an AMPK-activator, was shown to decrease sensory neurons excitability, as well as allodynia developed by mice after SNI. Since AMPK can inhibit various ion channels activity by NEDD4-2 activation, we investigated whether the effect of metformin can occur through post-translational modification of NaVs, via NEDD4-2.

Methods: INa was recorded in voltage-clamp, from HEK293 cells co-transfected with NEDD4-2 and NaV1.7 (a NaV isoform highly expressed in nociceptive neurons and regulated by NEDD4-2), and from isolated mouse DRG neurons, after 12-hours of incubation with metformin 20 mM. Cell-surface expression was studied using biotinylation and western blotting.

Results: Metformin treatment significantly increased AMPK phosphorylation and significantly reduced INa in HEK293 cells co-transfected with NEDD4-2 and NaV1.7 (-58%, $p < 0.05$). When NEDD4-2 was not co-transfected, metformin had no effect on INa. Cell-surface biotinylation showed a decreased NaV1.7 expression after metformin treatment (-60%, $p < 0.01$), only when NEDD4-2 was co-transfected. Incubation of isolated DRG neurons with metformin significantly reduced total INa as well as NaV1.7-mediated INa in control neurons (Nedd4-2fl/fl) by 35% and 52%, respectively ($p < 0.05$), but not in neurons lacking NEDD4-2 (SNS-Nedd4-2^{-/-}). NaV1.7 expression was decreased in whole-cell lysates and at the surface of cultured DRG neurons from Nedd4-2fl/fl control mice (-34%, $p < 0.05$), but not in cultured DRG neurons from SNS-Nedd4-2^{-/-} mice. The effects of metformin were mediated by changes either in NEDD4-2 expression or in NEDD-2 phosphorylation. Preliminary results obtained using current-clamp or multi-electrode array recordings showed that metformin decreases DRG neurons excitability, partially in a NEDD4-2-dependent way.

Conclusion: Our results suggest that metformin effect on DRG neurons excitability is related to post-translational modulation of NaVs by their regulator NEDD4-2. Comprehension of mechanisms of action of metformin opens new alternatives for the diminution of hyperexcitability related to neuropathic pain.

FM 16

Impact of natural sleep, sedation and hypercapnia on physiological ventilation variability: an experimental study

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Background and aims: The respiratory system exhibits intrinsic variability in breathing pattern. This physiological breath-to-breath variability in tidal volume (VT) and respiratory rate (RR) is expected to reduce tissue stress and improve regional ventilation and gas exchange. We aimed at investigating the effect of natural sleep, sedation and hypercapnia on the intrinsic variability of spontaneous breathing in juvenile rabbits.

Methods: Variability in VT and RR was measured by unconstrained barometric whole-body plethysmography in 3 juvenile rabbits (460–540 g) during 60 minutes twice a day, for 3 consecutive days. Breath-to-breath VT and RR variability, assessed as the coefficient of variation (CV, SD/mean) during the awake state, natural sleep, hypercapnia (inhaling 5% CO₂) and under light and deep sedation with sevoflurane (2% and 4%) was averaged over the 2 final days.

Results: There was a significant decrease in the CV of RR under light ($p < 0.01$) and deep sedation ($p < 0.01$) (table). CV of VT decreased under hypercapnia ($p < 0.01$), light ($p < 0.01$) and deep sedation ($p < 0.01$). Conversely, natural sleep did not significantly change breathing variability. CV VT (%): Awake (15.5 ± 2.2), CO₂ 5% (11.1 ± 2.8*). Sleep (15.8 ± 3.1), Sevo 2% (7.6 ± 3.0*) and Sevo 4% (6.6 ± 1.8*). CV RR (%): Awake (25.0 ± 10.2), CO₂ 5% (24.8 ± 9.3), Sleep (14.9 ± 2.2), Sevo 2% (6.1 ± 3.3*) and Sevo 4% (4.7 ± 0.4*).

Conclusions: Our data show that sedation and hypercapnia, but not natural sleep decrease the physiological variability of breathing. Further study will assess the effects of breathing variability suppression under sedation and its causative role in adverse respiratory outcomes.

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FM 17

«Alerte Douleur», an automatic alert system for patients at risk for chronic postsurgical pain

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Chronic postsurgical pain (CPSP) is a problem affecting more than 10% of surgical patients, and in certain types of surgery 30–50%. Detecting patients at risk is an important first step for the implementation of prevention strategies. Multiple studies have revealed risk factors, but in clinical routine the screening of CPSP risk is rarely performed. However, most risk factors are documented in the routine documentation, and an automated alert system retrieving these risk factors from the multiple sub-systems of a hospital information system may help to direct the attention of caregivers to these patients at risk of CPSP. In this study we want to test the sensitivity and specificity of such an automated alert for the prediction of CPSP at 6 months postoperatively, and compare this with more exact prediction scores including specific preoperative questionnaires.

Methods: Included will be 450 adult patients scheduled for surgeries with known risk of CPSP: total knee arthroplasty, total shoulder arthroplasty, spine surgery, thoracic surgery, laparotomy, inguinal hernia repair, breast surgery. Excluded are patients undergoing emergency surgery and those undergoing repeat surgery. Following written informed consent, patients complete preoperatively the questionnaires HADS and PCS, and 24h postoperatively the international pain outcomes questionnaire. At 6 and 12 months, patients receive per email the BPI and DN4 questionnaires. The automatic alert is activated (i.e. an automated email is sent) if one of the following conditions is fulfilled: 1) in the preanesthetic consultation preoperative chronic pain, depression, anxiety disorder, substance dependence or chronic opioid or benzodiazepine use noted; OR 2) use of more than 20 mg of morphine iv in the recovery room OR 3) more than 3 pain scores of >5/10 noted in the electronic patient record in the 48h postoperatively.

Results: Until now 145 patients were included, 56 questionnaires at 6 months are already completed. 13/56 patients reported pain at the surgical site, and for 11 of these patients an alert was activated. However, in 28 of 43 patients reporting no CPSP there was also an alert activated, indicating a low specificity of the current alert system.

Conclusion: The automated alert in its raw form is much too unspecific; 39/56 of the patients included had at least one risk factor for CPSP. A combination of risk factors will be necessary to augment the specificity of the automated alert system.

FM 18

Retroclavicular or supraclavicular brachial plexus block for patients undergoing distal upper limb surgery? A randomized controlled trial

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Background: Brachial plexus block provides excellent anaesthesia and analgesia for forearm and hand surgery. A retroclavicular approach to the brachial plexus has recently been described [1], but has not been systematically compared to other commonly used approaches. We performed this randomized controlled single-blinded trial to examine block- and pain-related outcomes after ultrasound-guided retroclavicular (RCB) versus supraclavicular block (SCB).

Methods: 120 patients scheduled for distal upper limb surgery were randomized into two groups; three patients were excluded from analysis because of protocol violation. In patients allocated to a SCB, the needle tip was placed in the angle formed by the junction of the first rib and subclavian artery. For RCBs, the needle was inserted in the supraclavicular fossa, behind the clavicle and positioned posterior to the axillary artery. All patients received a 1:1 mixture of plain mepivacaine 1% / ropivacaine 0.5%, 30 mLs. There was no needle tip repositioning during the block procedure. The primary outcome was the success rate 30 minutes after local anaesthetic injection. Secondary outcomes included needling and procedure times; rates

of paraesthesia and vascular puncture; pain scores during block procedure and at 24 postoperative hours; and patient satisfaction. **Results:** Patient characteristics were similar between groups. In both groups, 98% of patients had a successful block ($p = 0.96$). Needling and procedure times were statistically longer with RCB ($p = 0.004$), but without having any clinical impact. All other block- and pain-related outcomes were similar between groups. Patient satisfaction was high after both blocks.

Conclusion: RCB and SCB provide equivalent anaesthesia and analgesia for distal upper limb surgery.

Reference: 1 Charbonneau J. The Ultrasound-Guided Retroclavicular Block. *Reg Anesth Pain Med* 2015;40:605–609.

FM 19

Postoperative analgesia in children recovering from tonsillectomy and adenoidectomy

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Background: Insufficiently treated postoperative pain after tonsillectomy (TE) is frequent in adults [1]. Respective data of children recovering from TE are scarce. To improve clinical care, results of a standardized questionnaire on patient reported outcome on the first postoperative day were analyzed. Within the scope of a project of quality control of postoperative pain management, the intention was to detect possible deficits and, subsequently, to implement respective changes in clinical practice.

Methods: The analysis is based on the international registry PAIN OUT infant, in which children >4 years are prospectively enrolled for quality control of postoperative pain management [2]. Written informed consent was obtained from the parents. Patient characteristics as well as anesthesia, analgesia and surgery related data were collected and documented in the internet-based case report form. On the first postoperative day, children (or children with the help of parents) answered the age adapted patient reported outcome questionnaire asking for pain related impairment and side effects of therapy. Benchmarking was used for comparison of participating hospitals.

Results: Complete data of 385 children undergoing tonsillectomy and/or adenoidectomy (females 52%; 8.3 ± 4.0 years, 35 ± 21 kg) could be analyzed. The benchmarking procedure allowed the comparison of nine hospitals. Our hospital showed good results for pain at rest (NRS median (IQR): 0(0/2)) and worst pain (4(2/8)), however, nausea (34.1% of the patients), vomiting (38.6%) and fatigue (65.9%) were relatively frequent. 93% of the children received a nonopioid analgesic as pain prophylaxis (Inselspital/other hospitals: paracetamol 86%/60%, diclofenac 41%/15%, metamizole 23%/41%, ibuprofen 0%/31%). Loading doses were relatively low at our institution, e.g. metamizole 14 mg/kgKG. On the wards, paracetamol was the preferred drug, frequently given in combination with other nonopioid analgesics. Twenty-four-hour doses per kg body weight were beneath recommended daily doses.

Conclusions: An analysis of the PAIN OUT infant registry data provided information on “real life data” from daily clinical practice in

children undergoing TE. Some aspects, like opioid-related side effects and not sufficiently high doses of nonopioid analgesics were identified, which should be improved in the future.

References: 1. Gerbershagen H, et al. *Anesthesiology* 2013;118:934–44. 2. www.pain-out.eu

FM 20

ERK and p38 contribute to the regulation of nociceptin and the nociceptin receptor in human peripheral blood leukocytes

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Introduction: Recent preclinical and clinical studies on nociceptin and its receptor (NOP) have indicated that NOP-targeted compounds may be new drug candidates for the treatment of various diseases and conditions, including pain and inflammatory disorders [1–4]. However, little is known about the mechanisms involved in the regulation of nociceptin and NOP in response to inflammation and pain in circulating blood cells. In this study, specific signalling pathways contributing to the regulation of nociceptin and the nociceptin receptor in human blood leukocytes were investigated.

Methods: After approval by the ethics committee, peripheral blood obtained from healthy donors was co-cultured with or without phorbol-12-myristate-13-acetate (PMA). Nociceptin precursor (prepronociceptin, ppNOC) and NOP mRNA were analysed by RT-qPCR. Nociceptin concentrations in culture supernatants were measured by fluorescent enzyme immunoassay and nociceptin and NOP protein levels in blood leukocyte subsets were determined using flow cytometry. To examine the contribution of signalling pathways to ppNOC and NOP regulation, blood was pre-treated with kinase inhibitors specific for ERK, JNK, p38 and NF κ B pathways prior to co-culturing with or without PMA.

Results: PMA dose-dependently upregulated ppNOC mRNA but downregulated NOP mRNA in human peripheral blood leukocytes. PMA 10 ng/ml increased ppNOC after 6 hours and suppressed NOP after 3 hours compared to controls (both $p < 0.005$). Nociceptin concentrations were increased in supernatants of PMA-induced blood samples after 24 hours ($p = 0.02$), whereas expression of cell-membrane NOP was suppressed by PMA in blood leukocyte subsets (all $p < 0.05$). Blockade of ERK or p38 pathways partially prevented PMA effects on ppNOC and NOP mRNA (all $p < 0.05$). The combination of ERK and p38 inhibitors completely reversed the effects of PMA ($p < 0.05$).

Conclusions: ERK and p38 are two major signalling pathways regulating nociceptin and its receptor in human peripheral blood leukocytes under inflammatory conditions.

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P 1 Kir2.1 regulates spinal microglial membrane potential in the SNI model of neuropathic pain

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Introduction: Following nerve injury, sensory neurons release erratic action potentials inducing hyperexcitability of secondary neurons located in the dorsal horn of the spinal cord. Here microglia gets activated and enhance the sensitization process by releasing cytokines and chemokines. Overall this results in an amplification of nociceptive signals, generating hypersensitivity and allodynia – hallmarks of neuropathic pain. Several studies have shown that Microglial cells change their potassium currents once activated. We hypothesized that potassium channels may be necessary for microglial activation and proliferation. We investigated this in the context of neuropathic pain using the spared nerve injury (SNI) model.

Methods: Adult male CX3CR1-GFP transgenic mice (20–24 g) were sacrificed and L3–L5 dorsal horn part of the spinal cord was taken. For immunohistochemistry, it was fixed, sliced and stained with the proliferation marker Ki-67. For Electrophysiology, we incubated it in papain for 30 min at 30 °C and dissociated cells. Microglial cells were kept in culture until experiment. After GΩ-seal formation, whole-cell configuration was obtained and microglial currents were recorded.

Results: By immunofluorescence we assessed the microglial proliferation, we show with the Ki-67 staining that it starts already 2 days after SNI and is reduced at day 4. The number of microglia increase already a bit at day 2 but then increase much more at day 4. At day 7 it increases again, but in a smaller amount. Inward potassium currents showed a 2 to 3 fold increase two days after SNI, and the resting membrane potential (RMP) of microglial cells got more hyperpolarized going from -21.15 ± 5.83 to -36.91 ± 5.83 mV when compared to naive animals. To determine the provenance of this current we used the SK channel blocker Apamin and the Kir2.x channel blocker ML133. Apamin did no significant change to both the current and RMP of SNI D2 cells. However ML133 abolished the potassium current and depolarized the RMP of microglial cells from -36.91 ± 5.83 to -9.00 ± 1.96 mV, reversing the membrane potential state beyond the naive condition. ML133 reduced the inward potassium current in a dose dependent way.

Conclusion: Interestingly, the peak of potassium current appears at D2, which corresponds to the proliferation peak of microglia after SNI. Thus potassium channels in microglia may play an important role in the activation and proliferation of Microglia.

P 1

30/34 (88%), bias was deemed possible due to COIs, or to the presence of a sponsor; 4/30 (13%) described having taken protective measures. Disclosures of COI and sponsors have increased over time, but remain low.

Conclusions: Disclosure of COI and sponsor remain low and their potential influence on the guidelines' recommendations is poorly documented.

P 3 Are there differences in paediatric trauma amongst European centers? Epidemiology in a Swiss trauma center

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Background and Goal of Study: Major paediatric trauma in Switzerland is rare and published data are scarce. The University Hospital of Lausanne (CHUV) serves as a tertiary center for trauma and burn injuries. Its first trauma registry dates from 2011. The purpose of this study was to provide an internationally comparable overview of paediatric trauma and to compare the results with other European trauma centers, in order to improve their care.

Materials and Methods: We analysed all injured children below 16 years admitted to the resuscitation room (RR) after prehospital triage. Data included: age, gender, injury severity score (ISS), mechanism of injury, lactate level, emergency interventions, location of transfer, length of stay and in-hospital mortality. The analysis covered the period of 2011–2016. p-values were calculated with the likelihood-ratio test from the chi-square distribution.

Results and Discussion: We included 328 children. 63% were male, the median age was 8. Severe trauma (ISS >15) occurred in 97 patients. Main mechanisms of injury were falls (45%), road traffic (29%) and burns (14%). Number of home and sports accidents was similar (32%; 28%). Affected areas were: head & neck (66%) and external body region (38%). Due to over triage, 43% of children were redirected from RR to the emergency department. Intensive care admission amounted to 27%. 20% underwent immediate surgical interventions (wound care, neurosurgery, and orthopaedic surgery). Overall mortality was 5.5% (18/328) with a median ISS of 9 (Denmark: 24/331, median ISS 9 [Do HQ 2012]). In the severe trauma subgroup, mortality was 17.5% with a median ISS of 22 (Germany: 13.4% median ISS 25 [Schoeneberg 2014]; United-Kingdom: 8.6%, median ISS 16 [TARN 2014]). Half of children died within 6 hours. The main causes of death were falls from above 5m and traffic accidents as pedestrian. Mechanism, ISS, GCS, intubation and lactate level influence mortality (p <0.001).

Conclusions: Compared to European trauma centers our mortality is slightly higher. Children died early after the admission, this suggests that improving pre-hospital care early resuscitation and injury prevention are likely to decrease mortality. Prevention should focus on pedestrian safety and protection from head injuries. Our results are similar to Danish paediatric trauma population. For the safety of children, a deliberate over triage strategy was adopted.

P 3

P 2 Reporting of conflicts of interest of panel members and chairpersons of guidelines in anaesthesiology. A cross-sectional study

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Background: Conflicts of interest (COI) of panel members (panellists) may bias guideline recommendations. Their potential impact, and management, should be transparently reported.

Methods: We analysed 65 guidelines published in five anaesthesia journals (2007–2016). We report on the number (%) that 1) published COIs, 2) in a distinct paragraph, 3) described COIs of panellists and 4) of the Chairperson, 5) described the impact of the sponsor on recommendations, 6) reported procedures taken to minimise the risk of biases due to panellists' COI or to sponsoring.

Results: COIs were published in 31/65 (48%) guidelines; in a distinct paragraph of 14/31 (45%). Panellists reported no COI in 7/31 (23%) guidelines, disclosed COIs without describing their impact in 23/31 (74%), and described their impact in 1/31 (3%). 16/31 (52%) chairpersons were identified; 7/31 (23%) reported no COIs, 8/31 (26%) disclosed COIs without describing their impact, and 1/31 (3%) made no statement regarding COI. Statements regarding sponsors were reported in 17/65 (26%) guidelines; 5/17 (29%) declared none, 11/17 (65%) reported sponsoring without explanation of potential impact, and 1/17 (6%) described its potential influence on the development of the guideline. 34 guidelines had COI and/or sponsorship disclosure. In

P 2

P 4 Anesthesia in toxic environment: PIPAC pressurized intraperitoneal aerosol chemotherapy

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Background: Pressurized Intraperitoneal Vaporized Chemotherapy (PIPAC) is a new technique of chemotherapy application for peritoneal carcinosis. Specificity of this technique is the transient chemo-toxic environment created in the theatre, requesting anticipation from the anaesthesiologist who will not be able to enter the operating room for 30 minutes. The procedure could be compared to a laparoscopic cholecystectomy and last 90 minutes.

Methods: From January 2015 until February 2018, all patients undergoing PIPAC procedure were included in the study. Due to the chemo-toxic environment, anaesthesia was conducted in order to monitor the patient out of the OR during the vaporization of the chemotherapy. Safety check list and anaesthesia recommendation were elaborated. Adherence to the anaesthesia protocol were analysed. All per-operative anaesthetic complications were recorded. PONV and pain were assessed at 24, 48, and 72 hours in a quality control database for the first 74 procedures.

P 4

Results: 193 PIPAC were performed on 87 patients from January 2015 until February 2018. Adherence to the protocol demonstrated that all patients benefited a propofol based anaesthesia, 98% were curarized with rocuronium, 99% received antiemetic prophylaxis and 87% had a perfusion of lidocaine. Sugammadex was used in 27% of the procedure. All PIPAC procedure were performed by a dedicated surgeon team, but for the dedicated team of anaesthesiology, the nurses anaesthetist were attended in 55% and for anaesthesiologist in 79% of the procedure. Anaesthetics complications were of mild severity. No accidental exposure of chemotherapy to health providers occurred despite occasional entries in the OR during the vaporization phase. 6.3% patients suffered delayed recovery, 58% due to hypothermia and 42% due to excessive sedation or curarization. 5.2% patients had mild hypothermia at the end of the procedure. Other complications were 3 difficult intubations, 4 difficult iv accesses and 10 mild hemodynamic instability during the laparoscopic phase. In recovery room, 16% patients suffered pain moderate to severe, requiring more than 8 mg of morphine iv with median doses of 13.7 mg. VAS showed an average score between 1 and 2 at rest until 72h and, between 1 and 3 at mobilization. PONV were present in less than 10% during the first 12h and in 40% at 72h.

Conclusions: Anaesthetic management of PIPAC patient can be safely performed with safety check list and anaesthetics protocols.

P 5

Anaesthetic risk factors on early cancer-related outcomes in bladder cancer patients undergoing radical cystectomy and urinary diversion: a case-series analysis

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Background: The impact of anaesthetic techniques on disease recurrence is controversial. In addition, concerns have been voiced that noradrenaline may be implicated in angiogenesis and metastasis via oxidative stress. The primary aim of this study was to assess the potential association between noradrenaline on disease recurrence.

Methods: We conducted a retrospective analysis of a consecutive series of 952 urothelial carcinoma patients undergoing radical cystectomy and urinary diversion, between 2000 and 2016. A total of 582/952 patients (62%) received noradrenaline intraoperatively. Subgroup analysis was performed according to patients who received neoadjuvant chemotherapy or not. Additional sensitivity analysis evaluated risk factors for early disease recurrence (i.e. within 12 months). Regression models were used to analyze clinicopathologic variables associated with disease recurrence.

Results: The use of noradrenaline was not a predictor for disease recurrence in any models ($P = 0.48$). Duration of surgery (HR 0.996, 95% CI 0.992–1.000, $P = 0.035$), administered fentanyl (HR 1.002, 95% CI 1.000–1.004, $P = 0.044$), preoperative eGFR (HR 0.993, 95% CI 0.988–0.998, $P = 0.011$), neoadjuvant chemotherapy (HR 1.676, 95% CI 1.265–2.220, $P < 0.001$), tumor stage (HR 2.143, 95% CI 1.654–2.776, $P < 0.001$), positive surgical margin (HR 2.304, 95% CI 1.803–2.993, $P = 0.001$) and nodal stage (HR 2.323, 95% CI 1.803–2.993, $P < 0.001$) were associated with higher risk of disease recurrence. In patients treated with neoadjuvant chemotherapy ($n = 146$), administered fentanyl (HR 1.001, 95% CI 1.000–1.002, $P = 0.004$), sex (HR 2.945, 95% CI 1.691–1.130, $P < 0.001$), tumor stage (HR 2.385, 95% CI 1.135–4.213, $P = 0.003$), and surgical margin (HR 3.478, 95% CI 1.475–8.199, $P = 0.000$) were associated with higher risk of disease recurrence. Amount of fentanyl (OR 1.003, 95% CI 1.000–1.007, $P = 0.04$), pT stage (OR 0.368, 95% CI 0.259–0.522, $P < 0.001$), surgical margin (OR 0.324, 95% CI 0.135–0.778, $P = 0.012$), nodal stage (OR 0.480, 95% CI 0.327–0.704, $P < 0.001$), duration of surgery (OR 1.008, 95% CI 1.002–1.013, $P = 0.008$) were risk factors for early recurrence in patients who did not receive neoadjuvant chemotherapy.

Conclusions: Noradrenaline does not seem to have an impact on disease recurrence after radical cystectomy for muscle invasive urothelial carcinoma. The amount of fentanyl seemed to influence disease recurrence in patients treated with neoadjuvant chemotherapy and consequently should be used with cautious.

Intrusive mental imagery in chronic pain: a prospective observational study using diaries

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Aim of Investigations: Recent studies have shown that patients suffering from chronic pain can experience intrusive mental imagery related to pain. These images (i.e. thoughts in the form of a sensory experience) may be particularly distressing and could contribute to pain maintenance and suffering. This study aimed to investigate prospectively how these images occur, their frequency and characteristics, by asking a sample of patients with chronic pain recruited in a Pain Center at a Swiss University Hospital to complete electronic diaries over the course of a week.

Methods: Forty chronic pain patients with a history of an accident or surgery in the course of their disease will be interviewed about the experience of pain-related mental imagery. Those who report such images are asked to complete a daily diary of their intrusive mental imagery and pain levels during 7 days. The characteristics of the intrusions (content, modality, trigger, intrusiveness, vivacity, associated emotion, as well as intensity and valence of the emotion, momentary pain intensity) are measured. In addition, scores evaluating pain interference, mood and symptoms of PTSD as well as the tendency to use mental imagery in general are completed by all patients. Pain-related imagery characteristics will also be correlated with pain characteristics, such as the presence of neuropathic symptoms.

Results: Preliminary intermediate analysis shows that, out of 20 participants, 15 reported intrusive images. The 15 patients who completed a diary described an average of 7.3 pain-related intrusive images over the course of the observed week. Further quantitative data regarding the characteristics of the intrusions will be presented on the full sample.

Conclusions: Intrusive mental imagery appears to be prevalent and frequently experienced in chronic pain populations. The current study will shed more light on this important cognitive process, allowing it to be better recognized and more systematically addressed through specific therapeutic interventions.

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Speckle-tracking based assessment of early diastolic mitral annular velocity

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Background: Recently, speckle-tracking derived displacement of the tricuspid annulus in transthoracic echocardiography [TEE] has been shown to agree with TAPSE in transthoracic echocardiography [TTE]. Furthermore, we have shown that differentiating speckle-tracking based displacement of the tricuspid annulus over time (i.e. a velocity) represents a TEE surrogate for the myocardial systolic excursion velocity (S') in TTE. As measuring diastolic dysfunction by E' (the peak mitral annular velocity during early filling) in TEE may be inaccurate due to misalignment of the Doppler beam and is often forgotten, we sought to examine the accuracy of speckle-tracking based early diastolic velocity of the mitral annulus.

Methods: In 25 adult patients undergoing elective cardiac surgery, E' was assessed after induction in a randomized order by TTE and TEE by two echocardiographers. Views used were the apical 4-chamber view in TTE (AP4CTTE) and midesophageal 4-chamber view in TEE (ME4CTEE). In both views, E' was measured by both Tissue Doppler Imaging (E'TDI) and by speckle-tracking (E'STE). For the main comparison, E'TDI by TTE was compared to E'STE by TEE by correlation and Bland-Altman plots.

Results: E'TDI by TTE was available in 24 of 25 patients and E'STE by TEE was available in 22 of 25 patients. Frame rates were 160 Hz for E'TDI by TTE and 52 Hz for E'STE by TTE. Mean E'TDI by TTE was 6.9 ± 1.6 cm/s and mean E'STE by TEE was 5.4 ± 1.7 cm/s ($P < 0.001$). Correlation, however, was fair (slope = 0.61, $P < 0.001$, $r = .55$).

Discussion: Measuring E' by speckle-tracking in TEE is feasible and correlates with E' measured by Tissue Doppler in TTE. However, it is uncertain why speckle-tracking based velocities are systematically underestimated. One potential cause may be the relatively lower frame rate. Further studies are needed and ongoing for this interesting alternative.

P 8

Anaesthesia-related mortality in Sub-Saharan African countries. A systematic review of the indexed and non-indexed literature

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Aim: We set out to estimate anaesthesia-related mortality in Sub-Saharan Countries based on the indexed and non-indexed (grey) literature.

Methods: Reports on dichotomous anaesthesia-related mortality in Sub-Saharan African countries (except South Africa) were systematically searched until April 2017. Searches were done in medical databases (PubMed, Cochrane, Web of Science, Embase – indexed literature), and African medical journals, African National Congresses on obstetrics and surgery, medical theses and Google (non-indexed literature). Definitions of anaesthesia-related mortality were taken as reported in the individual reports. No restriction was applied concerning date or language of publication, or type of surgery. The Human Development Index, a summary measure of average achievement in key dimensions of human development, was regarded as a surrogate of the quality of a country's national health care system. **Results:** We included 170 reports (1,054,364 patients); 103 (882,734 patients) were from the indexed and 67 (171,630) from the non-indexed literature. Weighted mean of overall anaesthesia-related mortality was 8.03/10,000; it was 5.45/10,000 in the indexed literature and was 21.27/10,000 in the non-indexed literature. There was a trend toward lower mortality rates in countries with higher Human Development Indexes.

Conclusion: Anaesthesia-related mortality in Sub-Saharan African countries is higher than previously reported. It remains unclear whether mortality is underestimated in the indexed literature or overestimated in the non-indexed literature. Countries with lower Human Development Indexes have higher mortality rates.

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Interscalene brachial plexus block for surgical repair of clavicle fracture: a matched case-control study

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Background: Innervation of the clavicle is complex and debated, with scarce data on the analgesic impact of regional anaesthesia after surgical repair of clavicle fracture. We report a matched case-control cohort study of patients undergoing clavicle fracture fixation performed under general anaesthesia with or without an interscalene brachial plexus block (ISB).

Methods: Fifty consecutive patients scheduled for surgical fixation of middle/distal clavicle fracture under general anaesthesia with ISB were prospectively enrolled. This cohort was compared to a historical control of 76 retrospective patients without regional block. The primary outcome was total intravenous morphine equivalent consumption at 2 postoperative hours. Secondary outcomes included perioperative sufentanil administration, intravenous morphine equivalent consumption at 24 postoperative hours, and resting pain scores at 2 and 24 postoperative hours. To assess the ISB impact, we performed both an overall cohort analysis and a case-matched analysis with each ISB-treated patient matched to a Non-ISB-treated patient. Matching employed a 1-to-1, nearest-neighbour approach using the Mahalanobis metric.

Results: In the overall cohort, patients with ISB had significantly lower i.v. morphine equivalent consumption at 2 postoperative hours (0.7 mg [95%CI: 0.1–1.2]) versus controls (8.8 mg [95%CI: 7.1–10.4]; p < 0.0001). Secondary outcomes were also significantly reduced,

except resting pain scores at 24 postoperative hours. These results persisted after case-matching the cohorts (mean difference for the primary outcome: 8.3 mg [95%CI: 6.5–10.0; p < 0.001).

Conclusions: ISB provides effective analgesia after surgical fixation of middle/distal clavicle fracture suggesting clinically relevant clavicle innervation mainly from branches of the brachial plexus. These results should help physicians establishing an analgesic strategy for this type of surgery.

Keywords: Peripheral nerve block, regional anaesthesia, postoperative analgesia, trauma, clavicle fracture

Trial registry number: clinicaltrials.gov: NCT02565342

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Will I ever debrief?

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In this poster/workshop we aim to show/apply simulation-based debriefings methods to clinical practice. Particularly in intense, high-risk medical domains such as anaesthesia improving patient safety is a major concern. The science of teams provides a promising lens for examining work in these high-risk domains. Applying this lens reveals that work is performed by ad-hoc teams which are fluid and dynamic rather than definite and stable [1]. Despite the growing presence of these so-called acute care teams (ACT) in today's organizations, not much is known of what drives their effectiveness and enables their learning [2]. Current team learning theories do not apply to ACTs because they do not factor in their lack of temporal stability [2]. Due to this temporal instability, learning has to be transitional, that is enable team members to use the team experience from participating in one ACT to improve participating in another ACT [2]. However, there is only limited knowledge on what ACTs do and need to learn. Our objective is to present how structured debriefings can provide a suitable learning infrastructure. Although widely used in simulation-based trainings (SBT) and studied in the context of simulation [3–6], debriefings are underutilized and understudied in clinical practice. The learner will be able to: (1) Discuss the core elements of SBT; (2) Describe how debriefings offer multiple learning possibilities; (3) Assess how learning and performance of ACTs will be effective; (4) Discuss how ACT debriefings have to be embedded in organizational learning; and (5) Identify what health care providers need in order to learn and apply debriefings.

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5. Rudolph JW, Simon R, Dufresne RL, Raemer DB. There's no such thing as "nonjudgmental" debriefing.

6. Rudolph JW, Simon R, Rivard P, Dufresne RL, Raemer DB. Debriefing with good judgement: Combining rigorous feedback with genuine inquiry.

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Digital Emergency Checklists (DEC) – the cockpit in the operating room

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Emergency situations regularly occur in the perioperative setting. Doctors and nurses must initiate the correct diagnostic or therapeutic steps within a very short time in order to ensure optimal patient care. As with aviation, the treatment teams in the operating room of the Cantonal Hospital Baden have checklists at their disposal since 2014 when the hospital joined the project "Progress – Safe Surgery." The DEC are based on the Stanford Cognitive Aid Group. A few simulation studies described in literature have shown that the patient's outcome after an emergency situation is better when working according to checklists. In addition, the medical team also achieved better results in terms of communication, leadership, decision-making and problem solving. The checklists at the Hospital in Baden have been designed to assist the team of anaesthesiologists in unpredictable and rare acute situations in order to ensure prompt and adequate treatment. Such situations pose a challenge to the entire team. Priorities and treatment procedures need to be set and established within an appropriate time. The goal, inspired by aviation, is to design clear and easily structured

checklists for doctors and nurses of anaesthesia, regardless of their experience and hierarchy level. In analogy to the internationally known ABCDE-scheme for the treatment of trauma patients, the DEC are structured similarly. The main idea is the fast, reliable and priority-oriented recording as well as the targeted initiation of treatment measures of the most threatening disturbances of the vital functions ("treat first what kills first"). A precondition for the successful implementation of DEC in emergency situations used in the Cantonal Hospital Baden is regular staff training. Thanks to the central storage in the hospital's intranet and as well as to the smartphone version, every employee of anaesthesia is able and required to familiarize themselves with the DEC anywhere and anytime and to deepen their knowledge. A continuous update of the DEC that reflects the latest level of knowledge is ensured and simplified by our digital version. Errors that occur in stressful situations have decreased significantly because the involved health professionals follow a rule based action algorithm. The general sense of preparedness of the whole anaesthesia team at the Cantonal Hospital in Baden reflects the success and the generally positive response to the DEC respectively.

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Ultrasound evaluation of radial nerve injuries by cortex overlapping screw-tips in the spiral groove in osteosynthesis of humeral fractures: a cadaveric study

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Background: The radial nerve may be painfully irritated or damaged by osteosynthesis of humeral fractures. Secondary radial nerve lesions after osteosynthesis of humeral shaft fractures are described in up to 16%. Not only peripheral nerves but also orthopaedic instruments and osteosynthesis material are well visible in ultrasound. We evaluated the accuracy of ultrasound in assessing the relation between screw-tips and the radial nerve after osteosynthesis of humeral fractures.

Methods: Ultrasound guided drilling was used to place screws as close as possible to the radial nerve in 8 humeri of four cadavers. The relation between the radial nerve and the screw tips were assessed by high-resolution ultrasound. The overlap of the screw tip over the bone were measured by ultrasound and fluoroscopy and verified by anatomical dissection.

Results: We could correctly identify all screw-tips and their relation to the radial nerve by ultrasound. In 7 of 8 cases the screw-tip had direct contact with the radial nerve. The overlaying length of the screw-tip was accurately measured by using ultrasound in all cases, in contrast fluoroscopy underestimated this length in 50% of cases.

Conclusions: With this study we show that ultrasound could be an adequate tool to guide drilling in humeral fracture osteosynthesis and to reliably visualize the screw-tips and its relation to the radial nerve. Furthermore, ultrasound is a promising diagnostic tool to evaluate patients with radial nerve irritations or lesions after humeral fracture osteosynthesis.

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