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Swiss Medical Weekly

Formerly: Schweizerische Medizinische Wochenschrift

Supplementum 207

ad Swiss Med Wkly
2014;144
October 23, 2014

The European Journal of Medical Sciences

Common congress of the Swiss Society of Anaesthesiology and Resuscitation SGAR-SSAR and the Swiss Society for the Study of Pain SGSS-SSED

Interlaken (Switzerland), November 6–8, 2014

Suppl. 207
ad Swiss Med Wkly
2014;144
October 23, 2014

FM1–FM20: Free communications	2 S
P1–P32: Posters	8 S
Index of first authors	18 S

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ISSN printed version: 1424-7860

ISSN online version: 1424-3997

FM 1

Endotracheal tube displacement during head mobilisation

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Background and Goal of Study: Depending on the type and location of the surgery, head mobilisation after endotracheal intubation (ETT) and tube fixation may be required for better surgical access or exposure and can lead to ETT displacement. The purpose of this investigation was to assess the displacement of the ETT by measuring changes in distances between the ETT tip and carina during a standardized trial of head and neck movements.

Materials and methods: After standardized orotracheal intubation (Mallinckrodt® size 6.5 respectively 7.5 for female and male patients) and appropriate ETT fixation, a fiberscope was introduced in the ETT to assess tube displacement on 50 adults patients in 5 specific situations, i.e. neutral position, maximum head extension and flexion and maximal right and left rotations.

Results and discussion: Despite the ETT being positioned by the in-charge anaesthesiologist according to the marks printed by the manufactures, the distance between tube extremity and carina varied from 1–10 cm (median of 5.0 cm, SD 3.5; 7.0). Maximal head extension led to tube extremity withdrawal in 68% of cases while flexion led to further caudal tube movement displacement in 76%. Maximal ranges of movement up to 7.0 cm after head extension and 4.8 cm after head flexion were observed and led to selective intubation in 4% of our population, while no extubations were observed. Left and right head rotation led to median tube displacement of respectively 0.1 cm caudally (SD -0.5; 0.55) and 0.05 cm (SD -0.5;1).

Conclusion(s): This is the first clinical study assessing tube displacement in a standardized head and neck movement trial. Proper tube positioning is an essential part of endotracheal intubation. Head mobilisation can lead to tube extremity displacement which may create clinically relevant issues. Selective endobronchial intubation must be suspected for small distances between tube extremity and carina. Reassessment of proper tube positioning after head and neck mobilisation is mandatory.

FM 2

Intubation with VivaSight or Conventional Left-sided Double Lumen Tubes: A Randomised Trial

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Introduction: Double-lumen tubes (DLT) are commonly used for single-lung ventilation during surgery. DLTs are difficult to insert, and often move during surgery which can cause life-threatening complications. Consequently, fiberoptic bronchoscopy is routinely used to confirm proper positioning. The VivaSight-DLT is a new type of DLT that has an integrated camera, thus allowing continuous visualisation of its position within the trachea. Our primary hypothesis was that time to intubation using the VivaSight-DLT is faster than with a conventional DLT.

Methods: We enrolled 40 adults having elective thoracic surgery. Patients were randomised to conventional DLT (n = 20) or VivaSight DLT (n = 20). Time to intubation was our primary outcome, whereas rate of blind insertion, frequency of tube displacement, ease of insertion, quality of lung collapse, postoperative complaints and airway injuries served as our secondary outcomes.

Results: Time to successful intubation was significantly faster with the VivaSight-DLT (63 ± 58 seconds) compared with the conventional DLT (97 ± 84 seconds, p = 0.03). VivaSight DLT was correct blindly inserted in all intubation attempts. Malposition of the VivaSight-DLT were early detected and easily corrected, even in lateral position. Both devices were comparable with respect to postoperative complaints such as coughing, hoarseness, and sore throat. Airway injuries tended to be more common in the VivaSight-DLT patients, although this study was underpowered for airway injuries.

Conclusion: In summary, the VivaSight-DLT was significantly faster successfully inserted and malpositions were easily corrected without the use of additional fiberoptic bronchoscope. Continuous visualisation of the tube position promise a significant benefit in daily clinical practice.

FM 3

Interobserver Variability of Airway Assessment Scores – A Pilot Study on Mallampati

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Background: The preoperative evaluation of the airway is a key anesthesia competency. For this purpose, the Mallampati classification is widely used. There are a few studies indicating the presence of a wide inter-observer difference in Mallampati ratings. This pilot study investigated these inter-observer differences.

Methods: Thirty photographs with different Mallampati classification I–IV were briefly shown to study participants in a randomized order. The answers were compared with the scores previously defined by consent agreement of two of the study authors.

Results: Thirty-three anaesthetists participated and gave written informed consent (58% females). There were 30% residents, 18% attendings and 52% nurses, mean age 39 ± 2 years, mean experience 11 ± 2 years. Overall, the correct answer was achieved in 55 ± 16%, with no differences between the groups (p = 0.33). Fourteen (42%) of participants rated an (inexisting) Mallampati V at least once. Distribution of answers according Mallampati classification see table.

Discussion: The correct Mallampati score was only given in half of all cases and inter-observer agreement was unacceptably low. This fact may contribute to the low predictive value of Mallampati for difficult airway management. The results justify a large multi-centre study regarding inter-observer validity of different airway scores.

Correct answers in % (Interquartile range)	Mallampati score				p-value
	I	II	III	IV	
	73 (19, 83)	52 (37, 70)	52 (44, 61)	61 (53, 65)	0.48

FM 4

The AirView Study: Comparison of intubation conditions and ease of use between the Airtraq®-AirView and the King Vision®

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Introduction: Numerous guided intubation devices are available on the market. In order to identify anatomical landmarks necessary to perform proper intubation, visualization is obtained either straight on the device or via a LCD display.

iPhones contain the technical characteristics to obtain images and are available in everybody's pocket.

We conducted a simulation study assessing the speed and quality of intubation between the Airtraq® coupled to an iPhone with the new AirView app and the King Vision® in a manikin study simulating a difficult airway.

Methods: 30 senior anaesthetists attending a difficult airway course were randomly assigned to perform 3 series of 3 intubations with the Airtraq®-AirView® or the King Vision® on an airway manikin simulating a difficult airway (immobilised neck and reduced mouth opening). Insertion and intubation success within 60 seconds, time necessary to identify glottis, to block the cuff and to ventilate the lungs were recorded as well as assessment of best view (CL 1, 2a, 2b, 3, 4) obtained before and during intubation. Ease of insertion of the device in the mouth, of epiglottis visualisation and intubation were also documented (1 = very easy, 2 = easy, 3 = moderate, 4 = difficult, 5 = very difficult).

Results: All anaesthetists (16 females and 14 males) had experience in video-laryngoscopy with an average exposure to difficult airway management of 12 years (SD 9.9). 18 (60.0%) participants possessed the Airtraq in their clinical setting, 14 (46.7%) possessed the King View and 6 (20.0%) had both. Insertion and intubation were possible within the allocated time in all cases with both devices.

Time difference

– to identify glottis (1.1, [-1.3; 3.9] p = 0.019),

– to block the cuff (2.1 [-2.6; 9.4] p = 0.002)

– to ventilate the lungs (2.8 [-2.4; 11.5] p = 0.001)

were significantly shorter with the Airtraq-AirView.

Cormack Lehane view before intubation was reported as better with the King Vision (p = 0.03) while no significant difference was noted during the intubation process between both devices.

No statistically significant difference was noted for subjective

– device insertion or

– quality of epiglottis visualisation.

Subjective assessment of tracheal tube insertion was significantly better with the Airtraq-AirView ($p = 0.001$).

Conclusions: The Airtraq-AirView allows faster identification of the landmarks and intubation in a simulated difficult airway manikin. Anaesthetists assessed the intubation better with the Airtraq-AirView.

FM 5

Randomized, Double-blind Comparison of Liquorice versus Sugar-water Gargle for Prevention of Postoperative Sore Throat and Post-extubation Coughing

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Background: One small study suggests that gargling with liquorice before induction of anesthesia reduces the risk of postoperative sore throat. Double-lumen tubes are large and thus especially likely to provoke sore throats. We therefore tested the hypothesis that preoperative gargling with liquorice solution prevents postoperative sore throat and post-extubation coughing in patients intubated with double-lumen tubes.

Methods: We enrolled 236 patients having elective thoracic surgery who required intubation with a double-lumen endotracheal tube. Patients were randomly assigned to gargle 5 minutes before induction of anesthesia for one minute with: 1) Extractum Liquiritiae Fluidum (liquorice 0.5 g); or, 2) Sirupus Simplex (sugar 5 g); each diluted in 30 ml water. Sore throat and post-extubation coughing was evaluated 30 minutes, 90 minutes, and 4 hours after arrival in the post-anesthesia care unit, and the first post-op morning using an 11-point Likert scale by an investigator blinded to treatment.

Results: The incidence of postoperative sore throat was significantly reduced in patients who gargled with liquorice rather than sugar-water: 19% and 36% at 30 minutes, 10% and 35% at 1.5 hours, and 21% and 45% at 4 hours, respectively. The corresponding estimated treatment effects (relative risks) were 0.54 (95% CI: 0.30, 0.99, liquorice versus sugar-water; $P = 0.005$), 0.31 (0.14, 0.68) ($P < 0.001$), and 0.48 (0.28, 0.83) ($P < 0.001$).

Conclusion: Liquorice gargling halved the incidence of sore throat. Pre-induction gargling with liquorice appears to be a simple way to prevent a common and bothersome complication.

published: Ruetzler K, Fleck M, Nabecker S, et al. A randomized, double-blind comparison of licorice versus sugar-water gargle for prevention of postoperative sore throat and postextubation coughing. *Anesth Analg*. 2013;117(3):614–21.

FM 6

Effects of a single anesthetic induction dose of etomidate on hemodynamics and adrenocortical function in cardiac surgery: a prospective, parallel group, triple-blinded, randomized controlled trial

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Background: To evaluate the effect of a single anesthetic induction dose of etomidate on hemodynamics and adrenocortical function in patients undergoing cardiac surgery.

Methods: This prospective, randomized controlled trial was conducted between December 2006 and December 2009 at the University Hospital of Bern, Switzerland, in 130 patients aged 18–80. Two subgroups, coronary artery bypass graft surgery (CABG, $n = 90$) and mitral valve surgery (MVS, $n = 40$), were randomized separately to receive either etomidate 0.15 mg/kg, propofol 1.5 mg/kg, or etomidate 0.15 mg/kg & hydrocortisone 100 mg in CABG (each $n = 30$), or etomidate 0.15 mg/kg or propofol 1.5 mg/kg in MVS (each $n = 20$). A 250 µg corticotropin test was performed the day before surgery, at 7 and 24 hours, and on day 4. Relative adrenal insufficiency (RAI) was defined as increase of serum cortisol < 248 nmol/L. Main outcome measure was cumulative vasopressor use (normalized to body weight) at postoperative day 1 (POD1), and overall incidence of relative adrenal insufficiency (RAI). Randomization was computer-generated, and allocation concealment by opaque sealed envelopes. Patients, investigators, and assessors were blinded.

Results: Ninety patients were randomized to CABG and forty to MVS. All 130 patients were analyzed in their allocated treatment group (intention-to-treat). For cumulative vasopressor use, no significant

differences between treatments were found in CABG (norepinephrine: $F 0.05$, $P = 0.95$; epinephrine $F 1.17$, $P = 0.32$) and MVS (norepinephrine: $F 2.18$, $P = 0.15$; epinephrine $F 0.86$, $P = 0.36$). For effect sizes see table. Overall RAI incidence was 87%, 43%, and 80% in CABG ($P < 0.000$), and 95% and 45% in MVS ($P = 0.001$).

Conclusion: In elective cardiac surgery, a single induction dose of etomidate significantly increases incidence of adrenal insufficiency for 24 hours. However, compared to propofol and etomidate & hydrocortisone, there is no relevant difference in cumulative vasopressor use during the first 24 hours after anesthetic induction.

Clinical Trial.gov Identifier: NCT00415701

	Mean difference	95% CI	Cohen's d
CABG Norepinephrine			
Eto – Pro	–0.45	–7.43 to 6.53	–0.06
Eto – Eto&Hyd	0.02	–3.58 to 3.62	0.00
Eto&Hyd – Pro	–0.47	–5.71 to 4.76	–0.08
CABG Epinephrine			
Eto – Pro	–12.2	–195 to 171	–0.33
Eto – Eto&Hyd	–3.44	–22.4 to 15.6	–0.29
Eto&Hyd – Pro	–8.74	–209 to 192	–0.22
MVS Norepinephrine			
Eto – Pro	–5.86	–38 to 26	–0.47
MVS Epinephrine			
Eto – Pro	–3.26	–28 to 21	–0.29

FM 7

RISK STRATIFICATION BY HIGH-SENSITIVITY TROPONIN T AND NT-PROBNP PRIOR TO MAJOR NONCARDIAC SURGERY

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Background and Goal of Study: Recent reports [1, 2] described the prognostic impact of elevated high-sensitivity troponin concentrations before noncardiac surgery. We aimed to evaluate the incremental value of high-sensitivity troponin T (hsTnT) for risk stratification prior to non-cardiac surgery when combined to the revised cardiac risk index (RCRI). Further, we assessed the reclassification improvement when combining elevated hsTnT and NT-proBNP to the RCRI.

Materials and Methods: This prospective, international multicentre cohort enrolled 979 patients undergoing major noncardiac surgery. hsTnT and NTproBNP concentrations were sampled within 7 days prior to the procedure. The primary endpoint was a composite of in-hospital mortality, acute myocardial infarction, cardiac arrest, cardio-pulmonary resuscitation, and acute decompensated heart failure. We calculated the likelihood ratio (LR) of elevated biomarkers for the composite endpoint. Further, we assessed the net reclassification improvement when combining hsTnT to the RCRI and both biomarkers to the RCRI.

Results and Discussion: Twenty-five patients (2.6%) died and 36 (3.7%) of the patients experienced the combined endpoint. Preoperatively, 128 patients (13%) had hsTnT concentration exceeding 14 pg/mL and NTproBNP concentrations > 440 ng/L, 211 patients (23%) had an elevation in either hsTnT or NTproBNP. The positive and negative LR for preoperative hsTnT and for NTproBNP were 2.73 and 0.29 ($p < 0.001$), and 2.10 and 0.51 ($p < 0.001$), respectively. The interval LR for no elevation, either hsTnT or NT-proBNP elevation and for both elevated hsTnT and NTproBNP were 0.26, 1.86, and 2.96 ($p < 0.001$), respectively. The combination of information from hsTnT to the RCRI resulted in a NRI of 0.32 ($p < 0.05$). The combination of data on hsTnT and NTproBNP to the RCRI was associated with a NRI of 0.39 ($p < 0.05$).

Conclusion: The prognostic information by preoperative hsTnT and NT-proBNP measurements significantly improved risk stratification prior to major noncardiac surgery compared to the RCRI.

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FM 8

Troponin T and Brain Natriuretic Peptide after On-Pump Cardiac Surgery: Impact on 12-Month Mortality and Major Cardiac Events after Adjustment for Postoperative Complications

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Background and Goal of Study: The independent predictive value of troponin T (TNT) after on-pump cardiac surgery was established in several studies. However, adjustment was limited to preoperative risk factors without considering perioperative complications. Data on the prognostic value of postoperative B-type natriuretic peptide (BNP) after on-pump cardiac surgery are scarce. Our aim was to assess independent value of TNT and BNP to predict 12-month outcome after cardiac surgery after adjustment considering preoperative risk estimates and postoperative complications and to report risk stratification gains when considering the EuroSCORE combined with postoperative biomarkers.

Materials and Methods: This prospective cohort study included consecutive patients undergoing on-pump cardiac surgery between 2007 and 2010 in a single tertiary centre. We evaluated postoperative peak TNT and BNP, the EuroSCORE, and postoperative complications, i.e. sepsis, sternal infection (without sepsis), respiratory infections, acute kidney injury as predictors of adverse events using Cox regression. The primary endpoint was death or major adverse cardiac events (MACE) within 1 year after surgery. We calculated the net reclassification index (NRI) of TNT and BNP in addition to the EuroSCORE.

Results and Discussion: We enrolled 1559 patients. Follow-up was completed in 1545 patients (99.1%); the remaining 14 patients were censored at last contact date. Within the first year after surgery, 176 patients (11.3%) suffered an event. Eighty-three events (5.3%) occurred within 30 days of surgery, of which there were 58 deaths (3.7%). The adjusted hazard ratio (HR) of peak TNT >0.8 µg/L was 2.13 (95% CI, 1.47–3.15), of peak BNP >790 ng/L 2.44 (95% CI, 1.65–3.62). The NRI of the addition of TNT and BNP to the EuroSCORE was 0.276 (95% CI, 0.195–0.348). A model fitted to predict 30-day events showed similar results.

Conclusion(s): Postoperative TNT and BNP are strong predictors of 1-year events after on-pump cardiac surgery independent of preoperative risk factors and postoperative complications. Updating the preoperative EuroSCORE risk with postoperative TNT and BNP after surgery allows for improved prediction of 1-year death or MACE.

FM 9

Does intraoperative fluid restriction combined with preemptive norepinephrine affect functional outcome in patients undergoing radical cystectomy with orthotopic bladder substitution?

Functional results observed after a randomized clinical trial

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Background & Objectives: Intraoperative restrictive fluid administration combined with a preemptive norepinephrine infusion reduces intraoperative blood loss, rate of blood transfusion, postoperative complication rate and improves dryness of the surgical field in patients undergoing open radical cystectomy with urinary diversion. We assessed the impact of intraoperative fluid management on early functional results (continence and erection rate).

Material & Methods: Analysis of a subgroup of 90 patients receiving an ileal orthotopic bladder substitution. Patients were allocated to receive either 2 ml/kg/h of crystalloid infusion combined with norepinephrine (restrictive group, n = 51) or 6 ml/kg/h of crystalloid fluid (control group, n = 39). We assessed daytime, nighttime continence and erectile function 1 year postoperatively.

Results: Baseline data were similar between the groups. Nerve sparing surgery was attempted unilaterally in 31/51 (61%), bilaterally in 17/51 (33%) and not at all in 3/51 (6%) in the restrictive group and in 19/39 (49%) and 20/39 (51%) in the control group; (P = 0.11). Daytime continence was good in 44/51 patients (86%) and unsatisfactory (≥1 pad/day) in 7/51 patients (14%) in the restrictive group and good in 26/39 patients (67%) and unsatisfactory in 13/39 (33%) in the control group; P = 0.038. Nighttime continence was good in 38/51 patients (75%) and unsatisfactory in 13/51 patients (25%) in the restrictive group and good in 24/39 patients (61%) and unsatisfactory in 15/39 patients (39%) in the control group; P = 0.259. Spontaneous or medically assisted erection was reported in 27/34 (79%) patients in the restrictive group [no support in 11/27 patients (41%), supported by PDE-5i in 10/27 patients (37%), by alprostadil in 6/27 patients (22%)] and in 11/30 patients (37%) in the control group

[no support in 4/11 patients (36%), supported by PDE-5i in 3/11 patients (27%), by alprostadil in 4/11 patients (36%]; P = 0.001. **Conclusion:** In patients undergoing open radical cystectomy with ileal orthotopic bladder substitute, daytime continence and erectile function were significantly better 1 year postoperatively using intraoperative reduced hydration and norepinephrine infusion by reducing significantly blood loss, allowing better visibility of the surgical field and less use of electrocautery allowing for a more meticulous nerve preservation. This may be a reason for better results in the restrictive group as a result of successful nerve sparing.

FM 10

The association between intraoperative electroencephalographic suppression and postoperative mortality

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Background: Low bispectral index values frequently reflect electroencephalographic (EEG) suppression and have been associated with postoperative mortality. This study investigated whether intraoperative EEG suppression was an independent predictor of 90-day postoperative mortality and explored risk factors for EEG suppression.

Methods: This observational study included 2,662 adults enrolled in the B-Unaware or BAG-RECALL trials. A cohort was defined with >5 cumulative minutes of EEG suppression, and 1:2 propensity-matched to a non-suppressed cohort (≤5 minutes suppression). We evaluated the association between EEG suppression and mortality using multivariable logistic regression, and examined risk factors for EEG suppression using zero-inflated mixed effects analysis.

Results: Ninety-day postoperative mortality was 3.9% overall, 6.3% in the suppressed cohort, and 3.0% in the non-suppressed cohort (Odds ratio (OR) [95% Confidence Interval (CI)] = 2.19 [1.48 to 3.26]). After matching and multivariable adjustment, EEG suppression was not associated with mortality (OR [95% CI] = 0.83 [0.55 to 1.25]), however, the interaction between EEG suppression and mean arterial pressure (MAP) <55 mm Hg was (OR [95% CI] = 2.96 [1.34 to 6.52]). Risk factors for EEG suppression were older age, number of comorbidities, chronic obstructive pulmonary disease, and higher intraoperative doses of benzodiazepines, opioids, or volatile anaesthetics. EEG suppression was less likely in patients with cancer, preoperative alcohol, opioid or benzodiazepine consumption, and intraoperative nitrous oxide exposure.

Conclusion: Although EEG suppression was associated with increasing anaesthetic administration and comorbidities, the hypothesis that intraoperative EEG suppression is a predictor of postoperative mortality was only supported if it was coincident with low MAP.

FM 11

Trauma epidemiology and patterns of injury over 5 years in a Swiss Traumacentre

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Introduction: Switzerland, country with the highest health expenditure per capita, lacks standardized data on traumacare and system planning. Recently twelve traumacentres were designated and will be reassessed through a future national traumaregistry. The anaesthesiology department of the Lausanne University Hospital has launched the first sustained Swiss traumaregistry in 2008, containing today the largest database on trauma activity nationwide. This report is the first comprehensive analysis of trauma workload of a Swiss Traumacentre.

Material and Methods: Retrospective analysis of prospectively collected epidemiologic and clinical data from consecutively admitted shockroom patients over the period of 1.1.2008 to 31.12.2012. Shockroom admission is based on physiology and mechanism of injury as assessed by prehospital physicians. Management follows a multidisciplinary, surgeon-lead approach based on ATL principles and local standards of care. Data is gathered from patient files by

specifically trained personal. Injury coding is performed by AAAM-certified coders.

Results: Over the 5 years, 1599 trauma patients were admitted, predominantly males with a median age of 38.8 years and median ISS of 13. Annual workload of severely injured (ISS >15) was 134 (42%). Road traffic injuries (40.4%) and falls (34.4%) were the principal mechanisms. Dominant patterns of injury were brain injury (64.4%), chest (59.8%) and extremity/pelvic girdle (52.9%). 29.1% underwent an immediate emergency intervention, performed mainly by orthopaedics (27.3%), neurosurgeons (26.3%) and visceral surgeons (13.9%) and 59.1% had at least one surgical intervention during their hospital stay. 44.3% required admission to ICU with a median length of stay of 4 days. In-hospital mortality for severely injured was 26.2%.

Conclusion: Trauma workload in a Swiss tertiary center is comparable to other major European cities. Mortality rates however are higher. Reasons for this may be a high rate of geriatric patients amongst the severely injured, high number of RTA with severe head injuries and potentially the high rate of secondarily transferred in patients.

This analysis provides a first step for an area-wide trauma system in western Switzerland and a benchmark report for national system planning. With 60% of patients needing an operative approach, early involvement of a multidisciplinary perioperative team is crucial.

FM 12

Erythromycin for Gastric Emptying in Patients undergoing General Anesthesia for Emergency Procedures

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Background: Patients undergoing general anesthesia for emergency procedures are at risk of aspiration of gastric contents into their lungs in the perioperative period. Erythromycin, which has prokinetic properties, may increase the proportion of empty stomachs among these patients.

Methods: In a randomized, double-blind trial we assigned trauma and non-trauma patients undergoing emergency procedures under general anesthesia to intravenous erythromycin 3 mg/kg or placebo 15 minutes prior to tracheal intubation. The primary efficacy outcome was clear stomach, defined as a residual volume of <40 ml liquids and no solids, identified through gastroscopy immediately after intubation.

Results: Clear stomach was diagnosed in 42 of 66 patients (63.6%) treated with placebo as compared with 53 of 66 patients (80.3%) treated with erythromycin (risk ratio, 1.26; 95% confidence interval [CI], 1.01 to 1.57; $P < 0.035$). In a multivariate model adjusting for body weight and delay since last intake, the difference in favor of erythromycin was significant in non-trauma patients (odds ratio, 13.4; 95% CI, 1.49 to 120; $P = 0.021$) but not in trauma patients (odds ratio, 1.81; 95% CI, 0.64 to 5.16; $P = 0.216$). Median volume of residual gastric liquid was 30 ml (IQR, 10 to 100) in patients treated with placebo, as compared with 15 ml (IQR, 5 to 25) in patients treated with erythromycin ($P = 0.053$). In patients treated with placebo, median pH of residual liquid was 2 (interquartile range [IQR], 1 to 4), in patients treated with erythromycin, median pH was 6 (IQR, 3 to 7) ($P = 0.002$). Patients treated with erythromycin had significantly more often nausea and stomach cramps.

Conclusions: In patients undergoing general anesthesia for emergency procedures, intravenous erythromycin increases the proportion of empty stomachs, and decreases acidity and volume of residual gastric liquid. (ClinicalTrials.gov number, NCT00827216.)

FM 13

Longitudinal study of rotational thromboelastometry during pregnancy

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Introduction: Peripartum haemorrhage (PPH) is increasingly frequent and new treating algorithms advise on early treatment of PPH induced coagulopathy. Point of care monitoring, such as rotational thromboelastometry (ROTEM) is considered to be helpful in this management. There is limited data on reference values of thromboelastometry in the hypercoagulable state of pregnancy. The aim of this investigation was to collect longitudinal values of thromboelastometry during pregnancy until delivery and to calculate reference values.

Methods: Pregnant women were included at their first visit in the antenatal clinic. Thromboelastometry was performed at 2 time points during pregnancy (gestational weeks 12–14 and 24–28), before delivery and on postnatal day 2. Data was analysed with R (R foundation for statistical computing) and repeated measurement ANOVA was used to compare time points. Reference values were computed with the r-package 'referenceIntervals' v. 1.0.

Results: A total of 126 women were included, 3 withdrew their consent. Median age was 29.5 years (range 18–44), median BMI was 23.3 (range 16.9–40.6). Only 70 patients remained for analyses of peripartum data, as the others delivered in other hospitals. Mode of delivery was: spontaneous 54%, instrumented vaginal 14% and caesarean section in 32%. All ROTEM parameters changed significantly throughout pregnancy and reflected pregnancy associated hypercoagulability.

Table 1 shows reference values before delivery of the Extem and Fitem analyses.

Variable	n	mean	reference range
Extem CT (s)	69	46.2	28.5–63.9
Extem CFT (s)	70	78.3	26.9–120.1
Extem A10 (mm)	70	62.3	51.3–75.2
Extem MCF (mm)	70	69.5	60.0–80.5
Fitem MCF (mm)	70	24.7	12.9–35.7

Conclusion: Hypercoagulability of pregnancy is well reflected in the results of thromboelastometry. During normal pregnancy reference ranges for these investigations are distinct from the non-pregnant population. During treatment of PPH it is yet unknown if the target should be set to these new reference values and the treatment threshold lowered accordingly.

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FM 14

Postoperative Nausea and Vomiting: Do Genetic variants contribute?

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Introduction: Postoperative nausea and vomiting (PONV) occurs as one of the most common side effects after anesthesia. Although the etiology of PONV is not completely understood, it has been suggested in previous publications that genetic variation might be involved in the predisposition for PONV [1]. However, data were inconclusive so far and sample sizes were mostly small [2–4]. Thus, the aim of the present study was to investigate the possible association between genetic variants of some well described candidate genes and PONV.

Methods: After approval of the local ethics committee and patients' written informed consents, EDTA blood was drawn in patients undergoing elective surgery. Genotyping was performed for genetic variants in 8 candidate genes (e.g. serotonin transporter; serotonin, dopamine and cholinergic receptors) by real-time based PCR and conventional PCR. End point was the occurrence of PONV or vomiting after surgery up to the 1st postoperative day. Categorical and continuous data were compared by χ^2 - and Mann-Whitney U test (SPSS).

Results: In total, 1432 patients with complete clinical and genotyping data were analyzed. As expected, female gender, younger age, nonsmoking status, previous PONV or motion sickness, amount of opioids used during surgery and in the recovering room were associated with the occurrence of PONV ($p < 0.001$). Among the genetic variants analyzed, 5HTTLPR ($p = 0.03$) and STin2 ($p = 0.02$) in HTT (serotonin transporter gene), and rs1176744 ($p = 0.015$) in HTR3B (serotonin receptor type 3B) were significantly associated with the occurrence of PONV. For the GTP-Cyclohydrolase I (GCH1) haplotype no association with the occurrence of PONV could be detected, however, this haplotype was associated with the occurrence of vomiting ($p = 0.049$). After correction for non-genetic risk factors, only patients with no copy of the pain protective haplotypes in GCH1 had a higher risk for PONV ($p = 0.026$) and vomiting ($p = 0.014$) than those with 1 and 2 copies with an odds ratio (95%-CI) of 1.33 (1.03/1.71) and 1.46 (1.08/1.98), respectively.

Conclusion: In this analysis PONV and vomiting were associated with the GCH1 haplotype. These findings need further validation. None of the previously described genetic associations could be replicated in the present trial.

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FM 15

Patient-versus clinician-controlled sedation with propofol: systematic review and meta-analysis

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Background: Patient-controlled sedation (PCS) with propofol is an alternative to clinician-controlled sedation (CCS) for procedures requiring conscious sedation. It remains unknown, whether patients are satisfied with PCS, and whether it is equally safe and efficacious as CCS.

Methods: We performed a comprehensive search in Pubmed, Embase, Cochrane Library and bibliographies, for published full reports of randomised controlled trials comparing propofol PCS with propofol CCS in patients requiring conscious sedation for a procedure. The last search was performed in March 2014.

Results: We analysed data from 16 randomised controlled trials that were performed in 1094 low- to medium risk adults, undergoing a variety of diagnostic and therapeutic procedures. With PCS, the cumulative propofol dose was significantly decreased (10 trials, 721 patients, weighted mean difference [WMD] -28.7 mg [95% confidence interval, -50.3 to -7.0]), as was the incidence of oversedation (9 trials, 762 patients, risk-ratio [RR] 0.44 [95% CI, 0.28 to 0.70]), and of rescue interventions for adverse event (13 trials, 882 patients, RR 0.59 [95% CI, 0.38 to 0.91]). There was no difference in the incidence of desaturation (13 trials, 986 patients, RR 0.74 [95% CI, 0.36 to 1.52]). Likewise, there was no difference in operator satisfaction on a visual analogue scale (VAS) from 0 to 10 cm (5 trials, 412 patients, WMD 0.12 cm [95% CI, -0.12 to 0.36]), in the duration of the procedure (11 trials, 655 patients, WMD 0.46 min [95% CI, -1.84 to 2.75]) and in the time required to reach the desired level of conscious sedation at the beginning of the procedure (4 trials, 252 patients, WMD 1.85 min [95% CI, -3.21 to 6.92]). In cross-over trials, patients preferred PCS (4 trials, 172 patients, RR 0.54 [95% CI, 0.35 to 0.83]) and patient satisfaction (VAS 0–10 cm) showed a trend in favour of PCS (7 trials, 582 patients, WMD -0.15 [95% CI, -0.34 to 0.07]). The incidence of pain-related amnesia was significantly lower with PCS (7 trials, 447 patients, RR 0.85 [95% CI, 0.75 to 0.98]).

Conclusion: In low- to medium-risk adults requiring conscious sedation for a variety of diagnostic and therapeutic procedures, PCS appears to be equally efficacious, but safer than CCS. There is a trend in favour of a higher patient satisfaction with PCS, and PCS seems to be the preferred method of sedation.

FM 16

Mechanistic insight regarding a possible inhibition of malignant cell metastatic potential by amide-linked local anesthetics

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Background: Expression and secretion of matrix-metalloproteinases (MMP) by malignant cells are thought to play a crucial role in solid tumor metastasis [1]. Circulating cytokines, such as tumor necrosis factor α (TNF α), activate the kinases Src, Akt and Focal Adhesion Kinase (FAK) essential for MMP secretion and function [2, 3]. We recently demonstrated that ropivacaine and lidocaine block TNF α -induced Src activation in malignant cells [4] and therefore evaluated whether these agents might also inhibit activation of Akt and FAK in malignant cells, thus attenuating MMP release.

Methods: Cell lysates from NCI-H838 lung adenocarcinoma cells were incubated with ropivacaine or lidocaine (1 nM–100 μ M) in absence or presence of TNF α (20 ng/ml) for 20 minutes. Activation/phosphorylation of Akt (threonine 308) and FAK (tyrosine 397) were evaluated by Western blot. The influence of ropivacaine and lidocaine on TNF α -induced MMP-9 secretion by NCI-H838 cells at 4 hours was assessed by ELISA in cell culture supernatant. Additionally, the effect of Wortmannin (100 nM, blocks Akt activation) and FAK-inhibitor F114 (5 μ M) on MMP-9 release was evaluated. Statistical analysis was conducted by two-way ANOVA with Bonferroni post-hoc testing.

Results: Ropivacaine (1 nM) and lidocaine (10 μ M) both significantly reduced TNF α -induced activation of Akt (ropivacaine: 40% reduction, $p = 0.01$, $n = 6$; lidocaine: 40%, $p < 0.01$, $n = 11$) and FAK (ropivacaine: 42% reduction, $p < 0.01$, $n = 7$; lidocaine: 51%, $p = 0.04$, $n = 8$) in NCI-H838 cells. MMP-9 secretion triggered by TNF α was attenuated by 36% in presence of 1 nM ropivacaine ($p < 0.01$, $n = 6$) and 52% in presence of 10 μ M lidocaine ($p < 0.01$, $n = 6$). The inhibition of MMP-9 release by the amide-LAs was similar to that observed in presence of Wortmannin or F114.

Conclusions: Ropivacaine and lidocaine – at clinically relevant concentrations – reduced the release of MMP-9 by malignant cells via inhibition Akt and FAK activation. Although our findings were determined entirely in vitro, they provide significant insight into a potential mechanism by which amide-LAs might attenuate metastasis of malignant cells.

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FM 17

A systematic review and meta-analysis of perineural dexamethasone for peripheral nerve blocks

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Introduction: Peripheral nerve blockade with local anaesthetic (LA) provides effective analgesia. Interventions that increase the duration of LA action may permit a prolongation of postoperative patient comfort [1]. Dexamethasone has been shown to prolong peripheral nerve blockade in animals [2]. Subsequent to the first clinical translation published in 2003 [3], several trials have been published with enthusiastic results. The objective of this meta-analysis is to better define the efficacy of dexamethasone as a LA adjunct for peripheral nerve blockade.

Methods: We followed the PRISMA guidelines and searched the following databases: PUBMED; COCHRANE CENTRAL; EMBASE; GOOGLE SCHOLAR. We included randomised controlled trials (RCTs) that compared perineural LA without versus with dexamethasone for peripheral nerve blockade. The primary outcome was duration of analgesia. We grouped interventions in RCTs by duration of LA action, short and medium (lidocaine, mepivacaine, prilocaine) vs long term action (bupivacaine, levobupivacaine, ropivacaine). Other secondary endpoints included pain-related outcomes and adverse effects associated with dexamethasone. We also performed a subgroup analysis according to doses of dexamethasone. We considered a two-sided p value < 0.05 significant.

Results: We included 29 RCTs with 1695 adults. LA with short term or medium term action were injected in 9 RCTs whilst 20 RCTs injected LA with long term action.

Dexamethasone increased the mean (95% CI) duration of analgesia, our primary outcome, by 136 (127–145) min when injected with LA with short or medium term action, $p < 0.00001$, and by 406 (399–413) min when injected with long term action, $p < 0.00001$. A subgroup analysis revealed that 4 mg of dexamethasone is equivalent to 8 mg when injected with LA with short or medium term action (dexamethasone 4 mg: 200 min, 51–350 min; dexamethasone 8 mg: 251 min, 175–327 min, $p = 0.55$) or with long term action (dexamethasone 4 mg: 461 min, 240–681 min; dexamethasone 8 mg: 480 min, 403–557 min, $p = 0.88$).

Dexamethasone also reduced morphine consumption (0.04), pain scores ($p < 0.00001$) and rate of PONV at 24 postoperative hours ($p = 0.008$). No significant adverse effects were associated with the use of dexamethasone.

Conclusion: In summary, perineural dexamethasone at a dose of 4 mg prolongs duration of analgesia after peripheral nerve blockade with LA, similarly to a dose of 8 mg, without any reported serious adverse effects.

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FM 18

Postoperative atelectasis prevention by application of PEEP and pressure support ventilation

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Background and Goal of Study: General anaesthesia (GA) is known to promote atelectasis formation which will persist in the postoperative period¹. A vital capacity manoeuvre (VCM) performed a few minutes before extubation followed by the use of 40% of O₂ will prevent this.

It is not the case if VCM is followed by application of 100% of O₂. However the use of 100% of O₂ before extubation is still recommended for safety reason. The goal of our study was to evaluate if a VCM performed before arousal followed by application of PEEP and pressure support ventilation (PSV) before and after extubation will prevent the recurrence of atelectasis despite the use of 100% of O₂.

Materials and Methods: We randomly assigned 24 non-obese patients scheduled for a gynaecological laparoscopy in 2 groups. 15 minutes before the end of surgery we performed a VCM (40 cmH₂O applied for 12 seconds), then O₂ was increased to 100% in both groups. In the PSV patients, a PEEP of 6 cmH₂O was applied associated with a PSV of 8 cmH₂O. This was continued after extubation for 3 minutes. The O₂ was then decreased to 40% and, when the expired oxygen saturation was <50%, PEEP and PSV were removed. For the control patients, no positive pressure and no PEEP were applied during spontaneous ventilation and 100% of O₂ was applied for 3 minutes after extubation. The atelectasis were then measured by CT scan with atelectatic lung as HU -100 to +100.

Results: There was no difference in demographic values including BMI, duration of intervention and tobacco use between the 2 groups. The proportion of atelectasis was significantly reduced in the PSV group (1.31 ± 0.27% vs 2.81 ± 2.35%, p = 0.0206).

Discussion and Conclusion: Vessels and normal conjunctive tissue have absorption of approximately -100 to +100 HU and this represents approximately 1%. Therefore measurements of 1% of lung tissue with this absorption probably reflect not atelectasis but only vessels. Moreover the head down position for the duration of laparoscopic surgery promotes atelectasis in the lower part of the right lung and in the apex which is not commonly seen in other study performed during GA. Our study showed that application of PEEP and PSV during arousal, before and after extubation, prevents recurrence of postoperative atelectasis. With a thorough explanation, this method is simple and well tolerated by the patient.

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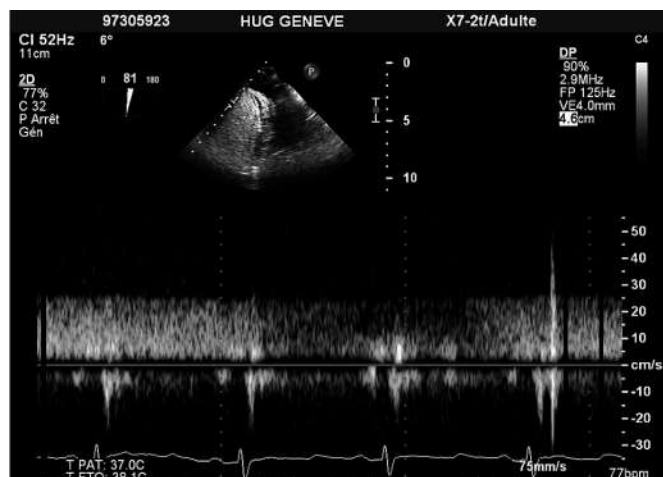
FM 19

Early and major decrease in hepatic blood flow and liver function during HIPEC procedures using the closed abdominal technique.

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Introduction: The hyperthermic intraperitoneal chemotherapy (HIPEC) procedure using the closed abdominal technique, actual treatment of reference for peritoneal carcinomatosis, induces an important increase in intra-abdominal pressure, which can cause a decrease of hepatic blood flow and impairment in liver function [1]. This prospective cohort observational study was designed to demonstrate the repercussions of increased intra-abdominal pressure on hepatic blood flow and liver function.

Materials and methods: Following approval of the institutional ethics committee and informed written consent, 12 adults with peritoneal carcinomatosis and scheduled for cytoreductive surgery with HIPEC were prospectively included in the study between 2011 and 2013. The hepatic blood flow was measured using transoesophageal echocardiography [2], the liver function using the clearance of indocyanine green method [3], and biological parameters were also measured. Data were measured after anaesthesia was started; before, during, and after intra-abdominal pressure was increased by the HIPEC.



Middle Hepatic Vein doppler measured by transoesophageal echocardiography before (first image) and during (second image) HIPEC.

Results: Hepatic blood flow became non pulsatile and no more Doppler was measurable in 11 of 12 patients; decrease in hepatic blood flow was major in the 12th patient. During that hepatic ischemia, liver function measured with indocyanine green was strongly reduced in all patients. This was associated with biological signs of hepatic distress followed by rapid recovery, with normalization at the first day after surgery.

Discussion: In this study, the increased intra-abdominal pressure associated with HIPEC using the closed abdominal technique induced a collapse of hepatic blood flow and a major reduction of liver function.

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FM 20

Pain-Out – Quality of postoperative pain management in lung surgery. A survey study

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Introduction: Every year, surgery is performed on over 40 million patients in Europe. Data registries with standardized data collection are optimal for the continuous measurement of the quality of postoperative pain, benchmarking of results and improvement of treatment quality. In patient having thoracic surgery 10–50% will develop a chronic pain condition. We compared postoperative outcomes for patients with any type of lung surgery (LS) with other participating hospitals in the pain-out data base.

Methods: After informed consent, patients with any type of LS (thoracotomy, thoracoscopy) were recruited from thoracic surgery (TS) wards the first postoperative day and questioned about their pain condition. Pain-Out questionnaires / methodology was used. We report only on the results of the pain-out outcome questionnaire (pain severity, interference, emotional impairment, adverse effects and perception of care) Obtained results were compared by ranking with the existing benchmark groups in the pain-out data base.

Results: We included 147 LS patients (63% men) which were compared with the benchmark group of 144 thoracic surgery patients ranked in eight groups. The mean worst pain score was 5.7 (SD = 2.8) 5th rank. Mean percentage of time with severe pain was evaluated at 25.7% (SD = 22.2) 8th rank. Pain interference with activities in bed or out of bed was evaluated on 0–10 scale. Interference with activities out of bed was 3.3 (SD = 2.5) both were ranked 4th. Pain effect on mood and emotions was assessed on 0–10 scale. Pain induced anxiety was 2.7 (SD = 2.7) 5th rank and pain induced helplessness was 2.9 (SD = 3.1) 7th rank. Postoperative nausea and drowsiness was evaluated on a 0–10 scale. Nausea score was 2.1 (SD = 3.1) 8th rank and drowsiness 2.2 (SD = 2.7) 2nd rank. 16% of patients would have preferred to receive more pain treatment (6th rank). Satisfaction with the result of pain treatment was evaluated on a 0–10 scale and was 8.2 (SD = 2.4) 8th rank.

Conclusion: Postoperative pain in lung surgery is a major issue and many patients report on high pain scores and with long lasting pain periods. Side effects (nausea) is despite the low scores a issue comparing to the benchmark. Pain induced emotional impairment was adequate. Satisfaction with the pain treatment was lower than in the benchmark groups. This evaluation showed that improvements should be done in the postoperative pain process.

Are laryngoscopy skills acquired during training with the Ambu KingVision® transferrable to laryngoscopic intubation with Macintosh blades and vice versa?

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Introduction: Intubation is only recommended for "experts" but it is still taught in advanced life support courses. With this study we aimed to measure the transfer from an airway management course including intubation training to performance on human cadavers. And we aimed to measure the transfer of skills learned with the Ambu KingVision® to perform with the direct laryngoscopy and vice versa.

Methods: After IRB approval a total of 90 subjects (students, residents and staff physicians) were recruited for participation in three-hour Airway Management Courses (AMC) of the American Heart Association (AHA®). We randomized participants into one of three groups: All groups received the obligatory part of the AMC and as additional parts training with the laryngeal mask airway and intubation. Following the video instruction of intubation methodology of the AMC one group trained direct laryngoscopy with the Macintosh blade only, one trained with the Ambu KingVision® only and one group trained with both tools. A fourth group of 22 participants was recruited and participants did not receive any airway management training. All subjects were then invited to participate in a test in which they all attempted intubation on two human cadavers.

Results: 104 subjects were tested. Data included time and success for a total of 414 intubation attempts. Within 30 seconds 16% were successful and 4% were esophageal intubations. After 60 seconds 35% were successful and 10% were esophageal intubations. Percentage of successful intubation within 30 and 60 seconds for each training group are reported in table 1. Esophageal intubation was more frequent when using the Macintosh blade (17%) compared to the KingVision® (2%).

Table 1

Group	KingVision®		Macintosh	
	successful in 30 sec	successful in 60 sec	successful in 30 sec	successful in 60 sec
Macintosh only (n = 56)	13%	32%	23%	52%
KingVision® only (n = 60)	20%	48%	20%	45%
Both tools (n = 47)	13%	30%	26%	45%
No training (n = 44)	0%	2%	11%	16%

n = Number of intubation attempts

P 1

Conclusion: The AHA® guidelines allow 30 seconds interruption during CPR. Participants just having followed the AMC had a low success rate within that time span and it did not increase much after 60 seconds, a time frame that may be tolerable for intubation attempts without ongoing CPR. There was only tendency to increased success rate when using the same tool as in the AMC indicating an incomplete transfer of skills.

P 2

Thoracic ultrasound for confirmation of correct lung exclusion before one lung ventilation in thoracic surgery

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Fiber optic bronchoscopy is the standard technique to assess correct double lumen endotracheal tubes positioning before lung exclusion for one lung ventilation. However it requires a trained specialized anesthesiologist and is often resources consuming. Aim of this study is to compare it with thoracic ultrasound performed by anesthetic nurses in terms of sensibility, specificity and cost-effectiveness. We designed a case-control, cross-over, blinded study in which, after patients intubation, correct lung exclusion was assessed both via standard bronchoscopy, performed by a specialist anesthesiologist and thoracic ultrasound, performed by a trained anesthetic nurse. A continuous cohort of adult patients undergoing thoracic surgery on one lung ventilation, after intubation with a double lumen endotracheal tube, subsequently underwent traditional fiber optic bronchoscopy followed by thoracic ultrasound to assess correct lung exclusion. A total of 51 patients were included over a period of 5 months. The two techniques resulted to be equally sensitive and specific. Thoracic ultrasound was associated to a significantly quicker execution than fiber optic bronchoscopy. Time of execution, together with the fact that ultrasound was performed by a nurse, the costs of materials and its sterilization, had a significant economic impact, with a net saving of 37.2 ± 5.4 Euros per case, which in this case-series translated in a global reduction in hospital costs of $7810,72 \pm 52.7$ Euros.

Conclusion: Even though fiber optic bronchoscopy remains the gold standard in checking optimal double lumen endotracheal tube positioning, thoracic ultrasound is a specific, sensitive and cost-effective method to quickly obtain a functional assessment that it is working properly, through identification of correct lung exclusion. However thoracic ultrasound could eventually be considered as a first method to assess correct lung exclusion after left DLET positioning, keeping fiber optic bronchoscopy as a rescue technique in case a further assessment is required, in case of doubts or complications.

P 3

Are non-channeled video-laryngoscope blades superior to channeled video-laryngoscope blades? Swiss Video-Intubation Trial 2 (SWIVIT 2)

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Background: Results from the Swiss multicenter Video-Intubation Trial (SWIVIT 1, SGAR research grant 2013/2014) showed that video-laryngoscopes (VLS) without a guiding channel for intubation required fewer attempts and less time until successful intubation

compared with VLS with a guiding channel. To verify that, we evaluated additional non-channelled blades in the same study design as published in Theiler L, et al. SWIVIT, *Trials* 2013;14:94.

Methods: With IRB approval and written informed consent, we include 480 patients without predictors for a difficult airway, scheduled for elective surgery at the University Hospital in Bern. After induction of anaesthesia, an extrication collar was adjusted to the patient's neck, limiting mouth opening and neck movement. Anaesthesiologists experienced with the VLS evaluated the clinical performance of 3 VLS without a guiding channel for intubation (see table) and compared that with the standard Macintosh blade and the results from SWIVIT 1. Primary outcome was intubation success at first attempt within 180 seconds.

Table: * significantly different to the channelled blade

mean ± SD or number (%)	Devices without guiding channel				Devices with guiding channel (from SWIVIT 1)			p-value
	Macintosh n = 30	Airtraq n = 30	A.P. Advance n = 24	King Vision n = 29	Airtraq n = 24	A.P. Advance n = 31	King Vision n = 36	
1 st attempt success	20 (67)	23 (77)	16 (67)	26 (90)	18 (75)	16 (52)	29 (81)	0.036
Overall success	20 (67)	26 (87)	20 (83)	27 (93)	23 (96)	26 (84)	36 (100)	0.003
Time successful attempt	55 ± 22	64 ± 31	70 ± 33*	72 ± 40*	57 ± 36	108 ± 52	90 ± 40	<0.001
% glottic opening	25 ± 27 79 ± 24 before cervical collar	88 ± 20	53 ± 34	96 ± 6	93 ± 9	66 ± 28	84 ± 22	<0.001

Results: So far, 113 patients have been enrolled without demographic differences between the groups. Fifty-seven (50%) were females, height 169 ± 8 cm, weight 74 ± 14 kg, BMI 26 ± 4 kg^m-2, mouth opening after extrication collar placement was decreased by 23 ± 6 mm to 24 ± 3 mm ($p < 0.001$).

Outcome data are presented in the table. Macintosh blade's intubation success was lower than VLS. The non-channelled version of AP Advance and King Vision performed better than the channelled version. There were no serious adverse events and no periods of hypoxia during intubation.

Discussion: Integrated tracheal tube guidance does not offer advantages for VLS in the hands of experienced anaesthesiologists. Two VLS without channel showed higher 1st attempt success and faster intubation times in the non-channelled version compared to the channelled version.

P 4

A tablet based simulation technology compared to standard equipment for ALS-teaching

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Background: Advanced life support (ALS) training needs a resuscitation manikin with palpable carotid artery pulse, electrical contact for defibrillation and ECG leads to simulate hemodynamics. Participants use real defibrillators to diagnose cardiac rhythms, to perform safe defibrillation, and to monitor for peri-arrest arrhythmias. Because oxygen saturation and blood pressure cannot be measured instructors need to announce it to support the participants.

A new stand-alone technology provides an alternative to real defibrillators and monitoring equipment. The isimulate ALSi application provides 1) tablet simulating the monitor or defibrillator and 2) another tablet as control unit to operate the first tablet. Both communicate wirelessly. The tablet monitor comes in an emergency case with fake ECG, defibrillator pads, pulse oximetry sensor and NIBP cuff that can be placed at any manikin. We evaluated during standardized ALS courses the non-inferiority of the ALSi-device to a standard defibrillator.

Method: We used a Laerdal ALS Resusci Anne connected to a laptop with the HeartSim4000 Software, and a Philips Heart Start XL Defibrillator during half of the time in ALS courses. The second half of the time the isimulate ALSi equipment was used on the ALS Resusci Anne. At the end of the course trainees and instructors answered a standardized questionnaire asking for usability, need for technical support or pre-use training needed, distraction from teaching, influence on training, and related problems.

Preliminary results: Instructors and candidates clearly prefer the ALSi equipment for future training due to the good usability. Instructors can concentrate more on observation of the participants. Continuous presentation of vital parameters was estimated to be important. Detailed figures and analysis will be provided at the conference.

Conclusions: 1. ALSi provides better safety for trainees because defibrillation is simulated without transferring electric energy. 2. A high variety of continuous monitoring is available for participants to enhance perceptual realism. 3. Instructors are able to focus more on the assessment of the participants. 4. High acceptance by instructors and trainees with little need for pre-use training. 5. Low fidelity manikins can be used for ALS training in combination with ALSi. 6. ALSi together with low fidelity manikins save costs compared to standard equipment.

P 5

Impact of a Teach the Airway Teacher course: Does it really improve didactic competence?

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Background: Most anesthesiologist are involved in clinical airway management teaching but only a few receive formal training in teaching skills. Learner directed interactive clinical 1:1 airway teaching in the OR is essential for every resident to become a skilled physician. Little is known about the efficacy of a "train the trainer" program. We evaluated the participants' self-assessment of the "Train the Airway Trainer" Course (TAT) on their specific airway teaching skills at the 2013 European Airway Conference in Istanbul and at the 2014 Bern Hands-on Airway Workshop. We assumed that TAT increases the self-assessed rating scores of clinical airway teachers' teaching competence.

Methods: The TAT-course covers 1) basic of adult learning, 2) learning climate, 3) assessment and effective feedback, 4) skill teaching of the airway management during daily routine, 5) basics of simulation and 6) teaching of non-technical skills. TAT-facilitators delivered interactive lectures, small-group teaching workshops,

microteaching, and observation of real airway skill teaching with structured debriefing. The TAT-design was derived from the Stanford University's Faculty Development Center for Medical Teachers course on Clinical Teaching. After the course, participants filled in a pre-post course self-assessment questionnaire (SFDP 26) on their teaching competencies. Results are presented as summary in the 7 teaching competencies and overall teaching ability.

Results: So far, 27 TAT-attendees participated and gave informed consent; 13 (48%) were female, mean age 40 ± 6 years. All participants rated their teaching competence substantially higher after TAT. Details are presented in the table.

Discussion: A specifically tailored train the trainer course derived from a well-established faculty development program specifically addressing airway management teaching competence seems to substantially improve these competencies, as self-assessed by the participants.

Table: SF 26 summarized teaching competences Lickert scale: 1 = very bad / 5 = very good median (interquartile range)	Before TAT	After TAT	p-value
Learning Climate	3 (3, 3)	5 (4, 5)	<0.001
Control of Session	3 (3, 3)	4 (4, 4)	<0.001
Communication of Goals	3 (2, 3)	5 (4, 5)	<0.001
Promotion of Understanding & Retention	3 (3, 3)	4 (4, 4)	<0.001
Evaluation	3 (3, 3)	4 (4, 4)	<0.001
Feedback	2.5 (2, 2.5)	4 (4, 4)	<0.001
Promotion of Self-Directed Learning	3 (2, 3)	4 (4, 4)	<0.001
Overall teaching ability	3 (2, 3)	4 (4, 4)	<0.001

P 6

MAPK-Dependent Signaling Pathways Contribute to the Modulation of Prepronociceptin in Human Whole Blood

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Introduction: The expression of the nociceptin precursor prepronociceptin (PNoc) in blood leukocytes [1, 2] and aberrant plasma nociceptin levels in patients with sepsis or pain [3, 4] support the hypothesis that nociceptin might play a role in human peripheral blood during inflammation and nociceptive processing. However, mechanisms contributing to the modulation of nociceptin in blood cells are still not clear. The aim of this study was to investigate possible signal transduction pathways involved in the regulation of nociceptin in human peripheral blood under inflammatory conditions.

Methods: After approval of the ethics committee, peripheral blood from healthy donors was cultured in this ex vivo study. Whole blood was cultured with or without different concentrations of phorbol-12-myristate-13-acetate (PMA) for up to 72 hrs. mRNA expression of PNoc was detected by quantitative RT-PCR. To investigate signaling pathways of the extracellular signal-regulated kinases (ERK), p38, c-Jun N-terminal kinase (JNK) and nuclear factor-kappa B (NF-κB), blood was pretreated for 1 hr with specific kinase inhibitor PD98509 (30 μM), SB203580 (10 μM), SP600125 (10 μM) or Bay11-7821 (3 μM) prior to the co-culture with PMA 10 ng/ml for 24 hrs. Statistics: ANOVA and Wilcoxon signed-rank test with subsequent post hoc analysis.

Results: PMA dose-dependently regulated PNoc mRNA expression in human peripheral blood cells with an EC50 of 2.7 ng/ml after 24 hrs ($p < 0.001$). PNoc expression was also time-dependently up-regulated when blood was exposed to PMA 10 ng/ml for up to 72 hrs ($p < 0.001$). Increased PNoc mRNA levels were detected in PMA-induced whole blood after 6 hrs compared to the control without any treatment (mean normalized ratio with SEM: 1.09 ± 0.19 vs. 0.16 ± 0.05 ; $p < 0.05$). Pretreatment with PD98509 or SB203580 partially prevented the up-regulating effects of PMA on PNoc with its mRNA expression declining to $72.7 \pm 6.2\%$ and $52.7 \pm 4.7\%$ of the whole blood treated with PMA only (both $p < 0.02$). In contrast, no preventive effects were observed for SP600125 and Bay11-7821.

Conclusions: PNoc mRNA expression was modulated in human blood cells under inflammatory conditions. The ERK and the p38 MAPKs might be two major signal transduction pathways contributing to the up-regulation of nociceptin in human peripheral blood cells.

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P 7

Do local anesthetics (e.g., lidocaine) attenuate opioid (morphine)-induced angiogenesis? If so, what is the mechanism?

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Background: Clinical observations suggest local anesthetics lower cancer metastasis and tumor growth. In vitro studies demonstrate that amide local anesthetics (e.g., lidocaine) attenuate tumor cell migration by blocking signaling pathways important to tumor growth and metastasis: Tumor Necrosis Factor- α (TNF α) – induced Src kinase activation and Intracellular Adhesion Molecule (ICAM-1) phosphorylation and expression in cancer- and endothelial cells.

Opioids (e.g., morphine) have been shown to modulate the immune response and promote tumor angiogenesis. Studies have suggested that μ opioid receptors (MOR) in endothelial cells may exhibit important pro-angiogenic effects via activation of Src-Kinase and Mitogen-activated protein kinase (MAPK) signaling pathways
Methods: Human lung microvascular endothelial cells (HLMVEC) were stimulated with 0.1–100 nM morphine for 1–30 min, lysed and blotted for pTyr418-Src and total Src (loading control). In parallel, cells were pretreated either with 100 μ M lidocaine or 100 nM methylnaltrexone (MNTX) and then stimulated with morphine, lysed, and blotted.

Results: Morphine increased the activation of Src Tyr 418 phosphorylation, thus proangiogenic signaling. Pretreatment with the LA lidocaine at the maximal dose of 100 μ M significantly reduced morphine-induced Src activation. Pretreatment with the MOR antagonist MNTX inhibited the morphine-induced Src activation likewise.

Conclusion: Morphine induces Src-kinase activation in HLMVEC in a time and concentration dependent manner. Results may suggest that lidocaine, by reduction of Src activation, can reduce morphine-induced angiogenesis. Since only the primary stages of the pathway were involved and the agents were administered as pretreatment, further investigation is needed.

P 8

Association of insertion/deletion variations in 8p23 beta-defensin cluster with severe sepsis

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Background: Severe sepsis is a severe systemic inflammatory response with organ dysfunction after infection. Beta-defensins are a group of small antimicrobial peptides which display strong ability against bacteria, fungi and virus. In addition, beta-defensins also possess cytokine-like functions to modulate immune response. The 8p23 beta-defensin genes (DEFBs) coding for beta-defensins formed a cluster, and the copy number (CN) of this cluster varies from 2 to 12. Moreover, several sequence variations (e.g. single nucleotide variations (SNVs) and insertion/deletion (Indel) variations) between different clusters were detected. In our previous study increased DEFB CN was found to be associated with death from severe sepsis in male patients. In this study, we want to investigate the association of Indel variations in the clusters with the predisposition to and the outcome of severe sepsis.

Methods: 721 severe sepsis patients and 283 healthy individuals with prepared DNA and determined DEFB CNs from previous study were enrolled. Indel variations rs35176041 (CTGA), rs201835163 (ACA) and rs201857400 (AGAA) were typed by fragments analysis after PCR. Combinations of major and minor alleles were inferred from CNs and ratios of areas from two PCR fragments. Major allele frequency was calculated by the equation major allele / total allele.

Results: The minor alleles for three Indel variations are always less than or equal to 2 copies in all patients and healthy individuals with few exceptions. The major allele frequencies for three Indel variations were not different between severe sepsis patients and healthy individuals as well as between survivors and non-survivors.

Conclusion: The test Indel variations in this study are not associated with the predisposition to and the outcome of severe sepsis.

P 9

Cerebral oxygen saturation during antegrade cerebral perfusion and hypothermic circulatory arrest – a single centre observational near-infrared spectroscopy study in 76 patients

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Introduction: Near infrared spectroscopy (NIRS) is a non-invasive optical method for continuous assessment of oxygen saturation of small cortical samples. During hypothermic circulatory arrest (HCA), continuous cortical deoxygenation was described. Antegrade cerebral perfusion (ACP) protects the brain against ischemic insults, and should restore cerebral oxygen saturation. However, optimal ACP conditions in humans are not known. Aim of our study was to determine the effect of our institutional ACP regimen on cerebral oxygen saturation in 76 patients undergoing surgery with HCA.

Methods: With IRB approval, we reviewed NIRS (NIRO200NX, Hamamatsu Photonics, Japan) and clinical records of 76 patients undergoing surgery with HCA and ACP. Tissue oxygen saturation (TOI) was expressed as a fraction of pre-HCA baseline. Our institutional ACP used two selective perfusion catheters in the carotid arteries at perfusate flow of 3–4 ml/kg/min for aneurysms, and one perfusion catheter in the right axillary artery with a supplemental catheter in the left carotid artery at 9–12 ml/kg/min for dissections, both at 20°C. As required, subclavian arteries were blocked by additional catheters.

Results: Seventy six NIRS traces were analysed in patients (male 64%, age 62 \pm 14 y, log EuroScore 23 \pm 17%) undergoing surgery with HCA for thoracic aortic aneurysms (n = 44) and dissections (n = 32). Length of surgery, CPB, HCA, and ACP were 282 \pm 104, 150 \pm 57, 28 \pm 18, and 18 \pm 2.5 min, respectively. Postoperative neurological deficits were temporal and permanent in 6 (8.1%) and 5 (6.8%) patients, respectively.

Fractional TOI of pre-HCA baseline with 95% confidence interval during ACP and HCA (difference, p < 0.000), and effect sizes (mean absolute difference with 95% CI, Cohen's d) are summarised in Table. There were no statistical differences in fractional TOI in patients with and without neurological deficits, (ACP, p = 0.52; HCA, p = 0.37).

	mean	95% CI
Fractionale TOI		
ACP	0.818	0.787 to 0.848
HCA	0.694	0.657 to 0.731
Effect sizes		
Mean difference	0.124	0.123 to 0.125
Cohen's d	0.889	

Conclusions: ACP restored cerebral oxygen saturation to significantly higher values than during HCA, however, still remaining below pre-HCA baseline levels (i.e. hypothermic full flow CPB). Effect sizes suggest a high practical significance of our ACP regimen during HCA. However, fractional TOI did not differ between patients with and without neurological deficits. Controlled studies are needed to determine optimal ACP conditions.

P 10

Predictive accuracy of FIBTEM assay for Clauss fibrinogen varies with fibrinogen substitution thresholds

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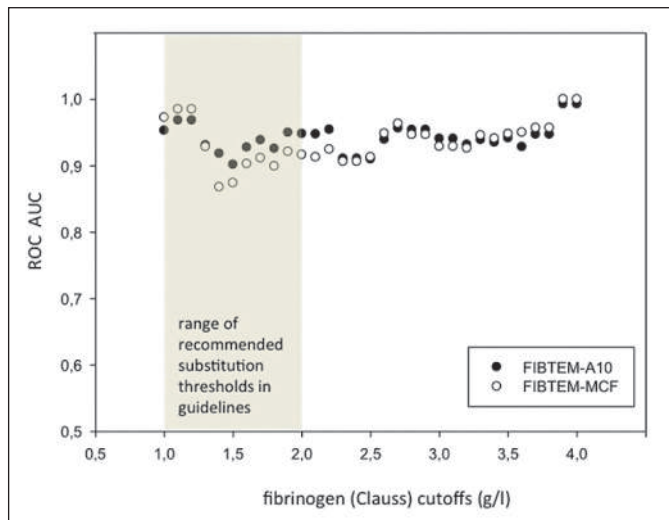
Introduction: Cardiac surgery with cardiopulmonary bypass (CPB) carries substantial risks of coagulopathy. Low preoperative fibrinogen levels are associated with postoperative bleeding. Clinical practice increasingly relies on point-of-care testing by thromboelastometric FIBTEM assay, instead of time-consuming Clauss method. Although FIBTEM has been shown to correlate reasonably well with Clauss fibrinogen, its discriminatory power may vary depending on substitution thresholds, potentially leading to over- or undersubstitution. Aim of the study was to determine predictive accuracy of FIBTEM assay for a range of fibrinogen substitution thresholds.

Methods: With IRB approval, coagulatory state of patients at risk of, or with manifest post-CPB bleeding were analyzed retrospectively. As per institutional routine, paired Clauss and FIBTEM tests were performed perioperatively, allowing a comparison of both methods at various time points. Exclusion criteria were missing values, exogenous fibrinogen substitution or hydroxyethyl starch administration. Receiver operating

characteristics analyses (ROC) were performed to assess the predictive accuracy of FIBTEM clot formation amplitude at 10 minutes (A10) and of maximum clot firmness (MCF), for 31 Clauss fibrinogen cutoff values in the range between 1.0 and 4.0 g/l. Data are counts and area under the ROC curve (AUC).

Results: Of 130 patients at risk of, or with manifest post-CPB hemorrhage, 75 patients met inclusion criteria. Surgical procedures were coronary artery bypass grafting with (34) and without (10) valve surgery, thoracic aortic repair (19), thoracoabdominal aortic repair (3), cardiac transplantation or assist device implantation (9). ROC analysis demonstrated variation in predictive accuracy for different Clauss fibrinogen cutoffs (AUC for A10, range 0.90 to 0.99; AUC for MCF, range 1.0 to 0.87). In the cutoff range between 1.3 and 2.4 g/l, A10 demonstrated better predictive accuracy for Clauss fibrinogen status than MCF ($p < 0.05$ between 1.9 and 2.2 g/l).

Conclusion: Our findings confirm clinically useful predictive accuracy of point-of-care FIBTEM-A10 and -MCF for Clauss fibrinogen status in a mixed cohort of cardiac surgical patients. Predictive accuracy varies, however, for different FIBTEM variables and decision cutoffs. For most accurate discrimination of fibrinogen status, and adequate rapid substitution based on point-of-care testing, FIBTEM-A10 appears superior to -MCF.



P 11

General anaesthesia for caesarean section: frequency, indications and neonatal outcome

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Introduction: Regional anaesthesia has distinct advantages for the mother (ref). With the establishment of regional anaesthesia for caesarean section (C/S), general anaesthesia (GA) is only infrequently used. Indications for GA include contraindications of neuraxial anaesthesia (such as coagulopathy, anatomical hurdles or patient refusal) or enormous time pressure in case of an obstetric emergency. In emergency C/S we have the local policy to perform a short time-out and re-evaluate the urgency when the patient is transferred into the C/S room. The aim of this work was to assess indication and neonatal outcome in C/S under GA between 2009 and 2011.

Methods: The local database was searched for C/S under GA between January st 2009 and December 31st 2011. For all patients the patient records were screened for information on: indication for C/S, time of decision, time of delivery, reason for GA, umbilical cord pH and 5 minutes APGAR score.

Results: From 2009 until 2011 there were 6676 deliveries, 1996 C/S and 32 of these were under GA. The rate of GA for C/S was 1.22%, 1.29% and 2.29% for 2009, 2010 and 2011, respectively. Of the 32 GA three were for postpartum haemorrhage and the other 29 were 16 primary GA and 13 conversions of insufficient regional anaesthesia. Maternal indications for GA were HELLP ($n = 4$), haemorrhage ($n = 3$), failure to progress ($n = 2$) and others ($n = 7$). Fetal indications for GA were fetal distress ($n = 9$), placental abruption ($n = 5$) and cord prolapse ($n = 2$).

Neonatal compromise (arterial cord pH ≤ 7 an/or 5 minutes APGAR ≤ 7) was present in 1 out of 9 with fetal distress (11%, 95% CI 5–50%). In 4 out of 5 cases with placental abruption there was neonatal compromise (80%, 95% CI 30–99%). This was also the group with the shortest decision to delivery time (8–16 min). The proportion of neonatal compromise for primary and secondary GA were 57% and 26%, respectively (n.s.).

Conclusion: Primary GA is performed due to coagulation abnormalities (HELLP) or due to urgency because of fetal compromise. Arterial blood pH and 5 minute APGAR values were lowest with primary GA. This reflects the choice for GA for the most urgent cases. In case of placental abruption – and in absence of overt airway abnormality – a primary GA is possibly a wise choice. The rarity of GA for C/S underlines the importance of simulation in training for this potential life saving skill.

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P 12

The incidence of Postoperative Delirium in the Recovery Room – a prospective analysis in 1000 patients in a Swiss single institution

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Introduction: In recent years, delirium occurring in hospitals has become a better studied, but only partially understood problem. Delirium may induce serious consequences. Very little is known about the incidence of delirium in the diverse patient population that frequents a post procedure recovery room (PACU). We investigated the formal presence of a delirium in the PACU of our institution.

Methods: The study was conducted after approval by the local ethics committee. The nursing staff of the recovery room prospectively evaluated 1000 consecutive patients in the post anesthesia care unit (PACU) of the Kantonsspital Frauenfeld (www.stgag.ch) using the Nursing Delirium Scale (NU-DESC; 0–10 points) at the point where the patients were ready to be transferred to the normal ward. A total of ≥ 2 points indicated the formal presence of a delirium. Statistics are descriptive.

Results: 90.6% of the patients were preoperatively classified as ASA I or II. A total of 43 patients (4.3%) presented with a delirium (138.4 ± 55.2 min after arrival in the recovery room). 287 patients (28.7%) of the entire group were over the age of 70 years. Considering only this subgroup, delirium was diagnosed in 30 individuals (10.5%). In the group of orthopedic patients with an age of 70 years or older ($n = 111$) 12 patients were diagnosed with delirium (10.8%), in the corresponding urological sub-group ($n = 43$), there were 5 patients (11.6%).

Conclusion: There was a relatively low incidence of delirium of only 4.3%, compared to commonly cited rates. Aside from the anesthetic management, the patient population in our study and the evaluation of patients by PACU personnel might have played a more distinct role. Amongst other reasons, the interference of postoperative sedation and the time of assessment could be the main reasons for that.

P 13

Update of the EMHG database on genetic variants in type 1 ryanodine receptor and their possible impact on phenotype

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Introduction: The type 1 ryanodine receptor (RYR1) is expressed in human skeletal muscle and plays a key role in calcium homeostasis. Most patients with malignant hyperthermia (MH) have mutations in the RYR1 gene. Today, the gold standard for MH diagnosis is an invasive open muscle biopsy followed by the in-vitro-contraction-test (IVCT). The European Malignant Hyperthermia Group (EMHG) RYR1 mutation database is not up-to-date.

The aim of this study was to collect information about variants in the RYR1 gene and their functional effect.

Methods: We performed a PubMed search with the three keywords "Malignant Hyperthermia", "Mutation" and "Ryanodine Receptor Calcium Release Channel". Publication dates from the beginning of 2006 to the end of 2012 were selected. However, some older and newer studies were also included if they seemed important for the gain of information. Additionally, the considered papers had to be relevant for the human species. Data was collected and processed in Microsoft Excel for Mac 2011 (Microsoft Corporation, Redmont, WA, USA).

Results: Altogether 62 publications were found according to the search algorithm. In the newly created database, an overall of 316 variants were gathered. 143 variants were not yet in the EMHG database, 129 of them not functionally characterized or non-pathogenic, 13 functionally characterized and putatively causative and one causative (p.H4833Y), respectively.

Among another 11 variants which were already in the EMHG database two (p.R530H, p.R2336H) can be classified as causative.

Conclusion: This study shows that important additional information on variants in RYR1 was published since 2006. However, only three mutations (p.R530H, p.R2336H and p.H4833Y) can be newly classified as causative mutations according to the EMHG guidelines. The main reason for this disappointing conclusion is the fact that the criterion "co-segregation with the disease in at least two pedigrees" according to the EMHG guidelines was missing in otherwise MH causative mutations. Nevertheless, this update of the database gives easier access to genetic information and emphasizes the increasing significance of genetic testing.

References

<http://emhg.org/genetics/>

P 14

Alteration of temporal organization of EEG microstate sequences during propofol-induced loss of consciousness

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The estimation of the depth of anesthesia is of major importance but remains unsatisfactory in daily clinical practice. Novel tools assessing level of consciousness are thus highly desirable. The EEG is a comprehensive and powerful brain-imaging tool that maps with high temporal resolution at the surface of the scalp the electrical field generated by the brain. Unlike local variations of amplitude or power, the topography of the electrical scalp remains stable for brief periods (80–120 ms), the so-called EEG microstates. Interestingly, 4 dominant microstate topographies only can be identified across life-span, and they are considered as the 'atoms of thought'. We have recently shown that the temporal organization of EEG microstate sequences showed long-range dependencies and a mono-fractal temporal organization that covered the range from 256 ms to 16 s, i.e. they showed the same temporal structure across multiple temporal scales that are 2 orders of magnitude apart, which we postulated to be a necessary prerequisite for consciousness. EEG microstate durations are altered during sleep and hypnosis. Though these alterations are promising candidates for the assessment of loss of consciousness, microstates and their temporal dynamics have never been studied during pharmacologically induced loss of consciousness in humans. In the present study, we assessed EEG microstate dynamics as a function of the gradual loss of consciousness during a step-wise induction of general anesthesia with propofol.

In 13 awake, adult subjects, scheduled to undergo elective surgery, 5 min of resting EEG (64 channels, acticap, BrainProducts) were recorded as a baseline. Propofol was then administered intravenously using a Target Controlled Infusion system (Orchestra Base Primea, Fresenius, France) and the pharmacokinetic model by Schnider et al. The initial effect-site (cerebral) concentration was $0.5 \mu\text{g ml}^{-1}$. Effect site concentrations were then increased stepwise by $1 \mu\text{g ml}^{-1}$ until $2.5 \mu\text{g ml}^{-1}$ and then by $0.5 \mu\text{g ml}^{-1}$ until loss of consciousness. After each increase, and once equilibration of the blood-brain concentration was reached, 5 min of resting EEG were recorded. Throughout the induction procedure, clinical assessment of patient consciousness was performed every minute using the Observer Assessment of Alertness/Sedation Scale (OAA/S).

Long-range dependency of EEG microstate sequences decreased significantly both as a function of clinical assessment of consciousness (OAA/S) and estimated propofol effect site concentration. The correlation of determination (r^2) of the hurst exponent with OAA/S was 0.215 ($p = 0.05$) and 0.041 with increasing propofol dose ($p = 0.001$). Our results suggest that this feature might indeed reflect an objective measure of pharmacologically induced loss of consciousness. It is hence a promising and potentially sensitive tool to assess the levels of consciousness during the induction and maintenance of general anesthesia.

COST-CONSEQUENCE ANALYSIS OF A RISK STRATIFICATION BY PREOPERATIVE HIGH-SENSITIVITY TROPONIN AND NT-BNP IN PATIENTS UNDERGOING NONCARDIAC SURGERY

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Aims: To conduct a cost-consequence analysis of a biomarker-based risk stratification using high-sensitivity Troponin T (hsTNT) and N-terminal B-type natriuretic peptide (NT-proBNP) compared to the Revised Cardiac Risk Index (RCRI) prior to noncardiac surgery.

Methods: Our cohort study enrolled 979 patients. hsTNT and NT-proBNP were measured preoperatively. The endpoint was a composite of in-hospital mortality and major adverse cardiac events. We calculated the net-reclassification index (NRI) and absolute reclassification using both biomarkers compared to the RCRI and we conducted a model-based cost-consequence analysis. We retrieved resource utilization data from the literature.

Results: The NRI using hsTNT $\geq 14 \text{ ng/mL}$ and NT-proBNP $>300 \text{ pg/mL}$ amounted to 0.33 (95%CI 0.17–0.48) in all patients with limited functional capacity and to 0.199 (95%CI 0.02–0.39) in patients with limited functional capacity and at least one risk factor. In spite of a higher NRI risk, cardiac biomarker-based reclassification resulted in an increased absolute misclassification (219/1000 patients). Further, it resulted in additional cost of 71 \$ per patient and it increased noninvasive testing (30/1000 patients) without gains in coronary revascularization yields. In contrast, limiting biomarkers' measurement to patients with at least one risk factor improved absolute classification (268/1000 patients) reduced noninvasive testing (–43/1000 patients) and improved revascularisation yields at low cost (12 \$/patient).

Conclusion: A biomarker-based preoperative risk stratification in noncardiac surgery patients with limited functional capacity and at least one risk factor reduced the number of misclassified patients and noninvasive testing, and it increased coronary revascularization yields at moderate costs. In contrast, measurement of hsTNT and NT-proBNP in patients without additional risk-factors was not cost-effective.

P 16

Effectiveness of adding morphine to spinal anesthesia for cesarean section

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Introduction: Based on evidence suggesting better postoperative pain control after cesarean section by adding morphine to local anesthetics for spinal anesthesia we changed our clinical practice accordingly.

Objectives and outcome measures: As part of a quality assurance program the aim of the current analysis was to establish effectiveness and safety of intrathecal morphine application for cesarean section and to compare these results with former practice. Primary outcome measures were the proportion of women without any postoperative intravenous opioid application, secondary outcome measures were the total amount of postoperative opioid consumption and pain control (as measured by visual analog scale, VAS) on postoperative day 1 and 2. Safety endpoints were the occurrence of pruritus or postoperative nausea and vomiting, and signs of respiratory depression.

Patients and Methods: After IRB approval data from women undergoing cesarean section before and after introduction of intrathecal morphine into clinical practice were collected. Spinal anesthesia was performed with 9 to 14 mg hyperbaric bupivacain supplemented by 0.02 mg fentanyl (November 2012 and January 2013) or 0.01 mg fentanyl plus 0.1 mg morphine (November 2013 and January 2014), respectively. Charts of 275 consecutive patients were screened from which 128 had to be excluded (general anesthesia in 7, epidural anesthesia in 27, lack of consent in 88, incomplete documentation in 6 cases).

Dichotomous data were compared by chi-square test or fisher exact test, continuous data were compared by parametric or non-parametric tests, as appropriate. Analysis were performed by SPSS for windows.

Results: The groups consisted of 74 and 73 women in the morphine and control group; there were no differences in baseline characteristics. In the morphine group, 45/74 women did not receive iv opioids postoperatively compared with 17/73 in the control group ($p < 0.0001$). The mean postoperative iv morphine consumption during the first 24 h was 2.3 mg (95% confidence interval (CI) 1.4–3.3 mg) and 6.95 mg (95% CI 5.6–8.3 mg) ($p < 0.0001$), the median maximal VAS at rest during the first 24 h was 3 (interquartile range (IQR) 3) vs. 6 (IQR 3) ($p < 0.0001$), respectively. There was no difference in safety endpoints.

Conclusion: We successfully implemented a change in clinical practice in spinal anesthesia for cesarean section and proved that the expected effectiveness is reproduced in our clinical setting.

P 17

Neuraxial anaesthesia for external cephalic version – progress or hazard?

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Introduction: The rising number of caesarean sections (C/S) is a matter of concern for the mother, the baby and the healthcare system. Vaginal birth out of breach position is associated with an increased risk and therefore these babies are usually delivered by C/S. External cephalic version (ECV) has the potential to avoid this C/S. Some report higher success rates if neuraxial anaesthesia is used for ECV.
Methods: All ECV performed from 2009 until 2012 in our hospital were analysed for mode of anaesthesia, success, complications and mode of delivery. Until 5/2011 ECV were performed under analgesedation (AS = remifentanyl/diazepam), thereafter under combined spinal epidural anaesthesia (CSEA).

Results: We analysed 33 ECV, 13 under AS, 20 with CSEA. Success of ECV was 3 (23% 95% CI 6–54) and 10 (50% 95% CI 30–70) for AS and CSEA, respectively. Emergency C/S following ECV was 0 (95% CI 0–28) and 4 (20 95% CI 6–44) for AS and CSEA, respectively. These results were not statistically significant.

Conclusion: In accordance with the literature there seems to be a higher success rate if neuraxial anaesthesia is used for ECV. The high number of emergency C/S in the CSEA group is unexplained. The lower 95% CI (6%) is significantly above the reported incidence of 0.43–3.8%. We do not (yet) have an explanation for this finding. There seems to be a trade-off between a higher success rate of ECV and an increased risk of emergency C/S. However, both of these – clinical significant – observations were not statistically significant.

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P 18

Co-administration of a volatile anaesthetic and propofol for burst suppression during carotid endarterectomy – a retrospective single centre analysis in 112 patients

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Introduction: Electroencephalographic (EEG) burst suppression (BS) during cross-clamp of the internal carotid artery (ICA) requires effect-site concentrations of propofol (P-Cet) that largely exceed Cet usually required for surgery. To avoid administration of excessive propofol doses, we have modified our practice by supplementing TIVA with a low concentration (0.3 MAC) of volatile agents (= IVAPlus).

Methods: With IRB approval we have reviewed records of patients who underwent CEA between January 2012 and September 2013. Patients received general anaesthesia either as TIVA alone, or as IVAPlus at the discretion of the attending anesthesiologist. Neuromonitoring included transcranial Doppler sonography and evoked potentials. Before ICA cross-clamp, BS (one burst for every ten seconds of isoelectric EEG) was induced with stepwise increments of P-Cet. The primary outcome measure was maximal P-Cet required for BS. Secondary outcome measures were total amount of propofol (P-Tot) and time from skin closure to extubation (T-Ext). Data are mean ± SD.

Results: In 112 patients with complete anaesthesia records, TIVA and IVAPlus was used in 76 and 36, respectively. There were no differences in demographics, co-morbidities, use of opioids, or length of anaesthesia or surgery, BS and ICA cross-clamp. For results and effect sizes (mean absolute difference and 95% confidence interval, standardised mean difference) see table. Twenty five minutes after skin closure, 57% of patients receiving TIVA remained intubated, compared to 36% with IVAPlus (p = 0.067). After 40 minutes, the respective proportions were nine of 76 (12%) and one of 36 (3%).

Conclusion: EEG burst suppression was achieved with lower concentrations of propofol when TIVA was supplemented with 0.3 MAC of a volatile agent. Further, effect sizes suggest a high practical significance for reduction in maximal propofol Cet and total propofol dose. There was also a trend to faster recovery, as well as to a lower incidence of excessively prolonged recovery. These findings need to be confirmed by a prospective, randomized controlled trial.

	P-Cet max (mcg/ml)	P-Tot (mg)	T-Ext (min)
TIVA (n = 76)	9.3 ± 2.8	105 ± 25	27 ± 12
IVAPlus (n = 36)	6.3 ± 1.8	82 ± 24	23 ± 9
P-Value	<0.05	<0.05	0.08
Effect sizes:			
Mean difference	-3	-23	-4
95% CI	-3.3 to -2.7	-54.3 to -8.3	-9.9 to 1.9
Standardised mean difference	1.27	0.94	0.38

P 19

Bern Anaesthesia Research Data Management Unit (BARDM): state of the art approach using an open source cross-platform

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Introduction: Scientific data management should cover various needs of researchers, study groups, and management of research divisions. Further, it must comply with international and local legal requirements, institutional regulations, as well as international scientific standards. Technically, scientific data integration and collaboration among groups are highly complex tasks for software solutions. We aimed to introduce an open source data management platform to standardize scientific data flow, to ensure data safety and compliance with legal and regulatory requirements, and to enable rapid adaptation to evolving needs.

Methods: LabKey Server (LabKey Corporation, Seattle, US), an open source platform, was identified as valuable data management solution. The web application is running on Apache Tomcat webserver. Data are stored in relational databases like Microsoft SQL Server. Some key features are included, but LabKey is highly customizable. Structured data import and efficient data entry minimizes redundancies and errors. Metadata collection stores essential properties. Research data security, a key feature of regulations, is provided by user login and sets of permissions distributed by authorized administrators. Finally, high accessibility enables real-time data management through web-based file sharing. LabKey server version 13.1 was tested on a standalone server since January 2013. Version 13.2 was implemented in January 2014.

Results: Two administrators are handling an increasing user number (March n = 36; April n = 44). Seventeen folders are grouped in 11 group (senior researchers project folders), 5 data sharing (e.g. wikis), and 1 assay data folder (genetic lab results). From March to April 2014, the number of running studies increased from 8 to 14. The audit log database tracks all important events. From September 2013 to March 2014, user events (login, logout) increased from 100 to 900. In March 2014 we recorded 73'319 file system events.

Conclusions: An open source platform (LabKey Server) enabled us to cover all legal and departmental requirements for comprehensive scientific data management in a large Swiss Anaesthesia department. System set up and service is possible despite limited economic resources. Major advantages of this open source platform are independency of commercial data management providers and its related costs, and high flexibility in extending and customizing additional tools and functionalities to evolving needs of researchers.

P 20

Pain related patient outcome after total hip and knee replacements in Swiss and other European hospitals

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Introduction: Total hip replacement (THR) and knee replacement (TKR) are major orthopedic surgeries and sufficient postoperative analgesia is crucial. Patients' subjective pain related outcome might be a suitable indicator for quality of postoperative pain management. Eight Swiss hospitals are taking part in the international Acute Pain Registry PAIN OUT (1) to improve patient care. This analysis focuses on patient outcome after THR and TKR in Swiss and other European hospitals.

Methods: Participants of Pain Out (ClinicalTrials.gov NCT02083835) obtained approval from their ethics committees. On the first

postoperative day consenting patients filled in the validated outcome questionnaire (2). Inclusion criteria were elective THR or TKR and age ≥ 18 years. Anaesthesia, analgesia and surgery related data were retrieved from anaesthesia and ward records and entered into the web based PAIN OUT data base. Data entered up to December 31st 2013 were analysed using SPSS software.

Results: 3657 patients were enrolled in 42 European hospitals for the two interventions. The Swiss hospitals included 630 patients (THR 366, TKR 264). For THR, the percentage of patients with a minimum pain score >4 during the first postoperative 24h ranged from 0% in one Swiss hospital to 22% in another. Similar inter-hospital differences were found for other patient-reported outcome measures such as "percentage of time in severe pain" (7–58% of patients reported $>50\%$ of time in severe pain), percentage of patients wishing more pain treatment (2–17%), being not satisfied with pain treatment (satisfaction score <7 , 2–44%), with less than 30% pain relief (0–36%) or severe interference of pain with movement in bed (interference score >6 , 6–45%). For TKR, inter-hospital differences were comparable. In comparison to the other European hospitals, Swiss hospitals ranked from best to worst in some outcome measures.

Conclusions and discussion: Large differences of patient-reported pain outcome between the 7 Swiss hospitals were detected. Differences may result from different pain management strategies or varying implementation of these. Further analysis should consider analgesic techniques and the use of regional anaesthesia and their influence on outcome. Comparison of outcome data offers a chance to improve postoperative pain management where patients noted deficits, using successful strategies as guidance.

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P 21

Comparison of Two Modes of Measuring Conditioned Pain Modulation in Chronic Low Back Pain

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Background: Endogenous analgesia is measured experimentally by conditioned pain modulation (CPM), where a painful conditioning stimulus induces analgesia to a distantly applied test stimulus. Depending on the method, the result is either a lower pain rating of a constant stimulus or a stronger stimulus to evoke the same pain. Different stimuli are currently used, but it remains unknown whether different paradigms yield similar results. We investigated the association between two CPM paradigms using mechanical and electrical tests in chronic low back pain patients.

Methods: We tested 68 patients (40 women). Pressure pain thresholds (PPT) were assessed at the 2nd toe using a pressure algometer. Electrical train-of-five stimulation (2 Hz) was applied below the lateral malleolus at a constant intensity to evoke a baseline pain $>4/10$ on the numeric rating scale (NRS). Subjects immersed their contralateral hand into iced water until a pain rating of 7/10. PPT and electrical pain ratings were repeated and differences to baseline were calculated as a measure of CPM. The relationship between both was analyzed by linear regression. Results are reported as means and standard errors.

Results: PPT rose from 299 (12.4) to 344 (13.3) kPa and NRS to electrical stimulation decreased from 6.2 (0.15) to 5.4 (0.17) during the cold pressor test ($p < .001$). A 17.4%-increase (2.5%) in PPT by was thus paralleled by a 13.5%-decrease in NRS (1.6%). An inverse relationship between PPT and NRS ratings was observed in 57 patients (84%). Eleven patients (16%) showed a simultaneous in- or decrease in PPT and NRS. The change in PPT weakly correlated with the change in electrical pain ratings (kPa: $r = -0.25$, $p = .04$, percent: $r = -0.22$, $p = .06$).

Conclusion: Increases in PPT correspond with decreases in pain ratings in a majority (84%) of patients and are of similar magnitude (17.4% and 13.5%). This indicates that endogenous analgesia is not stimulus-specific and different CPM paradigms may come to similar conclusions in most patients. However, the proportion of patients with paradoxical CPM is not negligible (16%). An explanation may be that PPT assess a threshold and electricity was delivered at supra-threshold intensity. On the other hand, paradoxical CPM response might represent a specific phenotype in chronic pain patients. Without a gold standard, one cannot say which paradigm is more suitable to assess CPM, but our findings suggest that the choice of paradigm is important.

Usefulness of the International Spinal Cord Injury Pain (ISCIP) classification in the pain management: A retrospective study

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Introduction and Aims: Pain, either nociceptive or neuropathic following spinal cord injury (SCI) is a frequent symptom, often difficult to manage for both individuals with SCI and clinicians. The aim of this study was to investigate the epidemiology of pain types in patients with SCI according to the ISCIP classification.

Materials and Methods: Files of individuals with SCI were retrieved at the Centre for Pain Medicine Nottwil from January 2011 to December 2013. Socio-demographic data and clinical data were evaluated and ISCIP classification was applied. Correlations between data were explored.

Results: Sixty-six individuals (17 females and 49 males) with a mean age of 51 years (± 13) had spinal cord injury pain (SCIP); with a lesion older than 5 years in 67% of patients and a pain history older than 5 years in 54% of patients. AISA Impairment Scale (AIS) grade A was predominant (41%), followed by AIS D (38%), C (12%) and B (9%). 58% of patients showed a spinal cord lesion, 19% had a combined spinal cord and cauda equina lesion and 23% had a cauda equina lesion only. The etiologies were traumatic and non-traumatic in respectively 97% and 3% of patients. Patients had severe pain (mean intensity: 8.2 (± 1.6) on a 0 to 10 numerical scale) at one site (46%), 2 sites (39%) or 3 to more sites (15%). The health-related quality of life assessed by the SF-12 Health Survey was low (mean physical component 29.3 \pm 9.4; mean mental component 42.9, ± 12.4). Mild to severe depression and anxiety assessed by the Hospital Anxiety and Depression Scale (HADS) were present respectively in 53% and 56% of patients. According to the ISCIP classification, nociceptive pain was present in 55% (musculoskeletal pain) and 3% (visceral pain) of the patients. At-level, below-level neuropathic SCIP and other neuropathic pain were observed respectively in 53%, 42% and 5% of patients. Unknown pain type was found in 7% of patients. At-level SCIP was found in 74% of patients with AIS A lesions, followed by 50% in AIS C, 36% in AIS D and 33% AIS B. Below-level SCIP was present in 83% of patients with AIS B lesions, followed by 50% in AIS C, 44% in AIS A and 28% AIS D. 57% of patients with a spinal cord lesion had nociceptive pain, 34% had at-level SCIP and 67% below-level SCIP. 62% of patients with a combined spinal cord and cauda equina lesion had nociceptive pain (47% musculoskeletal, 15% visceral), 80% had at-level SCIP whereas 8% had below-level-SCIP. 53% of patients with cauda equina lesion had nociceptive pain while 77% had at-level-SCIP. Patients with a complete lesion showed significantly more frequent neuropathic pain ($p = 0.021$) and more frequent at-level SCIP ($p = 0.004$) compared to those with an incomplete lesion. **Conclusion:** The use of the ISCIP classification in clinical setting is mirroring the very complex pain situation in patients with SCIP and might be an important step for adequate pain therapy. This need to be further investigated according to ISCIP pain types.

P 23

NLRP3 inflammasome is not involved in neuropathic pain and spinal cord inflammation

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Background and aims: NLRP3 inflammasome is composed the central scaffold protein for which it is named NLRP3, an adaptor apoptosis-associated speck-like protein (ASC) containing a caspase activation and recruitment domain (CARD) and the precursor form of caspase-1 enzyme, pro-caspase-1. Its activation leads to the processing (clivage by caspase-1) and release of IL-1 β , a cytokine known to be involved in painful pathologies. The present experiments were designed to study the role of the NALP3 inflammasome in neuropathic pain, formalin-induced pain and spinal cord inflammation. **Methods:** SNI (spared nerve injury) surgery, subcutaneous formalin and intrathecal LPS injection were performed in C57BL/6 mice or NALP3 knockouts. Mice underwent several behavioral tests (hot plate, tail flick, pincher, acetone, von Frey, Hargreaves) to evaluate nociceptive responses. qPCR as well as IL-1 β ELISA were used to assess the inflammasome pathway in the spinal cord.

Results: The lack of expression of NLRP3 gene does not modify responses to sensory stimuli in behavioral tests. Formalin injection and SNI surgery trigger painful responses of the same intensity in both WT and KO mice. SNI does not provoke any change in expression of inflammasome components, ASC, caspase-1 and IL1 β , in the spinal cord after one and two weeks. IL-1 β protein is also not increased at these timepoints after SNI. IL-1 β at both mRNA and protein level is increased in WT and KO animals after intrathecal LPS injection.

Conclusions: NALP3 inflammasome is not involved in nociceptive responses, and neither in neuropathic, or formalin-induced pain. The increase of IL-1B after intrathecal LPS administration indicates an inflammasome-independent pathway for releasing the mature form of this interleukin. The absence of IL-1B increase in the spinal cord after nerve injury is somewhat counterintuitive given the importance of the cytokine in many other pain processes.

P 24

Usefulness of laser-evoked potentials and quantitative sensory testing in patients with spinal cord injury pain: A retrospective multiple case study

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Introduction and Aims: Laser-evoked potentials (LEP) and quantitative sensory testing (QST) are recommended to assess the function of spinal thalamic tract (STT) and dorsal column system (DCS). In this study, their usefulness was tested in patients with spinal cord injury pain (SCIP).

Materials and Methods: Eleven consecutive patients (3 females and 8 males) with a mean age of 49 years (sd 15) having SCIP were assessed with the German pain questionnaire for pain, disability, psychic distress and health-related quality of life. All patients had MRI of the spinal cord and a careful neurological examination was performed. Nine patients had an injury level above L1 vertebra consistent with a spinal cord lesion, while 2 patients were diagnosed with *cauda equina* syndrome. LEP following Tm-YAG laser stimulation of the skin and QST performed according to the protocol of the German Research Network on Neuropathic Pain (DFNS) were obtained within clinical affected dermatomes, corresponding to the pain site in 9 patients. The following QST parameters were studied: Cold detection threshold (CDT), warm detection threshold (WDT), thermal sensory limen (TSL), paradoxical heat sensation (PHS), cold pain threshold (CPT), heat pain threshold (HPT), mechanical pain threshold (MPT), mechanical pain sensitivity (MPS), allodynia (ALL), wind up ratio (WUR) and pressure pain threshold (PPT) for STT function. DCS function was assessed by mechanical detection threshold (MDT) and vibration detection threshold (VDT).

Results: Patients had a mean history of spinal cord lesion of 7.0 years (SD 5.8) and a mean pain history of 5.2 years (SD 4.5). ASIA impairments were: A in 2; B in 1; C in 1 and D in 7 patients. The mean pain intensity was 76.8 (sd 10.4). Six patients had at-level SCIP and 5 had below-level SCIP. Pain sites were: hand (3); trunk (3), thigh (2) and foot (3). LEPs were abnormal in 9 patients with reduced amplitude in 1 and no LEPs in 6 cases. Sensory detection and pain thresholds to laser stimuli were respectively abnormal in 6 and 4 patients. QST was abnormal for STT in all patients. Thresholds were increased for TSL (7 patients), WDT (6), CDT (5), MPS (3), MPT (2), HPT (1). PHS was present in 3 cases. Decreased thresholds were found for MPT (4), MPS (3), CPT (2), HPT (2), PPT (3) and CDT (1). Allodynia was present in 4 and WUR in 2 patients. DCS function in QST was abnormal in 11 patients showing increased VDT (10) and MDT (6). MRI's were normal in one patient, abnormal in 6 for both STT and DCS lesions, while 4 MRI scans were not assessable due to artifacts or patients had *cauda equina* syndrome with no obvious lesion. STT abnormalities were consistent between LEP, QST and MRI in 5 cases. DCS abnormalities were consistent between QST and MRI in 6 cases. **Conclusion:** Based on our results in patients with SCIP, a high rate of STT and DCS abnormalities measured by LEP and QST is found. A comparison to patients without SCIP should further support their usefulness.

P 25

Sensitivity of infrared thermography imaging in the evaluation of the accuracy of nerve root and sympathetic nerve blocks

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Question: In chronic pain patients diagnostic nerve root and sympathetic nerve blocks play an important role for pain management. To evaluate the accuracy of the blocks infrared thermography (IRT) can be used. To our knowledge the diagnostic value of IRT in this field is unclear. A retrospective analysis of all IRT's taken in diagnostic nerve root and sympathetic nerve blocks within a 12 month period was performed to assess the value of IRT.

Methods: In our daily routine IRT is taken 15 minutes before and after diagnostic nerve root and sympathetic nerve blocks. Interventions are done under fluoroscopy using lidocaine or chirocaine. A positive IRT is considered if an increase of temperature for at least 1 °C occurs. A significant improvement in pain is considered when at least 50% pain improvement is achieved 30 minutes post intervention.

Results: 278 nerve root and 21 sympathetic nerve blocks were evaluated. The ratios (in percentages) for positive IRT / significant pain improvement / both positive IRT and significant pain improvement were: cervical 20/57/14, thoracic 6/42/3, lumbar 32/53/21 resp. sacral 42/52/26. The ratios for L5 blocks were 52/56/33 and for S1 blocks 50/53/32 respectively. In sympathetic nerve blocks the following ratios were found: cervical 100/33/33 and lumbar 71/79/50.

Conclusion: In diagnostic nerve root blocks IRT does not contribute to assess the technical quality of the intervention, except for L5 and S1 intervention where IRT might be helpful. In cervical and lumbar sympathetic nerve blockades IRT may contribute to assess the quality of the intervention.

P 26

Ethics Procedures and Patient Informed Consent in a European-Wide Multi-Centre Study

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Background: Research ethics approvals, procedures and requirements for institutionalized research ethics committees vary considerably by country and by type of organisation. The objective of this study was to evaluate the requirements and procedures of research ethics committees, details of patient information, and informed consent based on a multi-centre European trial.

Methods: Local investigators of European hospitals participated in a European prospective observational multi-centre study on chronic postsurgical pain (euCPSP). An electronic questionnaire was mailed to all local investigators asking for details of their local ethics procedures, requirements of their research ethics committees as well as institutions' procedures regarding patient information and consent and further details such as costs and the duration of the approval process. Outcome measures were a comparison of research ethics procedures and committee requirements from the perspective of clinical researchers.

Results: Local investigators of 23 hospitals (5 Swiss hospitals) from 11 European countries filled in the questionnaire and these answers could be analysed. The approval process for euCPSP at the local ethics committees lasted from less than two weeks up to more than eight weeks. In twenty hospitals (5 Swiss hospitals), a patient information sheet was provided. Nine of these documents with 4 from Swiss participants were very detailed. Written informed consent was not necessary at one institution, whereas oral consent was required at ten. Patients' written informed consent was mandatory at twelve hospitals, including all five Swiss participants. The financial fees for the ethics approval varied between 0 and 500 CHF.

Conclusions: There is considerable variation in the administrative requirements for approval procedures by research ethics committees in Europe. This results in further variation of the extent of information and consent procedures for the patients involved. As clinical researchers, we intend to achieve harmonisation in research ethics approval to support the development of European clinical trial projects.

P 27

Telescopic sham needles in randomized controlled acupuncture trials on pain conditions

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Aim of investigation: In 1998 the first telescopic sham needle was introduced in acupuncture research. Because this needle allows patient blinding without penetration of the skin it has been used increasingly as placebo control in clinical acupuncture trials. Aim of this narrative review was to summarise the results on different pain conditions in randomized controlled acupuncture trials (RCT) utilizing telescopic sham needles as control.

Methods: MEDLINE covering the period from 1998 onwards was searched for randomized controlled acupuncture studies using telescopic non-penetrating sham needles as control. Only high quality studies on pain conditions including 50 or more subjects were included.

Results: In 7 of 13 detected RCTs acupuncture showed a significant better effect on pain conditions compared to a treatment with telescopic sham needles. The most treated pain condition was osteoarthritis of the knee in 6 studies of which 3 showed significant better improvement in acupuncture compared to sham control. Two

studies on shoulder pain were positive, as well as single studies on pancreatic cancer pain, and on chronic low back pain. Single studies on chronic arm pain, on arthralgia attributable to aromatase inhibitors, and on pelvic girdle pain showed no significant effect in the main outcome criteria. Five of 6 trials which included electrical stimulation of the acupuncture needles showed positive results.

Conclusions: Acupuncture RCT utilizing telescopic non-penetrating sham devices showed conflicting results on different pain conditions which make a conclusive interpretation impossible. Only acupuncture on shoulder pain showed non-conflicting positive results in more than one study. Electrical stimulation of acupuncture needles seems to be superior to a mere placebo effect in pain conditions.

P 28

Test-retest reliability of thermal quantitative sensory testing on two sites within the L5 dermatome of the lumbar spine and lower extremity

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Introduction: Quantitative Sensory Testing (QST) is widely used in human research to investigate the integrity of the sensory function in patients with pain of neuropathic origin, or other causes such as low back pain. Reliability of QST has been evaluated on both sides of the face, hands and feet as well as on the trunk (Th3-L3). In order to apply these tests on other body-parts such as the lower lumbar spine, it is important first to establish reliability on healthy individuals. The aim of this study was to investigate intra-rater reliability of thermal QST in healthy adults, on two sites within the L5 dermatome of the lumbar spine and lower extremity.

Methods: Test-retest reliability of thermal QST was determined at the L5-level of the lumbar spine and in the same dermatome on the lower extremity in 30 healthy persons under 40 years of age. Results were analyzed using descriptive statistics and test-retest reliability was assessed with intraclass correlation coefficients (ICC) and Bland-Altman plots. Values obtained from the lower extremity were compared to normative data from the German Research Network on Neuropathic Pain (DFNS), using Z-transformations.

Results: Mean intraindividual differences were small for cold and warm detection thresholds but larger for pain thresholds. ICC values showed excellent reliability for warm detection and heat pain thresholds, good-to-excellent reliability for cold pain threshold and fair-to-excellent reliability for cold detection threshold. ICC had large ranges of confidence interval (95%). Bland-Altman plots showed a low bias for cold and warm detection thresholds and a larger bias for pain thresholds, mainly for cold pain threshold. For men, all modalities obtained from the lower extremity were similar to normative values ($p > 0.05$). Women were less sensitive in feeling cold and warm and detected cold pain earlier in our sample than in the reference population.

Conclusion: In healthy adults, thermal QST on the lumbar spine and lower extremity demonstrated fair-to-excellent test-retest reliability. Results of this study were obtained from healthy subjects and encourage further research on low back pain patients.

P 29

Central post-stroke pain explored by laser-evoked potentials and quantitative sensory testing: A retrospective multiple case study

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Introduction and Aims: After a stroke, central post stroke pain (CPSP) i.e. a neuropathic pain syndrome can occur. Here, we described the neurophysiological assessments including laser evoked potentials (LEP) and quantitative sensory testing (QST) in single cases.

Methods: Five patients (3 males) with a mean age of 56 years (SD 7) were assessed with LEP and QST. All patients had a cerebral MRI and a neurological examination was performed. Stroke aetiology was embolic ischaemia (2), microvascular ischaemia (1), intracerebral hemorrhage (1) and subarachnoid hemorrhage in 1 case. LEP and QST performed according to the German Research Network on Neuropathic Pain were obtained in the painful area (3 patients on the hand and 2 on the foot). The following QST parameters were studied: Cold detection threshold (CDT), warm detection threshold (WDT), thermal sensory limen (TSL), paradoxical heat sensation (PHS), cold pain threshold (CPT), heat pain threshold (HPT), mechanical pain threshold (MPT), mechanical pain sensitivity (MPS), allodynia (ALL), wind up ratio (WUR) and pressure pain threshold (PPT) for STT

function. DCS function was assessed by mechanical detection threshold (MDT) and vibration detection threshold (VDT).

Results: The mean age of patients at stroke was 52.8 years (SD 8.4). Patients had a mean pain history of 3.3 years (SD 2.0). The mean pain intensity was 82.6 (SD 16.3). LEPs were abnormal in 4 patients with reduced amplitudes in 2 and absent in 2 cases. Latencies were normal in 2 patients, increased in 1 and absent in 2. Pain thresholds to laser stimuli were respectively normal and abnormal in 3 and 2 patients. QST was abnormal for STT in all patients. Thresholds were increased for TSL (all patients), CDT (4), WDT (4), MPT (1) and MPS (1). PHS was present in 2 cases. Decreased thresholds were found for MPT (2) and MPS (1). Allodynia was present in 3 patients. DCS function in QST was abnormal in 4 patients showing increased VDT (3) and MDT (2). All MRI's showed a lesion within the somatosensory system as in insular cortex (2), white matter (1) and brainstem (2). STT abnormalities were consistent between LEP and QST in 4 cases. **Conclusions:** Based on our results in patients with CPSP, a high rate of STT and DCS abnormalities measured by LEP and QST is found. A comparison to stroke patients without CPSP should further support the usefulness of both tools.

P 30

The video-assisted pre-anesthetic elective consultation optimizes the patient's informed consent

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Background: The patient's information is essential for his informed consent, and constitutes a professional and legal responsibility [1] of anesthesiologist. Compared to face-to-face interview alone, the video may enhance patient satisfaction, leads to a better understanding of procedure and risks and maximized information gain [2-3]. In our hospital, the patient becomes written information at home before elective pre-anesthetic consultation. However, little is known if a standard video produced by our clinic could influence the patient's informed consent.

Methods: 58 consecutive patients have a face-to-face standardized pre-anesthetic consultation. After this information about technique and risks, the patient observes video and then he answers to a standardized questionnaire of satisfaction. The videos of the general, epidural and spinal anesthesia and axillary block were produced by the department of anesthesia [4]. The video's playing time was between 2' and 2'44".

Results: 56 of 58 patients were considered (2 patients were excluded because of blindness). The patient's mean age was 51 years (range 17 to 84), 65% were female and 82% had experience of anesthetic procedure before pre-anesthetic consultation.

Procedures accepted by patient during the pre-anesthetic elective consultation						
Anesthesia technique [%]	GA	EPC	SA	AB	FB	IS
	36	3	55	9	18	1

GA: general anesthesia; EPC: epidural catheter; SA: spinal anesthesia; AB: axillary block; FB: femoral block; IS: interscalene block

Patient's opinion		
Question's content	Answers	[%]
Elective pre-anesthetic consultation	Necessary <i>and</i> essential evaluation	95
Video assessment of clinic situation	Largely <i>and</i> totally assessment	86
Anxiety induced by video	No <i>and</i> a little anxiety	95
To be reassured by video	Largely <i>and</i> totally reassured	70
Video-assisted pre-anesthetic consultation	Necessary <i>and</i> essential	77

Conclusions: Our study suggests that the patient considers as essential the elective pre-anesthetic consultation and that the standardized video gets him into clinical situation. Therefore, the video-assisted pre-anesthetic elective consultation could contribute to patient's choice and optimized the informed legal consent.

References

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- 2 S. A. Snyder-Ramos, et al. Anesth Analg 2005.
- 3 C. Salzwedel, et al. Anesth Analg 2008.
- 4 <http://vimeo.com/hopitalfribourgeois/videos>

P 31

Impact of the technique on patient safety for subclavian central venous cannulation by physicians in education

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Introduction: There will always be a first time for performing central venous cannulation in physician education. For the subclavian approach risks include perforation of the pleura, arteries and brachial plexus. With this study we aimed to identify the method leading to lowest incidence of these adverse events. Reviewing the literature we identified four techniques: the landmark and three ultrasound guided techniques: short axis, long axis and oblique long axis.

Methods: In groups of six a total of 24 last year medical students followed a three hour workshop in subclavian venous cannulation including hands-on training on gelatine models, task trainers and human cadavers. After the workshop students performed subclavian vein cannulation on human cadavers. Arteries of the cadavers were filled with plastic and the subclavian vein with a red colour liquid respectively. Each student was planned to perform one central cannulation per technique and cadaver side. The cadaver was placed on a CT scan table. Students were oriented to the anatomy of the cadaver and were instructed where to aim the puncture on the ultrasound screen and landmarks respectively. No help was given for needle insertion and direction. After puncture, leaving the needles in situ, needle position was identified in a CT scan. All puncture attempts were also videotaped with one camera showing students' hands and puncture site on the cadaver and the other showing the ultrasound image. Videos will be reviewed by blinded experts to scale puncture difficulty for each cadaver.

With 3D CT scan reconstruction of the needles position we will calculate the number of arterial, nerve, vein (target) and pleural perforation as well as the potential success and risk as measured by needle proximity to these structures.

CT scan analysis is currently in progress.

Results: 23 students completed the test following the workshop. Three students only performed on the right side of the cadaver. 172 needle placements were documented. Preliminary results, viewing live performance, show that landmark technique was associated with high success rate of fluid aspiration however also with high incidence of pleural puncture. Needle insertion site was most lateral for the long-axis techniques.

Conclusions: Identification of the technique with highest success rate and lowest incidence of adverse events for subclavian puncture may contribute important information for residency curriculum development.

P 32

Easy and Quick Access to Background Information of Medical Devices – QR Code

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Background: Structured information about the function of medical devices is necessary to operate them safely and correct in daily clinical practice. Handbooks, further background information, educational videos, and interactive e-learning programs are used to teach that. Even computer based systems do not provide these information easily and fast in the OR-environment. To improve the availability of that device related information we planned the application of the two-dimensional barcode – the QR-code which facilitates accessibility to webpage addresses with a standard browser. The open source QR-barcode contains more information compared to one-dimensional, linear barcode system and smartphones or tablet PCs decode it easily. This pilot-project evaluated the feasibility of QR-code placement on all medical devices in an university anaesthesia department and how possible user needed information access via the QR-code. The primary outcome was the time to access the information.

Method: All available information (handbooks, product videos) was collected from the departmental webpage and single webpages were installed for each product to enable direct QR-code access. In a pilot-cohort we tested the usability. Randomly selected anaesthesia staff was asked to search for the handbook of a patient monitor within the department. We recorded 1) time from starting the search until the information was visible on the screen and 2) interventions helping that process. Then participants used a tablet PC with a QR-code reader to scan the patient monitor QR-code. Time and interventions were recorded as before.

Results: Standard intranet search: Out of 8 participants so far, 6 needed assistance, 2 not. It took them 191 ± 105 sec (95% CI 118–264 sec).

QR-code mediated search: All of them found information without help in 31 ± 13 sec (95% CI 22–40 sec). The difference is 160 ± 101 sec. (95% CI 76–245 sec).

Student-t test compared both groups significantly ($p = 0.003$).

Conclusion: The QR-Code was easy to use for all participants and the time needed to access the information was substantially shorter without any assistance needed. Reason for that might be the lower barrier to start the search because of easy access to the information using the QR-code. No further knowledge where such information might be stored is necessary, only simple scanning with a widely available technology help. The quick and easy access satisfies the user.

The numbers refer to the pages of this supplement.

Basciani RM 3 S, 10 S, 13 S
Berger J 2 S
Borgeat A 10 S
Bruppacher HR 17 S

Curto-Reyes V 14 S
Czarnetzki C 5 S

Erdoes G 10 S

Gabriel L 13 S
Greif R 9 S
Grütter F 11 S

Heim C 4 S
Henny-Fullin K 5 S

Kaiser H 4 S
Kirkham KR 6 S
Knessl D 11 S
Knutti IA 16 S

Koennecke X 8 S
Kreienbühl L 6 S
Künzli M 17 S

Lan Zhang 9 S
Landmann G 14 S, 15 S
Lo Piccolo A 8 S
Löffel LM 4 S
Lurati Buse G 3 S, 4 S, 12 S

Macrea LM 7 S
Maillard J 12 S
Masouyé P 7 S

Naef N 15 S

Opsommer E 16 S
Othenin-Girard A 6 S

Piegeler T 6 S

Rehberg B 13 S
Romano R 16 S
Ruetzler K 3 S

Schliessbach J 14 S
Schoettker P 2 S
Schuepbach R 2 S
Signer S 9 S
Speierer G 13 S
Streitberger K 15 S

Tailleur R 2 S

Wen T 5 S
Winter A 11 S
Wolf L 8 S

Zhang L 9 S
Zhang X 10 S

Zettl A 12 S