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Sevoflurane postconditioning reduces postoperative complications in patients undergoing liver resections

Michael Ganter1, Stefan Breitenstein2, John Bonvini3, Pierre-Alain Clavien1, Beatrice Beck-Schimmer1

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Introduction: Hepatic inflow occlusion is a routine procedure to reduce intraoperative blood loss during liver resection. This manoeuvre however is associated with ischemia-reperfusion injury and may worsen clinical outcome. It has been previously shown that volatile anesthetics can protect against ischemia-reperfusion injury when used prior to the onset of ischemia, rendering the organ less vulnerable to a following injury (preconditioning).

Objectives: To compare the protective effects of sevoflurane, administered after hepatic inflow occlusion (postconditioning) with an established preventive strategy (ischemic conditioning) in liver resection. Tissue markers such as liver transaminases were defined as primary, postoperative complications according to Dindo [1] as secondary endpoints.

Materials and Methods: Patients undergoing liver surgery with hepatic inflow occlusion were randomized into 3 groups: [a] postconditioning with sevoflurane after inflow occlusion (SEVO; n = 48) [b] ischemic conditioning (ISCH; repetitive 15 min clamping, 5 min reperfusion; n = 50), and [c] control group (CON; continuous inflow occlusion; n = 17). In all of the patients, anesthesia was performed with propofol. In the SEVO group upon reperfusion, propofol infusion was stopped and replaced by sevoflurane for 15 min.

Results: Peak values of transaminases were significantly reduced in the SEVO (AST median, IQR: −347 [−64 to −48], p = 0.02) and ISCH (−193 [−345 to −42, p = 0.01]) group compared to CON. Major complications were lower in both treatment groups (see table).

Conclusion: This is the first randomized controlled trial showing that postconditioning with volatile anesthetics is protective during liver surgery reducing organ injury as well as postoperative complications. Application of volatile anesthetic is an easy, but effective intervention, which could be performed in individual cases requiring inflow occlusion.

<table>
<thead>
<tr>
<th>Table</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comparisons of postoperative outcomes for ischemic conditioning (ISCH) and sevoflurane postconditioning (SEVO) versus control (CON).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CON</th>
<th>ISCH</th>
<th>SEVO</th>
<th>ISCH vs CON</th>
<th>SEVO vs CON</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any complication, n (%)*</td>
<td>13 (77)</td>
<td>23 (46)</td>
<td>12 (25)</td>
<td>0.50</td>
</tr>
<tr>
<td>Major complication, n (%)**</td>
<td>7 (42)</td>
<td>8 (16)</td>
<td>5 (10)</td>
<td>0.50</td>
</tr>
<tr>
<td>ICU stay, number, (%)</td>
<td>3 (18)</td>
<td>9 (18)</td>
<td>3 (6)</td>
<td>1.00</td>
</tr>
</tbody>
</table>


** as treated

Transcutaneous nicotine does not prevent postoperative nausea and vomiting: a randomized controlled trial

C. Czerniecki1, E. Schiffler1, C. lysowsk1, G. Haller1, D. Bertrand1, M. R. Tramèr2

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Aims: There is empirical evidence that smokers are less likely to suffer from postoperative nausea and vomiting (PONV). We sought to investigate whether transcutaneous nicotine prevents PONV.

Methods: Non-smokers receiving a general anaesthesia for surgery were randomly allocated to Nicotinell® Patch 10 cm² (TTS 10), containing 1.75 mg nicotine of average delivery rate, 7 mg 24 h−1, or matching placebo patch. Patches were applied one hour before surgery and were left in situ until 24 hours after surgery (or until the first PONV symptoms occurred).

Results: We randomized 90 patients (45 nicotine, 45 placebo). In the post-anaesthetic care unit, the incidence of nausea was 22.2% with nicotine and 24.4% with placebo (P = 0.80), and the incidence of vomiting was 20.0% with nicotine and 17.8% with placebo (P = 0.78). Cumulative 24 hours incidence of nausea was 42.2% with nicotine and 40.0% with placebo (P = 0.83), and of vomiting was 31.1% with nicotine and 28.9% with placebo (P = 0.81). PONV episodes tended to occur earlier in the nicotine group. Postoperative headache occurred in 17.8% of patients treated with nicotine and in 15.6% with placebo (P = 0.49). More patients receiving nicotine reported on a low quality of sleep during the first postoperative night (26.7% versus 6.8% with placebo; P = 0.01).

Conclusions: Non-smokers receiving a prophylactic nicotine patch had a similar incidence of PONV during the first 24 hours and tended to develop PONV symptoms earlier compared with controls. They had a significantly increased risk of insomnia during the first postoperative night.

Trial Registration: clinicaltrials.gov identifier: NCT00553709.

Intravenous d-9THC (Cannabis) does not prevent postoperative nausea and vomiting (PONV)

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Background: Postoperative nausea and vomiting (PONV) complicates and prolongs hospitalization. Effectiveness of oral THC against PONV is debated [1]. Oral THC undergoes extensive first pass metabolism and it is impractical to give perioperatively. We therefore evaluated the effects of intravenous THC in high-risk patients undergoing elective surgery under general inhalation anesthesia in a prospective, randomized, placebo-controlled, double blind trial.

Methods: With IRB approval and informed consent, 40 of 320 planned patients (39 females) were randomly assigned in blocks (taking into account smoking status and history of PONV) to receive either placebo or one dose of 0.125 mg/kg THC in 15 min before the end of surgery. Primary outcome was incidence of nausea. Data are presented as mean ± SD, number, or percentage.

Results: Demographic data did not differ between groups. Despite randomization, surgery time was shorter in the THC group (144 vs. 212 min, p = 0.02). Incidence of nausea did not differ significantly between groups (table). There were no differences in vomiting at all time points.retching was more frequent in the THC group in the first 2 hours (53% vs. 21%, p = 0.04). Time to exubtation was longer in the THC group (20 ± 16 vs. 12 ± 6 min, p = 0.04). During the first 30 minutes, patients in the THC group showed higher scores for confusion (p < 0.01), anxiety (p = 0.03), change of perception (p < 0.01), and sedation (p < 0.01). PCA fentanyl consumption was lower in the first 2 hours (p = 0.03) in the THC group. There were no significant cardiovascular or respiratory side effects noted. One patient experienced extensive mood swings during the first 24 h after surgery.

Conclusion: Intravenous THC given before emergence is not effective against PONV. The major side effect is sedation, which might explain the decreased opioid consumption. While intravenous THC imposes no cardiorespiratory risks, it seems unsuitable as an adjunct; and we therefore stopped the study after 40 patients due to side effects and lack of benefits.

Incidence of nausea. Data in % or mean ± SD

<table>
<thead>
<tr>
<th>TH n = 19</th>
<th>Placebo n = 21</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nausea overall y/n</td>
<td>58/42</td>
<td>67/33</td>
</tr>
<tr>
<td>Early nausea (0–2h) y/n</td>
<td>47/53</td>
<td>48/52</td>
</tr>
<tr>
<td>Late Nausea y/n</td>
<td>21/79</td>
<td>29/71</td>
</tr>
<tr>
<td>Highest nausea score (0–10)</td>
<td>3.7 ± 3.5</td>
<td>4.1 ± 3.2</td>
</tr>
</tbody>
</table>

Reference:
An intravenous infusion of lidocaine has no impact on onset of rocuronium-induced neuromuscular block but improves intubation conditions. Randomised study

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Background: Lidocaine has neuromuscular blocking effects. We studied the effect of an intravenous infusion of lidocaine on intubation conditions and the time course of the neuromuscular blockade with an intubation dose of rocuronium.

Methods: Fifty-two adults undergoing surgery were randomly allocated to intravenous lidocaine 1.5 mg kg⁻¹ followed by an infusion of 2 mg kg⁻¹ h⁻¹ or physiological saline (control) throughout surgery. Anaesthesia was induced and maintained with a target controlled propofol infusion and sufentanil. After loss of consciousness, rocuronium 0.6 mg kg⁻¹ was given. Neuromuscular transmission was measured using TOF-watch SX acceleromyography. Intubation conditions were scored by a blinded observer using a validated three-item scale.

Results: Intubation time was analysed in 26 lidocaine patients and 26 controls, recovery in 26 lidocaine patients and 25 controls, and intubation conditions in 26 lidocaine patients and 26 controls. Onset time (to 95% depression of T1) was on average 113.9 sec [SD 35.3] with lidocaine and 119.5 sec [44.9] with saline (p = 0.618). Total recovery time (to TOF 0.9) was on average 58.1 min [15.1] with lidocaine and 54.3 min [16.9] with saline (P = 0.394). Clinical duration was on average 56.0 min [10.6] with lidocaine and 41.3 min [8.1] with saline (p = 0.21). Recovery index was on average 11.5 min [5.0] with lidocaine and 10.6 min [4.1] with saline (p = 0.458). Recovery time was on average 24.6 min [9.3] with lidocaine and 23.2 min [9.2] with saline (P = 0.541). Of 26 lidocaine patients, 22 (85%) had excellent and 4 (15%) had good intubation conditions; of 26 controls, 14 (54%) had excellent and 12 (46%) had good intubation conditions (p = 0.016).

Conclusion: An intravenous lidocaine infusion has no impact on onset or recovery times after a single intubation dose of rocuronium but significantly improves intubation conditions.

Trial Registration: clinicaltrials.gov identifier: NCT00828373.

Learning Curves for Rigid Intubation Videostyles
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Background: Rigid intubation styles are alternatives in the management of expected and unexpected difficulties in airway management. So far, no comparative studies have investigated the efficacy and learning process for the use of the Bonfils Intubation Endoscopy (Karl Storz GmbH, Tuttingen, Germany) in contrast to the SensaScope (Acutronic Medical Systems AG, Hirzel, Switzerland).

Methods: Twenty patients were randomized to intubation with the Bonfils or SensaScope in random order. Each participant intubated 10 patients per device. Major outcome was the time needed until successful intubation. Training 5 times on a manikin seems to be sufficient in elective anesthetized patients without predictors of difficult airway management.

Results: Onset time was analysed in 26 lidocaine patients and 26 controls, recovery in 26 lidocaine patients and 25 controls, and intubation conditions in 26 lidocaine patients and 26 controls. Onset time (to 95% depression of T1) was on average 113.9 sec [SD 35.3] with lidocaine and 119.5 sec [44.9] with saline (p = 0.618). Total recovery time (to TOF 0.9) was on average 58.1 min [15.1] with lidocaine and 54.3 min [16.9] with saline (P = 0.394). Clinical duration was on average 56.0 min [10.6] with lidocaine and 41.3 min [8.1] with saline (p = 0.21). Recovery index was on average 11.5 min [5.0] with lidocaine and 10.6 min [4.1] with saline (p = 0.458). Recovery time was on average 24.6 min [9.3] with lidocaine and 23.2 min [9.2] with saline (P = 0.541). Of 26 lidocaine patients, 22 (85%) had excellent and 4 (15%) had good intubation conditions; of 26 controls, 14 (54%) had excellent and 12 (46%) had good intubation conditions (p = 0.016).

Conclusion: An intravenous lidocaine infusion has no impact on onset or recovery times after a single intubation dose of rocuronium but significantly improves intubation conditions.

Trial Registration: clinicaltrials.gov identifier: NCT00828373.

Can a practical course in anaesthesia promote 4th year medical students to choose anaesthesia as a career path?
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Background: Recruitment of residents for our specialty is of concern for anaesthesia societies. Deciding on anaesthesia as a career path was linked to personal operating experience and expert knowledge as a motivational force. We were interested in the effect of a one week practical course in anaesthesia on the hypothesized selection of a medical specialty in fourth year undergraduate medical students.

Methods: All medical students at the University of Bern participated in a mandatory 4-hour anaesthesia seminar that includes airway management and full-scale simulation of an anaesthesia case in the 4th year of an undergraduate medical university program. Furthermore all students took a one week mandatory anaesthesia practical course. A simulation session on anaesthesia cases was scheduled for all Monday morning and Friday afternoon at the other days of the week a senior anaesthetist taught, demonstrated and supervised each student in a 1:1 setting. The mandatory learning goals were successful mask ventilation, establishment of I.V. access and patient monitoring with interpretation of the obtained measurements. Students were assessed 1. on their attendance during the week, 2. a direct observation of a procedural skill (DOPS) on one of the learning goals as formative assessment by the end of the week, and 3. a written report on their achieved clinical competencies. With informed consent
Effects of a Standardized Patient based Training on the Performance of 4th Year Students during a Pre-anaesthesia Patient Assessment: A Rater Blinded RCT

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1Dept. of Anesthesiology & Pain Therapy, University Hospital Bern and 2Dept. of Assessment and Evaluation, Inst. of Med. Education, University Bern

Background: Medical schools often limit their time for practical anaesthesia course. It is therefore of up most importance to have effective and efficient teaching methods to train students in the basic understandings of the pre-anaesthesia patient assessment. Because of limited time resources of clinicians we were interested in teaching effects with non physicians and asked if a 30 min, teaching by trained standardized patient (SP) improve the performance of 4th year medical students in the pre-anaesthesia patient assessment with real patients?

Are there common perioperative factors shared by postoperative delirium and postoperative cognitive dysfunction?

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1Service d’Anesthésiologie, Centre Hospitalier Universitaire Vaudois et Université de Lausanne; 2Departement Anästhesie, Universitätsspital A.U. Monsch3, L.A. Steiner1

Results: From 144 students 136 mini-CEX were performed. Trained students (n = 70) scored significantly higher compared with none trained (n = 66) for overall impression (8.8 ± 0.8 vs. 8.3 ± 0.9, p = 0.002; effect size: 0.56). Trained students scored higher in history taking (8.6 ± 1.0 vs. 8.2 ± 1.0, p = 0.020), ASA Status Classification (8.6 ± 1.1 vs. 8.3 ± 1.3, p = 0.050), organisation and efficiency (8.5 ± 1.3 vs. 7.9 ± 1.2, p = 0.019) and professional behaviour (9.2 ± 0.9 vs. 8.8 ± 1.1, p = 0.022) but not in airway assessment (8.8 ± 1.1 vs. 8.4 ± 1.3, p = 0.119), communication of peri-operative management (8.1 ± 1.4 vs. 7.8 ± 1.5, p = 0.418).

Conclusion: A single encounter with trained SP significantly improves the performance of 4th year medical students in pre-anaesthesia patient assessment. Remarkably one 30 minute teaching sequence of a non physician revealed a medium effect size on the overall impression. The reason why no significant differences in airway assessment were found might be that the lecture already covered the necessary content of these scoring systems which could not be improved by the SP encounter. Long term effects of the intervention could not be analysed within the study’s framework.

Table 2
ANOVA, post-hoc LSD.

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean ± SD</th>
<th>CRP preop [mg/l]</th>
<th>CRP d3 [mg/l]</th>
<th>CRP d7 [mg/l]</th>
<th>Hb preop [g/l]</th>
<th>Hb d3 [g/l]</th>
<th>Hb d7 [g/l]</th>
</tr>
</thead>
<tbody>
<tr>
<td>No POCD</td>
<td>5 ± 7</td>
<td>105 ± 60⁺</td>
<td>47 ± 35</td>
<td>136 ± 18</td>
<td>97 ± 12</td>
<td>106 ± 10⁺</td>
<td>108 ± 14⁺</td>
</tr>
<tr>
<td>POCD</td>
<td>22 ± 60</td>
<td>168 ± 116</td>
<td>58 ± 57</td>
<td>133 ± 17</td>
<td>103 ± 13</td>
<td>108 ± 14⁺</td>
<td></td>
</tr>
<tr>
<td>Delirium</td>
<td>9 ± 8</td>
<td>236 ± 96⁻</td>
<td>74 ± 53</td>
<td>121 ± 23</td>
<td>93 ± 13</td>
<td>91 ± 5⁺</td>
<td></td>
</tr>
</tbody>
</table>

* Significantly different to POCD, † significantly different to delirium, ‡ significantly different to no POCD

Table 1

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean ± SD</th>
<th>Age [yrs]</th>
<th>CERAD preop [points]</th>
<th>Blood loss [ml]</th>
<th>Duration of anesthesia [min]</th>
<th>Hospital stay [d]</th>
</tr>
</thead>
<tbody>
<tr>
<td>No POCD</td>
<td>72 ± 6⁺</td>
<td>75 ± 14</td>
<td>349 ± 354⁺</td>
<td>269 ± 86⁺</td>
<td>11 ± 4⁺</td>
<td></td>
</tr>
<tr>
<td>POCD</td>
<td>75 ± 2⁵</td>
<td>75 ± 11</td>
<td>376 ± 420⁺</td>
<td>271 ± 99⁺</td>
<td>13 ± 7</td>
<td></td>
</tr>
<tr>
<td>Delirium</td>
<td>76 ± 7⁺</td>
<td>69 ± 11</td>
<td>750 ± 567⁺</td>
<td>383 ± 157⁺</td>
<td>18 ± 11⁺</td>
<td></td>
</tr>
</tbody>
</table>

* Significantly different to POCD, † significantly different to delirium, ‡ significantly different to no POCD
Comparison of four different rescue regimens to treat circulatory arrest due to bupivacaine intoxication — An experimental study in newborn piglets

Jacqueline Mauch1, 2, Olga Martin Jurado3, Nelly Spielmann1, Regula Betttschart-Wolfensberger4, Markus Weiss2
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Background: Local anesthetic (LA) intoxication with cardio-vascular arrest is a potential fatal complication of regional anesthesia in anesthetized children. Recently, lipid-resuscitation for early treatment of LA toxicity with cardiac arrest has been promoted. Aim of the study was to investigate four different rescue regimens using epinephrine and/or Intralipid® and vasopressin to treat cardiac arrest due to bupivacaine intoxication.

Methods: Piglets were randomized into four groups, anaesthetised with sevoflurane, their trachea intubated and ventilated. Bupivacaine was continuously infused by a syringe infusion pump through a central venous line at rate of 1 mg/kg/min until circulatory arrest (pulsless electrical activity was defined as mean arterial pressure (MAP) 25% of initial value, corresponding to 12–13 mm Hg). Then, bupivacaine infusion and sevoflurane were stopped, chest compression was started and the pigs were ventilated with 100% oxygen. One minute later epinephrine 10 µg/kg (group 1), Intralipid® 20% 4 ml/kg (group 2), epinephrine 10 µg/kg + Intralipid® 4 ml/kg (group 3) or Vasopressin 2 U + Intralipid® 4 ml/kg (group 4) was administered. Return of spontaneous circulation was defined as MAP >40% of initial value. Epinephrine rescue of 10 µg/kg (in case of circulatory arrest) or 3 µg/kg (if MAP ≤75%) was given every 5 minutes if necessary. Hemodynamic course was recorded. Results are given in median (range).

Results: Twenty-eight piglets (4x7) aged 27 days (13–36) and weighing 5.1 kg (4.3–6.1) were investigated. Total amount of bupivacaine administered was 7.7 mg/kg (6.0–10.6) in group A, 9.0 mg/kg (5.5–10.5) in group B, 10.2 mg/kg (5.1–20.2) in group C and 8.0 mg/kg (6.4–14.6) in group D. Bupivacaine intoxication caused pulsless electrical activity and asystole.

Number of surviving pigs and intervention leading to ROSC:

<table>
<thead>
<tr>
<th>Group A</th>
<th>Group B</th>
<th>Group C</th>
<th>Group D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surviving Pigs</td>
<td>5</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>ROSC due to study drug</td>
<td>5</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>ROSC due to epinephrine 10 µg/kg</td>
<td>0</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

Number of surviving pigs receiving low dose epinephrine for hemodynamic support:

<table>
<thead>
<tr>
<th>Epinephrine 3 µg/kg</th>
<th>Group A (n = 5)</th>
<th>Group B (n = 2)</th>
<th>Group C (n = 6)</th>
<th>Group D (n = 4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x</td>
<td>2</td>
<td>1</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>1x</td>
<td>2</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>2x</td>
<td>1</td>
<td>1</td>
<td>–</td>
<td>1</td>
</tr>
</tbody>
</table>

Conclusion: During resuscitation of bupivacaine induced cardiac arrest in piglets spontaneous circulation did not return after administration of Intralipid® alone or vasopressin+Intralipid®. First line rescue with epinephrine and epinephrine + Intralipid® was more effective with regard to survival. The later did not need further epinephrine rescue after ROSC.
Methods: Cecal ligation and puncture was performed in anesthetized Wistar rats (CLP group). Sham group animals were treated the same manner but without this procedure. Ringer lactate (RL) was intravenously infused to all animals at a volume of 30 ml/kg. Two hours after initiation of injury rats received RL (control, 75 ml/kg), unbalanced HES 130/0.42 (HES, 25 ml/kg) or balanced HES 130/0.42 (Tetraspan, 25 ml/kg). Animals were euthanized 6 hours after induction of peritonitis. Monocyte chemotactic protein-1 (MCP-1), intercellular adhesion molecule-1 (ICAM-1), and tumor necrosis factor-α (TNF-α) mRNA expression was assessed in kidneys and liver. Linear regression analysis was used to evaluate upregulation of MMP9 release. Two-tailed Student’s t-test was used to compare different fluid resuscitation procedures on inflammatory mediator expression.

Results: CLP had a significant effect on production of inflammatory mediators. HES induced significant renal injury (p < 0.05) and liver injury (p < 0.05). While HES did not alter expression of inflammatory mediators compared to RL, fluid resuscitation with Tetraspan provoked a burst in inflammatory mediator expression, which was at least three-fold higher in the kidneys (p < 0.001) and eight-fold in the liver (p = 0.001) compared to the ringer lactate group.

Conclusions: While unbalanced HES did not show a proinflammatory effect on renal and hepatic tissue in early sepsis, the balanced HES solution upregulated inflammatory mediators. Further studies have to be performed to elucidate this phenomenon in detail and to assess the functional implication of these results.

Preconditioning with volatile anesthetics decreases matrix metalloproteinase-9 release in human neutrophils

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Introduction: The ability to degrade extracellular matrix (ECM) is a hallmark of malignant tumors promoting their spread to distant sites. Matrix metalloproteinase-9 (MMP9) degrades gelatins, which are components of the ECM. Inhibition or genetic deletion of MMP9 was shown to increase both CXCL8 and MMP9 levels and to promote liver metastasis. VA has been demonstrated to reduce MMP9-release.

Methods: Freshly isolated human neutrophils were exposed to 1 MAC (sevoflurane; p < 0.05) and 42% (desflurane; p < 0.05). This reduction was also evident regarding the enzymatic activity of MMP9. CXCR2-expression was assessed by flow cytometry. Statistics were performed with two-way ANOVA with Bonferroni post-hoc testing.

Results: Preconditioning with VA reduced MMP9-release by 43% (sevoflurane; p < 0.05) and 42% (desflurane; p < 0.05). This reduction was also evident regarding the enzymatic activity of MMP9. CXCR2-expression was assessed by flow cytometry. Statistics were calculated using one-way ANOVA with Bonferroni post-hoc testing.

Discussion: VA did not change the expression of CXCR2.

Conclusion: The data presented in this investigation provide strong evidence that anaesthetic postconditioning with sevoflurane mediates reduction of peritonitis. Monocyte chemotactic protein-1 (MCP-1), interleukin tumor necrosis factor-α (TNF-α), and interferon gamma test were performed in the neutrophils. The data presented in this investigation provide strong evidence that anaesthetic postconditioning with sevoflurane mediates reduction of peritonitis. Monocyte chemotactic protein-1 (MCP-1), interleukin tumor necrosis factor-α (TNF-α), and interferon gamma test were performed in the neutrophils.
Conclusions: Midazolam, propofol and lidocaine do not interfere with IA measurement, even at near toxic plasma concentrations. In patients treated with high oral doses of magnesium, IA results for ADP and TRAP-Test should be interpreted with caution.

Course of FXIII in children undergoing major surgery

Thorsten Haas¹, Wolfgang Korte¹, Nelly Spielmann¹, Jacqueline Mauch¹, Cathé Madjdpour¹, Markus Schmugge³, Markus Weiss¹, Thorsten Haas¹, Wolfgang Korte², Nelly Spielmann¹, Jacqueline Course of FXIII in children undergoing major surgery

Introduction: Intraoperative acquired coagulopathy due to blood loss and hemodilution is a frequent finding in children; however there is a lack of data about acquired deficiency of coagulation factor XIII and the efficacy of factor XIII replacement therapy. The aim of this prospective observational trial was to investigate the intraoperative course of FXIII in children undergoing elective major surgery with anticipated bleeding.

Material and methods: Blood samples were repeatedly taken from 46 children aged 3.3 years (IQR 0.9–10.7 years). Concentrations of FXIII, plasma fibrinogen level, thrombelastometry (ROTEM®) and cell count were assessed at several time points during surgery. Data are expressed as median (IQR).

Results: All baseline measurements were within reference ranges. Notably, fibrinogen level decreased in 53% (IQR 49–69%) was already observed at the beginning of the surgical procedures (reference range FXIII 70–140%), while ROTEM® traces remained unchanged. At this time, a median absolute amount of fluids of 19 mL/kg (12–30 mL/kg) were administered, whereby twenty-seven children received additional infusion of colloids (gelatin solution). FXIII levels further deteriorated intraoperatively to minimal levels of 33% (15–61%). Likewise, during the operative course clot strength was additionally impaired (ROTEM® MCF 44 mm (34–50 mm)) and fibrinogen levels deteriorated to minimal levels of 130 mg/dL (95–160 mg/dL). In 43 out of 46 children transfusion of RBC was necessary. Despite of transfusion of FFP (cumulative total dose 22 mL/kg (11–32 mL/kg)) in 21 out of 46 children, FXIII level remains low till the end of surgery at levels of 39% (20–46%).

Discussion: A decreased FXIII levels are suggested to be a late phenomenon in the development of dilutional coagulopathy, our results showed a marked and very early decrease to levels that were currently discussed as critically low. The intraoperative decrease of FXIII might be explained by dilutional effects but may be aggravated by influence of infused colloids. Recently published data suggested that perioperative diminished FXIII activity was associated with an increased risk of bleeding; thus maintenance of adequate FXIII levels might be important in treating dilutional coagulopathy and hyperfibrinolysis. However, transfusion of FFP was not able to correct intraoperative decreased levels of FXIII in our study.

Reduction of catheter-associated bloodstream infections by a winning strategy: the REDCO-CVC project (→REDUCTION des ComplIcations liées aux Cathéters Veineux Centraux)

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Background: Central line associated bloodstream infection (CLABSI) is an avoidable complication related to central venous catheters (CVC). The aim of the study was to evaluate the impact of a global quality project named REDCO-CVC on the CLABSI rate.

Methods: REDCO-CVC is a step by step quality program [baseline (3 month 2006), tracing (January 2008), insertion (June 2008), CVC maintenance (September 2008)]. Documentation, insertion and CVC maintenance were standardized: A theoretical and practical teaching with simulation of insertion on a mannequin was elaborated specifically for anesthesiologists and an interactive e-learning (insertion, dressing, removal) dedicated to all nurses was created. An internal website was created. All CVC were followed from insertion to tip culture after removal. CLABSI was defined allowing to the US National Nosocomial Infection Surveillance System criteria. The following steps were analyzed: baseline, tracing and insertion.

Results: 3975 CVC were included. Cumulative catheter-days and median (IQR) dwell-time were 35914 and 6 (3–11) days, respectively. Anesthesiologists, intensivists and other physicians placed respectively 1665 (42%), 1693 (43%), and 617 (15%) CVC. Insertion place was: jugular (62%), sub-clavian (23%) or femoral (15%). Global CLABSI-rate diminished from 3.8/1000 CVC-day to 1.9. CLABSI rate for anesthesiologist, intensivists and other physician were 4.9 ± 1000 CVC-day, respectively 2.9 and 2.0 (IRR 0.75; 95%CI 0.57–0.99; p = 0.04) at baseline. After the tracing period, rates were the following: 2.7 ± 1000

CVC-day, respectively 1.4 and 2.2 (0.96; 95%CI 0.63–1.46; p = 0.85) and after the insertion period: 1.6/1000 CVC-day, 2.1 and 3.9 (1.54; 95%CI 0.83–2.84; p = 0.37).

Conclusion: CLABSI rate was reduced by 50% after this global quality program. This decrease was even higher in the studied population, the anesthesiologists, with a statistically significant decrease in CLABSI-rate.

Effect of perioperative systemic alpha2-agonists on postoperative morphine consumption and pain intensity: systematic review of randomized controlled trials

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Background: Systemic alpha2-agonists are believed to reduce postoperative opioid requirements and pain intensity.

Methods: We searched Medline, Embase, Central and bibliographies, for randomized trials (to 02.2011) testing any systemic alpha2-agonist (versus placebo or no treatment), administered before, during or after surgery, in adults undergoing non-cardiac surgery under general anesthesia, and reporting on postoperative cumulative opioid consumption and/or pain intensity. Opioid doses were converted to morphine equivalents to estimate weighted mean differences (WMD) for continuous data and numbers-needed-to-treat/harm (NNT/H) for dichotomous data, both with 95% confidence intervals (CI), when data from ≥5 trials and/or ≥100 patients could be combined.

Results: Thirty studies (1,792 patients, 933 received clonidine or dexmedetomidine) were included. Regimens of alpha2-agonists varied widely. With both molecules, there was evidence of postoperative morphine-sparing at 2h, WMDClon –0.6 mg [95%CI, –1.8 to 0.5] and WMDDex –6.3 mg [–8.3 to –4.2]; at 12h, –9.8 mg [–16.2 to –3.4] and –6.0 mg [–9.9 to –3.0]; at 24h, –4.1 mg [–6.0 to –2.2] and –14.5 mg [–22.1 to –6.8]. Both molecules decreased pain intensity during the first 24h. At 24h, WMDClon –0.7 cm [–12.0 to –0.1] on the 10 cm VAS; WMDDex –0.6 cm [–0.9 to –0.2]. The incidence of early nausea was decreased with clonidine (NNT 9 [5 to 87]), and of late nausea with dexmedetomidine (NNT 4 [4 to 40]). Clonidine increased the risk of intraoperative and postoperative hypotension (NHN 9 [6 to 16] and NHN 17 [10 to 41]); dexmedetomidine increased the risk of postoperative bradycardia (NNH 3 [2 to 5]). Recovery times were not prolonged.

Conclusions: Peri-operative systemic alpha2-agonists have a weak beneficial effect on postoperative opioid consumption, pain intensity and nausea. Awakening time is not prolonged. Adverse effects are bradycardia and arterial hypotension.

Systemic ropivacaine does not reduce pain and hyperalgesia in electrically induced pain in human

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1Institute of Anaesthesiology, University Hospital of Zurich, Switzerland

Aim: Ropivacaine is a local anesthetic widely used in clinical practice for continuous regional anesthesia because of its advantages regarding systemic toxicity. The aim of this study was to elucidate possible effects of systemic ropivacaine at clinically relevant concentrations on pain, hyperalgesia, allodynia and flare response.

Methods: 20 healthy subjects were included in a randomized, double-blinded, placebo-controlled, crossover study approved by the local ethical committee. Electrical pain was evoked over two subcutaneously implanted gold wire electrodes in the forearm. The stimulation software simulated the rating of the subjects on a numeric rating scale (0–10) over the first 20 minutes after the start of the stimulation (t0). Saline, lidocaine or ropivacaine were infused intravenously. The time to reach the defined stimulation threshold was recorded (1). Areas of hyperalgesia, allodynia, flare response and plasma concentrations were measured at t0 and t1.

Results: 11 was significantly shorter with lidocaine (13.8 ± 2.1 min) than with saline (18.4 ± 1.5 min; P <0.05). The area of hyperalgesia increased with saline (+16 cm², P <0.05) and ropivacaine (+15 cm², P <0.05), but not with lidocaine (+3 cm², P = 0.62). The area of allodynia increased with all three medications. Pain threshold at the area of intensity of flare reaction was recorded.

Conclusion: In contrast to lidocaine, systemic ropivacaine at clinically relevant concentrations did not reduce electrically evoked pain, hyperalgesia or flare response.
Perioperative intravenous application of lidocaine in laparoscopic renal surgery. A randomized, controlled study

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Background: Recently published randomized studies have suggested that perioperative continuous intravenous lidocaine application may reduce analgesic requirement and shorten hospital stay after abdominal surgery. Lidocaine has not been investigated in renal surgery. The primary aim of this randomized, double-blinded, placebo-controlled study was to evaluate the effect of perioperative intravenous application of lidocaine on hospital stay. Secondary aims were to study the effect of lidocaine on postoperative analgesia, inflammatory response and gastrointestinal functions in patients undergoing laparoscopic renal surgery.

Methods: Sixty-four patients who underwent laparoscopic renal surgery were randomly assigned to receive lidocaine or saline solution (placebo). Lidocaine was initially administrated with a bolus of 1.5 mg/kg during anesthesia induction, followed by an infusion of 2 mg/kg/h intraperioperatively and 1.5 mg/kg/h for 24 h postoperatively. Primary outcome measures were duration of the hospital stay. Postoperative pain and sedation, analgesic requirement, incidence of postoperative nausea and vomiting, inflammatory and stress response (C reactive protein (CRP), procalcitonin (PCT), cortisol) and return of bowel function were recorded.

Results: The length of hospitalization did not differ between both groups (6.75 days for the lidocaine group (SD ± 1.89) vs 6.37 days for the placebo group (SD ± 1.89), P = 0.07). There were no significant differences between both groups concerning the time course of pain scores at rest (P = 0.71), at coughing (P = 0.14), during mobilization (P = 0.13) and morphine consumption (P = 0.59) during the two days after surgery. No differences were observed in postoperative return of bowel function, plasma concentration of CRP, PCT and cortisol, postoperative nausea and vomiting and sedation.

Conclusion: Systematic administration of lidocaine failed to decrease the duration of hospital stay in patients undergoing laparoscopic transperitoneal renal surgery. Our study could not show any benefit of perioperative intravenous application of lidocaine in terms of reduction of pain intensity, morphine consumption, postoperative analgesia, inflammatory and stress response and gastrointestinal response.
Conclusion: The COOH metabolite of THC accumulates to exceed the concentrations of the parent by up to 100 fold in individuals with wild type CYP2C9. Our findings show there is a slow metabolizer phenotype for CYP2C9*3. Genetic variability determines the pharmacokinetics of THC with impact on vital signs and psychotropic side effects, and may influence clinical and forensic medicine.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Cmax (mcg/L)</th>
<th>AUC0–∞ (mcg/L*h/kg)</th>
<th>T½ (h)</th>
<th>p-value</th>
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</thead>
<tbody>
<tr>
<td>THCCmax</td>
<td>146</td>
<td>2130</td>
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<tr>
<td>AUC0–∞</td>
<td>56</td>
<td>37</td>
<td>11.2</td>
<td>0.06</td>
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<tr>
<td>T½</td>
<td>24.7</td>
<td>27.3</td>
<td>12.2</td>
<td>0.06</td>
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</table>

Gastric emptying in children: 4 versus 6 hours fasting

Aim: To compare residual gastric contents volumes (GCVw) and emptying half-life (T1/2) after 4 versus 6 hours fasting for food, using magnetic resonance imaging (MRI).

Methods: Eighteen healthy volunteers aged 6.8 to 12.2 years participated twice, to simulate 4 / 6 hours fasting (Sim-4 / Sim-6) in a crossover study: after overnight fasting (baseline), a light breakfast and after 4 / 6 hours; all previous MRI after and immediately before syrup intake revealed significantly higher GCVw for Sim-4: Baseline ± 28.3 (± 5.7) minutes (p = 0.47) for Sim-4 / Sim-6 (Wilcoxon test).

Conclusion: GCVw at anaesthesia start and T1/2 were similar for 4 and 6 hours food fasting in healthy volunteer children. Our results support that fasting times shorter than recommended by the ASA guidelines may be practicable.

1 Anesthesiology. 2011;114:495–511.

Comparison of standard plasmatic coagulation tests to thrombelastometry (ROTEM®) in children undergoing major pediatric surgery

Thorsten Haas1, Nelly Spielmann2, Jacqueline Mauch1, Caveh Madipour1, Oliver Speer3,4, Markus Schmugge5, Markus Weiss1
1Departments of Anaesthesia and Haematology, University Children’s Hospital Zurich, Switzerland; 2Children’s Research Center, University Children’s Hospital Zurich, Zurich, Switzerland; 3Zurich Center for Integrative Human Physiology, University Zurich, Switzerland

Introduction: Timely and close meshed monitoring of perioperative hemostasis is suggested to be of great importance in the management of major pediatric surgery. Thrombelastometry (ROTEM®) provides fast and on-line information about hemostasis in the OR and may be useful to early detect intraoperative coagulation disorders. We performed an observational trial to compare results of this technique to standard plasmatic coagulation tests and to compare the times of performance.

Material and methods: Intraoperative blood withdrawals were obtained in children undergoing elective major surgery at the discretion of the anesthesiologist. At each time point, standard coagulation tests (aPTT, PT, fibrinogen level) as well as ROTEM® analyses (INTEM, ExTEM, FbTEM) were performed simultaneously by trained hospital laboratory staff.

Results: A total of 288 blood samples from 50 children were analysed and compared. While there was only moderate correlation between PT and aPTT to ExTEM CT and INTEM CT respectively, a good correlation was detected between plasma fibrinogen level and FbTEM assay (r = 0.882; p < 0.001). Notably, 64% of all PT and 94% of all aPTT measurements were outside the reference range, while impaired clotting times were observed in 13.0% and 6.3% respectively. Standard coagulation test results were available after median of 53 minutes (45 min – 63 min IQR), whereas 10 minute values of ROTEM® results (A10) were available online after 23 minutes (21 min – 24 min IQR).

Mean gastric emptying half-life T½ after syrup intake was 30.8 (± 12.2) / 28.3 (± 5.7) minutes (p = 0.47) for Sim-4 / Sim-6 (Wilcoxon test).

Conclusion: GCVw at anaesthesia start and T1/2 were similar for 4 and 6 hours food fasting in healthy volunteer children. Our results support that fasting times shorter than recommended by the ASA guidelines may be practicable.

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1 Anesthesiology. 2011;114:495–511.
Discussion: Based on our data, PT and aPTT compared to ROTEM® clotting times are not interchangeably to detect hematic disorders. Good correlation was found between plasma fibrinogen level and FibTEM assay. Turnaround times are considerably longer with plasmatic coagulation testing than with ROTEM®, which may have an impact on timely monitoring and guiding coagulation therapy. In addition, our results showed that impaired standard coagulation tests was a very common and early finding, while meaningful changes in the ROTEM® tests were observed less frequent. Thus, there might be a strong need to re-evaluate clinical meaningful thresholds for all coagulation parameters.

Evaluation of the feasibility of rotational thromboelastometry during cardiopulmonary bypass (CPB) using a heparinase modified ROTEM® assay

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CHUV, Department of Cardiac Surgery, Lausanne, Switzerland

Background and Goal of Study: ROTEM® is a whole blood point of care test used to assess the patient’s coagulation status. Three of the available ROTEM® tests are EXTEM (activation by recombinant thromboplastin, rTP), INTEM (activation by ellagic acid) and HEPTEM. In the latter, heparin, added to the INTEM reagent, eliminates heparin to reveal underlying coagulopathies. Performing ROTEM® analysis during CPB might allow the anesthesiologist to anticipate the need for blood products. The goal of this study was to evaluate the feasibility of ROTEM® analysis in the presence of very high heparin concentrations as seen during CPB; and to evaluate whether heparinase could reverse heparin effect on EXTEM and INTEM during CPB.

Materials and Methods: In this prospective observational study, informed consent was obtained from 20 patients scheduled for elective cardiac surgery using CPB. Arterial blood samples were drawn for analysis after induction of anaesthesia (T0) and 10 minutes after the administration of heparin (T1). The following tests were performed: EXTEM, INTEM, HEPTEM and a heparinase modified EXTEM (hEXTEM). For the latter, rTP instead of the ellagic acid was used in the HEPTEM test. Heparin concentrations were measured at T1 and at the end of bypass (T2). HEPCON® was used for heparin management. Paired t-test was used for statistical analysis using JMP 7.0. Data are presented as mean ± SD.

Results and Discussion: Heparin plasma concentration at T1 was 7.19 ± 1.9 IU/ml, and remained stable during CPB (T2 2.82 ± 1.38 IU/ml, p >0.6). At T0, hEXTEM differed significantly from EXTEM, at T1, EXTEM and hEXTEM were significantly altered, compared to EXTEM at T0. HEPTEM at T1 was significantly different from INTEM at T0.

Conclusions: High heparin concentrations on CPB, influence EXTEM. The heparinase concentration in HEPTEM is insufficient to reveal underlying INTEM. Heparinase in itself influences the EXTEM test. ROTEM® analysis cannot reliably be performed during CPB.

<table>
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<tr>
<th>Table 1 Results.</th>
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<td>CT (sec)</td>
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<td>CFT (sec)</td>
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<td>A10 (mm)</td>
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<tr>
<td>MCF (mm)</td>
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<tr>
<td>α (°)</td>
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<tr>
<td>EXTEM T0</td>
</tr>
<tr>
<td>53.6 ± 5.79</td>
</tr>
<tr>
<td>66.6 ± 15.79</td>
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<tr>
<td>63.1 ± 4.89</td>
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<tr>
<td>69.1 ± 4.04</td>
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<td>77.9 ± 3.14</td>
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<tr>
<td>EXTEM T1</td>
</tr>
<tr>
<td>69.9 ± 9.54*</td>
</tr>
<tr>
<td>78.9 ± 21.04</td>
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<tr>
<td>58.8 ± 5.79*</td>
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<tr>
<td>67.7 ± 4.69</td>
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<td>74.7 ± 4.42</td>
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<td>hEXTEM T0</td>
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<td>50.4 ± 7.99</td>
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<td>69.1 ± 13.95</td>
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<td>57.1 ± 5.51*</td>
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<td>hEXTEM T1</td>
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<td>63.3 ± 10.94*</td>
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<td>74.2 ± 21.57</td>
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<td>60.9 ± 5.23*</td>
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<td>76 ± 6.08</td>
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<td>INTEM T0</td>
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<td>147.5 ± 18.22</td>
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<td>61.2 ± 3.49</td>
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<td>66.2 ± 3.56</td>
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<td>79.1 ± 0.78</td>
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<tr>
<td>HEPTEM T1</td>
</tr>
<tr>
<td>193.5 ± 34.4*</td>
</tr>
<tr>
<td>62.8 ± 15.27</td>
</tr>
<tr>
<td>58.2 ± 4.82*</td>
</tr>
<tr>
<td>65 ± 3.5</td>
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<td>77.5 ± 7.83</td>
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</table>

CT = coagulation time, A10 = amp. at 10 min., CFT = Cloth formation time, MCF = Max cloth firmness. *p <0.005.

Difficult intubation in Neuro and ENT Anaesthesia: changes of practice after introduction of new airway devices

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Service d’Anesthésiologie, Centre Hospitalier Universitaire Vaudois
CHUV, Lausanne

Introduction: Difficult intubation remains a challenge in anaesthesia and rates as high as 6–12% are reported in Neurosurgical or ENT patients. Preoperative airway assessment (mouth mobility) was assessed and intubation predicted potentially difficult if others1 17 0.002

Laryngoscope 388 (74.3) 400 (59.9) <0.001
McCoy 14 (2.7) 12 (1.8) 0.405
Bougie 58 (11.1) 61 (9.1) 0.306
Airtraq 0 94 (14.1) <0.001
Glidescope 0 79 (11.8) <0.001
Fiberscope 130 (24.9) 52 (7.8) <0.001

others 0.002

Ventilation strategies in obese patients undergoing surgery under general anaesthesia: systematic review and meta-analysis

M. Aldenkortt, N. Elia, C. Lysakowski, L. Brochard, M.R. Tramèr
Division of Anaesthesiology, Geneva University Hospitals

Background: The most appropriate ventilation strategy to optimize intraoperative gas exchange and pulmonary mechanics and to prevent postoperative respiratory complications in obese patients undergoing surgery remains unknown. We performed a systematic review and meta-analysis of randomized controlled trials to assess the impact of different intraoperative ventilation strategies in obese patients undergoing surgery.

Methods: We searched MEDLINE, EMBASE, CENTRAL, and bibliographies (up to December 2010), without language restriction. We included randomized trials in patients with a Body Mass Index ≥30 kg m-2 that reported on intraoperative gas exchange, pulmonary mechanics or postoperative respiratory complications. We estimated weighted mean differences (WMD) with 95% confidence intervals (CI) using data extracted from published papers.
Results: Twelve studies (441 patients) met the inclusion criteria. They reported on 11 different interventions: pressure controlled ventilation (PCV), volume controlled ventilation (VCV), pressure support ventilation, various tidal volumes, different levels of positive end-expiratory pressure (PEEP) with or without different alveolar recruitment maneuvers (RM), and a variety of RM with or without PEEP. PaO2/FIO2 ratio had a positive effect on the intraoperative PaO2/FIO2 ratio (WMD, 91.3 mm Hg; 95% CI, 54.8–127.9) compared with PEEP alone without any impact on mean arterial blood pressure. In comparing PCV with VCV, there was no difference in PaO2/FIO2 ratio, mean airway pressure, or mean arterial blood pressure. For all other comparisons, combination of data was not feasible.

Conclusions: The evidence base on the impact of different ventilation strategies on pulmonary outcomes in obese patients undergoing surgery is sparse. Most comparisons have been tested in 1 or 2 studies and a small number of patients. There is some limited evidence that in presence of PEEP, alveolar recruitment maneuvers may improve intraoperative oxygenation without adverse hemodynamic effects. There is a lack of evidence of any difference between PCV and VCV. A consensus on how to test ventilation strategies in obese patients undergoing surgery is needed.

Effects of perioperative blood glucose targets on glucose metabolism

A. Kopp Lugli1, C. Gillis2, H. Schepperle1, G. Kunz3, A. Urwyler1, J. Bläss3, L. Wykes2

Background: Surgical injury provokes stereotypical metabolic alterations including hyperglycaemia and protein catabolism. This appears to be particularly pronounced in patients with diabetes mellitus type 2 (DM2) and is related to increased perioperative morbidity. Recently, perioperative blood glucose target has been widely discussed here intensified insulin therapy may not only reduce glucose toxicity but is also associated with adverse events namely hypoglycaemia. The aim of this study was to assess glucose metabolism when applying two different blood glucose protocols in patients undergoing colorectal surgery.

Methods: Nineteen patients were randomly assigned to receive standard blood glucose control (subcutaneous insulin bolus, blood glucose <10 mmol·l–1; SC group n = 9) or continuous intravenous insulin (blood glucose <6 mmol·l–1; IV group n = 10). All patients received general anaesthesia and an epidural catheter. During surgery and immediately after surgery while receiving an amino acid infusion a stable isotope study with [6,6-D4]glucose was performed over 3 h to assess glucose kinetics. Plasma glucose, glucagon as well as insulin were measured.

Results: Fasting glucose and baseline insulin sensitivity assessed as HOMA (Homeostasis model assessment) were comparable for both groups. The stress of surgery induced higher glucose production (EGP) (p < 0.001) and reduced glucose clearance (GCL) (p < 0.001) in the postoperative period. Continuous intravenous insulin suppressed EGP (p < 0.001) and increased GCL, but it is labour intensive and bears the risk of hypoglycaemia. The aim of this study was to assess glucose metabolism when applying two different blood glucose protocols in patients undergoing colorectal surgery.

Material and methods: Following ethics committee approval, an observational prospective study was conducted on a consecutive cohort undergoing ambulatory foot surgery with a continuous popliteal nerve block. After informed consent, patients were discharged from hospital with 5 ml copivacaine 0.5% (continuous infusion through a disposable elastomeric pump (Easy-pump, Braun, Germany). Exclusion criteria were contraindications to regional anaesthesia, patient’s refusal, lack of an accompanying person, difficult accessibility to hospital, age less than 18 years. Patients were monitored daily by trained anaesthetic nurses through a telephone follow-up. Data are expressed as means ± standard deviations.

Results and discussion: From January 2010 until September 2010, 117 patients were enrolled (11 males/106 females, age 58.0 ± 12.8 years, ASA class 1/2). All of them bypassed PACU to be directly discharged to the day-hospital clinic. Home-based CRA was 4.3 ± 1.4 days long, at the end of which all patients successfully removed their percutaneous catheters. Treatment was very effective (mean NRS: 1.9 ± 2.6), with a low incidence of PONV (1.7%). The more frequent side effect was persistent motor block of the ankle and foot (5.9%), which in all cases was successfully managed over the telephone, giving instructions to stop the infusion temporarily. Complications observed were: accidental removal (5.5%) or obstruction (2.5%) of the catheter, mostly requiring readmission to day-hospital for repositioning and infections at insertion point (2.5%), which were all superficial and resolved completely after antibiotic therapy. 2.5% of patients referred an accidental fall at home, this was uneventful and not clearly related to CRA.

Conclusion: Outpatient CRA has few, generally benign complications, which can be effectively managed on an ambulatory basis.

References
Predictors of maternal satisfaction with anaesthesia during labour

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Introduction: Assessing maternal satisfaction with anaesthesia provides a valuable insight into patients' perspective on the quality of anaesthetic care provided. It is however largely unknown which factor really contribute to maternal satisfaction. The study purpose was to determine the predictors of maternal satisfaction with anaesthesia management during childbirth.

Materials and Methods: We performed a retrospective cohort study on 15386 parturients admitted between August 2003 and November 2008 in our labour and delivery units. We used anaesthetic records and retrieved data on patients' demographics, comorbidities, procedures performed and various aspects of their anaesthetic experience including their level of satisfaction measured on a Likert scale from 0–10. We performed a multivariate analysis to identify the different predictors of maternal satisfaction and more specifically those related to pain management, continuity and coordination of care, experience of the anaesthetic procedure and complications.

Results: We found that 761 parturients (7.6%) were dissatisfied with their anaesthetic care. Factors decreasing patient satisfaction were a high risk pregnancy and a dystocic delivery process, OR 95% CI 0.59 (0.34–0.92) and 0.62 (0.52–0.87) respectively. In addition, pain, a negative attitude towards surgery and delay in performing surgery in analgic, perceived poor coordination within healthcare teams and the presence of maternal or neonatal complications following delivery were the main factors decreasing patient satisfaction, OR 95% CI 0.57 (0.46–0.69) to 0.70 (0.59–0.85), P <0.001.

Discussion-Conclusion: Maternal satisfaction with anaesthesia care is largely determined by the effectiveness and overall experience of the anaesthetic procedure performed. However, other factors such as a good coordination in patient management and the absence of complications also influence maternal satisfaction. These should be all considered when defining and assessing quality of anaesthesia care during labour and delivery.

Quality control in pain relief and satisfaction for epidural anaesthesia in labour

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Background: Epidural anaesthesia (ECA) is commonly performed for pain relief in parturients in our hospital. We controlled quality in performance of the epidural, pain relief and satisfaction of the parturients.

Methods: With hospitals ethics committee approval every EDA in nulliparous women from July to October 2010 was enclosed in the prospective observational study. Time of every procedural step from informed consent to first epidural medical bolus administration (5 ml bupivacain 0.125% with 2 µg fentanyl/ml) was recorded. Efficacy of the anaesthesia was measured by visual analogue scale (VAS; 0 = no pain; 10 = most pain imaginable) before and 30 minutes after first bolus was administered. Satisfaction was investigated by an anonymous questionnaire postpartum.

Results: 78 primipara parturients were included. 3 have been excluded by an incomplete dataset, 1 for spinal anaesthesia. Median time from informed consent until EDA order was 12 min. (range 1–60), from order to arrival of the anaesthesist to the parturient 6 (1–110) min. and further to administration of the first bolus 25 (11–60) min. Median time from consent to bolus was 51.5 min. (24–130). Initial mean VAS of 8.2 (3–10) was reduced to 1.8 (0–6) within 30 minutes after bolus application and 69 of 74 women considered analgesia satisfying. Improved satisfaction was achieved by further bolus application or partial withdrawal of the catheter. One catheter had to be replaced and one pain control failed. 10 women complaining about postpartum headache were treated conservatively. One blood patch was administered. Satisfaction with ability to move was 3.5 (0 = complete control, 10 = no control at all). Self-control level was quoted 2.9 (0 = complete control, 10 = no control at all). The audit database included 25172 patients. We identified 141 patients (0.6%) who had at least one BP. All had been examined by a radiologist. The median had radiological tests (CT, MRI). 10 cases intracranial hypotension was confirmed. In 2 cases (after partially effective BP) an alternative diagnosis was made (sinusitis, migraine). Atypical symptoms included the following: neck pain irradiating to shoulders, arm, spine (42%); cranial nerves symptoms in 25% (hypoaesthesia, diplopia, scoloma); in patients with alternative diagnosis the type of headache changed after BP; other patient presented neuropsychiatric symptoms attributed to persistent intracranial hypotension one month after delivery despite having received a blood patch 1 day post-partum.

Discussion-Conclusion: Atypical symptoms are not rare in patients having PDPH. In a number of cases severe complications such as HAS and engagement of the cerebral trunk must be considered. We recommend a systematic MRI examination and a prompt neurological examination of these patients.

Risk factors for recurrence of post-dural puncture headache following blood patch in obstetric patients

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Background and Goal of Study: Postdural puncture headache (PDPH) is a well known complication following neuraxial anaesthesia. In obstetrics, the reported incidence varies greatly, between 0.16 to 5%. It is due to cerebrospinal fluid leakage from the dural sac causing a decrease of intracranial pressure. The clinical presentation is characterized by a throbbing headache following spinal or epidural anaesthesia, usually occipital, frontal or vertex in location. In some cases, the headache may have atypical presentation such as the occurrence of so-called “atypical headache”. There is evidence in the literature that atypical presentation of PDPH is associated with a higher incidence of complications such as delayed headache onset, need to increase analgesics and a lower rate of success with blood patch. This may lead to missed diagnosis and erroneous treatments. The current study aims to determine the incidence and clinical presentation of patients having atypical PDPH in obstetrics.

Materials and Methods: We performed a retrospective analysis of our quality database on population covered by our hospital between 2001 and 2010. Data collected include pre, intra and postpartum patient and procedure-related information. It also includes information on patient satisfaction and possible post-success-related complications such as PDPH or nerve injuries, collected within 24 hrs after delivery by the anaesthesist in charge. For our study we retrieved all patients who had an identified dural puncture (with a spinal or epidural needle, or a catheter) followed by typical PDPH treated with a BP. For all these patients we determined risk factors for recurrent PDPH by comparing patients and procedures characteristics of patients with or without recurrent symptoms after the BP. We used Chi-square, T-test and OR with 95% CI to compare groups.

Results: The database included 25 172 patients. We identified 141 patients (0.6%) with a typical PDPH who had at least one BP. Of these 57 (37.1%) had one BP and 27 (18%) had a failure of the initial BP.
Postoperative pain was better controlled with PVB in each of the 3 first
distributed data and Mann-Whitney test for non-parametric data;
anaesthesia and analgesia after breast surgery. Aim of this study is to
postoperative period.

Background: Chronic pelvic pain in endometriosis is associated with
and intervertebral spaces. In our cases, 58.8% of patients
standard deviation (S) ±

Methods: During 17 months, one anaesthesiologist performed US
exams and used ultrasonography aimed at helping to improve
attempts and sometimes in failed procedures. First use of
Ultrasonography was found 30 year ago in literature for epidural space
visualized. Internal caliper was used to calculate the depth

Discussion: It has been shown that US use, decreases attempts,
and of course costless as in each delivery room an

Results: 17 patients participated. Prepuncture US examination was
used in first position in 10 cases, and as second line in 7 cases. The
average maternal age was 29.5 ± 7.5 years. 11 had pre-pregnancy BMI
level ≥30. 14 reached the WHO criteria for obesity at the end of
pregnancy, with a mean BMI at 35.4 ± 10.4. In this series we
used US landmarks, with a 88.23% success rate of insertion at the
first “US assisted” attempt. We reach 100% success rate with second attempt.
Epidural space depth (cm) measured at US (UD = 5.51 ± 0.45) was very close to
the depth measured by the needle insertion (ND = 5.57 ± 0.43)

Discussion: It may have a place in obstetrical anesthesia, especially for obese women. It appears unnecessary to perform “US guided” epidural insertion for these patients. Prepuncture US-assisted landmarks seem to be sufficient, and of course costless as in each delivery room an ultrasound with appropriate probe for lumbar screening is present.

Paravertebral block prolonged opioids sparing effect after breast surgery
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Background and aims: Thoracic paravertebral block (PVB) presents a very effective technique to provide both a dense regional anesthesia and analgesia. Aim of this study is to investigate the duration of its opioids sparing effect in the postoperative period.

Methods: Two consecutive cohorts of patients undergoing mastectomy, quadrantectomy or breast reconstructive surgery under general anesthesia (GA) with and without PVB were retrospectively studied with regard to postoperative analgesia during the first 72 hours. In patients undergoing GA the level was assessed by numeric rating scale (NRS) and opioids consumption was calculated for each of the first 3 postoperative days as morphine equivalents total dose (MED). Data are given as mean ± standard deviation or medians. Statistical analysis was made with unpaired Student t-test for normally distributed data and Mann-Whitney test for non-parametric data; a p value <0.05 was considered statistically significant.

Results: 116 patients underwent GA (mean age 57.7 ± 14.4 years, mean weight 65.8 ± 14.1 kg), while in 109 cases a PVB was performed injecting a mean volume of 5 ml ropivacaine 0.35 to 0.75 % per level to be blocked (mean age 58.0 ± 13.1 years, mean weight 62.0 ± 15.9 kg). Postoperative pain was better controlled with PVB in each of the 3 first postoperative days (mean NRS after AG: 6 vs median NRS after PVB: 0; p <0.001). Opioids requirement was reduced in the PVB for 72 hours (mean MED day 0: AG 6.2 ± 3.6 mg vs PVB 5.0 ± 5.4 mg, p <0.05; mean MED day 1: AG 73 ± 1.7 mg vs PVB 4.6 ± 7.4 mg, p <0.01; mean MED day 2: AG 8.3 ± 3.1 mg vs BPV 2.3 ± 3.6 mg, p <0.01).

Conclusions: PVB has a significant opioids sparing effect which exceeds the expected duration of the local anesthetic effect, showing a preemptive analgesic effect after breast surgery.

Correlation between electrophysiological pain parameters and peritoneal fluid inflammatory cytokine concentrations in endometriosis patients with chronic pelvic pain
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Background: Chronic pelvic pain is associated with hypersensitivity of the central nervous system, and also with elevated concentrations of cytokines and growth factors in the peritoneal fluid. We tested the hypothesis that the concentration of inflammatory cytokines in the peritoneal fluid (PF) correlate with electrophysiological parameters of central pain hypersensitivity in endometriosis patients with chronic pelvic pain.

Methods: Eleven patients with histological diagnosis of endometriosis and suffering from chronic pelvic pain were tested. During surgery, PF was aspirated quantitatively, clarified by centrifugation and stored at −80°C in aliquots. The concentrations of IL-8, tumor necrosis factor (TNF-α), pregnancy-associated plasma protein A (PAPP-A), glycopentin (PP14), RANTES, leptin, osteoprotegerin (OPG), midkine, macrophage colony stimulating factor-1 (MCP-1), IP-10, ficolin-2 lectin, defensin, human epididymal protein-4 (HE-4) and CA-125 were determined by single manual ELISA. The following electrophysiological tests were performed: (i) the size of reflex receptive fields (RRF) = area of the foot sole from which a reflex of the anterior tibial muscle could be elicited; (ii) the reflex threshold after single (RTS) and (iii) repeated (RRT) electrical stimulation of the sural nerve (current intensity that elicits a withdrawal reflex in hamstring). Correlations were determined using Pearson’s correlation. A p <0.05 was considered as significant.

Results: RRF area correlated positively with PP-14 (Pearson’s rho r = 0.44, p <0.05) and with ficolin-2 (r = 0.47, p <0.05): the higher the concentration of PP-14 and ficolin-2, the larger the RRF area (meaning higher central pain sensitivity), and vice versa. IL-8 (r = 0.69, p <0.05), PP-14 (r = 0.78, p <0.01), MCP-1 (r = 0.69, p <0.05), and CA-125 (r = 0.87, p <0.05) displayed a positive correlation with RRF volume, indicating an association between these cytokines and central pain sensitivity. RIRS correlated negatively with TNF-α (r = −0.83, p <0.01): the higher the TNF-α concentration, the lower the RIRS (meaning higher central pain sensitivity). No correlation was observed between RTSS and the concentration of any cytokine tested.

Conclusions: The observed correlations suggest that inflammatory mechanisms may be important in the pathophysiology of central pain hypersensitivity, and that cytokines produced in the environment of endometriosis could act as mediators in this function.

Expansion of nociceptive reflex receptive fields in patients with low back and neck pain
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Background and aims: Expansion of receptive fields of spinal cord neurons may be one of the mechanisms underlying central hypersensitivity, and can be measured in humans with a new method involving nociceptive reflexes. We tested the hypothesis that patients with low back pain and neck pain display an expansion of nociceptive reflex receptive fields.

Methods: 40 patients with chronic low back pain, 40 with chronic neck pain and 14 with acute low back pain (data collection is running) were tested and compared with a cohort of 300 pain-free subjects. All subjects were tested by the same investigator (A.N.). Electrical stimuli were applied to 10 sites of the foot sole to evoke reflexes in the tibialis anterior.
anterior muscle. The reflex receptive field area was defined as the area of the foot sole (expressed as fraction of the foot sole) from which a muscle reflex was evoked by the reflex stimulus. The groups were compared by Kruskal-Wallis ANOVA on ranks and Multiple Comparisons versus control group.

**Results:** All three patient groups displayed significantly larger RRF area, compared with pain-free subjects. Medians (25 and 75 percentiles, p-value compared to controls) were: acute low back pain 0.46 (0.33–0.52, p = 0.004), chronic low back pain 0.39 (0.26–0.55, p = 0.047), chronic neck pain 0.40 (0.29–0.48, p = 0.006) and control group 0.30 (0.18–0.44). No significant differences between patients were observed.

**Conclusions:** This study provides the first evidence for widespread expansion of reflex receptive fields in acute and chronic musculoskeletal pain.

**Key words:** reflex receptive fields, central sensitization, acute low back pain, chronic low back pain, chronic neck pain.

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**Reliability of quantitative sensory testing in a low back pain population**

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**Background and aims:** Reliability is an essential condition for using quantitative sensory tests (QST) in research and clinical practice, but information on chronic pain patients is sparse. The aim of this study is to evaluate the reliability of different QST assessments in chronic low back pain patients.

**Methods:** The first 19 patients were included in this preliminary analysis. Patients received QST on two different sessions: pressure, electrical, heat and cold stimulation, and conditioned pain modulation using ice water (CPM). The data were analyzed with Pearson product moment correlation.

**Results:** The correlation coefficients (p-values) were: pressure pain detection threshold 0.75 (0.0002), pressure pain tolerance threshold 0.75 (0.0002), electric pain single stimulation threshold 0.49 (0.0337), electric pain temporal summation threshold 0.32 (0.189), NRS at supra-threshold electric temporal summation 0.75 (0.0002), heat pain detection threshold 0.33 (0.168), heat pain tolerance threshold 0.72 (0.0006), cold pain detection threshold 0.51 (0.0271), time to reach NRS 7 in ice-water 0.89 (0.0000), CPM on pressure pain tolerance 0.45 (0.0512), CPM on electric pain 0.53 (0.021).

**Conclusions:** Most QST were reliable. In this preliminary analysis, low reliability of some tests may partly be due to lack of statistical power.

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**Conditioned pain modulation in patients with low back and neck pain**

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**Background and aims:** Conditioned pain modulation (CPM) is an endogenous pain modulatory mechanism that occurs when response to a painful stimulus is inhibited by an additional conditioning painful stimulus. Disturbed CPM is observed in chronic pain patients and may be one of the mechanisms underlying central hypersensitivity. We tested whether patients with low back and neck pain display altered CPM.

**Methods:** In a running study, we analyzed 34 patients with chronic low back, 40 with acute low back, 36 with chronic neck pain and 21 healthy controls. Test-stimulus was pressure pain tolerance threshold (PPT, expressed in kPa) at the 2nd toe, measured before and immediately after conditioning stimulus at the hand (ice water test). PT was defined as the point at which the subject felt the pain as intolerable. CPM was calculated as absolute difference between PPT after and PPT before ice water test. Mean differences were compared by Kruskal-Wallis ANOVA on ranks and multiple comparisons versus control group.

**Results:** All groups displayed significantly higher PPT after cold water test, i.e. a CPM effect (p < 0.001). The mean differences (95% confidence intervals) of PPT after – before ice water test were: 161 (93 – 228) in chronic low back, 164 (120 – 207) in acute low back, 88 (49 – 126) in chronic neck pain and 141 (89 – 193) in controls. There were no statistically significant differences among groups.

**Conclusions:** In this preliminary analysis, we did not observe alterations of CPM in acute or chronic low back pain, and in chronic neck pain.

**Key words:** conditioned pain modulation, acute low back pain, chronic low back pain, chronic neck pain.

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**Lack of efficacy of intravenous tropisetron on modulation of pain and central hypersensitivity in chronic low back pain patients**


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**Background and aims:** The activation of 5-HT3 receptors may be one mediator of widespread central hypersensitivity, leading to exaggerated pain responses. The anagogic effects of 5-HT3 receptor antagonists have been proven in patients with fibromyalgia. To our knowledge, no data on the efficacy of 5-HT3 receptor antagonists in low back pain are available. This randomized, double-blind, placebo-controlled cross-over clinical trial was undertaken to test the hypothesis that the 5-HT3 receptor antagonist tropisetron attenuates pain and central hypersensitivity in patients with chronic low back pain.

**Methods:** We studied thirty patients with chronic low back pain. 15 were women (age 53 ± 14) and 15 men (age 48 ± 14). A single intravenous injection of 0.9% saline solution, tropisetron 2 mg and tropisetron 5 mg was administered in three different sessions, in a double blind crossover manner. The main outcome was the pain VAS score before, 15, 30, 60 and 90 minutes after drug administration. Secondary outcomes were nociceptive withdrawal reflexes to single and repeated electrical stimulation, reflex receptive fields, pressure pain detection and tolerance thresholds at 2nd toe and pain drawing area. The data were analyzed by panel multiple regression.

**Results:** All three medication reduced VAS scores. However, there was no statistically significant difference between tropisetron and placebo in VAS scores. No effect of tropisetron compared to placebo on any secondary outcome was detected.

**Conclusions:** A single dose intravenous administration of tropisetron in patients with chronic low back pain had no significant specific effect on intensity of pain and parameters of central hypersensitivity.

**Key words:** 5-HT3 receptor antagonists, tropisetron, central sensitization, randomized, placebo-controlled, chronic low back pain.

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**Neuropathic pain induced by peripheral nerve injury is associated with glial modifications in emotion-related brain regions**

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Psychiatric symptoms are highly prevalent in neuropathic pain (arising from nerve injury), amplifying its socioeconomic burden and impeding the proper compliance to treatments. In psychiatric disorders, converging evidences point at the involvement of cortical and subcortical glial cells. Therefore, in the present work we asked whether limbic glia (astrocytes and microglia) undergo modifications following peripheral nerve lesion induced by spared nerve injury (SNI), in mice and rats. An marked anxiety-like behavior (marble burying test) is detected from 6 weeks post-lesion in painful mice. Western-blots analysis shows a significant upregulation of the astrocytic protein GFAP at 7 days post lesion, but not after 6 weeks, with no other detectable glial changes. In rats, we report increases in glial glutamate transporters EAAT-1 and EAAT-2 in the hippocampus, as well as an increase in the GABA transporter GAT-3 in the amygdala 7 days post-surgery. Immunofluorescences shows significant increases of microglial density in the infralimbic cortex and s100β positive astrocytes in the amygdala (basolateral and central regions). In addition, significant morphological modifications in astrocytic GFAP were found in the prelimbic cortex and hippocampus. Together, our data show that cortical and limbic glia respond to peripheral neuropathic injury, with an intricate pattern of cellular reactions. This might pave the way for a better understanding of the connection between neuropathic pain and its psychiatric symptoms.
Effects of GABA-agonists on pain modulation: An experimental study in healthy volunteers

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Background and aims: Neuropathic and inflammatory pain are associated with plastic changes of the central nervous system, leading to reduced glycergic and GABAergic inhibitory control within the spinal cord. This diminished inhibitory control can be modulated by GABA-agonists, producing anti-nociception in animal models. The aim of this study was to explore GABA-agonists using a multimodal experimental testing procedure. Positive findings would encourage further development in the field of GABA-modulation.

Methods: Sixteen healthy male volunteers were tested in a double-blind, crossover, placebo-controlled study. Each volunteer randomly received 3 drugs on 3 different sessions: tolterodine (active placebo), clonazepam (less sedative GABA-agonist), and clobazam (less sedative GABA-agonist). Experimental pain tests were: area of secondary hyperalgesia induced by capsaicin, electrical stimulation of sural nerve and tibialis anterior muscle, pressure algometry on the second toe, ischemic cuff algometry, conditioned pain modulation with ice-water stimulus as conditioning stimulus and pressure algometry as test stimulus.

Results: Based on preliminary analyses, we detected an analgesic action of clonazepam in only one of the experimental models used. Clonazepam did not display analgesic action in any model. Because pharmacogenomic and pharmacokinetic analyses are pending, these results have to be considered as preliminary.

Conclusions: Based on preliminary analyses, we detected an analgesic action of clonazepam in only one of the experimental models used. Clonazepam did not display analgesic action in any model. Because pharmacogenomic and pharmacokinetic analyses are pending, these results have to be considered as preliminary.

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The ubiquitin ligase Nedd4-2 is a potent regulator of the voltage-gated sodium channel Nav1.7 and is implicated in neuropathic pain

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Background and aim: Neuropathic pain (NP) occurs after a lesion of the nervous system and is associated with nervous system hypersensitivity. Peripheral nerve activity is mainly carried by voltage-gated sodium channels (VGSC), with Nav1.7 isoform being important for nociception. Ubiquitin ligases from the Nedd4 family are well known for their ability to deubiquitinate and downregulate membrane receptors in an activity-dependent manner. The ubiquitin ligase Nedd4-2 is a potent regulator of the voltage-gated sodium channel Nav1.7 and is implicated in neuropathic pain.

Results and discussion: The subcellular fractionation of dorsal root ganglia (DRG) allowing the separation of membrane and cytosolic enriched fraction was performed to study the targeting of Nav1.7 after SNI. Nedd4-2 expression after SNI was investigated using both immunohistochemistry and western blotting. In vitro whole cell patch clamp on HEK293 transiently transfected with Nav1.7 alone, or Nav1.7 and Nedd4-2, produced higher pain threshold to muscular repeated electrical stimulation, compared to placebo. The analyses for all the other quantitative pain measurements failed to show statistically significant differences between clonazepam or clobazam and placebo.

Conclusions: Based on preliminary analyses, we detected an analgesic action of clonazepam in only one of the experimental models used. Clonazepam did not display analgesic action in any model. Because pharmacogenomic and pharmacokinetic analyses are pending, these results have to be considered as preliminary.

Cleaning Blood: Extracorporeal Device for Blood Purification using Ultra-strong Metal Nanomagnets

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Nanomagnets with metal core have recently been shown to be promising candidates for magnetic drug delivery and hyperthermia due to superior magnetic properties compared to commonly used metal oxide beads. This presentation will discuss the direct removal of harmful substances from human plasma using functionalized magnetic nanoparticles. The applicability of the concept is demonstrated utilizing three examples: The removal of a heavy metal (lead), a steroid drug (dihydropyridine) and whole proteins (Interleukin-6 and Interleukin-1β) was achieved by spiking human whole blood with the contaminant and applying appropriately functionalized magnetic beads for the detoxification. The contaminant concentration in intoxicated whole blood could be significantly decreased in a dose-dependent manner using magnetic separation-based blood purification. As successful application strongly relies on a safe implementation, a particular focus is put on possible interactions of nanomagnets with the vascular compartment. The integrity of the blood was not affected by the process as depicted by monitoring a series of clinically important parameters. The implementation of the concept was used to develop an extracorporeal blood purification device (ex vivo test) and further steps in the direction of a clinical application of the concept will be discussed in detail. Using magnetic blood purification, previously inaccessible higher molecular weight compounds can be removed at actively and swiftly compared to conventional dialysis. Potential future applications of this young technology reside in the treatment of sepsis by extracting endotoxins and other inflammatory mediators.

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A novel radiofrequency denervation method for cervical zygopophysial joint pain based on ultrasound localisation of the nerves

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Background and aims: In several studies, radiofrequency neurotomy of the cervical facet joint nerves has provided complete pain relief in 60–70% of the patients for about 9 months. The main disadvantages are procedural times of 2–4 hours, because several lesions need to be made due to the variable nerve course. Ultrasound imaging enables localisation of these nerves. This information could be used in order to reduce the amount of thermal lesions performed per nerve. We tested the hypothesis, that a shortened radiofrequency procedure based on ultrasound localisation of the nerves would reach the benchmark of at least 80% pain relief in 80% of patients for a median duration of 35 weeks.

Methods: We studied 15 consecutive patients with cervical facet joint pain. They were treated using a shortened radiofrequency procedure under fluoroscopic control, based on ultrasound localization of the joint supplying nerves, with only two lesions performed per nerve. Successful treatment was defined as at least 80% pain relief in theVAS.

Results: 14 of the 15 patients were successfully treated (93%, 95% CI 80–100%) with a median time of pain relief of 44 weeks. At 6 and 12 months, 13 (87%, 95% CI 70–100%) and 6 patients (40%, 95% CI 15–65%) reported successful treatment, respectively. The median duration of the procedure was 35 minutes (interquartile range 27–48 minutes).

Conclusion: In patients suffering from chronic cervical facet joint pain, radiofrequency denervation according to a shortened protocol based on ultrasound localisation of the nerves reached the benchmark of the standard technique.
Implementation of a multidisciplinary surgical safety checklist and a “team time out” to improve patient safety at Inselspital Bern

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Background: Wrong site, wrong procedure and wrong person surgeries are sentinel events with serious consequences for the patient, the medical staff and the hospital. The World Health Organization advise the adoption of a chirourgic safety checklist and to pause for a moment (time out) immediately before starting the procedure. The Inselspital Bern consents to this universal iniative.

Methods: An interdisciplinary and interprofessional task force designed an adap-ted version of the WHO-checklist. The originated “checklist Inselspital Bern” is a tool of questions, specially tailored to the particular needs of individual units and separated in three parts: first the pre-operative verification, second the period be-fore induction of anesthesia and third the “time out” previous to skin incision.

The implementation follows a defined schedule. Before the official beginning the check-list was undergoing pilot site evaluation. Hereby first difficulties could be verified and addresed. From January 2011 onwards all involved departments seiz the opportunity to introduce the checklist and to familiarize with this new tool. On February 1st, 2011, the start of the current six-monthly introductory phase, the implementation takes place in all operative divisions. We attach great importance to structured staff-training. To brief the directly involved persons we specially produced an educational filmwich instructs about the accurate use of the checklist and the performance of the team time out.

Results: The interim results demonstrate a good acceptance by the medical staff. The interdisciplinary as well as interprofessional approach to implement and per-form the checklist appears to be successful. Part two and three of the checklist reach high rates of completion. Physicians and nurses contribute to the perfor-mance equally. Case reports of near miss errors of identification are sampled in a systematic manner.

Conclusion: The introduction of a change of processes implying interruption of established procedures poses a great challenge for the ongoing hospital operations. Successful implementation of new safety measures depends upon the quality of staff-briefing and education sincere commitment of hospital leaders. The checklist represent an essential contri-bution for team-formation, awareness and improve-ment of communication within the hospital resulting in a better quality of patient care.