POSTER DISCUSSION 5
Regional and Acute Pain
Co-chairs:
Dr Shalini Dhir, Department of Anesthesia and Perioperative Medicine, Western University, London, ON
Dr Marie-Josée Nadeau, Department of Anesthesiology, Laval University, Quebec City, QC

Monday June 24
08:00 – 09:45
Chinook 1

DISCUSSION DES AFFICHES 5
Anesthésie régionale et douleur aiguë
Co-présidents :
Dr Shalini Dhir, Département d’anesthésie et de médecine périopératoire, Université Western, London, ON
Dr Marie-Josée Nadeau, Département d’anesthésiologie, Université Laval, Québec, QC

Lundi 24 juin
8 h à 9 h 45
Chinook 1

1599253 - PREDICTION OF THE DEPTH OF THE HIGH THORACIC EPIDURAL SPACE BY CT SCAN
Presenter: Ann Merah, Anesthesia, University of Calgary, Calgary, AB
Co-authors: Michael Beriault, Andrew Walker, William Morrish

1625407 - THORACIC EPIDURAL INSERTION VIA A LUMBAR APPROACH IN A PORCINE MODEL
Presenter: Jonathan Gamble, Department of Anesthesiology, Perioperative Medicine and Pain Management, University of Saskatchewan, Saskatoon, SK
Co-authors: Barbara Ambros, Patrick Seguin, Perrine Benmansour, Elemir Simko

1627683 - COMPARISON OF THREE BLOCKS REGIMENS FOR POSTOPERATIVE ANALGESIA IN AMBULATORY SHOULDER SURGERY: A DOUBLE-BLINDED PROSPECTIVE RANDOMISED PILOT STUDY
Presenter: Meggie Raymond, Department of Anesthesiology, Centre hospitalier universitaire de Sherbrooke, Université de Sherbrooke, Sherbrooke, QC
Co-authors: Étienne De Médicis, Jean-Pierre Tétrault, Véronique Gagnon, Marie-Hélène Massé, Frédéric Balg, Stéphane Ricard, Frédéric Mior

1646569 - CINNAMALDEHYDE PROLONGS CUTANEOUS ANALGESIA OF LOCAL ANESTHETICS IN RATS
Presenter: Yu-Chun Hung, Anesthesiology, Mackay Memorial Hospital, Taipei, Taiwan
Co-authors: Chiao-Yi Lin, Chien-Chuan Chen, Jen-Kun Cheng

1647781 - PARAVERTEBRAL BLOCKS FOR AMBULATORY BREAST TUMOUR RESECTION: EFFECTS OF AN INHALATIONAL GAS- AND OPIOID-FREE ANESTHETIC ON THE QUALITY OF RECOVERY. RANDOMIZED CONTROLLED TRIAL
Presenter: Faraj Abdallah, Anesthesiology, University of Toronto, Toronto, ON
Co-authors: Pamela J Morgan, Tulin Cil, Andrew McNaught, Jaime Escalon, John Semple, Vincent W Chan

1650712 - CAN ULTRASOUND GUIDANCE REDUCE THE VOLUME AND CONCENTRATION OF LOCAL ANESTHETICS FOR SUCCESSFUL INTERSCALENE BRACHIAL PLEXUS BLOCK? A SYSTEMATIC REVIEW
Presenter: Moein Tavakkoli zadeh, Department of Anesthesia, Sunnybrook Health Sciences Centre, Toronto, ON
Co-authors: Clarita Margarido, Colin McCartney, Jing Wang
1599253- PREDICTION OF THE DEPTH OF THE HIGH THORACIC EPIDURAL SPACE BY CT SCAN

Ann N. Merah¹, Michael Beriault², Andrew Walker³, William Morrish⁴

1. Anesthesia, University of Calgary, Calgary, AB, Canada
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Introduction: The objective of this study was to determine if the CT measured skin to anterior bony border of T3,4 (anterior surface of T 3,4 vertebral body) distance was related to the actual epidural depth (anterior surface of ligamentum flavum) measured at the time of T3,4 midline epidural needle placement.

Methods: Local ethics committee approval and individual patient consent were obtained. It was determined that twenty-eight patients would suffice to ascertain an 80% confidence level for correlation between the two measurements. Epidurals were performed prior to induction of anesthesia with patients in the sitting position and a midline approach at T3/4. Successful epidural puncture was confirmed using loss-of-resistance-to-air or saline. Epidural depth was read from the Tuohy needle and recorded on the anesthetic record. Chest X-rays done in recovery room confirmed the epidural catheter was in the T3,4 interspace. When the patient was discharged to the ward and it was ascertained that postoperative analgesia was satisfactory, the patient was recruited into the study. After all 28 patients were inducted into the study, their anesthetic records and preoperative CT scans were retrieved from medical records and radiology archives for data collection and epidural depth measurement. The preoperative CT imaging measurements were made by authors (AM, HM) blinded to the measurement made at clinical insertion. CT measurements were taken from the skin line to the anterior border of the T4 vertebral body at the level of the intra-articulating facets.

Results: Mean value for the actual (Tuohy) epidural distance was 6.3 cm while the CT measured distance was 5.0 cm and this was statistically different (t-stat of 7.12; p < 0.05).

Discussion: The difference between the Touchy needle (skin to loss of resistance) and the CT measured distances (skin to anterior border vertebral body) must be in part due to the thickness of the ligamentum flavum and any other soft tissue (fat pad). In our study this difference averaged 1.1 cm (range -1.6 to 2.3). The reported thickness of the T3,4 thoracic ligamentum flavum ranges between 0.3 to 0.5 cm (3). In two patients loss of resistance occurred at a shallower depth that predicted by CT measurement. We do not have a hypothesis for this anomaly apart from data entry errors. We conclude that reviewing the preoperative CT scan to estimate the depth to epidural space is more likely to help avoid false loss of resistance (26/28 patients). Although the depth to epidural space by Tuohy needle averaged 6.3 +/- 1.0 cm, predicting the depth to the epidural space by CT measurement in any individual patient is unhelpful given the wide range of difference (3.9 cm) between actual loss of resistance measurement and CT measurement.

1625407 - THORACIC EPIDURAL INSERTION VIA A LUMBAR APPROACH IN A PORCINE MODEL

Jonathan Gamble¹, Barbara Ambros², Patrick Seguin¹, Perrine Benmansour², Elemir Simko²

1. Department of Anesthesiology, Perioperative Medicine and Pain Management, University of Saskatchewan, Saskatoon, SK, Canada
2. Western College of Veterinary Medicine, University of Saskatchewan, Saskatoon, SK, Canada

Introduction: Continuous thoracic epidural analgesia is a valuable and common technique for analgesia both intraoperatively and postoperatively.1 Despite the excellent analgesic efficacy it is not without risk. The most common risk is technique failure, but the possibility of spinal cord injury exists.2,3 Both of these risks are greater with thoracic than lumbar epidural placement.3 There is significant pediatric experience placing thoracic epidurals via a caudal approach. 4 The advantages of this technique are a high success rate with minimizing the risk of spinal damage. The use of a stimulating catheter offers the advantage of real time conformation of appropriate catheter placement. We hypothesize that the tip of a stimulating epidural catheter can be reliably advanced to the thoracic epidural space with lumbar placement. This was explored in a living porcine model under general anesthesia.

Methods: Local Animal Care Committee approval was obtained prior to study commencement. In this prospective cohort porcine study we evaluated the feasibility of placing the tip of a stimulating epidural catheter to a predefined thoracic epidural location after percutaneous lumbar epidural access. Six healthy pigs weighing 28.4-33.7 kg were anesthetized. The fourth thoracic spinous process was clinically identified and marked with a subcutaneous needle, then confirmed with fluoroscopy. Epidural insertion was accomplished in lateral position with a 17G Tuohy needle. The stimulating epidural catheter was connected to a nerve stimulator and advanced until the fourth thoracic myotome was stimulated. The final position of the catheter in relationship to the needle was verified by fluoroscopy. At the end of the experiment all animals were euthanized, and an autopsy performed to examine the spine for needle entry position, final location of the epidural catheter (both tip level and space), as well as examination of the spinal cord for damage.

Results: See Table 1

Discussion: Our study demonstrates that access to the thoracic epidural space is possible via a lumbar approach. Additionally the location of a stimulating epidural catheter tip can be accurately identified using electrical stimulation. Based on gross and histopathological examination, this procedure was not associated with spinal cord damage in 3 out of 6 pigs (3/6). However, the subdural catheter placement (1/6), subdural hemorrhages (3/6), and spinal cord hemorrhagic cavitation (2/6) mandate further research.


Table 1 - Results

<table>
<thead>
<tr>
<th>Animal</th>
<th>Catheter Entrance</th>
<th>Final Tip Location</th>
<th>Final Location of Catheter</th>
<th>Subdural Hemorrhage</th>
<th>Hemorrhagic Cavitation in Spinal Cord</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>T16-L1</td>
<td>T4/5</td>
<td>Extradural</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>2</td>
<td>L2-L3</td>
<td>T3</td>
<td>Extradural</td>
<td>L4</td>
<td>L4-5</td>
</tr>
<tr>
<td>3</td>
<td>L1-L2</td>
<td>T4/5</td>
<td>Subdural</td>
<td>Multifocally adjacent to catheter</td>
<td>T10-L5</td>
</tr>
<tr>
<td>4</td>
<td>T16-L1</td>
<td>T5</td>
<td>Extradural</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>5</td>
<td>T16-L1</td>
<td>T4/5</td>
<td>Extradural</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>6</td>
<td>L1-L2</td>
<td>T5</td>
<td>Extradural</td>
<td>T15-16; L1-2</td>
<td>None</td>
</tr>
</tbody>
</table>

All results were extracted from autopsy except final catheter tip position, which were obtained from fluroscopy.
COMPARISON OF THREE BLOCKS REGIMENS FOR POSTOPERATIVE ANALGESIA IN AMBULATORY SHOULDER SURGERY: A DOUBLE-BLINDED PROSPECTIVE RANDOMISED PILOT STUDY

Meggie Raymond¹, Étienne De Médicis¹, Jean-Pierre Tétrault¹, Véronique Gagnon¹, Marie-Hélène Masse¹, Frédéric Balg², Stéphane Ricard², Frédéric Mior³

1. Department of Anesthesiology, Centre hospitalier universitaire de Sherbrooke, Université de Sherbrooke, Sherbrooke, QC, Canada
2. Department of Orthopedic surgery, Centre hospitalier universitaire de Sherbrooke, Université de Sherbrooke, Sherbrooke, QC, Canada

Introduction: Both subacromial (SA) and interscalene (IS) blocks have been advocated for shoulder surgery (1,2). We designed a double-blinded prospective randomised study to compare the efficacy of a single preoperative interscalene block versus postoperative subacromial block and their combination. All patients received a continuous subacromial block for 48 hours.

Methods: After written consent and ethics committee approval, 60 patients were prospectively randomised and followed for 48 hours postoperatively. Patients were distributed in three groups (Table 1). All surgeries were done under general anesthesia. Ultrasound use for the IS block was at the discretion of the anesthesiologist. The primary outcome was morphine consumption at 48h. Secondary outcomes, among others, included: morphine consumption at 0, 12 and 24h, pain on a visual analog scale (VAS) in the 48 postoperative hours, level of satisfaction and presence of postoperative nausea and vomiting (PONV). Chi square, Fisher exact, Kruskal-Wallis and Mann-Whitney tests were used where it was appropriate, with the Bonferroni correction when needed.

Results: Groups were comparable demographically and for types of surgeries. The IS blocks were ultrasound guided in 84% of the time, with no differences between the three groups. There was no statistically significant difference in the narcotic consumption at 48h. However, there was a statistically significant difference in the morphine consumption between the three groups in the first 24 postoperative hours. At 12h postoperative, the groups with the IS block (1 and 2) had a median of 0mg and 10mg of PO morphine consumption respectively compared to the group 3 which had a median of 48.5mg (p=0.001). At 24h, the groups 1 and 2 had a median of 16.5mg and 26mg respectively and the group 3 had a median of 59mg (p=0.018). Pain scores were lower in the post anesthesia care unit (PACU) (p<0.001) and at 24 hours (p=0.020) in the groups with the IS block. In the PACU, 90% of patient in group 2 had no or mild pain compared with 21% in group 3. At 24h, 75% of patient in group 1 had no or mild pain compared with 63% of patients in group 3. PONV were also reduced in the groups with the interscalene block: in the day surgery unit, 10% of patients in group 2 had PONV vs 60% in group 3 (p=0.007). In the subsequent 48 hours, 0% vs 35% of patients in group 2 and 3 respectively had PONV (p=0.016). Patients median score of satisfaction were about 90% in all groups (p = 0.674).

Discussion: There was no difference at 48h in the narcotic consumption. However, pain scores, narcotic consumption at 12 and 24h postoperative and PONV were lower in patients receiving a preoperative interscalene block instead of a postoperative subacromial block only, in ambulatory shoulder surgery. The effect of the single interscalene injection on pain score and morphine consumption lasted 24 hours postoperatively.


Table 1 Three regimens for postoperative pain control

<table>
<thead>
<tr>
<th>Group</th>
<th>Interscalene</th>
<th>Subacromial</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bolus 30 ml</td>
<td>Bolus 10 ml</td>
</tr>
<tr>
<td>1</td>
<td>Bupivacaine 0.5% + epinephrine 1 :200 000</td>
<td>NaCl 0.9% (placebo)</td>
</tr>
<tr>
<td>2</td>
<td>Bupivacaine 0.5% + epinephrine 1 :200 000</td>
<td>Bupivacaine 0.5%</td>
</tr>
<tr>
<td>3</td>
<td>NaCl 0.9% + epinephrine 1 :200 000 (placebo)</td>
<td>Bupivacaine 0.5%</td>
</tr>
</tbody>
</table>
CINNAMALDEHYDE PROLONGS CUTANEOUS ANALGESIA OF LOCAL ANESTHETICS IN RATS

Yu-Chun Hung1, Chiao-Yi Lin1, Chien-Chuan Chen1, Jen-Kun Cheng1

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Introduction: Cinnamaldehyde is an organic compound from cinnamon bark and contributes to flavor and odor of cinnamon. It serves as an agonist of transient receptor potential ankyrin subfamily member 1 (TRPA1), which is a nonselective cation channel expressed in nociceptors. It is widely accepted that TRPA1 agonists, similar to a transient receptor potential vanilloid type 1 activator (capsaicin), enhance inhibitory as well as excitatory synaptic transmission in nervous system. For example, cinnamaldehyde elicited heat and mechanical hyperalgesia, and cold hypoalgesia as well. Recent studies have suggested that a prolonged blockade can be achieved via capsaicin along with local anesthetics. However, the role of TRPA1 agonists on cutaneous analgesia remains unclear. Therefore, we investigated whether cinnamaldehyde prolongs cutaneous analgesia when co-administered with local anesthetics.

Methods: The study was approved by the institutional Animal Care Committee. Male Sprague-Dawley rats (weights 250-300 g) anesthetized with isoflurane, and 0.6ml drug solutions of 0.5% lidocaine, 0.0625% bupivacaine, and cinnamaldehyde in selected concentrations were injected subcutaneously via rat shaved dorsal skin respectively (n = 8 per group). In combination groups, cinnamaldehyde was co-administered either with lidocaine or bupivacaine. The inhibition of the cutaneous trunci muscle reflex was evaluated by pinpricks. For histological evaluation of toxicity, skin was excised from euthanized rats, and stained with hematoxylin and eosin.

Results: Cinnamaldehyde alone provided a dose-dependent block to pinpricks. The time to full recovery were 43.13±5.97, 63.75±4.7 and 95.63±3.94 minutes (mean±SE) in 0.5%, 1% and 2% cinnamaldehyde respectively. Complete block to pinpricks accomplished in 2% cinnamaldehyde with 0.5% lidocaine and with 0.0625% bupivacaine, and the time to full recovery were 157.5±5.67 and 159.38±6.3 minutes which were significantly prolonged compared to lidocaine or bupivacaine alone. In histology, there were some lymphocytic infiltrations approximately 2 days after treatment which indicated inflammation around the injected area.

Discussion: The combined application of cinnamaldehyde and local anesthetics produced a markedly prolonged cutaneous nociceptive block in rats when compared with either agent alone. A dose-dependent prolongation was observed while high concentrations of cinnamaldehyde augment duration of cutaneous analgesia. The mechanisms through which cinnamaldehyde affects the duration have not yet to be elucidated. Further researches are needed to the safety of clinical usage.
PARAVERTEBRAL BLOCKS FOR AMBULATORY BREAST TUMOUR RESECTION: EFFECTS OF AN INHALATIONAL GAS- AND OPIOID-FREE ANESTHETIC ON THE QUALITY OF RECOVERY.
RANDOMIZED CONTROLLED TRIAL

Faraj W. Abdallah¹, Pamela J. Morgan¹, Tulin Cil², Andrew McNaught¹, Jaime Escalon², John Semple², Vincent W. Chan¹

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Introduction: Current evidence associates tumor recurrence and metastasis with postoperative pain, surgical stress, inhalational anesthetics, and opioid use. Consequently, regional anesthesia techniques are advocated for tumor resection surgery as they effectively treat surgical pain, attenuate the neuroendocrine stress response, and minimize the use of general anesthetics and opioids. This study examines the effects of using an inhalational gas- and opioid-free anesthetic technique that relies on total intravenous anesthesia (TIVA) and thoracic paravertebral blocks (PVBs) on the quality of recovery (QoR) following ambulatory breast tumor resection.

Methods: After local ethics committee approval, sixty-six consented adult females undergoing breast tumor resection surgery were randomized to receive a standardized general anesthetic regimen inclusive of sevoflurane, fentanyl, and morphine (General Group) or a combination of PVBs and propofol-based anesthesia (PVB Group). The PVB group received 5mL of ropivacaine 0.5% in each of the T1-T5 paravertebral spaces on the operative side using an out-of-plane parasagittal technique. The General group received five-level sham blocks with subcutaneous saline. QoR was assessed before discharge and on postoperative day (POD) 2 using the QoR questionnaire. Secondary outcomes including pain scores on admission and discharge from post-anesthesia care unit (PACU), discharge from hospital, and POD2; intra- and postoperative opioid consumption; time to first analgesic request; incidence of nausea and vomiting (PONV); patient satisfaction; and discharge time were assessed.

Results: Data from sixty-four patients was analyzed. Patient demographics were similar between groups. The QoR score before discharge and on POD2 was superior in the PVB group: 146 (143-149) and 144 (141-149) versus 131 (126-135); P<0.0001 and 138 (131-145); P= 0.013, in the General group respectively. Postoperative visual analogue scale (VAS) pain scores at rest were reduced after PVB in all time points assessed. Expressed as mean (95% CI), differences in VAS scores favoring PVBs equivalent to 3 (1 - 5); P<0.0001 on admission to PACU, 2 (1 - 3) on discharge from PACU; P=0.0011, 2 (1 - 3); P<0.0001 on discharge from hospital, and 1.5 (1 - 2); P=0.001 on POD2 were noted. PVBs also reduced intraoperative morphine consumption by 14.27mg (16.31-12.23); P<0.0001, reduced the incidence of PONV (odds ratio = 0.23; P=0.04), and decreased the discharge time by 49.7min (72.66-26.7); P=0.0005 compared to the General group. There were no differences in postoperative morphine consumption, time to first analgesic request, and patient satisfaction between the groups.

Discussion: Combining propofol-based general anesthesia and PVBs provides superior quality of recovery, analgesia, and shorter discharge time than an inhalational and opioid-based anesthesia in patients undergoing ambulatory breast tumor resection.
Introduction: Reducing the dose of local anesthetic (LA) required for interscalene brachial plexus block (ISBPB) improves its safety by decreasing the risks of systemic toxicity and block side effects such as phrenic nerve palsy. Since ultrasound-guidance increases block efficacy, it has been used to investigate the effects of reduced LA dose on block success, duration and incidence of phrenic nerve palsy. We aim to summarize the effect of low-dose ultrasound-guided ISBPB on block efficacy.

Methods: Medline, Medline in-process, Embase, Cochrane Central Register of Controlled Trials and Cochrane Database of Systematic Reviews were searched to retrieve randomized controlled trials (RCTs) and prospective observational trials studying ultrasound-guided ISBPB for shoulder surgery using less than established LA volumes (20ml for analgesia and 40ml for anesthesia). Outcome measures included block success, duration and incidence of phrenic nerve palsy. Methodological quality was determined using the Thomas Quality Assessment Tool for observational trials and the Cochrane Collaboration's Tool for RCTs.

Results: The electronic databases identified 199 abstracts, of which 61 were duplicates, and 37 did not meet inclusion criteria. 13 of the 24 full articles reviewed met criteria, representing 614 patients. A moderate dose-response correlation between block success and log dose ($R^2=0.57$), log volume ($R^2=0.76$) and log concentration ($R^2=0.60$) was established through weighted linear regression. The predicted effective dose (ED)95 (95%CI) for successful ultrasound-guided ISBPB with ropivacaine was 106mg (23-148) for dose, 18ml (4-24) for volume at 0.5%, 15ml (2-22) for volume at 0.75%, and 0.56% (0.24-0.72) for concentration at 20ml. Phrenic nerve palsy showed a moderate-high dose–response correlation with LA dose and volume. The predicted ED95 (95%CI) for normal diaphragmatic function was 20mg (16-51) for ropivacaine dose and 3.5ml (2.7-7.4) for ropivacaine volume at 0.75%.

Discussion: Ultrasound-guidance can reduce LA dose for ISBPB while maintaining block efficacy, although block success can be compromised by very low LA doses (<40mg). The conservation of block duration at doses which reduce block success suggest that once LA is accurately deposited, even very low volumes can maintain shoulder analgesia. The wide confidence intervals reflect small sample sizes (15-40 patients per allocation), as well as heterogeneity between trials regarding block technique (single or multiple injections; single-shot or catheter), operator experience (single or multiple), and surgery subtypes (open or arthroscopic). Therefore, future RCTs studying the effect of LA dose on ISBPB efficacy are still necessary.