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1324182 - TIVA REDUCES EMERGENCE DELIRIUM IN CHILDREN

Dorothy Myers[1], John R. Chandler[1], Disha Mehta[1], Emma Whyte[1], Michelle K. Misse[2], J. Mark Ansermino[1], Carolyne J. Montgomery[1]

1. **Pediatric Anesthesia and Anesthesiology, Pharmacology, and Therapeutics, BC Children's Hospital and University of British Columbia, Vancouver, BC, Canada**
2. **Post Anesthetic Care Unit, BC Children's Hospital, Vancouver, BC, Canada**

Introduction: Emergence delirium (ED) refers to a variety of behavioral disturbances including restlessness, agitation, inconsolability and struggling, commonly seen in children following emergence from anesthesia[1]. The incidence of ED in children may be as high as 40%[2,3]. Sevoflurane is associated with the highest incidence of ED[1]. Propofol has been shown to reduce ED in children compared with sevoflurane-only anesthesia[4,5], but these studies have confounding factors such as sedative pre-medication, ED-provocative designs and poorly validated ED outcome tools. We used a well-validated ED outcome tool to assess ED after a sevoflurane anesthetic (SEVO) compared with a total intravenous anesthetic (TIVA) using propofol. Pre-op induction behavior and post-op pain were also measured.

Methods: Following REB approval in this randomized, double-blind study, we recruited 112 children, ASA I-II, aged ≥ 2 and ≤ 6 yr, undergoing elective strabismus repair. Subjects were assigned to either the SEVO or TIVA arm and all received an oral pre-med of acetaminophen 20 mg/kg and ibuprofen 10 mg/kg. TIVA subjects received an intravenous (IV) induction of anesthesia with propofol 5-10 mg/kg and remifentanil 2.5-5 μg/kg followed by a maintenance infusion of propofol 200 μg/kg/min and remifentanil 0.1 μg/kg/min, then titrated by the clinician. SEVO subjects received an inhalational induction of anesthesia with 70% N_2O in 30% O_2 mixture by mask for 60 sec followed by incremental increases in sevoflurane (1-7%) and maintained by titrating sevoflurane to an end tidal value of 2.5%. The airway was maintained using a laryngeal mask airway (LMA). Topical tetracaine and fentanyl 1 mcg/kg IV and were administered for analgesia. Fentanyl 0.5 mcg/kg IV was repeated Q30 min. Induction behaviour was scored using the Perioperative Adult Child Behavior Interaction Scale (PACBIS). Post-op scoring began at LMA removal and continued for 35 min. Every 5 min, a masked investigator assessed ED using the Pediatric Anesthesia Emergence Delirium (PAED) Scale and pain using the face, legs, activity, cry, consolability (FLACC) scale. A positive ED outcome was a PAED ≥10.

Results: An interim analysis was performed per protocol. Data are reported for 94 subjects; 18 were excluded (1 failed IV, 17 protocol deviations). Recovery outcomes are reported in Table 1. Incidence of ED was higher with SEVO (38.3%) vs TIVA (14.9%) (Fisher exact, P=0.02). Based on this result, the trial was discontinued following recruitment of 50% of planned subjects. There was no difference in the median PACBIS score between arms. A higher maximum FLACC score (Mann-Whitney, P=0.033) was seen with SEVO (median 3) vs TIVA (median 1). Subjects experiencing ED had higher maximum FLACC scores (median 7) vs those unaffected by ED (median 1).

Discussion: There was a lower incidence of ED after TIVA. Both IV and inhalational inductions were similarly well tolerated without pre-operative anxiolysis. Higher FLACC scores were measured in the SEVO arm. There was a positive correlation between FLACC and PAED scales.

References: [1]Anesth Analg 2007 104: 84-91 [2]Paediatr Anaesth 2007 17: 56-60 [3]Anesth Analg 2000 91: 563-6 [4]Anesthesiology 2007 107: 733-8 [5]J Anesth 2007 21: 19-23

Recovery outcomes

	TIVA	SEVO	Total
Max FLACC ≥ 4[a]	14 (29.8)	22 (46.8)	36 (38.3)
Max PAED ≥ 10[a]	7 (14.9)	18 (38.3)	25 (26.6)

[a] *n* (%)

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1326932 - ULTRASOUND GUIDED CAUDAL-THORACIC EPIDURAL CATHETERS IN INFANTS

Nina Plant[1], Basem Naser[1], Gail Wong[1]

1. Anesthesia and Pain Medicine, The Hospital for Sick Children, Toronto, ON, Canada

Introduction: Access to the thoracic epidural space via the caudal route in neonates and infants avoids potential injury associated with direct needle insertion at a site where depth from skin to dura can be less than 1 cm.[1] When performed without catheter visualization, depth of insertion may be determined by landmark-based techniques, but exact catheter positioning remains uncertain. Ultrasound is a relatively new method of verifying catheter-tip location.[2] We describe our experience with caudal-inserted thoracic epidurals (CTE) positioned under ultrasound guidance (USG).

Methods: Research ethics board approval was obtained for interrogation of our Acute Pain Service database to identify patients who received a CTE from 2006 (when USG regional anesthesia was introduced in our facility) to 2011. Patient charts were reviewed to identify demographic data, catheter positioning techniques and clinical course related to epidural analgesia.

Results: 242 CTE were performed in the 6-year period. 45 were under USG. Median patient age and weight for USG CTE was 6 weeks and 4.3 kg, respectively. On average, catheters were inserted to the T8-9 interspace, with depth of catheter placement from the caudal insertion site ranging from 13 to 16 cm. In addition to USG, incidental perioperative fluoroscopic X-ray (XR) occurred in 8 patients. In the absence of injectable contrast, catheters were visible in 4 of these patients. Appropriate depth of catheter placement on XR correlated with measured depth by landmark based technique in all patients. In 3 patients reviewed on XR, catheters placed with USG without prior measurement of depth by landmark resulted in higher catheter tip placement by a median of 2 interspaces from the desired position. Catheters remained in situ for a median of 2 days (range 0 - 4). 9 catheters (20%) were discontinued for inadequate analgesia. 7 (16%) were removed prematurely due to catheter soiling.

Discussion: Blind positioning of CTE may result in a 32% rate of inadequate catheter position.[3] While the gold standard for catheter tip verification is XR, it is cumbersome, exposes patients and staff to ionizing radiation and may require injection of contrast into the epidural space. Ultrasound can guide needle placement in the caudal space and catheter advancement to a cephalad site.[2] It is non-invasive, non-irradiating, easily taught, does not require avoidance of neuromuscular relaxation, and allows real-time visualization of fluid injection into the epidural space. Our 80% rate of successful analgesia with USG CTE is comparable to the 84.9% reported in CTE placed using nerve stimulation.[4] However many catheters were abandoned for reasons unrelated to analgesia. This technique is limited by reduced visualization of spinal anatomy with increasing patient age, weight and bone ossification. In our experience, it is most effective in patients under 6 months of age. Landmark-based determination of depth of catheter insertion was more accurate than USG when confirmed on XR. However blind insertion alone cannot confirm catheter advancement in the correct direction, therefore landmark techniques should be used in addition to USG to determine depth of catheter placement.

References: 1. Anesthesiology 1988; 69(2): 265-269
2. Paediatric Anaesthesia 2003; 13: 681-684
3. Paediatric Anaesthesia 2002; 12: 424-428
4. Anesthesiology 2004; 100: 683–9

1331679 - SAFETY AND RELIABILITY OF ULTRASOUND-GUIDED CAUDAL EPIDURALS

Nicholas West[1], Ashley Robinson[2], Emma Whyte[1], Gillian Lauder[1]

1. Department of Pediatric Anesthesia, BC Children's Hospital, Vancouver, BC, Canada
2. Department of Radiology, BC Children's Hospital, Vancouver, BC, Canada

Introduction: The caudal epidural (CE) regional block technique is firmly established in pediatric anesthesia and provides peri-operative analgesia for infants receiving surgery below the umbilicus. The current standard blind technique of CE analgesia involves the injection of local anesthetic (LA) via the sacral hiatus into the CE space, usually as a test dose followed by a main dose. The test dose is used to confirm correct CE placement, but is unreliable[1]. Quoted failure rates for this blind technique are up to 25%[2]. LA may be inadvertently injected into a blood vessel, into CSF, subperiosteally, subcutaneously or peri-rectally. This may result in one or more of the following: regional block failure, inability to use alternative LA techniques as maximum LA dose has already been used, the need to use systemic opioids for postoperative analgesia and the potentially devastating consequence of systemic LA toxicity from intravascular injection. Blind CE regional block therefore exposes this vulnerable patient population to the potential for significant morbidity. Ultrasound (US) imaging has been shown by experts to enable direct visualization of the cannula and the LA as it is administered in the CE space[3]. We aimed to show that a novice ultrasonographer could use US imaging to reliably confirm placement of LA in the CE space in infants.

Methods: Following ethical approval and informed consent, 40 infants, ASA I-II, less than 6 months of age, undergoing elective surgery with planned CE analgesia, were recruited. Following induction of anesthesia, CE injection was performed with the aid of US control by the study's principal investigator, an experienced anesthesiologist, but a novice in the use of US imaging of caudal injections. Real-time visual identification of the CE space, the cannula and the test dose were noted and cephalad spread (height) of the main dose was estimated where possible. If visualized, the injection of the main dose was tracked. The US images were recorded and subsequently reviewed by an independent expert sonographer. The test and main doses administered were 0.1 ml/kg and 0.9 ml/kg of 0.25% bupivacaine with 1/200,000 epinephrine respectively.

Results: Table 1 demonstrates a learning curve for identification of anatomical structures, cannula and LA doses (9 cases for this investigator). US technique improved with experience and enabled confirmation of test dose placement in all post-learning curve cases.

Discussion: US imaging is a non-invasive and efficient technique for verifying correct placement of LA in the CE space in infants. There is an associated learning curve. Once mastered, it provides a timely and extremely reliable way to ensure the test dose is correctly placed. We propose that US imaging of CE regional blocks in infants can be adopted by any pediatric anesthesiologist and should become an international standard of care to improve the safety and effectiveness of CE analgesia in infants.

References: [1] Anesth Analg 2010, 110:41-5; [2] Anesthesiology 2004, 101:181-4; [3] Paediatr Anaesth 2010, 21:121-7

Table 1: Performance of caudal ultrasound technique improved after initial learning curve		Learning curve (first 9 cases)	Post learning curve (subsequent 31 cases)
Structures identified	Sacral hiatus	100 %	100 %
	CE space	78 %	100 %
	Cannula	22 %	77 %
Test dose	Visualized	44 %	100 %
Main dose	Trackable	22 %	90 %
	Height determined	0 %	29 %

1336919 - CLOSED-LOOP CONTROL OF INTRAVENOUS ANESTHESIA IN CHILDREN

Nicholas West[1], Guy A. Dumont[2], Klaske van Heusden[2], Sara Khosravi[2], Chris Petersen[1], J. Mark Ansermino[1]

1. Anesthesiology, Pharmacology & Therapeutics, University of British Columbia, Vancouver, BC, Canada
2. Electrical & Computer Engineering, University of British Columbia, Vancouver, BC, Canada

Introduction: Closed-loop control of anesthesia occurs when a measure of clinical effect, such as the electroencephalogram (EEG), is used as feedback to continuously adjust a drug infusion. This technique, described in adult studies[1,2], would be especially advantageous in children because of the inconsistency of existing pediatric pharmacokinetic (PK) and pharmacodynamic (PD) models and the large inter-patient PK/ PD variability observed in children[3]. Closed-loop control is expected to reduce the effect of inter-patient variability, improve stability of the depth of hypnosis and improve safety of administering intravenous anesthesia. In this pilot study of children undergoing gastrointestinal endoscopy, closed-loop control of propofol infusion was evaluated for both induction and maintenance of anesthesia while maintaining spontaneous breathing.

Methods: Following REB approval, and informed consent/assent, 30 children, ASA I & II, aged 6-16 were enrolled. A closed-loop controlled system, designed specifically for children, was used to continuously adjust the infusion rate of propofol, via an Alaris TIVA pump, during both induction and maintenance of anesthesia. The NeuroSENSE WAV_{CNS} index provided a feedback measure of depth of hypnosis[4]. The initial setpoint was WAV_{CNS} = 50, but this could be adjusted during maintenance of anesthesia at the discretion of the anesthesiologist. Prior to induction of anesthesia, NeuroSENSE sensors were applied and intravenous access was obtained. Following lidocaine (0.5 mg/kg), remifentanil was administered as a bolus (0.5 µg/kg) over 1 minute, and then as a continuous infusion (0.03 µg/kg/min). Oxygen at 2 L/min was delivered via nasal cannulae.

Results: Results are presented for 29 subjects (12 yr ± 3, 46 kg ± 14, 153 cm ± 15); one subject required an inhalational induction and was excluded. Procedures included 16 upper, 4 lower and 9 upper/lower endoscopies. Median time to initial setpoint was 328 sec (range, 121-598). This induction phase required mean 2.7 mg/kg (± 1.2) propofol, culminating in a mean predicted plasma concentration of 4.1 mg/ml (± 1.5). Loss of eyelash reflex occurred at median 180 sec (range, 60-360). Additional induction boluses of 0.5 mg/kg were administered in two cases. Mean propofol consumption for the maintenance phase (after initial setpoint was reached to the end of anesthesia) was 297 µg/kg/min (± 73) over 9 min (± 3) for upper endoscopies and 177 µg/kg/min (± 55) over 41 min (± 9) for longer procedures involving colonoscopies with or without upper endoscopy. The system was adjusted for deeper anesthesia (by setting WAV_{CNS} setpoint < 50) in 3 cases and for lighter sedation (by setting WAV_{CNS} setpoint > 50) during part of the maintenance phase in 12 cases. Two subjects required an intervention (continuous positive airway pressure or increased WAV_{CNS} setpoint) to maintain oxygenation.

Discussion: The primary focus of this study is to optimize the algorithm for closed-loop control of propofol infusion in children. This remains a work in progress. These results suggest that closed-loop control provides a viable method of overcoming the limitations of population-derived PK/PD infusion regimes for total intravenous anesthesia in children.

References: [1] Br J Anaesth 2003,90:737-4; [2] Anesthesiology 2006, 104:686-95; [3] Anesthesiology 2011, 115:83-93; [4] IEEE Trans Biomed Eng, 2006, 53:617-32

1342040 - SERUM LEVELS OF ORAL MORPHINE IN CHILDREN

Joy M. Sanders[1], Carolyne J. Montgomery[1], Gillian Lauder[1], Katherine Brand[2], Pamela E. Winton[3], Erin Cooke[1], Bruce C. Carleton[4], Gideon Koren[5], Michael J. Rieder[6]

1. **Pediatric Anesthesia and Anesthesiology, Pharmacology and Therapeutics, BC Children's Hospital and University of British Columbia, Vancouver, BC, Canada**
2. **Anaesthesia, Evelina Children's Hospital, London, United Kingdom**
3. **Anaesthesia, Southampton University NHS Trust, Southampton, Hampshire, United Kingdom**
4. **Pediatrics, Pharmaceutical Sciences, BC Children's Hospital and University of British Columbia, Vancouver, BC, Canada**
5. **Clinical Pharmacology and Toxicology, Hospital for Sick Children and University of Western Ontario, Toronto, ON, Canada**
6. **Pediatrics, Physiology & Pharmacology and Medicine, Schulich School of Medicine & Dentistry, University of Western Ontario, Toronto, ON, Canada**

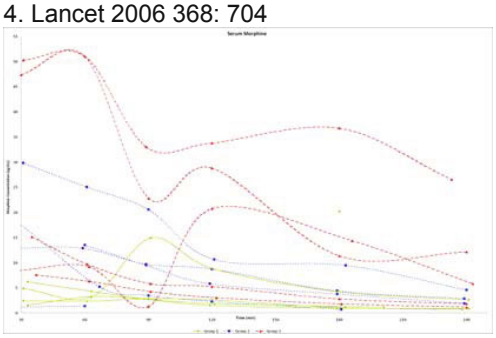
Introduction: Codeine is a prodrug that is activated by the isoenzyme CYP2D6[1]; genetic variations can result in either inappropriately low analgesic efficacy in "poor-metabolizers" or adverse effects such as respiratory depression and death in "ultra-rapid metabolizers". Morphine is metabolized to morphine-3-glucuronide (M3G) and morphine-3-glucuronide (M6G) by the isoenzyme UGT2B7[2], which also displays genetic variability. Oral (PO) morphine may be a feasible and safe alternative to codeine. The optimum analgesic dose of morphine should result in a peak serum concentration at 60 - 90 min and an analgesic therapeutic range of 10 - 40 ng/ml[3]. The pharmacokinetic (PK) properties of PO morphine have never been studied in healthy perioperative children. Understanding the prevalence of the genotypes described in our outpatient population may lead to safer use of perioperative opioids.

Methods: With REB approval and written informed parental consent in this randomized clinical PK study, we are recruiting 45 subjects, ASA I-II, aged 2-6 yr, undergoing elective surgery with a minimum hospital stay of 4 hr and requiring opioid analgesia. Subjects are block randomized to receive one of three doses of PO morphine pre-operatively; Group 1 = 0.1 mg/kg, Group 2 = 0.2 mg/kg or Group 3 = 0.3 mg/kg. Blood sampling is performed at 30, 60, 90, 120, 180 and 240 min. Adverse drug effects are measured for a 4 hour study period. Serum concentrations of morphine, M3G and M6G are measured using high-performance liquid chromatography. Genotyping of CYP2D6 and UGT2B7 are performed using the technique described by Koren[4].

Results: Six male and 9 female subjects were recruited into the first block of 15 subjects. Mean (SD) age, weight, height and BMI were 3.6 (1.4) yr, 18.4 (4.7) kg, 104.8 (14.0) cm and 16.5 (0.9) kg/m^2, respectively. No adverse events were observed. Peak serum concentrations (ng/ml) of morphine (mean (SD)) were; Group 1: 9.47 (7.71), Group 2: 15.23 (10.32) and Group 3: 29.08 (20.55). See figure. Groups 2 and 3 had variable but predominately therapeutic serum levels. Results for pharmacogenetics (PG) are pending.

Discussion: These preliminary findings suggest that 0.1 mg/kg PO morphine does not result in adequate serum levels and may not be adequate for outpatient pediatric pain management. The optimum dose determined from this study will be used in a larger PK/PG phase 2 study.

References: 1. Pharmacogenetics 1995 5: 335-46
2. Drug Metab Dispos 2003 31: 1086-9
3. Anaesthesia 1986 41: 753-5
4. Lancet 2006 368: 704



Serum morphine levels following PO morphine for subjects in Group 1 (0.1 mg/kg), Group 2 (0.2 mg/kg) and Group 3 (0.3 mg/kg) vs. time

1342220 - INTRA-OPERATIVE DOPAMINE AND DELAYED GRAFT FUNCTION AFTER RENAL TRANSPLANTS IN PEDIATRIC PATIENTS

Thomas W. Kim[1], Victor Figueroa[2], Armando Lorenzo[2], Rodrigo Romao[2], Katherine Taylor[1]

1. **Anaesthesia, Hospital for Sick Children, Toronto, ON, Canada**
2. **Urology, Hospital for Sick Children, Toronto, ON, Canada**

Introduction: In transplant surgery, adequate graft reperfusion after vascular unclamping plays a significant role in the allograft function. In some situations Dopamine is needed to stabilize blood pressure after vascular unclamping. The aim of this study was to evaluate the use of intra-operative dopamine as predictor of poor graft reperfusion and subsequent delayed function.

Methods: The medical records of 95 patients who underwent renal transplantation between 2006 and 2011 were retrospectively reviewed. Demographic information, warm ischemia time, anesthesia records, use of intra-operative dopamine, allograft source (cadaveric versus living donor), nadir creatinine and time to reach nadir creatinine were captured.

Results: Mean age at the time of renal transplantation was 10.5 years (17 months-17years). Of 95 transplants (63 males and 32 females), 54 (56.8%) were deceased donor allografts and 41 (43.2%) were from living donors. The mean time to nadir creatinine in the deceased donor allograft group was 10.5 days (1-55) and 2.7 days (1-16) in the living donor allograft group ($p<0.0001$). In 76 cases (80%), Intra-operative dopamine was used. The mean time to nadir creatinine was 7.8 days (1-55) in patients where intra-operative dopamine was required versus 4.1 days (1-21) without dopamine ($p=0.05$). When the patients were segregated by graft source the used of intra-operative dopamine has not impact on the mean time to nadir creatinine (2.8 days versus 2.2 days) in living donor allografts, however in deceased donor allografts, the mean time to nadir creatinine was 7.8 days in the intra-operative dopamine group versus 4.1 days without intra-operative dopamine ($p<0.0001$). We did not find statistically significant differences on mean patient age (10.1 vs. 11.6 years, $p=0.23$) and mean body surface area (1.1 vs. 1.22 m2, $p=0.68$) when we compare with the administration of intra-operative dopamine.

Discussion: In our series we found a significant increase in the mean time to nadir creatinine when intra-operative dopamine was used. These findings suggest that patients who require dopamine, particularly those receiving cadaveric organs and subsequently having a longer cold ischemia, may have a poor graft reperfusion and thus delayed time to nadir creatinine.

1342447 - EFFECT OF MAGNESIUM SULFATE ON MOTOR AND SOMATOSENSORY EVOKED POTENTIALS

Carolyne Pehora[1], Mark W. Crawford[1], Samuel Strantzas [2], Christian Zaarour [1], Laura M. Holmes[2], Michael Letal [1], Catherine Doherty[1]

1. Department of Anesthesia and Pain Medicine, The Hospital for Sick Children, Toronto, ON, Canada
2. Division of Neurosurgery, The Hospital for Sick Children, Toronto, ON, Canada

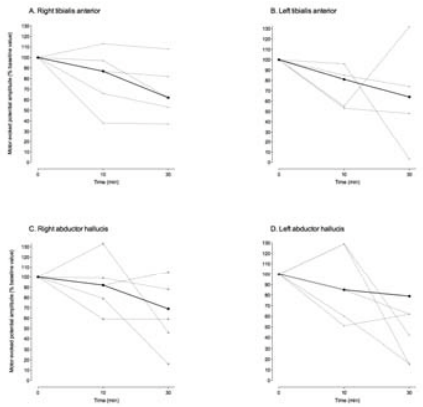
Introduction: Motor and sensory evoked potentials are used to assess the functional integrity of the spinal cord during surgery such as correction of scoliosis that places the spinal cord at risk for surgical trauma.[1] Opioid-induced hyperalgesia can develop during scoliosis surgery as a result of high-dose opioid infusion.[2] Intraoperative administration of magnesium may prevent the development of opioid-induced hyperalgesia;[3] however, we could find no prior studies evaluating the effect of intraoperative magnesium infusion on evoked potentials. We evaluated whether i.v. magnesium sulfate has a clinically significant effect (defined as ≥ 50% reduction) on the amplitude of motor and somatosensory evoked potentials in adolescents undergoing surgical correction of idiopathic scoliosis.

Methods: Local ethics committee approval and informed consent were obtained. Five ASA physical status I adolescents undergoing posterior spinal fusion were studied. Propofol and remifentanil titrated to response were used for maintenance of anesthesia. Magnesium sulfate was administered i.v. as a bolus dose of 50 mg/kg followed by an infusion of 10 mg/kg/hr in the interval between the completion of spinal instrumentation and skin closure. Motor (left and right tibialis anterior and abductor hallucis muscles) and cortical somatosensory evoked potentials were recorded immediately before and at 10 and 30 min after the start of the magnesium infusion. A reduction of 50% or greater in evoked potential amplitude was considered to be clinically relevant.

Results: Of the 40 motor evoked potential amplitudes recorded during magnesium infusion, eight (20%) were less than 50% of the value at baseline (Figure) and were considered clinically significant reductions. Serum inonized magnesium concentration increased from 0.70 ± 0.06 mmol/L at baseline to 1.28 ± 0.13 mmol/L after magnesium infusion. There were no clinically significant changes in motor evoked potential latency, somatosensory evoked potential amplitude or latency, and no adverse events attributable to infusion of magnesium sulfate.

Discussion: Magnesium sulfate can decrease the amplitude of motor evoked potentials. Its use as an adjuvant during scoliosis surgery to prevent opioid-induced hyperalgesia is not recommended.

References: 1. Eur Spine J 2007;16:S115-29
2. Anesth Analg 2006;102:1662-7
3. Can J Anesth 2006;53:1180-5



MEPs at baseline, 10 min and 30 min after starting $MgSO_4$ infusion

1343221 - IMPACT OF CONTEMPORARY TREATMENT OF MUCOPOLYSACCHARIDOSES ON AIRWAY MANAGEMENT IN CHILDREN

Grant Stuart[1], Carolyne Pehora[1], Komudi Siriwardena[2], Gail Wong[1]

1. Department of Anesthesia and Pain Medicine, The Hospital for Sick Children, Toronto, ON, Canada
2. Department of Clinical and Metabolic Genetics, The Hospital for Sick Children, Toronto, ON, Canada

Introduction: Patients with mucopolysaccharidosis (MPS) present significant perioperative challenges and have been described as the "worst airway problem in pediatric anesthesia".[1] The natural history of MPS may be altered by new therapies.[2] We sought to describe the impact of bone marrow transplantation (BMT) and recombinant alpha-L-iduronidase enzyme replacement therapy (ERT) on airway management in the pediatric MPS population.

Methods: Research ethics board approval was obtained for a retrospective review of the database maintained by the metabolic genetics department from 2000 to 2010. Charts were reviewed to identify patients with MPS, determine classification of MPS, type of therapy used and airway management for anesthetic encounters.

Results: 61 children with MPS required 294 anesthetics. The overall rate of difficult airway was 33%. Of 27 patients with Hurler's syndrome, 63% were treated with BMT and 22% with ERT. In those treated with BMT, 12% had difficult airways, compared with 75% in patients who received neither treatment. 50% of patients with Hurler's syndrome who had received ERT had a difficult airway. In most of these patients, ERT was commenced over 5 years of age. 89% of patients with Hunter's syndrome had difficult airways. ERT did not improve airway difficulty. 36% of all anesthetics were conducted without airway instrumentation. Direct laryngoscopy, with or without difficulty, was used in 29% of anesthetics, the laryngeal mask airway in 22%, fibreoptic bronchoscope in 3.5%, and video laryngoscope in 3.8%.

Discussion: Patients with MPS have a 25% reported rate of difficult airway, and up to 54% and 71% in patients with Hurler's and Hunter's syndromes, respectively.[1,3] BMT and ERT appear to slow the progression of MPS, although the benefits of BMT in patients over 18 month of age are reported to be minimal.[2] We report an 84% reduction of difficult airway in patients with Hurler's syndrome treated with BMT. Compared to BMT, ERT remains relatively novel and did not improve airway difficulty to the same extent, however the impact of ERT administered in infancy remains unknown. Use of newer equipment has altered the airway management of the pediatric MPS patient. Total intravenous anesthesia techniques may have facilitated minimal airway instrumentation for non-invasive procedures.

References: 1. Anaesthesia 1994; 49(12): 1078-84
2. Pediatrics 2008; 121: 377-86
3. Paediatric Anaesthesia 1992; 2: 317-324

	Mucopolysaccharidosis Type					
	Type I (Hurler)	Type II (Hunter)	Type III (Sanfillippo)	Type IV (Morquio)	Type VI (Maroteaux-Lamy)	Total
Number of patients	27	9	12	12	1	61
Total number of anesthetics	160	31	35	59	9	294
- excluding in situ ETT	154	31	34	58	9	286
Bone marrow transplant (BMT)						
- Number treated	17	0	0	0	0	17
- Age at start of treatment (range)	2m - 2y	-	-	-	-	
Enzyme replacement therapy (ERT)						
- Number treated	6	3	0	0	1	10
- Age at start of treatment (range)	14m - 11y	2y - 15y	-	-	2.5y	
Not treated	4	6	12	12	0	34
Number of difficult airways						
- Total: no. (%)	8 (30%)	8 (89%)	1 (8%)	2 (17%)	1 (100%)	20 (33%)
- Treated with BMT: no. (%)	2 (12%)	-	-	-	-	2 (12%)
- Treated with ERT: no. (%)	3 (50%)	3 (100%)	-	-	1 (100%)	7 (70%)
- Not treated: no. (%)	3 (75%)	5 (83%)	1 (8%)	2 (17%)	-	8 (24%)
Intubation (% of all anesthetics)						
- Direct laryngoscopy	46 (30%)	3 (10%)	17 (50%)	18 (31%)	3 (33%)	84 (29.4%)
- DL with significant BURP ± bougie ± 2-person technique	1 (0.6%)	7 (23%)	0	1 (2%)	1 (11%)	10 (3.5%)
- Fibreoptic bronchoscope	5 (3%)	3 (10%)	0	2 (3%)	0	10 (3.5%)
- Video laryngoscope	1 (0.6%)	3 (10%)	1 (3%)	5 (9%)	1 (11%)	11 (3.8%)
- Failed intubation	1 (0.6%)	2 (6%)	0	1 (2%)	0	4 (1.4%)
Laryngeal Mask Airway	42 (27%)	5 (16%)	6 (18%)	9 (15%)	0	62 (21.7%)
Face mask	23 (15%)	7 (23%)	5 (14%)	4 (7%)	2 (22%)	41 (14.3%)
Nasal prongs	34 (22%)	1 (3%)	5 (14%)	18 (31%)	2 (22%)	60 (21%)
Regional only	1 (0.6%)	0	0	0	0	1 (0.3%)

1343845 - A SINGLE CENTRE, FIFTEEN-YEAR AUDIT OF EPIDURAL INFUSION ANALGESIA IN CHILDREN

Gail Wong[1], Sue Chew[1], Basem Naser[1], Mark W. Crawford[1]

1. Department of Anesthesia and Pain Medicine, The Hospital for Sick Children, Toronto, ON, Canada

Introduction: We have previously reported an incidence of major complications related to epidural analgesia of 90 in 10,000 at our institution,[1] which is comparable to a reported incidence of 47-90 in 10,000 in existing literature.[2] We sought to determine if recent changes in epidural infusate preparation and delivery have impacted the incidence of complications occurring at our centre and describe trends of epidural analgesia usage that may have occurred with the introduction of ultrasound-guided regional anesthesia techniques to our practice.

Methods: Research ethics board approval was obtained for a retrospective review of the acute pain service database for the period 1997 to 2011. Major complications were identified and categorized according to type of incident, with a grading of severity from severe (requiring operative intervention or resulting in permanent deficit), moderate (resolving with non-surgical intervention) to mild (resolving without intervention).

Results: Of a total of 3154 epidurals performed, 29 major complications were identified (incidence 92 in 10,000). In the last 3 years, 8 complications occurred in 814 epidurals (98 in 10,000). The most common type of incident in this time period remained local skin infection as previously described, however whereas complications owing to drug error were second-most frequent previously, none occurred in this period. Of the new complications, 1 severe complication (compartment syndrome) and 1 moderate complication (neuropraxia) were associated with but not attributable to epidural analgesia. 2 other complications were of moderate severity, and 4 were mild. Complications remained more common in neonates and infants than older children relative to the number of epidurals performed in each age group. There was an increase in the number of infants receiving caudal-thoracic epidurals.

Discussion: No drug-related errors have occurred since the introduction of pharmacy-prepared infusate and specific pumps and delivery tubing dedicated to epidural infusion analgesia. Potential for programming error associated with new and unfamiliar equipment may have been avoided with pre-set weight specific infusion rate limits in these pumps. The use of ultrasound guided caudal-thoracic epidurals was associated with increased epidural analgesia use in infants in the last 3 years. Although epidural numbers decreased slightly in the past 12 months, the impact on epidural use by ultrasound-guided block/catheter techniques may have been minimal but is uncertain.

References: 1. ASA abstract A697 2009
2. Ped Anesth 2007; 17: 520-33

Complications

Type of complication	No. from 1997 to 2008	No. from 2009 to 2011	Total	% of Total complications
Local infection	8	4	12	43%
Drug error	4	0	4	15%
PDPH	0	2	2	7%
Catheter removal while coagulopathic	2	0	2	7%
Unrecognized intravascular catheter	1	0	1	3%
Unrecognized intrathecal catheter	1	0	1	3%
Misplaced catheter	1	0	1	3%
Respiratorydepression	1	0	1	3%
Pressure sore*	1	0	1	3%
Peripheral nerve injury*	1	1	2	7%
Compartment syndrome*	0	1	1	3%
Cardiac arrest*	1	0	1	3%
All complications	21	8	29	100%

*associated with but not attributable to epidural analgesia

1344798 - NEUROMONITORING ALERTS IN PEDIATRIC SPINAL FUSION SURGERY

Victor M. Neira[1], Victor Quaye[1], Paul Moroz[2], Renee Grenon[3], Karolinah Lukitto[1], Jan Jastrzebski[1], James Jarvis[2]

1. Anesthesia, Children's hospital of eastern ontario, Ottawa, ON, Canada
2. Surgery, CHEO, Ottawa, ON, Canada
3. Epidemiology, CHEO Research Institute, Ottawa, ON, Canada

Introduction: Neurologic injury is one of the most feared complications associated with scoliosis surgery. Intraoperative Neurophysiologic monitoring (IONPM) has replaced the wake-up test for assessment and early detection of neurologic function abnormalities during spinal fusion surgery. The objective of this study is to describe the use of the intraoperative neurophysiologic monitoring during spinal surgery.

Methods: Institutional Ethics Board approval was opbtained to perform a retrospective chart review of consecutive patients undergoing spinal fusion surgery at a single pediatric institution from March 2007 to March 2010. Variables included demographics, preoperative and intraoperative data, use of intraoperative neuromonitoring and modality (somatosensorial evoked potentials SSEPs and motor evoked potentials MEPs), and new post-operative neurologic deficits. IONPM alert was defined as decreased in amplitude of the SSEPs more than 50% and MEPs more than 65% compared with the baseline. Records were reviewed to classify the major contribution to the alert. Preoperative and intraoperative variables were analyzed with the abnormal IONPM as outcome, univariate and multi-variate logistic regression was performed.

Results: We had 157 cases undergoing spinal fusion surgery. IONPM was not used or unable to obtain in 19 cases (12%) one case had postoperative paraplegia in this group. 119 (83%) cases had normal reliable IONPM signals, 2 cases in this group had reversible neurologic injury. Twenty three (16.6%) had abnormal MEPs judged related with: hypotension 15 (9.5%), anesthesia 9 (5.7%), surgery 4 (2.9%), technical problems 4 (2.9%) and position 1 (0.6%). One case of this group had paraparesis. Abnormal SSEPs were found in eight cases (5.7 %) judged related with hypotension 4 (2.5%), position 4 (2.5%), anesthesia 1 (0.6%), and technical problems 1 (0.6%). Multivariate logistic regression analysis found Coob's angle and cardiovascular comorbidity as factors associated with IONPM alerts. Intraoperative use of vasoconstrictors was associated with decreased the risk of IONPM alerts (Table 1). Sensitivity and specificity of MEPs were 100% and 83%, in contrast for SSEPs were 0 and 94.2.

Discussion: Cardiovascular comorbidity and Cobb's angle were associated with increased risk of IONPM alerts, while the use of vasoconstrictors decreased the risk.MEPs seem to be sensitive to detect alterations in the spinal cord function related to different causes including hypotensive ischemia, mechanical injury or patient positioning.

References: Qiu Y, Wang S, Wang B, Yu Y, Shu F, et al. Incidence and risk factors of neurological deficits of surgical correction for scoliosis. Spine 2008; 33: 519-26.
Schwartz DM, Auerbach JD, Dormans JP, Flynn J, Bowe A, et al. Neurophysiological detection of impending spinal cord injury during scoliosis surgery. J Bone Joit Surg Am 2007; 89: 2440-9.

Table 1 Multivariate Logistic Regression Analysis for Intraoperative Neurophysiologic Alerts in Pediatric Patients Undergoing Spinal Fusion Surgery

Factor	O.R. (C.I.)	p
Cobb's Angle	1.34 (1.0-1.77)	0.045
Cardiovascular comorbidity	4.12 (1.04-16.3)	0.04
Intraoperative use of vasoconstrictors	0.22 (0.08-0.6)	0.003

138 cases were successfully monitored. Cobb's angle O.R. expressed as per ten degrees.

1312346 - PULSE PRESSURE VARIABILITY IN PIGS: EFFECT OF AGE AND TIDAL VOLUME

Kristin McCrea[1], **Linda Girling**[1], **Ruth Graham**[1]

1. Anesthesia, University of Manitoba, Winnipeg, MB, Canada

Introduction: Assessment of fluid status is essential for patient management but standard measures require invasive procedures that may be inaccurate or unavailable in pediatric patients. Alternatively, the dynamic change in arterial pulse pressure during mechanical ventilation (PPV) is suggested to be predictive of fluid responsiveness in adults[1], and requires only arterial access. Due to differences in aortic and chest wall compliances, however, adult PPV values may not apply to pediatric patients. The goal of this study was to determine baseline and threshold PPV that predicts fluid responsiveness in immature vs. mature piglets at two clinically relevant tidal volumes (V_T).

Methods: Following Institutional Animal Care Committee approval, we measured hemodynamics and PPV in two groups of piglets, 10-15 kg (pediatric equivalent, N=9) and 25-30 kg (young adult equivalent, N=10), under stable propofol/ketamine anesthesia at V_T = 8 and 10 ml/kg. Minute ventilation was maintained constant by adjusting respiratory rate. Measurements were taken at baseline euvolemia, then with stepwise blood withdrawal in 5ml/kg aliquots up to 30 ml/kg, and stepwise blood readministration. Results were analyzed using mixed measures ANOVA. For each age group and V_T, we constructed receiver operating characteristic (ROC) curves to determine the threshold PPV that was predictive of fluid responsiveness. A positive response was defined as ≥ 15 % increase in stroke volume (SV) with a 5 ml/kg bolus.

Results: PPV was significantly lower in immature pigs vs mature pigs and at V_T 8 vs V_T10 at every measurement period (see table). In both groups at either V_T, ≥ 20 ml/kg blood withdrawal was required before PPV increased significantly from baseline. Significant areas under the ROC curve were obtained in immature pigs at both V_T's but in mature animals at V_T10 alone. From the ROC's, the PPV threshold was 8.2% at V_T 8 and 10.9% at V_T 10 in immature animals vs 15.9% at V_T10 in mature animals. However, for each age group and V_T, the relationship between SV and PPV was found to best fit a curvilinear function with $p < 0.05$. This suggests that a single threshold PPV that predicts fluid responsiveness is difficult to ascertain. At the same V_T, the SV-PPV relationship was shifted to a significantly higher PPV intercept in mature vs immature pigs with no difference in slope. In mature pigs, V_T had no effect on the SV-PPV relationship. In immature pigs, both slope and PPV intercept increased significantly at higher V_T suggesting that PPV is more V_T sensitive in this cohort.

Discussion: Under the same anesthetic regimen, PPV values are lower and more V_T sensitive in immature compared to mature pigs. Although ROC curves permit calculation of a threshold PPV, the curvilinear nature of the SV vs PPV relationship suggests that a single threshold PPV should not be assumed and PPV may be more appropriately used as a trend monitor.

References: 1. Marik PE et al. Crit Care Med 37:2642-2647, 2009

Group	Immature (n=9)		Mature (n=10)	
Tidal Volume	V_T8	V_T10	V_T8	V_T10
PPV (%) Baseline	6.4 ± 0.7%	7.9 ± 1.3% *	10.5 ± 1.3% #	12.9 ± 2.0% *#
PPV (%) (30 ml/kg out)	10.0 ± 2.5%	12.3 ± 3.1%*	17.0 ± 6.0%#	20.1 ± 5.7%*#

* <0.05 V_T8 vs V_T10, # p <0.01 mature vs immature.

1315845 - NEAR-INFRARED SPECTROSCOPY AND THE VASCULAR OCCLUSION TEST DURING CARDIOPULMONARY BYPASS: A PILOT STUDY

Ryan S. Smith[1], **John M. Murkin**[1]

1. **Department of Anesthesia and Perioperative Medicine, University of Western Ontario, London, ON, Canada**

Introduction: Cardiac surgery and cardiopulmonary bypass (CPB) are known to induce alterations in the microcirculation that affect organ and tissue perfusion (1). Near-infrared spectroscopy (NIRS) technology uses light absorption to determine regional tissue oxygen saturation (StO2). The vascular occlusion test (VOT) uses StO2 to assess the integrity of the microcirculation by inducing a reproducible ischemia/reperfusion challenge to quantify the microcirculatory vasoactive response (2). VOT has been used to quantify microcirculatory dysfunction in severe sepsis (3) and hemorrhagic shock, but not in cardiac surgery. This pilot study examined whether differences in microcirculatory reactivity, as measured by StO2 and the VOT, exist during CPB.

Methods: After institutional review board approval and written informed consent, elective cardiac surgery patients were enrolled and had a series of VOTs performed. An StO2 sensor and attached spectrometer (Hutchinson InSpectra™ 650) were applied to the thenar eminence and a tourniquet placed over the brachial artery. VOTs were performed by occluding arterial flow to the hand for 3-5 min and recording StO2 values. VOTs were conducted at specified intervals in the operating room before, during and after CPB and VOT metrics were calculated using semi-automated software. Statistical analyses of VOT metrics were performed using one-way ANOVA with Tukey post-hoc comparisons (α=0.05).

Results: 13 patients were enrolled. There was no significant difference in occlusion slope (approximates rate of oxygen consumption) or hyperemic area (represents post-ischemic vessel dilation) pre-CPB, during CPB or post-CPB (Table 1). Mean reperfusion slope (representing microcirculatory vasoactive response to hypoxia) was significantly different pre-CPB compared to during CPB and post-CPB.

Discussion: This pilot study demonstrates a significant difference in the reperfusion slopes during CPB when compared to pre- and post-CPB intervals, suggesting impaired peripheral microvascular reactivity. Reperfusion slopes also exhibited a successive decline with duration of CPB, implying worsening microcirculatory dysfunction. The decreases in reperfusion slopes observed in this study are similar in magnitude to those measured in severe sepsis and are likely reflective of the vasomotor dysfunction previously identified in patients undergoing CPB. If these changes in microvascular function as measured by VOT are indicative of microvascular abnormalities in other organ systems (e.g. gut, kidney, brain) then the VOT could be used as a guide to optimize circulatory parameters during CPB.

References: 1. Eur J Cardiothorac Surg 2004;26:1002–1014
2. Am J Physiol Heart Circ Physiol 2007;293:H1065–71
3. Shock. 2007;27:348–353

Table 1. VOT metrics. Values are mean ± standard error.

	Pre-CPB	During CPB	Post-CPB
Occlusion slope (StO2% / min)	-9.8 ± 0.61	-11.1 ± 0.55	-11.4 ± 0.54
Reperfusion slope (StO2% / s)	4.1* ± 0.44	2.4* ± 0.22	3.5* ± 0.42
Hyperemic area (StO2% x min)	26.9 ± 4.3	24.5 ± 2.0	18.6 ± 3.7

*significant difference, p=0.0008

1323978 - INSPIRED OXYGEN CONCENTRATION DURING THORACIC SURGERY WITH ONE-LUNG VENTILATION DOES NOT AFFECT POSTOPERATIVE PNEUMONIA, CARDIOVASCULAR COMPLICATIONS, OR SURVIVAL

Peter H. Norman[1], Peter F. Thall[2], Ronaldo V. Purugganan[1], Dilip R. Thakar[1], Ara A. Vaporciyan[3], Heather Y. Lin[2]

1. **Anesthesiology and Perioperative Medicine, UT MD Anderson Cancer Center, Houston, TX, United States**
2. **Biostatistics, UT MD Anderson Cancer Center, Houston, TX, United States**
3. **Thoracic and Cardiovascular Surgery, UT MD Anderson Cancer Center, Houston, TX, United States**

Introduction: When a patient is on one-lung ventilation (OLV) for thoracic procedures including lung resection and esophagectomy the inspired concentration of oxygen is maintained at 100% as advocated by standard textbooks (1). This promotes better oxygenation. It may also predispose to more lung injury from oxygen toxicity. Lower saturations may predispose to cardiovascular complications. One of the authors started using lower oxygen concentrations where possible for thoracic surgery while maintaining saturation at or above 90%. We decided to study outcomes.

Methods: IRB permission was obtained to retrospectively obtain patient data from the hospital electronic medical record (EMR). Potential patients requiring OLV for cancer surgery assigned to one of the three anesthesiologists for the calendar year 2007 were identified from the hospital EMR. The year chosen was after the initial decision to try lower FiO2s and long enough ago for some survival data. The anesthetic EMR was queried for the use of OLV. The FiO2 was determined 20 minutes after the start of one lung ventilation or the start of surgery where one-lung ventilation was used but the onset of OLV not recorded. Pulmonary complications including pneumonia, and cardiovascular complications including arrhythmias and myocardial infarction were obtained from the thoracic surgical database. Last known contact information (LKC) was recorded from the center's tumor registry. Using the latter with operation date determined overall survival time and status (alive or dead). Statistical analysis was by Chi-square tests or Fisher exact tests for categorical variables and the Wilcoxon-Mann-Whitney test for continuous or ordinal-valued variables. Fitted Bayesian logistic and log-normal regression models were used to determine posterior probability.

Results: A total of 226 patients were identified as eligible. There was no correlation between continuous or dichotomized (≥70% or <70%) FiO2 and pulmonary complications or cardiovascular complications (Table 1). In the higher FiO2 group 45/141 have died and in the lower FiO2 group 24/85 have died (P=0.59).

Discussion: There may be no necessity to maintain 100% oxygen for the safe management of OLV. This may allow for other inspired gases or just reduce the anxiety when a patient who has been exposed to bleomycin needs surgery. Anecdotally there seems to be less sudden desaturation after commencement of OLV when a lower inspired oxygen concentration is initially used.

References: 1) Anesthesia for Thoracic Surgery / Jonathan L Benumof - 2nd ed. WB Saunders 1995. ISBN 0-7216-4467-8

Table 1: Association between inspired oxygen and complications (univariate)

Outcome		HIGH O2 (≥70%)	LOW O2 (<70%)	p-value
Pneumonia	none	127(94.8%)	74(92.5%)	.5000
	present	7(5.2%)	6(7.5%)	
CV Complications	none	102(76.1%)	64(80%)	.5102
	present	32(23.9%)	16(20%)	

1343666 - DELIRIUM FOLLOWING CARDIAC SURGERY: THE IMPACT OF DIFFERING ICU ENVIRONMENTS

Lindsey MacDonald[1], Rakesh C. Arora[2], Brett Hiebert[2], Hilary Grocott[1]

1. Dept of Anesthesia, University of Manitoba, Winnipeg, MB, Canada
2. Department of Surgery, University of Manitoba, Winnipeg, MB, Canada

Introduction: Delirium is a common problem that occurs after cardiac surgery. Postoperative delirium has been associated with increased 30-day and 5-year mortality, higher hospital costs, and a loss of functional independence. [1-3] Several aspects of the intensive care unit (ICU) environment contribute to the development of delirium. Accordingly, quiet private rooms with ready access to natural light are thought to reduce ICU sleep deprivation and delirium. We had a unique opportunity to examine the impact of environmental factors on postoperative delirium with the creation of a new cardiac ICU in our center. The overall purpose of this study was to determine the incidence and severity of post-cardiac surgery delirium, as well as to determine the impact of various ICU environmental factors.

Methods: Following Institutional Research Ethics Board approval, we conducted a retrospective chart review on patients having undergone cardiac surgery at a tertiary care cardiac surgical center. Analysis was performed in two cohorts of consecutive patients undergoing surgery. From May 1, 2010 to June 15, 2010 (E1 cohort) patients were managed in an “open” style ICU with the lack of physical barriers between beds and access to natural light. In May 1, 2011 to June 15, 2011 (E2 cohort) patients were admitted to a “closed” style ICU with individual, private rooms and outside windows at each bedside. Assessments for delirium were performed routinely on a 12 hourly basis using the Confusion Assessment Method (CAM; while on the ward) or CAM-ICU (while in the ICU) until postoperative day seven. A multivariable logistic regression with a stepwise selection process was used to determine the demographic and perioperative variables associated with delirium.

Results: Of the 286 patients analyzed, 44 (15.4%) had at least one episode of delirium during their hospital stay. Increasing age was confirmed as an independent risk factor for the occurrence of delirium (1.55 OR per 10 yrs of age, 95% CI 1.11 -2.17; p = 0.0105). Conversely, extubation of the patient in operating room was associated with a reduction in the occurrence of delirium (0.24 OR, 95% CI 0.10 – 0.59; p = 0.0009). When examining the effect of environment on patients older than 65 years, the “closed” style of ICU was associated with a significant reduction in postoperative delirium (12.9%, E2 vs. 24.7%, E1; p = 0.048).

Discussion: Delirium following cardiac surgery, as determined by standardized screening, was confirmed to be more common in the elderly. Early postoperative extubation was associated with a lower delirium incidence. Importantly, managing patients in a “closed” ICU was associated with nearly a 50% reduction in delirium. Further studies are required to determine the elements of the ICU environment have the greatest impact and are the most feasible to implement.

References: [1] Flacker JM, Cummings V, Mach JR, Jr., Bettin K, Kiely DK, Wei J. The association of serum anticholinergic activity with delirium in elderly medical patients. Am J Geriatr Psychiatry. 1998;6:31-41
[2] Gaudreau JD, Gagnon P, Roy MA, Harel F, Tremblay A. Association between psychoactive medications and delirium in hospitalized patients: a critical review. Psychosomatics. 2005;46:302-16
[3] van der Mast RC. Delirium: the underlying pathophysiological mechanisms and the need for clinical research. J Psychosom Res. 1996;41:109-13

1344107 - DOES PREOPERATIVE CRP PREDICT POSTOPERATIVE OUTCOMES?

Lori-Anne Noyahr[1], Tian Le Zhou[1], Duminda Wijeysundera[2]

1. Postgraduate Department of Anesthesia, University of Toronto, Toronto, ON, Canada
2. Department of Anesthesia, Toronto General Hospital, Toronto, ON, Canada

Introduction: Postoperative complications can result in significant mortality and morbidity, thus necessitating accurate screening tests to identify high-risk surgical patients. C-reactive protein (CRP) is an inflammatory marker associated with cardiac, cerebrovascular and infective events. We conducted a quantitative systematic review to determine whether preoperative CRP levels can predict cardiac events, atrial fibrillation, infections and mortality after major surgery.

Methods: This study required no REB approval. Sensitive search strategies were created for Medline (1950-June 2011) and EMBASE (1980-June 2011). These databases were searched independently by two authors for cohort studies that measured the association of preoperative CRP levels with cardiac events, infections, and all-cause mortality within 30 days of major surgery (cardiac and non-cardiac). No language restrictions were applied. The pooled predictive accuracy of CRP was calculated using a hierarchical summary receiver-operating-curve (hsROC) meta-analysis method. This random-effects model accounted for both within-study and between-study variability. Pooled measures of prognostic accuracy [area-under-the curve (AUC) of receiver-operating-characteristic (ROC) curve, sensitivity, specificity, positive likelihood ratio, negative likelihood ratio] were then calculated.

Results: From 7142 unique citations identified in the electronic databases, 52 eligible studies (18,977 patients) were included in the systematic review. Postoperative atrial fibrillation was reported in 22 studies; cardiac events in 15 studies; infections in 16 studies; and mortality in 15 studies.

In a pooled hsROC analysis of all surgeries, preoperative CRP poorly predicted postoperative cardiac events (AUC 0.57, 95% CI 0.53 to 0.62), with positive likelihood ratio (PLR) of 1.20 (CI 0.99 to 2.29) and negative likelihood ratio (NLR) of 0.80 (CI 0.64 to 1.00). Its performance was somewhat better in non-cardiac surgeries (AUC 0.68, CI 0.64 to 0.72), with PLR of 1.26 (CI 0.97 to 1.64) and NLR of 0.66 (CI 0.47 to 0.94). CRP also poorly predicted atrial fibrillation after cardiac surgery (AUC 0.53, CI 0.48 to 0.57]) with PLR of 0.96 (CI 0.71 to 1.29) and NLR of 1.02 (CI 0.90 to 1.16).

Preoperative CRP demonstrated reasonable predictive accuracy (AUC 0.73, CI 0.69 to 0.76) with regard to postoperative infections in all surgeries, with PLR 2.23 (CI 1.28 to 3.89) and NLR 0.51 (CI 0.31 to 0.86). CRP also had fair predictive value (AUC 0.67, CI 0.63 to 0.71) with respect to postoperative mortality after all surgeries, with PLR 1.72 (CI 1.28 to 2.30) and NLR 0.58 (CI 0.48 to 0.69).

Discussion: Preoperative CRP generally performs poorly as a *single* predictor of postoperative mortality and major complications. Further research is needed to determine whether the addition of preoperative CRP to other preoperative screening tools can improve the prediction of postoperative infections (all surgeries), mortality (all surgeries) and cardiac events (non-cardiac surgeries). Such prognostic studies should use newer analytic approaches, such as reclassification measures.

1344424 - IN VIVO PROTAMINE TITRATION IN CARDIAC SURGERY: PROOF OF CONCEPT

Antoine Rochon[1], Sylvain Bélisle[1], Alain Deschamps[1], Christian Ayoub[1], Robert Blain[1], Jennifer Cogan[1], Pierre Couture[1], André Y. Denault[1], Jean-Sébastien Lebon[1], Louis Perrault[1], Baqir Qizilbash[1], Jean Taillefer[1], Karine Toledano[1]

1. Anesthesiology, Montreal Heart Institute, Montreal, QC, Canada

Introduction: Protamine sulfate is used to neutralize unfractionated heparin after cardiopulmonary bypass (CPB). The optimal protamine:heparin ratio (P:H) is difficult to individualize. Indeed, when in excess, protamine can induce hemodynamic instability, complement activation and platelet dysfunction.1 Using in vivo titration curves, our objective was to determine the optimal P:H, hoping it would translate into a safe and effective heparin neutralization.

Methods: With our Research Ethics Board approval, 118 patients admitted for elective primary cardiac surgery requiring CPB consented to participate in this prospective randomized controlled study. After weaning from CPB, protamine infusion was initiated and celite activated clotting time (ACT) values were measured every 3 minutes. The control group was given a standard protamine infusion of 1.3 mg:1 mg (100 U) of heparin. The test group was given an infusion of protamine until two consecutive celite ACT values were lower than 160 and had reached a plateau. Anti-Xa activity was determined pre-protamine, 15 minutes and 3 hours post-protamine. The P:H, blood losses and transfusion exposure were recorded.

Results are presented as mean ± standard deviation. Student T-test, Chi2 or Wilcoxon rank sum tests were used for analysis. Statistical significance was assumed for a P value lower than 0.05.

Results: Demographic data between the two groups were similar. At the end of the protamine infusion, the ACT was significantly lower in the test group (136 ± 28 sec vs. 151 ± 23 sec) . Mean P:H was 1.31 ± 0.10 in the control group and 0.82 ± 0.22 in the test group ($P < 0.0001$). Residual heparin concentrations were higher in the test group 15 minutes (0.12 ± 0.12 U/ml vs. 0.04 ± 0.06 U/ml, $P = 0.0002$) and 3 hours (0.07 ± 0.12 U/ml vs. 0.01 ± 0.03 U/ml, $P = 0.0005$) post-protamine. Mean total blood losses in the control group were comparable to blood losses in the test group (1335 ± 1420 cc vs. 1275 ± 960 cc, $P = 0.99$).

Discussion: The lower ACT at the end of infusion in the test group suggests that excess protamine causes an elevation of ACT. The optimal P:H was 0.82 mg of protamine to 100 U of total heparin, consistent with the existing literature.2 Residual circulating heparin did not qualify for heparin rebound (i.e. > 0.3 U/ml). Optimized protamine dosing did not translate into increased blood losses and/or transfusion of allogenic blood products. The in vivo protamine titration method eliminates the need for estimating the blood volume and measuring the heparin concentration at the end of CPB. It individualizes the optimal protamine:heparin ratio and is safe and efficient in this low-risk population.

References: 1. Kirklin JK, et al. Ann Thorac Surg 1986; 41:193-199
2. Jobes DR. et al. J Thorac Cardiovasc Surg 1995; 110(1):36-4

1344608 - METABOLIC SYNDROME ABOLISHES HIGH INTRALIPID- BUT NOT SEVOFLURANE-MEDIATED CARDIOPROTECTION IN WISTAR RAT HEARTS

Phing-Hou Lou[1], Liyan Zhang[1], Manoj Gandhi[2], Eliana Lucchinetti[1], Alexander Clanachan[2], Michael Zaugg[1]

1. Anesthesiology & Pain Med., University of Alberta, Edmonton, AB, Canada
2. Pharmacology, University of Alberta, Edmonton, AB, Canada

Introduction: Eighty million people in the US suffer from metabolic syndrome (MET), which is defined by dyslipidemia, prediabetes, and arterial hypertension. There is growing evidence that MET increases the risk of cardiovascular complications by 4-fold. Previous experimental and clinical studies reported that various cardioprotective strategies against ischemia-reperfusion (I/R) injury fail in diabetic hearts. But it is unknown whether MET hearts are still amenable to protection elicited by pharmacological agents such as high intralipid emulsion (HIL) or sevoflurane (SEVO).

Methods: Male Wistar rats were fed normal rat chow and either normal water (healthy) or water containing 10% fructose (MET) for a total of 5 weeks. Isolated hearts from healthy and MET animals were perfused in the working mode under aerobic conditions or exposed to I/R injury (15 min of ischemia). HIL (1%) was administered at the onset of reperfusion, while SEVO (2 vol.-%) was given before and after ischemia. Left ventricular work (LVW) was measured and substrate flux through fatty acid and glucose oxidation (GOX) was determined using [3H]palmitate and [14C]glucose. In aerobic protocols, glycolysis and GOX were measured by the quantitative collection of [3H]-water liberated at the enolase step of glycolysis and [14C]-CO2 liberated at the level of pyruvate dehydrogenase complex and in the citric acid cycle from hearts perfused with tracer amounts of radioactive [3H]glucose and [14C]glucose. Glucose uptake was determined from glycolysis rates plus rates of incorporation of radioactive glucose into glycogen. Proton production was calculated as 2 x (rate of glycolysis - rate of GOX). Mitochondrial respiratory chain activities (complex I/II/IV), β-oxidation and leak respiration (uncoupling) were measured in permeabilized cardiac fibers obtained at the end of perfusion using high-resolution respirometry.

Results: Rats fed with the lipogenic sugar fructose reliably exhibited elevated fasting plasma glucose, hyperinsulinemia, dyslipidemia and hypertension consistent with the presence of MET. MET hearts exhibited unchanged LVW and glucose uptake but decreased GOX, glycogen synthesis and increased complex I/II activities, leak respiration and proton production under aerobic conditions. Both SEVO and HIL preserved LVW after I/R in healthy hearts. SEVO but not HIL exerted protection in MET hearts. After I/R, complex I/II activities were markedly reduced in MET vs healthy hearts. SEVO preserved β-oxidation in healthy and complex I/II activities in MET hearts. HIL preserved β-oxidation in healthy but not MET hearts. Leak respiration was increased in healthy (palmitoylcarnitine/malate as substrates) and MET hearts (palmitoylcarnitine/malate; pyruvate/malate; succinate as substrates) after treatment with SEVO. In HIL-treated hearts, adenine nucleotide transporter-mediated leak respiration was diminished in MET vs healthy hearts.

Discussion: Our experiments demonstrate that mechanisms underlying cardioprotection are distinct in healthy and MET hearts. MET hearts are only amenable to SEVO but not HIL protection. Protective strategies need to be tailored to the metabolic phenotype of diseased hearts.

1344683 - VOLATILE PRE AND POST CONDITIONING DOES NOT TRANSLATE INTO CLINICAL PRACTICE

Marcin Wasowicz[1], **Angela Jerath**[1], **George Djaiani**[1], **Jacek M. Karski**[1], **Scott Beattie**[1]

1. Anesthesia & Pain Management, Toronto General Hospital, Toronto, ON, Canada

Introduction: Multiple experimental studies suggest that volatile anesthetics before ischemic insult can reduce myocardial damage (volatile anesthetic induced pre- conditioning -APC). 1 Other studies propose volatile agents after ischemia can provide further beneficial effect (post-conditioning). Clinical studies investigating the concept of APC are difficult to conduct; cardiac surgery is one medical sub-specialty which enables translational studies investigating cardio-protective properties of volatile anesthetics.

This study investigates cardiac outcomes in patients undergoing CABG surgery with combined volatile-based anesthetic pre- and post-conditioning during the perioperative period. We hypothesize that combined APC and post-conditioning results in better outcomes when compared to IV based anesthesia and post-operative sedation.

Methods: After REB approval 154 patients scheduled for elective CABG surgery with use of cardiopulmonary bypass (CPB), were randomized to either combined volatile anesthesia (0.6-2 MAC) and postoperative sedation (0.1-0.3 MAC) or propofol-based anesthesia (2-6 mg/h/kg) and postoperative sedation. Volatile sedation was provided with an Anesthetic Conserving Device (Sedana Medical, Sweden). Depth of anesthesia was monitored with BIS targeted between 40-60. All perioperative care, anesthesia, surgical and ICU were protocolized. Outcomes: troponin leak, incidence of arrhythmias (Holter monitoring), hemodynamic parameters and inotropic requirement during the perioperative period. Statistical analysis used Mann-Whitney and Fisher's exact test to analyze continuous and categorical variables, respectively.

Results: 78 patients were randomized to volatile and 79 to propofol, 15 patients revascularized off pump were excluded. Demographic characteristics were similar between groups. The troponin leak in the volatile and propofol group was similar 2, 4 and 12h after surgery (3.2/4.1, 5.0/5.8 and 5.1/5.5 mcg/ml, respectively-see Fig. 1). There was no difference in hemodynamic variables, inotropic support or incidence of post-operative atrial fibrillation. Glyburide use was similar in both groups.

Discussion: Our data showed that combined volatile anesthesia and post-operative sedation does not offer cardioprotective properties in patients undergoing cardiac surgery. It may suggest that volatile pre and post conditioning studied in laboratories do not translate into clinical practice. It is possible that clinically relevant doses of volatile agent used in our study were not sufficient to induce APC.

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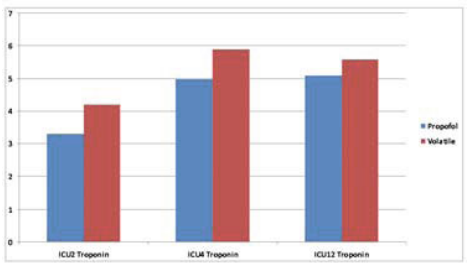

Troponin Leak

1344726 - CARDIAC COMPLICATIONS IN POST PCI PATIENTS UNDERGOING NON CARDIAC SURGERY

Tenille Ragoonanan[1], Summer Syed[2], Duminda Wijeysundera[1], Prathiba Harsha[2], Scott Beattie[1], Marcin Wasowicz[1]

1. **Anesthesia & Pain Management, University Health Network, Toronto General Hospital, Toronto, ON, Canada**
2. **Anesthesia, Hamilton General Hospital, Hamilton, ON, Canada**

Introduction: Approximately 2 million individuals undergo percutaneous coronary intervention (PCI) each year in Western countries.[1] About 5% of patients who have had PCI with stent placement will undergo non-cardiac surgery (NCS) in the first year after stenting.[2] Anesthesiologists are frequently confronted with such patients and the evidence regarding the perioperative management is weak and scarce. The current recommendations developed by the ACC/AHA Task Force [3] are based on low-grade levels of evidence such as retrospective observational studies and expert opinion. [4, 5] The primary goal of the study is to investigate the independent relationship between platelet function and major adverse cardiac events during the peri-operative period. This is a preliminary report on the incidence of MACE.

Methods: Following REB approval surgical patients who had either a Bare Metal Stent (BMS) within 2 years before NCS or Drug Eluting Stent (DES) at anytime before NCS were included in the study. Patients received routine intraoperative surgical and anesthetic care in accordance with ACC/AHA guidelines.[3] Anti-platelet therapy was re-started on the first postoperative day where possible. ECG measurements were performed daily for five days postoperatively and troponin measurements were performed every 8 hours (first 48 hours postoperatively) then once daily until the fifth postoperative day. Patients were assessed daily for the incidence of MACE defined as cardiovascular death, myocardial infarction (ECG or enzymatic criteria), stents thrombosis, need for repeat revascularization or stroke.

Results: In this preliminary report 102 patients were studied. The incidence of MACE was 17.6% (18 patients). Among those patients the clinical presentation of MI ranged from elevated troponin to cardiogenic shock. Of the 18 patients who had an MI, 2 received further PCI postoperatively and 2 died (non cardiac death – Renal failure and Respiratory failure). Of the 18 patients who had an MI, 9 patients had DES (50%), 6 had both DES and BMS (33%) and 3 had BMS only (17%). Additionally 2 patients suffered postoperative stroke (1.9%) and there was one non-cardiac death at one year follow-up however this patient did not experience MACE.

Discussion: Despite being maintained on anti-platelet therapy, the incidence of MACE is still high in PCI patients undergoing NCS (17.6%). Multiple factors may contribute including perioperative stress and the use of drugs that impact the activity of antiplatelet therapy. Characterizing these effects in the perioperative period on platelet inhibition (function) in this population is warranted. This study highlights the importance for further understanding of the mechanisms of MACE in patients with PCI undergoing NCS.

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2. Vicenzi MN et. al , Br. J Anesth 2006; 96:686-93
3. Fleisher LA, et. al, ACC/AHA 2007 guidelines
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1344749 - SPINAL CORD ISCHEMIA AND CSF DRAINS IN TEVAR PROCEDURES: A SINGLE INSTITUTION CASE SERIES

Alexander J. Gregory[1], Duc V. Ha[1], Jehangir Appoo[2]

1. Anesthesia, University of Calgary, Calgary, AB, Canada
2. Cardiac Surgery, Libin Cardiovascular Insitute, University of Calgary, Calgary, AB, Canada

Purpose: Spinal cord ischemia (SCI) is a potential complication operations involving the descending aorta. Though literature suggests lower risk with endovascular repair (TEVAR) vs. open interventions for aneurysmal disease, it is still estimated to be 3-7%.1-3 CSF drains, in conjunction with MAP augmentation, may prevent or reverse SCI in open repair4-6 and TEVAR.3,7,8 CSF drains are not without risks, though generally infrequent some are associated with high mortality.9-12

Clinical Features: Our institution's ethics board did not require patient consent. Data was analyzed from 54 patients, representing our initial local experience in TEVAR procedures. All received a GA with arterial and central venous pressure monitoring +/-PAC in select patients. Evoked potential monitoring was not used and pre-operative CSF drains were inserted into patients considered high risk for SCI. Drains were set at 10 cmH2O intra-operatively and raised to 15 cmH2O if stable post-operatively. If SCI occurred, MAP was increased to >90 mmHg and CSF returned to 10 cmH20 (placed if emergently if needed). Drainage was limited to 10 mL/hr except in refractory SCI. Our overall incidence of SCI was 11% (6/54) with the majority occurring in dissection repairs (4/6). CSF drains were used in 19% of cases (10/54), five being placed emergently for delayed SCI presenting an average of 57.6 hours post-op. No patient suffered permanent paraplegia and full recovery was seen in 66% of the cases (4/6). The total incidence of drain related complications was 50% though most were minor (see table).

Conclusion: Our incidence of SCI was greater than current literature, possibly reflecting the learning process with a new technique but significantly impacted by including data from emergency cases and dissections. We had success reversing SCI neurologic deficits, comparing favorably with others.3,6 Our drain complications included some not previously reported and most resulted in low morbidity.9-12 SCI causes significant morbidity, demanding vigilant care and expedient management. The patient's risk for SCI and the risk-benefit ratio of CSF drains should play a role in the anesthesiologist's management decisions with TEVAR procedures.

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2. Circulation 2008; 118:808-17
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4. J Vasc Surg 2002; 35:631–9
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Summary of CSF drains and complications

CSF DRAIN COMPLICATIONS	n (%)	INCIDENCE FROM LITERATURE %
Total CSF drains	10 (19)	33
Rescue CSF drains	5 (50)	0-62.5
Total CSFd complications	2 (20)	1.5-3.7
PDPH	2 (20)	0.54-0.6
Catheter #	1 (10)	0-1.8
Catheter blockage	1 (10)	NR
FFP anaphylaxis	1 (10)	NR
Epid hematoma	0 (0)	0-3.2
Subdur hematoma	0 (0)	0-3.5
Intra-cran hemorrhage	(0)	0-5.5
Meningitis	0 (0)	0-1.2

1339707 - ULTRA-LOW COMPARED TO HIGHER CONCENTRATION EPIDURAL LOCAL ANESTHETIC SOLUTIONS IN LABOR: A META-ANALYSIS

Caitriona Murphy[1], Pervez Sultan[2], Stephen Halpern[1], Brendan Carvalho[3]

1. Department of Obstetrical Anesthesia, Sunnybrook Health Sciences Centre, Toronto, ON, Canada
2. Department of Anesthesia, University College London Hospital, London, United Kingdom
3. Department of Anesthesia, Stanford University School of Medicine, Stanford, CA, United States

Introduction: While epidural analgesia does not increase the cesarean delivery rate compared to non-epidural techniques [1], the effect of epidural analgesia on the incidence of operative vaginal delivery is controversial. Current guidelines suggest that low concentrations of local anesthetics (<0.125% bupivacaine) are preferable to higher concentrations [2]. The purpose of this meta-analysis was to determine whether ultra-low concentration (ULC) infusions of local anesthetics are associated with a lower incidence of assisted vaginal delivery (AVD) than higher concentrations (HC).

Methods: We searched electronic databases (PUBMED,EMBASE, Ovid MEDLINE, CINAHL) and the Cochrane Central Register of Controlled Trials 2nd Quarter 2011 using MeSH terms and text words ropivacaine, bupivacaine, obstetric labor complications, instrumental and cesarean delivery. We included randomized controlled trials of laboring patients that compared ULC (defined as <0.1% epidural bupivacaine or <0.17% ropivacaine) with higher local anesthetic concentrations for maintenance of analgesia. The study quality was graded using the Jadad 5 point scale and allocation blinding[3]. The primary outcome was AVD. The odds ratio (OR) and 95% confidence interval (CI) was calculated using random effects modeling (Review Manager 5.0). An OR <1 favored ULC and a p value <0.05 was considered statistically significant.

Results: 16 studies met our criteria. 5 publications from the COMET study group were presented as one study. There were 1284 patients in the ULC group and 892 patients in the HC group that reported the primary outcome. The median quality score was 2 (range 1 to 5). 6 studies had blinded allocation and 7 studies were not blinded or not clearly outlined. There was a statistically significant reduction in the incidence of assisted vaginal delivery in the ULC group (OR=0.79, 95% CI=0.64-0.98, p=0.03) (Figure). There was no difference in the incidence of cesarean delivery (OR=0.95, 95% CI=0.77-1.18, p=0.65).

Discussion: The use of ULC of local anesthetics for labor epidural analgesia maintenance reduced the incidence of AVD compared to HC solutions. We therefore recommend the use of ULC epidural analgesia whenever possible to optimize obstetric outcomes.

References: 1. Anim-Somuah et al. Cochrane Database Syst Rev 2011;12:CD 000331
2. ASA Guidelines. Anesthesiology 2007;106:843-863
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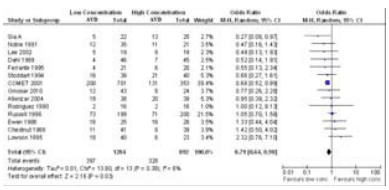

1343202 - SIMULATION-BASED TEACHNING OF ASEPTIC TECHNIQUE FOR LABOR EPIDURALS

Naveed T. Siddiqui[1], Cristian Arzola[1], Sharon Davies[1], Laarni Guerina[1], Jose Carvalho[1]

1. Anesthesia and Pain Management, Mount Sinai Hospital, University of Toronto, Toronto, ON, Canada

Introduction: Practice of dexterity during labor epidural insertion is not strictly observed. One of the important reasons for this practice could be the lack of teaching of the fundamental principles of asepsis. It has been shown that novice trainees learn technical skills of the procedure with time, but their practice of dexterity remains unchanged. Hence there is a need to develop teaching and evaluation methods of aseptic procedures in anesthesia teaching programs. The minimal training required by anesthesia trainees in order to master the technique of asepsis during labor epidural insertion has not been studied. Applying a comprehensive educational model, the objective of this study was to determine the number of teaching sessions required by anesthesia trainees to successfully learn 'aseptic technique' during epidural insertions. We also wanted to assess as how this knowledge is transferred to clinical practice and retained over time.

Methods: After REB approval and informed consent, we conducted a prospective, observational study. Anesthesia residents and fellows were scored for their baseline skills of maintaining sterility during simulated epidural insertions using a previous validated15-item checklist. They were than given didactic teaching, a focused workshop and an explicit video demonstration of all the correct and incorrect steps involved in maintaining sterility during the procedure. This was followed by hands-on simulations of the epidural technique on a Styrofoam epidural model. Each trainee had individual successive simulation and debriefing sessions till they obtained competency, which was defined as a 100% score on the checklist. All the sessions were observed and evaluated by the investigators. After the didactic teaching and simulation phase, the retention of competence was evaluated in real time practice on actual patients every 2 weeks for a total of 4 assessments in a similar manner.

Results: A total of 21 anesthesia trainees (12 residents and 9 fellows) participated in the study. Out of a total of 15 points on the checklist, the baseline average score for the residents and the fellows were 6 and 7.9 respectively. After the initial teaching, there was a significant improvement in both groups to 10.8 and 11.2 respectively ($p<0.001$). During the simulation training, overall it took 5 attempts for the residents and 3 attempts for the fellows to obtain 100% competence in maintaining sterility during the insertion of labor epidurals. After the simulation sessions, which by definition brought all participants to a 15-point mark, the 4 subsequent assessments on actual patients over time consistently showed scores in the range of 13-15.

Discussion: This study demonstrates that a comprehensive model of didactic teaching, focused workshop and simulation significantly improves the performance of anesthesia trainees as it relates to the aseptic technique for epidural insertion. It also suggests a minimum number of teaching interventions to accomplish that goal.

References: 1. Anesthesiology 2006; 105:381–93
2. Anesth Analg 2007; 104: 965–74
3. Anaesthesia 2002; 57: 593–6

1343639 - QUALITY OF LABOR ANALGESIA AND MATERNAL SATISFACTION: A PROSPECTIVE OBSERVATIONAL STUDY

Jefferson Clivatti[1], Naveed T. Siddiqui[1], Akash Goel[1], Ioana Crisan[2], Melissa Shaw[2], Kristi Downey[1], Jose Carvalho[1]

1. **Anesthesiology, Mount Sinai Hospital, University of Toronto, Toronto, ON, Canada**
2. **Nursing, Mount Sinai Hospital, University of Toronto, Toronto, ON, Canada**

Introduction: The current practice of neuraxial labor analgesia in most centers in North America is thought to be evidence based. This evidence comes from studies conducted in very controlled settings and do not account for the variability of the daily practice. Prospective observational studies assessing quality and safety of analgesia during the entire labor and delivery process, including a focus on maternal satisfaction, are not common in the medical literature (1). The purpose of this study is to prospectively evaluate the effectiveness and safety of labor analgesia provided at a tertiary teaching center, as well as maternal satisfaction.

Methods: This was a prospective observational study approved by the REB. All patients requesting neuraxial analgesia for labor in November 2011 were approached to participate, and after signing informed consent, were included in the study. Patients were managed as per routine with a test dose and a loading dose, followed by a PCEA with bupivacaine 0.0625% + fentanyl 2mcg/ml, and PRN top-ups given by nursing and/or physicians. According to physician judgment, the PCEA solution could be changed to bupivacaine 0.125% with fentanyl 2 mcg/ml. After delivery, the patients were given a satisfaction questionnaire comprising 10 sentences to be classified according to a Likert scale ranging from strongly agree to strongly disagree. Furthermore, physicians' and nurses' notes were reviewed to ensure that all data pertaining to the quality of analgesia and complications in all stages of labor and delivery had been captured.

Results: There were 508 deliveries in the study period, 332 patients were eligible, 10 (3%) refused to participate, 28 (8.4%) were lost follow-up, and 294 were analyzed. Most patients (274) received epidural analgesia and the remainders received CSE. The mean dilatation and pain score (verbal rating scale 0-10) at the time of request of analgesia was 4.8±2.0 cm and 7.6±2.2, respectively. There was no intravascular catheter placement, there were 3 (1.03%) unintentional dural punctures and 13 (4.4%) catheters had to be replaced. The incidence of spontaneous vaginal delivery was 71% and cesarean sections were 15.9%. About 40% of the patients reported to have had a pain score greater than 3 at least once after the activation of the epidural. The number of patients who received top-ups from nurses and from MD was 106 (36%) and 72 (24%) respectively, and 23 (7.8%) had the maintenance solution switched to higher concentration. The incidence of hypotension was 9.1%, pruritus 7.1%, fetal bradycardia 7.1% and nausea or vomiting 7.1%.

Discussion: Overall, the incidence of complications was small and similar to previous reports. The placement of epidural was comfortable for most patients but a large number of them reported to have had moderate to severe pain at least once during the maintenance period of the epidural. This motivated a high incidence of top-ups by nurses and physicians. Interestingly, very few women had the maintenance concentration increased. Despite this, more than 80% considered that their epidural worked well. The data is currently under evaluation to identify predictors of breakthrough pain and maternal satisfaction.

References: 1. Int J Obstet Anesth. 2004;13:227-33

1344185 - CARBETOCIN AT ELECTIVE CESAREAN DELIVERY: A DOSE FINDING STUDY

Suresh Anandakrishnan[1], Mrinalini Balki[1], Dan Farine[2], Gareth Seaward[2], Jose Carvalho[1]

1. Anesthesia, Mount Sinai Hospital, University of Toronto, Toronto, ON, Canada
2. Obstetrics and Gynaecology, Mount Sinai Hospital, University of Toronto, Toronto, ON, Canada

Introduction: Carbetocin is an oxytocin derivative now recommended by the Society of Obstetricians and Gynaecologists of Canada during elective cesarean sections (CS) as the uterotonic of choice (1). Compared with oxytocin, it has a longer half life by a factor of 4-7 times, and a comparable side effect profile. It has been shown to reduce the use of additional uterotonics following CS compared with a bolus dose of oxytocin (2). A dose-response study in elective CS was performed by the manufacturer involving 18 patients, determining the final recommended dose of 100mcg. However, no significant differences in efficacy have been shown between doses ranging from 80-120mcg (3), suggesting that lower doses might be effective, potentially reducing side effects. This study aimed to identify the minimal dose of carbetocin to produce effective uterine tone at elective CS under spinal anesthesia.

Methods: After REB approval, we carried out a randomized, double-blind dose-finding study of carbetocin in five groups, 20, 40, 60, 80 and 100 mcg. The inclusion criteria were low risk patients undergoing elective CS under spinal anesthesia, with written consent sought. Carbetocin was administered intravenously upon delivery of the anterior shoulder, over one minute. Assessment of uterine tone was performed by the obstetrician at one minute intervals for five minutes. Two minutes after administration, the obstetrician could request initiation of our normal oxytocin protocol at any time, or any additional uterotonic if required. During surgery, adverse effects were recorded. Preoperative and postoperative hemoglobin and hematocrit values were obtained to assess operative blood loss. Our primary outcome was satisfactory uterine tone at 2 minutes after delivery.

Results: A total of 120 patients were recruited, 24 per group. Overall, 7 (5.8%) patients had unsatisfactory uterine tone at two minutes. Of those, 5 required supplementary oxytocin. A further 11 patients received additional uterotonic within 4 hours. Therefore, a total of 16 (13.3%) patients required additional uterotonics. There was no statistically significant difference between the groups in terms of uterine tone or need for additional uterotonic, and no correlation with dose either. Consequently, it was not possible to construct a dose-response curve. There were no statistically significant dose related differences with regard to the side effects of the drug, including hypotension.

Discussion: Our study shows that in patients at low risk for postpartum hemorrhage, there is no difference in efficacy between doses of 20-100 mcg during elective CS. However, there appears to be a high incidence of hypotension (45.0%) across all doses, and a dose-dependent increase in nausea. It is possible that even lower doses of carbetocin may be sufficient to achieve satisfactory uterine tone in this subset of patients, and further studies are required to investigate whether associated side effects may also be reduced.

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2. Attilakos G et al. BJOG 2010;117:929–36
3. Cordovani D et al. SOAP 2011, Abstract 85

Dose (μg)→ Observation↓	20	40	60	80	100
Inadequate uterine tone @ 2 mins	0 (0)	2 (8.3)	1 (4.2)	3 (12.5)	1 (4.2)
Additional uterotonic required; n (%)	1 (4.2)	4 (16.7)	6 (25.0)	3 (12.5)	2 (8.3)
Hypotension; n (%)	10 (41.7)	14 (58.3)	13 (54.2)	9 (37.5)	8 (33.3)
Nausea; n (%)	1 (4.2)	2 (8.3)	1 (4.2)	4 (16.7)	6 (25)

1344377 - THE ANALGESIC EFFICACY OF TAP BLOCKS AFTER CESAREAN DELIVERIES: A SYSTEMATIC REVIEW

Sudha I. Singh[1], Kamal Kumar[1], Angela P. Kolesnichenko[1], Philip Jones[1]

1. University of Western Ontario, London, ON, Canada

Introduction: Pain relief after cesarean deliveries (CD) remains challenging. In addition to visceral pain, there is incisional pain. Recently, there has been interest in the role of transversus abdominis plane (TAP) blocks to decrease this somatic pain. This systematic review evaluates the analgesic efficacy of TAP blocks in parturients for post CD pain relief.

Methods: Multiple electronic databases were searched using combinations of the following terms " transversus abdominis plane block "and " cesarean" and " caesarean". The search results were then limited to the English language and randomized controlled trials in humans. The reference lists of the articles were searched to identify other relevant studies. This review included all RCTs that used any comparator (including placebo) and evaluated TAP blocks in parturients having CD. The primary outcome was analgesic requirement. Data were extracted independently by 2 reviewers. The methodological quality of the studies was evaluated independently by 2 reviewers.

Results: A total of 7 studies involving 460 patients met eligibility. 204 patients received TAP blocks. Quality scores were high (median Jadad score=5, range 3-5). Methodologically, there were 2 low quality studies due to inappropriate random sequence generation, allocation concealment, & blinding.In 5 studies, ultrasound guidance was used to place TAP blocks. Levobupivacaine, bupivacaine or ropivacaine were used for TAP blocks. In one study, all patients received general anesthesia. Patients received spinal anesthesia in the remaining studies. Follow up of patients ranged from 24h to 6 weeks. There were 3 studies that used spinal morphine and 2 of these compared the efficacy of spinal morphine to TAP blocks. These studies did not show any analgesic benefit of TAP blocks. The remaining 4 studies showed decreased opioid consumption when TAP blocks were used. No study evaluated TAP block failure rate or extent of block. One patient experienced an anaphylactoid reaction to the ropivacaine injected in the TAP block. No other complications were reported. Meta-analysis is ongoing and results will be presented at the meeting.

Discussion: When spinal morphine was used, ultrasound guided or landmark based TAP blocks did not improve analgesia. However, when spinal morphine was not used, both landmark based and ultrasound guided TAP blocks improved analgesia after CS. TAP blocks should be considered in patients not receiving spinal morphine.

References: 1. Anesth Analg 2008;106:186-191
2. RAPM 2009;34:586-90
3. BJA 2009;103:726-30
4. Anesth Analg 2010;111:475-81
5. MEJA 2010;20:821-6
6. BJA 2011;106:706-12
7. EJA 2012;29.

1344459 - ASSESSMENT OF QOL INDICATORS IN THE POSTPARTUM PERIOD

Leyla Baghirzada[1], Kristi Downey[1], Alison Macarthur[1]

1. Anesthesia and Pain Management, Mount Sinai Hospital, University of Toronto, Toronto, ON, Canada

Introduction: Although specific maternal morbidity in the postpartum period has been well documented in the literature, this 6 week period has generally been largely ignored by health care delivery systems. QOL tools have not been commonly used in obstetric anesthesia studies, moreover there are currently few instruments available for measuring the mothers' health-related quality of life. The short form of World Health Organization Quality of Life assessment (WHOQOL-Bref) tool has been recently validated in a sample of postpartum women and shown to be reliable measure of quality of life 1. The Nottingham Health Profile (NHP) was devised in the 1980's to provide information about health services. NHP is shorter and easier to implement, which also makes it fairly inexpensive. The aim of this study was to assess the usefulness of NHP in postpartum period and to evaluate psychometric characteristics of this quality of life instrument.

Methods: Following REB approval, a random sample of 133 English speaking women was entered into the study prior to discharge and women completed the scale in-hospital between 24-48 hours of delivery. Participants were then mailed/emailed the NHP questionnaire at 7 days postpartum and a sample of women was randomized to complete it by phone. WHOQOL-Bref was sent by mail/email along with NHP at the 7 day questionnaire point.

Results: We approached 398 women. 181 patients consented to participate in the study and filled out NHP at 24-48 hrs after delivery. 133 patients responded to the follow up postpartum contact, giving a 74% response rate. The mean age of the women was 34 with the median parity of 2. 50% had vaginal delivery. The NHP tool indicated that in the acute setting physical ability, energy level and pain were the most affected components of quality of life. At 1-2 week follow up women were describing greatest difficulties with energy level and pain domains. The scores for physical ability, pain, sleep, energy level significantly improved compared to baseline, whereas the scores for social isolation and emotional reactions remained similar to baseline values. Energy level and Emotional reaction domains of NHP showed moderate correlations with physical and psychological health dimensions of WHOQOL BREF tool. NHP scores at 1-2 week follow up were significantly lower in physical ability, pain and energy level domains for women who had caesarean delivery compared to vaginal delivery group.

Discussion: NHP scale was found to be suitable for evaluation of quality of life in the population of postpartum women and showed reasonable feasibility, reliability, and validity of the measures in a clinical obstetric setting. NHP did not demonstrate significant impairment in the domains of emotional reaction and social isolation at 1-2 week follow up, therefore it may not be the best tool to screen for postpartum depression. To our knowledge this is the first study evaluating the usefulness of NHP in postpartum population as well as the first study evaluating quality of life in the postpartum period of Canadian women.

References: 1. Webster J, Nicholas C, Velacott C et al. Validation of WHOQOL-BREF among women following childbirth. Australian and New Zealand Journal of Obstetrics and Gynaecology 2010; 50: 132–137

1344646 - MATERNAL CARDIAC ARREST: REVIEW OF CASES FROM 1989-2011

Mrinalini Balki[1], **Leyla Baghirzada**[1]

1. Anesthesia, Mount Sinai Hospital, Toronto, ON, Canada

Introduction: Cardiac arrest in pregnancy is a rare event, with an incidence of 1:30,000 births and a survival rate of 6.9% (1). The survival of both the mother and the baby is dependent on a number of factors, including the underlying reason for the arrest, the location of the arrest, and the skill and resources of the care providers. The key intervention to save the mother and her infant is perimortem cesarean section (PMCS) (1). Ideally delivery of the baby should be performed within 5 minutes after the onset of maternal cardiac arrest. However, successful maternal and neonatal outcomes can occur beyond this recommendation, especially at older gestational ages of 30-38 weeks (2). In theory, if there is no return of spontaneous circulation (ROSC) within 4 min, PMCS should result in lower case fatality rate when performed within 4 min after the onset of maternal cardiac arrest as compared to patients who do not have PMCS (3). The primary objective of this study was to assess the maternal and fetal outcome after maternal cardiac arrest, and propose steps to improve them.

Methods: After REB approval, search of hospital's health record database was conducted using the terms "pregnancy" and "cardiac arrest" codes. Cases were included when mothers had cardiac arrest and cardiopulmonary resuscitation (CPR) was initiated before cesarean delivery.

Results: Initial search identified 9 charts, but only 5 charts met the inclusion criteria (Table). Overall quality of charting was very poor. Four out 5 women were obese and older than 35 years suggesting that obesity and increased maternal age are risk factors for maternal morbidity. Two women had pre-existing cardiac condition. Three had vaginal deliveries, and 3 cases resulted in PMCS but only 1 was performed within the recommended time. Two patients died. Cause of cardiac arrest could not be determined for any of the cases but amniotic fluid embolism (AFE) was contemplated in majority of them.

Discussion: Our study supports the finding by Katz et al (3), that most of the time PMCS cannot be performed within 5 min. Due to the limited number of cases, we cannot comment whether failure to perform a timely PMCS affects maternal or neonatal outcome. It is necessary to ensure ongoing training in obstetric emergencies with a multidisciplinary team in order to improve the quality and safety of maternity care.

References: Circulation 2010; 122:S829-61; Resuscitation 2011; 82: 801-9; Am J Obstet Gynecol 2005; 192:1916-21

Summary of cases of maternal cardiac arrest 1989-2011

Case	Demographic data/Comorbidities	Mode of delivery/Time from arrest to delivery	Probable cause of arrest	Maternal Morbidity/ Outcome	Neonatal outcome	Comment
1	21 yr, G3P2, 33 weeks gestation, obese, IDDM and asthma	Vaginal (vacuum) / 14 min	AFE/ PE/ Total spinal	ARDS, airway hemorrhage/ Survived, neurologically intact.	Survived Apgar-2/6/7	Became unresponsive 10 min following administration of CSE for labor.
2	37 yr, G5P0, 41 weeks gestation, healthy, obese	Vaginal (vacuum) / 2 min	AFE	PPH/ Survived, neurologically intact.	Survived Apgar-4/8	Became unresponsive while pushing during delivery. PEA arrest.
3	38 yr, G4P0, 27weeks of gestation, h/o mechanical Ao valve and repaired Ao aneurysm	CS/ 3 min after 2nd arrest	Unknown	Died	Died	Not in labor. Symptoms of lightheadedness and nausea followed by PEA arrest (lasted 21 min), ROSC for 4 minutes but 2nd PEA arrest, PMCS followed.

4	35 yr, G4P1, 27 weeks gestation, obese, DVT, placenta accreta	CS/ 6 min	DIC secondary to AFE	Died	Survived Apgar-1/4/5	Emergency CS for profuse vaginal bleeding. VFib 2 min after intubation, ROSC after 5 min, but had repeated episodes of arrest accompanied by profuse PV bleeding.
5	45 yr, G2P0, 38 weeks gestation, obese, h/o severe Ao regurgitation, Ao coarctation with stent, hypertension, embolic stroke	CS/ 13 min	Unknown	Renal failure, VTach/ Survived, neurologically intact.	Survived Apgar-1/3/4	Out of hospital PEA arrest. Not in labor. Dramatic improvement after delivery.

1344668 - PRE-EMPTIVE ANALGESIA USING INTRAVENOUS FENTANYL FOR ELECTIVE CESAREAN SECTION UNDER GENERAL ANESTHESIA DOSE NOT HAVE SIDE EFFECTS ON NEWBORN APGAR

Parviz Kashefi[1], **Khosrou Naghibi**[1]

1. Anesthesia, Isfahan University of Medical Sciences, Isfahan, Isfahan, Islamic Republic of Iran

Introduction: Fentanyl is an effective preemptive analgesic but it may have effects on newborn Apgar score and the safety of intravenous fentanyl administered during labor remains unclear(1).The aim of this study was to test the hypothesis that the use of fentanyl for postoperative analgesia do not have side effects on newborn apgar.

Methods: With the approval of the institutional ethical committee and written informed consent of the patients In this randomized, double –blind , placebo- controlled, study, 64 , ASA physical status I and II ,aged 20 – 35 yr , who were undergoing elective Caesarean Section under general anesthesia were randomly allocated into two groups. Group I (N= 32) received 2 mic/kg Fentanyl before induction of general anesthesia and Group II (N = 32) received 2 cc Normal Saline ..In the recovery room pain was assessed using the Visual analog Scale (VAS).in addition , the newborn Apgar score and the time to first postoperative analgesics and additional analgesic requirement were assessed up to 24 h after operation.

Results: There were no significant differences between the two groups with respect to age, weight , ASA class, surgical duration and Clinical characteristics. The pain score and analgesic requirements were significantly less in preemptive group compared with Placebo group ($P<0.01$). No significant differences between the two groups were observed with regard to newborn Apgar score at o and 5 min after birth.

Discussion: A single dose of Fentanyl before induction of general anesthesia in elective Ceasarean section resulted superior analgesia in postoperative period and a reduction in postoperative morphine consumption without significant side effects on newborn Apgar.

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1344671 - SUBLINGUAL MICROCIRCULATION OF PREGNANT AND NON-PREGNANT WOMEN

Allana Munro[2], Ronald B. George[1], Islam Saleh Abdo[2], Dolores M. McKeen[1], Christian Lehmann[2]

1. Department of Women's & Obstetric Anesthesia, IWK Health Centre, Halifax, NS, Canada
2. Department of Anesthesia, Dalhousie University, Halifax, NS, Canada

Introduction: Microcirculation, the small vessels in the vasculature that are embedded within organs, is responsible for the distribution of blood within tissues, regulation of blood pressure, delivery of oxygen and other nutrients, and regulation of body temperature. The physiologic changes of pregnancy likely impact the microcirculation. Sidestream dark-field (SDF) imaging is a stroboscopic LED ring-based imaging modality allowing microscopic assessment of microcirculatory. Blood flow is quantified by SDF using Microvascular Flow Index (MFI), perfused vessel density (PVD), and the proportion of perfused vessels (PPV). The objectives of this observational trial were; to compare the sublingual microcirculation of pregnant subjects to that of comparable non-pregnant volunteers and to evaluate the usefulness of SDF imaging, in this cohort.

Methods: The institutional REB approved this project and informed consent was obtained. The primary outcome is the difference between the MFI of pregnant versus non-pregnant subjects. Inclusion criteria include ASA I-II participants in two groups; Pregnant – non-labouring women with uncomplicated, singleton pregnancies, at 36 – 40 weeks gestation, Non-Pregnant – healthy female volunteers who have never been pregnant, matched to pregnant participants for age ± 1 year. Participants were excluded with cardiovascular disease, obesity (BMI > 35 kg/m2), diabetes, or caffeine intake 2 hours before imaging. Each participant was be asked to provide 20 second measurements in five visual fields with the SDF device. Video clips were analysed blindly and at random to prevent coupling between images. The mean MFI values for each individual was analyzed using paired t-test. Apriori power calculation was performed for the difference between two independent means using a standard deviation of 0.8 (about 15% of the mean from previous experiences in experimental measurements of mucosal functional capillary density): effect size 1.125, number of groups 2, alpha 0.05, power 0.8. Fourteen subjects per group results in 82% power. To address our assumptions and potential drop-outs we will increase the group size by 20% (18 subjects per group).

Results: Thirty-seven participants were recruited (19 pregnant, 18 non-pregnant), a single pregnant participant was withdrawn because of technical issues. Morphometric characteristics are listed in table 1, obviously the pregnant subjects were significantly heavier than the non-pregnant group. The PVD and PPV were not significantly different, while the MFI was significantly higher in the pregnant group.

Discussion: The microvascular flow index of pregnant women is higher than a comparable non-pregnant group, which appears to correlate the physiological changes of pregnant women. Future projects of this technique should focus on determining the time course of these changes and the impact of disease process.

	Pregnant	Non-Pregnant	p-value
ASA Status	1 (1, 2)	1 (1, 1)	0.1631
Age (years)	29 ± 5	29 ± 5	0.9075
Weight (kg)	78 ± 14	61 ± 10	0.0009
Height (cm)	163 ± 6	165 ± 7	0.3582
BMI	29.6 ± 4.3	22.9 ± 2.8	< 0.0001
MFI	2.7 ± 0.2	2.5 ± 0.3	0.0208
PVD	14.1 ± 2.7	13.7 ± 2.2	0.7070
PPV	93.1 ± 5.0	91.6 ± 5.5	0.4031
*mean (range), mean ± sd			

1344793 - IN-VITRO RAT MYOMETRIAL CONTRACTIONS AT VARIOUS TRIMESTERS

Mrinalini Balki[1], Magda Erik-Soussi[1], John Kingdom[2], Jose Carvalho[1]

1. Anesthesia, Mount Sinai Hospital, Toronto, ON, Canada
2. Obstetrics and Gynecology, Mount Sinai Hospital, Toronto, ON, Canada

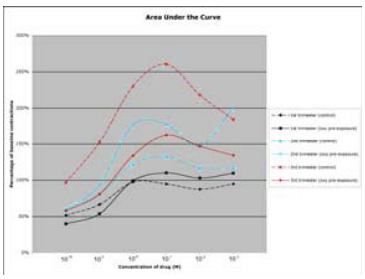
Introduction: Oxytocin receptors in both human and rat myometrial cells are desensitized by exposure to oxytocin, reducing the ability of cells to respond to subsequent administration of oxytocin (1). This desensitization effect reduces oxytocin-induced contractility of the isolated term pregnant rat uterus after pre-treatment with 10-8M concentration of oxytocin for 1h (2). Rat uterine contractility in response to oxytocin has been shown to increase with increased gestational age, both in cell culture and in tissue (3, 4), but the inhibition of contractility after oxytocin pretreatment has heretofore only been explored in the term pregnant rat uterus. The objective of this study was to investigate pregnant rat myometrial contractility in response to oxytocin administration after pretreatment with oxytocin at early gestation (Day 7), mid gestation (Day 14), and term gestation (Day 21-22).

Methods: After approval by the Animal Care Committee, this in-vitro study was conducted in pregnant Wistar rats. Four longitudinal myometrial strips were isolated from each animal and after equilibration, were pre-treated with either oxytocin 10-8M or PSS (control) for 1h, then subjected to a dose-response study with oxytocin in a pattern of one log molar increase every 10 min from 10-10M to 10-5M. The amplitude and frequency of contractions were recorded, and the area under the curve (AUC) was calculated and compared between groups.

Results: Myometrial samples were obtained from 27 rats and a total of 67 experiments were performed (oxytocin pre-exposure, n=33; control, n=34). The AUC during the dose-response period increased with increasing gestational age (Fig 1). The AUC was significantly higher in the control group vs. oxytocin pre-treated group at term gestation (Δ70.25%, p = 0.036), but the difference was not significant at early and mid gestation.

Discussion: These findings agree with our earlier work in term pregnant rat uterus (2). As the desensitization phenomenon does not affect oxytocin-induced myometrial contractility at early and mid gestation, oxytocin can be effectively used as an uterotonic for 1st and 2nd trimester abortions, even after prior oxytocin exposure. Studies in human myometrium are warranted to confirm these findings.

References: Am J Obstet Gynecol 2003;188:497–502; Reprod Sci 2009;16:501-8; Mol Cell Endocrinol1997;128:77-84; J Physiol 2008;586:6063-76



1315057 - NON-TECHNICAL SKILLS IN ANESTHESIA PROVIDERS IN RWANDA: AN ETHNOGRAPHY

Lauren Zolpys[1], Christian Mukwesi[2], Patricia Livingston[1], Theogene Twagirumugabe[2], Sara Whynot[1], Anna MacLeod[3]

1. **Department of Anesthesia, Dalhousie University, Halifax, NS, Canada**
2. **Department of Anesthesia and Intensive Care Medicine, National University of Rwanda, Butare, Rwanda**
3. **Division of Medical Education, Dalhousie University, Halifax, NS, Canada**

Introduction: Patient safety in the operating room can be jeopardized by poor team working and communication. Estimates are that 70 to 80% of anesthetic and surgical untoward events are caused by human factors. 1 The Anaesthetists' Non-Technical Skills (ANTS) framework was developed to explore human factors and identify behavioural markers that influence safe practice of anesthesia. 2 ANTS have been studied in European, Australian, and North American centres but there are no reports of use of this framework in developing countries. 3 The operating room environment in developing countries is particularly stressful, with major clinical demands, few mentors, and scarce resources. 4 In this setting, ANTS such as situational awareness, decision-making, task management and team working are especially important to prevent untoward events and improve peri-operative patient safety.

The purpose of this qualitative study is to obtain a clear description and understanding of how ANTS are currently practiced by anesthesia providers at two tertiary care hospitals in Rwanda.

Methods: We used an ethnographic approach combining interviews and observations. After institutional Local Ethics Committee approval was obtained and study participants' consent, semi-structured interviews were conducted with eleven non-Rwandan anesthesia providers with previous experience teaching in Rwanda. Observation of non-technical skills currently being practiced by Rwandan anesthesia providers was also undertaken. A hybrid discourse analysis approach was used to evaluate raw data from both interviews and observations. Data was coded in an iterative fashion, allowing emerging themes to inform subsequent interviews and analysis by identifying themes that emerged rather than trying to categorize behaviours according to the ANTS framework. Data collection is ongoing.

Results: Preliminary results identified three themes: situation awareness, cultural factors, and the challenges of working in a resource-poor setting, all of which have a direct impact on communication, which affects patient care. Lack of mentorship, combined with scarce resources, creates resignation to poor outcomes, which manifests as lack of recognition of clinically significant events and creates difficulty applying anesthesia theory to practice.

Anesthesia providers in Rwanda work in a culture in which formality, politeness and hierarchy are important. These influences may lead to a lack of assertiveness/discomfort with leadership, resulting in poor role definition. Great potential for improvement has been recognized through the introduction of daily anaesthesia team meetings, which allows coordination and planning of team activities.

Discussion: A complex relationship exists between factors influencing the safe provision of anesthesia in Rwanda. It is expected that designing a framework to address leadership and communication may lead to better team coordination and improved patient care.

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1328033 - THE EFFECTS OF OPERATING ROOM HIERARCHY ON TRAINEES' ABILITY TO CHALLENGE AUTHORITY: MEASURING HEALTH ADVOCACY WITH PATIENT SIMULATION

Devin Sydor[1], M. Dylan Bould[2], Viren Naik[3], Jessica Burjorjee[1], Cristian Arzola[4], Megan Hayter[5], Zeev Friedman[4]

1. **Department of Anesthesiology and Perioperative Medicine, Queen's University, Kingston, ON, Canada**
2. **Department of Anesthesiology, Children's Hospital of Eastern Ontario, University of Ottawa, Ottawa, ON, Canada**
3. **Department of Anesthesiology, The Ottawa Hospital, University of Ottawa, Ottawa, ON, Canada**
4. **Department of Anesthesiology, Mt. Sinai Hospital, University of Toronto, Toronto, ON, Canada**
5. **Department of Anesthesiology, St. Michael's Hospital, University of Toronto, Toronto, ON, Canada**

Introduction: Operating room (OR) communication is important for team function and patient safety.1,2 Status asymmetry between team members contributes to communication breakdown and threatens patient safety.1,3-5 We investigated how hierarchy in the OR team influences an anesthesia resident's ability to challenge an unethical decision by a staff anesthesiologist in a simulated crisis scenario.

Methods: After gaining local research ethics board approvals and voluntary informed consent we prospectively randomized 60 postgraduate years (PGY) 2-5 anesthesia residents at 2 academic hospitals to a videotaped simulated crisis scenario with a confederate OR team practicing a hierarchical team structure (group H) versus a nonhierarchical team structure (group NH). The scenario allowed residents several opportunities to challenge their staff anesthesiologist when administering blood to a Jehovah's Witness. Three independent, blinded raters scored the performances using the modified Advocacy-Inquiry Score (AIS). The primary outcome was comparison of the best-response AIS between groups H vs. NH. Secondary outcomes included comparison of best AIS by PGY and the percentage in each group that checked and administered blood.

Results: The AIS did not differ between groups (p=0.832) but significantly improved from PGY 2-5 (p=0.026). The rates of checking blood (92% vs. 76%, p=0.082) and administering blood (62% vs. 57%, p=0.721) were not significantly different between groups.

Discussion: This study did not show a significant effect of OR team hierarchical structure on residents' ability to challenging authority, however the median best-response AIS were only moderate in quality. The concerning high rates of blood checking and administration in both groups may reflect lack of training in challenging authority with implications for patient safety.

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2. Qual Saf Health Care 2004 13:330-334
3. Acad Med 2004 79:186-194
4. Qual Saf Health Care 2006 15:277-283
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CONTROL ID: 1341704
TITLE: CRITICAL INCIDENTS RELATED TO OPIOID INFUSIONS IN CHILDREN
AUTHORS (FIRST NAME, LAST NAME): Vahid Nilforushan[1], Nicholas West[1], Jonathan Stinson[1], Gillian Lauder[1]
INSTITUTIONS (ALL): 1. Department of Pediatric Anesthesia, BC Children's Hospital, Vancouver, BC, Canada.

ABSTRACT BODY
Introduction: Opioids have a narrow therapeutic index and have the potential to cause significant harm[1,2]. In this retrospective study, we performed a root cause analysis (RCA) to identify the root causes and contributing factors which led to critical incidents involving pediatric patients receiving parenteral opioid infusions in a children's hospital over a 5-year period. Furthermore, we aimed to determine if there is a difference in the rate of incidents in patients under the care of the acute pain service (APS) compared with those under care of other services (non-APS).

Methods: Following local REB approval, lists of potential critical incidents in patients receiving parenteral opioid infusions from December 2004 to December 2009 were derived from patient safety and pharmacy data. All 166 medical charts identified from those lists were reviewed and a timeline of events preceding, during and following the incidents was generated. The incidents were given a Safety Assessment Code (SAC)[3] according to their severity and probability of recurrence. Incidents with SAC scores ≥ 8 were selected for RCA. A reality tree diagram was used to map the factors contributing to each selected incident. Once the root causes and contributing factors were identified and classified, formal causal statements were written and action plans recommended.

Results: Fifty-eight of the reviewed medical charts included one or more relevant critical incident; in 13 (22.4%), more than one incident occurred. The most common incident, occurring in 39 (67%) cases, was opioid administration error. All resulting harms were of minor or moderate severity. Fourteen charts with an SAC score of 8 were selected for RCA. A total of 39 root causes were identified. The most frequent and significant of these included: defects in opioid infusion pre-printed order sheets; lack of a nursing guideline for opioid infusion rate adjustment and weaning; and inadequate policies and guidelines for monitoring and recording pain, vital signs and arousal score. Overall, identified root causes were classified as barrier (36%), policies/procedures/rules (33%), communication (16%), environment/equipment (10%) and training (5%). Incomplete data prevented detailed comparison of the incidence of events in patients under the care of APS and non-APS services. However, two-thirds of the incidents investigated occurred in children under the care of a non-APS service and inadequate analgesia was more common in the non-APS group.

Discussion: Despite limitations associated with a retrospective RCA study, it has been possible to identify the root causes and contributing factors for a range of critical incidents and these have been used to generate recommendations for improving both patient safety and quality of analgesia for children with acute pain. Key recommendations are: 1) promote uniform hospital-wide monitoring, documentation, and policies related to opioid administration, opioid weaning and opioid conversion in children transferred to and from the pediatric intensive care unit; 2) enhance education in pediatric acute pain management for residents and other healthcare professionals to include an awareness of the pharmacogenetic variability of opioid medications in children; 3) promote timely involvement of the APS service.

References: [1] Paediatr Anaesth 2010, 20:119-25; [2] Pain Res Manage 2011,16:93-98; [3] US Department of Veterans Affairs

Ethics Approval: REB approval only
Funding: Funding - No
Disclosure: Nothing to Disclose

CURRENT CATEGORY: Patient Safety
Ian White Patient Safety Award: No
PRESENTATION TYPE: Abstract
KEYWORDS: Root Cause Analysis, Pediatric Acute Pain, Opioid.

CONTROL ID: 1341754
TITLE: CARDIAC INDEX CHANGES IN CHILDREN PLACED PRONE FOR SURGERY
AUTHORS (FIRST NAME, LAST NAME): Matthias Görges[1], Zoe Brown[2], Erin Cooke[2], Stephan Malherbe[2], J. Mark Ansermino[2]
INSTITUTIONS (ALL): 1. Electrical and Computer Engineering Department, University of British Columbia, Vancouver, BC, Canada.
2. Department of Anesthesiology, Pharmacology and Therapeutics, University of British Columbia, Vancouver, BC, Canada.

ABSTRACT BODY
Introduction: For a posterior surgical approach to scoliosis repair, patients are placed in the prone position. This can be associated with significant decreases in blood pressure [1]. This hypotension is occasionally resistant to treatment, requiring a return to the supine position. Changes in cardiac index (CI) when turning adult patients prone for spinal surgery is well documented [2, 3], but these hemodynamic changes have not been studied in children. The aim of this project was to compare pediatric patients' CI before and after positioning prone for scoliosis surgery.

Methods: Following REB approval and written informed parental consent and subject assent, 14 ASA I-III patients, aged 10-18 years undergoing primary scoliosis repair, were recruited into this pilot observational study. Anesthesia was administered in the supine position using a standardized technique and standard monitoring. Following induction of anesthesia, a transesophageal doppler (TED) probe was inserted into the esophagus and correctly positioned [4, 5]. CI, stroke volume and corrected flow time were recorded post induction of anesthesia, following a 5ml/kg fluid bolus, and immediately after the patient was turned prone. Data was plotted and analyzed using MATLAB (The Mathworks Inc, Natick, MA).

Results: Median patient age was 16 (range 13-18) years. The median first measured CI was 2.7 (range 2-3.7) L/min/m2 and increased to 3.0 (range 2.2-4.4) L/min/m2 following the fluid bolus. After turning prone, median CI was 2.35 (range 1.4-4.8) L/min/m2. Turning prone resulted in a median reduction of 0.4 (range -0.4-1.1) L/min/m2, a 16.0 (range -10.3-36.3) % reduction [see Fig. 1].
A secondary outcome was that measuring CI using TED in the prone position is feasible. Intermittent adjustment of the probe is required, as the probe tends to move slightly during surgery. By monitoring CI throughout the case, changes in CI were observed in response to fluid challenges and vasopressor use. In addition, changes in spinal cord monitoring could be correlated with CI and surgical manipulation.

Discussion: A > 15% reduction in CI with positioning pediatric patients prone for scoliosis correction surgery was observed with a large degree of variability (-10.3% to 36.3% change). To improve patient safety, routine use of TED during surgery will allow for early detection and more appropriate management when hypotension is observed. This has now been implemented as standard of care at our institution.

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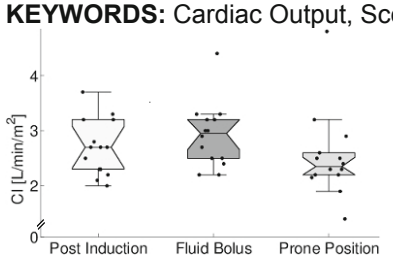
Ethics Approval: REB approval with patient consent was obtained
Funding: Funding - Other
Disclosure: Grants/research support:Postdoctoral Fellowship:Canadian Institutes of Health Research
Grants/research support:Research Support:Child & Family Research Institute
CURRENT CATEGORY: Patient Safety
Ian White Patient Safety Award: Yes
PRESENTATION TYPE: Abstract

KEYWORDS: Cardiac Output, Scoliosis, Prone Position.



Cardiac Index Values

1341957 - ULTRASOUND-GUIDED SUBCLAVIAN VEIN CATHETERIZATION: A SYSTEMATIC REVIEW AND META-ANALYSIS

Osman Ahmed[1], Ashraf Fayad[2], Gregory L. Bryson[2], Dean A. Fergusson[3], Patrick Sullivan[2], Calvin Thompson[2], Manoj Lalu[2]

1. **Faculty of Medicine, University of Ottawa, Ottawa, ON, Canada**
2. **Anesthesiology, The Ottawa Hospital, Ottawa, ON, Canada**
3. **Medicine, Surgery, & Epidemiology and Community Medicine, The Ottawa Hospital Research Institute, Ottawa, ON, Canada**

Introduction: Central venous access is required in the perioperative setting for various reasons, including monitoring hemodynamic status and drug administration. Current guidelines strongly recommend the use of ultrasound (US) when central venous catheterization is performed through the internal jugular vein. Although US use for catheterization through the subclavian vein has been well described, evidence for its use is not well known. We thus conducted a systematic review and meta-analysis to determine the efficacy and safety of US-guided subclavian vein catheterization compared to the traditional “blind” landmark method.

Methods: A systematic search of Medline, EMBASE, Cochrane Central Register of Controlled Trials, Cochrane Database of Systematic Reviews and CINAHL was performed (to December 2011) along with a manual search of reference lists of retrieved articles. Only randomized control trials of US compared to landmark technique for subclavian catheterization in adult populations were considered. All forms of US were included [dynamic two-dimensional (2-D) US, static 2-D US, and Doppler].Studies using tunnelled catheters, pacemakers, or pediatric populations were excluded. Outcomes included efficacy (reported as failure of catheterization) and adverse events (pneumothorax, inadvertent arterial puncture, hematoma, malposition, arrhythmia, nerve injury, cardiac tamponade). Data extraction was done in duplicate independently. Failure of catheterization was analyzed with inverse variance random effects modeling and expressed as risk ratios (RR) and 95% confidence intervals (CI) while adverse event data was analyzed according to Peto’s method and expressed as odd-ratios (OR) and 95% CIs.

Results: 333 studies were reviewed and 8 met inclusion criteria (n=2013 participants). Four used dynamic 2-D US (n= 568), 1 used static 2-D US (n=821), and 3 used Doppler-guided insertion techniques (n=624). All studies reported on failure of catheterization. Pooled analysis of all studies demonstrated no difference in failure of catheterization between the ultrasound group and the landmark method (RR 0.85, CI 0.48-1.51, n=2013). Pooled analysis of only studies using dynamic 2-D US demonstrated a trend favouring ultrasound-guidance (0.24 RR, 95% CI 0.04-1.56; n=568). Three of the 4 dynamic 2-D US studies defined adverse events a priori. Use of dynamic 2D-US compared to the blind landmark technique significantly decreased pneumothorax (OR 0.20, 95%CI 0.06-0.65; n=497), decreased inadvertent arterial puncture (OR 0.21 95% CI 0.08-0.57; n=497), and decreased hematoma formation (OR 0.24 95% CI 0.10-0.59; n=497). There was no significant difference between the two groups for malpositioning (OR 0.75 95% CI 0.41-1.37; n=497). There was insufficient data to analyze other adverse events.

Discussion: Dynamic 2D US-guided subclavian catheterization significantly improves patient safety compared to the traditional landmark technique. It reduces risk of pneumothorax, inadvertent arterial puncture, and hematoma. Overall successful catheterization rates between US and landmark techniques are similar. In conclusion, this data supports the regular use of dynamic US for subclavian catherization in order to reduce adverse events.

1343983 - TRANEXAMIC ACID AND BLOOD TRANSFUSION IN ORTHOTOPIC LIVER TRANSPLANTATION: A PROPENSITY SCORE MATCHED CASE CONTROL ANALYSIS

Anand Sharma[1], Simon Gower[1], Hui Ju[2], Saeda Nair[1], Coimbatore Srinivas[1], Stuart A. McCluskey[1], Marcus Selzner[1]

1. Anaesthesia, Toronto General Hospital, Toronto, ON, Canada
2. anaesthesia, peking university, Beijing, China

Introduction: Orthotopic liver transplantation (OLT) remains associated with significant blood loss. This is in part due to enhanced fibrinolysis due to tissue plasminogen activator (tPA) accumulation. Tranexamic acid (TA), a synthetic derivate of lysine, inhibits fibrinolysis, and is reported to reduce bleeding in surgical procedures. However, there is a paucity of published data demostrating its efficacy in OLTs. The objective of this retrospective clinical trial was to determine the effectiveness of TA in reducing the requirement for allogeneic blood transfusion in liver transplantation.

Methods: Following Research Ethics Board approval, data on consecutive patients undergoing liver transplantation from January 1998 to December 2008 were obtained from a prospectively collected database. Exclusions included combined organ transplantation, contraindications to tranexamic acid (TA), aprotinin use, TA dose less than 3g and insufficient data on TA dose. A propensity score derivation model was used to match patients who received tranexamic acid to unique controls. Measured covariates and outcomes in the matched group were compared between treatment groups with paired Wilcoxon signed-rank test for continuous variables and conditional logistic regression for categorical variables.

Results: 1103 patients received OLT in the study period. After exclusions, 186 matched pairs were obtained from these using propensity score analysis. Overall RBC and blood product transfusion rates were high . The TA group (4 units IQR 1,7) had significantly less RBC transfusion (p 0.0269) than the non TA (5 IQR 2,8) group. There were more patients in the TA group (42, 23% vs 23, 12%) who did not require RBC transfusion (p 0.0079). The FFP, platelet, and massive transfusion (RBC ≥ 6 units) rates were not significantly different between the two matched groups.

Discussion: We used propensity score matching to control large inter group differences inherent in observational studies. All variables including background disease, hepatomas and live donor transplantation were taken into account when matching patients. Our study demonstrates that TA can reduce blood transfusion requirements during OLT. Further investigations are required to determine whether this translates into improved patient safety and outcome.

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1344654 - MECHANISMS OF POSTOPERATIVE STROKE: A MULTI-DISCIPLINARY TRANSLATIONAL RESEARCH PROGRAM

Scott Beattie[1], Duminda Wijeysundera[1], Gordon Tait[1], Tenille Ragoonanan[1], Tina Hu[2], Mostafa El Beheiry[2], Albert K. Y. Tsui[2], Jo Carroll[1], Keyvan Karkouti[1], C. David Mazer[2], Gregory M. T. Hare[2]

1. **Anesthesia & Pain Management, Toronto General Hospital, University Health Network, Toronto, ON, Canada**
2. **Anesthesia, St. Michael's Hospital, Toronto, ON, Canada**

Introduction: Metoprolol, a relatively poor β1 specific drug increases the risk of postoperative stroke. Animal studies demonstrate that possible mechanisms include the impairment of compensatory mechanisms which maintain cerebral oxygen delivery by antagonism of: 1) β1-mediated increases in cardiac output and 2) β2-mediated cerebral vasodilatation. Published clinical meta-analyses suggest that drugs with increased β1 selectivity may not increase stroke risk. This clinical evaluation hypothesized that a more highly β1 specific β-blocker (bisoprolol) would not increase stroke rates compared to a relatively nonspecific beta-blocker (metoprolol).

Methods: This is a single center, having 3 sites, retrospective cohort study. After Institutional Ethics approval and linking the operative booking, discharge, pharmacy, laboratory, blood bank, and diagnostic imaging databases we identified 71,000 consecutive inpatient surgeries between Jan 2003 and Dec 2009. We excluded all patients having cardiac, transplant and neurosurgery. Postoperative stroke was defined as a patient with a discharge ICD10 code for cerebral ischemia, independently confirmed by either MRI and/or CT findings of stroke within 7 days of index surgery. Logistic regression with backward elimination was used to identify the independent associations with postoperative stroke.

Results: 11,595 β-blocked patients were identified: 6439 (55%) patient received metoprolol and 1327 (13%) received bisoprolol. Stroke was identified in 103 patients within 7 days of surgery (0.1%). The peak incidence was the first and second postoperative day. A history of cerebral vascular disease, age, nadir hemoglobin, transfusion, and high risk surgery, (vascular and thoracic Sx) were found to be independently associated with stroke. The model was accurate ROC=.803 and well calibrated. (Homser-Lemenshow p= .478) This analysis found that 49 patients receiving non specific Beta blockers experienced stroke (OR 2.6; 95% CI 1.7-4.1) Five (5) patients taking highly selective β1 drugs experienced a stroke (OR1.2; 95%CI 0.4-3.4).

Discussion: Our data demonstrate that metoprolol, but not bisporolol, was found to be associated with more than a doubling of the peri-operative stroke rate. Importantly, stroke is also influenced by acute reductions in Hb and a history of CVD. In this common peri-operative scenario cardio-protective drugs with higher β1 selectivity are not associated with increased stroke incidence.

1344674 - REVERSAL OF NEUROMUSCULAR BLOCKADE IN CANADA: INTERIM ANALYSIS OF THE RECITE STUDY

Louis-Philippe Fortier[1], Dolores M. McKeen[2], Kim E. Turner[3], Brian Warriner[4], Alan Chaput[5], Philip Jones[6], Robin Curtis[7], Etienne de Medicis[8], Ronald B. George[2], Jean-Francois Pouliot[9], Andre Galarneau[9]

1. Hôpital Maisonneuve-Rosemont, Montreal, QC, Canada
2. IWK Health Centre, Halifax, NS, Canada
3. Queen's University, Kingston, ON, Canada
4. University of British Columbia , Vancouver, BC, Canada
5. The Ottawa Hospital, Ottawa, ON, Canada
6. London Health Sciences Centre, London, ON, Canada
7. Red Deer Regional Hospital Centre, Red Deer, AB, Canada
8. Centre Hospitalier Universitaire de Sherbrooke, Sherbrooke, QC, Canada
9. Merck Canada, Kirkland, QC, Canada

Introduction: Residual neuromuscular blockade (rNMB) is common at tracheal extubation (TE) and in the post-anesthesia care unit (PACU) (1). Residual blockade at the time of TE may be associated with an increased risk of hypoxemia, impaired pharyngeal function and risk of aspiration, and airway obstruction.1 Full recovery of neuromuscular function (TOF ratio ≥0.9) at the time of TE is strongly recommended (2,3). Use of peripheral nerve stimulation (PNS) and reversal of neuromuscular blocking agents (NMBA) with acetylcholinesterase inhibitors may help to prevent rNMB, but the extent and impact of their use has not been documented in Canadian clinical practice. The RECITE (REsidual Curarization and its Incidence at Tracheal Extubation) study prospectively examined the incidence of rNMB (TOF ratio < 0.9) during routine anesthesia practice.

Methods: Local Ethics Committee approval was obtained at each institution and all subjects provided written informed consent. RECITE is an ongoing prospective, multicenter trial assessing the incidence of rNMB in ASA class 1-3 adults undergoing elective open abdominal or laparoscopic surgery. Neuromuscular function was assessed using acceleromyography (TOF-Watch® SX). The attending anesthesiologist and PACU nurses were blinded to the TOF-Watch monitoring. All clinical care including NMBA dosing, administration of NMB reversal and the decision to extubate were at the discretion of the attending anesthesiologist in accordance with local practices. Usage and impact of NMB reversal on the incidence rNMB (Train of Four (TOF) <0.9) at TE and at arrival at the PACU were assessed.

Results: An interim analysis was performed on a total of 141 evaluable subjects recruited at 8 centers between June 2011 and December 2011. The study population was mainly female (74%) and median age of 45 years. Procedures included laparoscopic (54%) and open abdominal (46%) surgeries. Rocuronium was used in 99% of cases. NMB reversal with neostigmine was used in 73%; median dosage was 35 mcg/kg (ranging from 6 to 77 mcg/kg). Overall, the incidence of rNMB (TOF <0.9) at TE and at arrival in the PACU was 57% and 45%, respectively, and the use of reversal did not decrease the incidence (Table 1).

Discussion: These data suggest that using a conventional reversal agent (neostigmine) to prevent the occurrence of rNMB has little impact on the incidence of rNMB in Canadian clinical practice. Despite reversal usage, rNMB was identified in a majority of patients at the time of TE and in a high proportion of patients at arrival in the PACU. A trend toward a lower incidence of rNMB was noted when no reversal agent was used. This may be due to the fact that anesthesiologists are not using reversal when patients are clearly unparalyzed. Better usage of conventional reversal agents or other interventions are warranted to prevent rNMB in normal clinical setting. Improving the timing of reversal and/or better monitoring of the patient are potential solutions.

References: 1. Anesth Analg 2010;111:120
2. Anesthesiology 2003;98:1042
3. Anesth Analg 2004;98:854

Table 1: Incidence of rNMB (TOF<0.9)

	Overall	Reversal (TE - N=103) (PACU - N=97)	No Reversal (TE - N=38) (PACU - N=29)	p Value**
TE (N=141)	80 (57%)	62 (60%)	18 (47%)	0.185
PACU (N=126)	57 (45%)	48 (49%)	9 (31%)	0.092

** using Fisher's exact test (two-sided test)

1344718 - WAIT TIMES, AUTONOMY & IN-HOSPITAL MORTALITY IN HIP FRACTURE PATIENTS

Mykolas Kaspervacius[1], Michael McMullen[2], John Murdoch[2], John Rudan[3], Rene Allard[2], Vidur Shyam[2]

1. School of Medicine, Queen's University, Kingston, ON, Canada
2. Anesthesiology & Perioperative Medicine, Queen's University, Kingston, ON, Canada
3. Surgery, Division of Orthopedic Surgery, Queen's University, Kingston, ON, Canada

Introduction: More than 264,000 elderly people suffered hip fractures in the U.S during 2007 alone.[1] Morbidity and mortality rates are high in these patients, particularly when the wait times to surgery exceed 48 hours.[2] Reducing wait time is important for improvement in patient care and reducing healthcare costs. The current investigation examined wait times from emergency presentation to surgical fixation and alterations in level of autonomy following hip fracture in 207 patients.

Methods: Following institutional ethics approval, data was gathered retrospectively on all hip fracture admissions to a mid-sized teaching center in 2010. Demographic information, time from emergency presentation to surgery/discharge, pre-and post-fracture functional level (as defined by level of living independence), and in-hospital mortality rates were recorded.

Results: Of the 220 hip fracture patients admitted, charts of 13 were excluded due to missing data for precise presentation time. Of the 207 remaining, the average age was 81 ± 9 years and 70% were women. 79% underwent surgery within 48 hours and the average time to discharge was 15 days. 61% of all patients lived at home independently prior to fracture, while only 18% returned to this functional level upon discharge. 29% lived in a long-term care (LTC) facility prior to the fall while 44% were discharged to LTCs; 7% died in-hospital.

Discussion: Consistent with other centers, the majority of patients at our center underwent surgery within 48 hours.[3] Our in-hospital mortality rate was also comparable to that of other centers.[4] Further prospective investigations may be warranted to comprehensively determine the impact of time to fixation on long-term autonomy, morbidity, mortality and cost-efficacy of healthcare delivery. Our preliminary study suggests a need to focus resources on regaining pre-operative autonomy and living status. This would not only greatly improve the quality of life for these patients but also reduce healthcare costs.

References: 1. National Hospital Discharge Survey; 2007 Summary, National Health Statistics reports. No. 29, Hyattsville, MD: National Center for Health Statistics. 2010
2. Can Med Assoc J 2010 182: 1609-16
3. Can J Anesth 2008 55:135-9
4. JAGS 2009 57(11): 2046-2054

1344721 - OXYGEN THERAPY FOR OSA PATIENTS: A SYSTEMATIC REVIEW

Vanita Mehta[1], Jean Wong[1], Barbara Phillips[2], Frances Chung[1]

1. **Anesthesia, Toronto Western Hospital, Toronto, ON, Canada**
2. **Department of Sleep Medicine, University of Kentucky College of Medicine, Lexington, KY, United States**

Introduction: Hypoxemia is an immediate consequence of obstructive sleep-disordered breathing. Oxygen administration has been used as an alternative treatment in patients with Obstructive Sleep Apnea (OSA) who do not adhere to Continuous Positive Airway Pressure (CPAP) in order to reduce the deleterious effects of intermittent hypoxemia during sleep. This systematic review aims to investigate the effects of O2 therapy on patients with OSA.

Methods: We conducted a systematic search of the databases Medline, Embase, Cochrane Central Register of Controlled Trials (1st Quarter 2011), Cochrane Database of Systematic Reviews (from 1950 to February 2011). Our search strategy yielded 4793 citations. Irrelevant papers were excluded by title and abstract review, leaving 105 manuscripts. We reviewed all prospective studies that included: 1) a target population with obstructive sleep apnea, 2) O2 therapy and/or CPAP as a study intervention, 3) the effects of O2 on the Apnea Hypopnea Index (AHI), nocturnal hypoxemia or apnea duration.

Results: We identified 13 studies including a total of 296 patients. Nine studies were of single cohort design while four studies were randomized control trials with 3 groups (CPAP, oxygen and placebo/sham CPAP). When CPAP was compared to O2 therapy, all but one showed a significant improvement in AHI. Ten studies demonstrated that O2 therapy improved oxygen saturation vs. placebo (Table). However, the average duration of apnea and hypopnea episodes were longer in patients receiving O2 therapy than in placebo.

Discussion: This review shows that O2 therapy significantly improved oxygen saturation in patients with OSA. However, it also increased the duration of apnea-hypopnea events.

References: 1.Chest 1990 98:325–30
2. Hypertension 2006 47:840-5
3.J Appl Physiol 2006 100:343-8
4.Behav sleep Med 2007 5:21-38
5.J Clin Sleep Med 2007 3:380-6
6.Chest 1980 78:682-5
7.Am rev respir dis 1984 130:958-63
8.Am rev repir dis 1986 134: 925-29
9.Chest 1986 89:30-8
10. Chest 1987 92:411-7
11.J of Int Med Res 2000 28:1-8
12. Am J of Rhino 2001 15:311-3

Table : Outcome measures

Study ID	Variables	CPAP	O2	Placebo CPAP
Phillips 1990	AHI SPO2	3.0 ± 0.9* 93.7 ± 0.9	16.8 ± 3.2 95.9 ± 0.3†	22.1 ± 5.7 89.9 ± 1.8
Norman 2006	AHI SPO2	3.4 ± 3.0* 95.6 ± 3.1†	43.6 ± 3.8 96.2 ± 3.3†	50.1 ± 32.1 92.1 ± 3.8
Mills 2006	AHI	2.56 ± 0.57*	50.1 ± 10.7	57.3 ± 8.2
Bardwell 2007	AHI SPO2	3.6 ± 3.9* 95.9 ± 3.3†	55.8 ± 40.9 95.5 ± 3.6†	51.0 ± 30.5 91.3 ± 3.6
Lim 2007	SPO2	96.2 ± 2.8†	95.9 ± 3.5†	91.2 ± 4.1
Study ID	Variables	O2	Air	p value
Kearley 1980	SDB event/ h	6.3	13.7	n.s

	O2 desaturation e/h	0.7	4.5	p < 0.015
Smith 1984	SDB event/ h SaO2 (%)	56 ± 11 96 ± 0.6	69 ± 10 94 ± 0.06	p < 0.01 p < 0.02
Gold 1986	SDB event/ h SaO2 (%)	51 ± 9 94 ± 2	71 ± 7 87 ± 3	p < 0.01 p < 0.01
Alford 1986	SDB event/ h SaO2 (%)	67.4 94.6 ± 3.5	88.2 87.7 ± 6	p < 0.001 p < 0.001
Block 1987	SDB event/ h O2 desaturation < 90 %	14 36	11 91	n.s p< 0.003
Pokorski 2000	SDB event/ h SaO2 (%)	38.9 ± 9.3 92.0 ± 1.1	52.7 ± 10.4 89.4 ± 0.93	p < 0.002 p < 0.02
Friedman 2001	SDB event/ h SaO2 (%)	33.1 ± 8.7 93.3 ± 3.84	28.6 ± 15.6 82.4 ± 4.73	n.s p < 0.01
Kumagai 2008	SDB event/ h SaO2 (%)	12.7 ± 8.5 97.7 ± 0.9	31.1 ± 8.8 94.2 ± 1.2	p < 0.01 p < 0.01

Abbreviations: CPAP: Continuous Positive Airway Pressure; O2: Oxygen, n: number of patients; AHI: Apnea-Hypopnea Index; SDB: sleep disordered breathing

*Denotes statistically significant change from oxygen($p<0.05$); † Denotes statistically significant change from placebo($p<0.001$)

1304721 - DEXMEDETOMIDINE ADDED TO ROPIVACAINE FOR TIBIAL NERVE BLOCK

Malenfant-Rancourt Marie-Pier[2], Natalie T. Albert[1], Maxime Côté[1], Dany-R Létourneau[1], Paul-Marie Bernard[3]

1. Anesthésiologie, Centre hospitalier de l'Université Laval (CHUQ-CHUL), Québec, QC, Canada
2. Anesthésiologie, Université Laval, Québec, QC, Canada
3. Social and preventive medecine, Université Laval, Québec, QC, Canada

Introduction: Dexmedetomidine, an α2-receptor agonist, prolongs analgesia when used in neuraxial and intravenous blocks (ref 1-5). We evaluated whether dexmedetomidine added to ropivacaine for tibial nerve block increases the duration of the sensory blockade.

Methods: After approval of this prospective, randomized, controlled, double-blinded, crossover trial by the local ethics committee, fourteen healthy volunteers were recruited and allocated to two groups. One group received an echoguided tibial nerve block with 10 ml of 0.5% ropivacaine (group R); the other group received 10 mL of a solution containing 0.5% ropivacaine with 1 mcg/kg of dexmedetomidine (group RD). After the injection, monitoring of vital signs, evaluation of onset and resolution of sensory block and level of sedation (OAAS scale) was performed. Three weeks later, the same procedure was repeated, but the study subjects were allocated to the other group in a crossover fashion. The primary endpoint was the duration of sensory blockade. Time and carry-over effects were evaluated. Secondary outcomes were the onset time and the presence of adverse effects such as hypotension, bradycardia, hypoxia and sedation. The values obtained in both groups were compared using either the paired Student t test or Wilcoxon signed-rank test. $P < 0.05$ was considered statistically significant.

Results: Sensory blocks lasted longer in group RD than in group R (21.5 vs 16.2 hours; mean pairwise difference 5.3 hours, [95% CI : 3.9 – 6.7]; $P < 0.0001$). Onset times were similar for both groups. The mean systolic and diastolic BP levels seemed stable throughout the study period in group R. In group RD, a noticeable drop in systolic and diastolic BP is evident from hours 1 to 8. In this group, two volunteers experienced hypotension as compared to none in group R. The lowest BP value was 77/49 (initial pressure 116/74). Heart rate values seemed lower in group RD. A slight sedative effect was observed in that group for the first 4 hours after the injection. Peripheral oxygen saturation was clinically similar among groups.

Discussion: Dexmedetomidine added to ropivacaine for tibial nerve block prolongs the duration of sensory blockade. However, potential adverse hemodynamic effects and sedation might be associated with its use. Further studies are needed to determine optimal dosage and ensure the safety of this practice.

References: 1. Anesth Analg 2004; 98:835-840
2. Saudi Med J 2009; 30:365-370
3. Acta Anaesthesiol Scand 2006; 50:222-227
4. Curr Drug Targets 2009; 10:696-706
5. Br J Anaesth 2009; 103:268-274

1310550 - LOCAL ANESTHETICS OFFER FIRST BIOLOGIC TREATMENT FOR PTSD

Eugene G. Lipov[1], Maryam Navaie[2], Eric T. Stedje-Larsen[3], Kevin Burkhardt[1], Jessica C. Smith[2], Leighla H. Sharghi[2], Anita H. Hickey[3]

1. Advanced Pain Centers, Hoffman Estates, IL, United States
2. Advance Health Solutions, La Jolla, CA, United States
3. Department of Anesthesiology, Naval Medical Center San Diego, San Diego, CA, United States

Introduction: Post-traumatic stress disorder (PTSD) is a chronic anxiety condition caused by experiencing traumatic events. Current PTSD treatment options include pharmacotherapy and psychotherapy but efficacy rates are only between 20 to 30% [1]. Recently, a biologic treatment alternative using stellate ganglion block (SGB) has shown favorable results in preliminary case reports [2,3]. This study aims to build on these promising reports by: (a) further investigating the effects of SGB on various PTSD symptom clusters, and (b) postulating SGB's potential mechanism of action in the treatment of PTSD.

Methods: IRB approval and informed consents were obtained. A retrospective case series of 8 PTSD patients who received one or more SGB treatments using 1% lidocaine administered with fluoroscopic needle guidance at the C6 cervical vertebrae was identified at a single private practice. Sociodemographics, treatment history, co-morbidities, medications, traumatic exposures including military combat, use of sedation, type and concentration of local anesthetics, adverse events and PTSD severity were extracted from medical records. T-tests were used to compare mean changes in PTSD severity scores with $p<0.05$ denoting significance.

Results: Among the case series, most were men (88%) and veterans (63%). More than 60% had been prescribed multiple psychotropic medications and all suffered from refractory PTSD for multiple years. Mean follow-up time after SGB treatment was 17 days (range, 1–59 days). For patients who received one SGB, statistically significant improvements in overall PTSD severity were observed in symptom clusters related to avoidance and hyperarousal dimensions of the anxiety disorder. On average, these patients experienced a 41% decrease in PTSD severity (range, 6–70%). Relative to patients who received one SGB, patients with two SGBs reported greater levels of relief (58% and 73%) with substantial improvements in all three PTSD-related psychological symptom clusters: hyperarousal, avoidance, and re-experiencing with no adverse events.

Discussion: Deactivation of the sympathetic nervous system alleviates PTSD symptoms [4,5]. Nerve growth factor (NGF) is likely to be key in explaining SGB's mechanism of action since NGF regulates a variety of signaling events such as cell differentiation and survival, growth cessation, and apoptosis of neurons [5]. Mechanistically, the body responds to stress by increasing NGF levels [5], leading to retrograde transport from the intracerebral site to the stellate ganglia where sprouting of sympathetic neurons are increased [6,7]. This results in elevated norepinephrine levels. Severe trauma may trigger this biochemical cascade that is responsible for PTSD. Reversal of this cascade can be achieved by local anesthetics applied to the stellate ganglion, thereby reducing NGF that leads to the death of new sympathetic nerve shoots [8]. SGB shows promise as the first biologic intervention for the treatment of PTSD. Randomized trials are needed to generate robust evidence to expand SGB's indication for the treatment of PTSD.

References: 1. Institute of Medicine 2008
2. Ann Clin Psychiatry 2008 20: 227-228
3. Pain Pract 2010 10: 359-365
4. Med Hypotheses 2009 72: 657-661
5. Cleve Clin J Med 2009 76: S86-90
6. Cardiovasc Res 2001 50: 409-416
7. Exp Neurol 1996 139: 54-60
8. Anesth Analg 2006 102: 462-467

1311154 - TRANSVERSUS ABDOMINIS PLANE BLOCK IN CADAVERIC RENAL TRANSPLANTATION: A RANDOMIZED TRIAL

Caitriona Murphy[1], Noelle Freir[1], Anna Linnane[1], Mohan Mugawar[1], Anthony J Cunningham[1]

1. Department of Anaesthesia, Beaumont Hospital, Dublin 9, Ireland

Introduction: Post-operative modes of analgesia in patients with end stage renal failure undergoing renal transplantation are limited. Considerations relate to the patients premorbid condition, impaired renal excretory function, uremic bleeding diasthesis and the desire to avoid hypotension that may compromise the return of graft function. The transversus abdominis plane (TAP) block is associated with reduced opioid requirements and pain scores for procedures involving the lower abdominal wall [1,2]. This study assessed TAP block efficacy (landmark technique) in patients following cadaveric renal transplantation.

Methods: Following local ethics committee approval and written informed consent by all participants, this prospective study randomized 65 adult renal transplant recipients to receive a standardized general anesthetic technique supplemented with levobupivacaine 0.375% 20ml TAP block (TAP group) or sham block with 20ml 0.9% saline (control group). Both groups received intravenous acetaminophen 1g, morphine 0.1 mg kg-1 and ondansetron 4mg intraoperatively, and patient controlled morphine analgesia with regular acetaminophen in the postoperative period. Patient assessment occurred in the post anesthetic care unit and at 2, 4, 6, 12, and 24 hours. The primary outcome was total morphine consumption in the first 24 hours postoperatively. Secondary outcomes included pain scores, presence of nausea and/or vomiting, excessive sedation and respiratory depression. Continuous variables were analyzed using the Wilcoxon Mann-Whitney test. Multiple regression analysis was used to calculate morphine requirements and logistic regression was used for analysis of binary endpoints.

Results: 32 patients were randomized to the TAP group and 33 to the control group. Morphine requirements did not differ between the 2 groups, 31.6 + 5.6 mg in the TAP group and 32.6 + 5.5 mg in the control group, [95% CI (-8.96 to 7.09, p=0.817)]. Pain scores also did not differ significantly at any time point following surgery. Nausea and vomiting rates were increased in the TAP group 53% and 22% respectively compared with 24% and 6% in the control group. No patient exhibited excessive sedation or respiratory depression.

Discussion: The addition of a TAP block using the landmark technique to the analgesia regimen for cadaveric renal transplantation did not confer any additional benefit on opioid requirements or pain scores in the first 24 hours postoperatively and was associated with no appreciable patient benefits.

References: 1.Anesth Analg 2007; 104: 193-97
2.Reg Anesth Pain Med 2006; 31: 91

	TAP Block (n=32)	Control (n=33)	P value
Intraoperative Morphine (mg)	6.6 [5.7 – 7.5]	7.1 [6.2 - 8.0]	0.448
PACU Morphine (mg)	4.0 [2.6 – 5.3]	3.1 [1.8 – 4.3]	0.340
Total Morphine (mg) (24hr)	31.6 [26.0 – 37.3]	32.6 [27.1 – 38.1]	0.817

Data are presented as mean, adjusted for age and weight, and 95% Confidence interval. TAP= Transversus Abdominis Plane, PACU= Post anesthetic care unit.

1318360 - AN AUDIT OF REGIONAL ANESTHESIA PRACTICES BY RESIDENTS

Lillia Fung[1], Alan Chaput[2], Anne Lui[2]

1. Lillia Fung, University of Ottawa, Ottawa, ON, Canada
2. Anesthesia, University of Ottawa, Ottawa, ON, Canada

Introduction: The use of regional anaesthesia (RA) has been popularized by favourable post-operative recovery outcomes, pain control, safety profile, and cost-effectiveness (1-3). Since 2003, the University has offered a 1-month block dedicated to teaching residents regional anaesthesia techniques. This project presents the practice patterns of residents rotating through the regional anesthesia program over seven clinical years.

Methods: Residents completed RA follow up forms for each procedure done during their rotation. These detailed block type, indications, techniques, drugs, block efficacy, and unanticipated events. Patients were also monitored post operatively by phone calls. Following institutional ethics approval, all forms between January 2003 to November 2010 were analyzed. Neurologic complications (defined as new onset pain, paresthesia, or electromyographic signs of damage in the blocked nerve distribution) were further investigated using postoperative surgical notes, neurology and/or anesthesia consultations.

Results: Included in the study were a total of 1643 blocks preformed on 1628 patients with a mean age of 51 years (range 14-100). The three major surgical types were orthopedic (81%), general surgery (10%), and vascular (9%). Blocks preformed with greatest frequency over all years were the interscalene (37%), popiteal fossa (20%), and femoral blocks (18%). Over time, the use of combined ultrasound and neurostimulation increased (44.77% overall), while the use of neurostimulation alone showed a trend to decrease (42.7% overall). The patient satisfaction rate was 97% over all years, with a mean visual analog pain score of 1.78 and 1.79 on postoperative day 1 and 2, respectively. The overall acute and delayed unanticipated event rates were 7% and 7.7%, respectively; the event rate per block approach is reported in Table 1. No neurologic complications were detected by the database.

Discussion: The present study demonstrates the safety and efficacy of RA procedures performed by residents with a 97% patient satisfaction. It was limited, however, by a relatively small sample size for detecting neurological complications reported in the range of 0.24-0.04% (4,5) and a short follow up period. Our hope is to use the present findings to design a new electronic regional pain database that will continue to collect valuable information regarding the ongoing effectiveness and safety of the RA program.

References: 1. Anes. 2004;101:127-132
2. Anes. 2005;102:1001-1007
3. Anesth Analg.2006;102:248-257
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5. Reg Anesth Pain Med. 2009 Nov-Dec;34(6):534-41

Table 1. Acute and Delayed Unanticipated Event by Block Technique

		Block technique			
	N	Neurostim only	Any U/S used	Other	p-value
ALL ACUTE EVENTS	1100	25	36	4	0.70
Pain	1095	3	2	1	0.27
Blood Aspiration	1095	6	5	2	0.18
Paresthesiaon injection	1095	2	9	1	0.11
Resistance	1094	5	13	1	0.26
Primary failed block	1100	6	5	0	0.76
Other	1036	5	5	1	0.65
ALL DELAYED EVENTS	871	30	33	2	0.75
Secondary failed block	871	15	12	0	0.34
Equipment failure	871	9	11	0	0.80
Transient paresthesia	871	5	9	2	0.27
N/V	871	2	2	0	1

1320047 - SATISFACTION LEVEL WITH TOPICAL VERSUS PERIBULBAR ANESTHESIA EXPERIENCED BY SAME PATIENT FOR PHACOEMULSIFICATION

Nauman Ahmad[1], **Abdul Zahoor**[1]

1. Anesthesia, King Khaled Eye Specialist Hospital, Riyadh, Saudi Arabia

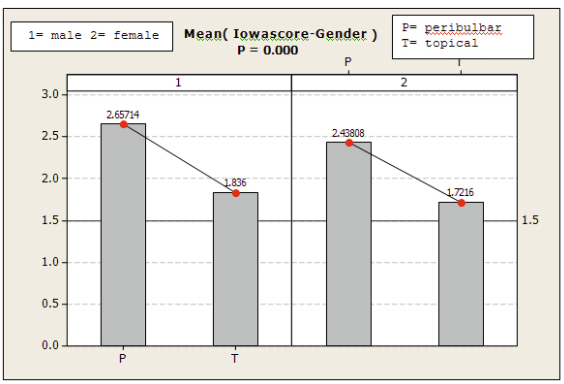
Introduction: Aim of study was to determine satisfaction level in same patient who gets topical anesthesia in one eye and peribulbar block in another eye. Evaluation of patients variable with satisfactory line will help better selection of cases for topical anesthesia in the future.

Methods: After approval of local IRB and informed patients consent, 80 patients (160 eyes) scheduled for phacoemulsification were enrolled in prospective, randomized, double-blind study. Each patient scheduled twice, one eye under topical anesthesia and other under peribulbar block. For topical anesthesia, tetracaine hydrochloride 1% drops and lidocaine gel 2% were applied 15 minutes pre operatively. For the peribulbar block infero-temporal and a supero-medial injection (if needed) was given with 6-10 ml Bupivacaine 0.5%, in addition to lidocaine 2% in 2:3 volume mixes with 5 IU/ml hyaluronidase. Pain, discomfort and pressure during application of local anesthetic , intraoperatively and at 2 hours after procedure were assessed on scale as pain score: No pain = 0, Mild pain=1, Moderate pain=2, Severe pain=3, Discomfort: Yes= 1, No= 2, Pressure: Yes= 1, No= 2 . Use of Intraoperative analgesia in each group and surgeon's opinion was also assessed as No difficulty, Slight difficulty and Moderate difficulty at the end of the procedure. Before discharge patient satisfaction level was checked for all patients in a standardized manner with Iowa satisfaction with anesthesia scale(ISAS)1,2. Student's t-test was used to determine significance of IOWA score in both groups. The statistical analysis was performed in Minitab 16. Numerical data were analyzed using unpaired two tailed t-test, while Chi-square test was used for categorical data. Nominal data and proportions were compared with Chi-squared analysis. A P value <0.05 was considered significant.

Results: Patient satisfaction measured with the ISAS shows that peribulbar anesthesia with P =0.000 is strongly significant. Intraoperative analgesia needed more in topical group (P =0.014). Surgeons faced less difficulties in patients with peribulbar block (P= 0.046)

Discussion: Our study was unique in a way that same patient experienced with both techniques and detemined satisfaction level by a sensitive ISAS scoring method. Our results are comparable with clinical trials in which pain scores with topical anesthesia were reported to be higher than with injection of local anesthetic3. In conclusion Peribulbar anesthesia provided significantly better patient satisfaction in comparison with topical anesthesia when used for cataract surgery.
Most of such trials were done

References: 1. Anesth & Analg 2005; 100:1637-43
2. Anesth & Analg 2005; 100:1644-50
3. Ophthalmology1996;103:1196 –203



1325184 - REAL TIME PARAVERTEBRAL BLOCKADE USING A GPS GUIDED ULTRASOUND SYSTEM

Balvindar Kaur[1], Raymond Tang[1], Andrew Sawka[1], Himat Vaghadia[1]

1. **Department of Anaesthesia, University of British Columbia, Vancouver General Hospital, Vancover, BC, Canada**

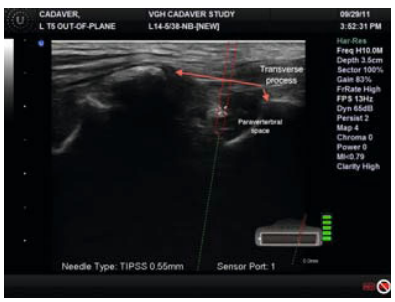
Introduction: We report the successful use of a novel Sonix GPS system to accurately place a needle tip in the paravertebral space of 2 cadavers using both, an in-plane and out-of-plane approach. Needle tip placement was confirmed by methylene dye injection into the space and dissection.

Methods: After instituitional and ethics approval, 3 un-embalmed cadavers were used to perform in- plane thoracic paravertebral (TPVB) injections on one side of the cadaver and out of plane paravertebral injections on the other side at 4 levels: T5, T7, T9, T11. The C5-2/60 GPS convex probe on the Sonix Touch (Ultrasonix, Richmond, BC) was used to identify the TPVB space in the transverse plane. A Sonix GPS 19G 80mm needle (Ultrasonix, Richmond, BC) was advanced in an in- plane or out of plane fashion into the paravertebral space using the needle guidance system. 1 ml of methylene blue dye was injected, a guide wire left in situ, and blind dissections were performed to confirm dye placement. The study was repeated in 10 adults, with local anaesthetic. Block was assessed by sensory loss to temperature post procedure.

Results: 8 in-plane and 12 out-of plane paravertebral injections were performed using this technique in cadavers. 5 in-plane and 9 out-of-plane injections were successful. Dissection into the thoracic cavity revealed no pleural punctures with either technique. In 10 patients 3 unilateral TPVB injections were placed at 3 levels for post operative analgesia. Successful block to ice was demonstrated in all.

Discussion: TPVB block is a well described technique for unilateral analgesia of contiguous dermatomes after thoracic surgery. 1,2 Locating the paravertebral space using an ultrasound guided approach is challenging due to the acute insertion of the needle and poor visualization of needle tip. We used a novel approach with the Sonix GPS System (Ultrasonix, Richmond, BC) and demonstrated successful placement of TPVB in cadavers and humans. We propose that this technology may be used to perform the TPVB block safely and successfully in patients.

References: 1. C.O. Riain S, O. Donnell B, Guffe T, C. Harman D, P. Fraher J, Shorten G. Thoracic paravertebral block using real time ultrasound guidance. Anesthesia and Analgesia Jan 2010; 110 (1): 248-51. 2. Karmakar MK. Thoracic paravertebral block. Anesthesiology 2001;(95): 771– 80



Out of plane paravertebral injection, with `x' marking needle target in the TPVB space.

1325235 - SUPERIOR LARYNGEAL NERVE BLOCK USING A NOVEL ULTRASOUND TECHNIQUE

Balvindar Kaur[1], Raymond Tang[1], Andrew Sawka[1], Himat Vaghadia[1]

1. **Department of Anaesthesia, University of British Columbia, Vancouver General Hospital, Vancouver, BC, Canada**

Introduction: We investigated the feasibility of performing ultrasound guided superior laryngeal nerve (SLN) block using a novel ultrasound technique. To date, only a single case report performed this block under ultrasound guidance, but the SLN was not visualized and surrogate landmarks were utilized.1,2 We hypothesized that with the improvements in ultrasonographic technology, the SLN could be visualized to enable accurate placement of the needle.

Methods: After ethics and institutional approval, a 8-15 MHz transducer (HST15-8/20 linear probe (Ultrasonix, Richmond, BC, Canada) was used on 2 fresh unembalmed cadavers to identify the SLN nerve bilaterally. Cadavers in the supine, neck extended position were scanned using the transducer placed in the transverse position relative to the skin, to identify the greater cornu of hyoid bone and the superior lateral aspect of the thyrohyoid membrane. By rotating the medial aspect of the probe cephalad, the SLN was identified. A needle was inserted in-plane to the ultrasound beam, advanced to the SLN and 1ml of green dye was injected. Correct dye placement was confirmed by a blinded anatomist. Dye spread was noted and photographed.

Results: In both cadavers, we confirmed successful bilateral dye placement on the SLN by anatomical dissections.

Discussion: Visualization of the SLN has not been consistently successful leading some authors to advocate use of the hyoid image or superior laryngeal artery as surrogate ultrasound landmarks for blockade of the nerve. 1,2 Current ultrasound technology has improved image processing and resolution and now made it possible to identify and target the SLN accurately under ultrasound guidance. We propose that this method may be used in humans to perform the block safely and successfully.

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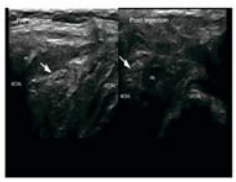

Pre and post injection images with arrows indicating the SLN

1334369 - SONIXGPS™ FOR ULTRASOUND-GUIDED BRACHIAL PLEXUS BLOCKS

Kanchan Umbarje[1], Raymond Tang[1], Roop Randhawa[1], Andrew Sawka[1], Himat Vaghadia[1]

1. Anesthesiology, Vancouver General Hospital, Vancouver, BC, Canada

Introduction: Main limitation with the current ultrasound technology is the difficulty in consistent needle tip visualization during block performance.

We describe our experience with the SonixGPS™ system which provides a real-time display of the needle and the tip using transmitters in the needle and the transducer.

We present a cadaveric and clinical series of real-time ultrasound guided performance of interscalene, supraclavicular and infraclavicular brachial plexus blocks using an out-of-plane technique with the SonixGPS™ system.

Methods: With institutional ethical approval, 3 unembalmed cadavers were selected.

Blocks in the Cadavers:
Interscalene, supraclavicular and infraclavicular blocks were performed bilaterally with methylene blue dye using an out of plane approach with 5-14 MHz SonixGPS™ enabled linear transducer (Ultrasonix, Richmond, BC, Canada). All blocks were performed using a SonixGPS™ 19g, 80mm needle utilizing the needle guidance system. At each site, 1 milliliter of methylene blue was injected at the target. A blinded anatomist then dissected each region layer by layer to confirm correct placement of dye along the brachial plexus. For each procedure the location of the needle tips were identified, spread of the dye noted and photographed.

Blocks in patients:
With written informed consent 15 patients were selected into each of the 3 groups: interscalene (ISB), supraclavicular (SCB) and infraclavicular (ICB). Same technique as in the cadavers were used to perform the blocks on the patients using local anesthetic. Patients were assessed for sensory and motor block every 5 minutes until complete blockade necessary for the proposed procedure was achieved. All patients were contacted afterwards for information on block resolution, complications and patient satisfaction.

Results: In the cadaveric study, dissection confirmed the correct deposition of methylene blue around the brachial plexus in all 3 cadavers bilaterally for the ISB, SCB, and ICB.

In the clinical study, successful sensory blockade necessary for surgical anesthesia was achieved in all the patients. All the patients were pain free in the recovery and rated their satisfaction as very satisfied with the anesthetics. No complications were observed during the procedure nor reported during the telephone follow up. In all the cases, the needle guidance system was easily aligned with the target structure and the calculated trajectory of the needle corresponded to the actual needle path at any angle.

Discussion: Successful nerve blockade is dependent on image acquisition and good visualization of needle tip position which is impaired at steep insertion angles. The SonixGPS™ system, with sensors in the probe and needle, allows for the accurate extrapolation of needle position relative to the ultrasound plane regardless of the angle. Successful blocks of the upper limb were achieved with an out-of-plane approach in all cadavers and patients.

1342971 - NOVEL SUBPECTORAL ULTRASOUND GUIDED INFRACLAVICULAR BLOCK

Jacques H. Smit[1], Raymond Tang[1], Himat Vaghadia[1], Andrew Sawka[1]

1. Anesthesiology and Pharmacology, Vancouver General Hospital, Vancouver, BC, Canada

Introduction: Ultrasound guided infraclavicular blocks are well known. Often, assumptions of cord positions are made when sonographic visualisation of all three are not possible.1-3 The posterior cord is the preferred site for local anesthetic deposition, but is the furthest from the skin in the deltopectoral view and not visualised in 2% of cases. This may require the use of the axillary artery as a surrogate landmark for placement of local anesthetic.3 The objective of this study was to compare the ease of infraclavicular plexus identification via the deltopectoral view (DP) with a novel subpectoral view(SP).

Methods: After institutional ethics approval, the study was performed in volunteers and cadavers. With each cadaver supine, the arm was placed in 110° abduction. A 38 mm 5-14 MHz transducer (L14-5/38 GPS; Ultrasonix, Richmond, BC, Canada) was placed obliquely on the lateral chest wall under the pectoral fold, aiming at the corocoid. Using an out of plane approach, an 8 cm 19 G needle (Ultrasonix, Richmond, BC) was inserted and advanced towards the posterior cord using the SonixGPS needle guidance system (Ultrasonix, Richmond, BC). 1 mL of green dye was injected through the needle. The procedure was performed on both sides of each cadaver. A blinded anatomist dissected the infraclavicular area to allow accurate identification of dye location followed by photography. In 10 adult volunteers, an identical method was used to image the plexus in the SP projection followed by imaging in the standard DP projection. Distance of the posterior cord from the skin was measured with the caliper function.

Results: In all 3 cadavers, correct dye placement via the SP approach was demonstrated by dissection. In volunteers, the skin to posterior cord distance (mean + SD) was 33 + 6.4 mm and 21 + 3.6 mm in the DP versus SP view ($p < 0.001$). Although the posterior cord was visualized in all the studies, the lateral and medial cords and pleura were more reliably visualized in the DP view.

Discussion: This study provides a sonoanatomical basis for a shorter and more direct access to the posterior cord for placement of local anesthetic during infraclavicular block.

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1344599 - HAND WASHING TECHNIQUE FOR EPIDURALS-EFFECT ON REDUCTION OF CONTAMINATION RISK

Naveed T. Siddiqui[1], Suresh Anandakrishnan[1], Allison McGeer[2], Laarni Guerina[1], Jose Carvalho[1], Zeev Friedman[1]

1. **Anesthesia and Pain Management, Mount Sinai Hospital, University of Toronto, Toronto, ON, Canada**
2. **Microbiology and Infectious Diseases, Mount Sinai Hospital, University of Toronto, Toronto, ON, Canada**

Introduction: Infection associated with neuraxial anesthesia and analgesia may result in rare but devastating morbidity and mortality. There is however no current literature containing best practice guidelines for hand sanitizing measures in this context. Results from previous work demonstrate bacterial transmission from operators' forearms to epidural equipment implying possible contamination of the epidural space, especially where gowning is not used (as is the case in many centers when performing labor epidurals). These findings underscore the need for evidence based guidelines for effective methods of hand and arm sterilization before performing epidural anesthesia. The objective of the study was to compare the growth of microbial organisms on the operator's forearm, between 3 common techniques of hand washing for labor epidurals.

Methods: This was a prospective blinded randomized controlled trial. Following REB approval, written informed consent was obtained from all subjects (randomly chosen epidural practitioners). There were three groups consisting of the common variants of practice at our institution.

A) Alcohol gel only up to elbows (5mls Endure 300 Cida-Rinse Gel by Ecolab)
B) Hand washing with soap (Bacti-stat AE Healthcare) up to elbows, sterile towel to dry
C) Hand washing with soap up to elbows, non-sterile towel to dry, followed by alcohol gel.

There were a further two sub-groups analyzed for completeness –

D) Hand washing up to elbows, non-sterile towel to dry (interim sample from C)
E) Hand washing up to elbows, sterile towel to dry, followed by alcohol gel (follow on sample from B)

Power analysis yielded a necessary sample size of 300. Specimens were obtained from a 5cm area on the inside aspect of the middle segment of participants' forearms. Swabs were coded and cultures were immediately performed by a blinded microbiologist. Bacterial growth was studied for up to 72 hours.

Results: We found colonization rates to be 4%, 25% and 16% in groups A, B and C respectively on one or both arms. Compared to group A, the odds ratio of bacterial growth was 8.00 for group B ($P<0.001$) and 4.57 with group C ($P=0.009$). Table-1

Discussion: The findings of this study attest to the superiority of alcohol gel use in reducing bacterial growth. In contrast to our assumption, hand-washing followed by the use of sterile towels followed by alcohol gel was less effective than the use of alcohol alone. This most likely represents a less strict technique of sterilization with the alcohol gel when done following hand washing as opposed to when done as a single technique. We hope the results of this study would be highly relevant to clinical practice, and will enable us to develop guidelines in order to standardize and improve hand-sanitizing practices amongst epidural practitioners.

References: 1. Anesthesiology 2004;101:950-9
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Odds ratios of bacterial colonization comparing four hand-washing protocols against using alcohol alone during epidural procedures

Handwashing Protocol (n=500)	OR for colonization (95% CI)	p-value
Non-sterile Towel alone	12.36 (4.19, 36.49)	<0.001
Non-sterile Towel plus alcohol	4.57 (1.43, 14.20)	0.009
Sterile Towel alone	8.00 (2.67, 23.98)	<0.001
Sterile Towel plus alcohol	1.53 (0.42, 5.60)	0.519
Alcohol alone	1.00 (Ref)	-

1304828 - CORRECTION FOR MULTIPLE COMPARISONS IN ANESTHESIA JOURNALS

William P. McKay[1]

1. Anesthesia, University of Saskatchewan, Saskatoon, SK, Canada.

Introduction: Statistical teaching for much clinical research is based on a simple experimental design comparing differences in a single outcome measurement between two groups with different interventions.(1) When an experiment involves more than two groups, more than one outcome measurement, or subgroup analysis, the issue of multiple comparisons (MCs) arises. Modern clinical research commonly reports many groups or outcome variables. Most statisticians recommend correcting the experiment-wise probability to avoid chance rejection of the null hypothesis (a Type I error) in MC experiments.(2) This study examines current anesthesia literature to determine real-world adherence to promoted statistical theory.

Methods: Reports of scientific studies from the first October issue of 2011 for the ten anesthesia journals with the highest Impact Factor (IF) were examined for MCs and their statistical correction. Observational papers where correction was not needed were excluded. Family-wise correction was counted as “corrected”. The highest IF medical and general science journal were also examined in order to compare the performance of the anesthesia journals with the world’s leading scientific journals.

Results: See table: 146 anesthesia papers were examined, along with 4 from the New England Journal of Medicine and 12 from Nature. Corrections were not indicated in 6 anesthesia and 2 general science papers. There were up to 140 MCs (Bonferroni-corrected P-value: 0.00036) per anesthesia paper. Experiment-wise correction was never used in papers with more than 5MCs. Family-wise correction was used in 5 of the anesthesia papers. Correction rates by journal ranged from 0 to 50%. The New England Journal of Medicine ranged from 23 to 49 MCs per paper while Nature ranged from 16 to 189 MCs (corrected P-value: 0.00026) per paper with a correction rate of 0% in both journals.
Surprisingly, Nature published 4 papers, in physical chemistry, botany, paleoclimatology, and genetic biochemistry, where statistical analysis was indicated, but inferences were made without any statistical analysis whatsoever.

Discussion: Statisticians’ admonitions to correct MCs in order to avoid type I errors are ignored by many scientists, even writing in high IF journals. Bonferroni-corrected P-values are very small when many MCs are measured, making Type II errors an issue. Leading scientists in some fields ignore statistical analysis altogether.

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2. Bland JM, Altman DG (1995) BMJ 310: 170

Journal	IF	Papers	MCs per paper. mean(S.D.)	MC papers	Corrected papers	Percent
Anaesthesia	3.0	9	15.8 (16.9)	8	1	13
Anesthesia and Analgesia	3.1	25	14.2 (9.4)	24	4	17
Anesthesiology	5.5	17	32.8 (21.6)	17	2	12
British Journal of Anaesthesia	3.8	19	22.8 (17.5)	19	1	5
Canadian Journal of Anaesthesia	2.2	5	29.2 (21.8)	4	2	50
Clinical Journal of Pain	3.1	11	32.1 (22.6)	11	1	9
European Journal of Pain	4.4	15	34.3 (24.5)	15	0	0
Journal of Neurosurgical Anesthesia	2.2	9	36.6 (32.6)	8	0	0
Pain	5.4	25	44.5 (33.7)	24	3	13
Regional Anesthesia and Pain Medicine	2.8	9	15.8 (16.9)	8	1	10
TOTALS		146	29.4 (26.2)	140	15	11
NEJM	53.5	4	40.3(11.7)	4	0	0
Nature	34.5	12	75.2(55.1)	10	0	0
TOTALS		16	65.2(104.1)	14	0	0

1321962 - AVAILABILITY FOR TEACHING OUTSIDE THE OPERATING ROOM IN CANADA

Peter Moliner[1], Fred Baxter[2], Chisolm Janice[2], Michael Cummings[2], Joel Fox[2], Francois Girard[2], Caroline Goyer[2], Jeff Granton[2], Craig Haberman[2], Matt Klas[2], Mark Levine[2], Jean-Pierre Morin[2], Oleary Susan[2], Persaud Desirée[2], Raazi Mateen[2], Brent McNicol[2]

1. **Anesthésie et Réanimation, Université de Sherbrooke, Sherbrooke, QC, Canada**
2. **Association of Canadian University Departments of Anesthesia Post-Graduate Education Committee, Canada**

Introduction: Anesthesia teaching is routinely carried out one-to-one INSIDE operating rooms. A survey was carried out to document teaching resources available to program directors. This report focuses on the difficulties that are encountered by program directors in providing for teaching OUTSIDE the operating room.

Methods: A survey was sent to all Anesthesia Program Directors in Canada which inquired on their needs and their resources. One third of the questions pertained to staffing and availability for non-clinical teaching.

Results: All sixteen program directors responded to the survey. A majoriity of centres insist on a major role in non-clinical teaching from all or some of their members. Half of all programs reported frequent difficulty in liberating staff for non-clinical teaching with another third reporting this some of the time. Pressure to provide clinical services at the expense of academic activities was reported in 75% of centres and a 20% found this hindered teaching. A majority of centres felt time available for teaching was inadequate or somewhat lacking. Staff preference for clinical work was cited as a difficulty in providing out of OR teaching in about half of centres. Administrative pressures were also important. One quarter of centres confirm using senior residents to run rooms so that staff could be liberated for teaching, research and administration. In only 20% of centres did Clinical Fellows have defined teaching responsibilities.

Discussion: To our knowledge, this is the first survey to document resources for non-clinical teaching in anesthesia. Most programs reported difficulty in freeing up staff for teaching outside the OR. Anesthesia is particular as it requires staff on duty to be immediately available at all times This may contribute to the difficulties encountered in liberating staff. The use of senior residents to cover for teaching is paradoxical and underscores the limitations that were reported. Training in anesthesia is increasingly complex and not all of it can be accomplished in the operating theatre(1). New approaches such as simulation, attention to CanMEDS non-expert roles, requirements for didactic teaching and new technologies all require liberating staff to teach outside the OR. Given the difficulties revealed by this survey we need to optimise this non-clinical time. Moreover, if some forms of teaching are better carried out outside the operating room (2), this needs to be recognized and supported.

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2. Hallikainen J, Teaching anaesthesia induction to medical students: comparison between full-scale simulation and supervised teaching in the operating theatre. European Journal of Anaesthesiology. 26(2):101-4, 2009

1327726 - ONLINE 3-D MODEL TO IMPROVE EARLY ULTRASOUND SCANNING OF THE SPINE

Ahtsham U. Niazi[1], Gordon Tait[2], Jose Carvalho[3], Vincent W. Chan[1]

1. Anesthesia, Toronto Western Hospital, Toronto, ON, Canada
2. Anesthesia, Toronto General Hospital, Toronto, ON, Canada
3. Anesthesia, Mount Sinai Hospital, Toronto, ON, Canada

Introduction: The use of ultrasound for neuraxial anesthesia is a new application that is rapidly becoming an accepted standard of care, with research demonstrating an improvement in the success of the spinal or epidural technique (1, 2). This new application has posed a challenge to educators, as new skills must be taught. To assist with the teaching and learning of ultrasound guided neuraxial anesthesia (UGNA) we have created an online interactive educational module (http://pie.med.utoronto.ca/vspine). This module consists of two components: 1) spinal anatomy and 2) sonoanatomy. Our study aimed to determine whether the use of this interactive 3-D spine model for a 2-week period would improve the performance of novice operators in determining defined landmarks during real time ultrasound imaging of the lumbar spine.

Methods: After obtaining local research ethics board approval and participant consent, 16 PGY1 anesthesia residents were randomly assigned to two groups. The control group received password-protected access to the lumbar anatomy component of the online module, whereas the study group received access to both the anatomy and ultrasound components. All residents had access to the modules for two weeks following a full day workshop. This workshop included a 45-minute didactic lecture on UGNA, a 45 minute mentored teaching on cadaveric spine dissections, and a 2-hour hands-on ultrasound scanning of live models. At the end of the two weeks, the residents were asked to perform a spine scan on a live model and their performance was evaluated by a single person, using a 12 item task-specific checklist. The items included the sacrum, the lumbar interspaces and major ligaments. The residents were also asked the depth of the ligamentum flavum and their ideal needle insertion point. Each correct answer received one point and each incorrect answer received zero points.

Results: The study group logged in on-line to access our interactive 3-D spine model an average of 3.9 times and spent an average of 42 (+/- 27) minutes reviewing the content. The control group logged in an average of 1.4 times and spent an average of 13 (+/- 5) minutes reviewing the content. The control group scored 5.88 (SD = 3.60) while the study group scored 10.13 (SD = 2.47) points in the task specific checklist, with a significant difference of 4.25 between the groups ($p<0.02$).

Discussion: Our results show superior performance by the residents who had access to both components of the module. Access to the interactive 3-D spine model may improve knowledge and skills prior to clinical care. This may provide advantage in learning this new technique by allowing residents to start at a higher point on their learning curves.

References: 1. J Clin Anesth. 2002 May; 14(3):169-75
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1336378 - ASSESS EARLY AND OFTEN: COMPETENCY-BASED ANESTHESIA TRAINING

Amy Fraser[1], **Simone Crooks**[1]

1. Anesthesiology, The Ottawa Hospital, Ottawa, ON, Canada

Introduction: Competency-based medical education is gaining ground in Canada (1); at least one pilot program has given residents the opportunity to accelerate residency training based on demonstration of competency. Assessment of resident competency is best done using serial point assessments based on established learning objectives. Therefore, we sought to establish learning objectives for an initial point assessment for junior Anesthesia residents.

Methods: A literature search was conducted to identify existing learning objectives for Anesthesia residents (2-3). A modified Delphi process was used to compose learning objectives in the domains of knowledge, technical skills, and attitudes. Knowledge objectives were designed to apply to generalist, adult anesthesia rotations only, as the timing of subspecialty rotations may vary. CanMEDS roles (4) were cross-referenced to specific competencies for areas such as Professionalism and Collaboration. A plan for dissemination of objectives to learners and teachers was developed, and changes to existing instruction and assessment were proposed, to improve alignment with objectives.

Results: A set of objectives has been developed for the first of several serial point assessments. These objectives will serve as the foundation for further sets of objectives designed to support point assessments for more senior residents. The end of the PGY-2 year, or the equivalent competency level, was selected as the basis for the first assessment point. PGY-2 level objectives were designed to reflect the junior learner who has spent 12 months or less on the Anesthesia service.

Discussion: Although several national Anesthesia societies have created behaviour-based learning objectives for the graduating or certified anesthesiologist (2,3), at the time of writing there are no published, behaviour-based learning objectives intended for use during the body of residency training. Resident assessment and feedback, therefore, is based on a subjective reference standard that is unique to each Anesthesiologist. When feedback is subjective and level-specific learning goals are unstated, residents may have difficulty interpreting the quality of their performance and progress (5). Level-specific learning objectives will help residents to self-assess their learning and help staff to guide teaching, assessment, and feedback. Program Directors will be better able to define learning success and failure, set defensible passing standards (6), and support recommendations for remedial training – or rapid advancement – where indicated. And finally, Royal College certification examination will no longer need to serve as the lone "gatekeeper" in assessment of competency.

Further work in this area will consist of development of learning objectives to support serial point assessments of more senior residents, and setting of defensible passing standards for serial point assessments.

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1343476 - THE EFFECT OF MENTAL PRACTICE ON CRISIS RESOURCE MANAGEMENT

Megan Hayter[1], M. Dylan Bould[2], Mahnaz Afsari[1], Nicole Riem[4], Michelle Chiu[3], Sylvain Boet[3]

1. **Department of Anesthesia, St. Michael's Hospital, University of Toronto, Toronto, ON, Canada**
2. **Department of Anesthesia, Children's Hospital of Eastern Ontario, University of Ottawa, Ottawa, ON, Canada**
3. **Department of Anesthesia, The Ottawa Hospital, University of Ottawa, Ottawa, ON, Canada**
4. **Department of Anaesthesia and Emergency Medicine, Kantonsspital Hospital, University of Basel, Liestal, Switzerland**

Introduction: Mental practice (MP) is defined as the 'symbolic rehearsal of a physical activity in the absence of any gross muscular movements' and has been traditionally used in sport and music to enhance performance (1). In healthcare, MP has been demonstrated to improve technical skill performance of surgical residents (2). However, its effect on crisis resource management (CRM) skills in high stakes clinical scenarios has yet to be determined. We aimed to investigate the effect of warm-up with MP on non-technical skill performance during a simulated crisis scenario.

Methods: Following Research Ethics Board approval, forty anaesthesia residents were randomized. The intervention group participated in 20-minutes of MP based on a CRM script. The control group received a 20-minute didactic teaching session on a topic unrelated to CRM. Each subject then managed a simulated cardiac arrest. Video recordings of each performance were analysed by two expert anaesthetists using the previously validated Ottawa GRS, time to start chest compressions, to administer epinephrine and blood.

Results: There was no significant difference between the intervention and control groups; total Ottawa GRS score (Median (Inter Quartile Range [Range]) (24.50 (18.63-28.88 [6.50-34.50])) vs (20.50 (13.00-29.13 [6.50-34.50])) (P = 0.53); time to starting chest compressions 146.0 (138.0-231.0 [115.0-323.0]) vs 162.5 (138.0-231.0 [100.0-460.0]) (P = 0.27), time to epinephrine administration 163.0 (151.0-187.0 [111.0-337.0]) vs 187.0 (164.0-244.0 [115.0-310.0]) (P = 0.09), and time to blood administration 220.5 (130.8-309.0 [92.0-485.0]) vs 252.5 (174.5-398.8 [65.0-527.0]) (P = 0.48).

Discussion: Unlike technical skills, warm up with MP does not seem to improve CRM skills.

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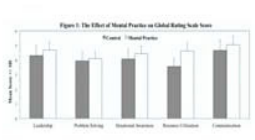

1343810 - EDUCATING ANESTHESIA RESIDENTS TO OBTAIN AND DOCUMENT INFORMED CONSENT FOR EPIDURAL LABOUR ANALGESIA: DOES SIMULATION PLAY A ROLE?

Andreas Antoniou[1], Kristine Marmai[1], Richard Cherry[1], Sudha Singh[1], Philip Jones[1]

1. Anesthesia and Perioperative Medicine, London Health Sciences Centre, London, ON, Canada

Introduction: Prior to performing epidural labour analgesia in an obstetric patient, informed consent must be obtained. There is no formal teaching at our centre for residents to learn the components of informed consent, but rather this is informally done at the bedside during patient assessment.

This study aims to assess the ability of anesthesia residents to acquire and retain knowledge regarding informed consent documentation for epidural labour analgesia, in the setting of didactic teaching versus simulation. It also assesses how well this knowledge is translated to practical clinical ability by assessing the verbal informed consent process during an interaction with a standardized patient.

Methods: Following approval by the institutional Research Ethics Board, twenty anesthesia residents were consented for study participation and randomized to a 'didactic group' or 'simulation group'. Each resident was first presented with a written scenario and asked to document the informed consent process as they normally would in clinical practice (pre-test). The didactic group then had a presentation about informed consent, while the residents in the simulation group each interviewed a simulated patient (high fidelity simulation mannequin) where scenarios focused on different aspects of informed consent. All residents were then again asked to read a scenario and document the informed consent process (post-test). Six weeks later all residents interviewed a standardized patient in labour and documented the informed consent from this interaction (6 week test).

The documentation as well as the verbal interaction with the standardized patient was scored independently by 2 investigators using a points system that was developed based on the Canadian Medical Protective Association guidelines (1) as well as current literature and expert opinion from several experienced obstetrical anaesthesiologists (2,3).

Results: There was no significant difference in the baseline performance between the two groups. The didactic group performed better than the simulation group at both the immediate time point and six week time point. Both groups had a significant improvement in their written consent documentation at the immediate time point compared to baseline, but the improvement in the didactic group was greater. The didactic group retained their acquired knowledge at the six week time point better than the simulation group. Clinical test scores (acquisition of oral informed consent from a standardized patient) did not differ statistically between groups.

Discussion: A didactic teaching method was better than simulation for residents to acquire and retain knowledge regarding informed consent documentation. The difference between the two groups at the immediate time point could be either due to a real effect, to the method of teaching between the two groups or to unrecognized differences in the content delivered. However the absence of a difference in the clinical test scores indicates that didactic teaching is not superior to simulation training during a conversation observed between a resident and a standardized patient to obtain informed consent.

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1343898 - VIDEO TEACHING IN THE OPERATING ROOM

Chris Durkin[1], Himat Vaghadia[2], James Price[2]

1. **Anesthesiology, Pharmacology and Therapeutics, University of British Columbia, Vancouver, BC, Canada**
2. **Department of Anesthesia, Vancouver General Hospital, Vancouver, BC, Canada**

Introduction: Effectively teaching physicians in training medical procedures has gained attention in recent literature (1-9). While traditional methods make up the bulk of the literature, there has been a move to investigate alternative techniques in an effort to improve procedure training (1-3, 5-10). Web 2.0, which allows users to collaborate and interact with social media such as video sharing sites is being studied in all specialties in medicine, including anesthesiology (1). However, video learning independent of hands on experience is insufficient for competency and supervised practice is essential (1, 3). The purpose of this study was to assess the educational value and acceptance of using video teaching of common anesthetic procedures before and after performing procedures in the operating room under the supervision of an anesthesiologist.

Methods: Ethics approval was obtained from the Research Ethics Board. Fourth year medical students on an anesthesiology elective were eligible to participate. A word document library of video resource links that demonstrate a technique of twelve commonly performed procedures in anesthesiology was created and distributed to the medical students and their supervisor. The students were asked to refer to the video library before and after performing procedures and discuss the videos with their supervisor in the operating room. A survey was distributed to the students to assess the usefulness of the resource.

Results: Twenty-four medical students were recruited. Students agreed that they were aware of videos on the internet demonstrating anesthetic procedures (median 4, IQR = 2) but disagreed that they had been exposed to the use of these videos in previous anesthesia rotations (median 2, IQR = 0.5). The medical students were neutral that the video library was easy to use in the operating room (median 3, IQR = 1.5) but agreed that watching the videos prior to performing the procedure improved their confidence in performance (median 4, IQR = 0). They agreed that they had previously performed procedures on patients without feeling comfortable (median 4, IQR 1). Medical students agreed that watching the anesthesia videos prior to the procedure improved their subjective technique (median 4, IQR = 0). The students also agreed that the video library was a useful learning tool in the operating room (median 4, IQR = 0.5).

Discussion: This educational, qualitative survey study explores a technique to teach procedures to fourth year medical students not previously described in the literature. This technique combines supervision with video teaching used in the operating room. Medical students agreed that using the video library in the operating room subjectively improved their confidence in performance and technique. This educational project provides evidence for the feasibility and utility in exploring video teaching in and out of the operating room as a possibility to improve procedural learning.

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1344065 - WITHIN-TEAM DEBRIEFING VERSUS INSTRUCTOR-DEBRIEFING FOR INTERPROFESSIONAL SIMULATION-BASED EDUCATION: A PROSPECTIVE RANDOMIZED TRIAL

Sylvain Boet[1], M. Dylan Bould[2], Bharat Sharma[3], Scott Reeves[4], Viren Naik[1], Emmanuel Triby[5], Teodor Grantcharov[3]

1. **Department of Anesthesiology & The University of Ottawa Skills and Simulation Centre, The Ottawa Hospital, University of Ottawa, Ottawa, ON, Canada**
2. **Department of Anesthesiology & The University of Ottawa Skills and Simulation Centre, Children's Hospital of Eastern Ontario, UNiversity of Ottawa, Ottawa, ON, Canada**
3. **Department of Surgery, St Michael's Hospital, University of Toronto, Toronto, ON, Canada**
4. **Center for Innovation in Interprofessional Healthcare Education, University of California, San Francisco, CA, United States**
5. **Faculté de Sciences de l'Education, Université de Strasbourg, Strasbourg, France**

Introduction: Teamwork performance during crisis management in the operating room (OR) is important for patient safety.[1] In interprofessional simulation these skills are usually taught by a trained instructor. One of the main costs to implementing an interprofessional simulation curriculum is finding instructors with appropriate training and dedicated time. A within-team debriefing, led by the individuals of the team itself rather than an external instructor, has the potential to address this barrier. This study compared the effectiveness of within-team debriefing to that of instructor debriefing on interprofessional team performance during a simulated operating room crisis.

Methods: After Research Ethics Board approval, 120 participants were grouped into 40 teams consisting of one anesthesia resident, one surgical resident and one staff circulating OR nurse. An actor played the scripted role of an OR scrub nurse. All teams managed a simulated crisis scenario (pretest). Teams were then randomized to either a within-team debriefing or an instructor debriefing. In the within-team debriefing group, the teams reviewed the video of their scenario by themselves with a debriefing guide based on the Ottawa Global Rating Score scale. The teams in the instructor debriefing group reviewed their scenario, guided by a trained instructor. Immediately following debriefing, all teams were recorded managing a different intraoperative crisis scenario (posttest). After data collection, three blinded expert examiners rated all performances in a random order using the validated TEAM scale.[2]

Results: A two-way, mixed ANOVA detected a significant improvement in team performance from pretest to posttest (p=.008) with no significant effect of the debriefing type received (p=.91). The effect of debriefing modality showed no interaction with respect to pre or post test performance (p=.52) (Figure1).

Discussion: Within-team debriefing results in measurable improvements in team performance in simulated crisis scenarios. Within-team debriefing may be as effective as instructor team debriefing for interprofessional team-based simulation, which could improve cost-effectiveness and flexibility of scheduling.

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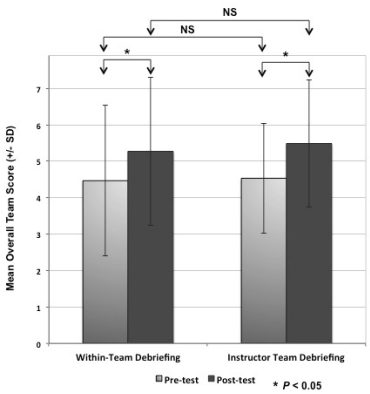

Within-team debriefing versus instructor team debriefing comparing pre-tests and post-tests for overall TEAM score (Mean +/- SD). NS, not significant.

1344660 - A HAPTIC SIMULATION MODEL TO TRACK EPIDURAL NEEDLE INSERTION

Din Kagalwala[1], Sanjib D. Adhikary[1], Roger Webster[2], Bosseau Murray[1]

1. Anesthesiology, Penn State College of Medicine, Hershey, PA, United States
2. Department of Computer Science, Millersville University, Millersville, PA, United States

Introduction: Presently, there is a lack of suitable simulation models for training epidural skills. Trainees usually learn these skills on patients. When trainees encounter an obstruction, they are instructed to adjust the angle of the needle in small increments. While the trainees say they are doing so, the fact is not always known. We evaluated a haptic device for such skills. The objective was to test the value of haptic devices in simulated advancement of an epidural needle in teaching scenario and also to train the residents to understand angle adjustments of the epidural needle.

Methods: Following ethical approval, we developed a Virtual epidural simulator based on a haptic device (Phantom Omni, Sensable Technologies, Woburn, MA, USA). A 22 mm diameter round object (coin) was programmed at a depth of 40 mm. The programming language environment used Microsoft's C# in .NET and Microsoft's XNA application framework. These software packages allow to build 3D graphic applications and games by eliminating the need to rewrite the graphics
Part A (baseline): Trainees advanced the simulated epidural needle straight ahead (horizontal) to encounter the object. They were then requested to repeat the procedure, while changing the angle with the aim of finding ("walking off") the edge. They were asked to establish, from the angle of insertion, the size of the object. During this phase, the screen of the computer was turned away.
Part B: (practice): While viewing the computer screen, trainees practiced advancing the needle making only necessary (small) angle changes to find the edge of the object.
Part C: (testing): With the screen turned away, residents attempted finding the edge of the object as before. Comments were elicited from residents as to the value of the training and suggested changes. We calculated the variation (standard deviation) of each resident's attempts. We calculated the average of the group's variations for Part A and Part C. We used Fisher's Exact Probability Test to compare Part A and B. P-values of <0.05 were considered significant.

Results: For Part A, the 16 volunteers had an average variation of 11.4 mm (minimum 5, maximum 17.) For Part C the average variation was 13.3 mm (minimum 4, maximum 21.) The differences were not significant. The residents indicated that this could be a useful device to use for training.

Discussion: Discussion: The computer-based haptic device demonstrated some useful advantages as a learning tool. The system precisely recorded and displayed deviations in angles of insertion from midline made by the participants. Our study also established a foundation for future models. Based on our results, we believe this is a valuable training device for residents, and further development would be deemed worthwhile.

References: 1

1344676 - USING NOVEL PODCAST TECHNOLOGY TO ENHANCE KNOWLEDGE ACQUISITION

Fahad Alam[1], Sylvain Boet[2], Dominique Piquette[3], Vicki LeBlanc[4]

1. Anesthesia, University of Toronto, Toronto, ON, Canada
2. Anesthesia, University of Ottawa, Toronto, ON, Canada
3. Critical Care, University of Toronto, Toronto, ON, Canada
4. Wilson Centre for Research in Education, University of Toronto, Toronto, ON, Canada

Introduction: The ability to provide optimal learning opportunities for medical trainees remains a challenge due to mandated reduced clinical working hours and increased number of trainees[1-2]. One way to meet this challenge is to supplement reduced learning opportunities with the use of electronic-learning, specifically podcasts. However, there is currently little research regarding the most effective manner to utilize e-learning opportunities.

The goal of this study was to identify whether podcasts can be used to teach complex medical content involving decision-making. Furthermore, we examined the role of different approaches for presenting podcast medical content based on two learning strategies: mental practice and modeling.

Modeling involves the trainee being able to view a demonstration of what needs to be learned. It has been extensively studied as a means of teaching new behaviors and has been specifically shown to enhance the development of motor skills and higher-level cognitive processes[3].

Mental practice [MP] is defined as the cognitive rehearsal of the steps of a particular task in the absence of overt physical movement. It has been extensively investigated in the domains of athletic training, military exercises, and recently surgical education[4-6].

Methods: After local ethics committee approval was obtained, fifty-six medical students participated in this prospective randomized controlled trial. Students were randomized to view one of four podcasts teaching airway management: 1) lecture-based podcast (control), 2) videotaped simulation-based podcast (modeling), 3) lecture-based podcast followed by MP 4) videotaped simulation-based podcast followed by MP. One week later, students were asked to manage an airway crisis during a mannequin-based simulation. Knowledge was assessed by multiple-choice pre (baseline) and post-intervention (one-week retention) quizzes. This abstract reports the results of the knowledge assessments.

Results: A two way mixed ANOVA of the knowledge scores was conducted, with time (pre/post intervention) and group (control, MP, modeling, MP+modeling) as the between subject variable. There was a main effect of time ($p<.01$) and a significant time by group interaction ($p<.05$) across all groups. A subsequent one-way ANOVA of the pre-intervention quiz scores showed no significant differences between the groups at baseline (range 50%-58%, $p=.65$). However, a one-way ANOVA of the post-intervention quiz scores revealed a main effect of group ($p<.01$). Paired T-test comparisons revealed that the MP and modeling groups showed significantly higher post-intervention scores than the control group (MP= 71%, modeling = 71%, control = 61%, $p<.05$). The combined MP+modeling group had significantly higher post-intervention scores than all other groups (MP+modeling = 81%, all $p<.05$).

Discussion: Results support our hypothesis that podcasts can be used to teach tasks requiring higher-level cognitive processes. Furthermore, the effectiveness of podcasts for knowledge acquisition can be enhanced with the addition of either MP or modeling. The most effective method is the combination of both.

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1288050 - CAREGIVER BURDEN AFTER AMBULATORY SURGERY IN THE ELDERLY

Natalie A. Clavel[1], Rebecca A. Moga[1], Barbara Power[2], Monica Taljaard[3], Howard Nathan[4], Gregory L. Bryson[4]

1. Anesthesiology, University of Ottawa, Ottawa, ON, Canada
2. Geriatric Medicine, The Ottawa Hospital, Ottawa, ON, Canada
3. Methods Center, The Ottawa Hospital Research Institute, Ottawa, ON, Canada
4. Anesthesiology, The Ottawa Hospital, Ottawa, ON, Canada

Introduction: According to the National Survey of Ambulatory Surgery, 17 million ambulatory procedures were performed on patients over 65 years old in the United States in 2006.[1] Ambulatory surgical procedures have been found to impair postoperative function for up to one week in patients 18-65; the impact on those >65, and those who care for them, is unknown.[2] The purpose of this prospective cohort study was to determine whether postoperative changes in instrumental activities of daily living (iADL), as assessed by the Système de Mesure de l'Autonomie Fonctionelle (SMAF), were associated with an increased burden of care, as assessed by the Zarit Burden Interview (ZBI) in their primary caregiver.

Methods: Following research ethics board approval, patients aged >65, booked for eligible elective procedures with planned discharge home within 24 hours of surgery were recruited. Patients were excluded if they did not have an eligible primary caregiver, did not speak English or French, or could not complete the study instruments. Patients and their primary caregivers were recruited preoperatively and interviewed by phone on postoperative (POD) days 7 and 30. General linear models (repeated measures analysis) with Tukey adjustment for multiple comparisons were used to evaluate changes in caregiver burden over time, as well as the association between caregiver burden and patient functional status over time.

Results: Participant characteristics and outcomes are listed in Table 1. SMAF declined by 6.9 (95% CI 5.3 to 8.4) and 2.6 (95% CI 1.3 to 4.0) points on PODs 7 and 30, respectively. Least square mean change in ZBI was -0.4 (95% CI -1.8 to 0.96) and -0.6 (95% CI -2.1 to 0.8) indicating no change in caregiver burden over the same intervals. Linear regression analysis revealed an association between patient SMAF and caregiver burden ($p<0.0001$) that was significantly different over time ($p<0.0001$). At POD 30, a 1 unit increase in patient SMAF was associated with a 0.51 unit increase in caregiver burden. Caregiver SMAF at baseline ($p=0.0177$) was shown to be a significant predictor of ZBI however, surgery type ($p=0.8282$) and patient age ($p=0.7634$) were not.

Discussion: The majority of patients regained baseline function within 30 days of ambulatory surgery and did not impose significant burden on their caregivers. On average, patients reported a postoperative loss of function equivalent to that requiring 25 minutes or less of daily support.[3] Patients and caregivers whose iADLs were impaired however, experienced increased caregiver burden. These findings highlight the importance of functional assessment of both elderly patients and their caregivers when preparing for ambulatory surgery.

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3. J Can Geriatr Soc 2001;4:141-147

	Patients N=102	**Caregivers N=101**
Age	71(6)	67(11)
Gender (m)	48[47]	47[46]
ASA Status (1,2,3,4)	(3,56,39,4)	-
Caregiver (spouse)	86[84]	-
Employed	14[14]	25[25]
Surgery		
Orthopedic Peritoneal	51[50] 51[50]	- -
SMAF		
Baseline POD7 POD30	4.03(5.94) 10.90(7.59) 6.67(7.16)	2.04(2.87) - -

ZBI		
Baseline	-	9.27(9.89)
POD7	-	8.86(9.76)
POD30	-	8.63(10.61)

(SD)[%]

1289987 - SYSTEMATIC REVIEW OF OUTCOME OF OSA PATIENTS UNDERGOING AMBULATORY SURGERY

Saravanan P. Ankichetty[1], Girish P. Joshi[2], Tong J. Gan[3], Frances Chung[4]

1. Anesthesia, Toronto Western Hospital, Toronto, ON, Canada
2. Anesthesia, UT Southwestern Medical Centre, Dallas, TX, United States
3. Anesthesia, Duke University Medical Centre, Durham, NC, United States
4. Anesthesia, Toronto Western Hospital, Toronto, ON, Canada

Introduction: OSA patients may pose significant challenge in ambulatory surgical settings. The objective of this systematic review is to determine the outcome of OSA patients after ambulatory surgery.

Methods: We searched The Cochrane CENTRAL Register of Controlled Trials, Medline, Embase, and Cochrane Database of Systematic Reviews from 1950 to Feb 2011 for relevant articles. The included studies met the criteria: human studies, adults patients with OSA undergoing ambulatory surgery and published in English.

Results: The search strategy resulted in 1909 articles. Seven papers of 1591 OSA ambulatory surgical patients met our criteria and selected for further analysis. The remaining 69 articles were excluded due to the following reasons: irrelevant abstracts or full text review (39 articles), duplicate records (8 articles), reviews (15 articles), obese patients without OSA (3 articles), case reports and correspondence (4 articles). Of the included studies, 3 were prospective and 4 retrospective studies. OSA patients had significant history of stroke, myocardial infarction and congestive heart failure ($P<0.05$) (Table 1). Similarly, they had higher BMI, higher incidence of diabetes and hypertension compared to non-OSA patients (Table1).

There was no anesthetic related unanticipated admission or mortality when OSA patients underwent ambulatory surgery. One study reported OSA receiving general anesthesia had higher intraoperative events vs. non-OSA patients (Table2). Higher incidence of hypoxemia (Spo2<95%) with OSA patients undergoing upper extremity procedures and associated chronic obstructive pulmonary disease was described after regional anesthesia. In OSA patients undergoing ambulatory upper airway surgery, 18 % OSA patients were hospitalized. Of those, 3% were due to oxygen desaturation. The need of oxygen supplementation was greater with OSA patients in the postoperative period (Table 2).

Discussion: Few adverse effects were reported when OSA patients underwent ambulatory surgery. More frequent oxygen desaturation requiring oxygen supplementation was documented after regional and general anesthesia. There was no anesthetic related unanticipated hospital admission or mortality after ambulatory surgery. However, the quality and number of patients in the studies were limited. There is a need for further trials with large numbers and uniform reporting of outcomes.

References: Anesth Analg 2003; 96:1328-35.

Outcome of OSA patients undergoing ambulatory surgery

1310504 - SERUM HCO3 IMPROVES SPECIFICITY OF STOP-BANG SCREENING FOR OSA

Edmond H. Chau[1], Peter Liao[1], Yiliang Yang[1], Richard Hall[2], Babak Mokhlesi[3], Frances Chung[1]

1. **Anesthesiology, TWH, University Health Network, Toronto, ON, Canada**
2. **Anesthesiology, QEII Health Sciences Centre, Halifax, NS, Canada**
3. **Pulmonary and Critical Care Medicine, University of Chicago Pritzker School of Medicine, Chicago, IL, United States**

Introduction: The STOP-Bang questionnaire has been validated as a screening tool for obstructive sleep apnea (OSA) in surgical patients.1 A positive STOP-Bang screen (score ≥ 3) is highly sensitive but only moderately specific.1 The objective of this study was to determine whether the addition of serum bicarbonate (HCO3) to a STOP-Bang score ≥ 3 improves specificity for OSA.

Methods: After hospital ethics approval, preoperative patients over 18 years and without diseases which may cause abnormal electroencephalography were approached. The recruited patients were asked to answer STOP-Bang questionnaire1 (Snoring, Tiredness, Observed apnea, high blood Pressure, BMI > 35kg/m2, Age > 50, Neck circumference > 40cm and male Gender) and invited to undergo overnight in-home portable polysomnography (Embeltta X-100) for research purposes. The BMI, age, neck circumference and gender (Bang) were documented by research staff. A total of 4077 patients were approached. 650 consented patients completed polysomnography and 516 of them had complete data on STOP-Bang questionnaire. Of these patients, 384 with preoperative HCO3 were analysed. Predictive parameters (sensitivity, specificity, positive and negative predictive values) for STOP-Bang and HCO3 were calculated.

Results: The mean age of 384 patients was 60 ± 11 years; 46% males; BMI 30.9 ± 6.9 kg/m2; neck circumference 39 ± 4 cm; HCO3 26.4 ± 2.7. STOP-Bang score was ≥ 3 in 304 (79%) patients. The apnea-hypopnea Index (AHI) was > 5 in 275 (65%) patients; 158 (41%) patients had AHI > 15 and 72 (19%) patients had AHI > 30. HCO3 of 28 mmol/L represented the 75th percentile of the studied population and was selected as a cutoff for analysis. The specificity (95% CI) of a STOP-Bang score ≥ 3 for AHI > 5, AHI > 15 and AHI > 30 was 35.2% (26.2-45.0), 27.1% (21.4-33.4) and 24.1% (19.5-29.3), respectively. With the addition of HCO3 ≥ 28 mmol/L to the STOP-Bang score ≥ 3, the specificity (95% CI) for AHI > 5, AHI > 15 and AHI > 30 were improved to 82.4% (73.9-89.1), 79.6% (73.7-84.6), 77.2% (72.1-81.7), respectively. In addition, increasing HCO3 cutoff levels further increased specificity. However, the addition of HCO3 ≥ 28 to a STOP-Bang score ≥ 3 decreased the sensitivity (95% CI) for AHI > 5, AHI > 15 and AHI > 30 from 84.8% (80.0-88.8), 88.1% (82.0-92.7) and 93.2% (84.7-97.7) to 30.1% (24.7-30.9), 35.2% (27.8-45.2) and 42.5% (31.0-54.6), respectively.

Discussion: The addition of HCO3 (≥ 28 mmol/L) to a STOP-Bang score ≥ 3 improves the specificity of predicting OSA but decreases the sensitivity. We propose a 2-step screening process. The first step uses STOP-Bang to screen all patients for OSA and the second step uses HCO3 ≥ 28 mmol/L in those with STOP-Bang score ≥ 3 for increased specificity.

References: 1. Anesthesiology 2008 108: 812-821

1312949 - FUNCTIONAL RECOVERY AFTER AMBULATORY SURGERY IN THE ELDERLY

Rebecca A. Moga[1], Natalie A. Clavel[1], Barbara Power[2], Monica Taljaard[3], Howard Nathan[4], Gregory L. Bryson[4]

1. Anesthesiology, University of Ottawa, Ottawa, ON, Canada
2. Geriatric Medicine, The Ottawa Hospital, Ottawa, ON, Canada
3. Ottawa Hospital Research Institute, The Ottawa Hospital, Ottawa, ON, Canada
4. Anesthesiology, The Ottawa Hospital, Ottawa, ON, Canada

Introduction: The 2006 National Survey of Ambulatory Surgery identified that over 400 ambulatory surgical procedures were performed annually per 1000 persons over the age of 65, a rate nearly double that in 1996.[1,2] Research among younger patients identified that seemingly "minor" ambulatory surgeries result in reductions in functional independence lasting up to a week.[3] The purpose of this study is to evaluate whether ambulatory surgery in elderly patients results in significant reductions in instrumental activities of daily living (iADL), and as a secondary objective to assess whether these changes are correlated with inadequate postoperative analgesia.

Methods: Following research ethics board approval patients 65 years and older undergoing elective day surgery involving orthopedic procedures or intraperitoneal surgery were recruited. Those who resided in a nursing home providing professional services, had cognitive or physical impairments making them unable to complete the study instruments were excluded. Assessments of functional capacity and pain were carried out preoperatively, and days 7 and 30 postoperatively using the Système de Mesure de l'Autonomie Fonctionnelle (SMAF), Brief Pain inventory (BPI). Numeric Pain Rating Scale (NRS) was recorded post operative day (POD) 1-3 in a patient diary. The minimum clinically important difference in SMAF is 5-points . Demographics were described with number [%] or means with standard deviation (SD). SMAF and BPI scores are described with median [25th,75th centiles]. General linear models (repeated measures analyses) were used to investigate reductions in functional independence over time and test associations with the BPI. Pairwise comparisons were adjusted for multiplicity using Tukey's method.

Results: Of the 102 patients, 2 were admitted and 2 readmitted to hospital, for uncontrolled pain, myocardial infarction, perforated uterus and gastrointestinal bleed. Characteristics and outcomes associated with NRS, BPI and SMAF are seen in Table 1. Sixty-one patients reported a 5-point or greater increase in SMAF score at POD7. Least square mean increases in SMAF (95% CI) were 6.9 (95% CI 5.0 to 8.7) and 2.6 (95% CI 1.1 to 4.2) at POD7 and POD30 respectively. The linear association between SMAF and BPI was positive (1-unit increase in BPI associated with 0.7 unit increase in SMAF) and statistically significant ($p<0.001$).

Discussion: Elderly patients have measurable decline of iADLs 7 and 30 days following ambulatory surgery. While consistent with community dwelling peers, POD7 SMAF scores indicate that our patients require 25 minutes of assistance daily.[4] NRS scores on POD 1, 2, and 3 indicate moderate ongoing pain. The linear relationship between BPI and SMAF indicates that pain impacts functional capacity.

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Table 1

	Orthopedic (N=51)	**Peritoneal** (N=51)	**Total** (N=102)
Age	70(SD 4.5)	73(SD 6.5)	71(SD 6.0)
Male gender	19[37]	29[57]	48[47]
ASA Physical Status (1,2,3,4)	(1, 28, 19, 3)	(2, 28, 20, 1)	(3, 56, 39, 4)
Employed (any employment)	11[22]	3[6]	14[14]
Admitted or Readmitted	2[4]	2[4]	4[4]
NRS Pain(Peak) POD 1 POD 2 POD 3	(N=46) 4.6(SD 3.0) 4.5(SD 3.1) 3.7(SD 2.6)	(N=46) 5.2(SD 2.5) 5.1(SD 2.5) 4.3(SD 2.8)	(N=92) 4.88(2.77) 4.78(2.82) 4.00(2.82)
BPI FunctionalInterference Score Baseline POD 7 POD 30	 1.6 (0.2,2.9) 1.6 (0.4, 3.1) 1.0 (0.0, 1.0)	 0.0 (0.0, 1.9) 1.2 (0.0, 3.4) 0.0 (0.0, 1.0)	 0.7 (0.0, 2.6) 1.4 (0.3, 3.1) 0.3 (0.0, 1.9)
SMAF			

Baseline POD POD 30	7	2.0(0.5, 4.0) 11.5(6.0, 14.5) 6.0(2.0, 11.0)	2.0(0.0, 5.5) 10.0(6.0, 14.0) 4.5(1.0, 8.0)	2.0(0.0, 5.5) 10.0(6.0, 14.0) 5.0(2.0, 10.0)

1342551 - PERIOPERATIVE CONSIDERATIONS IN OBESITY HYPOVENTILATION SYNDROME

Edmond H. Chau[1], David Lam[1], Jean Wong[1], Babak Mokhlesi[2], Frances Chung[1]

1. **Anesthesia, University Health Network , Toronto, ON, Canada**
2. **Pulmonary and Critical Care Medicine, University of Chicago Pritzker School of Medicine, Chicago, IL, United States**

Introduction: Obesity is a growing global concern. One of the consequences of morbid obesity is obesity hypoventilation syndrome (OHS). This syndrome is characterized by the triad of obesity (body mass index ≥ 30 kg/m2), daytime hypoventilation (PaCO2 ≥ 45 mmHg and PaO2 < 70 mmHg at sea level), and sleep-disordered breathing without other known causes of hypoventilation. It is a disease entity distinct from simple obesity and obstructive sleep apnea (OSA). Currently, information regarding the perioperative evaluation and management of OHS is extremely limited in the anesthesiology literature. We performed a systematic review on the epidemiology, pathophysiology, clinical characteristics, screening, treatment and perioperative considerations in OHS.

Methods: A literature search on articles related to OHS was performed in Medline, Medline in-process & non-indexed citations, EMBASE, Cochrane Database of Systematic Reviews and the Cochrane Central Register of Controlled Trials. Study selection and data extraction were performed independently by two reviewers (DL, EC). Titles and abstracts were screened to identify studies reporting prevalence and treatment of patients with OHS. Demographic data, arterial blood gas values, lung function and sleep study parameters were collected for analysis.

Results: The search strategy identified 583 articles. 47 studies (30 prospective studies, 12 retrospective studies, 4 randomized control studies, and 1 case control study) were included. In total there were 1077 patients who were diagnosed with OHS.

Discussion: The overall prevalence of OHS is evaluated to be 11% in OSA patients and 8% in bariatric surgical patients. The three leading hypotheses for the pathogenesis of OHS are: obesity-related impaired respiratory mechanics, leptin resistance and impaired compensatory response to acute hypercapnia. Compared to eucapnic obese patients, OHS patients present with severe upper airway obstruction, restrictive chest physiology, blunted central respiratory drive, pulmonary hypertension and increased mortality. The mainstay of therapy for OHS is non-invasive positive airway pressure. Short-term benefits of positive airway pressure therapy include an improvement in gas exchange and sleep-disordered breathing. Long-term benefits include improved lung volumes, central respiratory drive to CO2 and reduced mortality.

Perioperative management begins with a high index of suspicion for OHS in the morbidly obese patient. Screening questionnaires such as the validated STOP-Bang questionnaire can identify patients at high risk of OSA. This screening tool can be further complemented by the presence of low SpO2 and elevated serum HCO3- level to identify patients at high risk of OHS. Before major elective surgery, these patients should be referred to sleep medicine for polysomnography and positive airway pressure titration. An echocardiogram should be considered to assess RV function and pulmonary hypertension. Perioperative precautions of OHS include prudent airway management, rapid emergence, monitoring for ventilatory impairment and early resumption of positive airway pressure therapy.

1344056 - 2-CHLROPROCAINE AS COMPARED TO BUPIVACAINE FOR SPINAL ANESTHESIA IN INGUINAL REPAIR: A COHORT STUDY

Olivier Lacoursière[1], Alexis F. Turgeon[2], Jean-Pierre Morin[3]

1. université Laval, Québec, QC, Canada
2. Anesthesiology, Hôpital de l'Enfant-Jésus, Québec, QC, Canada
3. Anesthesiology, Hôpital St-Francois d'Assise, Québec, QC, Canada

Introduction: Inguinal hernia repair is a surgery that can be performed under spinal anesthesia. Since lidocaine has been associated with transient neurological symptoms, no short acting local anesthetic is available. Recently, solutions of 2-chloroprocaine without preservatives are a promising alternative and its spinal use spreading, but has not yet received approval from Health Canada.(1) We hypothesized that the use of hyperbaric 2-CP 2% (dextrose 8.25%) is a suitable alternative to hyperbaric bupivacaine for spinal anesthesia in this type of surgery and may improve perioperative efficiency.

Methods: We conducted a single center cohort study of patients who underwent inguinal hernia repair under spinal anesthesia over a five year period (January 2006-June 2011). The project was approved by the research ethics board of our institution. Eligible medical records were identified using ICD-10 codes. One investigator reviewed charts and selected patients who underwent spinal anesthesia with 2-CP 2%. A non-exposed group (ratio 1:1) was subsequently randomly selected from all patients who underwent spinal anesthesia with hyperbaric bupivacaine 0.75%. The primary endpoint was the time before hospital discharge. Secondary endpoints were PACU length of stay, time before micturition, drink and ambulation. 53 patients per group were required to evaluate a 60 min difference between groups on the time to hospital discharge. Student's t tests and Fisher's exact test were used for continuous data and proportions, respectively. A p-value <0.05 was considered significant.

Results: Of 486 patients who underwent inguinal hernia repair under spinal anesthesia, 37 received 2-CP. Groups were comparable for age, sex, ASA status, duration of surgery and intra-spinal use of fentanyl. A mean dose of 70 mg of hyperbaric 2-CP was used compared with 12 mg of bupivacaine 0.75%. Twenty-eight patients (76%) in the 2-CP group and 33 (89%) in the bupivacaine group have required additional sedation (p=0.10). General anesthesia was required for one patient in each group. The mean hospital length of stay was 352 minutes in the 2-CP and 469 min in the bupivacaine group (MD 117 min [95% CI: 85-149 min]; p <0.0001) (Table 1).

Discussion: We observed that the use of hyperbaric 2-CP was associated with a shorter hospital length of stay and improved perioperative efficiency compared with 0.75% hyperbaric bupivacaine for spinal anesthesia in a context of inguinal hernia. More safety data are however required before its spinal use becomes standard.

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Table 1. Primary and secondary endpoints

	2-CP (n=37)	Bupivacaine (n=37)	MD (95% CI)	p-value
Primary endpoint				
Time before discharge (min)	352 ± 70	469 ± 68	117 (85-149)	<0.0001
Secondary endpoints				
Time to micturition (min)	245 ± 55	401 ± 69	156 (127-185)	<0.0001
Time in PACU (min)	53 ± 24	123 ± 57	70 (50-91)	<0.0001
Time in ambulatory surgical unit (min)	284 ± 68	328 ± 62	44 (14-75)	0.004
Time to first drink (min)	98 ± 59	150 ± 61	52 (24-79)	0.0004
Time to ambulation (min)	246 ± 57	371 ± 64	125 (97-153)	<0.0001

Legend: MD mean differences; CI confidence interval

1344479 - COMPREHENSION AND COMPLIANCE WITH AMBULATORY PERIOPERATIVE INSTRUCTIONS

Pamela H. Lennox[1], **Rowena Lawson**[1], **Kelly V. Mayson**[1]

1. Anesthesia, University of British Columbia, Vancouver, BC, Canada

Introduction: Patients' compliance with postoperative instructions can be marginal[1]. A quality assurance audit was undertaken with institutional ethics approval to look at an ambulatory patient population's comprehension and compliance with information and instructions given in the Perioperative period of an ambulatory procedure. Patient satisfaction of their perioperative care was also assessed.

Methods: Over a 4 month period, patients were contacted 24-48 hours after their procedure by an anesthesiologist and were asked 17 questions. A minimum of 3 attempts was made to contact the patient. Inquiries included their comprehension and compliance with pre and post operative orders, the incidence of common postoperative complications, circumstances of their discharge and accompanying personnel home and overnight was assessed.

Results: 456 patients were called of which 299 patients were successfully contacted and interviewed Mean age was 50 years, 51% were male 40% were female. The majority (83%) had their procedure under general anesthesia. 96% stated they had adequate preoperative instructions, while 10% stated they did not receive adequate post operative instructions. 9% had pain greater than 5/10 at discharge and 4% thought their discharge pain medications were inadequate. 26% had nausea/vomiting in the first 24hours. 4% felt they were rushed out of hospital. One patient went home unescorted.11% had no care giver staying overnight. Almost 3% patients had returned to work within 48 hours of their surgery. 4% had driven a car within 24hours of their procedure. 90% felt they had adequate information and were satisfied with their experience.

Discussion: Patients understood postoperative instructions when they received them. In our facility, we need to be proactive in mitigating pain and nausea and also ensuring surgical and analgesia postoperative instructions are adequate. Discharge criteria and a patient's perception of home-readiness [2] need to be aligned particularly when few have a care giver staying overnight. We need to continue to advocate for a responsible adult to accompany the patient home and care for them overnight[3].

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1344483 - POSTOPERATIVE VOMITING IN LAPAROSCOPIC GYNECOLOGICAL SURGERY

Tatjana Simurina[1], Boris Mraovic[2]

1. Department of Anesthesiology and ICU, General Hospital Zadar, Zadar, Croatia
2. Anesthesiology, Thomas Jefferson University, Philadephia, PA, United States

Introduction: Postoperative vomiting (POV) is the second most common postoperative patient complaint. Patients undergoing laparoscopic gynecological surgery have a higher incidence of POV. Assessment of POV risk factors helps clinicians to use appropriate POV prophylaxis. The most used predictive models for POV in clinical practice are Apfel's and Koivuranta's simplified risk scores.(1,2) We analyzed multiple predictive factors for POV in laparoscopic gynecological surgery and proposed a new predictive model for POV. Additionally we compared Apfel's and Koivuranta's risk score with our new score model in this clinical setting.

Methods: After obtaining IRB approval and informed consent, 421 women (ASA PS I-II) undergoing laparoscopic gynecological surgery were enrolled in a prospective study. Of these women, 47 were excluded and 374 completed the study. No POV prophylaxis was given. Thiopental was used for induction and isoflurane or sevoflurane for maintenance of general anesthesia. POV and pain scores were measured at 2 and 24 hours postoperatively. Diclofenac and meperidine were used for postoperative pain and metoclopramide for POV. We analyzed 21 patient, 11 anesthesia, and 2 surgery related factors. Multivariate logistic regression was used for predictive modeling. Initially all predictors with $p>0.2$ significance and then iterative predictors with $p>0.05$ were excluded. All excluded predictors were then individually tested for possible interaction with the final model looking for influence of the predictors' significance on the model for more than 20% of the initial significance.

Results: Incidence of POV was 32.3%. Predictive modeling showed 4 predictive factors in the final model: type of surgery (OR=3.54), history of PONV (OR=1.92), non-smoking (OR=1.77) and early postoperative pain (OR=1.033). Our model showed better absolute and relative predictive accuracy (70.86% and 68.97%, respectively) compared with Apfel's (62.03% and 61.16%) and Koivuranta's (66.84% and 54.15%). Also, our model had higher sensitivity and specificity (0.743 and 0.636, respectively) compared with Apfel's (0.636 and 0.586). Koivuranta's model had higher sensitivity (0.901) but poor specificity (0.181).

Discussion: A new predictive model for POV with four predictors (history of PONV, nonsmoking status, early postoperative pain, and type of surgery) compared with two commonly used models was a better predictor for POV in patients undergoing laparoscopic gynecologic surgery. Further validation of our model on a new data set is needed.

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1344618 - RANDOMIZED CLINICAL TRIAL OF MIDAZOLAM/FENTANYL VERSUS KETAMINE/FENTANYL FOR CONSCIOUS SEDATION IN THE END STAGE RENAL DISEASE UNDERGOING AVF PROCEDURE

Khosrou Naghibi[1], Parviz Kashefi[2], Maliheh Shafiei[3]

1. Anesthesia, Isfahan University of Medical Sciences, Isfahan, Isfahan, Iran, Islamic Republic of
2. Anesthesia, IUMS, Isfahan, Isfahan, Iran, Islamic Republic of
3. Anesthesia, IUMS, Isfahan, Isfahan, Iran, Islamic Republic of

Introduction: The objective was to compare the occurrence of respiratory depression, adverse events, and recovery duration and agitation of Midazolam/Fentanyl versus ketamine/Fentanyl for use in procedural sedation in end stage renal disease (ESRD) in AVF procedure.

Methods: With the approval of the institutional ethical committee and written informed consent of the patients,This was a randomized double blinded prospective clinical trial of adult patients undergoing procedural sedation for AVF procedures in the ESRD. Patients were randomized to receive either Midazolam 0.05 mg/kg IV followed by Fentanyl 1micg/kg (Group 1) or ketamine 0.75 mg/kg IV followed by Fentanyl 1micg/kg (Group 2).Doses, vital signs, nasal end-tidal CO2 and pulse oximetry were recorded. Subclinical respiratory depression was defined as a change in ETCO2 of >10 mm Hg, an oxygen saturation of <90% at any time, or an absent ETCO2 waveform at any time. After the procedure, patients were asked if they experienced pain during the procedure and had recall of the procedure. Physicians were asked to describe any adverse events or the occurrence of recovery agitation.

Results: Eighty six patients underwent sedation and were included in the analysis. 43 patients received Midazolam/Fentanyl and 43 received ketamine/Fentanyl. Subclinical respiratory depression was seen in 4 of 43 patients in the Midazolam/Fentanyl group and 6 of 43 patients in the ketamine/Fentanyl group ($p = 0.05$). The median time to return to baseline mental status after the procedure was completed was 32 minutes (range = 21 to 65 minutes) for the Midazolam/Fentanyl group and 46 minutes (range = 26 to 68 minutes) for the Ketamine/Fentanyl group ($p < 0.001$). Pain during the procedure was reported by 4 of 43 patients in the Midazolam/Fentanyl group and 2 of 43 patients in the ketamine/Fentanyl group.Recall of some part of the procedure was reported by 2of 43patients in theMidazolam/Fentanyl group and 4 of 43patients in the Ketamine/Fentanyl group. Forty-one of 43procedures were successful in theMidazolam/Fentanyl group and 38 of 43 in the ketamine/Fentanyl group ($p = 0.357$). Recovery agitation was reported in 4 of 43 in the Midazolam/Fentanyl group and 9 of 43 in the ketamine/Fentanyl group.

Discussion: There was no significant difference in the rate of clinical interventions related to respiratory depression, pain, or recall of the procedure between the groups. Recovery agitation was seen more frequently in patients receiving ketamine than in those receiving Midazolam. The time to return baseline mental status was longer in the ketamine group than the Midazolam group. This study suggests that the use of Midazolam/Fentanyl is safer and more effective for procedural sedation in the ESRD than ketamine/Fentanyl.

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2-Miner JR, Gray RO, Bahr J, Patel R, McGill JW, Randomized clinical trial of propofol versus ketamine for procedural sedation in the emergency department , 2010 Jun;17(6):604-11

1304123 - PATIENT CONTROLLED WARMING IMPROVES OUTCOME AFTER KNEE ARTHROPLASTY

Bill Ong[1], Ember Benson[2], Diana McMillan[2]

1. Anesthesia, University of Manitoba, Winnipeg, MB, Canada
2. Faculty of Nursing, University of Manitoba, Winnipeg, MB, Canada

Introduction: Total knee arthroplasty (TKA) can be associated with inadvertent perioperative hypothermia (PH) (Sessler 2008) and significant postoperative pain (Hebl et al 2008). We evaluated the efficacy of patient controlled active warming to diminish hypothermia and postoperative opioid requirement after TKA.

Methods: Local Ethics Committee approval was obtained. Thirty patients undergoing TKA with bupivacaine spinal anesthesia and intrathecal morphine were studied. Fifteen patients were randomized to receive standard warm blankets (Blanket patients) and fifteen patients received Bair Paws® gowns (Gown patients). The Bair Paws® system (Arizant Healthcare, UK) consists of a portable warming unit (1000 BTU h – 1) that blow warmed air into a single use patient gown. The patients have handheld units to control the temperature of the warmed air. The blankets and gowns were started in the preoperative holding area, continued in the operating room and the postanesthesia care unit (PACU). Oral temperatures were measured in the PACU. Opioid requirements in the first 48 hours after surgery were assessed. Patients rated their satisfaction with their assigned warming methods, with a five point scale, from 1 = very unsatisfied to 5 = very satisfied. Data were analyzed using SPSS version 17. Data are presented as mean + standard deviation.

Results: On admission to the PACU, Gown patients (GP) had higher mean temperatures (36.5 ± 0.3°C vs 36.0 ± 0.8°C) ($p < 0.001$). Only one of the gown patients was hypothermic (35.9°C). Three of the Blanket patients were hypothermic (34.5°C, 34.6°C and 34.7°C). The Blanket patients required more opioid than the gown patients (53.6 ± 37.9 mg vs. 31.9 ± 11.7 mg) in the first 48 hours postoperatively ($p = 0.05$). Gown patients reported significantly higher satisfaction scores for thermal comfort (5.0 ± 0.9 vs 3.0 ± 0.8) ($p = .004$).

Discussion: We found that patient controlled active warming was more effective in preventing hypothermia than warm blankets in TKA patients. Being more comfortable as a result of the better temperature control, might have provided the gown patients with better feelings and reduced stress. Those feelings of well being and greater sense of self control might have contributed to reduced requirements for opioid in the postoperative period and a higher level of satisfaction. Lingard and Riddle (2007) have found that patients who were distressed had worse pain before and after TKA surgery.

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1304177 - ANALGESIC MODALITIES AND KNEE ARTHROPLASTY OUTCOMES

Bill Ong[1], Shelley Coombes[2]

1. Anesthesia, University of Manitoba, Winnipeg, MB, Canada
2. Nuring, Seven Oaks General Hospital, Winnipeg, MB, Canada

Introduction: After knee arthroplasty at our hospital, previous management with spinal morphine and short acting opioids, resulted in some patients having severe pain and length of hospital stay (LOS) greater than 6 days. We instituted a new analgesic protocol with additional modalities. This study determined whether analgesia and LOS were different with additional analgesic modalities

Methods: Local Ethics Committee approval was obtained. Three hundred and seven patients who had knee arthroplasty between March 2010 and August 2011 were assessed. The postoperative modalities utilized, were determined by the patients, anesthesiologists, surgeons and nurses. The analgesic modalities were: 1. single shot femoral nerve block 2. spinal anesthesia with intrathecal morphine 3.hydromorphone sustained release (SR) in post-anesthesia care unit 4. hydromorphone SR on the ward 5. hydromorphone immediate release after surgery 6. gabapentin after surgery 7. acetaminophen after surgery 8. naproxen after surgery. All patients were managed on existing clinical pathway. Pain intensities were determined using a verbal 0-10 rating scale (VRS) on day 2 after surgery. The patients were grouped by the number of analgesic modalities utilized. These were group A - 4 modalities or less, group B - 5 or 6 modalities and group C – 7 or 8 modalities. The age, VRS and LOS data were analyzed using analysis of variance. The data are presented as mean + standard deviation. The male/female ratio data were analyzed using the chi-square test.

Results: Patients who had 7 or 8 modalities had significantly shorter LOS (5.1 + 1.4 vs 5.4 + 1.6 vs 5.9 + 2.4 days) (P=0.012). There was no significant difference between the 3 groups in age, VRS or male/female ratio. (Table 1)
Two hundred and forty-eight of the 307 patients (80.4%) received hydromorphone SR. One of the 248 patients (0.4%) received naloxene for respiratory rate of 8 per minute. None of the 248 patients had any other significant respiratory complication.

Discussion: We found that patients ssing more analgesic modalities, had shorter length of hospital stay after knee arthroplasty. The major limitation of this study is the uncontrolled usage of analgesic modalities. Further studies with randomized controlled multimodal analgesic protocols and clinical care paths are needed to determine the relationship between analgesic modalities and recovery from knee arthroplasty.

References: 1.Trueblood A, Manning DW. Curr Opin Orthop. 2007;18:76
2.Hebl JR, Dilger JA, Byer DE et al. Reg Anesth Pain Med. 2008;33(6):510
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Table 1

Analgesic modalities	1 - 4	5 - 6	7 - 8
Number of Patients	62	129	116
Age (years)	68.2 ± 10.3	67.3 ± 10.3	64.9 ± 9.0
Male/Female	20/42	53/76	58/58
Pain VRS (0-10)	5.9 ± 2.3	5.8 ± 2.3	5.5 ± 2.5
Length of Stay (days)	5.9 ± 2.4	5.4 ± 1.6	5.1 ± 1.4**

** P=0.012

1310428 - A PILOT STUDY TO VALIDATE A NEW TECHNIQUE FOR MEASURING HEAD MOVEMENT DURING TRACHEAL INTUBATION

Brady M. Warnick[1], J. A. Law[1], Robert A. Vandorpe[2], Orlando Hung[1]

1. Department of Anesthesia, Dalhousie University, Halifax, NS, Canada
2. Department of Radiology, Dalhousie University, Halifax, NS, Canada

Introduction: Tracheal intubation is a risk factor for further neurologic deterioration and worse outcome after cervical spinal cord injury1. Therefore, morbidity may be reduced by using intubation methods that produce the least amount of head and neck movement. Many techniques to quantify cervical movement during intubation utilize fluoroscopy2,3,4, thereby exposing subjects to radiation. Our goal was to develop and validate a technique without radiography; accordingly, a video recording of coloured fiducials was used and compared with fluoroscopic measurements. A secondary goal of this study was to compare head movement during laryngoscopy with and without a tracheal introducer (bougie).

Methods: After obtaining research ethics board approval, access to seven fresh 'clinical-grade' human cadavers was obtained and a 1 cm diameter yellow fiducial was affixed over the tragus and a green fiducial over the temporal region. One investigator intubated the trachea of each cadaver twice: the first time with only a Macintosh 3 laryngoscope, and the second time adding a bougie and the minimum view of the glottic opening required for success. Each intubation was filmed with an HD camera (7D, Canon Inc) and the fluoroscope (BV-25, Philips Inc) was also filmed with an HD video camera (HDR-XR520V, Sony Inc). The footage of the coloured markers was then processed by custom software developed in Matlab (The Mathworks Inc). This software examined each frame of HD video independently and identified the coloured fiducials. The centroid of each fiducial was calculated, and then used to calculate angular displacement over time.

The fluoroscopic footage was independently analyzed by a neuroradiologist with video analysis software (Kinovea) and the maximum extension of the occiput was determined. This maximum extension was then compared with that obtained by our new software analysis technique.

Results: Data from the first cadaver was not analyzable due to recording difficulties. For the remaining 12 intubations, our new technique measured a mean head movement of 12.8 (± 5.2) degrees. Measurement by fluoroscopy yielded a maximum head movement of 9.3 (± 6.0) degrees. A Bland-Altman plot was created, which showed limits of agreement of +4.1 to -11.2 degrees.

Using our new technique for measurement, those intubations with a bougie yielded a mean head movement of 9.8 (± 5.6) degrees, whereas the mean without a bougie was 15.8 (± 2.7) degrees. This was a 6.0 (± 3.4) degree reduction in head movement when a bougie was utilized (p=0.007).

Discussion: These data provide wide limits of agreement suggesting the two methods cannot be used interchangeably. However, qualitatively we are satisfied with the angular displacement plots produced by our new technique and plan to repeat the study with more advanced fluoroscopic equipment. Although unvalidated, our new technique shows a 6.0 (± 3.4) degree reduction (p=0.007) in head movement when the laryngoscopist obtained only the minimum view of the glottic opening required to pass a bougie. Therefore, further research may be able to recommend that only-the-minimum-view-to-pass-a-bougie technique be utilized in those patients with a potentially unstable cervical spine.

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1310852 - MOBILE MASS ON A CLOTH-COVERED STARR-EDWARDS MITRAL VALVE

Jessica Collings[1], Rene Allard[1], Robert Tanzola[1]

1. Anesthesiology and Perioperative Medicine, Queen's University, Kingston, ON, Canada

Introduction: An intraoperative echocardiographic diagnosis of a mobile mass on a cloth-covered Starr-Edwards prosthetic mitral valve is presented, and the possible diagnosis of cloth tear and its clinical implications are discussed.

Methods: Consent for disclosure was obtained from the patient.

Results: A 49-year-old man presented with severe symptomatic aortic stenosis, as evidenced by a mean gradient of 42 mm Hg and an estimated valve area of 0.6 cm2. Past medical history was relevant for rheumatic mitral stenosis requiring mitral valve replacement with a #6320 cloth-covered Starr-Edwards (CCSE) prosthetic valve, remote transient ischemic attacks TIAs), atrial fibrillation, systemic hypertension, and smoking. While planning for his aortic valve replacement, the mean gradient across his CCSE mitral valve was measured to be high at 10 mm Hg. Although such a high gradient is not uncommon for this type of prosthetic valve in the mitral position, it was decided that he should undergo concomitant mitral valve replacement with a prosthesis that would offer a better hemodynamic profile.
Pre-cardiopulmonary bypass (CPB) transesophageal echocardiography (TEE) revealed a previously undiagnosed mobile mass – 10mm x 3 mm, and moderately echogenic –attached to the cage of the CCSE mitral valve prosthesis. Given the type of valve, and the appearance of the mass, the possibility of cloth tear was entertained. Surgical exploration and subsequent analysis by pathology, however, revealed the mobile mass to be thrombus. The patient underwent successful combined aortic valve replacement (mechanical bileaflet) and mitral valve replacement (also mechanical bileaflet).

Discussion: Caged-ball Starr-Edwards prosthetic mechanical valves have been used since 1961 (1). Despite their long track record of success in improving hemodynamics, these valves are highly thrombogenic. For this reason, cloth-covered Starr-Edwards (CCSE) valves were developed in the early 1970s (2). Unfortunately, despite a double layer cover of Teflon and polypropylene, these CCSE valves remained thrombogenic (3). In addition, the cloth cover was found to tear over time, leading to TIAs, myocardial infarction, hemolytic anemia, and new valve regurgitation (4). Historically, cloth tears were discovered either during surgery or at autopsy (5). But, since the advent of echocardiography, TEE has been shown to be the superior diagnostic modality for diagnosing CCSE valve cloth tears (5).

The differential diagnosis of a mobile mass attached to a prosthetic valve includes a thrombus, fibrin strand, and vegetation (3). With a CCSE valve, however, the clinician must entertain the additional diagnosis of a cloth tear, in order to initiate prompt, appropriate clinical management. Echocardiographic features suggestive of a cloth tear include a very echogenic and elongated appearance of the mass, and its location being on the ‘downstream’ side of the valves, as opposed to vegetations which are more frequently located on the ‘upstream’ side of the valve (3). The diagnosis of cloth tear is even more likely in an anticoagulated patient without clinical signs of endocarditis (3).

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1313375 - A 7 YEAR REVIEW OF 1380 GLIDESCOPE INTUBATIONS

Andrew D. Milne[1], Claire A. Brousseau[1], Orlando Hung[1]

1. Anesthesia, Dalhousie University, Halifax, NS, Canada

Introduction: Video-laryngoscopes such as the Glidescope (GVL) have been increasingly used for difficult airway management. There are multiple smaller controlled trials published on the GVL[1], and 2 large scale studies (n=728, n=2004) on the effectiveness of this device[2-3]. The purpose of this study was to examine the overall performance of the GVL in a large cohort at an academic centre.

Methods: Ethics approval was granted by our REB for this retrospective study. Our anesthesia information management system (AIMS) was searched from 2003 to 2009 for all cases where the GVL was used. All available airway details were reviewed and extracted: ease of bag-mask ventilation (BMV), primary/rescue GVL use, best glottic view obtained, easy/difficult/failed GVL use, adjuncts used, ultimate method used to secure the airway and general airway comments.

Results: There were 76454 general anesthetics requiring intubation between the years 2003-2009. The GVL was used in 1380 adult cases over this 7 year period. The GVL was used as a primary device in 1005 cases (73%), rescue device in 110 cases (8%) and for elective/teaching purposes in 265 cases (19%). The patients were ramped in the sniffing position in 54 cases and 120 cases were rapid sequence inductions. The bougie was used with the GVL in 125 cases. The majority of cases achieved Cormack-Lehane Grade 1 or 2 views with the GVL. There were 54 Grade 3 views (4%) and 3 Grade 4 views (0.2%) obtained with the GVL. GVL intubation was documented as “difficult” in 56 cases (4%), and failed in 88 cases (6%). In the 88 failed GVL cases the most common rescue techniques included: direct laryngoscopy 46 cases (52%), bronchoscopy 17 cases (19%), lightwand 14 cases (16%), and LMA 8 cases (9%). In the failed GVL cases, the median Mallampati score was 3, 20% had decreased mouth opening, 25% had decreased thyromental distance, and 31% had decreased neck movement. In 23 of the failed GVL cases (26%), the cords were fully visualized with the GVL but difficulty occurred in advancing the endotracheal tube (ETT) through the glottis.

Discussion: Our overall GVL success rate (94%) was similar to the literature rate (90-97%)[1-3]. Direct laryngoscopy was the primary rescue technique (52%) which is also comparable to the literature (47%)[2]. In the failed GVL cases, 26% had a full view of the cords but were unable to advance the ETT, this is comparable to the 2 prior larger studies who had Grade 1-2 views in 35-53% of GVL failures[2-3].This large scale retrospective study further characterizes the efficacy of the GVL as an airway device.

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1314696 - TRANSTHORACIC ECHO TO CONFIRM INTERNAL JUGULAR GUIDE WIRE POSITION

Aliya Nurmohamed[1], Amir Rumman[1], Ramiro Arellano[1], Brian Milne[1], Robert Tanzola[1]

1. Anesthesiology, Queen's University, Kingston, ON, Canada

Introduction: Errors in placement of central lines can result in serious injury or death should cannulation occur without appropriate venous placement. Confirmation of an appropriately placed guide wire in the central venous system by ultrasound is recommended prior to dilation and cannulation over the wire(1). Although transesophageal echocardiographic (TEE) confirmation of the guide wire in the superior vena cava or right atrium (RA) can definitively verify placement, it is invasive and not readily available(2). Transthoracic echocardiography (TTE) is a more common modality and, if reliable, could serve as an alternative to TEE. This study investigates the effectiveness of limited TTE in detecting the guide wire and blood contrast in the RA, two markers of successful right internal jugular (RIJ) cannulation.

Methods: Approval was obtained from the Research Ethics Board. Patients undergoing cardiac surgery who required a RIJ central line and TEE monitoring were recruited for the study. Patients with severe aortic stenosis or contraindications to TEE were excluded. After induction of anesthesia and intubation, a RIJ 9 French introducer was placed using the Seldinger technique. Simultaneously, TTE views of the RA were obtained in the subcostal or apical 4-chamber views. To confirm appropriate venous access, blood was aspirated once venous puncture was made and quickly re-injected to produce contrast (bubbles). The contrast was observed transiting through the RA on TTE. The 0.89 mm guidewire was advanced and observed entering the RA. Images were collected and stored from either or both views and the rates of detection of the bubbles and wire were noted. Baseline demographic data and optimal patient position to obtain TTE views were also collected.

Results: To date, 85 patients have been recruited for the study. The RA was adequately visualized in 80/85 patients (94.1%) in the apical, the subcostal or both views. Among these patients, bubbles could be visualized in 77/80 patients (96.3%) in either or both views. The wire was visualized in the RA in 76/80 patients (95.0%) in either or both views. Adequate views of the RA were achieved in the Trendelenburg position in 61/80 patients (76.3%) while 19/80 patients required the supine position. In patients in whom the wire was seen, the mean BMI was 28.5 vs. 33.6 in patients in which it was not seen (p=0.0088).

Discussion: According to recent consensus guidelines, real-time ultrasound should be used for confirmation of successful vessel cannulation and TEE imaging of the guide wire can provide definitive confirmation of placement into the central venous system(1). In contrast to TEE, TTE is noninvasive and its use in critical care and emergency settings is becoming routine. This makes it a more practical means to visualize the guide wire in the heart and great vessels. The results of this study suggest that TTE identification of blood contrast and direct visualization of the guide wire can serve as an alternative and effective means to confirm central line venous access prior to dilation and cannulation of the RIJ. When adequate views of the right atrium are obtained in either the 4-chamber or subcostal views, the detection rate of the contrast and the guide wire is very high. TTE may serve as a useful tool in the vast majority of patients.

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1315275 - PROPOFOL ENHANCES THE FIELD EXCITATORY POSTSYNAPTIC POTENTIALS IN CA1 HIPPOCAMPUS SLICES OF YOUNG AND AGED MICE

Yiqing Yin[1], Bill Middleton[1], Carlos Florez[2], Hossam Beheiry[3], Peter Carlen[2]

1. **Anesthesia, Toronto Western Hospital, Toronto, ON, Canada**
2. **Toronto Western Research Institute, Toronto, ON, Canada**
3. **Anesthesia, Trillium Hospital, Toronto, ON, Canada**

Introduction: Propofol is a widely used intravenous anesthetic. Increasing age was shown to decrease the requirements for general anesthetics (1) For propofol induction in adult, age significantly affects BIS, SE, and RE indices of LOC (2). However, the mechanisms of ageing-induced potentiation of anesthetic actions have not been clearly explored. It has been reported in an animal study, that isoflurane enhanced suppression of excitatory synaptic transmission in the aged rat hippocampus (3). But the data from animals undergoing propofol aneathesia are lacking. The aim of this study is to compare the effects of propofol on the field excitatory postsynaptic potentials (fEPSPs) in hippocampal slices of young and aged mouse.

Methods: Studies were approved by the local Animal Care Committee. Brain slices were prepared from C57BL6 male young (8-16 weeks) and ageing (>12months) mouse. The dendritic field excitatory postsynaptic potential was recorded from the CA1 stratum radiatum using patch clamp electrophysiological methods. A bipolar concentric stimulating electrode was placed along the Schaffer collateral for othodromic stimulation. The effects of clinically-relevant concentrations of propofol were studied in the young and ageing mouse slices. Data are presented as mean ± SEM.

Results: In slices from young mice, a clinically relevant concentration (10 μM) of propofol increased the peak amplitude and area under the curve of fEPSP, but there were no effects on the half-width and decay. As for the peak amplitude of fEPSP, the potentiation effects of propofol occurred in a dose-dependent manner. In aging mouse slices, 10 μM propofol enhanced the peak amplitude and area under the curve of the fEPSP. 10 μM propofol prolonged the half-width but had no effects on the decay of fEPSP. The potentiations of peak amplitude and the area under the curve of the fEPSP in young mice are significantly greater than that in aging mice, while there is no difference in the time course of half-width and decay between young and aging mouse. Furthermore 10 μM propofol increased the pre-axonal potential in young hippocampal slices.

Discussion: he fEPSP of slices from aging mice demonstrates diminished sensitivity to the enhancing actions of propofol on the amplitude and area under the curve These data might provide a partial explanation as to why aging patients are prone to develop the adverse reactions from clinical propofol anesthesia.

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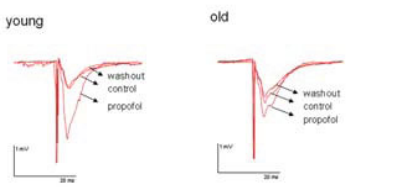

10 μM propofol enhance the fEPSP in young and old hippocampal slices

1315569 - ADDING PREGABALIN IN A MULTIMODAL ANALGESIC STRATEGY DOES NOT REDUCE PAIN SCORES IN WOMEN FOLLOWING COSMETIC SURGERY. A RANDOMIZED TRIAL

Luis E. Chaparro[1], Hance Clarke[5], Paola A. Valdes[2], Mauricio Mira[2], Sandra L. Duque[4], Nicholas Mitsakakis[3]

1. **Anesthesiology & Perioperative Medicine, Queen's University, Kingston, ON, Canada**
2. **Surgery, Anesthesia Section, Universidad de Antioquia, Medellin, Antioquia, Colombia**
3. **Toronto Health Economics and Technology Assessment, University of Toronto, Toronto, ON, Canada**
4. **School of Nursing, Universidad de Antioquia, Medellin, Antioquia, Colombia**
5. **Anesthesia & Pain Management, University of Toronto, Toronto, ON, Canada**

Introduction: In cosmetic surgery, some demographic characteristics including middle-aged women, extroversion (1) and anxiety (2) have been associated with a decreased tolerance to pain. Multimodal analgesia (3) increases the chance of successful discharge and pain control after surgery and pregabalin is promoted as an effective analgesic, based on placebo-controlled studies. We investigated whether adding pregabalin improves pain control and reduces opioid request when is added to a multimodal analgesic scheme for cosmetic surgery.

Methods: Randomised, double-blind, clinical trial developed in three surgical centers in Medellin, Colombia. We randomised 110 women who underwent ambulatory cosmetic surgery and ninety-nine completed the study. Patients received oral pregabalin, 75 mg q12h for five consecutive days starting the night before surgery or identical placebos. They also received intravenous dexamethasone 8 mg, a non-steroidal anti-inflammatory drug, dipyrone or diclofenac, and 0.5 mg/kg of intravenous morphine. The ambulatory treatment included a weak opioid plus acetaminophen capsules plus anti-inflammatory as needed. The primary endpoint was the postoperative numerical movement-evoked pain scores at 2, 24, 48, 72 and 96 hours after surgery. The secondary endpoints included rest pain scores, categorical pain scores, analgesic and antiemetic requirements, incidence of nausea, vomiting, and somnolence.

Results: We found no differences between groups in the primary endpoint throughout the trial. 72 hours after surgery, movement-evoked median pain score was < 4/10 in both groups. We found no differences in opioid ($p=0.95$), anti-inflammatory requirement ($p=0.45$) or adverse events.

Discussion: In this clinical trial, adding pregabalin in a multimodal regimen for postoperative pain management after cosmetic surgery represented no difference compared with placebo, based on our primary outcome, movement-evoked pain scores. The groups remain comparable even after multiple post-hoc analyses for potential confounders such as age, body mass index or type of surgery. We also found no differences in analgesic requirement or adverse effects.A publication bias (4) favouring positive trials is feasible in this field.

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1315596 - PHARMACOTHERAPY FOR THE PREVENTION OF CHRONIC PAIN AFTER SURGERY

Luis E. Chaparro[1], Shane A. Smith[1], Phillip J. Wiffen[2], Henry J. McQuay[3], Roger A. Moore[3], Ian Gilron[1]

1. Anesthesiology & Perioperative Medicine, Queen's University, Kingston, ON, Canada
2. UK Cochrane Centre, Oxford, United Kingdom
3. Nuffiield division of Anesthetics, University of Oxford, Oxford, United Kingdom

Introduction: Surgery, as a cause of chronic pain, is unique because the injury is planned and predictable [1]. We report here preliminary results of an ongoing systematic review of clinical trials evaluating pharmacotherapy to prevent chronic postsurgical pain in adults.

Methods: Our review criteria and search strategy included double-blind, placebo-controlled, randomized adult trials of one or more perioperatively administered drugs that measured pain at least three months after surgery. All reviewed trials are graded using the Cochrane risk of bias tool. The primary outcome was defined as the proportion of participants reporting any pain at, or referred to, the anatomical site of the procedure three months after the procedure. The Cochrane Central Register of Controlled Trials (CENTRAL), MEDLINE, EMBASE, and PaPaS Trials Register were the databases used for the search strategy. Other trials are currently being searched from reference lists of relevant articles in order to complete this review.

Results: The first iteration of the literature search yielded, thus far, 37 trials that met inclusion and evaluated impact on chronic postsurgical pain following administration of: gabapentin or pregabalin (15 trials), NMDA antagonists (14), opioids (2), NSAIDs (2), corticosteroids (2), and single trials of topical local anesthesia, and allopurinol. Twelve studies followed the patients for 3 months; 17 studies for at least six months; 7 followed the patients for one year and only one for two years.

Discussion: Results of this ongoing systematic review have revealed evidence that NMDA antagonists and gabapentinoids may play a role in reducing chronic pain after surgery. Imminent completion of the trial search and meta-analysis of combinable studies will serve to quantify the impact of these two drug classes on the development of chronic postsurgical pain.

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1315658 - DIAGNOSIS OF TRICUSPID VALVE PUNCTURE BY PACEMAKER LEAD

Rebecca Gerlach[1], Rene Allard[1], Robert Tanzola[1]

1. Anesthesiology and Perioperative Medicine, Queen's University, Kingston, ON, Canada

Introduction: An unusual case of permanent pacemaker (PPM) -associated severe tricuspid regurgitation (TR) is presented, and associated diagnostic challenges are discussed.

Methods: Consent for disclosure was obtained from the patient.

Results: A 74-year-old woman presented with findings of right heart failure, including dyspnea, peripheral edema, pulsatile liver and elevated JVP. Past medical history included coronary artery bypass grafting (CABG) six years earlier and post-operative sick sinus syndrome necessitating single lead PPM implantation. Transthoracic echocardiogram (TTE) revealed new severe TR associated with a dilated tricuspid annulus (41mm) and a mildly dilated and hypokinetic right ventricle (RV). Pulmonary artery systolic pressure (PASP) was estimated at 56mmHg, despite normal left ventricle (LV) systolic function. It was unclear whether the mechanism for her TR was due to annular dilatation or PPM wire interference. Given the patient's symptomatic right heart failure in the context of severe TR, she was scheduled for tricuspid valve replacement. Pre-cardiopulmonary bypass (CPB) transesophageal echocardiography (TEE) confirmed severe TR centered on the pacemaker lead. The lead appeared to be adjacent to an immobile posterior leaflet. Unexpectedly, surgical exploration revealed the pacemaker actually perforating the posterior leaflet and the associated papillary muscle, causing significant fibrosis. Tricuspid valve replacement was undertaken, and the patient was successfully weaned from CPB. At 3-month follow-up, the patient had good exercise tolerance, resolution of her right heart failure, and TTE evidence of a well-functioning bioprosthetic tricuspid valve.

Discussion: PPM implantation is frequently associated with mild TR (1). Possible contributing mechanisms for PPM-associated TR include abnormalities in muscle depolarization, pacemaker-associated atrioventricular asynchrony, direct leaflet impingement by the pacing lead, and development of scar tissue and adherence to an adjacent leaflet (2). Severe PPM-lead associated TR is not well recognized, and is often the result of leaflet laceration or perforation (3). Although this case is not unique, it is an example of a rare complication that is often diagnosed only at autopsy (1).
Due to acoustic shadowing from the PPM lead, routine TTE alone is often not able to accurately grade the severity of PPM-associated TR; the exact mechanism for TR is also often difficult to identify (4). TEE, on the other hand, is more effective in assessing the severity of TR in this setting, but may be insufficient in delineating the orientation of the PPM lead with respect to the valve leaflets (4). Three-dimensional echocardiography may have a role to play in more accurately delineating the mechanism of PPM-related TR by providing superior structure visualization (5); this, in turn, would allow for prompt and appropriate clinical management. Finally, given the difficulties in diagnosis, a high index of suspicion for significant PPM-associated TR is required, as symptoms of right heart failure may not develop for years following PPM implantation (3).

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1315799 - CRICOTHYROID MEMBRANE ASSESSMENT FEASIBILITY BY ULTRASOUND

Matthew R. McFarling[1], Ronit Lavi[1], Jennifer M. Racine[1], Daniel Bainbridge[1], Peter Mack[1], Ivan Iglesias[1]

1. **Department of Anesthesia and Perioperative Medicine, University of Western Ontario, London, ON, Canada**

Introduction: Airway management is the foundation of anesthesia practice and necessitates skill in a variety of airway management methods and approaches. Transtracheal instillation of local anesthetic to facilitate bronchoscopy and awake intubation is a well known but infrequently practiced technique(1,2,3,4) This can be attributed to poor ability to identify the cricothyroid membrane (CTM) by anatomic landmarks(5) and the attendant risks. However, the availability of ultrasound (US) machines commonly used for vascular access and regional anesthesia might be used here to improve accuracy in such procedures as instilling local anesthetic, placing jet ventilation catheters, or emergency cricothyrotomy. We investigated the feasibility of US assessment of the CTM compared to the standard use of anatomical landmarks by our local anesthesiologists.

Methods: Local Ethics Committee Approval was obtained. Physicians completed a questionnaire detailing their clinical experience with airway management and level of training. Centre point of CTM in healthy volunteers was determined as a reference by two study physicians using palpation and US imaging using reference images, marked with invisible ink, and protected for durability.(5) In double-crossover fashion physicians assessed neck anatomy in pairs of volunteers using ultrasound and palpation techniques, alternately. Physicians indicated their assessment of the central point of the CTM using watersoluble marker. The distance between reference and indicated points was measured. Distances were compared against volunteer and physician characteristics using the t-test statistic A p-value of 0.05 was considered significant.

Results: Forty-eight physicians (23 consultants, 17 residents, and 8 fellows) and 9 volunteers participated in 5 sessions.

The target point was identified in 19 (9.9%) attempts (11/96 by US and 8/96 by palpation) with consultants (7/11 US, 6/8 palpation) and trainees similarly successful (Fisher Exact; p=0.343 and 0.147). Median (IQR [range]) distance-to-reference by palpation 4.5 (2-8 [0-30]) mm was less than by ultrasound 6 (2-11.25 [0-35]) mm (p=0.012). Trainee and consultant subgroups were not significantly different (p=0.087 and 0.084, respectively).

Consultants and trainees by palpation: 2.5 (1-8.5 [0-30]) mm versus 5 (2-8[0-18]) mm; p=0.836) and ultrasound, 5 (1.75-11 [0-31]) mm versus 6 (2.75-10.25[0-18]) mm; p=0.607).

Discussion: A minority of physicians were able to identify the central point of the membrane by either technique; comparable to published rates(5). Use of ultrasound for CTM identification did not improve accuracy over palpation in this group of healthy volunteers. We currently lack the experience to reliably identify the centre of CTM by US for airway procedures, but suggest it is feasible to improve accuracy and safety in this technique given our general familiarity with US use.

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1315976 - PROPHYLACTIC NASAL CPAP FOLLOWING ELECTIVE LAPAROTOMY

Elizabeth Hoeppner[1], Dennis Ong[1], William P. McKay[1]

1. **Anaesthesiology, Perioperative Medicine and Pain Management, University of Saskatchewan, Saskatoon, SK, Canada**

Introduction: The objective of this study was to determine the effect on gas exchange of prophylactic nasal continuous positive airway pressure (nCPAP) following elective laparotomy for bowel surgery when compared to low flow oxygen delivered by a simple face mask. Abdominal surgery is a risk factor for post-operative pulmonary complications (PPCs) such as hypoxemia, pneumonia and respiratory failure.1 PPCs lead to increased mortality and hospital length of stay.2 CPAP is a method of respiratory support that decreases atelectasis, work of breathing and hypoxemia.3,4 The effect of prophylactic nCPAP on gas exchange following laparotomy for bowel surgery has not been evaluated.

Methods: This study was a prospective, randomized controlled trial. Approval from the local Research Ethics Board was obtained prior to recruitment. Patients scheduled to undergo elective laparotomy for bowel surgery were included. Patients who were less than 18 years of age or were admitted to the intensive care unit post-operatively were excluded. Upon arrival to the post-anaesthesia care unit (PACU), thirty-two subjects were randomized by opening opaque envelopes containing computer generated randomization numbers corresponding to the control group or the study group. The control group received oxygen at 8 litres per minute (lpm) through a simple face mask. The study group received nCPAP at 10cm H2O plus oxygen at 8lpm. An arterial blood gas was obtained after one hour of treatment to measure the partial pressure of arterial oxygen (PaO2) and the partial pressure of arterial carbon dioxide (PaCO2). The alveolar to arterial oxygen gradient (A-aDO2) was calculated as the difference between the alveolar partial pressure of oxygen (PAO2) and PaO2. PAO2 was calculated using the alveolar air equation.5 An oxygen concentration of 28-32% was measured in the nCPAP circuit from three subjects. For subjects in the nCPAP group where a measurement was not obtained, an FiO2 of 35% was used. An FiO2 of 55% was used for the control group as previously determined.6

Results: The median A-aDO2 in the nCPAP group (upper and lower quartiles) was 72.1 (43.6 to 93.5) mmHg vs the simple face mask group which was 136.5 (88.3 to 186.2) mmHg ($P<0.01$). The results for age, gender, ASA status, smoking history, narcotic use and presence of an epidural were similar ($P>0.05$).

Discussion: The results show that prophylactic nCPAP at 10cm H20 for one hour following elective laparotomy for bowel surgery decreases the A-aDO2 when compared to oxygen delivered at 8lpm by a simple face mask. This indicates that prophylactic nCPAP, a method of non-invasive respiratory support, improves post-operative gas exchange following laparotomy for bowel surgery.

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1318169 - EFFECTS OF DIFFERENT ANAESTHETIC TECHNIQUES ON ELECTROCORTICOGRAPHY IN PATIENTS UNDERGOING EPILEPSY SURGERY

Hemanshu Prabhakar[1], Ashish Bindra[1], Rajendra S. Chouhan[1], Sarat Chandra[2], Manjari Tripathi[3]

1. Neuroanaesthesiology, All India Institute of Medical Sciences, New Delhi, India
2. Neurosurgery, All India Institute of Medical Sciences, New Delhi, India
3. Neurology, All India Institute of Medical Sciences, New Delhi, India

Introduction: An estimated 5 – 10% of patients with medically intractable epilepsy need surgical therapy.[1] Potential effect of anaesthetic on the degree and pattern of interictal epileptiform activity is an unresolved issue.[2] The aim of our study is to compare the effects of different anaesthetic techniques on electrocorticography (ECoG) in patients undergoing epilepsy surgery, in terms of satisfactory recognition of epileptiform foci. We also compared the recovery characteristics and postoperative complications.

Methods: After approval from Institute Ethics Committee, for this prospective, randomised, double blind cross-over study, we enrolled 39 patients undergoing epilepsy surgery. Anaesthesia was induced with fentanyl 2 mcg/kg, propofol 2-3 mg/kg and rocuronium 1 mg/kg. Patients were randomised to receive isoflurane (Group I) or propofol (Group P) and oxygen (50%) with air or nitrous oxide was used as carrier gases. After exposure of brain grid electrode ECoG was recorded with both carrier gases. ECoG was analysed by a blinded neurologist.

Results: Demographics, duration of surgery and anaesthesia, Intensive care unit and hospital stay were comparable in two groups. Use of nitrous oxide decreased ECoG scores in both groups but significantly in Isoflurane group [Table 1]. In Isoflurane group 89% patients were seizure free as compared to 85% in propofol group.

Discussion: Both Isoflurane and propofol are safe during epilepsy surgery. Nitrous oxide may be avoided during ECoG recording as it reduces the scores.

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2. Epilepsy Research 2010; 89: 133 – 141

Intra-group comparison of the mean ECoG scores

	Nitrous	Air	Δ	Air	Nitrous	Δ	p-value
	Mean ECoG score			Mean ECoG score			
Isoflurane	2.9 (1.3)	3.8 (1)	-0.9	4.2 (0.8)	3.2 (0.80	1.2	0.003
Propofol	2.7 (1.3)	3.2 (1)	-0.5	3.5 (1.2)	3.4 (1.1)	0.08	0.46

Δ - difference in mean ECoG scores

1318206 - COAGULATION EFFECTS OF COMBINATION OF MANNITOL AND 0.9% NORMAL SALINE OR HYDROXY-ETHYL-STARCH IN NEUROSURGICAL PATIENTS

Gyaninder P. Singh[1], Hemanshu Prabhakar[1], Ashish Bindra[1]

1. All India Institute of Medical Sciences, New Delhi, India

Introduction: Neurosurgical patients often require administration of both, mannitol and hydroxyl-ethyl starch (HES). A recent in vitro study demonstrated that HES in combination with mannitol could disturb coagulation parameters and should be avoided in neurosurgical practice.[1] The aim of our study was to evaluate coagulation abnormalities due to mannitol when administered alone and in combination with hydroxyl-ethyl starch in patients undergoing craniotomy for various intracranial brain tumors.

Methods: After approval fro Institute Ethics Committee, we enrolled 30 adult patients and randomized them into 2 groups: Group A – Patients received 10 ml kg -1 0.9% normal saline and 1 gm kg -1 mannitol and Group B – Patients received 10 ml kg -1 hydroxyl-ethyl starch 130/0.4 and 1 gm kg -1 mannitol, immediately after induction of general anesthesia. Rotational thromboelastography (ROTEM) immediately after induction of general anesthesia, and 5 minutes after administration of mannitol. Measured parameters of blood coagulation were clotting time (CT) and clot formation time (CFT) with EXTEM and maximum clot firmness (MCF) with EXTEM and FIBTEM.

Results: Fourteen patients in each group completed the study. The mean age of patients in the 2 groups was 36.7 and 36.4 years ($p = 0.94$) and weights were 63.8 and 58.5 kg ($p = 0.18$). Insignificant change was noted in CT; CFT altered significantly from the baseline in both the groups ($p < 0.05$). MCF with FIBTEM did not change significantly from baseline ($p > 0.05$) but significantly differed between groups ($p = 0.001$). However all values were in normal range.

Discussion: Mannitol 1 gm kg -1 and HES 10 ml kg -1 can be safely administered in patients undergoing craniotomy for supratentorial tumors, without clinically significant changes in coagulation parameters.

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1318851 - UNRECOGNIZED TAMPONADE ON PRE-INDUCTION FOCUSED ECHOCARDIOGRAPHY

Rebecca Gerlach[1], Tarit Saha[1], Robert Tanzola[1], Russell Hollins[2], Jeremi Mountjoy[1]

1. **Anesthesiology, Queen's University, Kingston, ON, Canada**
2. **Otolaryngology, Queen's University, Kingston, ON, Canada**

Purpose: A case describing the incidental finding of pericardial tamponade on preoperative focused echocardiography requiring urgent management is described.

Clinical Features: Consent for disclosure was obtained from the patient. A 58-year-old man with a history of severe aortic stenosis, hypertension, and asthma presented for elective endoscopic sinus surgery for intractable nasal polyps. Cardiac surgery had recommended proceeding with the sinus surgery, as the patient's asymptomatic status did not warrant aortic valve replacement at that time. A pre-induction focused cardiovascular ultrasound (FoCUS) was performed to assess his current cardiac function. Unexpectedly, a large pericardial effusion was present with collapse of the right atrium (RA) and right ventricle (RV) and a dilated inferior vena cava (IVC). These findings suggested tamponade. Surgery was aborted and the patient was transferred to the coronary care unit where pericardiocentesis was performed by cardiology. Upon further scrutiny, the patient admitted to a 3 month history of increasing dyspnea, orthopnea, weight loss, and cough. Subsequent analysis of the pericardial fluid and bronchoscopy biopsies revealed eosinophilic infiltrates. Together with evidence of vasculitis found on cardiac MRI and a rapid response to prednisone therapy, a diagnosis of Churg-Strauss vasculitis was made. The patient was discharged from hospital several days later.

Conclusion: The diagnosis of tamponade is increasingly a clinical and echocardiographic one, as the classically described Beck's triad (decreased blood pressure, elevated central venous pressure and quiet heart sounds) is not reliably present when pericardial fluid develops gradually. Echocardiographic features of tamponade include abnormal respiratory variation in tricuspid and mitral flow velocities, systolic RA compression, RV diastolic collapse, a dilated IVC, and swinging heart. A moderate to large effusion and pulsus paradoxus are almost always present with clinically significant tamponade(1). Although rarely progressing to tamponade, Churg-Strauss is an uncommon small vessel vasculitis that frequently presents with pericardial effusion.
Echocardiography has traditionally been the domain of cardiology. Recent decreases in equipment costs and improved portability have enabled a wide range of physicians to use echo as a point-of-care tool during resuscitation. The skill to perform transthoracic echocardiography is particularly valuable to anesthesiologists, as hemodynamically unstable patients are frequently encountered in the perioperative setting. A FoCUS exam can rapidly identify significant abnormalities that will have an impact on anesthetic management, including valvular disease, ventricular dysfunction or the presence of a pericardial effusion(2). FoCUS is particularly useful in perioperative assessment as it can be performed quickly with relatively minimal training. However, the requirements for training and certification in FoCUS have not been established. Various protocols and requirements have been suggested(3). In this case, the ability to perform a FoCUS exam allowed for urgent treatment of unrecognized tamponade before the induction of anesthesia, preventing potential hemodynamic collapse.

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1319119 - INTRAOCULAR PRESSURE CHANGES DURING AIRTRAQ ASSISTED INTUBATION

Waleed Riad Soliman[1], Saeed Al Motowa[2], Waleed Al Rashed[2], Nauman Ahmad[3]

1. Anesthesia, Toronto Western Hospital, Toronto, ON, Canada
2. Ophthalmology, King Khaled Eye Specialist Hospital, RiyadH, Riyadh, Saudi Arabia
3. Anesthesia, King Khaled Eye Specialist Hospital, RiyadH, Riyadh, Saudi Arabia

Introduction: Tracheal intubation with the Macintoch laryngoscope is associated with increased intraocular pressure, tachycardia and hypertension 1. These changes are not desirable for many ophthalmic procedures, especially in patients with preexisting glaucoma or open eye injury. The Airtraq laryngoscope requires less force during laryngoscopy because of fewer tongue and epiglottis manipulations and is less stimulating to the airway stretch receptors 2. The aim of this study was to evaluate Airtraq assisted intubation and its effects on intraocular pressure and the cardiovascular system.

Methods: After approval of the local IRB and informed patient consent, 42 adult ASA I patients with normal intraocular pressure scheduled for ophthalmic surgery who required tracheal intubation were recruited. Anesthesia was induced with fentanyl and propofol followed by rocuronium. Subjects randomly allocated by computer-generated number to be intubated either with Airtraq (group 1) or with Macintoch laryngoscope (group 2). Intraocular pressure of non-operated eye, heart rate and blood pressure were measured before induction, immediately before, one minute and five minutes after tracheal intubation.
Power analysis indicated that 21 patients were required in each arm to detect a difference of 30% in the intraocular pressure with 80% power and alpha error set to 0.050 two-sided. Statistical analysis was done using Independent student t-test, ANOVA and Chi square test wherever appropriate. A P value of < 0.05 was considered statistically significant.

Results: There was no difference between groups in patients' age, sex, weight, height, Mallampati/ASA classifications or duration of surgery. Figure (1) shows intraocular pressure changes in the induction period. Intraocular pressure was not significantly different between groups before and after anesthetic induction nor at one and five minutes after tracheal intubation (P = 0.88, 0.15, 0.17, 0.08 respectively). Duration of intubation was 22.86 ± 10.3 and 16.43 ± 4.5 sec in Airtraq and Macintoch groups respectively. This difference is statistically significant (P= 0.013). Mean arterial pressure (MAP) was not significantly different between groups at all measurement points (P = 0.45, 0.31, 0.57, 0.61respectively). No statistical difference in the Heart rate (HR) was observed between groups at all measurement points (P = 0.53, 0.32, 0.68, 0.97respectively).

Discussion: Airtraq assisted intubation showed no advantages over tracheal intubation with Macintoch laryngoscope with regard to intraocular pressure or cardiovascular changes in patients with normal intraocular pressure. However, further work is needed for patients with elevated intraocular pressure.

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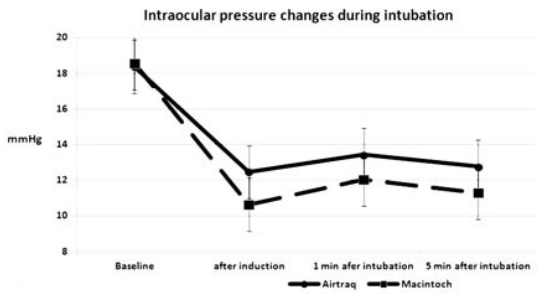

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1319831 - EFFECTIVENESS OF A PERIOPERATIVE SMOKING CESSATION PROGRAM: AN RCT

Susan M. Lee[1], Philip Jones[1], Patricia K. Morley-Forster[1], Jennifer Landry[1], Ozzie Buhrmann[2]

1. Anesthesia and Perioperative Medicine, University of Western Ontario, London, ON, Canada
2. Pharmacy, Parkwood Hospital, London, ON, Canada

Introduction: Cigarette smoking by surgical patients is associated with increased complications(1), particularly perioperative respiratory problems and poor wound-healing(2). Facing surgery is a "teachable moment" that may motivate patients to engage in permanent smoking cessation(3). Perioperative smoking cessation interventions have been shown to be effective in European populations in reducing perioperative smoking(4) and perioperative complications(5,6).

The purpose of this study was to determine if a perioperative smoking cessation intervention designed for a busy preadmission clinic would be successful in reducing smoking rates and intraoperative and immediate postoperative complications in a Canadian setting. The primary outcome is the rate of smoking cessation as confirmed by exhaled carbon monoxide breath test. Secondary outcomes include perioperative complications and unanticipated hospital admission.

Methods: This randomized controlled trial was conducted at a university-affiliated hospital. Following approval of the research protocol by the local research ethics board, adult smokers were identified in the preadmission clinic at least 3 weeks preoperatively. After informed consent, baseline data were collected, including self-reported smoking status, exhaled carbon monoxide level and modified Fagerstrom test for nicotine dependency(7). Patients were randomized to either intervention or control groups. The control group received no specific smoking cessation intervention. The intervention group received 1) brief counselling by the preadmission nurse, 2) brochures on smoking cessation, 3) referral to the Canadian Cancer Society's Smokers' Helpline, and 4) a free 6-week supply of transdermal nicotine replacement therapy. All caregivers on the operative day were blinded to group assignment. Blinded observers collected self-reported smoking status, exhaled CO level, and using a standardized data sheet, obtained information on perioperative complications from the anesthesiologist and PACU nurse. Patients were called 30-days postoperatively for self-reported smoking status and postoperative complications.

Results: Between October 2010 and January 2012, 153 patients were recruited into the study, representing 91% recruitment. Data were not unblinded at the time of this abstract submission pending full recruitment to the study, which is expected to be complete by March 2012. Aggregate data to date show that 46.4% of the 138 analyzed patients either achieved smoking cessation (8.7%) or reduction (37.7%) on the day of surgery. Intraoperative or postoperative complications occurred in 11.6% patients and 2.9% had an unanticipated hospital admission.

Discussion: One of the objections to more widespread use of smoking cessation interventions in the preadmission clinic is that it is too labour-intensive. The results of this study will show whether a smoking cessation intervention, designed to minimize additional use of physician or nursing time, introduced 3 weeks preoperatively results in decreased smoking rates on the day of surgery. Examination of perioperative complications may aid in determining whether a three week period is sufficient to demonstrate improvement in clinical outcomes.

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5 Lancet 2002: 114-7
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1319871 – SUBCUTANEOUS METHADONE ON POSTCESAREAN ANALGESIA

Mitra Jabalameli[1], **Forough Kalantari**[1]

1. Anesthesia and intensive care , Alzahra General Hospital, Isfahan University of Medical Sciences, Isfahan, Islamic Republic of Iran

Introduction: The postoperative analgesic effect of subcutaneous(SC) wound infiltration with methadone have not been extensively studied in caesarean section (1, 2, 3).The aim of this randomized double blind, clinical trial study was to evaluate the administration of subcutaneous methadone on postcesarean pain relief.

Methods: After institutional approval and obtaining informed patient consent, 60 ASA physical status I-II women scheduled for cesarean section with spinal anesthesia were included in the study. At the time of skin closure, patients allocated to 1 to 2 groups. Patients in group M: methadone 10 mg SC, and group C received the same volume normal saline SC. Patients and staff involved in data collections were unaware of the patient group assignment. Pain intensity,frequency of nausea and vomiting and opioid consumption evaluated on arrival in recovery room and then 15, 30, 60 minutes and 1, 2, 4, 6, 12 ,18, 24 hours after arrival in the recovery.

Results: VAS scores were significantly lower in group M compared with group C in all the times post operatively ($p < 0.05$). The incidence of nausea and vomiting was not different between the 2 groups. Analgesic requirement was more in group C than M but it was not statistically significant.

Discussion: The administration of subcutaneous methadone after cesarean delivery improves analgesia and has a morphine sparing effect compared with control group. So, we conclude that SC methadone may be good alternative choice for postcesarean pain relief.

References: 1- He L, Kim J, Ou C, McFadden W, van Rijn RM, Whistler JL. Methadone antinociception is dependent on peripheral opioid receptors. J Pain 2009 10(4):369-79
2- Labuz D, Mousa SA, Schäfer M, Stein C, Machelska H. Relative contribution of peripheral versus central opioid receptors to antinociception. Brain Res 2007 30; 1160:30-8
3- Hum A, Robin L. Subcutaneous Methadone-An Issue Revisited. J Pain 2007 34(6):573

1322475 - COMPARING EFFICACY OF KING VISION AND GLIDESCOPE IN CADAVERS

Tim Mullen[1], Jeanette Scott[2], George Kovacs[3], Orlando Hung[1]

1. Anesthesia, Dalhousie University, Halifax, NS, Canada
2. Anaesthesia, Middlemore Hospital, Auckland, New Zealand
3. Emergency Medicine, Dalhousie University, Halifax, NS, Canada

Introduction: This study compares the efficacy of the Glidescope (GS) and the new King Vision (KVL) video laryngoscopes when used by anesthesiologists to intubate clinical grade cadavers, with and without cervical spine immobilization.

Methods: Following Institutional Review Board approval, four 'clinical-grade' cadavers were prepared. Two cadavers were placed in appropriately sized cervical collars and two had no collar. Anesthesiologists with experience using the GS were recruited, and after obtaining informed consent, participants familiarized themselves with the KVL prior to beginning the study. Participants then proceeded to intubate each cadaver with each laryngoscope in a randomized fashion, resulting in a total of eight intubations per participant. All intubation attempts were recorded to assess the Time To Intubation (TTI), participant comments and number of intubation attempts. Following each intubation, participants documented the subjective ease of intubation (EOI) using a 100mm visual analog scale (VAS), and graded the view of the glottis with Cormack-Lehane (C-L) and Percent Of Glottic Opening (POGO) scores.

Results: Twenty-one participants were recruited and each performed eight intubations, providing 84 sets of paired data. Preliminary data analysis showed no difference between the performance of GS and KVL for EOI, TTI or C-L grade, although the KVL did have a slightly higher POGO (4.4% ± 19.6%, 95% C.I. 0.2% to 8.6%, p=0.042) than the GS. Results are summarized in Table 1.

Discussion: Difficulty placing an endotracheal tube is an important cause of morbidity and mortality in the operating room, emergency department, intensive care setting and in out-of-hospital resuscitation.(1) Video laryngoscopes are often useful as either a primary tool for intubation or as a rescue tool if immediately available during a difficult intubation(2). However, prohibitively high cost and poor portability have prevented their being immediately available in many intubation situations and locations. The results of this study show similar efficacy of the KVL and GS when used by anesthesiologists in cadavers, in both the normal airway and with cervical spine immobilization. While clinical studies are still warranted, it is encouraging to see that an affordable, portable video laryngoscope, such as the KVL, has the potential to play an important role in airway management.

References: 1.Br J Anaesth 2011;106:613–616 2.Anesthesiology 2011;114:34–41

Table 1: Results of Paired Samples T-test

Pairs	Paired Differences				
			95% C.I. of the Difference		
	Mean	Std. Deviation	Lower	Upper	Sig. (2-tailed)
EOI (G) - EOI (K) (mm)	2.8	23.3	2.2	7.9	0.275
TTI (G) - TTI (K) (seconds)	-0.2	39.0	-8.7	8.3	0.963
POGO (G) - POGO (K)	-4.4%	19.6%	-8.7%	-0.2%	0.042

1325435 - ANESTHESIA COMPLICATIONS AND OUTCOME AFTER ENDOVASCULAR STROKE THERAPY

Jee Jian See[1], **Michelle Xue Ling Chia**[1]

1. Tan Tock Seng Hospital, Singapore, Singapore

Purpose: The use of endovascular devices for removal of acute intracranial thrombus is increasingly being performed due to its efficacy in recanalization, longer time windows and potentially improved patient outcome. Providing anesthesia for these patients who had an acute ischemic stroke emergently in the radiological suite presents unique challenges to the anesthesiologist. We undertook a review of the anesthesia management, complications and outcome in our patients who had undergone endovascular treatment for acute thrombotic stroke.

Clinical Features: After local IRB approval, we reviewed and analyzed the medical records of 38 consecutive patients treated between December 2006 and June 2011 in our institution. Data collected included the patients' demographics, presenting GCS, preoperative risk factors and time interval between presentation to procedure. The anesthesia records were examined for hemodynamic stability and presence of any complications. Discharge location, length of stay, modified Rankin Score on discharge and mortality were also recorded. A total of 35 records were examined. Three records were incomplete and data were excluded. Two procedures were abandoned after induction of anesthesia as a result of unfavorable anatomy. Posterior circulation occlusion occurred in 16 patients (48%) and anterior circulation occlusion in 19 patients (58%). Median GCS at induction was 11 (range 3-15). Continuous arterial blood pressure was monitored for all the patients. 29 patients (88%) had their lowest recorded SBP < 140 mmHg. Four patients required significant amounts of vasopressors were administered for these patients. Other complications encountered during procedure include: clot migration in 3 patients, vessel perforation with contrast extravasation in 1 patient, vasospasm in 1 patient, new onset frontal bleed in 1 patient and re-occlusion in 1 patient. One patient developed severe bradycardia during the procedure and another patient developed ischemic ECG changes. 22 (67%) patients were sent to the intensive care unit ventilated. Median ICU stay was 3 days (1-9). Median modified Rankin Score was 4 (2-6) after the procedure. 4 patients (12%) had MRS score of <2 on discharge. All cause mortality in these patients was 40%.

Conclusion: The urgency of revascularization of acute cerebral thrombosis allows the anesthesiologist little time to optimize the patients who oftentimes have multiple co-morbidities on top of the acute ischemic event. Recently, there were some controversial evidences to suggest that local anesthesia may be superior to general anesthesia for this procedure; possibly due to delay to treatment and more hypotension during general anesthesia [1-2]. Even with continuous arterial blood pressure monitoring, systolic blood pressure lower than140 mmHg was commonly observed in our patients during the procedure. We were unable to correlate the occurrence of hypotension with the neurologic outcome. Neurologic complication and overall mortality remain high in this group of patient.

References: 1. Stroke 2010;41:1175-79
2. Anesthesiolgy 2012;116 (in press)

1330002 - VALIDATION AND OPTIMIZATION OF THE REVISED CARDIAC RISK INDEX: A PROSPECTIVE COHORT STUDY OF 11,524 PATIENTS

Christopher Davis[1], Jo Carroll[1], Gordon Tait[1], Duminda Wijeysundera[1], Scott Beattie[1]

1. **Anesthesia & Pain Management, Toronto General Hospital, University Health Network, Toronto, ON, Canada**

Introduction: With its inclusion in the ACC/AHA cardiac guidelines, the Revised Cardiac Risk Index (RCRI) has become the standard for predicting post-surgical cardiac complications [(1)]. Despite this widespread adoption, “Insulin therapy" and "Pre-operative serum creatinine >176.8mmol” failed to maintain significance in the validation cohort of the original publication. These 2 factors (diabetes and renal failure) have never been formally re-evaluated. The purpose of this study was to re-examine the inclusion of diabetes and renal failure in the RCRI.

Methods: After approval of the Research Ethics Board, 11,524 consecutive patients, ≥50 yrs undergoing elective, non-cardiac surgery were evaluated. Using the criteria outlined by Lee [(2)] the six RCRI predictors and outcome variables of Major Cardiac Complications were reconstructed. Each patient was categorized as per the original RCRI scoring system. The validity of the original predictors was tested using binomial logistic regression modelling and receiver operator curve (ROC) analysis.

Results: "Insulin Therapy", OR 1.7 (0.9-3.3), and "Preoperative serum creatinine >176 mmol/L", OR 1.8 (0.9-3.8), were not independent predictors of MCC. Models were generated to optimize the RCRI predictors (Table 1). A reconstruction of the original six factor RCRI model showed similar, if somewhat improved risk stratification between the RCRI classes. A second "4-Factor Model", generated without diabetes or renal failure, using a forward conditional binary logistic regression analysis, preserved the overall predictive quality of the RCRI score. Finally, adding “Preoperative GFR <30ml/min to the 4-Factor model, displays a similar ROC as the two previous models, but improves the risk stratification between Class III and Class IV compared to the previous two models. No definition of diabetes, type diabetic treatment, (insulin, or oral hypoglycaemic) nor preoperative glucose level improved discrimination of the RCRI.

Discussion: "Insulin Therapy" or "Preoperative serum creatinine >176.8mmol/L” do not improve the discrimination of the 4 other factors in the RCRI. A simplified five factor model using high-risk type of surgery, a history of ischemic heart disease, congestive heart failure, cerebrovascular disease and preoperative GFR <30 mL/min results in superior discrimination of major cardiac complications following elective non-cardiac surgery.

References: 1) Fleisher LA, et al. Circulation 2007; 116: 418-499
2) Lee T, et al. Circulation 1999; 100: 1043-1049

Table 1

Model	Events/Total, by Model Score, n/n (%)				ROC(95% CI)
	0 Points	1 Point	2 Points	≥ 3 Points	
Lee et al 1999 <(1)>	7/1559 (0.4)	19/1673 (1.1)	35/764 (4.6)	31/319 (9.7)	0.78 (0.73-0.82)
Reconstructed RCRI	47/7346 (0.6)	84/3362 (2.5)	36/662 (5.4)	22/154 (14.3)	0.74 (0.70-0.77)
4-Factor Model*	47/7519 (0.6)	95/3351 (2.8)	34/573 (5.9)	13/81 (16.0)	0.73 (0.69-0.77)
5-Factor Model**	41/5947 (0.7)	85/2784 (3.1)	27/495 (5.5)	16/84 (19.0)	0.73 (0.69-0.77)

* Original RCRI predictors including high-risk type of surgery, a history of ischemic heart disease, congestive heart failure, cerebrovascular disease but removing "Insulin Therapy for Diabetes" and "Preoperative Serum Creatinine >176.8mmol/L"
** 4-Factor model with the addition of GFR <30ml/min. Not all patients had data necessary to calculate GFR (n= 9479 used)

1330190 - DOES THROMBOELASTOGRAPHY IMPROVE PERI-OPERATIVE OUTCOMES?

Rajeev Subramanyam[1], Bradley C. Johnston[1], Mazen Faden[1], Mark W. Crawford[1]

1. Department of Anesthesia and Pain Medicine, The Hospital for Sick Children, Toronto, ON, Canada

Introduction: Typically, standard blood coagulation tests and clinical judgment are used to guide transfusion strategies in pediatric anesthesia. Although these tests are generally reliable, their results are often delayed, possibly postponing important clinical decisions. Thromboelastography (TEG) and rotational thromboelastography (ROTEM) are expensive, real-time, blood coagulation analyzers that are generally not used in pediatric anesthesia. Although a review of randomized trials of TEG/ROTEM has been conducted in adults with promising results (1), the state of the evidence in children is not known. Our research question is: In children (≤18 yr) undergoing surgery associated with severe bleeding, do TEG or ROTEM guided transfusion strategies, as compared to standard practice, improve clinical or patient-important outcomes (reduce post-operative bleeding, reduce proportion of patients requiring transfusion, surgical re-intervention for bleeding)?

Methods: In consultation with an expert librarian, a systematic search of 4 primary databases was conducted up to November 2011: MEDLINE, EMBASE, CINAHL and the Web of Science. We also searched bibliographies of systematic reviews and included studies. Screening and data extraction will be conducted independently, and in duplicate, by reviewers (RS, FM) using pre-constructed standardized forms. Using the Risk of Bias Instrument (randomized trials) or Ottawa Newcastle Scale (observational studies), the risk of bias for each included study will be rated. Data will analyzed using the RevMan Analyses statistical package in Review Manager (version 5.1). Using the random-effects model, dichotomous data will be presented as a relative risk (RR) and continuous data will be presented as a mean difference (MD). To explore the impact of missing outcome data, we will compare our primary analysis (i.e. a complete case analysis) to a series of sensitivity analyses to examine the robustness of our results (2). The overall quality of evidence will be rated for each outcome using the GRADE (Grading of Recommendations Assessment, Development and Evaluation) approach (3).

Results: A total of 227 studies were identified from the primary electronic databases (MEDLINE 98, EMBASE 68, CINAHL 34, Web of Science 27). Of these, 70 were identified as duplicates, leaving 157 abstracts and/or titles identified as original publications. Independent review (RS, FM) of these titles and/or abstracts identified 30 potentially relevant studies for full-text review. Data from subsequent stages of the project will be presented.

Discussion: Our results will summarize the potential of TEG/ROTEM versus standard care for clinical outcomes such as bleeding and transfusion. Results will be used to inform future studies.

References: 1. Cochrane Database of Systematic Reviews 2011, Issue 3. CD007871
2. BMC Trials. 2009:11;10(1):40
3. BMJ 2008;336(7651):995-8

1331436 - INTERPRETING POOLED ESTIMATES IN SYSTEMATIC REVIEWS INVOLVING PAIN

Kristian Thorlund[2], Bradley C. Johnston[1], Mark W. Crawford[1], Gordon H. Guyatt[2]

1. Department of Clinical Epidemiology & Biostatistics, McMaster University, Hamilton, ON, Canada
2. Department of Anesthesia and Pain Medicine, The Hospital for Sick Children, Toronto, ON, Canada

Introduction: Systematic reviews of clinical trials that include measurements of pain potentially provide critical information for patients and clinicians facing challenging health care decisions. The Cochrane Handbook of Systematic Reviews suggests that when individual studies use different continuous instruments to measure the same construct such as pain, authors present results in standard deviation units (standardized mean difference - SMD). The SMD is, however, limited by vulnerability to differential variability in populations enrolled, and challenges in interpretation. The objective of this study is to summarize and assess the relative merits of approaches to enhance interpretability of pooled estimates of continuous variables in meta-analyses.

Methods: We conducted a comprehensive review of methods for reporting meta-analytic summary estimates from continuous data (1). Based on the strengths and limitations of the methods, we have recommended five methods for presenting summary estimates (2). Here, we provide examples from one, a review of dexamethasone for pain, whose SMD was 0.79.

Results: A meta-analysis of prophylactic dexamethasone for nausea and vomiting after laparoscopic cholecystectomy included 17 trials of which 5 employed two widely used instruments for measuring post-operative pain: a 10-point (10 cm) Visual Analogue Scale (VAS) and a 100-point (100 mm) VAS scale (3). Extensive evidence supports the validity and responsiveness of the VAS (4,5), and a consensus statement suggested that 1cm on the 10cm scale constituted an MID (6). See Table for worked example.

Discussion: Systematic review authors dealing with continuous variables should, in addition to, or, as alternative to the SMD, present results using one or more of the analytic approaches that enhance interpretability. We recommend presenting results as relative or absolute effects, complemented by presentation in either natural units, MID units, or as ratio of means. More research is needed to determine the summary estimates to which clinicians most easily relate and most easily comprehend.

References: 1. Research Synthesis Methods 2011
2. Journal of Clinical Epidemiology, 2012 (accepted)
3. Annals of Surgery 2008; 248:751-762
4. Pain 1983; 16:87-101
5. Anesthesia & Analgesia 1998; 86:102-106
6. Journal of Pain 2009; 9:105-121
7. BMC Medical Research Methodology 2008; 8(32):1-15
8. BMC Health and Quality of Life Outcomes 2010; 8(116):1-5

Approach	Description	Estimate of effect	Advantage	Disadvantage
Standardized mean difference (SMD)	The pooled mean difference is presented in standard deviation units	SMD=-0.79 (95% CI -1.41 to -0.17)	(+) Widely used	(-) Interpretation challenging (-) Misleading when trial SDs are heterogeneous
Natural units	Linear transformation of trial data to most familiar scale	MD=-0.81 (95% CI -1.45 to -0.18)*	(+) Easier to interpret if scale well-known	(-) Few instruments in clinical practice are easy to interpret
Relative & absolute effects	Obtain proportion above threshold in both groups and calculate relative or absolute binary effect measure	OR=0.27 (95% CI 0.10 to 0.76)** RD=-0.03 (95% CI -0.07 to 0.01)**	(+) Very familiar to clinical audiences	(-) Involve statistical assumptions that may be questionable
Ratio of means (7)	The ratio between the mean	ROM=0.87	(+) May be easily	(-) NA for change

	responses in the intervention and control group	(95% CI 0.78 to 0.98)	interpretable to clinical audience (+) Fewer questionable assumptions	scores (-) Interpretation requires knowledge of control group mean
Minimal important difference (MID) units (8)	The pooled mean differences is presented in MID units	MID=-0.40 (95% CI -0.74 to -0.07)	(+) May be easily interpretable to clinical audience	(-) Only applicable when minimally important difference is known

*Based on the median SD=1.04 for the 10-point VAS scale; **MID used as threshold for obtaining proportions

1332664 - A NOVEL METHOD OF NON-INVASIVE VENTILATION IN CHILDREN

Ban Tsui[1], Sara Horne[2], Vivian Ip[1]

1. Anesthesiology and Pain Medicine, University of Alberta, Edmonton, AB, Canada
2. Faculty of Medicine & Dentistry, University of Alberta, Edmonton, AB, Canada

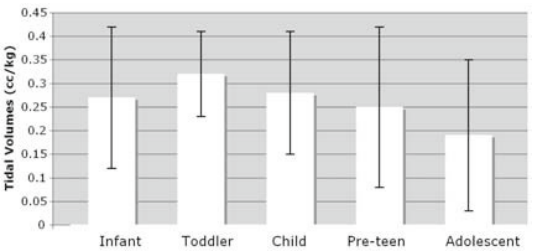
Introduction: Airway management in the pediatric and adult populations differs due to differences in respiratory physiology and anatomy. Current ASA guidelines recommend that invasive airway access, such as cricothyroidotomy, be used as a last-resort option for delivering oxygen to an individual who cannot be intubated or ventilated by conventional means (1). Since cricothyroidotomy is risky to the patient, we wish to develop a gentle, non-invasive method of providing oxygen to children in emergency situations. We hypothesized that applying pressure to the chest may be an easy, safe, and effective method of ventilating a child in an emergency situation. This method is based on the creation of a pressure gradient that forces air out when the chest is compressed, producing a recoil that causes intake of air upon release of pressure.

Methods: After obtaining research ethics board approval and informed consent, pediatric patients requiring general anesthetic and endotracheal intubation were recruited; patients with cardiac, pulmonary, or thoracic pathology were excluded. Under general anesthesia, patients were ventilated using a standard bag-valve-mask. The mask was maintained on the patient's face as gentle pressure was applied vertically down on the right chest. Pressure was then released and resulting tidal volume was measured. This procedure was then repeated following insertion of an endotracheal (ET) tube. Normal tidal volume generated via mechanical ventilation at 15 cm H2O was then obtained to determine an average tidal volume per kilogram (cc/kg). All steps were repeated twice after the first iteration. Data was analyzed using ANOVA and ANCOVA.

Results: A total of 63 patients were recruited (34 males, 29 females). Of these, 15 were excluded because of airway obstruction. Average age and weight was 7.5 yrs and 33.5 kg, respectively. Average tidal volumes measured before and after ET intubation were not significantly different (2.6 ± 1.5 cc/kg unprotected vs. 2.7 ± 1.2 cc/kg protected). Tidal volumes generated by mechanical ventilation averaged 13.3 ± 4.8 cc/kg. Analysis by ANCOVA demonstrated that age and enlarged tonsils did not change significance of tidal volumes generated before and after ET intubation.

Discussion: Using passive recoil of the chest after the release of pressure, one can generate >20% of normal tidal volume in a child with an unprotected airway. Despite the prevalence of enlarged tonsils among the pediatric population, the chest pressure technique has the potential to be an effective method for ventilation in emergent and non-emergent situations.

References: Anesthesiology 2003 98: 1269-77



Mean tidal volumes (cc/kg) generated for different age groups with an unprotected airway. Infant = 1-12 months; toddler = 1-3 yrs; child = 3-8 yrs; pre-teen = 8-13 yrs; adolescent = 13-18 yrs. Error bars indicate +/- SD.

1334223 - THE EFFECTS OF BUPIVACAINE AND PROPOFOL ON SEPTIC RAT AORTAS

Gregory Manning[1], Reza Tabrizchi[2], Michael Bautista[1]

1. Discipline of Anesthesia, Memorial University, St. John's, NF, Canada
2. Division of Biomedical Sciences, Memorial University, St. John's, NF, Canada

Introduction: The physiologic response to hypotension involves catecholamine-mediated contraction of vascular smooth muscle. During sepsis, this process is impaired and the response to catecholamines is blunted. Current evidence suggests that this is in part due to the over-production of nitric oxide by inducible nitric oxide synthase (iNOS) as well as the opening of K-ATP channels in vascular smooth muscle. In this study, we have examined the effects of propofol (a putative scavenger of peroxynitrite radicals) and bupivacaine (a K-ATP channel blocker) on concentration-response curves generated with phenylephrine (an α1-adrenergic agonist) in isolated rat aortic (thoracic) rings, ex vivo, obtained from animals 4 hours post-treatment with either saline (1.0 mL/kg) or lipopolysaccharide (LPS; 1.0 mg/kg).

Methods: All procedures on animals were carried out in accordance with the guidelines and approval of the Animal Care Committee at our institution. Aortic rings were suspended on stainless steel wire in 20 mL tissue baths containing physiological salt solution gassed with O2:CO2 95%:5% at temperature 37oC and pH 7.4. Isometric contractions were recorded using force transducers connected to a polygraph. The effects of propofol (10 μM and 30 μM), bupivacaine (30 μM), bupivacaine (30 μM) and propofol (30 μM) combined, N-nitro-L-arginine methyl ester (L-NAME; 10 μM) and NaOH (1.0 M; 20 μL) were investigated on phenylephrine-induced contractions.

Results: Injection of LPS compared to saline resulted in a significant reduction in the systolic blood pressure (108 ± 4.0 vs. 122 ± 4.0 mmHg) (mean ± S.E.M.), an increase in heart rate (410 ± 10 vs. 347 ± 9.0 bpm), and elevation in plasma concentrations of NO2-/NO3- (90.4 ± 8.8 vs. <3.0 μM), respectively. Mechanical responses of aortic rings to phenylephrine were diminished in tissues obtained from animals treated with LPS compared to saline. Maximal force of contraction induced by phenylephrine was 8.2 ± 1.4 mN and 6.5 ± 1.4 mN (n=12; mean ± S.D., $p<0.05$) in saline- and LPS-treated rats, respectively. The presence of propofol (10 and 30 μM) increased potency and efficacy of phenylephrine in tissue from animals treated with LPS. Bupivacaine (30 μM) alone also reversed the inhibitory effects of LPS-treatment on phenylephrine-induced contractions. A combination of propofol (30 μM) and bupivacaine (30 μM) produced an increase in phenylephrine-elicited contractions in aortic rings, however, the effect was less than with either agent alone. L-NAME potentiated phenylephrine-mediated contractions increasing the maximal response in aortic rings obtained from saline- and LPS-treated animals.

Discussion: It is possible that propofol-mediated sensitization to phenylephrine was due to (a) reduction of peroxynitrite radicals, (b) inhibition of iNOS or a combination of (a) and (b). The impact of bupivacaine may have been via the inhibition of K-ATP channels but it is evident that this effect was not synergistic with propofol.

Further research is needed to elaborate on these findings. Though clinicians may be reluctant to use propofol in hypotensive patients, its properties may be beneficial in patients with sepsis. Whether local anesthetics with better safety profiles than bupivacaine will show the same properties observed here has yet to be determined.

1334391 - FLUID MANAGEMENT IN DECEASED DONOR RENAL TRANSPLANTATION

Lindsay Hurlburt[1], Lior Flor[1], Andrew Roscoe[2], Adriaan Van Rensburg[2], Stuart A. McCluskey[2]

1. **Anesthesia, University of Toronto, Toronto, ON, Canada**
2. **Anesthesia and Pain Management, Toronto General Hospital, University Health Network, Toronto, ON, Canada**

Introduction: Delayed graft function (DGF) or need for dialysis within the first week of renal transplantation occurs in 30% to 60% of deceased donor transplants. To maintain adequate graft function and potentially avoid DGF, particular attention needs to be paid to fluid management. The recommended fluid in renal transplantation has traditionally been normal saline (NS). While NS contains no potassium (K), it can cause a hyperchloremic metabolic acidosis which in turn can elevate extracellular K as intracellular K is exchanged for hydrogen. O'Malley[1] randomized renal transplant recipients to NS or Ringer's Lactate (RL) for intraoperative fluid replacement and measured K and acid base status intraoperatively. This study confirmed that intraoperative NS in renal transplant patients was associated with metabolic acidosis and hyperkalemia, which was not seen with RL.

The objective of this study was to describe the volume and type of fluid administered perioperatively to deceased donor renal transplant recipients and to determine the incidence of electrolyte abnormalities e.g. hyperkalemia and hyperchloremia on postoperative day (POD) 1.

Methods: Following research ethic board approval the charts of all patients undergoing deceased donor renal transplantation between December 2009 and March 2011 were reviewed. The following data was extracted: gender, height, weight, preoperative dialysis, baseline vitals, surgical date and duration, length of stay, intraoperative fluids and blood products, blood loss, urine output, preoperative and postoperative (days 1, 2, 3-7) electrolytes/hemoglobin/creatinine, and need for dialysis at postoperative week 1. Incidence of electrolyte abnormalities and distribution of intraoperative fluids was expressed as percents and means with standard deviation.

Results: The dataset consisted of 98 renal transplant recipients: 15 patients did not have accurate fluid records. Total mean fluid given was 2,729 ± 952 ml (36 ± 13 ml/kg) crystalloid and 271 ml (1.8 ml/kg) colloid. One third of patients received a colloid and the vast majority of patient received NS (96%). Of these, 55% received ≥ 2 L of NS, 36% 1-2 L of NS, 9% < 1 L of NS and 4% received no NS. Nearly one half of patients were given a balanced salt solution (RL or Plasmalyte) (29% received ≥ 2L, 51% 1-2 L RL, and 20% <1 L). DGF occurred in 40 patients (41%) and 64 (66%) were hyperkalemic on POD 1. In contrast, 8 (8%) were hyperchloremic on POD 1.

Discussion: NS continues to be the crystalloid of choice in the management of deceased donor renal transplantation. Whether the use of NS is associated with hyperkalemia and/or DGF and whether the use of K containing balanced salt solutions might mitigate these electrolyte abnormalities will require a larger dataset or a prospective randomized trial.

References: 1 Anesth. Analg. 2005 100: 1518-24

1334608 - PHYSICAL ACTIVITY LEVELS AND SLEEP PATTERNS OF CANADIAN ANAESTHESIOLOGISTS

Riley Senft[1], **Dean Kriellaars**[2]

1. Anesthesia, University of Manitoba, Winnipeg, MB, Canada
2. Physical Therapy, University of Manitoba, Winnipeg, MB, Canada

ABSTRACT BODY
Introduction: Job stress and sequlae of shift work can have detrimental effects on the physical activity patterns, sleep, body composition and job satisfaction. Health of health care workers is inexorably linked to effective delivery of health care in Canada. This study was designed to characterize the lifestyles of Canadian anesthesiologists.

Methods: Online survey to eleven Canadian residency programs surveying staff (n=85) and resident (n=49) anaesthesiologists. Site visits to seven residency programs for direct measurement of physical characteristics and physical activity patterns using pedometry (7 day record).

Results: The participants were 63% male, 69.4% married, 45.5% did not have children and 98.5% were non-smokers. BMI revealed that 58% were within the healthy weight category, 8% were underweight and 34% were overweight or obese (65% of Canadians overweight/obese). Over 70% reported regular exercise compared to the Canadian average of 52.5%. The weekly total amount of moderate to vigorous physical activity was 176.5 min/week averaging 29.9 min per session exceeding the Canadian Activity Guideline of 150 min/week. The top three vigorous activities reported were running, swimming and cycling, with weight lifting, jogging and yoga as the top three moderate intensity activities. Despite a low mean sleep duration of 6.5 hours with a sleep latency of 18 minutes, 83.6% of participants ranked their sleep as fairly good to very good. 92% scored their job satisfaction above 7 (10 = very satisfied).

Discussion: Canadian anaesthesiologists associated with residency programs demonstrated surprisingly healthy lifestyles exceeding the Canadian public in numerous categories.

References: 1.Colley RC, Garriguet D, Janssen I, et al. Physical activity of Canadian adults: Accelerometer results from the 2007 to 2009 Can Health Measures Survey. Health Reports (Stats Can, Cat 82-003)2011;22(1) 2.Colley RC, Garriguet D, Janssen I, et al. Physical activity of Canadian children: Accelerometer results from the 2007 to 2009 Can Health Measures Survey.Health Reports (Stats Can, Cat 82-003)2011;22(1)

Exercise and Physical Activity

Activity Level	Number of times per week	Duration of activity (mins)	Top 3 activities
Light Activity (not perspiring and not able to hear breathing, but moving)	7.9	27.8	1. Walking 2. Climbing Stairs 3. Gardening
Moderate Activity (slightly perspiring & just able to hear breathing)	3.4	28.7	1. Weight lifting 2.Jogging 3.Yoga
Vigorous Activity (perspiring and deeply breathing and moving)	2.5	32.4	1. Running 2. Swimming 3. Cycling

Mean moderate to vigorous physical activity per week = 176.5 mins over 5.9 session = avg of 29.9 mins per session

1338649 - HEMOGLOBIN LEVELS AND TRANSFUSION IN NEUROCRITICALLY ILL PATIENTS: A SYSTEMATIC REVIEW OF COMPARATIVE STUDIES

Philippe Desjardins[1], Alexis F. Turgeon[2], Marie-Hélène Tremblay[1], François Lauzier[3], Ryan Zarychanski[4], Lynne Moore[5], Lauralyn McIntyre[6], Shane W. English[7], Amélie Boutin[2], Andrea Rigamonti[8], Jacques Lacroix[9], Dean A. Fergusson[6]

1. **Department of Anesthesiology, Université Laval, Québec, QC, Canada**
2. **CHA-Research Center, Enfant-Jésus Hospital, Université Laval, Québec, QC, Canada**
3. **Department of Medicine, Université Laval, Québec, QC, Canada**
4. **Department of Internal Medicine, University of Manitoba, Winnipeg, MB, Canada**
5. **Department of Social and Preventive Medicine, Université Laval, Québec, QC, Canada**
6. **Department of Medicine, University of Ottawa, Ottawa, ON, Canada**
7. **Clinical Epidemiology Program, Ottawa Hospital Research Institute, Ottawa, ON, Canada**
8. **Departments of Anaesthesia and Critical Care Medicine - St. Michael's Hospital, University of Toronto, Toronto, ON, Canada**
9. **Department of Pediatrics, Université de Montréal, Montréal, QC, Canada**

Introduction: Accumulating evidence suggests that a lower hemoglobin transfusion threshold is safe in critically ill patients. However, the optimal hemoglobin level and associated transfusion threshold in neurocritically ill patients remains unknown. We conducted a systematic review to evaluate the effect of hemoglobin levels on mortality, neurological function, ICU and hospital length of stay, duration of mechanical ventilation and multiple organ failure in adult and pediatric neurocritically ill patients.

Methods: We searched MEDLINE, Cochrane CENTRAL, EMBASE, ISI Web of Knowledge and Google Scholar. Two independent reviewers screened titles, abstracts and full-text articles of records. Randomized and non-randomized studies were included if at least two different hemoglobin thresholds, levels, targets, or RBC transfusion strategies were compared. Neurocritical conditions encompassed but were not limited to: subarachnoid hemorrhage (SAH), stroke, traumatic brain injury (TBI), intracerebral hemorrhage (ICH) and any cerebral neurosurgical conditions. Keywords pertaining to the population (neurocritical care) and to the exposure (hemoglobin levels, RBC transfusion, anemia) were combined for the search strategy. No restriction based on language, year or type of publication was applied. Data was collected using a standardized case report form. Odds ratios are used to report dichotomous outcomes and mean differences are used for continuous outcomes, with 95% CI.

Results: Among 4310 retrieved records, six studies met inclusion criteria (n=537). Four studies were conducted in TBI, one in SAH and one in a mixed population of neurocritically ill patients. The minimal hemoglobin levels or transfusion thresholds ranged from 7 to 10 g/dL in the restrictive groups and from 9.3 to 11.5 g/dL in the liberal groups. Three studies had a low risk of bias; three had a high risk of bias. Given the substantial heterogeneity observed in the study methods and participants, a formal meta-analysis was considered to be inappropriate and data was not pooled. No effect was observed on mortality (table 1), duration of mechanical ventilation or multiple organ failure. In studies reporting on ICU or hospital length of stay (n=4), two reported a significant shorter stay in the restrictive group (-11.4 days [-16.1,-6.7]; -5.7 days [-10.3,- 1.1]). One study observed a more favorable GOSe at 6 months in the restrictive group.

Discussion: We found no consistent effect of restrictive or liberal transfusion strategies. Considering the lack of evidence regarding long term neurological functional outcomes and the high risk of bias of most studies, no recommendation can be made on which transfusion strategy to favor in neurocritically ill patients. A sound randomized trial comparing restrictive vs. liberal transfusion strategies and assessing long-term neurological functional status in neurocritical care patients is needed.

Table 1 Effects of liberal vs. restrictive transfusion strategy on mortality

		# events / N participants		
Study	Time frame	Restrictive	Liberal	Odds ratio (95% CI)
McIntyre et al. 2006	30 days	5/29	5/38	1.38 [0.36, 5.29]
Flückiger et al. 2006	In-hospital	17/37	34/102	1.70 [0.79, 3.66]
Lacroix et al. 2007	28 days	2/30	1/36	2.50 [0.22, 29.01]
George et al. 2008	In-hospital	11/39	15/43	0.73 [0.29, 1.87]
Warner et al. 2010	6 months	6/63	13/76	0.51 [0.18, 1.43]

CI confidence interval

1339332 - THE IMPACT OF STATIN USE ON PERIOPERATIVE INFECTIONS AND SEPSIS

Diana Noseworthy[1], David Neilipovitz[1], Alan Chaput[1], Monica Taljaard[2]

1. Anesthesiology, The Ottawa Hospital, Ottawa, ON, Canada
2. Clinical Epidemiology, Ottawa Hospital Research Institute, Ottawa, ON, Canada

Introduction: Perioperative infection is a common and costly surgical complication. Infection may lead to sepsis and death by inducing an uncontrolled inflammatory cascade of cytokines. Emerging evidence in the non-operative setting suggests that statins, also known as HMG-CoA reductase inhibitors, may prevent infections and the progression to sepsis (1). It is unknown if this benefit applies to the perioperative setting. Statins have traditionally been marketed to reduce cholesterol levels (2). However, statins are now believed to exert pleiotropic effects, including anti-inflammatory, immunomodulatory, and anti-oxidant effects (3,4). Our study was designed to determine if statins protect against infection and sepsis up to 30 days after elective surgery.

Methods: With Research Ethics Board approval, we conducted this retrospective cohort study of a convenience sample of 400 patients from July 2004 to June 2009. Patients were aged 60 years or older and underwent one of the following elective surgeries; total knee/hip arthoplasty, total abdominal hysterectomy, open colon resection, or lung lobectomy. Statin use, co-existing diseases, length of surgery, American Society of Anesthesiologists classification (ASA), prophylactic antibiotics, and total surgical time were recorded. The outcome of interest was infection or sepsis in the first 30 days following surgery. Measured infections were urinary tract infection (UTI), surgical site infection (SSI), bloodstream infection, pneumonia, and infection not otherwise defined (NOD). Chi-squared or Fisher's exact tests were used to examine the effects of statin on infection. Multivariable logistic regression analyses were used to identify independent risk factors for infection.

Results: In our sample of 400 patients, 41.5% were statin users. No significant effect of statin on any type of infection was observed (Table). Independent risk factors for perioperative infection were length of surgery (OR=1.003, 95% CI 1.000-1.005), age (OR=1.079, 95% CI 1.042-1.117), and surgery type. Open colectomy had the highest infection rate at 26% and TAH had the lowest at 7%. Total knee/hip arthroplasty (OR=0.429, 95% CI 0.206-0.895) and TAH had significantly fewer post-operative infections than colectomy surgery (OR=0.217, 95% CI 0.089-0.527). There were no significant differences in rates of sepsis (p=0.653) or death (p=0.513) between the statin and non-statin groups.

Discussion: Existing evidence in the non-operative setting suggests that statins reduce progression to sepsis (5,6). Our observational study was unable to demonstrate a significant relationship between statin use and perioperative infection or sepsis. Future prospective studies are required to confirm these findings.

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(5) PLoS.One. 2010;5:e10702
(6) Clin Microbiol.Infect 2009;15:325-34

	Statin Patients (n=166)	Non-statin Patients (n=234)	Relative Risk (95% CI)	p-value
UTI	8 (4.8%)	12 (5.1%)	0.940 (0.393-2.248)	0.889
Pneumonia	13 (7.8%)	10 (4.3%)	1.833 (0.823-4.079)	0.132
SSI	12 (7.2%)	18 (7.7%)	0.940 (0.465-1.898)	0.862
Bloodstream infection	1 (0.6%)	1 (0.4%)	1.410 (0.089-22.376)	1.0 00
Infection NOD	1 (0.6%)	2 (0.9%)	0.705 (0.064-7.709)	1.000
Total patients*	29 (17.5%)	33 (14.1%)	1.239 (0.784-1.957)	0.359

*5 patients in the statin group and 7 patients in the non-statin group had multiple infections.

1341298 - INFANT GLIDESCOPE® LEARNING CURVE - A PILOT STUDY

Mazen Faden[1], Carolyne Pehora[1], Cengiz Karsli[1]

1. Anesthesia and Pain Medicine, The Hospital for Sick Children, Toronto, ON, Canada

Introduction: The Infant Cobalt GlideScope® Videolaryngoscope (GVL, Verathon Medical, Bothell, USA) is a valuable teaching tool and may provide a superior laryngoscopic view than direct laryngoscopy in infants requiring endotracheal intubation. This pilot study endeavors to identify a learning curve associated with infant GVL intubation by novice users compared to direct laryngoscopy (DL).

Methods: Five anesthesia residents who had no prior experience with infant airway management were recruited as the novice users. Each resident performed a total of 10 tracheal intubations (5 GVL and 5 DL, randomized) in infants weighing 10 kgs or less. Primary end points included time to optimum view of the vocal cords and time to tracheal intubation. The Adnet intubation difficulty score was measured for each patient. Demographic data and timed data were analyzed using the Mann-Whitney test. A p value of <0.05 was considered statistically significant. A power analysis was performed based on the results of the pilot study

Results: The mean age and weight of the infants were similar in both groups. In the GVL group, the time to optimum view (6.9 ± 4.2s) was shorter compared to that in the DL group (12.4 ± 8.4s, p=0.005). The times to tracheal intubation however were similar in both groups (27.3 ± 9.5s vs. 27.9 ± 11.3s, p=0.92). There was no significant difference in time to optimum view or intubation between the first and fifth intubation for either the GVL or DL groups. In the Glidescope® group there were two failures to visualize the vocal cords. They occurred in the third and fifth out of five GVL intubations carried out by two different novice users. In both cases, a size 1 blade was used whereas the patients' weights (4.4 and 4.6 kgs) would have dictated a size 2 blade be used.

Discussion: The main finding in this study was the apparent lack of learning curve associated with the use of GVL or direct laryngoscopy in infants by novice users. The small sample size of this study precludes any other conclusions, however allows for a power analysis and sample size calculation. Although the GVL is associated with a faster time to optimum view of the cords this may be clinically irrelevant as the time to tracheal intubation seems to be the same. Adherence to manufacturer's guidelines for GVL blade sizing is recommended. The Infant Cobalt GlideScope® Videolaryngoscope remains a valuable teaching tool and intubation device, even for novice users.

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1341423 - UPTAKE OF TOPICAL 10% KETAMINE GEL OVER 7 DAYS : A PILOT STUDY

Patricia K. Morley-Forster[1], Rajarathinam Manikandan[2], Craig Railton[1], Bradley Urquhart[3], David Freeman[3]

1. Anesthesiology and Perioperative Medicine, University of Western Ontario, London, ON, Canada
2. Anesthesiology, Ganga Hospital, Coimbatore, India
3. Medicine and Physiology and Pharmacology, University of Western Ontario, London, ON, Canada

Introduction: Both peripheral and central NMDA receptors are activated in chronic neuropathic pain The NMDA antagonist, ketamine, may cause side effects, when given orally or intravenously. Topical 5% and 10% ketamine gels reduce capsaicin-induced hyperalgesia (1) and allodynia(2).Serum levels were low after a single application in 10 patients (2), but have not been studied after repeated application . Blood levels <50 ng/mL are devoid of CNS effects (3).The study purpose was to measure serum ketamine levels after application of 10% gel TID for 7 days.

Methods: After IRB approval, 9 patients with focal neuropathic pain consented. Subjects were given 28 mL of 10% ketamine gel compounded in plurionic-lecithin-organogel vehicle (PLO) in 7 syringes of 4 mL each, and instructed to apply 1 mL (100 mg) TID over a 100 cm-square area. Each was issued a 10 x 10 cm cardboard template to ensure standard thickness and area application. Blood was drawn at 4 hours after the initial application on Day 0, then at 0900 on Day 3 and Day 7. After immediate centrifuging, EDTA plasma was stored at
-20 C until analysed by ultra-performance liquid chromatography (UPLC). Pain scores (11 point NRS) were recorded in a diary at baseline, at 4 hours, and on Days 1,2,3 and 7,as were side effects. Severity of allodynia was documented at baseline, Days 3 and 7 using a 5 point Likert scale (none to agonizing). The target sample size is 15; the planned completion date is April,2012.

Results: All subjects completed the protocol.There were 6 females, 3 males with a mean age of 46.5 years (Range 34-61) and mean weight 73.8 Kg (Range 43-91). Ketamine levels at all time points were below 10 ng/mL. Three subjects reported side effects of itching, mild burning and nausea. Five reported a drop in NRS of 1 or 2 points between Day 0 and Day 7.

Discussion: Repetitive application of 10% ketamine gel resulted in extremely low serum levels of ketamine after one week. The gel was an effective analgesic in 5 subjects;all 9 reported they would like to continue treatment. A placebo-controlled RCT can now be designed to verify efficacy without concern that systemic side effects, or unblinding, will occur due to central sedating effects of ketamine.

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1341611 - CAN CARDIAC SURGERY PATIENTS TRANSFER FROM ICU THE SAME DAY AS SURGERY?

Rizwan A. Manji[1], Rakesh C. Arora[1], Dean D. Bell[2], Alan Menkis[1], Eric Jacobsohn[2]

1. Surgery, University of Manitoba, Winnipeg, MB, Canada
2. Anesthesia, University of Manitoba, Winnipeg, MB, Canada

Introduction: Ability to transfer a patient out of the cardiac surgery ICU (CSICU) same day as surgery would assist with improving flow of cardiac surgery patients through the system as it would allow two patients to "occupy" the same bed in a 24 hour period. Objective: To characterize patients that are ward transfer ready ≤ 4 hours or >4 hours post arrival in CSICU.

Methods: Local HREB approval was granted. From Mar 2008 to Mar 2009, all cardiac surgery patients admitted to CSICU were specifically evaluated for earliest transfer time possible using specified criteria relating to bleeding, urine output, hemodynamic/respiratory status, neurological status and cardiac rhythm status. They were divided into two groups: early transfer group (ETG) were patients ready for transfer ≤ 4 hours from arrival in ICU who actually were transferred to ward in stable condition within 24 hours and late transfer group (LTG) which were all other patients. Multivariable logistic regression identified patients requiring longer ICU stay.

Results: There were 1010 patients enrolled in the study of which 274 (27.1%) were in the ETG having a transfer ready time of 2.1 ± 1.1 hours (mean ± SD). There were no readmissions to ICU and no in-hospital mortality in the ETG group. Logistic regression revealed emergency operation (OR 17.6; 95% CI 2.4 – 129.9; p=0.01), congestive heart failure (OR 2.9; 95% CI 1.5 – 5.7; p<0.01), cerebrovascular disease (OR 2.2; 95% CI 1.2 – 3.9; p<0.01), procedure involving aortic valve (OR 2.2; 95% CI 1.2 – 3.9; p<0.01); and procedure involving thoracic aorta (OR 5.0; 95% CI 1.5 – 17.3; p<0.01) to be associated with longer stay with peripheral vascular disease (p=0.06) and chronic renal failure (p=0.08) trending to be significantly associated with longer stay. Variables not significant in the model, suggesting they would be suitable for early transfer (assuming they did not also have one of the longer stay factors), were: isolated CABG, open chamber procedure, redo cardiac surgery, stable angina, and pre-operative arrhythmias. ICU length of stay in the two groups was – median (interquartile range): ETG 20.5 (18.0 – 22.3) versus LTG 40.8 (22.5 – 68.4) hours – p<0.01.

Discussion: Our data suggest that there are predictable factors that could be used to decide which patients may be transferable to the ward same day as surgery.

CONTROL ID: 1341721
TITLE: POSTOPERATIVE MEDICAL STATUS AND ITS RELATIONSHIP TO POSTOPERATIVE MYOCARDIAL INFARCTION, STROKE, AND CARDIAC ARREST IN NON-CARDIAC SURGERY
AUTHORS (FIRST NAME, LAST NAME): Homer Yang[1], Ramez Hendy[1], Hussein Baydoun[2]
INSTITUTIONS (ALL): 1. Anesthesia, University of Ottawa, ottawa, ON, Canada.
2. Undergraduate Medical Education, University of Laval, Laval, QC, Canada.

ABSTRACT BODY
Introduction: After non-cardiac surgery, cardiovascular complications comprise the most frequent non-surgical complications1. While postoperative surgical or medical complications may contribute to the occurrence of postoperative myocardial infarctions (POMI), little is known about their characteristics in POMI. To better develop strategies to prevent POMI, a case-control study on the incidence of surgical or medical complications during the postoperative hospital stay or up to 30 days, whichever transpires first, in patients with POMI, strokes, or cardiac arrest.

Methods: After REB approval, POMI, stroke, or cardiac arrest in 2006 -2008 were reviewed: POMI were defined as Troponin rise or by MD diagnosis; CVA, RIND, or TIA by CT, MRI, or MD diagnosis; cardiac arrest as successful resuscitation from documented or presumed V fib, V tach, or asystole. Controls were matched by age, year of operation, surgical group as per body cavity, and emergent/urgent versus elective. Postoperative surgical complications and medical complications were collected. In multiple complications, only the first or the most significant complication was selected. When POMI and pulmonary edema occurred on the same day, POMI was selected. Complications preceding POMI, strokes, or cardiac arrest were collected. The highest HR recorded > 120 or lowest SBP recorded < 90 were collected. Categorical and continuous parameters were compared using $\chi 2$ and t-test respectively.

Results: Between 2006 and 2008, 41 patients suffered POMI; postoperative medical complications were statistically more frequent compared to controls (Table). Of the complications, 12/21 (57%) medical and 1/5 (20%) surgical preceded POMI; 28/41 (68%) POMI had no preceding surgical or medical complications. On POD 1 – 3, the highest recorded postoperative HR > 120 between POMI and controls was no different.

Discussion: Preliminary results suggest that postoperative medical complications were more frequent in patients with POMI than controls and 12/21 (57%) of the complications preceded POMI. In patients without antecedent complications (28/41), further research is needed for better risk stratification in the prevention of POMI.

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CURRENT CATEGORY: Cardiovascular & Thoracic: Basic Science & Clinical
Ian White Patient Safety Award: No
PRESENTATION TYPE: Resident
KEYWORDS: Cardiovascular, Complications, Postoperative.
Table

	Age	ASA IV:III:II:I	Elective: Urgent	Med Comp	Sx Comp	POD 1 – 3 HR > 120
MI (n = 41)	78±9.7	13:22:3:0	20:21	21‡	5†	8 a
Non-MI	78±10	10:25:6:0	20:21	9	7	4

(n = 41)				P=O.O12	NS	NS

‡ 12 occurred on the day of or prior to POMI; † 1 occurred on the day of or prior to POMI;
a Highest HR recorded on POD 1 – 3. In the MI group, all occurred on the day of or prior to POMI.

1341774 - OUTCOMES IN ICU PATIENTS WITH SEIZURES POST CARDIAC SURGERY

Rizwan A. Manji[1], Hilary Grocott[2], Alan Menkis[1], Eric Jacobsohn[2]

1. **Surgery, University of Manitoba, Winnipeg, MB, Canada**
2. **Anesthesia, University of Manitoba, Winnipeg, MB, Canada**

Introduction: Seizures occur in patients following cardiac surgery in the ICU. There is minimal descriptive data outlining the implications of seizures on overall outcome. We sought to provide a descriptive analysis of the intermediate outcomes in patients with seizures post cardiac surgery.

Methods: A retrospective chart review was conducted of all patients that had seizure following cardiac surgery at a single institution from April 2003 to Jan 2010. In addition to recording in-hospital outcomes, patients were followed post discharge via telephone interview. Local HREB approval was obtained. Informed consent was obtained for the telephone interview.

Results: Seizures occurred in 56 of 5958 (0.94%) cardiac surgery ICU patients with 35% of the seizing patients being females. Patients were mean (SD) 70.9 (11.6) years old, with an APACHE score of 20.8 (7.1) and had a cardiopulmonary bypass time of 156.5 (79.7) min. Preop neurological disease was present in 29%, preop cardiac arrest in 6%, preop renal dysfunction in 20% and preop peripheral vascular disease in 26%. Seventy-one percent had open heart procedures and 12% had previous cardiac surgery. The time to first seizure was - median (IQR) - 4.5 (2.3 – 9.2) hours after end of surgery with 60% having grand mal seizure; 64% having recurrent seizure within 24 hours of first seizure, and 49% having recurrent seizure during hospital stay. Most seizures lasted minutes however 4 patients (females, mean age 78 years, mean APACHE score 26.5, all having had aortic valve or other aortic surgery) demonstrated nonconvulsive status epilepticus confirmed via EEG. CT head demonstrated old or new stroke in 45% of all patients. ICU length of stay was 4.7 (2.0 – 7.8) days with ICU mortality 7%. Hospital length of stay was 15.0 (10.0 – 33.0) days with hospital mortality 20%. Follow up was available on 70% of patients with a median follow up of 16 (9 – 29) months. No patient experienced a seizure after discharge from hospital; at the median follow-up period, only 30% continued on anticonvulsant therapy. Stroke after discharge occurred in 5% of patients. Thirty-six percent of patients were unable to drive post op due to restrictions secondary to seizure.

Discussion: Seizure following cardiac surgery is relatively uncommon but when they occur, they are associated with long ICU and hospital length of stay, as well as high ICU and in-hospital mortality.

1341835 - PREHABILITATION FOR A FRAIL ELDERLY PATIENT WITH ENDOMETRIAL CANCER: A CASE REPORT

Russell Brown[1], Franco Carli[2], Stephan Kennepohl[3]

1. Department of Anesthesia, University of Toronto, Toronto, ON, Canada
2. Department of Anesthesia, McGill University, Montreal, QC, Canada
3. Multinnova Medical Clinic, Montreal, QC, Canada

Purpose: Despite modern advances in surgical technology, including improvements in anesthesia, post-operative complications and delayed recovery represent a major concern for older patients. Current interventions targeting recovery are carried out postoperatively which coincides with a period of emotional vulnerability and fatigue so patients have difficulty complying with intense recovery programs. Here we report on a novel pre-operative exercise program that was devised with the intent of accelerating recovery while minimizing the deleterious effects of a total hysterectomy in a frail 88 year-old woman with endometrial cancer, mild cognitive impairment and two prior episodes of post-operative delirium.

Clinical Features: This case report received approval from the ethics board. Three weeks prior to surgery the patient underwent functional (6 minute walk test;6MWT, short form 36;SF-36), nutritional and neuropsychological assessments (Repeatable Battery of the Assessment of Neuropsychological Status; RBANS), prior to starting a home-based prehabilitation program consisting of strength and endurance exercises carried out under the supervision of a trained kinesiologist, as well as nutritional optimization. She then resumed her program 1 week following surgery.

Remarkably, there were no episodes of post-operative confusion and she was discharged on her second post-operative day. Over the 8 weeks following surgery she continued to show significant and objective improvements in exercise tolerance (as per the 6 minute walk test; 91.2m vs. 144.8m), cognitive function (as per RBANS scores; 58 or <1st percentile vs. 81 or about the 10th percentile) and overall functional capacity (SF-36 physical component scale 33.7 vs. 37.3 and mental component scale 47.2 vs. 65.3). Subjectively she reported increased pleasure in her activities of daily living as well as improved concentration.

Conclusion: These data would suggest that prehabilitation can be a feasible approach which may offer significant and sustained benefits for elderly patients scheduled for surgery who are particularly vulnerable to post-operative delirium and deconditioning. However this approach now needs to be tested in a larger cohort as we attempt to elucidate the underlying mechanisms responsible for the accelerated recovery.

1341903 - WHICH CARDIAC SURGERY ICU PATIENTS WITH A POSITIVE HIT ELISA ARE AT INCREASED RISK FOR THROMBOSIS?

Rizwan A. Manji[1], Hilary Grocott[2], Alan Menkis[1], Eric Jacobsohn[2]

1. Surgery, University of Manitoba, Winnipeg, MB, Canada
2. Anesthesia, University of Manitoba, Winnipeg, MB, Canada

Introduction: Heparin induced thrombocytopenia (HIT) and thrombosis (HITT) is an important cause of morbidity/mortality/cost after cardiac surgery (CS). Thrombotic complications include deep venous thrombosis (DVT), pulmonary emboli (PE) and arterial occlusion (AO). The rapidly available ELISA (positive if the optical density is ≥ 0.4) is sensitive but non-specific. The serotonin release assay (SRA) is specific but generally not immediately available. If HITT is clinically suspected (positive ELISA), a non-heparin based anticoagulant should be started which is associated with increased cost and risk of bleeding. If there were known pre- and intraoperative factors associated with thrombosis, this would assist in clinical decision making with regard to starting a non-heparin anticoagulant. Objective: To determine pre- and intraoperative factors associated with increased risk of DVT, PE and AO post CS in patients suspected of HIT.

Methods: The CS patients having a HIT ELISA between 2008 - 2010 were divided into 2 groups: the high risk thrombosis (HRT) group had a positive ELISA with a positive SRA, or positive ELISA with evidence of DVT/PE/AO (but negative SRA); the low risk thrombosis (LRT) group had a negative ELISA, a negative SRA, or a positive ELISA with negative SRA. Regression analysis was performed to determine factors associated with thrombotic risk. The local HREB approved the HIT study.

Results: Of the 269 patients having ELISA assays, 47 (17.4%) were positive. Of these 47, 11 had a positive SRA, and 6 had negative SRA but evidence of thrombosis - i.e. 17 patients in HRT group. The remaining 252 were the LRT group. (See table for univariate analysis). Multivariate analysis revealed aortic surgery to be associated with HRT (OR 4.9, 95% CI 1.3 – 17.8, p=0.017). ICU LOS was longer in HRT group – 4.8 (3.8 – 8.0) vs. 3.8 (2.2 – 6.8) days in LRT group, p=0.05.

Discussion: Our data suggest that there appears to be an increased risk of thrombosis in patients having aortic surgery and who have a positive HIT ELISA.

VARIABLE	LRT GROUP (N= 252)	HRT GROUP (N=17)	p value
Peripheral vascular disease	20.3%	46.7%	0.03*
Aortic procedure only	9.9%	41.2%	0.001*
Total heparin/kg body weight during surgery (U/kg) - mean (SD)	670.0 (205.9)	721.9 (236.8)	0.34
Total cross clamp time (min) - mean (SD)	94.8 (52.1)	94.5 (71.4)	0.99
Total CPB time (min) - mean (SD)	150.6 (73.1)	176.8 (99.2)	0.32

*statistically significant CPB = cardiopulmonary bypass

1342354 - IS PREVIOUS CHOLECYSTECTOMY A CONTRAINDICATION TO PARACETAMOL/CODEINE PREMEDICATION? CASE SERIES REPORT

Abdul Zahoor[1], Massa Mateger[1], Nauman Ahmad[1]

1. Anesthesia, King Khaled Eye Hospital, Riyadh, Riyadh, Saudi Arabia

Purpose: To describe codeine premedication can cause spasm of the sphincter of Oddi and a previous cholecystectomy predisposes for this complication.

Clinical Features: We report a series of five cases that developed epigastric pain after oral premedication with a single dose of paracetamol/codeine combination. Patients were scheduled for ophthalmic procedures under local anesthetic block. All were females, age ranges 38-56 years. The only common element in all was a history of cholecystectomy in the past. All patients were premedicated 2 hours before surgery with 2 tablets of Revacod. Each tablet had paracetamol 500mg and codeine 10mg. Patients started complaining of severe epigastric pain after one to one and a half hour of premedication. They had a feeling of some nausea but no vomiting. Patients were restless but the vital signs were stable and abdominal palpation did not exacerbate the pain.

A provisional diagnosis of spasm of the sphincter of Oddi was made and Pethidine 50mg I/V was given in titrated doses for pain relief. A gradual improvement was noted but it took 1-2 hours for the patients to return to normal condition.

The remaining 3 patients were treated with Naloxone 0.1-0.4 mg in titrated doses and the response was proportional to the dose. Faster and better relief was achieved at higher doses. Complete relief was seen in all patients by 15-20 minutes.

Discussion: Morphine is well known to cause the spasm of the sphincter of Oddi1. Codeine is a morphine derivative and is not only analgesic but is also a cough suppressant and is usedl as premedication for the procedures done under local anesthesia to avoid excessive coughing during surgery2. Previous cholecystectomy is known to be a predisposing factor for the spasm of the sphincter of Oddi after Morphine sedation3. As codeine works on the same receptors as morphine, we suspected it to be responsible for the pain secondary to the spasm of this sphincter. The biliary system has a rich supply of pain fibers4. The pain of the sphincter of Oddi is not because of the spasm itself but is due to the resultant hypertension of the bile duct5. A severe and prolonged spasm may lead to acute pancreatitis6. The possible mechanism of spasm of the sphincter of Oddi in post-cholecystectomized patients may be disruption of the inhibitory nerve fibers of the sphincter7,8. We treated our first two patients with Pethidine, because of its ability to relieve biliary spasm9 but we noted an incomplete relief. Naloxone, on the other hand showed a prompt and clear reponse on dose dependant manner in the remaining three patients

Conclusion: Premedication with Codeine is likely to cause the spasm of the sphincter of Oddi in patients with previous cholecystectomy. The pain may be somewhat relieved by pethidine but appears highly responsive to Naloxone. Naloxone serves both diagnostic and therapeutic purposes. Opioids are not the drugs of choice for premedication in patients with previous cholecystectomy.

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1342482 - POSSIBLE PROTECTIVE EFFECT OF REVERSING CEREBRAL DESATURATION DURING HIGH-RISK CARDIAC SURGERY ON THE INCIDENCE OF CEREBRAL DESATURATIONS IN THE INTENSIVE CARE UNIT

Alain Deschamps[1], André Y. Denault[1], Antoine Rochon[1], Jean-Sébastien Lebon[1], Christian Ayoub[1], Pierre Couture[1], Yoan Lamarche[2], Baqir Qizilbash[1], Jennifer Cogan[1]

1. Anesthesiology, Montreal Heart Institute, Université de Montréal, Montréal, QC, Canada
2. Cardiac Surgery, Montreal Heart Institute, Montreal, QC, Canada

Introduction: Measurements of cerebral saturation using near-infrared reflectance spectroscopy (NIRS) during cardiac and complex vascular surgery have been increasingly popular in recent years. Nevertheless, its routine use in cardiac surgery has been questioned since no consensus exists on the strategies used to reverse decreases in baseline NIRS values. Also, the benefit of reversing cerebral desaturations on patient's outcome remains to be confirmed. The purpose of the present study is to test whether strategies to reverse low NIRS values actually result in a reduction in the total time patients spend in cerebral desaturation during high-risk cardiac surgery and in a reduction of the incidence and severity of cerebral desaturations in the Intensive care unit (ICU).

Methods: After informed consent was obtained, high-risk cardiac surgery patients were randomized in two groups;an intervention group, with strategies to reverse cerebral desaturations, and a control group, with no attempts to reverse cerebral desaturations. Significant cerebral desaturation was defined as a fall of 20% from baseline for more than 15 sec. The primary outcome was the difference in the total area over the curve of cerebral desaturations over time between the groups. This is a measure of the time patients spend in desaturations multiplied by the depth of desaturation, which correlates with worse outcome and measures the severity of cerebral desaturations. Other measurements included, demographic data, the success rate of reversal of desaturations, the duration of surgery and cardiopulmonary bypass (CPB), the rate of complications and the severity of desaturations in the CU, where no interventions were made in either group. Statistical analysis was done with Fisher's exact tests, t-tests or Mann-Whitne tests when appropriate.

Results: Forty-eight patients concluded the study, 16/23 (69.6%) patients in the intervention group had desaturations compared to 19/25 (76.0%) in the control group. There were no differences in demographic data, total time of surgery or CPB, intubation time, ICU and hospital lengths of stay, or complications. Reversal of desaturations was successful 92.5% of the times. The control group had more severe desaturations (729.7 ± 1260.6 vs 154.3 ± 218.3 min.%desat for intervention, p=0.0406). In the ICU, half of the patients in the control group (14/25) had desaturations compare to a quarter (6/23) in the intervention group (p=0.0347). The severity of cerebral desaturation in the ICU was greater in the control group (856.6 ± 956.6 vs 324.4 ± 54.7.3 min.%desat for intervention, p=0.0292).

Discussion: Strategies to reverse decreases in NIRS values are effective in reducing the severity of cerebral desaturations during high-risk cardiac surgery. This benefit appears to reduce the incidence and severity of cerebral desaturations in the ICU. A large multicenter RCT trial will be necessary to look at overall patient's outcome.

1342509 - MULTIMODAL PREHABILITATION PROGRAM TO ENHANCE PREOPERATIVE FUNCTIONAL CAPACITY

Franco Carli[1], Chao Li[2], Liane Feldman[2], Sender Liberman[2], Patrick Charlebois[2], Barry Stein[2], Ann Gamsa[3]

1. Department of Anesthesia, McGill University, Montreal, QC, Canada
2. Department of Surgery, McGill University, MONTREAL, QC, Canada
3. Department of Psychology, McGill University, Montreal, QC, Canada

Introduction: The process of enhancing functional capacity of the individual before an operation to enable him or her to withstand the stress of surgery has been termed prehabilitation(1). In a previous RCT comparing two exercise regimens (intense exercise on a stationary bike vs moderate exercise) for 4-5 weeks before colorectal surgery, it was found that poor preoperative physical function, presence of anxiety and depression were significant predictors of prolonged recovery (2). In addition, nutrition was not controlled

Therefore we conducted a second study to determine the impact of a 4-week multimodal prehabilitation program based on moderate exercise, supplemental nutrition and stress reduction on functional capacity.

Methods: The study was approved by the Institutional Ethics Committee. A single cohort of forty-five subjects scheduled for elective colorectal cancer resection agreed to participate in this study. Following a nutritional, physical and psychological assessment, they started a 4-week home-based multimodal prehabilitation program composed of customized moderate aerobic and muscle strength exercise 3 times per week, daily nutritional supplement with whey proteins, omega-3 and vitamins, and daily relaxation and deep breathing exercises. Primary outcome measure was functional walking capacity as assessed by the 6 minute walk test (6MWT) recorded 4 weeks before surgery (baseline) and just before surgery (preoperative). Data on 6 minute walking distance (6MWD) were compared between the multimodal group and the two groups of patients receiving either intense or moderate exercise as previously published (2). The self-reported questionnaire on physical activity (CHAMPS) was also administered.

Results: Compliance to protein intake was over 75%. The median [IQR] prehabilitation period was 33 days in the multimodal group and 42 days in the unimodal groups. The mean (SD) 6MWD increased by 11 (37) m from 489m to 501m in the moderate exercise group, while it decreased by 7 (38) m in the intense exercise group from 498m to 490m. In contrast, the 6MWD increased by 40 (40) m in the multimodal group, from 424m to 464m ($p<0.01$). Level of activity reported in the CHAMPS questionnaire was significantly increased in the multimodal group during the prehabilitation period.

Discussion: The addition of nutrition and stress reduction strategies to exercise resulted in a positive impact by significantly increasing functional capacity before surgery.

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1342553 - INTRAOPERATIVE INTRA-ABDOMINAL PRESSURES IN CARDIAC SURGERY

Emilie Richer Séguin[2], Christian Ayoub[1], Gabriel Fournier[2], Anna Nozza[1], André Y. Denault[1]

1. **Anesthesiology, Montreal Heart Institute, Montreal, QC, Canada**
2. **Anesthesiology, Université de Montréal, Montreal, QC, Canada**

Introduction: Intra-abdominal hypertension (IAH) is defined as an intra-abdominal pressure (IAP) higher than 11 mmHg. IAH has been recognized as a cause of significant morbidity and mortality in critically-ill medical and surgical patients. The World Society of Abdominal Compartment Syndrome (www.wsacs.org) has published definitions and recommendations for IAP measurement as well as diagnostic criteria. They recommend that IAP be measured regularly in critically-ill patients who demonstrate risk factors for the development of IAH. Even if these risk factors are found in cardiac surgery patients, the prevalence of IAH in cardiac surgery has not been described. The aims of this study were, therefore, to establish in a cardiac surgical population the prevalence of IAH and the predisposing factors, if any, associated with IAH.

Methods: After obtaining approval from the research ethics board of our institution and informed consent, patients undergoing emergency or elective cardiac surgery were recruited. Intra-abdominal pressure were measured with Foley catheter after induction of anesthesia (pre-surgical) and before the patient leaves the operating room (post-surgical). Demographic, anthropometric, co-morbidities, hemodynamic and echocardiographic datas were collected for analysis. Statistical analysis was performed in relation with the presence or not of a normal distribution. In order to perform a linear regression that included 5 variables with a correlation (R2) of 0.025, a sample size of 191 patients was required in order to obtain a power of 80% with an alpha of 0.05 in order to obtain an increase in R2 of 0.03 per additional variable.

Results: Between May 2010 and June 2011, 191 patients were recruited. The mean age was 64±11 years. There were 151 men and 40 women with a mean Parsonnet score of 13±9. A total of 83 patients (43%) underwent simple coronary artery bypass graft surgery. Mean pre and postsurgical IAP were 12±4 and 13±5 mmHg. IAH was present in 55% and in 60% of the patients before and after surgery. Body mass index values were significantly higher in patients with IAH ($p<0.0001$) and obese patients had higher IAP (14±3 vs 11±5) ($p<0.0001$). Central venous pressure (16±4 vs 12±4) ($p<0.0001$), pulmonary capillary wedge pressure (20±5 vs 167±5) ($p=0.007$) and mean pulmonary artery pressure (29±5 vs 25±7) ($p=0.0014$) were higher in patients with IAH. Reduction in IAP after surgery was associated with the use of a nasogastric tube ($p=0.0018$). However, no statistically significant difference was found between the occurrence of renal failure, intensive care length of stay, length of hospitalization or mortality and IAP baseline values or variations.

Discussion: More than half of the patients going under cardiac surgery have IAH. IAH is associated with obesity, higher filling pressure and pulmonary hypertension. Further studies with larger population would be required to determine the clinical impact of IAP measurements in cardiac surgery.

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1342814 - OPIOIDS FOR CHRONIC NON-CANCER PAIN: A SYSTEMATIC REVIEW

Jason Busse[1], Bradley Johnston[5], John Riva[1], Shanil Ebrahim[1], Per Vandvik [4], Mostafa Kamaleldin [1], Stefan Schandelmaier[2], Jessica Anner[2], Regina Kunz[2], Diane Heels-Ansdell [1], Daniel Sessler[3], Gordon H. Guyatt[1]

1. **McMaster University, Hamilton, ON, Canada**
2. **Internal Medicine, Universitatsspital Basel, Basel, Switzerland**
3. **Cleveland Clinic Lerner Research Institute, Cleveland, OH, United States**
4. **Norwegian Knowledge Centre for Health Services and Medical Department, Innlandet Hospital Trust, Gjøvik, Norway**
5. **Department of Anaesthesiology & Pain Medicine , The Hospital for Sick Children, Toronto, ON, Canada**

Introduction: Chronic non-cancer pain (CNCP) includes any painful condition that persists for ≥3 months and is not associated with neoplastic disease. The 2007/08 Canadian Community Health Survey found that of 57,660 respondents between the ages of 12 to 44 years 10% reported CNCP. [1] Opioid use for CNCP is frequent and increasing. Canada, on a per capita basis, currently consumes five times the amount of prescription opioids used in the United Kingdom.[2] Between 2005 and 2008 the number of opioid prescriptions in Ontario rose from 3.7 to 4.7 million.[3] Opioid prescribing patterns for CNCP vary widely between physicians. In 2006 Dhalla and colleagues reported that Ontario-based family physicians in the uppermost quintile had an opioid-prescribing rate 55 times higher than physicians in the lowermost quintile (931.5 versus 16.7 per 1000 eligible patients).[4] This variation may be due to uncertainty regarding the relative benefits and harms of opioids in the management of CNCP.

Methods: We identified relevant randomized controlled trials, in any language, by a systematic search of CINAHL, EMBASE, MEDLINE, AMED, HealthSTAR, PsychINFO, and the Cochrane Central Registry of Controlled Trials, from inception of the databases. Eligible studies were randomized controlled trials that enrolled patients with CNCP, and randomly allocated them to an opioid analgesic or a non-opioid control. We will use the GRADE (Grading of Recommendations Assessment, Development and Evaluation) system [5] to evaluate the quality of the evidence on an outcome by outcome basis. We will use the guidelines published by the Initiative on Methods, Measurement, and Pain Assessment in Clinical Trials (IMMPACT) [6-9] to inform the outcomes we will collect and present. All subjective decisions, including trial eligibility, data collection, and GRADE ratings will be done by teams of reviewers independently and in duplicate. We will conduct the following a priori subgroup analyses to explain heterogeneity between eligible trials: (1) subjective syndromes will show less effect vs. objectively diagnosed conditions; (2) trials comparing opioids to placebo will show larger effects than trials using active comparators; (3) patients receiving disability benefits or involved in litigation will show less effect vs. those that are not; (4) weaker opioids will show less of a treatment effect than stronger opioids; and (5) trials with higher risk of bias will show larger effects than trials with lower risk of bias. Our proposed review will evaluate both the effectiveness and the adverse events associated with opioid use for CNCP.

Results: Our literature search yielded 26,146 references; 6672 duplicate articles and 19474 unique citations. We anticipate data from subsequent stages of the project will be available at the time of the Conference.

Discussion: Our findings will guide evidence-based use of opioids for patients with CNCP.

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1343161 - PROPOFOL PHARMACOKINETICS IN CHILDREN WITH SICKLE CELL ANEMIA

Nobuko Taguchi[1], Mark W. Crawford[1], Alejandro Nava-Ocampo[2], Motoshi Tanaka[1]

1. Anesthesia and Pain Medicine, The Hospital for Sick Children, Toronto, ON, Canada
2. Pharmacology & Toxicology, University of Toronto, Toronto, ON, Canada

Introduction: Alterations in the metabolism of cytochrome P450 and uridine glucuronosyltransferase substrates were demonstrated in a murine model of sickle cell anemia (SCA) (1). In children with SCA, the pharmacokinetics (PK) of morphine exhibited large inter-individual variability, suggesting that considerable individualization of morphine dosing is necessary (2). Although the PK of propofol have been widely studied, we were unable to find any study in children with SCA. We aimed to assess the PK of a bolus of propofol in children with SCA undergoing elective surgery.

Methods: REB approval and parental consent were obtained to study 16 children with SCA. Propofol 3.0 mg/kg i.v.was administered and venous blood was sampled. Samples were prepared by solid-phase extraction, and analyzed by HPLC with fluorescence detection. We assessed the PK of propofol using a model that included a central compartment interacting with 3 peripheral compartments, one of which acted as a closed circuit with no drug elimination. The other 2 peripheral compartments irreversibly eliminated the drug, as is expected to occur in liver and lung. The central compartment was also modeled assuming an irreversible lost of propofol (simulating renal clearance). We assumed a combination of slow and fast transfer rates between central and peripheral compartments. Simulations were performed using SAAM II.

Results: Based on physiological plausibility, we explored 2 assumptions: a) a closed circuit was formed between the central and a peripheral compartment and b) this peripheral compartment also drained unidirectionally to the “liver”, another peripheral compartment (semi-closed model). As propofol is highly lipophilic, it was assumed that the transfer rate from central to peripheral compartments in the closed circuit was faster than the transfer rate for propofol from this peripheral back to the central compartment. All patients were successfully modeled using the closed-circuit approach and indicators of quality of adjustment were enhanced using this model (Figure).

Discussion: Our data suggest that the PK of propofol in children with SCA are more complex than the classic 3 compartment model, and should include at least one peripheral compartment interacting with the central compartment as a closed circuit. In addition, our analysis supports that irreversible drug elimination occurs from peripheral compartments (e.g. liver and lung), and not only from the central compartment. Further modeling of the predictability of this model is desirable.

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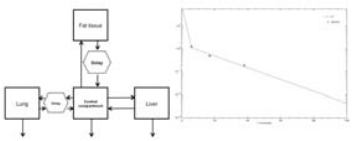

1343275 - DELAYED REPORTING OF INTRAOPERATIVE AWARENESS

Alexander J. Villafranca[1], Ben Arenson[1], Hilary Grocott[1], Eric Jacobsohn[1]

1. Anesthesia, University of Manitoba, Winnipeg, MB, Canada

Purpose: We describe a volitionally delayed reporting of intraoperative awareness with explicit recall (AWR) within the context of a clinical trail, involving preoperative education and two structured postoperative interviews assessing AWR. This delayed reporting altered the results of a major clinical trial.

Clinical Features: AWR is an outcome of interest in clinical practice, quality assurance initiatives, and clinical trials. Delayed reporting of AWR by patients may impact subsequent psychological sequelae, and influence estimations of AWR. Volitionally delayed reporting occurs in clinical practice with patients who have not received routine postoperative interviews (1, 2). However, combining structured interviews with preoperative education regarding AWR is assumed to ensure patient disclosure (3).

A 75 year-old man with no psychiatric or neurological history having on-pump coronary artery bypass grafting and aortic valve replacement, was recruited for a clinical trial comparing two interventions to prevent AWR (Bispectral index (BIS) or end tidal anesthetic (ETAC) guided anesthetic titration). The patient underwent a consent process explaining the definition and possible manifestations of AWR, including potential psychological sequelae. As per clinical trial protocol, three follow-up interviews were conducted (modified Brice interviews at 24 hrs and 1-month postoperatively, and a mortality/ satisfaction follow-up at 1-year). The patient did not report awareness at either Brice interview. However, during the one year follow-up, he spontaneously reported an intraoperative awareness experience. Three independent experts blinded to group assignment (i.e. BIS-guided group), classified the case as "definite, Class 2 AWR (tactile and auditory perceptions) without distress," based on the Michigan Awareness Classification Instrument (4). The patient provided written informed consent for this case report, and the local IRB approved the project.

The patient's delayed disclosure involved the perceived unimportance of non-distressing awareness experiences. Cases of AWR that are not reported in a timely manner can have important implications in both clinical practice and research contexts (1, 5). For instance, had this case been included in the trial, it would have increased the number needed to treat to benefit with the BIS-guided protocol, from 3,333 to 10,000.

Conclusion: Although rare, a patient can have lucid memories of the surgery at the time of Brice interviews, yet choose not to disclose them despite a consent process related to a clinical trial investigating AWR. This can affect quality assurance initiatives and clinical trials investigating AWR. Therefore, patients should be explicitly instructed to report all suspected AWR cases promptly, regardless of their perceived importance.

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1343335 - CEREBRAL ANEURYSM SURGERY AS AMBULATORY DAY SURGERY

Nicolai Goettel[1], Lashmi Venkatraghavan[1], Michael Tymianski[2], Pirjo Manninen[1]

1. **Anesthesia, UHN Toronto Western Hospital, Toronto, ON, Canada**
2. **Neurosurgery, UHN Toronto Western Hospital, Toronto, ON, Canada**

Introduction: In the neurosurgical treatment of patients with intracranial lesions, such as unruptured cerebral aneurysm, a need for postoperative hospital admission has generally been assumed. Ambulatory day surgery is an evolving specialty in line with demands of modern medicine, services and economics. When hospital stays are shortened, there less chances of other complications such as nosocomial infections, medical errors and thromboembolic events [1,2,3].

From the anesthetic point of view, the important areas of consideration for day surgery include the choice of anesthetic technique and agents that allow day surgery, assuring maximum standards of anesthetic security, quality of care, and patient safety, as well as the management of postoperative nausea, vomiting and pain [4,5]. The purpose of this study was to review the anesthetic management of the patients who underwent a craniotomy for clipping of a cerebral aneurysm on the basis of day surgery at our institution.

Methods: After institutional research ethics board approval, this observational study was carried in a retrospective manner. The medical records of all patients who were scheduled for craniotomy for clipping of a cerebral aneurysm on the basis of day surgery were analyzed. The data included the preoperative assessment of the patient, the intraoperative anesthetic management, postoperative care, and the presence of perioperative complications.

Results: In this initial report, a total of 20 patients scheduled for day surgery aneurysm repair were reviewed and included in the data analysis. Basic demographics were similar among study participants (fig. 1). 12 patients returned home on the day of surgery; in 2 patients, the medical team decided before the operation to admit the patient postoperatively. 5 patients were admitted to the hospital after the surgery due to perioperative complications, and one patient was readmitted to the hospital on the fourth postoperative day. Reasons for unplanned postoperative hospital admission varied, ranging from changes in level of consciousness in PACU, bradycardia, postoperative fever, severe PONV, and generalized motor weakness.

Discussion: Our data demonstrates that surgical repair of unruptured cerebral aneurysms can be performed in an ambulatory day surgery setting without compromising patient safety or quality of care. However, the presence of an adequate infrastructure and a backup strategy for unplanned postoperative hospital admission are required, since complications occur and remain highly unpredictable given the complexity of these cases.

Anesthetic care for these patients should be orientated individually, including a thorough preoperative assessment and screening for eligibility of day surgery, personalized intraoperative anesthetic management, and a close collaboration of the anesthetic and neurosurgical teams into the postoperative period in order to identify and treat complications, that may eventually lead to unplanned hospital admission.

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Figure 1: Patient demographics

	n	Gender	Age (mean ± SD)	ASA (mean ± SD)	BMI (mean ± SD)
Day surgery	12	4M, 8F	52 ± 9	2.8 ± 0,4	25.7 ± 5.3
Hospital admission	8	6M, 2F	56 ± 6	2.9 ± 0,4	31.3 ± 8.9
p-value			0,33	0.81	0.09

1343376 - THE EFFECT OF STELLAR GANGLION BLOCK WITH BUPIVACAINE COMBINED OR NOT WITH NEOSTIGMINE ON THE PAIN RELIEF IN PATIENTS WITH COMPLEX REGIONAL PAIN SYNDROME

Mariya Kostadinova[2], Gilbert Blaise[1], Alfred Homsy[1], Nathalie De Gagné[1], Sonia Font del Pino[1]

1. **Anaesthesiology, Université de Montréal, Montreal, QC, Canada**
2. **Biomedical, Université de Montréal, Montreal, QC, Canada**

Introduction: Complex regional pain syndrome (CRPS) patients exhibit multisystem pathology and inflammatory changes after limb trauma. CRPS are characterized by vascular dysfunction affecting the microcirculation in the distal part of the involved extremity. The stellate ganglion block consists of the injection of a local anesthetic (bupivacaine) in the front of the neck which blocks nerve conduction of sympathetic fibers that are very often involved in pain sensation. Co administration of epidural neostigmine and lignocaine appears to be a useful technique for postoperative analgesia as it increases the duration of analgesia and provides desirable sedation at the same time (Harjai M). We hypothesize that addition of 500 µg neostigmine to Stellar Ganglion Block with Bupivacaine will relieve the pain more quickly and may be for an extended period of time. The aim of the study is to examine whether the addition of 500 µg neosigmine to the conventional treatment with a stellate block would have an impact on the duration of pain relief

Methods: This study is approved by Research ethical board at our research institute. A Randomised, Stratified, and Double-Blind Pilot Study, Comparing the Efficacy of Stellar Ganglion Block with Bupivacaine Combined or not with neostigmine in patients with Upper Limb CRPS. This study will enroll 32 patients who will be recruited from the patients referred to the Pain Clinic. Randomly, sixteen of the subjects will receive neostigmine with the stellate block, while the other sixteen will receive a placebo with the stellate block.

Results: Addition of neostigmine to local anaesthesia decrease time of establishment and increase duration of block.

Discussion: Preliminary data suggest that addition of neostigmine to local anaesthesia decrease time of establishment and increase duration of block. Long time effects of this combination in pain and function is still in the process of evaluation.

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1343388 - IS THERE A DIFFERENCE BETWEEN CARDIAC SURGICAL PRACTICE BETWEEN CANADA AND THE US?

Alexander J. Villafranca[1], Ben Arenson[1], Hilary Grocott[1], Rizwan A. Manji[2], Eric Jacobsohn[1]

1. **Anesthesia, University of Manitoba, Winnipeg, MB, Canada**
2. **Surgery, University of Manitoba, Winnipeg, MB, Canada**

Introduction: Percutaneous coronary intervention (PCI) is increasing in both the US and Canada (1). As a result, a reduced number of coronary artery bypass graft (CABG) operations are being performed. There may also be an increased number of valve procedures are being performed in the US (2). However, PCI is still more often utilized in the US (1). We hypothesized that distribution of cardiac surgeries performed, and the populations, would vary between countries.

Methods: This study is a secondary analysis of three surgical cohorts in the US and Canada who enrolled in a prospective trial. This was supplemented by public health data. The trial was approved by the local REB, and written consent was obtained from participants. The distribution of cardiac operations, and demographics of patients enrolled from a Canadian centre (n=735) and US centres (n=1353) were compared (Chi square, Fisher exact or Mann-Whitney, as appropriate). Logistic regression models determined predictors of presentation to a US centre for isolated CABG or isolated valve surgery, respectively. National and regional ratios of PCI/CABG procedures performed were collected from the Centre for Disease Control (US) and the Canadian Institute for Health Information (Canada) databases.

Results: The distribution of cardiac operations differed between the US and Canadian centres ($p<0.0001$). Compared to the US centres, there was a greater proportion of isolated CABGs, and a smaller proportion of isolated valve surgeries (both $p<0.0001$) at the Canadian centre. Independent predictors of presentation to US centres for CABG surgery included lower bodymass index, valvular heart disease (VHD), chronic obstructive pulmonary disease (COPD), diabetes, and a lack of peripheral vascular disease (fig. 1a). Independent predictors of presentation to US centres for isolated valve surgery included younger age and history of coronary revascularization (fig. 1b). Race was a significant predictor in both models. From 2003-2007 PCI/CABG ratios were higher in the Midwest states compared to the Canadian province, paralleling country-wide trends.

Discussion: This analysis, although interesting, may reflect unique referral patterns to the three centres and may therefore not be generalizable. Due to a possible reduced demand for CABG, US centres may be performing a greater proportion of isolated valve surgeries compared to Canada. Other non-CABG surgeries remain comparable in proportion. Isolated CABG patients with VHD or COPD had greater odds of presenting to US centres, independent of race. Thus at the US centres, non-operative treatment may be preferred for patients with fewer comorbidities. Future prospective studies should evaluate the use of PCI versus CABG in the US and Canada.

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1343448 - MANAGEMENT OF THROMBOTIC THROMBOCYTOPENIC PURPURA IN PREGNANCY

Saravanan P. Ankichetty[1], Marcos Silva[2], Pamela Angle[3], Stephen Halpern[4]

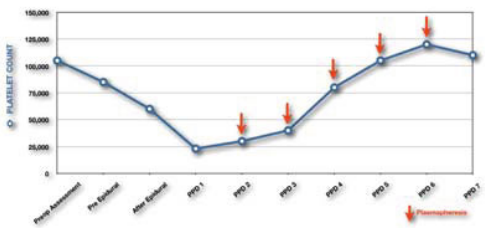
1. Obstetric Anesthesia, Sunnybrook Health Sciences Centre, Toronto, ON, Canada
2. Obstetric Anesthesia, Sunnybrook Health Sciences Centre, Toronto, ON, Canada
3. Obstetric Anesthesia, Sunnybrook Health Sciences Centre, Toronto, ON, Canada
4. Obstetric Anesthesia, Sunnybrook Health Sciences Centre, Toronto, ON, Canada

Purpose: Thrombotic thrombocytopenic purpura (TTP) is a rare, life-threatening disorder. We describe the management of a parturient who had normal vaginal delivery under epidural analgesia and was then diagnosed to have TTP in the immediate postpartum period.

Clinical Features: The patient was consented.A 41 year old G2P1 (BMI: 22.5Kg/m2) was admitted to the labour floor at 39 weeks of gestation. She requested labour epidural analgesia on admission. She was known to have pregnancy induced hypertension at 24 weeks of gestation and was on antihypertensive medications including oral labetalol 200mg TID and oral nifedipine 30mg TID during her pregnancy. She denied history of headache, vomiting, blurring of vision, abdominal pain, decreased urine output, swelling of limbs and previous hospitalization. She had an uneventful normal vaginal delivery 3 years ago. She had an unremarkable physical and systems examination. On admission, her platelet count was 85,000/cu.mm with Hb of 93g/L with AST: 25U/dl, ALT: 23U/dl and mild proteinuria.

After informed consent, epidural analgesia was initiated after a negative test dose and maintained with 0.08% bupivacaine and fentanyl 2mcg/cc. She delivered a healthy baby weighing 2400g with APGAR scores of 8 and 9 at 1 and 5 minutes respectively. However, the patient's platelet count dropped to 60,000/cu.mm early after delivery and then to 23,000/cu.mm on 1st postpartum day (PPD) (Figure 1). Petechia was noted over her arms and trunk without clinical evidence of bleeding. Hematologist was consulted and evaluated for HELLP syndrome, ITP and DIC. However, the diagnosis of TTP was made based on clinical and laboratory work up ADAMTS 13 ,enzyme assay for the diagnosis of TTP was found to be <2.5% (Normal:>10%). Plasmapharesis was instituted on PPD 2. Blood and blood products were transfused for 2 weeks with close monitoring of neurological status and signs of sepsis. The epidural catheter was left insitu and was removed with the platelet count of 105,000/cu.mm and ADAMTS13 activity of >10% on 5th PPD. She was discharged on 15th PPD, issued a warning card documenting the complications that she had during her post-partum period and advised to have regular follow up.

Conclusion: Parturients with idiopathic TTP during pregnancy have high relapse rate of 12-61%. The serial analysis of ADAMTS 13 activity, the role of prophylactic plasma exchange and identifying parturients at the greatest risk for relapse would be of considerable interest.



1343523 - ANESTHETIC MANAGEMENT OF A LARGE CARINAL TRACHEOSOPHAGEAL FISTULA

Zoe Brown[1], **Katherine Bailey**[1]

1. BC Children's Hospital, Vancouver, BC, Canada

Purpose: Tracheo-esophageal fistula (TEF) occurs in one in 3000 births and requires urgent surgical repair [1]. Over 30% of TEF are located within 1 cm of the carina [2]. Several different methods for securing the airway and controlling the fistula have been described. Surgical control and ligation of a large carinal fistula via gastrostomy can be technically challenging. Another option, endobronchial intubation and one lung ventilation, is often poorly tolerated in neonates. We describe the anesthetic management of a neonate with a large carinal TEF using an endobronchial blocker to occlude the fistula, and present a review of the literature.

Clinical Features: Informed consent for publication was obtained from the infant's mother. A 2.7 kg term male infant, with no other significant congenital abnormalities, presented for TEF repair. Following inhalational induction of anesthesia with spontaneous ventilation, a planned fiberoptic bronchoscopy demonstrated a large carinal TEF. The patient was kept anesthetized and spontaneously ventilating, whilst a 5 Fr endobronchial blocker was inserted down to the level of the mid-trachea. The proximal trachea was intubated with a 3.0 microcuff endotracheal tube alongside the blocker. The fiberoptic bronchoscope was used to guide the blocker into the TEF, successfully occluding the TEF (figure 1). This allowed mechanical ventilation and the surgeons to successfully perform a thoracotomy, ligate the TEF and repair the esophagus with the fistula fully isolated.

Conclusion: In a recent audit of anesthetic management of TEF, only 40.5% performed initial bronchoscopy [3]. Undertaking either rigid or fiberoptic bronchoscopy at the start of surgery allows identification of location and the presence of multiple TEF. This potentially prevents the need for emergency gastrostomy for tension pneumoperitoneum and, given the wide-spread availability of this equipment, it should be considered standard practice [4].

Initial bronchoscopic assessment allows for safe planning of intra-operative management of challenging TEF anatomy. This case presents a successful technique of occluding a TEF with an endobronchial blocker.

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[2] Paediatr Anaesth 1992; 2(4): 297-303
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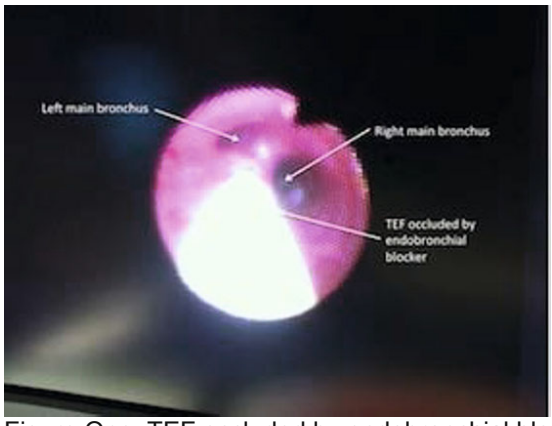

Figure One. TEF occluded by endobronchial blocker.

1343689 - MANAGEMENT OF BREAST NEEDLE LOCALIZATION PATIENTS WITH SEVERE PHOBIA

Farzin Goravanchi[1], Steve Wang[1], Alicia Kowalski[1], Elizabeth Rebello[1], Spencer Kee[1]

1. MD Anderson Cancer Center, Houston, TX, United States

Introduction: Breast needle localization is a widely used procedure integral to the surgical treatment of breast carcinoma. The localization is performed utilizing mammography or ultrasound. The procedure is considered safe and well tolerated by most patients. However, it may be complicated by pain or discomfort, anxiety, and vasovagal reactions. Helvie et al showed that vasovagal reactions occurred in up to 7% of cases and the severity of the reaction ranged from light headedness to syncope.

Methods: An institutional IRB and patient consent was obtained. A woman with a recent diagnosis of breast carcinoma is scheduled for surgery following right breast mass needle localization. Her medical history was significant for atrial fibrillation, asthma, chronic bronchitis, and osteoarthritis. Prior to the scheduled surgery date, the patient expressed considerable anxiety regarding the mammogram needle localization. The patient stated that her previous breast biopsy was a painful experience which resulted in a prolonged and difficult needle placement. She sought to avoid the discomfort during the needle localization. Options were discussed and the patient elected Paravertebral Block prior to needle localization. After consent was obtained, risks and benefits discussed with the patient, the block was performed in the sitting position under sedation and with routine monitors. Because sedation was given during the Paravertebral block, the patient was provided with a nurse escort to and from the remote needle localization service. Patient was brought back from needle localization without incident. After being transferred to the operating room, anesthesia was induced and surgery was performed without complications.

Results: The patient had an anxiety free and pain free breast needle localization. This modality resulted in a lower peri-operative analgesic requirement. Because of this multidisciplinary approach (anesthesia, surgery, radiology, and nursing) the patient experienced a satisfactory surgery outcome.

Discussion: This case demonstrates that although breast needle localization is generally well tolerated by most patients, it can still be considered an unpleasant experience for others. In this case, the successful placement of a thoracic Paravertebral block provided the patient with safe analgesia resulting in a comfort level in which she was able to proceed and tolerate the breast needle localization. Placement of the Paravertebral block did not cause delay for radiology and surgical teams. This technique provided an alternative choice for the patient who would have refused the needle localization and cancelled the surgery. There are extra costs associated with the extra patient care. There are the technical costs of the Paravertebral Block and the extra nursing support; including the patient escort to and from the needle localization suite. In cases of severe needle phobia or small pain threshold, alternatives should be sought. The Paravertebral Block is a safe option to be considered.

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2. “Thoracic Paravertebral Block for Breast Surgery”. Anesthesia and Analgesia 2000; 90:1402-5
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1343714 - NICOM VERSUS EDM GUIDED GDFT IN THE PERIOPERATIVE PERIOD

Nathan H. Waldron[1], Timothy E. Miller[1], Amy Manchester[1], John Nardiello[1], Tong J. Gan[1]

1. Anesthesiology, Duke University Medical Center, Durham, NC, NC, United States

Introduction: Goal-directed fluid therapy (GDFT) is associated with improved outcomes following moderate to major surgery[1]. The esophageal Doppler monitor (EDM), is widely used as a minimally invasive cardiac output (CO) monitor for GDFT[2]. However, it has several limitations[3]. The non-invasive cardiac output monitor (NICOM-Cheetah Medical), a bioreactance-based CO assessment, is a sensitive and specific method for assessing fluid responsiveness[4]. It is non-invasive, tolerable in awake patients, and is potentially applicable in a wide variety of patient populations. There are no prospective studies comparing the NICOM and the EDM for GDFT. We investigate if NICOM is equivalent to the EDM in assessing baseline stroke volume (SV), fluid response after colloid boluses, and patient outcomes following surgery.

Methods: After approval by our institutional review board, written informed patient consent was obtained from 100 adult patients, ASA physical status I-III undergoing colorectal surgery and participating in the Enhanced Recovery after Surgery (ERAS) protocol. Baseline SV and changes in SV after colloid bolus were compared between NICOM and EDM. Patients whose SV increased >10% after a colloid bolus were declared “fluid responsive” based on an established GDFT algorithm[5]. Baseline SV was compared using correlations, and the proportion of patients who were “fluid responsive” at each time point were compared using agreement statistics and McNemar’s test. Patients’ recovery profile was also recorded. $P<0.05$ was declared statistically significant.

Results: Data from 99 patients were available for analysis. There was a consistent and significant correlation of baseline SV between monitors (Pearson correlation coefficient 0.45056, $p<0.0001$). Information on agreement is shown in Table 1. Hemodynamic variables were not displayed by the NICOM for 58/1748 (3.32%) measurements and by the EDM for 131/1748 (7.49%) measurements due to a number of reasons. There were no significant differences in time to solid intake, first flatus, or first bowel movement ($p>0.05$). There was also no significant difference in total length of stay between the two groups (mean LOS in EDM group = 6.56 ± 4.32 days, NICOM group = 6.07 ± 2.85 days, $p=0.5016$).

Discussion: There was a good correlation of baseline SV measurements between monitors. Agreement on “fluid responsiveness” was highest at 15 min, with no systematic differences in disagreement between monitors (McNemar’s statistic 0.0286 to 0.6279, $p>0.05$ at all points). There was no difference in the recovery profile between the two groups. NICOM performs similarly to the EDM and may be a viable alternative to guide fluid administration.

References: 1. Acta Anaesthesiol Scand 2007; 51: 331–340
2. Anesth Analg 2005; 100: 1093-106
3. Anesth Analg 2009; 108: 887-97
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5. Anesthesiology 2002; 97: 820-6

10% increase in SV

Time Point	NICOM % fluid-responsive	EDM % fluid-responsive	Agreement	Chi-Squared (p)
5 min post-bolus	39.40%	37.20%	59.50%	0.0042
10 min post-bolus	40.80%	38.50%	61.00%	0.0003
15 min post-bolus	39.50%	41.90%	65.60%	<0.0001

Table 1: Agreement using 10% SV increase as threshold for fluid response

1343764 - DIFFERENCE IN ACCURACY OF LUNG SLIDING IDENTIFICATION BETWEEN THE RIGHT AND LEFT HEMITHORAX

Eric Piette[1], Raoul Daoust[2], Jean Lambert[3], André Y. Denault[4]

1. Emergency Medicine, Hôpital du Sacré-Coeur de Montréal, Montréal, QC, Canada
2. Emergency Medicine, Hôpital du Sacré-Coeur de Montréal, Montréal, QC, Canada
3. Preventive and Social Medicine, Université de Montréal , Montréal, QC, Canada
4. Anaesthesiology, Montreal Heart Institute, Montréal, QC, Canada

Introduction: The field of lung ultrasound (US) in critical care is in rapid expansion. Lung sliding (LS) identification has been used in anaesthesiology and emergency medicine (EM) to diagnose pneumothorax as well as to evaluate the adequacy of endotracheal intubation in and out of the operating room. Presence of the Lung Pulse artefact (back and forth pleural motion induced by the heartbeat) as well as the underlying heart may affect correct identification of LS in the left hemithorax, but this has never been studied. Our main objective was to evaluate the rate of correct identification (accuracy) of the presence or absence of LS in the right and left hemithorax.

Methods: The institutional Research Ethics Board approved this study. 280 short lung US sequences (one respiratory cycle), recorded in the operating room, of presence and absence of LS in intubated patients were randomly presented to 2 groups of physicians (in total: 2 medical students, 42 EM residents and 31 EM attendings). Sequences were divided equally between the right and left hemithorax. Each participant's knowledge of the Lung Pulse artefact was noted. Only the second group was instructed not to answer in case of uncertainty. A Kolmogorov-Smirnov test showed the rate of correct LS identification did not follow a normal distribution. Median rates are reported with interquartile range (IQR) and compared using a Mann-Withney test.

Results: Knowledge of lung pulse was higher in the second group (55% vs 21%, $p<0.05$). Globally, median accuracy of identification of LS presence or absence was 74.0% (IQR: 48.0-90.0) in the first group and 83.7% (IQR: 53.3-96.2) in the second ($p=0.006$). For the first group, median accuracy was 80.0% (IQR: 57.0-95.0) in the right hemithorax and 67.0% (IQR: 43.0-83.0) in the left ($p<0.001$). For the second group, median accuracy was 88.7% (IQR: 63.1-96.9) in the right hemithorax and 76.3% (IQR: 42.9-90.9) in the left ($p<0.001$).

Discussion: Accuracy of identification of LS presence or absence is higher in the right hemithorax. Our study is the first to report this finding. Presence of the Lung Pulse artefact, as well as the underlying heart, probably explains the worse accuracy found in the left hemithorax. Caution should be taken in using LS identification as a diagnostic tool in the left hemithorax and knowledge of the Lung Pulse artefact should be emphasized in chest US curriculum.

1343775 - ADEQUATE LUNG SLIDING IDENTIFICATION IS NOT INFLUENCED BY THE LEVEL OF ACADEMIC OR ULTRASOUND TRAINING

Eric Piette[1], Raoul Daoust[2], Jean Lambert[3], André Y. Denault[4]

1. Emergency Department, Hôpital du Sacré-Coeur de Montréal, Montréal, QC, Canada
2. Emergency Department, Hôpital du Sacré-Coeur de Montréal, Montreal, QC, Canada
3. Preventive and Social Medicine, Université de Montréal, Montréal, QC, Canada
4. Anaesthesiology, Montreal Heart Institute, Montréal, QC, Canada

Introduction: Rapid confirmation of the adequacy of endotracheal intubation is critical in the field of anaesthesiology and emergency medicine (EM). Methods confirming endotracheal tube (ET) position should have accuracy near 100%. Studies confirming ET position using lung sliding (LS) identification were done by physicians with extensive ultrasound (US) training using sometimes lengthy exam. Time is of the essence in critical airway situations either in the operating room or the emergency department and confirmation of the adequacy of the ET tube position should not be verified using lengthy techniques. Our primary objective was to compare the accuracy of EM physicians with different levels of academic and US training to correctly identify presence or absence of LS on random short sequences of lung US. Our secondary objective was to determine if results were better when participants had the choice to abstain themselves in uncertain cases.

Methods: The institutional Research Ethics Board approved this study. We recorded in the operating room 280 short lung US sequences (one respiratory cycle), of present and absent LS of intubated patients and randomly presented them to 2 groups of EM physicians. Accuracy was calculated for different academic and US training: none, basic Focused Assessment with Sonography in Trauma (FAST), FAST and advanced cardiac US, fellowship in EM US. We compared them using an ANOVA test. Only participants in the second group where instructed to abstain from answering in uncertain cases and accuracy was compared to the first group using a Student's t test.

Results: 2 medical students, 42 EM residents and 31 EM attendings participated. No difference in accuracy was shown between the subgroups of academic training with mean accuracies of 66.3% (med students), 70.9% (residents) and 69.0% (attendings) ($p=0.361$). No difference was shown between the subgroups of US training with means of 63.9% (no formation), 70.2% (FAST), 70.9% (FAST + advanced cardiac US), 74.2% (fellowship) ($p=0.119$). Accuracy was significantly better when participants could abstain from answering in uncertain cases with means of 67.5% (95% CI: 65.7-69.4) in the first group and 73.1% (95% CI: 70.7-75.5) in the second ($p<0.001$).

Discussion: Correct LS identification on short lung US sequences is not influenced by the level of academic or US training. Accuracy is better when the possibility to abstain oneself from answering is given. LS identification using only one respiratory US sequences should be used with caution to confirm adequacy of endotracheal intubation.

1343785 - SAFE METHOD FOR RECOVERY FROM ESOPHAGEAL INTUBATION?

Brian Milne[1], **Jessica Burjorjee**[1]

1. Anesthesiology & Perioperative Medicine, Queen's University , Kingston, ON, Canada

Introduction: How to proceed following inadvertent esophageal intubation and what to do with the misplaced endotracheal tube is controversial and not specifically addressed in the ASA difficult airway algorithm. Following esophageal intubation, it is often routine and instinctive practice to remove the endotracheal tube prior to manual bag-mask ventilation or proceeding with securing the airway. During this time, the patient is at risk for aspiration. Subsequent definitive airway management may be difficult and delay may lead to hypoxia. A simple and effective strategy was developed to manually ventilate the patient with an air cushioned face mask while leaving the endotracheal tube in the esophagus to provide a conduit for stomach content suction prior to definitive endotracheal intubation. The current report describes this technique and summarizes situations in which it has been employed.

Methods: Institutional Ethics Board approval was obtained to describe cases using this technique. Following inadvertent esophageal intubation, the endotracheal tube connector is replaced with the standard nasogastric tube double tapered connector or a Medi-Vac® 5 in 1 straight polypropylene tubing connector and this is hooked up to suction tubing to evacuate stomach contents. Next a transparent air cushioned facemask (Westmed®) is applied while bending the endotracheal tube down the left side of the face and manual bag–mask ventilation started. After adequate oxygenation, the airway can be secured with other options with minimal aspiration risk.

Results: This method makes it easy to maintain an adequate seal and provide patient ventilation with the facemask, while allowing for continuous suction of stomach contents. It has been used successfully in morbidly obese patients with full stomachs and a difficult airway case involving a cervical spinal fracture and bowel obstruction. In the latter, ventilation was easily managed and the airway secured with the aid of a GlideScope®. Another option would have been to pass the esophageal endotracheal tube through the port of a bubble endoscopy mask (VBM Medizintechnik GmbH). Performance of blind nasal intubation following inadvertent esophageal intubation was also facilitated by using this technique since the presence of the esophageal endotracheal tube provided anterior direction to the nasal tube.

Discussion: Although simple, the above method allows effective ventilation in many patients while providing a conduit for the suction of gastric contents. It may be a useful and inexpensive bridging technique in difficult airway management. The option to perform a blind nasal intubation is also made more feasible since intubation of the trachea is easier with esophageal occlusion. Whether to leave the endotracheal tube in the esophagus or remove it should be specifically addressed in difficult airway management algorithms.

1343796 - ILA EVALUATION FOR ENDOTRACHEAL INTUBATION IN CHILDREN

Erin Cooke[1], Simon Whyte[1], Stephan Malherbe[1], Andrew Morrison[1], Michael D. Traynor[1], J. Mark Ansermino[1]

1. BC Children's Hospital and Anesthesiology, Pharmacology and Therapeutics, University of British Columbia, Vancouver, BC, Canada

Introduction: The Air-Q® intubating laryngeal airway (ILA) is a supraglottic device designed to be used both as a primary airway and as a rescue device to facilitate fibreoptic bronchoscope (FOB) guided endotracheal intubation. This study is designed to evaluate ILA performance in pediatric patients in clinical practice. Our objective is to test the ILA's performance as a conduit for fibreoptic intubation.

Methods: With IRB approval and written informed parental consent, and assent where appropriate, we will recruit 120 subjects into four groups of 30: size 1.0 (>7 kg), size 1.5 (7-17 kg), size 2.0 (17-30 kg) and size 2.5 (30-50 kg). Following induction of anesthesia, the appropriate sized ILA is inserted, using the manufacturer's recommended technique, and the cuff is inflated to 60 cm H_2O, measured with a digital pressure cuff manometer. The intubation process is divided into 4 segments: 1: insert FOB through ILA and visualize vocal cords; 2: traverse vocal cords and visualize carina; 3: advance pre-loaded, cuffed endotracheal tube (ETT) over FOB, through the ILA and into the trachea; 4: ILA removal while the ETT remains in situ. The performance of the ILA is evaluated using firstly the FOB view, secondly the Likert assessment of difficulty scale, and finally the time for completion of each part of the intubation process.

Results: Data are reported from the 14 subjects recruited thus far (Table 1). All ETTs were successfully placed. Using Brimacombe and Berry's scoring system (1), 1 subject had no vocal cords visible, 3 had vocal cords and lingual surface of epiglottis visible, 1 had vocal cords and laryngeal surface of epiglottis visible, and 9 had only vocal cords visible. Parts 1, 2 and 4 of the intubation process had a median difficulty score of 0, and part 3 had a score of 1. SpO_2 remained above 92% throughout all intubations. Mean (SD) total time for fibreoptic intubation and removal of the ILA was 130.4 (32.8) seconds.

Discussion: The performance of the ILA as a conduit for fibreoptic intubation has been adequate through the early part of this ongoing study. Fibreoptic intubation through the ILA in children with normal airways was accomplished easily.

References: 1. Anesth Analg 1993;76:450

Table 1. Subject demographics and outcome measures		All Subjects (n = 14)
Sex (M/F)		7/7
Age Range		2 months - 15 years
Weight (kg) (range)		5.7 – 46.9
Induction (IV/IH)		11/3
FOB view (vocal cords visible/ not visible)		13/1
Time (s) [mean (SD)]	1 - Insert FOB though ILA to view of cords (n = 13)	10.8 (5.6)
	2 - Traversing vocal cords to view of carina (n = 13)	28.7 (16.7)
	3 - Place ETT in trachea (n = 13)	44.3 (22.9)
	Insert FOB and place ETT (Parts 1-3)	83.0 (23.8)
	4 - Remove ILA (n = 13)	47.8 (23.3)
	Total time (Parts 1-4) (n = 13)	130.4 (32.8)
Heart Rate (bpm) [mean (SD)] (n = 13)	Start of intubation	89.2 (26.4)
	End of intubation	100.3 (20.3)
$EtCO_2$ (mmHg) [mean (SD)] (n = 13)	Start of intubation	33 (4.1)
	End of intubation	31.8 (10.4)
Difficulty score (0 = no difficulty, 5 = impossible) [median (range)]	1 - Insert FOB though ILA	0 (0-2)
	2 - Traversing vocal cords	0 (0-4)
	3 - Place ETT in trachea	1 (0-2)
	4 - Remove ILA	0 (0-3)

M/F = male/female; IV/IH = intravenous/inhalational; FOB = fibreoptic bronchoscope; ETT = endotracheal tube

1343868 - BILATERAL VERTEBRAL ARTERY DISSECTION IN THE PARTURIENT

Caitriona Murphy[1], Etedal Aamri[1], Clarita Margarido[1], Richard Swartz[2]

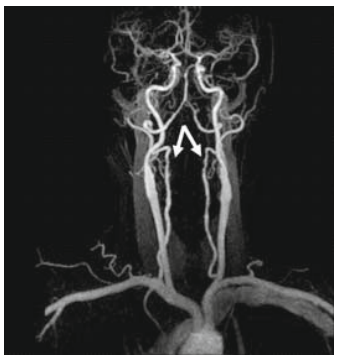
1. **Department of Obstetrical Anesthesia, Sunnybrook Health Sciences Centre, Toronto, ON, Canada**
2. **Department of Neurology and Obstetrical Medicine, Sunnybrook Health Sciences Centre, Toronto, ON, Canada**

Purpose: Postpartum spontaneous vertebral artery dissection (sVAD) is a rare condition that may result in devastating neurologic outcomes [1]. Clinical presentation may include headache, neck pain, pulsatile tinnitus, cerebral ischemia and subarachnoid hemorrhage [2,3]. This case describes postdural puncture headache (PDPH) masking bilateral sVAD in the parturient.

Clinical Features: Following uncomplicated spontaneous vaginal delivery of a healthy baby with epidural analgesia, a previously well 45 year old parturient (gravid 2, para 1) complained of a frontal headache 36 hours postpartum. Epidural catheter placement had been uneventful and second stage of labor was 6 minutes duration. The headache was initially postural, with no other symptoms, and settled with conservative management. Over the course of 2 days the headache became more posterior, remained positional and was associated with tinnitus. On re-assessment, the patient was apyrexic, normotensive (113/58 mmHg) and without evidence of meningismus or focal neurology. An epidural blood patch (EBP) for suspected PDPH was performed aseptically using 30 ml of autologous blood. This achieved temporary resolution of symptoms. She represented 3 days later with return of tinnitus, worsening occipital headache and new onset neck pain. The patient described an episode of excessive straining secondary to constipation prior to worsening of her symptoms. Neurological examination was again unremarkable. A second EBP was performed aseptically with 20 ml of autologous blood. With little improvement in headache and worsening of neck pain, urgent Neurology consultation was undertaken. Magnetic resonance angiography (MRA) revealed bilateral extra-cranial VAD. The patient was immediately commenced on subcutaneous therapeutic dose low molecular weight heparin for 3 months. Follow-up MRA is to be performed at the end of this treatment term. To date she remains fully active and neurologically intact.

Conclusion: Worsening or change in postpartum headache or neck pain following EBP for PDPH warrants further neurology assessment and investigation. Inciting events for sVAD in the puerperium may include excessive valsalva manoeuvres associated with straining. Early recognition and treatment is associated with favorable clinical outcome [3].

References: 1. Stroke 2008; 39(8):2377-2379
2. Neurology 2011; 77:1174-1181
3. Stroke 2006;37:2499-2503



1343895 - IMPACT OF PREGABALIN ON GENERAL ANESTHESIA INDUCTION

Jonathan Gaulin[1], **Etienne de Medicis**[1]

1. Anesthesiology, Université de Sherbrooke, Sherbrooke, QC, Canada

Introduction: Numerous studies have shown the efficacy of gabapentinoids (gabapentin and pregabalin) in reducing preoperative anxiety, postoperative pain as well as opoid consumption and their side effects.(1-3) Compared to gabapentin, pregabalin absorption is dose independent, resulting in a linear pharmacokinetic profile, advantageous for single preoperative dose usage.(4) Authors hypothesized that pregabalin premedication reduced, via its sedative effect, anesthetic requirement for general anesthesia induction.

Methods: After local ethics committee approval, a randomized, double blind, placebo-controlled trial was conducted. Fifty women, aged 18-40 years, ASA I-II, scheduled to undergo elective short laparoscopic gynaecologic procedures were enrolled after written consent. Treatment group patients were given 150mg PO of pregabalin 1 hour before surgery while control group patients received a placebo. The primary outcome is the dose of propofol required to achieve hypnosis in 50% of the patients (ED50). Hypnosis was defined based on predetermined spectral entropy values (SE < 50 and RE-SE < 10).(5) The ED50 was estimated using Dixon's up-and-down methodology.(6) The secondary outcome is preoperative anxiety.

Results: The propofol ED50 is not statistically different between the pregabalin and placebo group (1.33 ± 0.08 vs 1.30 ± 0.06 mg/kg ; p = 0.12), as is the median ([25th-75th percentile]) preoperative anxiety level (32 [23-55] vs 30 [6-67] ; p = 0.35).

Discussion: Premedication with 150mg PO of pregabalin does not reduce propofol requirement for induction of general anesthesia in a population of young ASA I-II women. This result is in agreement with the fact that gabapentinoids principally act on presynaptic calcium channels and not on GABA receptors. It also suggests not to decrease the induction dose of propofol following premedication with pregabalin. Finally, contrary to published literature, no significant anxiolytic effect of preoperative pregabalin was found in the studied population.

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1344034 - WHAT QUALITY OF LIFE CAN BE EXPECTED FOR THE ELDERLY ICU SURVIVOR?

Adam B. Van der Merwe[1], Susan Shaw[2]

1. Anesthesia and peri-operative medicine, University of Saskatchewan, Saskatoon, SK, Canada
2. Critical care, University of Saskatchewan, Saskatoon, SK, Canada

Introduction: Elderly people are being admitted more frequently to ICU, due mainly to an increase in the aging population. Population aging in Canada is expected to accelerate between 2011 and 2031; projections show that seniors could account for more than one-fifth of the population as soon as 2026.(1) As more demands are placed on the health care system due to an aging population, it will be important to get a wider perspective on who will benefit from these invasive and resource intensive service.(2) Previous research has focused on mortality as an end-point for successes of intervention.(3,4) However, patient quality of life post-ICU may provide more meaningful information to patients, families, and healthcare providers in evaluating the success of interventions.(5)

Methods: Following ethics approval from the local Behavioral Research Ethics Board, 32 patients >65 years were consented for study participation upon discharge from two hospital ICUs. Recruitment was done over 5 months for a prospective cohort study. The hospital charts were reviewed for predictors that have been identified in the literature to play a role on mortality. (6) Elective cardiac surgery patients were excluded due to their relatively short stay in ICU. The RAND-36 questionnaire was mailed to participants 6 months after discharge to evaluate patients' quality of life. (7) A Telephonic reminder was done within 2 months and a follow up letter send at 3 months to non-responders.

Results: In the 5-month period, 70 patients over the age of 65 were admitted to the ICUs of two hospitals. During ICU stay, 32 people passed away. Of the surviving 38 patients, 1 was discharged before consent could be obtained, 3 declined participation, and 2 were unable to consent due to cognitive status, leaving 32 patients consented for this study. In the 6-month follow up period, 10 people passed away, as identified by public obituaries. Questionnaires have been received from 11 of the remaining 22 participants (50% response rate). Further data analysis will be completed in February 2012. Possible predictors of poor quality of life will be identified in the ICU period.

Discussion: Although this study examines a small cohort, previous studies have been published with similar numbers, (8) and similar response rates ranging from 38-88%. (9-11) This project will provide more complete information about the outcomes of elderly patients that survive ICU.

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1344053 - DEVELOPMENT OF A PAINLESS INJECTION DEVICE; PRESSURE AND VIBRATION

Roman Gusztak[1], Tim Bolton[1], William P. McKay[1]

1. University of Saskatchewan, Saskatoon, SK, Canada

Introduction: This project is the first in a series to develop a device that decreases the pain of medical needle pricks by applying pressure, vibration and cooling or heating to the skin. The device is premised on the well-established gate theory of pain(1). In children, significant pain and distress can be associated with starting an intravenous, blood sampling or immunization. Children also remember previous painful experiences and learn to anticipate procedures, leading to pre-procedure anxiety(2). When anxiety is severe, a needle phobia can occur, leading to poor compliance with medical and dental procedures(3). This is the first study to complete a thorough, quantitative examination for the optimal pre-applied pressure and vibration to minimize needle pain.

Methods: After local Ethics Committee approval was obtained, 62 healthy consenting adult volunteers were recruited and demographic data collected. Sample size was calculated using data from the literature. An Electronic Von Frey's Anesthesiometer (EVFA) provided reproducible-mild pain. Subjects learned the verbal rating scale for pain, where 0 is no pain and 10 is the most pain imaginable. The EVFA was placed on the deltoid with an increasing force of 40 grams/sec until 3/10 pain was achieved. The opposite deltoid was then tested and the process completed for 24 measurements over 40 minutes. This established a baseline 3/10 pain score for each person. Subjects then returned to complete the 11 randomized pressure (50-550 torr) and 11 randomized vibration (75-125 Hz) measurements.

Results: The mean force applied by the EVFA causing 3/10 pain was 245±146 grams (N=62,n=1488). There was no difference between measurements taken over the 40 minute test period ($F_{1,23}=0.49$, $P=0.979$). Males (256 grams) could tolerate significantly more force than females (218 grams; $P<0.0001$). Applying external pressure and vibration increased the mean amount of force above baseline by 128±81 (N=48,n=528) and 85±50 (N=48,n=528) grams, respectively. There was a significant difference between the 11 pressure values ($F_{1,10}=2.93$, $P=0.0013$) with 400 and and 550 torr allowing the greatest amount of force above baseline at 164±161 and 173±138 grams, respectively. There was no single-optimal vibrational frequency ($F_{1,10}=0.33$, $P=0.9730$) but 105 Hz produced the highest force above baseline (96 grams). External pressure had a significantly greater amount of force compared to vibration ($t=5.62$, $df=47$, $P<0.001$).

Discussion: The EVFA was verified to be a reliable method to simulate mild needle pain. Both externally applied pressure and vibration allowed a greater amount of force to be applied by the EVFA than compared to baseline. However, external pressure was significantly better than vibration and could be easily incorporated into daily anesthesia practice for needle procedures. In future studies, pressure and vibration will be combined with cooling or heating in adult volunteers. Once optimal values are confirmed, then testing will be completed on pediatric patients.

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1344067 - CRANIOPAGUS CONJOINED TWINS HAVING A FUNCTIONAL MRI UNDER TIVA

Joy M. Sanders[1], Kawshala Peiris[2], Robert Purdy[1], Louis Scheepers[1]

1. **Pediatric Anesthesia and Anesthesiology, Pharmacology and Therapeutics, BC Children's Hospital and University of British Columbia, Vancouver, BC, Canada**
2. **Anaesthesia, University Hospitals of Leicester, Leicester, Leicestershire, United Kingdom**

Purpose: Anesthesia for craniopagus (joined at skull) conjoined twins poses specific challenges due to their shared circulations. We describe the anesthetic management of 4-year old craniopagus conjoined twins undergoing functional MRI, CT angiogram and ear examinations using total intravenous anesthesia (TIVA).

Clinical Features: Parental consent was obtained for the presentation of this case. The twins had a combined weight of 28 kg with estimated 40:60 weight distribution ratio. Twin A is anatomically on the right and Twin B on the left. They share their medial, parietal and occipital lobes and even sensory experiences. Twin A has a greater cardiac load, providing most of Twin B's cerebral circulation, and also receives most of the venous return. She is hypertensive and has a mild right hemiparesis. Twin B is hypotensive and has a mild left hemiparesis. Both have global developmental delay and seizure disorders, treated with clobazam. Past anesthetic history includes adenotonsillectomy in Twin A[1], cerebral imaging, cardiac catheterization and dental work. No crossover of volatile agents was seen during these anesthetics. Functional (f) MRI using tactile and visual stimulation was planned to assess crossed neural processing and a CT angiogram to study their shared vascularity.

Two anesthetic teams and set ups were prepared. Intravenous access was gained in Twin A and 1mg midazolam, 4 mg ketamine and 0.1 mg glycopyrrolate given. Both twins became sedated but spontaneous ventilation (SV) was maintained. They were positioned side-by-side. Intravenous access was then obtained in Twin B and the same medication given. Maintenance of anesthesia with propofol (10 mg/ml) combined with remifentanil (5 mcg/ml) (PR5) was started in both twins, as is the usual practice at our institution. The rate was adjusted from 100 - 200 mcg/kg/min propofol according to anesthetic depth. Oxygen was delivered via nasal prongs with capnography monitoring and SV continued without the need for airway instrumentation. After 3 hours of fMRI mapping, the twins were transferred to CT, then their ears were examined. Total anesthetic time was 6 hr and discharge home occurred shortly after.

Conclusion: Craniopagus conjoined twins are rare, with an in incidence of 1: 2.5 million live births[2] and a distinct female predominance (3:1). Theories for conjoining include incomplete fission or secondary fusion of the fertilized ovum. Classification is by most prominent union site; only 2% are craniopagus[3]. Craniopagus separation is the most challenging[4] and not possible in our twins due to complexity of shared vasculature and risk of significant morbidity or mortality.

The anesthetic management for surgical separation[5-7] and radiological studies[8] is well described, including the physiological and pharmacological challenges, positioning and need for excellent teamwork[9]. However, in published radiological cases to date, anesthesia was provided with volatile agents via a secured airway[8]. We describe the successful sedation of craniopagus twins for lengthy radiological studies using TIVA.

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2. Brain 2006 129: 1084-95
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7. Paediatr Anaesth 2006 16: 347-51
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1344104 - INTRAOPERATIVE TEE, ISOPROTERENOL & MULTIDISCIPLINARY COLLABORATION IN THE SURGICAL CORRECTION OF HCM

James Riddell[1], David McCarty[2], Linrui Guo[3], Ronit Lavi[1]

1. **Department of Anesthesia and Perioperative Medicine, University of Western Ontario, London, ON, Canada**
2. **Department of Cardiology, University of Western Ontario, London, ON, Canada**
3. **Department of Cardiac Surgery, University of Western Ontario, London, ON, Canada**

Purpose: We describe the use of intraoperative TEE, isoproterenol and multidisciplinary teamwork for optimal identification and surgical correction of HCM in a patient originally scheduled for a CABG with equivocal pre-operative dynamic LVOT obstruction.

Clinical Features: A 63 year old man, presented to a peripheral hospital with a 1 year history of increasing dyspnea on exertion. Coronary angiogram revealed significant triple vessel disease. TTE demonstrated features suggestive of HCM, with asymmetric septal hypertrophy, moderate MR, and a LVOT gradient with valsalva of 63 mmHg.

Repeat TTE and TEE at our institution confirmed the elements of HCM, with the exception of the dynamic LVOT gradient. As such, the patient was scheduled for a CABG and possible septal myomectomy.

After uneventful induction of anesthesia, a standard 20 views pre-bypass TEE examination was performed. Then, with the Cardiac Anesthesiologist, Surgeon and Cardiologist (who performed the pre-op TTE and TEE) at the bedside, 20 mcg of IV isoproterenol was administered. Significant obstruction of the LVOT occurred (see Figure 1), with the patient's BP decreasing from 120/80 to 60/30 mmHg, HR increasing from 68 to 118 bpm, and peak LVOT gradient increasing from 4 to 80 mmHg.

The patient's hemodynamic changes were quickly supported with a 500 cc bolus of Voluven and phenylephrine. Based on the significant inducible LVOT obstruction, the team decided to proceed with septal myomectomy during bypass. After weaning from bypass, the dynamic LVOT gradient was less than 10 mmHg and the MR was significantly improved. The patient was discharged from hospital on post-op day 6, and at two weeks was walking 5 kms without dyspnea. Patient consent for this case report was subsequently obtained.

Conclusion: The utility of intraoperative TEE in the repair of HCM has long been recognized, with pre and post-bypass findings resulting in changes in surgical management in 9% and 4% of patients, respectively (1,2). In our case, the intraoperative induction of dynamic LVOT obstruction did lead to a significant change in management, adding a septal myomectomy to the planned CABG.

What was arguably unique in our case was the collaborative work between cardiac anesthesia, surgery and cardiology that led to the use of isoproterenol intraoperatively to induce the LVOT obstruction. It has previously been demonstrated that isoproterenol has some utility in pre and post-operative assessment of dynamic LVOT obstruction, despite higher rates of induction of obstruction when compared to other methods (3,4). Notwithstanding this concern, the significant obstruction and hemodynamic collapse brought about by the isoproterenol challenge was convincing enough to proceed with septal myomectomy in our patient.

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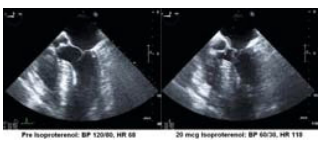

Figure 1: Pre and post isoproterenol 5 chamber views

1344244 - DIFFICULT CARDIOPULMONARY BYPASS WEANING: AN ADVERSE EVENT TRACKER?

Jean-Yves Dupuis[1], Sean Dickie[1], Diem T. Tran[1], Michael Bourke[1], James Robblee[1]

1. University of Ottawa Heart Institute, Ottawa, ON, Canada

Introduction: Trigger tool methodology is used in risk management to track adverse events related to medical practice (1). Difficult weaning from cardiopulmonary bypass (CPB) is an intraoperative event associated with increased mortality after cardiac surgery (2). In this risk-adjusted analysis of mortality related to difficult CPB weaning, we sought to determine the potential of difficult CPB weaning to trigger the identification of adverse events related to medical practice, rather than patients' condition.

Methods: After approval by our research ethics board, prospectively collected data were retrieved from our perioperative database for 3406 patients who underwent non-emergent cardiac surgery with CPB between April 2006 and March 2009. Heart transplantation, ventricular assist device, pulmonary thromboendarterectomy and trans-catheter aortic valve implantation were exclusion criteria. Patients were risk stratified using the Cardiac Anesthesia Risk Evaluation (CARE) score (3). Difficult CPB weaning was defined as more than one attempt and/or more than 5 minutes to separate from CPB with inotropic support. For each CARE score category, risk-adjusted mortality (RAM) was calculated using the formula: RAM = (observed/predicted) x overall mortality. The results of RAM are presented as means with their 95% confidence interval.

Results: The overall mortality in the patient cohort was 2.9%. A total of 168 patients (4.9%) had a difficult CPB weaning with an associated mortality of 24.4%. The incidence of difficult CPB weaning was 2.5% in the 1750 low-risk patients (CARE 1 & 2), 3.6% in the 1268 average risk patients (CARE 3), 10.4% in the 324 high-risk patients (CARE 4) and 28% in the 64 very high-risk patients (CARE 5). As compared to the overall observed mortality, RAM was markedly increased in the CARE 1-2 and CARE 3 patients with difficult CPB weaning: 23.9% (15.5 – 37.7) and 17.1% (12.2 – 23.6), respectively. In the CARE 4 patients with difficult CPB weaning, RAM was also significantly increased, but to a lesser extent: 8.7% (6.8 – 11.1). In CARE 5 patients with difficult CPB weaning, the RAM was 3.8% (2.8 – 5.4).

Discussion: A 6 to 8-fold increase in RAM was observed in the CARE 1 to 3 patients who had a difficult CPB weaning. A similar but weaker association was found in CARE 4 patients, and was absent in CARE 5 patients. Those results suggest a true potential for difficult CPB weaning as a trigger for identification of practice-related adverse events in low and average risk patients, but not in higher risk patients. Prospective studies are needed to define the reliability of difficult CPB weaning to assess whether an adverse event is truly present in those patients.

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3. Dupuis JY, et al. Anesthesiology 2001;94:194-204

1344285 - COMPARISON OF ANTERIOR AND LATERAL APPROACHES FOR ULTRASOUND-GUIDED STELLATE GANGLION BLOCK

David Flamer[1], Anuj Bhatia[1], Philip Peng[1]

1. **Department of Anesthesia and Pain Management, Toronto Western Hospital, University of Toronto, Toronto, ON, Canada**

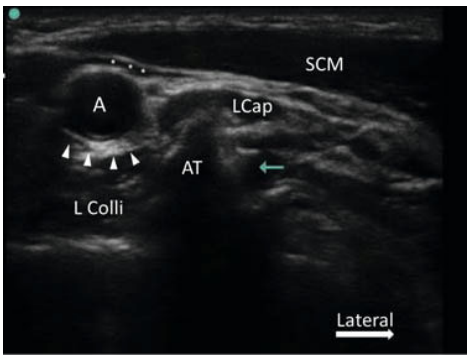
Introduction: Stellate ganglion block (SGB) is performed using anatomic-landmark based or fluoroscopic-guided techniques at level of the sixth cervical (C6) vertebra to provide analgesia and restore function in patients with sympathetically-maintained upper extremity pain. An ultrasound (US)-guided SGB can improve efficacy and reduce complications. This study assessed variation in regional neck anatomy and analyzed two different US-guided approaches for SGB.

Methods: Following protocol approval by IRB, 100 subjects aged 18-70 years were enrolled. A linear probe (13-6 MHz) was used to scan regional anatomy of the neck at the levels of bilateral sixth and seventh cervical vertebrae. Anterior and lateral approaches for needle trajectory were simulated to assess their safety and accuracy.

Results: A high incidence of partial/complete lateral esophageal displacement in relation to the cricoid at the level of the C6 vertebra (left: 48%, right: 2%) and C7 vertebra (left: 72%, right: 2%) was found. The mean distance between the lateral esophageal border and medial wall of the carotid artery was 9mm. Vascular analysis revealed the vertebral artery entering the foramen transversarium at/above level of C6 vertebra in 8% of subjects. A high percentage of subjects had thyroid vessels lying in the path of a simulated anterior approach (C6 vertebra: 26%, C7 vertebra: 43%).

Discussion: This study revealed significant variations in anatomy as relevant to SGB at the level of the C6 and C7 vertebrae. Variable location and course of esophagus, thyroid and vertebral vessels expose patients to risk of complications and block failure. Use of US can reduce these risks and the approach can be individualized depending on the pre-block scan.

References: 1. Gofeld et al. Development and validation of a new technique for ultrasound-guided stellate ganglion block. Reg Anesth Pain Med. 2009;34:475-9



Ultrasonographic image of neck at the level of the sixth cervical vertebra (left)

1344330 - MANAGEMENT OF TBI: VARIATIONS IN CARE ACROSS ONTARIO TRAUMA CENTRES

Andrea Rigamonti[1], Sunjay Sharma[2], Avery Nathens[3], Andreas Laupacis[4]

1. **Department of Anaesthesia. Keenan Reaserch Centre in the Li Ka Shing Institute, St. Michael's Hospital, University of Toronto, Toronto, ON, Canada**
2. **Department of Neurosurgery, Keenan Reaserch Centre in the Li Ka Shing Institute, St. Michael's Hospital, University of Toronto, Toronto, ON, Canada**
3. **Department of Surgery, Keenan Reaserch Centre in the Li Ka Shing Institute, St. Michael's Hospital, University of Toronto, Toronto, ON, Canada**
4. **Department of Medicine. Keenan Reaserch Centre in the Li Ka Shing Institute, St. Michael's Hospital, University of Toronto, Toronto, ON, Canada**

Introduction: Traumatic brain injury (TBI) has a significant impact on society in terms of lost lives, disability, lost productivity and medical costs. Internationally accepted guidelines (Brain Trauma Foundation - BTF) for the management of TBI exist since 1996[§], but compliance with these is variable. Although the methodological quality of the studies used to inform the guidelines is suboptimal, they are considered by experts to be the reference standard for optimal management of TBI. To date, no study evaluating current compliance with the guidelines in Ontario's trauma centres has been conducted. This study investigated the variability in the treatment approaches for patients with TBI across Ontario.

Methods: This is a retrospective analysis of data extracted from the Ontario Trauma Registry Comprehensive Data Set between the years 2003 and 2010. Approval was obtained from local REB. Inclusion criteria: Patients 16 years or older, with a head injury (abbreviated head injury score [hAIS] score of ≥ 3), with or without other associated injuries, and severe blunt brain injury (motor GCS score ≤ 4). Exclusion criteria: missing GCS

Objective. To examine the variations in rate of 1) ICP monitoring and 2) neurosurgical interventions (decompressive craniectomy and/or craniotomy with haematoma evacuation or lobectomy) in patients with severe TBI. We presented patient's characteristics and variations in care by trauma centre. Variations in care were stratified based on head AIS (≥ 4), gender, age (> 40) and hypotension (SBP < 90mmHg). Patients' characteristics, injury severity, and treatment strategies were compared between groups using appropriate bivariate tests (*t*-test, Mann-Whitney U test, χ^2 test, and Fisher exact test). Two–tailed $P<0.05$ will be use to define statistical significance.

Results: Patients characteristics (age, gender and number of comorbidities) were similar among centres, whereas injury characteristics differed (isolated head injury: 33-84%; severity of the head injury (mGCS=1-2): 58-87%. Centre trauma volumes were different among centres (919-6672 patients). ICP monitor insertion rates in eligible were low (< 30%). There was also a broad variability between centres (0.6-27.4%) (Figure 1). Similarly, neurosurgical interventions rates were low and highly variable (1.8-14.7%). Older patients, females and patients with hypotension received less ICP monitors ($P < 0.05$).

Discussion: TBI is a major public health problem in Ontario, affecting nearly 15,000 patients per year. Approximately one third of these patients require hospital admission. BTF guidelines are currently the reference standard for the treatment of TBI. The preliminary results of our study demonstrated that adherence to the BTF Guidelines is still poor and not consistent across Ontario. The publication of these findings will be used to increase awareness among the Ontario physicians who treat TBI patients about the gap between the current guidelines and practice and as a starting point for designing knowledge translation efforts to improve compliance with the guidelines.

References: [§] J Neurotrauma 1996; 13(11): 641-734

1344332 - TRACKING CEREBRAL OXIMETRY DURING ONE-LUNG ANESTHESIA FOR THORACOTOMY: A COMPARISON OF TWO FIO2 STRATEGIES

Christine M. Pickering[1], W. Alan C. Mutch[1], Duane Funk[1], Helmut Unruh[2], Ryan Amadeo[1]

1. Anesthesia, Health Sciences Centre, Winnipeg, MB, Canada
2. Thoracic Surgery, Health Sciences Centre, Winnipeg, MB, Canada

Introduction: Monitoring of cerebral oximetry may increase patient safety during surgery and anesthesia. Decreases in cerebral oxygen saturation, measured non-invasively, have been shown to correlate with increased post-operative morbidity. There is increasing interest in lung protection for patients undergoing thoracic surgery, which includes a low FiO2 strategy. We hypothesize that the management of one-lung ventilation (OLV) with an FiO2 of 0.6 may place the brain at risk for cerebral desaturation that may not be evident based on pulse oximetry values. The goal of this study is to determine whether the use of an FiO2 of 0.6 during OLV is safe with respect to cerebral oxygenation, as measured by cerebral oximetry. We hypothesize greater cerebral desaturation with an FiO2 of 0.6 compared to an FiO2 of 1.0.

Methods: Local Ethics Committee approval was obtained. Following informed consent, patients were randomly assigned to receive an FiO2 of 0.6 or a 1.0 during the period of OLV. The FiO2 was adjusted to maintain an arterial saturation of 92% as measured by pulse oximetry. Cerebral oximetry was measured with the Fore-Sight monitor. All data was downloaded using the Trendface Solo software system. Data will be statistically analyzed by constructing ANOVA tables to compare the two groups, p-values of <0.05 will be considered significant.

Results: We observed that 6 of 20 (30%) of patients had a significant cerebral desaturation during one-lung ventilation with an FiO2 of 0.6, compared with 2 of 10 (20%) of patients ventilated with an FiO2 of 1.0.

Discussion: Our preliminary results show a difference between the two groups, with more cerebral desaturations in the group ventilated with an FiO2 of 0.6. Formal statistical analysis will be done to determine significance.

Number of Cerebral Desaturations by Group

Group	FiO2 0.6	FiO2 1.0
Total Number of Patients	20	10
Number of Cerebral Desaturations	6	2
%	30%	20%

1344336 - SIGNIFICANT HYPOPHOSPHATEMIA AFTER SURGERY FOR HEAD AND NECK CANCERS

Leonid Minkovich[1], Stuart A. McCluskey[1], George Djaiani[1]

1. Anesthesiology, Toronto General Hospital, Toronto, ON, Canada

Introduction: Excision of tumor with microsurgical free flap reconstruction (FFR) is a leading treatment of head and neck cancers. FFR is a long complex procedure accompanied by significant complications including electrolytes derangements.

Phosphorus is an essential element for all living cells. Although often asymptomatic, hypophosphatemia (HP) may lead to multiple of symptoms including fatal cardiac and respiratory failure(1). In general hospitals population prevalence of HP ranges between 2.2 and 3.1%. HP found much common in patients after cardiac (34%) and after hepatic surgery (up to 100%). Prevalence of HP after FFR has not been reported. Goal of the study was to determine prevalence of clinically significant (moderate and severe) HP in patients undergoing FFR surgery.

Methods: After the REB approval and obtaining informed consent we prospectively studied 55 consecutive patients undergoing FFR. Exclusion criteria was renal insufficiency with creatinine level > 200 μmol/L. Anesthetic management was done according to current standards of practice for FFR surgery(2). Blood samples were collected at the PACU admission, 24, 48 hours thereafter, and on day 14th after the surgery. Plasma was separated by a centrifuge within 1 hour after collection and analyzed with Abbott Chemistry C8000 analyzer (Abbott Laboratories, Abbott Park Il, USA). The normall range of serum phosphate was 0.81-1.45 mmol/L. HP was defined as mild 0.66-0.81 mmol/L, moderate 0.32-0.65 mmol/L, and severe <0.31 mmol/L. Data were presented as the mean ± SD.

Statistical analysis was performed using analysis of variance.

Results: Fifty one patients (93%) developed HP after FFR with the nadir of 0.59 ± 0.14 mmol/L at 48 hours after surgery ($p<0.001$ comparing to average levels of plasma phosphate at the PACU admission, 24 h, and on day 14th after FFR). HP was mild, moderate and severe in 16%, 72%, and 5% of patients respectively. Phosphate level returned to normal range at day 14th after FFR in 89% of patients.

Discussion: Clinically significant HP is common after FFR surgery. The nadir of HP appeared to be delayed up to 48 h after the surgery. We found moderate and severe HP in 77% of patients undergoing FFR. This severity of HP should warrant prompt therapy. However it is remains unclear whether HP actually contributes to morbidity or is a marker for severity of perioperative illness.

Ability of treatment of HP to improve outcome after FFR should be addressed in further RCT.

References: 1. Crit Care 2010;14:R147
2. Microsurgery 2009;29:161-7

1344381 - GOAL DIRECTED FLUID THERAPY IN SURGERY FOR HEAD AND NECK CANCERS

Leonid Minkovich[1], Stuart A. McCluskey[1], George Djaiani[1], David Goldstein[2], Ralph Gilbert[2]

1. Anesthesiology, Toronto General Hospital, Toronto, ON, Canada
2. Head and Neck Surgery, Toronto General Hospital, Toronto, ON, Canada

Introduction: Excision of tumor with microsurgical free flap reconstruction (FFR) is a mainstay treatment of head and neck malignancies. FFR is a lengthy and complex procedure with considerable postoperative morbidity. Excessive administration of crystalloids during FFR was associated with poor outcome(1). The purpose of this study was to determine the effects of goal-directed fluid management (GDFM) based on the continuous monitoring of stroke volume (SV) on volume and composition of fluids administering during FFR.

Methods: After the REB approval, and informed consent, 60 consecutive patients undergoing FFR were enrolled and randomly allocated to either study (n = 30), or control (n = 30) groups. Stroke volume (SV) was monitored continuously (FloTrac/Vigileo™ Edwards Lifesciences, Irvine, CA) in both groups.The GDFM algorithm guided fluid administration in the study group. After achieving a steady state anesthesia, a Volume Loading Step-VLS (250 ml of VoluvenTM Fresenius Kabi, Canada) was administered. If the SV increased for > 10% after VLS, the patient was considered to be a positive fluid responder. The VLS were repeated until the increase in SV was < 10%. This maximal value of SV obtained as a result of the fluid loading was used as an individual set point for further fluid therapy. After VLS, intravascular volume was maintained with continuous infusion of 0.5 ml/kg/hr of Ringer's Lactate. No additional fluid boluses were administered unless SV decreased by 25% from the maximal (optimized) value. In that case, the same VLS strategy was repeated as described above.

Standard fluid management was used in the control group. The screen of Flotrac/Vigeleo™ monitor was blinded in the control group. Hemodynamic data was recorded for further off line analysis. However, anesthesia team was not been able to use this data for a clinical management.

Results: Demographics, ASA class, type of cancer, type of transferred free flap, duration of surgery, urinary output and blood loss was similar in the study and control groups.

Although patients in the study group received more Voluven, total volume of administered fluids, volume of crystalloids, and intraoperative fluid balance were significantly lower in the study group (Table 1).

Discussion: Continuous monitoring of stroke volume and application of the GDFM algorithm significantly decreased the volume of crystalloids administered during surgery. This strategy resulted in decreased fluid gain in patients undergoing FFR procedures.

Results of this study will serve as a foundation to a further study designed to determine the effects of SV optimization algorithm on clinical outcomes after FFR surgery.

References: 1. Head Neck 2010;32:1345-53

Comparison of types and volume of fluid administration during FFR surgery

Intraoperative Fluid Administration	Study Group N = 30	Control Group N =30	P value
Total volume(ml/kg/hr)	4.9±2.1	6.8±2.0	0.002
Crystalloids(ml/kg/hr)	3.5±1.7	6.3±2.1	0.001
Colloids(ml/kg/hr)	1.5±0.7	0.4±0.6	0.045
Fluid balance(ml/kg/hr)	3.3±1.8	5.4±2.2	0.004

Volume of fluids is normalized (ml/kg/hr) and presented as mean±SD

1344415 - TRICUSPID ANNULAR DISPLACEMENT AND VELOCITY IN THE ASSESSMENT OF RIGHT VENTRICULAR FUNCTION

Raymond Hu[1], Claude Tousignant[1]

1. Anesthesia, St Michael's Hospital, Toronto, ON, Canada

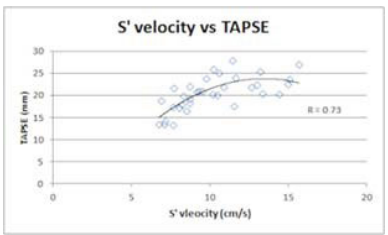
Introduction: Tricuspid annular systolic plane excursion (TAPSE) and velocity (S') are used to assess right ventricular (RV) function (1,2). Assessing RV response to inotropes might provide insights into outcome especially in the presence of left sided disease and pulmonary hypertension (PHTN).

Methods: Following IRB approval and informed consent, 19 elective CABG patients with grade 1-2 LV function were recruited. After induction of anesthesia and pulmonary artery catheter insertion, a transthoracic echo (TTE) 4 chamber view was obtained with colour tissue Doppler applied to the RV free wall ensuring a frame rate above 200fps. Tissue Doppler measurements included TAPSE and S'. Hemodynamic measurements included: SBP, HR, PAP, CO and CVP. Measurements were recorded at baseline and after administration of 10mg of Ephedrine. Two patients were excluded due to poor imaging.

Results: All hemodynamic and tissue Doppler measurements increased significantly after ephedrine except CVP. There was a good correlation between TAPSE and SBP (r=0.64) and CO (r=0.60). There was also a good correlation between S' velocity and SPB (r=0.54) and CO (0.58). There was a good, second order polynomial correlation between TAPSE and S' (r=0.73) (figure).

Discussion: The largest degree of RV work is longitudinal. Annular motion is best assessed using TTE. Tissue Doppler allows for the simultaneous measurement of velocity and displacement. Although the PAP does not figure in the assessment, the amount of work performed by the RV may be assessed using TAPSE. The S' velocity, on the other hand may be an indicator of power or the rate at which the work is performed. When TAPSE was plotted against S', a plateau was seen where further velocity increases did not result in any appreciable increase in TAPSE. The good correlation between TAPSE and SBP and S' and SBP may have treatment implications where raising systemic pressure improves RV function (both work and power) (3). Conclusion: Ephedrine administration increases excursion and velocity. There is a point after which increases in velocity do not translate into further increases in stroke distance. This relationship may be useful in the assessment of RV inotropic and work reserve.

References: 1) Heart 2006; 92:i19–i26
2) Anesth Analg 2009;108:407-21
3) Circ Res 1955;3:633-38



The relationship between S' velocity and TAPSE is seen as a second-order polynomial, with a plateau reached at S' velocity of about 12 cm/s.

1344431 - WORK HOURS, PATIENT SAFETY AND HANDOVER: A NATIONAL RESIDENT SURVEY

Mark Masterson[1], **Pankaj Shrichand**[2]

1. **Department of Anesthesiology, Pharmacology and Therapeutics, University of British Columbia, Vancouver, BC, Canada**
2. **Canadian Association of Internes and Residents, Ottawa, ON, Canada**

Introduction: The effects of continuous work hours on physician performance in Canada have received much attention recently, most notably in residents with the recent arbitration decision in Quebec. Previous investigations have shown the effects of work hours on resident and patient safety. This has been balanced against increased patient handover with shorter continuous working hours and the need for training in handover. However, there is little Canadian data on resident work hours, resident perceptions of the effect on patient safety of work hours and handover training.

Methods: REB approval was received and participants provided consent before entering the study. A series of questions were developed by a national working group of residents based on gaps in the existing literature about work hours, the effect of work hours on patient safety and handover training. The survey was distributed to all residents in Canada except Quebec.

Results: 1796 residents participated in the survey, representing 22% of eligible respondents. Residents reported working an average of 66h per week (standard deviation 16). 82% of respondents reported that the quality of care they had provided had suffered because of lack of sleep. 67% of respondents felt they could safely provide care safely after 16h of continuous work or less. 30% of respondents felt excessive work hours compromised the care they provided “often” or “very often”.

Only 52% of respondents had received training in handover, the most common method was informal modeling from senior residents or attending. Of those who had received training 72% felt it had improved their ability to provide safe care.

Discussion: This study shows the work burden faced by residents and the shocking frequency with which residents view quality of care being impaired by work hours. A majority of residents feel continuous working hours should be limited to 16h or less. Surprisingly, in spite of the recent attention on increased handover, training in handover is infrequent and rarely formalised. These results highlight the urgency of reviewing work hours for residents and ensuring appropriate training in handover skills to ensure safe care for patients.

1344432 - OUTCOME MEASURES IN SEVERE TRAUMATIC BRAIN INJURY: A SYSTEMATIC REVIEW

Genevieve Lalonde[1], Alexis F. Turgeon[2], Philippe Desjardins[1], Amélie Boutin[3], François Lauzier[2], Lynne Moore[3], Ryan Zarychanski[5], Dean A. Fergusson[4]

1. Anesthesiology, University Laval, Quebec, QC, Canada
2. Critical Care Medicine, University Laval, Quebec, QC, Canada
3. Social and Preventive Medicine, University Laval, Quebec, QC, Canada
4. Clinical Epidemiology, University of Ottawa, Ottawa, ON, Canada
5. Critical Care, University of Manitoba, Winnipeg, MB, Canada

Introduction: Traumatic brain injury (TBI) is a major cause of death, but also of long-term disability. Although mortality has been used for years, functional and quality-of-life scales have been suggested as being more meaningful for medical teams, families and patients. However, no consensus exists on the optimal outcome measure to use. We systematically reviewed randomized controlled trials (RCTs) of patients with severe TBI admitted in acute care hospitals to identify the outcome measures used.

Methods: We searched MEDLINE, EMBASE, Cochrane, Biosis and Scopus, and references of included trials. RCTs published from 2006 to October 2011 in one of 18 journals (with the highest impact factor in general medicine, critical care medicine and neurology/neurosurgery) were considered for inclusion. RCTs performed in adults with severe TBI (GCS ≤8) were eligible. The search strategy involved keywords and MESH terms for TBI (EMTREE for EMBASE), for RCTs (validated filters in MEDLINE and EMBASE), and for the 18 selected journals. The primary endpoint was the outcome measures used regardless of the intervention. Secondary outcomes were the timing of assessment of these outcomes and the methodological quality of RCTs using the Cochrane risk of bias assessment tool. Two independent reviewers selected trials and collected data using a standardized case report form. Data on study design, outcome measures and reporting quality were collected. A descriptive analysis of data was used.

Results: From 3616 citations retrieved, 32 RCTs met eligibility. Included RCTs enrolled from 10 to 1331 patients; 24 were single center and 8 were multicenter. The outcome measures most frequently used were the Glasgow Outcome Scale (GOS) (n=17, 53%), non-specific complications (n=14, 43%), neurologic physiologic indices (n=13, 41%), mortality (n=13, 41%), infections (n=9, 28%) and the extended GOS (GOSe) (n=8, 25%). Functional outcomes measures, such as the GOS and the GOSe, were mainly assessed at 6 months. Nine trials reported only physiologic indices and did not present any clinical or functional outcome measures. The methodological quality of included RCTs was heterogeneous. We observed a low risk of bias for sequence generation (n=25), complete data reporting (n=26) and selective reporting (n=32), but a high risk of bias for allocation concealment (n=16), blinding (n=20) and sample size (n=16).

Discussion: Outcome measures used to evaluate the effect of intervention in RCTs performed in adult patients with severe TBI in acute care are heterogeneous. Many RCTs used outcome measures that may be considered meaningless for patients and medical teams to help guiding therapies. In addition, very few trials assessed outcomes beyond 6 months. Considering that results from RCTs are used for clinical decision-making, we suggest that long-term functional outcomes, such as the GOS or the GOSe, in RCTs involving adult patients with severe TBI should be the standard outcome measures.

1344433 - THE COMBINED OPIOID ANESTHESIA PERI-OPERATIVE DATASET: A UNIQUE LINKED DATASET DESIGNED TO FACILITATE FUTURE STUDY OF THE RELATIONSHIP BETWEEN PRESCRIBING CONTROLLED SUBSTANCES AND THE PERI-OPERATIVE PERIOD

Niel Gandhi[1], Peter MacDougall[1], Andrew Milne[1], Paul Brousseau[1], Denise Pellerin[2], Darren Bishop[1], Sara Whynot[1]

1. Anesthesia, Dalhousie University, Halifax, NS, Canada
2. Nova Scotia Prescription Monitoring Program, Halifax, NS, Canada

Introduction: Post operative pain is common among the surgical patient population. Also a high level of pain post-operatively has been linked with an increased incidence of chronic pain, defined as continuous pain for more than 3 months. Despite long-standing promotion from various groups , studies suggest 20% to 30% of patients still experience moderate to severe pain after surgery. (1).

The provincial Prescription Monitoring Program (PMP) contains data from all prescriptions for controlled substances written since 1992. The Anesthesia Information System (AIMS) contains information from multiple hospital data sources. The AIMS database has been >90% complete since 2006. Linkage of 5 years of data from both datasets creates a large dataset that allows study of the relationship between opioid/cannabinoid use and surgery.

Methods: Research Ethics Board approval has been obtained for this project.

Linked data includes AIMS data for all surgical procedures from January 1, 2006 to December 31, 2010 and PMP data from July 1, 2005 to June 30 2011. This will allow future examination of the use of controlled drugs in the period six months before and after surgery. PMP data contains the following information: i) Type of opioid or synthetic cannabinoid; ii) Opioid formulation (long or short acting); iii) date of prescribing; iv) formulation (ie. oral, IV, transdermal); v) amount dispensed; vi) demographic information.

The AIMS contains the following information: i) Demographic information; ii) Type of anesthestic; iii) Administrative data: Date of admission, Date of discharge, Length of stay, Date of surgery, admission to and discharge from ICU or IMCU; iv) Medical history and peri-operative medications.

Merging of data sets from AIMS and PMP was accomplished using a software program which utilizes a Pobabalistic Matching tool to create an internally validated dataset. Data is linked and assigned a non- nominal identifier.

Results: We report the development of a unique linked dataset containing all surgical cases for a five year period linked with PMP data for a period extending 6 months before and after all surgical cases. This unique dataset contains

Discussion: The relationship between analgesic medications and surgery is complex. The COAP dataset provides a unique platform for future study of this relationship. Examples of potential studies include the relationship between peri - operative opioid use and total knee replacement or the relationship between opioid use and surgical procedures known to have high rates of chronic post-operative pain ie. thoracotomy.

References: Dolin SJ, C. J. (2002). Br J Anaesth , 89:409-423

1344454 - EFFECT OF MARGINAL DONOR CRITERIA ON LIVER TRANSPLANTATION OUTCOME IN CANADIAN SYSTEM

Raviraj Raveendran[1], Achal Dhir[1], Fiona Ralley[1], Debashis Roy[1], Christopher Harle[1], Anthony Vannelli[1], Wojciech Dobkowski[1]

1. **Department of Anesthesia and Perioperative Medicine, London Health Sciences Centre, University of Western Ontario, London, ON, Canada**

Introduction: Marginal donor organs are routinely used to overcome the shortage of organ availability. The definition of marginal donor is not well defined yet. We analyzed various criteria for marginal donors and their impact on the outcome of liver transplantation in Canadian system.

Methods: After ethics approval, we collected the data of consecutive 588 adult liver transplantations performed in last 10 years in a single Canadian center. Donor age > 60 years, Use of 2 inotropes in donor, Donor hospital stay > 5 days, Cold ischemic time > 10 hrs, Rewarming time > 60 minutes, DCD donors, BMI > 30 kg/ h2, Serum sodium > 155 mmol/L, Cardiac arrest, Serum creatinine > 200 umol/L, Hemoglobin > 100 g/L, History of drug abuse, Liver enzymes > 3 times and INR > 1.5 were considered as marginal donor criteria. The outcome measures were 1 & 5-year graft & patient survival and ICU stay. Kaplan- Meier method was used to analyze patient & graft survival while Cox proportional hazards regression model was used to calculate hazard ratios.

Results: Though none of the marginal criteria had a significant impact on 1year & 5-year patient & graft survival, the criteria with positive hazard ratio for patient & graft survival were: donor creatinine (1.85 & 2.08), INR (1.53 & 1.39), Donor age (1.39 & 1.30), serum sodium (1.15 & 0.89) and rewarm time (1.11 & 1.11). ICU stay was significantly more (8.03 days Vs 5.15 days, p value – 0.002) for donors with hemoglobin < 100 g/L.

Discussion: Studies using MELD scores for recipients show poor outcome with the use of marginal donors. Our study shows no effect of marginal donors on recipient outcome in Canadian allocation system. Recipients receiving organ from Donors with low hemoglobin had prolonged ICU stay. It is necessary to define the marginal donor criteria.

1344456 - OPTIMIZING AIRWAY MANAGEMENT: THE ROLE OF A MODIFIED GLIDESCOPE TECHNIQUE

Ryan Mahaffey[1], Tanya Viaznikova[2], Paula King[1], Michael McMullen[1]

1. Anesthesiology and Perioperative Medicine, Queen's University, Kingston, ON, Canada
2. School of Medicine, Queen's University, Kingston, ON, Canada

Introduction: The GlideScope® is a video laryngoscope that allows visualization of endotracheal tube placement, and is often utilized in management of the difficult airway.1 The GlideScope® is designed to provide a view of the glottic opening but this view is often compromised during manipulation of the tube. Recent studies have looked at ways of improving intubation times with the GlideScope®. 2,3 The aim of this study is to evaluate the time to secure the airway using a modification of the traditional GlideScope® technique that involves the simultaneous insertion of both the GlideScope® blade and the endotracheal tube.

Methods: Following ethics board approval and informed consent, 42 undergraduate medical students and 24 experience anesthesia providers participated in our prospective blinded cross-over study. Each participant received standardized instruction and viewed a video demonstration of both intubation techniques using the GlideScope®. Two attempts at intubation with the GlideScope® using both the traditional and modified technique were performed on an airway task trainer(Lardal) in a randomized fashion. The primary outcome of the study was time to intubation (sec) with each technique. Secondary outcomes included the number of attempts, optimal view obtained, ease of intubation technique and their comfort in performing the procedure.

Results: The modified GlideScope® technique was easily taught to both novice and experienced users and overall performance was similar to the traditional technique (Figure #1). Time to intubation was significantly shorter in experienced users for both techniques (26s vs. 39s standard; 25s vs.39s modified, $p<0.001$). Success on the initial attempt was high for both techniques (83% novice, 93% experienced). In follow-up, 11/23 experienced users (48%) stated they would incorporate the modified technique in their future practice.

Discussion: User performance was similar for both techniques despite the fact that experienced users had no prior experience with the modified technique. We believe that the modified technique has the potential to reduce intubation times via a reduction in the time from visualization of the glottis to passage of the endotracheal tube. This and other potential benefits could be further assessed in future trials focusing on users who had acquired significant clinical experience with both techniques.

References: 1. Br J Anaesth 2005 94: 381–4
2. Can J Anaesth 2007 54: 21-7
3. West J Emerg Med 2010 11: 426-431

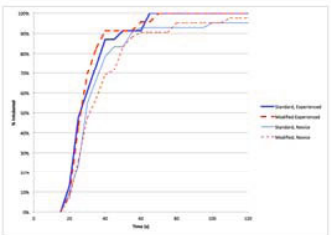


Figure #1: Effect of user experience and technique on time to intubation

1344461 - MYOCARDIAL PROTECTION IN MINIMALLY INVASIVE CARDIAC SURGERY, USING THE ENDOVASCULAR CORONARY SINUS CATHETER AND THE ENDOAORTIC CLAMP, IS EQUIVALENT TO OPEN MITRAL SURGERY

Melissa Colizza[1], Jean-Sébastien Lebon[1], Alain Deschamps[1], Pierre Couture[1], Antoine G. Rochon[1], Christian Ayoub[1], Jennifer Cogan[1], André Y. Denault[1], Baqir Qizilbash[1], Sylvain Belisle[1], Karine Toledano[1], Denis Bouchard[2], Michel Pellerin[2]

1. Anesthesiology, Montreal Heart Institute, Montreal, QC, Canada
2. Cardiac Surgery, Montreal Heart Institute, Montreal, QC, Canada

Introduction: Since minimally invasive mitral valve surgery (MIMS) began, several cardioplegia strategies have been employed, but no data has established which one provides optimal myocardial protection. In our institution, both antegrade and retrograde cardioplegia are administered in open mitral surgery (OMS) and MIMS. Although it is established that the endovascular coronary sinus (CS) catheter and the endoaortic clamp can deliver cardioplegia in MIMS with an acceptable complication rate , the quality of cardioprotection offered remains undetermined. Thus, we compared both cardioplegia administration strategies in MIMS and OMS to determine their equivalence regarding cardioprotection.

Methods: After Ethics committee approval, charts of patients admitted for MIMS since 2006 were reviewed. Patients without CAD undergoing isolated elective OMS through sternotomy were used as a control group. Cardioplegia in the MIMS group was delivered by the distal port of the endoaortic clamp positioned in the aortic root under TEE, and an endovascular CS catheter positioned under echographic and fluoroscopic guidance and monitored by CS pressure. Groups were matched for surgeons and surgery type. Data was collected regarding myocardial necrosis marker, hemodynamic instability, myocardial function, duration of hospitalization, ICU stay, and mortality. Myocardial infarction (MI) was defined by compatible ECG modification or a CKMB increase ≥ 100 UI/L.

Results: Data was collected from 111 MIMS files and 111 OMS files. Perioperative MI incidence was similar in both groups (4 MIMS vs 2 for OMS; p=0,6832). No statistically significant difference was found for maximal CK-MB (45.79 vs 40.79; p=0.4712) and number of patient with CK-MB levels > 50 UI/L (31 vs 28; p=0.7614). However, mean troponin levels in MIMS were significantly higher (1.50 vs 0.75; p=0.017). This includes a patient who had a massive perioperative MI due to an unidentified CS catheter displacement during surgery and subsequent decreased CS pressure and inadequate cardioplegia delivery. The information was not communicated. However, once this patient excluded, we obtain lower mean troponin levels (0.66 vs 0.75; p=0.0010) in the MIMS group. More patients received norepinephrine 24 hours post-operatively (25 vs 12; p=0.0297) in the MIMS group, but no difference was noted in second inotropic agent use (29 vs 27; p=0.8891). No difference was observed in duration of ICU (3.1 vs 4.0; p=0.3338) or hospital stays (9.3 vs 11.1; p=0.8712) and deaths (2 vs 1; p= 1.000).

Discussion: Cardioplegia delivered by the endovascular CS catheter and the distal port of the endoaortic clamp in MIMS provides equivalent myocardial protection when compared to OMS, if adequate position and function of the CS catheter is insured by monitoring of the CS pressure during cardioplegia administration.

References: Lebon JS and al. The endovascular coronary sinus catheter in minimally invasive mitral and tricuspid valve surgery: a case series. J Cardiothorac Vasc Anesth. 2010 Oct;24(5):746-51

1344466 - CRICOTHYROTOMY SKILLS ACQUIRED ON STATIC MODELS TRANSLATES INTO EFFECTIVE PERFORMANCE IN SIMULATED AIRWAY CRISES

Catherine Wong[1], Naveed T. Siddiqui[1], Cristian Arzola[1], Zeev Friedman[1], Laarni Guerina[1], Jessica Cheung[1], Eric You-Ten[1]

1. Department of Anesthesia, Mount Sinai Hospital, University of Toronto, Toronto, ON, Canada

Introduction: Studies demonstrate that anesthesiologists are uncomfortable performing cricothyrotomy(CT) in "cannot intubate-cannot ventilate"(CICV) airway crises because they are rare.[1] CT is traditionally taught and assessed using various "static" models including human cadavers, mannequins, and animal larynges that do not replicate the psychological and time stressors associated with a critical event. Whether CT skills acquired on static models translates into effective performance in simulated scenarios that mimic CICV crises remains unknown.

Methods: This REB-approved crossover study consisted of 65 consented anesthesia and emergency medicine postgraduate trainees and anesthesia assistants. All participants received a didactic review of the Difficult Airway algorithm, familiarization with the Melker 3.5 or 5.0 mm(Cook Medical, US) and Portex(Smiths Medical, US) CT kits, practiced CT on a low fidelity plastic tubing model and demonstrated acquired skills on a porcine larynx. Within 1 - 4 weeks of the pretest period, all participants performed CT on a high fidelity Simman® simulator-porcine larynx hybrid model during a simulated and non-simulated CICV scenario using the Portex and Melker 3.5 or 5.0 kits. The simulated CICV scenario occurred with full activation of the Simman® simulator including monitors and alarms, whereas in the non-simulated scenario monitors and alarms were inactivated. The order of the airway scenarios and kits was randomized for each participant. The hybrid model is unique in that it combines a clinical CICV crisis with a porcine larynx that closely mimics the anatomy and texture of the human larynx. Each performance was assessed for speed, injury severity, and failure rate. Bonferroni-adjusted p-value was used to determine statistical significance ($p < 0.05$).

Results: Our results show that simulation had no impact on the performance of cricothyrotomy. The speed, injury severity, and failure rate of performing CT using the Melker and Portex kits were similar in both simulated and non-simulated scenarios (Table 1). The order of each scenario and kit did not affect outcomes.

Discussion: Our study demonstrates that CT skills acquired on static models translates into effective performance in a simulated CICV scenario that may reflect actual performance in a clinical CICV airway crisis.

References: [1] Wong DT, et al., Cannot Intubate-Cannot Ventilate and Difficult Intubation Strategies. Anesth Analg 2005; 100: 1439-46.

Table 1. Outcomes of CT Performance In Simulated and Non-Simulated Scenarios

Outcomes	Scenario	CT Kit					
		Melker 3.5		Melker 5.0		Portex	
			n		n		n
[a]Speed $X^2 \pm$ SE	SImulated	101.5 ± 11.4	27	105.7 ± 10.4	27	58.6 ± 4.7	53
	Non-Simulated	101. 4 ± 23.3	28	86.5 ± 6.8	27	59.32 ± 4.8	53
	P value	NS		NS		NS	
[b]Injury Severity $X^2 \pm$ SE	Simulated	0.8 ± 0.15	27	1.78 ± 0.12	27	2.08 ± 0.10	53
	Non-Simulated	0.86 ± 0.25	28	1.74 ± 0.16	27	2.02 ± 0.11	53
	P value	NS		NS		NS	
[c]Failure Rate %	Simulated	16.1	5	18.2	6	18.5	12
	Non-simulated	12.9	4	18.2	6	18.5	12
	P value	NS		NS		NS	

[a]Speed: seconds from opening the CT kit to successful ventilation.
[b]Severity score: 0(None), 1(Mild), 2(Moderate), 3(Severe).
[c]Failure: the inability to ventilation in < 5 min, or > 2 attempts at CT.

1344475 - THE ANESTHETIC THAT BROKE MY HEART; CARDIAC ARREST UPON INDUCTION OF ANESTHESIA OF AN OTHERWISE HEALTHY YOUNG FEMALE

Jennifer M. Racine[1], **Craig Railton**[1]

1. Anesthesia, UWO, London, ON, Canada

Purpose: Takotsubo syndrome is an extremely rare and deadly cardiomyopathy that appears under circumstances of extreme stress1. A typical presentation mimics an acute myocardial infarction with similar electrocardiographic changes and moderate cardiac biomarkers release.2 Coronary angiography and ventriculogram usually reveal a reversible apical or mid-ventricular dyskinesia of the left ventricle without significant coronary stenosis on angiography. The pathogenesis of Takotsubo is unclear, but prognosis is good with reversal of the left ventricular dysfunction within weeks. One hypothesis is that sympathetic activation causes coronary vasospasm resulting in myocardial ischemia.3

Clinical Features: We report a case where a 23 yr old healthy Caucasian female athlete developed TakoTsubo cardiomyopathy upon induction of general anesthesia. The patient had previous uneventful anesthetics and was to undergo pharyngioplasty. Anesthesia was induced by intravenous: fentanyl 100 mcg , lidocaine 40 mg, propofol 200 mg and rocuronium 50 mg. Immediately following induction the patient developed ventricular tachycardia which deteriorated to ventricular fibrillation. She was defibrillated and returned to sinus rhythm. A first bolus and then infusion of epinephrine infusion was required to maintain adequate blood pressure. An electrocardiogram revealed ST elevation consistent with myocardial infarction. Intra-operative Trans Esophageal Echocardiogram revealed an ejection fraction of 20%, with a dilated left ventricular apex and global hypokinesia. Coronary angiography was normal. She was transferred to the intensive care unit and was supported by an intra-aortic balloon pump for 48 hours. She was extubated 24 hours later and discharged home after one week. Follow-up showed return of normal ventricular function in four months and she underwent the planned surgery with an uneventful general anesthetic 6 months post event. The patient was diagnosed with Takotsubo cardiomyopathy attributed to the stress and anxiety of surgery with contributions from the anesthetic.The patient consent was obtained.

Conclusion: Unexpected life threatening events can occur even in healthy patients. A literature search revealed that cardiomyopathy induced by stress may occur at any age. Heart failure can occur in unexpected situations and one's differential diagnosis of heart failure should include very rare conditions.

References: 1. J Med Case Reports. 2010 ;4:280
2. Acta Cardiol. 2007;62(5):507-1
3.Journal of the American College of Cardiology;2001 38 (1): 11–8
4.Kardiol Pol. 2009; 67(1):46-9

1344476 - POSTPARTUM PAIN: MATERNAL PERCEPTION OF PAIN MANAGEMENT

Leyla Baghirzada[1], Alison Macarthur[1]

1. Mount Sinai Hospital, Toronto, ON, Canada

Introduction: During the postpartum period women do not usually have health issues reviewed until 6 weeks. During an evaluation of women's postpartum perineal pain, we discovered many women had pain during the first week postpartum yet they failed to use physical measures or pharmacological agents to relieve their discomfort1 Our questions were “What were the major problems following hospital discharge?” and “What problems did they have managing pain since hospital discharge?” The purpose of this qualitative study was to examine information on how women perceive their postpartum morbidity and identify specific impediments to better pain management.

Methods: Following REB approval, 32 women were consented to participate in semi-structured postpartum home interviews conducted one month after delivery. Recruitment involved purposive sampling of: parity, gestational age, maternal age, socioeconomic groups, type of delivering physician, type of delivery, degree of perineal trauma amongst vaginal deliveries, groups, type of cesarean delivery, type of anesthesia for cesarean delivery. Interviews were audiotaped and transcribed verbatim. The qualitative analysis of the interviews included primary coding and clustering these codes to identify common themes and subthemes. The relationships between the themes and subthemes were analyzed and interpreted to determine main health outcomes following delivery.

Results: Out of 32 participating women, most were primiparous, delivered vaginally, over 30 years and were higher socioeconomic class. Most women (30/32) women had physical recovery after delivery hindered by four major concerns including breastfeeding pain and difficulties, delivery pain (perineal or incisional), reduced mobility and wound complications. An important finding of this study was the sense of abandonment from the health care providers that some first-time mothers expressed. Only 50% of women received a follow up phone call from the community public health nurse. Suggestions for improving postpartum experience for future mothers were mainly focused around preparation, getting help from family and friends, acknowledging the fact that personal reaction to the events that happen in postpartum period varies and most of the time is hard to predict and prepare for.

Discussion: The women in this study reported the range of unanticipated and unwanted physical and emotional health outcomes following delivery. This relevant missing information can be used in the design of a future, multidisciplinary (nursing, obstetrics, family practice, anesthesia and community health workers) clinical trial of postpartum management program.

References: Macarthur et al. Incidence, severity, and determinants of perineal pain after vaginal delivery. AJOG 2004; 191: 1199 – 204

1344484 - HOW IS THE INTERNET EDUCATING OUR OBSTETRIC ANESTHESIA PATIENTS?

Caitriona Murphy[1], Vinod Chinnappa[1], Clarita Margarido[1]

1. Department of Obstetrical Anesthesia, Sunnybrook Health Sciences Centre, Toronto, ON, Canada

Introduction: The Internet is a primary source of information that is easily accessible and readily available. Health and medical information inquiries constitute 45% of all searches performed using the major internet search engines [1]. This study was undertaken to investigate content, transparency, design and rank of sources of obstetrical anesthesia online information.

Methods: Internet search engines Google, Bing and Yahoo were used to search predefined terms “labor epidural” and “pain relief in labor” by 2 independent assessors on October 12th 2011. The first ten websites retrieved for each search-term and engine were selected and ranked independently. Content of website was assessed based on best evidence with regard to epidural analgesia and end points: risk of cesarean delivery, stage of labor for epidural catheter insertion and effects on breast-feeding [2,3]. Transparency was based on disclosure of sponsorship, year of posting, contact feedback, languages, and profit or non-profit status. Finally design of each site was reviewed in terms of search function, index, discussion forum and listed references. Youtube and Google Images were excluded. Evidence based content disseminated by non-profit and profit website sources were compared using the chi-square test.

Results: The number of retrievals varied among search engines (Table 1). In total, 34 websites were identified and 28 met criteria for review. Only one site appeared in all 6 searches. 21.4% (N=6) of epidural information sources noted physician input (4 Anesthetists, 1 Pediatric Endocrinologist, 1 Obstetrician). 32% (N=9) of sources cited references and of these 60% were dated 2001 or older. The frequency of “labour epidural stated as risk factor to increase cesarean section delivery rate", “minimal dilation of 4 centimeters as a mandatory requirement for epidural insertion” and “epidural has harmful effects on breastfeeding” were significantly different between non-profit and profit sources (P =0.023, P=0.012 and P=0.028 respectively). 57% (N=16) of sites provide discussion forums as a source of patient opinion and experience.

Discussion: Patient concerns and questions regarding obstetric anesthesia outcomes are being answered through unregulated and potentially inaccurate internet sources. As providers of this service, Obstetric Anesthetists and specialty professional organizations should consider how to effectively disseminate educational information to reach this target patient population.

References: 1.Kaimal. AJOG 2008;198:682.e1-682.e5
2.Wong C. Neuraxial labor analgesia and pregnancy outcome: fact and fiction. ASA Refresher Courses in Anesthesiology 2010;38
3.Anim-Somuah et al. Cochrane Database Syst Rev 2011;12:CD 000331

Numbers of hits retrieved for each search term.

Search term	Google	Bing	Yahoo
Labor epidural	3,270,000	3,470,000	3,060,000
Pain relief in labor	5,190,000	52,100,000	51,800,000

1344525 - BIOCHEMICAL CHARACTERIZATION OF NEUTRAL ENDOPEPTIDASE INHIBITORS FROM CRUDE EXTRACTS OF THE POLYPORE FUNGUS *PIPTOPORUS BETULINUS*

Justina J. Koshinsky[1], John Balsevich[2], Andrea Todd[1]

1. Anesthesiology, University of Saskatchewan, Saskatoon, SK, Canada
2. Plant Biotechnology Institute, National Research Council of Canada, Saskatoon, SK, Canada

Introduction: Opioid peptides exert their physiological actions by interacting with the various classes of opioid receptors present on both pre- and post-synaptic membranes of opioid and opioid target neurons. The pentapeptide enkephalins play a major role in nociception (pain perception), cognitive functions, affective behaviors, and locomotion.

Neutral endopeptidase (NEP) is a zinc-dependent cell surface enzyme that cleaves and inactivates endogenous enkephalins. It is a membrane bound enzyme, and is localized in the vicinity of opiate receptors in the central nervous system. The enkephalins are produced by the pituitary gland and the hypothalamus in vertebrates during strenuous exercise, excitement, and orgasm, and they resemble the opiates in their abilities to produce analgesia (inhibition of pain) and a sense of well-being.

Piptoporus betulinus, commonly known as the birch bracket, is a polypore bracket fungus that grows almost exclusively on birch trees in the Northern Hemisphere. A preliminary screening investigation of this fungus indicated inhibitory effects on NEP.[1]

The objective of this study was to assess the IC_{50} of various crude extracts from *P. betulinus* on NEP, and to determine the extraction method yielding the lowest IC_{50}.

Methods: Birch brackets were collected, dried, pulverized, and extracted with aqueous, methanol, and ethyl acetate solvents. The extracts were then dried, weighed, and reconstituted to a known concentration. A two-step fluorometric enzyme assay was employed to assess NEP inhibition in fungal extracts. Data was obtained from a minimum of two independent experiments with 3 to 6 parallel samples, and presented as the mean of percent inhibition ± SEM. The IC_{50} values were calculated by either interpolation or extrapolation after transformation of dose-effect-curves by linear regression, and reported as either an absolute or relative IC_{50}.

Results: The absolute IC_{50} of the ethyl acetate and aqueous fractions obtained by interpolation were 65.85 µg/ml and 19.71 µg/ml respectively; using extrapolation, the relative IC_{50} of the methanol extraction was 1.44 µg/ml.

Discussion: There is great interest in the identification of novel NEP inhibitors with improved properties for clinical use. This study serves to further our body of knowledge in the search for novel NEP inhibitors, and provides a foundation to test the analgesic and antinociceptive properties of these extracts in animal pain models.

References: 1. *Pharmazie* 1996 51:501–3

1344544 - PREVALENCE OF OSA IN SURGICAL POPULATION: A SYSTEMATIC REVIEW

Jigesh K. Mehta[1], Jean Wong[1], Kingman Strohl[2], Frances Chung[1]

1. **Anesthesia, Toronto Western Hospital,University Health Network, University of Toronto, Toronto, ON, Canada**
2. **Pulmonary, Critical Care and Sleep Medicine, Western Reserve University , Cleaveland, OH, United States**

Introduction: In the general population, obstructive sleep apnea (OSA) as defined by an apnea/hypopnea index (AHI) of more than 5 has been reported to affect 24% of males and 9% of females. However, the prevalence of OSA in the surgical population has not been well characterized. The purpose of this systematic review was to determine the prevalence of OSA in the adult surgical population.

Methods: The databases Medline, Embase, Cochrane database of Systemic Reviews and Cochrane Central were searched from 1950 to the present. We searched for prospective or retrospective studies reporting the prevalence of OSA as determined by polysomnography (PSG) in adult patients undergoing surgery. Studies that did not use PSG or non-English language studies were excluded.

Results: The search strategy resulted in 8888 articles. After excluding irrelevant papers , sixteen studies were selected including 9 prospective and 7 retrospective studies. Articles (n=628) were excluded for the following reasons: irrelevant papers (457), OSA in pediatric patients, general and medical population (134), reviews (31), incidence papers (4) and case reports (2). Among the 16 studies, the types of surgery reported were: 4 general, 9 bariatric, 1 intracranial tumor, 1 dental and 1 epilepsy surgery. Fifteen studies included both genders, while one study included females only. Four studies offered PSG to all patients. In the remaining studies, PSG was offered to patients who screened positive for OSA or had symptoms suggestive of OSA. The prevalence of OSA in the general surgical population ranged from 69- 82%; bariatric surgical population 40- 93%; intracranial tumors 63.3%; dental 96%; and epilepsy surgery 33%.

Discussion: This review shows that OSA is highly prevalent in patients undergoing bariatric surgery, general surgery and other types of surgery. However, the high prevalence may be due to self-selection bias since the patients with symptoms suggestive of OSA may be more likely to consent for PSG studies.

References: 1. N Eng J Med 1993; 328:1230-35

Table: Prevalence of OSA (AHI ≥ 5) in Surgical Population

Type of Surgery	Study ID	Country	Prevalence of OSA High risk (%)		
			Over all	Male	Female
General	Fidan 2006	Turkey	77	NA	NA
	Chung 2008	Canada	68.9	79.5	58.4
	Finkel 2009	U.S.A	82	NA	NA
	Ramchandran 2010	U.S.A	75.7	85.7	65.9
Bariatric	Boxem 1999	Netherland	39.5	68.4	20.6
	Frey 2003	U.S.A	71	86	68
	O' Keeffe 2004	U.S.A	76.6	47.6	63.7
	Daltro 2007	Brazil	93.6	96.7	92.3
	Lopez 2008	U.S.A	78	NA	NA
	Lee 2009	China	82.2	92.7	75
	Rao 2009	Singapore	73	NA	NA
	Sharkey 2010	U.S.A	86	NA	86
	Weingarten 2011	U.S.A	78.5	95.1	71.4
Intracranial tumors	Pollak 2003	Israrel	63.6	NA	NA
Dental	Levendowski 2008	U.S.A	96	NA	NA
Epilepsy	Malow 2000	U.S.A	33	50	19

Abbreviations: AHI = Apnea- Hypopnea Index

1344548 - DIFFICULT TRACHEOSTOMY: NEUROFIBROMATOSIS AND NECK HEMATOMA

Julia Haber[1], **Laura Duggan**[1]

1. Department of Anesthesiology, UBC, New Westminster, BC, Canada

Purpose: When the margin of safety is extremely narrow, an individualized airway strategy for the management of difficult tracheostomy is essential (1).

Clinical Features: Consent for this report was obtained. A 44-year-old woman with neurofibromatosis Type I presented with a massive neck swelling secondary to rupture of her left occipital artery during a Valsalva maneuver. Initial awake fiberoptic intubation was successful. The artery was emboli zed but widespread vessel ectasia was noted(2). Ongoing hematoma formation with increased interstitial and venous pressures resulted in progressive head and neck swelling. Conversion to tracheostomy was undertaken to secure the airway. Maneuvers such as BVM, endotracheal intubation, and use of an extra-glottic rescue device or emergent surgical airway were all thought to be associated with a high risk of failure. A clear, step-wise airway strategy was developed with the surgeon.

1. If oxygenation became difficult during the procedure, a fiberoptic bronchoscope (FOB) loaded with an Aintree catheter (AC) would be advanced through the existing ETT and manual ventilation via the AC would be attempted, with recognized potential for barotrauma due to lack of egress of tidal volume.

2. If 1. failed, a small ETT would be re-introduced over the AC.

3. If 2. failed, transtracheal provision of oxygen through an open tracheal incision using a Ravussin catheter as a temporizing measure would be attempted. Simultaneously, placement of a Fastrach LMA to assist FOB-guided re-intubation, would occur, knowing its success rate may be low.

4. If the tracheostomy was successful, the ETT would be removed under FOB visualization with a 14F airway exchange catheter placed prior to removal.

Short immobile neck, tracheal deviation, and copious bleeding from friable vasculature made the tracheostomy extremely challenging. FOB visualization during extubation showed almost complete supraglottic airway collapse.

Conclusion: Neurofibromatosis is associated with blood vessel ectasia as well as neurofibromas of the pharynx or larynx(3). Creation of a patient-specific airway strategy with the surgeon involved is essential for patient safety and optimal outcome.

References: 1. www.rcoa.ac.uk/index.asp?PageID=10892
2.Cardio Interv Rad 2010;34:131-35
3.BJA 2001;86:555-64

Patient with NF Type 1. Rupture of her left occipital artery resulted in tremendous face and left neck swelling.

1344581 - ENDOTRACHEAL TUBE PALPATION TO ASSESS ENDOTRACHEAL DEPTH

William P. McKay[1], Jim Klonorakis[1], Vladko Pelivanov[1]

1. Anesthesia, University of Saskatchewan, Saskatoon, SK, Canada

Introduction: Correct endotracheal tube (ETT) depth placement is achieved when the distal tip is in mid-trachea with the head in neutral alignment. This study reports a study of palpation of the trachea during intubation to achieve correct ETT depth. A similar technique is useful in newborns.[1] When palpating the anterior neck over the trachea during intubation, one can feel the tip of the ETT move down the trachea as the tracheal rings move slightly forward one by one as it slides by, enabling determination of tip position.

Methods: With Research Ethics Committee approval, ASA I and II patients expected to be intubated for elective surgery were recruited. Unstable patients and those with reflux or difficult airways were excluded. Induction and intubation were accomplished by the clinical anesthesiologist, who was asked simply to “advance the tube slowly once it is through the cords”. The trachea was palpated with 3 fingers by an investigator: the index fingertip over the cricothroid membrane, the ring finger in the sternal notch, and the middle finger over the anterior trachea between. As the ETT is advanced, its tip can be felt moving down the trachea as it passes each finger. When the ETT tip was felt in the sternal notch, the anesthesiologist was asked to stop advancing the ETT and immobilize it. Its position in the trachea was then determined by fibre-optic bronchoscopy.

Results: 79 patients were approached, and 77 consented to the study. The movement of the ETT in the sternal notch was easily or moderately easily palpated in 60 patients (palpable); barely palpable or impalpable in 17 (see Table). Ease of palpation was inversely correlated with age (R = -0.27). Smokers, diabetics, and obese patients all had higher percentages of difficult palpation (table). In subjects where the ETT motion was palpable, The ETT tip was too shallow (<2cm from cords) in 2 and too deep (<2cm from carina) in 7. Of the 7 with ETT too deep, 4 had depth-at-teeth < 21cm for females, and <23cm for males, widely used measurements to set the correct ETT depth.[2]

Discussion: Elderly, diabetic, and smoking patients have rigid tracheal rings that do not allow determination of ETT position by this technique. More ETTs were too deep than too shallow. It appears that the trachea is pulled upward relative to the boney thorax in achieving sniffing position. Further research will study and determine an optimal adjustment for this. Some of the misplacements were attributable to the first introduction of the technique to the involved clinical anesthesiologist, with better precision on subsequent patients. However, it appears to be quickly learned; more research will be needed to determine this and its ultimate clinical value. Measurement of ETT depth at teeth does not reliably predict safe ETT depth. This simple technique shows promise, with refinement, of clinical utility in placing the ETT at the correct depth and avoiding unnecessary xrays in intensive care units.

References: [1] Jain A et al. Resuscitation 2004; 60(3): 297
[2] Owen RL, Cheney FW. Anesthesiology 1987; 67: 255

Ease of palpation	Easy or moderate	Barely or impalpable
Number of subjects	60	17
Smokers (%)	21 (35)	12 (71)
Diabetes	5 (8.3)	2 (11.7)
BMI >30	20 (33)	9 (53)

1344603 - A COMPARISON OF TWO CRICOTHYROTOMY DEVICES ON A UNIQUE HIGH FIDELITY SIMULATOR-PORCINE LARYNX HYBRID MODEL

Eric You-Ten[1], Catherine Wong[1], Cristian Arzola[1], Naveed T. Siddiqui[1], Zeev Friedman[1], Jessica Cheung[1], Laarni Guerina[1]

1. Department of Anesthesia, Mount Sinai Hospital, University of Toronto, Toronto, ON, Canada

Introduction: Cricothyrotomy (CT) is a life-saving procedure in “cannot intubate-cannot ventilate” (CICV) situations. Two commonly available devices for CT include the Portex (tube-over-needle technique) and Melker (Seldinger technique) kits.

Previous studies comparing these devices have involved "static" airway models, such as mannequins[1] , which lack the stressors of a real-life CICV crisis and the ability to evaluate precision of airway placement. This study is the first of its kind, using a hybrid porcine larynx - high fidelity patient simulator in a CICV scenario to compare the efficacy and safety of the Portex versus Melker kits in CT performance.

Methods: This REB-approved crossover study consisted of consented anesthesia and emergency medicine postgraduate trainees, and anesthesia assistants. All participants received a didactic review of the ASA Difficult Airway algorithm, familiarization with the Melker 3.5 or 5.0 mm(Cook Medical, US) and Portex(Smiths Medical, US) CT kits and practiced CT on a previously described low fidelity plastic tubing model [2] and on a porcine larynx. One to four weeks after the review, all participants performed CT on the hybrid model during a simulated CICV scenario using the Portex and either the Melker 3.5 or 5.0 in randomized order. Each performance was videotaped and assessed for speed, injury severity, tube repositioning, and failure rate. Bonferroni-adjusted p-value was used to calculate statistical significance ($p < 0.05$).

Results: Table 1 shows the performance of CT with the Portex compared to the Melker 3.5 and 5.0 kits. The speed of airway insertion was similar with the Portex compared to the Melker kits (speed ratio of 0.88 ± 0.14, $p = 1.0$ and 0.71 ± 0.1, $p = 0.71$). However, the Portex device caused significantly more injury (injury difference 1.02 ± 0.13, $p < 0.0001$ and 0.31 ± 0.12, $p < 0.029$). There was a significantly greater likelihood that the Portex tube abutted the posterior wall of the trachea and required repositioning in order to achieve ventilation (odds ratio 25. 7, $p < 0.0001$ and 8.2, $p < 0.0001$). Failure rates were comparable for Melker vs Portex (6 vs 3 and 7 vs 3). The kit order did not affect outcomes.

Discussion: Using our hybrid model, the Portex device produced more injury, required more tube repositioning, and had more failures despite having similar insertion time. This suggests that in a clinical CICV airway crisis, the Melker kit may be safer to use.

References: [1] Assmann NM, Wong DT, Morales E. A comparison of a new indicator-guided with a conventional wire-guided percutaneous cricothyroidotomy device in mannequins. Anesth Analg. 2007 Jul;105(1):148-54 [2] Friedman Z, You-Ten KE, Bould MD, Naik V. Teaching lifesaving procedures: the impact of model fidelity on acquisition and transfer of cricothyrotomy skills to performance on cadavers. Anesth Analg. 2008 Nov;107(5):1663-9

Table 1. Comparison of Portex Versus Melker Kits in Performing CT in A Simulated CICV Crisis

CT Kit	Speed Ratio x^2 ± SE (p value)	Difference in Average Injury (p value)	Odds Ratio for Tube Repositioning (p value)	Failure Rate
Portex vs Melker 3.5 (n = 20)	0.88 ± 0.14 (p = 1.0)	1.02 ± 0.13 (p < 0.029)	25.7 (p < 0.0001)	6 vs 3
Portex vs Melker 5.0 (n = 24)	0.71 ± 0.1 (p = 0.71)	0.31 ± 0.12 (p < 0.0001)	8.2 (p < 0.0001)	7 vs 3

Speed: time (s) from kit opening to successful ventilation.
Injury: based on a 3-point injury scale: 0(None) – 3 (Severe).
Repositioning: tube manipulation required to achieve ventilation.
Failure: inability to ventilate in < 5 min, or > 2 attempts at CT.

1344606 - BRAIN OXYGENATION DURING CARDIOPULMONARY BYPASS IN DIABETICS

Claudine Pelletier[1], Jean S. Bussieres[1], Mickaël Martin[2], Nathalie Gagné[1], Paul Poirier[3], Patrice Brassard[2]

1. **Centre de recherche, Institut universitaire de cardiologie et de pneumologie de Québec, Québec, QC, Canada**
2. **Division de kinésiologie, Département de médecine sociale et préventive, Faculté de médecine , Université Laval, Québec, QC, Canada**
3. **Faculté de Pharmacie, Université Laval, Québec, QC, Canada**

Introduction: In order to preserve perfusion of vital organs such as the heart, kidneys and the brain during the period of cardiopulmonary bypass (CPB) of a cardiac surgery, mean arterial pressure (MAP) is usually kept above 60 mmHg with administration of vasopressors (1). Agents utilized to maintain MAP during CPB (phenylephrine (PE) and norepinephrine (NE)) seem to have a negative impact on brain oxygenation when administered to correct anesthesia-induced hypotension (2). This is of particular concerns for diabetics (D) since hypotension is more frequent following induction of anesthesia in these patients (3). In addition, D need more vasopressors to correct anesthesia-induced hypotension compared to non-diabetics (ND) (4). However, the influence of NE and PE on brain oxygenation during CPB in D is presently unknown. Accordingly, the aim of this pilot study was to evaluate the impact of NE and PE on brain oxygenation in D and ND during the CPB period of a cardiac surgery.

Methods: This study was approved by the local ethics committee. Fourteen D and seventeen ND undergoing cardiac surgery participated to this study. In order to maintain MAP above 60 mmHg during the CPB period, NE (D: n=6; ND: n=8) and PE (D: n=8; ND=9) were randomly administered. Systemic hemodynamics and brain oxygenation (ScO2) measured by near-infrared spectroscopy and hidden from the clinicians of the study, were continuously recorded. We measured the percentage of total CPB time during which ScO2 was reduced by 15% from the baseline value monitored before induction of anesthesia. The quantity of vasopressors for the period during which ScO2 was significantly reduced during CPB was also calculated.

Results: D and ND patients from each group had similar age, height and body weight ($p<0.05$). The targeted MAP was reached in D and ND with the administration of NE (63±3 vs 64±4 mmHg; p=0.5) and PE (63±6 vs 61±4 mmHg; p=0.5). With the administration of NE, ScO2 was reduced for a longer percentage of time in D vs ND (45±44 vs 10±19%; p=0.04). During that period, there was a trend toward a more important need for NE in D to maintain the targeted MAP (0.05±0.04 vs 0.01±0.02 µg.kg-1.min-1; p=0.06). The administration of PE was also associated with a higher percentage of time with reduced ScO2 (37±40 vs 11±21%) and a more important quantity of vasopressor (0.95±1.3 vs 0.3±0.5 µg.kg-1.min-1) in D vs ND, without reaching statistical significance (all p=0.2).

Discussion: The results of this pilot study suggest that D undergoing cardiac surgery and receiving NE during CPB have reduced ScO2 for a longer percentage of CPB time in comparison with ND. In addition, a more important quantity of NE is needed for these patients to maintain MAP during CPB.

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2- Neurocrit Care 2010 12 : 17-23
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4- J Anesth 2010 24: 748-756

1344609 - BLOOD PATCH REDO IN A 4 YEAR-OLD CHILD

Bruno C. Borges[1], Jason Hayes[2], Gail Wong[2], Lisa Isaac[2]

1. Department of Anesthesia, McMaster University, Hamilton, ON, Canada
2. Department of Anesthesia, The Hospital for Sick Children, Toronto, ON, Canada

Purpose: Report unusual development of PDPH symptoms and safety blood patches.

Clinical Features: Parents and patient's consent was obtained for this report. The parents of a 4-year-old, 17kg girl had noted clear fluid dripping from the child's nose for as long as they could remember. An abnormality of the nasal cavity was noted during asthma workup. The patient did not have any neurologic symptoms. The child's medical history included asthma under control, twin severe prematurity (born at 26 weeks) and RDS requiring prolonged intubations. The child was developing well. A computerized tomography showed a skull base defect with an associated encephalocele. The patient was then scheduled for a transnasal endoscopic encephalocele repair with lumbar drain insertion.

A week later, patient underwent surgery. General anesthetic was started. lumbar drain was places with a 18g Tuohy needle. The procedure was reported to be difficult. The rest of the surgery was uncomplicated.

The lumbar drain remained in place for 5 days. The patient was then discharged home. A month later, the patient was brought to the hospital complaining of worsening frontal headaches, nausea and vomiting for 4 days. The mother of the patient reported that symptoms started after the patient fell on a sitting position off one flight of stairs. Physical exam showed no nasal discharge, supple neck, no meningismus. Sensory and motor exams were unchanged. Headache alleviated with recumbency. Admission blood work was within normal range. Blood and urine cultures were negative. MRI showed an intact encephalocele repair site and a normal looking brain, but fluid containing outpoutchings of the epidural space(L4-S1). Patient was discharged home, but came back 6 days after, with worsening symptoms. MRI was repeated and Pain service/Anesthesia was consulted for a blood patch.

The patient underwent general anesthesia with sevoflurane. Venipuncture took place and lactater ringers injeciton of 50 mL/h was started. The patient was then turned to left lateral decubitus and flexed back. Ultrasound of the spine determined the L5-S1 interspace level and needle depth. Ten mL of blood were drawn from another vein, but only 7mL were injected. Bradycardia was obvious 5 minutes after the procedure, when the patient was placed in the post-anesthesia care unit (PACU) monitors. The ECG showed a regular sinus rhythm of 50 bpm, systolic blood pressure remained in the low 90's. Patient was discharged after 2h of observation. At the ward, the patient remained bradycardic from the PACU discharge until around 6:00am, when the bradycardia spontaneously resolved.

In the next day, there was no improvement on symptoms. A second blood patch was booked for the following day. Identical general anesthetic was initiated. However we aimed to patch the L4-L5 interspace at that time. Thirteen mL of blood were injected, by the same anesthesiologist. The symptoms completely resolved in the next morning and patient home discharged after 24h of observation. The parents were contacted by phone after one week and then one year later. No recurrent symptomatology was reported by the parents and the child is developing well.

Conclusion: Blood patch is safe to be repeated in a child. The amount of blood to be used remains undetermined and may vary in the same patient.

1344623 - SYSTEMATIC REVIEW OF PRE-CLINICAL AND CLINICAL STUDIES COMPARING DIFFERENT VASOPRESSOR DOSING STRATEGIES

Frederick D'Aragon[1], Emilie Belley Cote[2], Francois Lamontagne[3]

1. Anesthésie-Réanimation, Université de Sherbrooke, Sherbrooke, QC, Canada
2. Cardiologie, Université de Sherbrooke, Sherbrooke, QC, Canada
3. Médecine Interne, Université de Sherbrooke, Sherbrooke, QC, Canada

Introduction: Patients with septic shock receive vasopressors under the assumption that correcting hypotension improves perfusion, organ function and survival. However, the association between pharmacologically enhanced blood pressure and tissue perfusion remains unclear. Vasopressor use in septic shock is influenced by guidelines that recommend maintaining a mean arterial blood pressure of 65 mmHg or more (grade C). This systematic review aims to compare the effects on the macro- and microcirculation of different blood pressure targets in patients with septic shock and in vivo septic shock animal models.

Methods: We searched MEDLINE, the Cochrane Central Register of Controlled Trials and EMBASE. We included clinical and in vivo pre-clinical parallel arm studies of septic shock or septic shock models. We excluded before and after studies. Two reviewers independently assessed eligibility from titles and abstracts and, subsequently, full text articles. Disagreements were resolved through consensus or ultimately third party arbitration. We measured agreement between reviewers using kappa and collected data using a standardized pre-piloted form incorporating a measure of the results' risk of bias (internal validity) and clinical relevance (external validity).

Results: Two reviewers screened 5351 titles and abstracts. Of these, 183 were selected for full-text review. In the end, 3 studies (4 distinct experiments) met the inclusion criteria. The kappa for agreement between authors was 0.61. In the 3 pre-clinical experiments, lipopolysaccharide infusion modelled septic shock in different animal species and fixed doses of dopamine were compared. The number of animals per group in each study varied between 6 and 11.The first study yielded conflicting results with higher dopamine doses associated with higher arteriolar blood flow when administered with fluids but not when administered without fluids. In a second study, higher dopamine doses were associated with lower renal blood flow. In the only human study eligible for this review, 16 patients with septic shock were randomly allocated to a target mean arterial blood pressure of 65 mmHg vs. 85 mmHg. This study revealed no difference in gastric tonometry or hepatic blood flow at 6 hours but the total dose of vasopressors administered to both groups was not different, which limits interpretability.

Discussion: This systematic review of clinical and pre-clinical studies comparing different vasopressor dosing strategies demonstrates a lack of scientific evidence to guide the selection of blood pressure targets for vasopressor titration in septic shock. Rigorous, clinically relevant, pre-clinical dose-finding experiments would help to direct future clinical research in this field.

Table 1-Summary of Clinical and Pre-Clinical Studies

Experiment	Year	Animal model	Septic shock model	Number of subjects	Comparison	Micro/MacroCirculation evaluated	Results
Santos	2011	Hamster	LPS infusion	11 in each group	Dopamine 3 mcg/kg/min vs Dopamine7,5 mcg/kg/min	Skin functional capillary density by intravital video-microscopy	No significant difference between groups
	2011	Hamster	LPS infusion	6 in each group	Dopamine 3 mcg/kg/min vs Dopamine7,5 mcg/kg/min Associated with volume resuscitation	Skin functional capillary density by intravital video-microscopy	Significantly higher arteriolar blood flow at 6 and 24 hours in the higher dose group

Chin	2002	Piglet	LPS infusion	7 in each group	Dopamine 10 mcg/kg/min vs Dopamine20 mcg/kg/min Associated with volume resuscitation	Radiolabeledmicrosphere evaluation of renal blood flow	Significantly lower renal blood flow in higher dose group at 3 hours
Suk	2007	n/a (Human)	n/a	8 in each group	Target mean arterial blood pressure 65 mmHg vs 85 mmHg	Hepatic blood flow and gastric tonometry	No significant difference between groups

1344633 - RETROSPECTIVE ANALYSIS OF PAIN SCORES AND SIDE EFFECTS OF EPIDURAL REGIMENS IN PATIENTS UNDERGOING PECTUS EXCAVATUM CORRECTION SURGERY

Andrew Tse[1], Asad Siddiqui[1], James Paul[1], Bernice Teh[1]

1. Department of Anesthesia, McMaster University, Hamilton, ON, Canada

Introduction: Perioperative care of patients undergoing minimally invasive pectus excavatum repair (Nuss procedure) is challenging because of severe postoperative pain.[1] Minimizing this pain is important to facilitate ambulation and minimize length of stay.[2] Although multiple epidural regimens with varying opioids are presently used for pain management, there is currently no clinical consensus regarding which epidural regimen provides the best analgesia outcomes.[3, 4] Few studies have compared clinical outcomes between a highly lipophilic opioid (fentanyl) and one that is intermediately hydrophilic (hydromorphone) in an epidural regimen, but some of the literature documents that hydromorphone has a better side effect profile than fentanyl.[5, 6] This study was therefore performed at a tertiary care children's hospital to determine the epidural opioid that was most effective and associated with the fewest side-effects and critical incidents.

Methods: Approval was obtained from a Local Research Ethics Board for retrospective review of medical charts/health records. Following this, a retrospective chart review and computer pain database extraction was completed for 55 patients having undergone the Nuss procedure at a tertiary care children's hospital between 2002 and 2005. 35 of these patients met our inclusion criteria of having received post-operative pain control with one of the two epidural regimens commonly employed at our centre. Our primary outcome for this study was mean daily pain scores, and our secondary outcomes included opioid side effects, severe pain episodes, and adverse events. Continuous outcomes (like pain scores) were compared using the Students t test and nominal outcomes (like the incidence of nausea/vomiting, sedation and pruritus) were compared using Chi Square analysis. The criterion for statistical significance was set a priori at alpha = 0.05.

Results: Two epidural regimens were identified: Regimen A - 0.125% bupivacaine and 10 mcg/ml hydromorphone, and Regimen B - 0.125% bupivacaine and 5 mcg/ml fentanyl. Overall, 86.3% of patients receiving regimen A and 69.2% of patients receiving regimen B experienced severe pain at some point throughout their post-operative course. No significant difference was found between regimens for the following outcomes: maximal pain scores (p=0.923), presence of severe pain, need for breakthrough analgesia (p=0.282), or need for treatment for nausea (p=392) or pruritis (p=0.091). Although a trend was seen towards an increased incidence of pruritis in Regimen A, the results did not reach statistical significance. Mean duration of hospital admission was 6.7 days and there was no significant difference between regimens.

Discussion: The type of opioid (hydromorphone vs fentanyl) in a bupivacaine-based epidural regimen appears to make little difference in daily maximum pain scores, breakthrough analgesia requirements, side effect profile, and mean hospital stay in patients following Nuss procedure.

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1344635 - THE POLYSOMNOGRAPHIC EFFECT OF PREGABALIN IN POSTOPERATIVE PATIENTS

Daniel I. McIsaac[1], Alan Chaput[1], Chris Skinner[2]

1. Department of Anesthesiology, University of Ottawa, Ottawa, ON, Canada
2. Division of Neurology, University of Ottawa, Ottawa, ON, Canada

Introduction: Sleep is a naturally recurring state of relatively suspended sensory and motor activity. Sleep is divided into random eye movement (REM) and non-random eye movement (NREM) stages, as defined by polysomnography (PSG) (1). NREM sleep is further subdivided into substages N1, N2 and N3. High quality sleep architecture is defined by increased time spent in stages N2, N3 and REM. Furthermore, substage N3 is associated with the restorative functions of sleep(2). Multiple perioperative factors disrupt sleep architecture, including general anesthesia, pain and opioids(3,4). Perioperative PSG data is lacking from the literature, particularly 24 hour PSG. Furthermore, few pharmacologic agents have been tested with the goal of improving perioperative sleep architecture. Pregabalin is an α2δ calcium channel ligand with demonstrated usefulness in the treatment of perioperative pain(5). Pregabalin improves sleep architecture compared to placebo and other sedatives outside of the perioperative period(6,7,8). The goal of this study was to explore the effects of pregabalin on postoperative sleep architecture, using PSG, in patients undergoing orthopedic surgery.

Methods: Following Research Ethics Board approval, a double blind, randomized pilot study of 30 subjects, aged 65 and older, undergoing major orthopedic surgery was planned, recruiting from a larger double blind RCT investigating postoperative delirium. Patients received pregabalin or placebo, as a single preoperative dose and three times daily for 3 postoperative days. Twenty four hour PSG was completed, starting on the morning of postoperative day 2. The proportion of time spent in each sleep stage, as well as the time spent in each sleep stage and combined N2, N3 and REM was calculated for each patient.

Results: Seven patients, with ASA physical status 2 or 3, and a mean age of 72 (SD=5) were recruited; the primary study completed recruitment prior to the sleep study achieving its target sample size of 30. Five patients received placebo and 2 received pregabalin. Mean minutes spent in stages N2, N3 and REM was 354 (SD=254) for the pregabalin group and 272 (SD=81.6) for the placebo group. Mean minutes in stage N3 and REM was 60.0 (SD=31.8) and 45.8 (SD=39.2) respectively in the pregabalin group and 6.10 (SD=10.39) and 21.00 (SD=24.36) in the control group. Three of the 5 control patients spent no minutes in stage N3.

Discussion: This pilot study provides 24 hour postoperative PSG for seven patients, adding to this little studied area of sleep and perioperative medicine. Results suggest that pregabalin may increase the amount of time spent in the restorative stages of sleep. Recruitment and retention of study patients was hindered by participants' mobility concerns while wearing PSG equipment for 24 hours. Future studies should address pregabalin's effect on sleep architecture using larger sample sizes and portable PSG equipment.

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1344665 - HEMODYNAMIC PARAMETER VARIATIONS IN RELATION TO DIFFERENT LEVELS OF POSITIVE END-EXPIRATORY PRESSURE IN A POST-OPERATIVE CONTEXT

Frederick D'Aragon[1], Emilie Belley Cote[2], Serge Lepage[2], Btissama Essadiqi[2], Marianne Coutu[3], Stephane Coutu[1], Paul Farand[2]

1. Anesthésie-Réanimation, Université de Sherbrooke, Sherbrooke, QC, Canada
2. Cardiologie, Université de Sherbrooke, Sherbrooke, QC, Canada
3. Chirurgie Cardiovasculaire , Université de Sherbrooke, Sherbrooke, QC, Canada

Introduction: The benefit of pulmonary artery catheter use is controversial but it is considered the gold standard for hemodynamic monitoring. Variations of hemodynamic parameters in relation to positive end-expiratory pressure (PEEP) are not well documented. These variations can influence the management of mechanically ventilated patients. Diastolic pulmonary artery pressure (PAP) is frequently used as an approximation for pulmonary capillary wedge pressure (PCWP), but the effect of varying levels of PEEP on these two values is unknown.

Methods: After approval by the ethics committee, 20 patients scheduled for cardiac surgery with pulmonary artery catheter installation were recruited. Patients with severe chronic obstructive pulmonary disease, severe valvular heart disease not corrected during the current surgery or with an intra-aortic balloon pump postoperatively were excluded. Immediately following surgery, hemodynamic measures were taken with varying levels of PEEP (0, 5, 10 and 15 cmH2O) after a 10 minute delay. Vital signs, central venous pressure (CVP), PAP, PCWP, cardiac index (thermodilution) and indexed peripheral vascular resistances were measured 3 times at each level of PEEP. For each PEEP level, The means for each level of PEEP were compared overall with the Friedman test and then in pairs with the Wilcoxon signed rank test. A Rho Spearman correlation was done between PCWP and diastolic PAP. A Bland-Altman plot was used to describe the relationship between the PCWP and the diastolic PAP.

Results: PCWP, diastolic PAP and CVP augment significantly ($p< 0,000$; $p<0,001$; $p<0,002$) with increasing levels of PEEP. The other variables did not vary significantly in relation to PEEP with the exception of systolic blood pressure ($p = 0,006$). Diastolic PAP is strongly correlated with PCWP ($r= 0,668$, $p=0,000$). Regardless of the level of PEEP, diastolic PAP is always about 5 mmHg higher than the PCWP

Discussion: In the post-operative context, increasing levels of PEEP are associated with increases in the hemodynamic indicators of volemia (CVP, PCWP, diastolic PAP). Elucidating the contribution of PEEP to a given indicator of volemic status would permit for a more accurate estimation of real volemic status itself. The creation of such a predictive model for this will require a larger study

Hemodynamic parameter according to PEEP

PEEP (cmH20)	0	5	10	15
PCWP(mmHg)	13,18	13,87	15,91	17,48
CVP (mmHg)	11,32	11,8	12,97	14,56
Diastolic PAP (mmHg)	18,42	19,4	22,28	23,24

1344677 - AORTO-RIGHT ATRIAL FISTULA AND A WIDE PULSE PRESSURE

Wayne A. Nates[1], Alexander J. Villafranca[1], Darren Freed[2], Johann Strumpher[1], Eric Jacobsohn[1]

1. Anesthesia, University of Manitoba, Winnipeg, MB, Canada
2. Surgery, University of Manitoba, Winnipeg, MB, Canada

Purpose: A Stanford Type A dissection occurs when an intimal tear extends into the ascending aorta. Patients with this pathology generally require emergency repair to prevent the tear dissecting further to involve the coronary arteries or the aortic valve, which would usually have fatal consequences. An aorto-atrial fistula is a rare complication of a Stanford Type A dissection where the dissection results in a pathway for blood to flow from the aorta directly into the right (RA) or left atrium. We present a case where a postoperative wide pulse pressure (WPP) and right ventricular (RV) failure were indicators of an aorto-right atrial fistula that was undiagnosed at the initial surgery.

Clinical Features: A 63 year old male underwent an emergency repair of a Stanford type A dissection. The intra-operative echo findings showed an intimal tear in the ascending aorta located near the sino-tubular junction. He was weaned from cardiopulmonary bypass without incident and transferred to the ICU in a stable condition. The patient had a protracted ICU stay manifested by: 1) persistently elevated central venous pressure (18-23mmHg); 2) hypotension requiring vassopressor and inotropic support with a WPP (80-120/30-45mmHg); and 3) clinical evidence of right heart failure (low cardiac output, high CVP, peripheral edema, oliguria- acute kidney injury, and hepatic/interstinal congestion). Four days postoperatively, a transthoracic echocardiogram showed RA/RV dilatation and a normal prosthetic aortic valve. This clinical picture persisted and a transoesophageal (TEE) echocardiogram done an additional three days later showed that the right atrium and right ventricle were still severely dilated. It also demonstrated a high velocity jet from the aortic root to the right atrium. This prompted return to the operating room for repair of the aorta-right atrial fistula. The patient then quickly recovered with no other evidence of RV dysfunction. The patient consented to presentation of this case report, and local IRB approval was obtained.

Conclusion: The causes of hypotension and a WPP in the ICU are numerous. These include, amongst others, sepsis, systemic inflammatory response syndrome, adrenal insufficiency, anaphylaxis, acute-on-chronic liver failure, thiamine deficiency, vasodilating drugs, thyrotoxicosis, severe anemia, aortic insufficiency, and arterio-venous fistula.
These causes were all ostensibly excluded based on blood work and the initial transthoracic echocardiogram. The persistent WPP/ hypotension and RV failure resulted in a TEE which demonstrated the pathology. This case demonstrates that in the setting of a type A dissection and a WPP, consideration should be given to an aorto-atrial Fistula. These can sometimes be difficult to appreciate depending on the exact location of the fistula, requiring meticulous interrogation of the ascending aorta before and after cardiopulmonary bypass.

1344698 - DEVELOPMENT AND IMPLEMENTATION OF AN AUTOMATED ACUTE PAIN PIMS

Sanjib D. Adhikary[1], Susan Riemondy[1], Patrick McQuillan[1]

1. Anesthesiology, Penn State College of Medicine, Hershey, PA, United States

Introduction: Traditionally, acute pain management consults, procedures, and follow-up have been documented in the medical record as a single point of entry.Pain scores and analgesic requirements during an in-patient admission are subsequently documented independently in different locations in the patient's medical record. There are number of Shortcomings with these methods.We have developed an Automated, Integrated, and Continuous Acute Pain Patient Information Management System (Acute Pain PIMS) that is integrated with the Electronic Medical record (EMR) in our institution.

Methods: A team consisting of specialists in Information Technology (IT), billing, acute pain nurses and physicians designed the PIMS in approximately 8 months. Joint Commission (JC) and Centers for Medicare & Medicaid Services (CMS) guidelines and compliance requirements were also built into PIMS. PIMS use has 4 components: A) Acute Pain procedure and medication documentation, B) Creation and uploading the document to PIMS, C) Data entry, and D) Report generation.
Component A: Acute Pain procedure and medication documentation is completed by the APMS team (resident/attending) performing the acute pain procedure.
Component B: Creation and uploading the document to PIMS is completed by the APMS attending after verifying and electronically signing the APMS procedure document.
Component C: Data entry is completed by the point of care team on the inpatient wards. This is usually the nurse responsible for the patient's care.
Component D: A report can be generated by anyone with access to the EMR. One is also automatically generated every 12hr, including all patients having had acute pain procedures in the previous 48 hrs.

Results: The implementation of an Acute Pain PIMS has led to improvement in our APMS in a number of ways including:
1. We are now able to evaluate the efficacy of all Acute Pain procedures in one report before interacting with the patient. This information is also readily available to all care teams.
2. Analgesic requirements and pain scores are now monitored continuously for 48hrs after acute pain procedure.
3. The Acute Pain PIMS links the acute pain procedure details with the patient's pain management. This information has led to better evaluation of the effectiveness of procedure and detection and elimination of gaps in pain management.
4. This system fosters communication between care teams.
5. The implementation of Acute Pain PIMS, with the inclusion of required fields for documentation, ensures accuracy and compliance with regulatory requirements.
6. Utilization of a consistent, validated evaluation tool for peri-operative pain management.

Discussion: Conclusion:
To our knowledge, this is the first report of an integrated, continuous, electronic APMS data system. We believe implementation of an Acute Pain PIMS leads to a better and more comprehensive peri-operative pain management program.

1344700 - ATYPICAL PULMONARY EMBOLISM FOLLOWING TOTAL KNEE ARTHROPLASTY

Vidur Shyam[1]

1. Anesthesiology, Queens University, Kingston, ON, Canada

Purpose: Pulmonary embolism (PE) usually manifests more than 48 hours following surgery and presents as dyspnoea, tachypnea, pleuritic chest pain, circulatory collapse and oxygen desaturation. The purpose of the current report is to describe an atypical case of pulmonary embolism following total knee arthroplasty (TKA) under spinal anesthesia.

Clinical Features: Institutional ethics approval and patient consent were obtained for presentation of this case. A 73 year old female was administered spinal anesthesia with bupivacaine prior to undergoing TKA. The intraoperative course and the first postoperative night were unremarkable. On postoperative day 1, the patient had several syncopal episodes requiring O2 therapy. A cardiology consult and bedside echocardiogram revealed pulmonary hypertension > 60 mmHg. Spiral CT confirmed bilateral pulmonary emboli with moderate clot load in both left and right ascending pulmonary arteries and most areas of both lungs. The main pulmonary artery was of normal size, the right atrium and right ventricle were dilated and compatible with pulmonary hypertension. Treatment with intravenous heparin was initiated along with subcutaneous Dalteparin (15,000 IU for one week). This was followed by Warfarin for 3 months to maintain INR measures at 2-3.

Conclusion: PE has been reported previously following total joint arthroplasty.[1] PE requires rapid investigation, diagnosis and treatment with heparin followed by warfarin upon discharge. Prophylactic treatment for PE in TKA remains controversial. A joint registry evaluated venous thromboembolism prophylaxis and type of anesthesia on the overall incidence of PE, fatal PE and mortality.[2] Patients received mechanical prophylaxis alone or in combination with chemical prophylaxis. The incidence of overall PE was 0.45%; fatal PE, 0.01%; and death, 0.31%. The only significant observation was a reduced incidence of PE when Coumadin was combined with mechanical prophylaxis. Other chemical prophylaxes imparted no benefit over mechanical prophylaxis alone. Variables associated with a higher incidence of PE were age, ASA $\geq$3 and the use of general anesthesia. Taken together, these results suggest that general anesthesia should be discouraged in patients at increased risk for PE and perioperative anticoagulation therapy be considered. One possible prophylactic treatment may be subcutaneous Heparin (5,000 IU) and mechanical DVT prophylaxis similar to that used in some abdominal and pelvic surgical cases. To our knowledge, this is the first case of pulmonary embolism reported on the first postoperative day following TKA.

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1344713 - ECG AMPLITUDE – A DIAGNOSTIC TOOL TO DETECT PNEUMOTHORAX DURING LAPAROSCOPIC SURGERY

Raviraj Raveendran[1], Sathish Darmalingam[1], Sarah Ninan[1]

1. Department of Anesthesia, Christian Medical college & Hospital, Vellore, Tamil nadu, India

Purpose: Pneumothorax during laparoscopic surgery is not an uncommon complication. A change in the amplitude of ECG due to pneumothorax is well known. But, only limited evidence is available to use this as a diagnostic tool to detect the intraoperative pneumothorax during laparoscopic surgeries.

Clinical Features: Patient consent was obtained. A 35 year old male ASA risk I patient was scheduled for Laparoscopic left nephrectomy. During the intraoperative period, the ECG amplitude drastically reduced to 50% of its base line amplitude. Immediate clinical examination revealed decreased air entry on the left side lung. The possibility of pneumothorax was notified to the surgeon and a laparoscopic examination of the undersurface of left side diaphragm showed an iatrogenic rent. During this scenario the patient was hemodynamically stable and there was no desaturation, except there was a minimal increase in the airway pressure and end tidal CO2. To prevent further expansion of pneumothorax, surgeon was advised to reduce the intra peritoneal pressure and a PEEP (5 cmH2O) was introduced with the positive pressure ventilation. After closing the rent in diaphragm the amplitude of the ECG gradually improved to the normal size at the end of the case. The patient had an uneventful post-operative course.

Conclusion: Monitoring of ECG amplitude can be used as a diagnostic tool to identify the pneumothorax during laparoscopic surgery.

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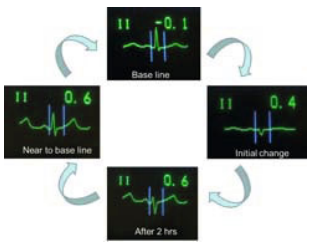

ECG Amplitude changes

1344715 - HIP FRACTURE PATIENTS WITH AORTIC STENOSIS: PERIOPERATIVE MANAGEMENT

Sarah Tierney[1], Michael McMullen[2], John Murdoch[2], John Rudan[3], Rene Allard[2], Vidur Shyam[2]

1. School of Medicine, Queen's University, Kingston, ON, Canada
2. Anesthesiology & Perioperative Medicine, Queen's University, Kingston, ON, Canada
3. Surgery, Division of Orthopedic Surgery, Queen's University, Kingston, ON, Canada

Introduction: Hip fractures in the elderly are common and associated with increased morbidity and mortality, particularly when surgery is not achieved within 48 hours. [1,2] As a result, guidelines have been set to ensure surgical repair in 48 hours or less. Addressing co-morbidities in this population has been shown to be equally important. Thus a balance is required to identify patients who will benefit most from efficient preoperative optimization practices.[3] The purpose of the current investigation was to identify those hip fracture patients with aortic stenosis (AS), and examine the practices surrounding their perioperative care.

Methods: Following institutional ethics board approval, we reviewed charts of all patients who underwent surgical hip repair at a mid-sized academic center during 2010. We documented the time from admission to surgery, the clinical description of any murmur, the echocardiographic results and/or prior diagnosis of AS, anesthetic technique, and postoperative complications.

Results: Charts of 220 patients were reviewed. In total, 63 patients (29%) had a documented murmur. Of these, 29 (46%) received an echocardiogram on current admission. The echocardiogram was associated with a delay to surgery (2.6 days versus 1.5 days; p =0.05) but served to diagnose new moderate to severe AS in 6 cases (21%). In total, AS was identified in 26 patients (13%). Of those with AS, 69% (n=18/26) were given general anesthesia compared to 38% of non-AS patients (n=74/194). 8% of patients with AS (n=2) were postoperatively admitted to the ICU compared to 5% of patients without AS (n=9). In-hospital mortality was elevated in AS patients (15%, n=4)) compared to (5%, n=10) of those without AS.

Discussion: Our study describes the prevalence of AS in elderly hip fracture patients. These findings may have important implications for perioperative management of this patient population. Further prospective investigations may be warranted to determine the costs & benefits of instituting standardized perioperative guidelines incorporating both early anesthesia assessment and focused echocardiographic studies to facilitate the timely management of this complex patient population.

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1344724 - SPINAL ANESTHESIA, HEMODYNAMICS, INFLAMMATION IN CABG & AVR

Stephen Kowalski[1], Trevor Lee[1], Douglas Maguire[1], Darren Freed[3], Kent HayGlass[2], Kelsey Falk[2]

1. Anesthesia and Perioperative Medicine, University of Manitoba, Winnipeg, MB, Canada
2. Immunology, University of Manitoba, Winnipeg, MB, Canada
3. Surgery, University of Manitoba, Winnipeg, MB, Canada

Introduction: High spinal anesthesia (HSA) using local anesthetics has been shown to decrease the stress response to cardiac surgery and cardiopulmonary bypass (CPB)(1). This study assessed the hemodynamic effects of HSA and measured inflammatory mediators in cardiac surgical patients.

Methods: Local Ethics Committee approval was obtained. Patients for elective coronary artery bypass surgery or aortic valve replacement provided written consent. Patients were randomized to receive HSA plus general anesthesia (GA) or GA alone. All patients had invasive hemodynamic monitoring with arterial line and pulmonary artery catheter established prior to induction of anesthesia.

Hemodynamic measurements were done as follows: baseline, post spinal/preinduction, 10 min. post intubation, 10 and 20 min. post sternotomy, 1, 10 and 20 min post separation from CPB, 10 min post sternal closure, on arrival to ICU, 1 and 4 hrs post arrival in ICU.

Blood samples for stress hormones and inflammatory mediators were taken at baseline, at the end of surgery, 2, 24, 72 and 144 hrs post-op.

Statistical analysis was done by the institutional biostatistical consulting unit using Student T test, Wilcoxon rank sum test, Mann-Whitney test for nonparametric data, repeated measures ANOVA with Least Squares Means for multiple comparisons.

Results: Fourteen patients were enrolled, 8 in the GA group, 6 in the HSA group. 3 patients in each group had aortic stenosis (AS). The aortic valve area was not different between groups (0.65 cm2 in GA vs 0.78 cm2 in HSA). There was no difference in demographics, risk factors, operative parameters, between groups. HSA patients received intrathecal bupivacaine, 45 mg, and morphine 250 mcg in a lumbar interspace, in the left lateral, head down position. There was no difference in any hemodynamic parameter at any time between groups. There was no difference in hemodynamic parameters between patients with or without AS. There was a trend to less phenylephrine use with HSA pre and post CPB (17.66 mcg/kg vs 31.75 mcg/kg, $p = 0.15$). No HSA patients required inotropes post CPB. 4 of 8 GA patients got inotropes post CPB. HSA patients had lower pain scores with coughing, 4 hrs post-op (2.3 vs 6.3, $p<0.007$).

There were no differences in stress hormones between groups.

Inflammatory mediators measured included effector molecules of inflammation (CRP, PTX3) and immunoregulatory molecules (ST2, Il-6, Il-1b, Il-10). There was no difference at any time in CRP, PTX3 or Il-1b. There was a trend to higher ST2 levels at 72 hrs post op in the HSA group. Il-6 levels were higher in the HSA group at 24 hrs post-op ($p= 0.04$). Il-10 levels were 10 times higher in the HSA group at 24 – 72 hrs post op ($p= 0.03$).

Discussion: High spinal anesthesia with hyperbaric bupivacaine was associated with hemodynamic stability in cardiac surgical patients, including patients with AS, as well as better post-op analgesia.

Molecules CRP and PTX3 were the same in both groups. These reflect tissue injury as well as inflammation. Elevated Il-6 and Il-10 levels in this study suggests that high spinal anesthesia may have potentially beneficial effects in dampening tissue injury/inflammatory responses in cardiac surgery involving CPB. Further well powered, prospective studies should be undertaken to evaluate these responses

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1344758 - ADENOID OBSTRUCTION OF ETT AT INDUCTION: A PEDIATRIC CASE

Ali Witt[1], **Vidur Shyam**[1]

1. **Anesthesiology & Perioperative Medicine, Queen's University & Kingston General Hospital, Kingston, ON, Canada**

Purpose: There are many known complications of naso-tracheal intubation including obstruction of the endotracheal tube (ETT) with tissues of the nasopharynx. Tissue obstruction typically presents with high airway pressures and inability to ventilate, as the obstruction lies proximal to the Murphy Eye. The purpose of the current report is to describe an atypical case of nasal ETT obstruction in a pediatric patient.

Clinical Features: Institutional ethics approval and parental consent was obtained for anonymous presentation of this case. A 4 year old female patient (ASA 1, 18kg) was scheduled for dental restoration. An inhalational induction was accomplished without complication. A softened and lubricated 4.5 cm un-cuffed nasal RAE ETT was inserted into the right nare with minimal resistance. Laryngoscopy revealed a grade 1 view with minor bleeding in the oropharynx and the ETT was advanced through the vocal cords without problem. Upon confirmation of placement, bilateral breath seemed appropriate as did the resistance to manual ventilation. However, no CO_2 return was detected on the capnograph. Capnograph function was verified, vital signs were stable, and laryngoscopy was repeated to confirm endotracheal intubation. The patient was re-intubated with a new ETT without difficulty. Upon examination, we determined the initial ETT to be obstructed with adenoid tissue distal to the Murphy Eye.

Conclusion: Solutions for problematic intubations such as this may include re-intubation or the use of a bronchoscope to suction the obstructing material. [1-3] The case described here is unique in that the obstruction occurred distal to the Murphy Eye. A patent Murphy Eye allowed ventilation to occur, and hence bilateral breath sounds were heard on auscultation following intubation. The amount of ventilation was however, limited and insufficient for CO_2 to be recorded by capnography. With no CO_2 return detected by capnography, a confirmed endotracheal placement, and stable vital signs, we ruled out the possibility of bronchial intubation in the presence of a one-way valve as too dangerous. [4] This case illustrates the importance of visualizing the tip of the ETT after nasal insertion prior to endotracheal placement. An opportunity to remove any potential obstruction to the ETT prior to endotracheal placement avoids potential complications associated with positive pressure causing dislodgement of a foreign body in the airway, or re-intubation.

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1344762 - MARFAN SYNDROME: NOT ALL DURAL ECTASIAS ARE THE SAME

Leyla Baghirzada[1], Jose Carvalho[1]

1. Anesthesia and Pain Management, Mount Sinai Hospital, University of Toronto, Toronto, ON, Canada

Introduction: The anesthetic management of women with Marfan syndrome and associated dural ectasia (DE) undergoing cesarean delivery remains controversial. Spinal anesthesia may result in undesirable abrupt hemodynamic changes in patients with significant cardiovascular disease, and may fail as a result of an increased lumbar CSF volume 1. Epidural anesthesia, while providing a more stable hemodynamic profile, could be difficult to perform due to scoliosis, commonly present in these patients 2. It has also been associated with failure and theoretical risk of accidental dural puncture due to DE 1 DE can be classified as mild, moderate and severe based on MRI or CT scan and one of the most commonly used diagnostic criteria is reduced lumbosacral pedicle width 3.

Methods: We present 2 cases of patients with Marfan syndrome and DE undergoing elective Cesarean delivery, where neuraxial anesthesia was used successfully. Both patients gave written informed consent to have their cases reported.

Results: Case 1: A 31 year old, G1P0 female with Marfan syndrome presented for elective caesarean delivery at 35 3/7 weeks of gestation. The MRI of the spine revealed significant DE in the lumbosacral area. Two level combined spinal epidural (CSE) anesthetic was planned. The spinal component comprising of 9 mg of 0.75% hyperbaric bupivacaine, 10 mcg fentanyl, 100 mcg of morphine produced no sensory block. The epidural was titrated to achieve a bilateral T4 sensory level. Patient delivered a healthy male infant. On the 5th postoperative day, she had a surgery for aortic root repair and discharged home 12 days later. Case 2: A 34 year old, G1P0 female, with Marfan syndrome presented for elective Cesarean delivery at 37 weeks of gestation. Two-level CSE technique was planned again. The spinal component comprising of 13.5 mg of 0.75% hyperbaric bupivacaine, 10 mcg of fentanyl and 100 mcg morphine, produced a bilateral T5 sensory level. She delivered a healthy female infant and was discharged home on the 4th postoperative day. MRI of the spine prior to discharge confirmed diagnosis of moderate DE.

Discussion: In summary, we reported two cases of parturients with Marfan syndrome and DE, who responded differently to spinal anesthesia, likely based on the severity of their DE. This finding may explain variability in cerebrospinal fluid volume and as a result, different response to neuraxial anesthesia. Greater volume of cerebrospinal fluid in the lumbar theca is postulated to restrict the spread of intrathecally injected local anesthetics and cause “failed” spinal. Although preoperative MRI may help to identify patients at risk for failed spinal, we suggest that a CSE technique should be used in cases of DE.

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Level	Pedicle width (mm)Case 1	Pedicle width (mm) Case 2	Reference range in general population (mm)	Reference range in patients with Marfan syndrome (mm)
L1	Pending	3.0	7.16-7.72	2.58-4.10
L2	Pending	3.6	7.88-8.41	2.89-4.55
L3	Pending	4.4	9.43-10.09	3.97-5.91
L4	Pending	5.8	12.29-13.06	5.28-7.28
L5	Pending	8.4	17.57-18.47	7.56-10.17

1344766 - REHABILITATION PROGRAMS PEDIATRIC CHRONIC PAIN: SYSTEMATIC REVIEW

Sachin Rastogi[1], Jennifer Stinson[1], Fiona Campbell[1], Saifa Hajee[2], Vanna Kazazian[2]

1. Anesthesia and Pain Medicine, Hospital for Sick Children, Toronto, ON, Canada
2. Faculty of Nursing, Ryerson University, Toronto, ON, Canada

Introduction: Chronic pain is a common and disabling problem for children and adolescents. It is estimated that 5-8% of children will develop significant pain-related disability and will require intensive rehabilitation involving an interdisciplinary team (comprising physical, psychological and medical components). The efficacy of such programs for adults with chronic pain is well established. However, little is known about the components of rehabilitation programs for children and adolescents or their effectiveness in terms of functional outcomes. The aim of this study was to systematically review pediatric outpatient interdisciplinary rehabilitation programs and to assess their effectiveness in improving pain and functional outcomes.

Methods: Databases (Medline, CINAHL, EMBASE, PsychInfo, ERIC, ISI Web of Science) were searched for outpatient rehabilitation programs for children and adolescents with chronic pain by an experienced librarian. We also sought other publications by posting a request on the Pediatric Pain Listserve. Identified abstracts were screened for relevance and assessed for inclusion by two reviewers independently. The components and features of the outpatient programs and treatment outcomes were extracted and summarized independently by two investigators.

Results: The search strategy retrieved 730 abstracts and the level of agreement between reviewers during the inclusion process was 90%. In total, 43 relevant studies were identified from the search. However, only 7 were interdisciplinary programs which treated only children and/or adolescents. One study was not in English and excluded. Studies included one prospective randomized controlled trial, longitudinal case series (n=4) and one retrospective chart review. Programs were either inpatient (n=3) or outpatient (n=3). All programs comprised psychological and physical therapy interventions. Others (n=4) comprised in addition occupational therapy, nursing and medicine. Duration of treatment ranged from 4 – 78 days. Outcome measures included pain intensity (n=4), disability (n=4), function (n=5), anxiety (n=4), sleep (n=1), and school attendance (n=3). All rehabilitation programs demonstrated improvement in all or some of the outcomes post treatment.

Discussion: There is a paucity of well controlled trials that assess the efficacy of interdisciplinary rehabilitation programs for children and adolescents with chronic pain. Group and rehabilitation based programs do exist and these studies are encouraging. However, there needs to be consensus on the essential components of such programs before the evidence base can be improved with more trials. Once essential components are determined, multicenter collaborations would be recommended to provide good quality trials.

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1344776 - REOPERATION FOR SHOCK AFTER MVR/CABG TO PLACE ATRIAL WIRES

Waiel Al-Moustadi[1], Alexander J. Villafranca[1], Trevor Lee[1], Michael Moon[2], Eric Jacobsohn[1]

1. Anesthesia, University of Manitoba, Winnipeg, MB, Canada
2. Surgery, University of Manitoba, Winnipeg, MB, Canada

Purpose: We describe an approach to the management of diastolic dysfunction which was used to stabilize a postoperative cardiac surgery patient in with circulatory shock secondary to diastolic dysfunction. This approach involves using atrial pacing to maintain atrial kick and stroke volume.

Clinical Features: Diastolic dysfunction is defined as the inability of the ventricular chamber to relax during diastole, resulting in impairment of the ventricle to accommodate volume without increasing in left atrial pressure. Severe diastolic dysfunction (DD) is considered to be an independent predictor of mortality in cardiac surgery. Furthermore, 40-75% of the patients presenting for cardiac surgery have an element of diastolic dysfunction. Hemodynamic goals in managing DD are often poorly understood.

An 83 year old female with long standing hypertension, hyperlipidemia and coronary artery disease presented with a NSTEMI and congestive heart failure. The echocardiogram revealed significant left ventricular hypertophy and mitral valve (MV) prolapse with severe regurgitation. The left LVEF was preserved but diastolic function was severely impaired. The coronary angiogram indicated three vessel disease. The patient underwent coronary artery bypass graft surgery with MV replacement. Following an uneventful operation, the patient was transferred to the ICU on 0.06mcg/kg/min norepinephrine. She had ventricular epicardial pacing wires.

On postoperative day one, the patient developed hemodynamically significant junctional rhythm, which was not responsive to atropine, and required an escalating dose of norepinephrine (up to 0.4mcg/kg/min) and vasopressin (2.4 units/hr) or ventricular pacing. The patient continued to deteriorate, and became aneuric. In an attempt to reestablish atrial kick and increase the heart rate (in a patient with likely restrictive LV physiology), the patient was returned to the O.R for atrial pacing wire insertion.

With the establishment of atrial pacing, the hemodynamics and urine output normalized, and vassopressors were discontinued. The patient was extubated the within 24 hours.

Conclusion: The severity of LV DD includes: mild (relaxation abnormality), intermediate (psuedonormalization), and severe (restriction). The conventional wisdom is to reduce the heart rate allowing time for diastolic filling, in the setting of severe DD, this may not be appropriate. In the setting of severe DD, a higher heart rate with atrial contribution is often required to maintain cardiac output. This case clearly demonstrates the critical nature of atrial pacing and higher heart rate in patients with severe DD, and also highlights the importance of placing atrial wires at the time of the initial surgery in any patient with DD. We are unaware of any reported reoperations specifically to place atrial pacing wires.

1344794 - RESTLESS LEG SYNDROME (PARASOMNIA) CAN MIMIC SEIZURES AFTER ANESTHESIA

Vidur Shyam[1], Rene Allard[1], Ryan Bicknell[2]

1. Anesthesiology & Perioperative Medicine, Queen's University, Kingston, ON, Canada
2. Department of Surgery, Division of Orthopedic Surgery, Queen's University, Kingston, ON, Canada

Purpose: The purpose of the current report is to describe a case in which restless leg syndrome (RLG) mimicked seizures during postoperative recovery following shoulder cuff repair under general anesthesia.

Clinical Features: Institutional ethics board approval and patient consent were obtained for anonymous presentation of this case report. A 34 year old male who had a moderate history of sleep apnea requiring CPAP treatment but was otherwise considered healthy, had a shoulder cuff repair under general anesthesia followed by a postoperative interscalene block for pain control. Postoperatively, the patient was awakened twice by the nurse and his wife because of apparent violent shaking which continued for 15-20 seconds. Once awake, the patient was alert with no evidence of tongue-bite or sphincter incontinence. The patient's wife reported similar violent shaking episodes occurring (approximately once every 2 months) over the last 5 years. Following each episode, the patient always awoke clear-headed and without any further apparent abnormality. The patient was discharged with a recommendation for follow-up by neurology. Subsequent neurological examinations and investigations revealed no abnormality in EEG and MRI. Having ruled out physical abnormality, this patient was diagnosed with Restless Leg Syndrome.

Conclusion: Restless Leg Syndrome is a common sensorimotor disorder with a prevalence of 5-10% but is more commonly associated with depression and anxiety.[1] Restless leg syndrome (RLS) is characterized by unpleasant sensations primarily in the ankles and calves and a compelling, often insatiable, need to move the legs, Because symptoms are brought on by inactivity, this condition may occur even with every day sedentary activities such as plane travel or car rides. Patients may not consider it important to report the presence of this condition to the anesthesiologist preoperatively. However, this is an example of a case in which RLS was confused with grandmal seizures which prompted further investigation. A detailed history to rule out RLS in patients with anxiety and depression might be important given the prevalence of RLS. Although harmless in nature, awareness of this condition may save on health care costs and mental distress for the patient and/or family.

References: 1. J Neuropsychiatry Clin Neurosci 2008 20(1):101-5

1344815 - CONTINUOUS TRANSVERSUS ABDOMINIS PLANE (TAP) BLOCK FOR OPEN RADICAL PROSTATECTOMY: PRELIMINARY DATA

Gabriele Baldini[1], Thanya Jump[1], Franco Carli[1], De Q.H Tran[1]

1. McGill University Health Centre, Montreal, QC, Canada

Introduction: Ultrasound-guided transversus abdominis plane (TAP) block constitutes a new regional technique to anesthetize the abdominal wall. In this randomized, controlled, double-blinded trial, we evaluate the analgesic efficacy of TAP block for patients undergoing open radical prostatectomy. We hypothesized that by adding bilateral continuous ultrasound-guided TAP block to patient controlled intravenous (iv) morphine analgesia (PCA) will improve postoperative analgesia and speed the surgical recovery in patients with prostate cancer undergoing open radical prostatectomy.

Methods: Local Ethics Committee approval and the consent for study participation from all patients recruited in the study were obtained. Fifty patients undergoing open radical prostatectomy will be required to reach the sample size and complete the study. Patients will be randomized to receive either a bolus of normal saline (20 ml per side) followed by a continuous infusion of normal saline (7 ml/hr per side) in the control group (Group C), or a bolus of lidocaine 1% with epinephrine 5 mcg/ml (20 ml per side) follow by a continuous infusion of ropivacaine 0.2% (7 ml/hr per side) in the TAP block group (TAPG). The infusion will be started immediately after the bolus doses and continued postoperatively for 48 hours. In addition, all patients will receive PCA iv morphine as well as regular ketorolac and acetaminophen. Postoperatively morphine consumption, opioid side effects and quality of surgical recovery will be assessed by a blinded investigator at 12, 24 and 48 hours postoperatively.

Results: To date, 15 patients have been recruited and completed the study. Six and nine were randomized to Group C and TAPG, respectively. Postoperative morphine consumption is shown in the table

Discussion: Our preliminary data seems to suggest that by adding a continuous bilateral TAP block to PCA iv morphine will provides better analgesia in the first 24 hours after open radical prostatectomy.

References: A meta-analysis on the clinical effectiveness of transversus abdominis plane block. Siddiqui MR, Sajid MS, Uncles DR, Cheek L, Baig MK. J Clin Anesth. 2011 Feb;23(1):7-14.

Postoperative Morphine consumption (mg)

Morphine consumption (mg)	Group C (n = 6)	Group TAPG (n=9)
PACU	5.5 [4.5-10]	10 [9-16]
12 hr	5 [4.3-5.8]	6 [2-13]
48 hr	17.5 [10.5-28.3]	3 [1-6]
72 hr	3 [0.8-6]	3 [0-5]

Data are reported as Median [IQR]

1310840 - CEREBRAL DESATURATION IS NOT CORRELATED WITH CARDIAC OUTPUT

Ryan Brinkman[1], Ryan Amadeo[1], Duane Funk[1], W. Alan C. Mutch[1], Hilary Grocott[1], Helmut Unruh[2]

1. Anesthesia, University of Manitoba, Winnipeg, MB, Canada
2. Thoracic Surgery, University of Manitoba, Winnipeg, MB, Canada

Introduction: Recent work has suggested that a significant number of people have >15% decrease in cerebral saturation during one-lung ventilation (OLV)(1) although the cause is unknown. This may potentially lead to increased perioperative morbidity and mortality(2). A proposed mechanism for these events was a decrease in cardiac output (CO) during OLV. The purpose of this study was to determine if there is a relationship between cardiac output and cerebral desaturation events (CDE) during OLV.

Methods: This is a blinded observational study in patients undergoing one lung ventilation and thoracic surgery. The local ethics committee approved this study and written informed consent was obtained from all participants prior to surgery. 23 patients undergoing surgery requiring one-lung ventilation were enrolled. Cerebral oxygenation was monitored using the Fore-Sight© cerebral oximeter (Casmed, Brantford, CT). Cardiac indices were assessed using the FloTrac© system (Edwards Life Sciences, Irvine CA). Patients received a standardized anesthetic that includes sevoflurane as the main volatile agent and an FiO2 of 1.0 for the duration of the case. Arrow 20g arterial lines as well as the Foresight© probes were placed pre-induction. Anesthesiologists provided PEEP and CPAP to the non-dependent lung to maintain peripheral saturations >90%. Serial blood gases were drawn pre-induction then every 15 minutes to a maximum of 2 hours. Baseline cerebral saturation was defined as the highest recorded saturation on two lung ventilation with an FiO2 of 1.0. A cerebral desaturation was identified after a decrease of >10% from baseline.

Results: Data was analyzed with ANOVA for repeated measures with a p-value <0.05 deemed significant. Data from 18 patients was analyzed with 5 being excluded due to protocol violations. In this study only 10/18 (55.5%) had significant CDE (>10% below baseline). There was no correlation between CO, mean arterial pressure (MAP), stroke volume (SV), or cardiac index (CI) and CDE. Of those patients who had CDE there was a significant positive correlation between SV and time length of the CDE. There was no correlation between peripheral arterial saturation (SpO2) and cerebral oxygen saturation (SctO2).

Discussion: To date no study has been identified that addresses the hypothesis that CDE are related to changes in CO. Cerebral desaturation events during OLV does not appear related to decreases in cardiac output or any other hemodynamic parameter. Those patients with longer periods of desaturation increased SV to maintain CO. As seen in other studies (1,2) SpO2 does not correlate with observed SctO2.

References: 1) Hemmerling TM, Bluteau MC, Kazan R, Bracco D. Significant decrease of cerebral oxygen saturation during single-lung ventilation measured using absolute oximetry. Br J Anaesth 2008; 101: 870-5
2) Casati A, Fanelli G, Pietropaoli P, et al. Continuous monitoring of cerebral oxygen saturation in elderly patients undergoing major abdominal surgery minimizes brain exposure to potential hypoxia. Anesth Analg 2005; 101: 740-7

	Baseline	Two Lung Ventilation	One Lung Ventilation
Mean Arterial Pressure (mmHg)	88 ± 17	77 ± 15	81 ± 19
Heart Rate (bpm)	75 ± 12	69 ± 13	61 ± 11
Cardiac Output (L/min)	5.3 ± 1.7	4.4 ± 1.1	4.4 ± 0.9
Stroke Volume (SV)	72 ± 27	60 ± 16	75 ± 14

(n=18)
(mean & SD)

1341467 - ELECTRICAL GUIDANCE OF TRACHEAL NEEDLE PLACEMENT IN HUMAN CADAVERS

Angela Neufeld[1], **Ban Tsui**[1]

1. Anesthesiology and Pain Medicine, University of Alberta, Edmonton, AB, Canada

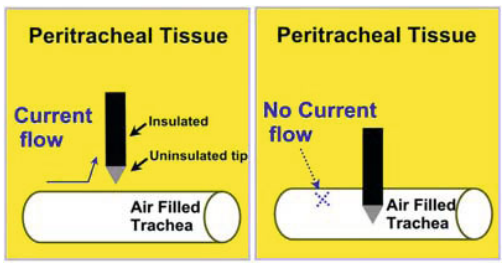
Introduction: Restoring oxygenation in situations of "cannot intubate/cannot ventilate" requires percutaneous airway access. A novel technique using nerve stimulation to detect the entry of an insulated needle into the trachea was recently described (1). This technique relies on the interruption of an electrical current to alert the user to when the needle tip is suspended in air, as in the tracheal lumen (see Figure). The objective of this study was to determine if electrical guidance allows faster and more accurate intratracheal needle placement compared to the conventional aspiration-of-air technique.

Methods: After obtaining ethics committee approval and informed consent, we recruited 27 anesthesiology residents with various experience levels and assessed their ability to perform successful cricothyroidotomy on human cadavers. Residents were given a two-minute timed attempt to place a needle tip in the tracheal lumen of one cadaver guided by aspiration of air into a syringe, followed by another two-minute timed attempt to place the needle tip into the trachea of a second cadaver under guidance of a nerve stimulation device (HNS 12, B.Braun, Germany). Between cadavers, the residents viewed a two-minute video on the use of the nerve stimulator. For all attempts, the residents' accuracy of needle placement and time taken to successfully place the needle tip was recorded. Visual confirmation of needle insertion and placement was obtained by a fibreoptic camera in the upper airway. To minimize learning effects, residents were not informed of their success until after the study was complete.

Results: Correct intratracheal needle placement was achieved by 81% (22/27) of residents using the electrically-guided method versus 22% (6/27) using the aspiration-of-air method, a difference that is statistically significant ($p < 0.05$). The average successful insertion time for residents using electrical guidance (35.1 s) was no greater than the average time for those who were successful using the conventional method (35.8 s). This study also achieved both 100% positive and negative predictive value for the electrical signal indicating entry into airway.

Discussion: Anesthesiology residents with little experience in performing cricothyroidotomy achieved greater success when attempting to place a needle in the trachea under guidance of an electrical stimulation device compared to a conventional method. These results demonstrate the value of electrical guidance in percutaneous access of the airway, warranting further testing in clinical scenarios.

References: 1. Can J Anesth 2012 59: 116-7



A needle tip in the peritracheal tissue maintains a closed circuit with current flow to the needle (left). Current flow stops when the needle is in the trachea due to impedance of the air-filled lumen (right).

1342868 - ECHOCARDIOGRAPHIC ASSESSMENT OF AORTIC COMPLIANCE AND ITS RELATION TO LEFT VENTRICULAR DIASTOLIC DYSFUNCTION USING SPECKLE TRACKING IMAGING: AN OBSERVATIONAL STUDY

Alexander J. Gregory[1], **Gary Dobson**[1]

1. Anesthesia, University of Calgary, Calgary, AB, Canada

Introduction: Left ventricular diastolic dysfunction is associated with perioperative morbidity in cardiac and vascular surgery.1-2 Aortic stiffness is known to correlate with diastolic dysfunction.3-5 Speckle tracking imaging (STI) is an echo-based modality with advantages over Doppler-based techniques.6 Recently used to quantify left ventricular diastolic function7-9 as well as the elastic properties of the carotid artery, thoracic and abdominal aorta10-12, to date no study has used STI to assess ascending aortic compliance and left ventricular diastolic function.

Methods: This was a retrospective observational study approved by research ethics. Images were obtained from intra-operative TEE studies. Diastolic function was determined by STI-derived longitudinal tissue velocities of the b-lateral and b-septal walls in early diastole (E'). Aortic compliance was calculated serially from the aortic root and proximal ascending aorta using (dV/dt)/(dP/dt) for each segment. The dV/dt was calculated by the formula dV/dt = (2πr * l * dr/dt) + (πr2 * dl /dt) where dr/dt and dl/dt were acquired with STI (see included image). Calculating dP/dt assumed exponential pressure decay to calculate dP over the first 10% of diastolic time, then taking the natural log of the quotient of the two. Aortic compliance to diastolic function relationship was assessed with linear regression analysis.

Results: Twenty-one patients were included. The mean series diastolic compliance was 18.07 cm/mmHg (+/- 8.06). Mean E' velocities of the b-septal and b-lateral wall were -4.63 cm/s (+/- 1.54) and -5.44 cm/s (+/- 1.95). Linear regression of b-septal E' and b-lateral E' vs. series diastolic compliance resulted in R2 values of 0.21 ($p<0.05$) and 0.19 ($p<0.05$).

Discussion: It has been shown that aortic stiffness correlates with diastolic function, possibly via afterload mechanisms.13,14 Our results are congruent with existing literature, suggesting STI has potential applications in further investigating aortic and ventricular interactions. A weakness of our study was the need to approximate dP/dt, however our calculation was a derivation of a generally accepted method.15 STI is independent of cardiac filling parameters or angles of measure, two drawbacks of M-Mode and Tissue Doppler Imaging (TDI) respectively. Furthermore it can be used retrospectively making it an ideal research tool. Our institution is currently conducting a prospective study to further delineate the usefulness of STI in quantifying aortic compliance.

References: 1. Ann Thorac Surg 2011; 91:1844–50
2. Anesthesiology 2010; 112:1316–24
3. Cardiology 2008; 109:99–104
4. Heart 2005; 91:1551–56
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6. J Am Coll Cardiol 2006; 47:1313–27
7. Heart Vessels 2011; 26(1):39-45
8. Heart 2011; 97(4):287-94
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11. J Am Soc Echocardiogr 2010; 23:985-92
12. Echocardiography 2008; 25(9):941-5
13. Cardiovasc Res 1999; 43:344–53
14. Circulation 2003; 107:714–20
15. Cardiovasc Res 1987; 21: 678-87

1343853 - A PERIOPERATIVE SMOKING CESSATION INTERVENTION WITH VARENICLINE: A DOUBLE-BLIND, RANDOMIZED, PLACEBO-CONTROLLED TRIAL

Amir Abrishami[1], Jean Wong[1], Yiliang Yang[1], Amna Zaki[1], Zeev Friedman[2], Peter Selby[3], Kenneth Chapman[4], Frances Chung[1]

1. **Anesthesia, Toronto Western Hospital, University of Toronto, Toronto, ON, Canada**
2. **Anesthesia, Mt. Sinai Hospital, University of Toronto, Toronto, ON, Canada**
3. **Family & Community Medicine and Psychiatry, Dalla Lana School of Public Health, University of Toronto, Toronto, ON, Canada**
4. **Respirology, Toronto Western Hospital, University of Toronto, Toronto, ON, Canada**

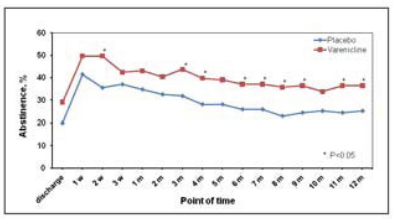
Introduction: The preoperative period represents a "teachable moment" for tobacco cessation interventions[1]. However, the efficacy of these interventions on long-term abstinence is unclear[2]. Varenicline, a partial agonist/ antagonist of nicotine receptors, has been shown to be more efficacious than the other available therapies in non-surgical populations[3]. Our objective was to determine the efficacy and safety of a perioperative smoking cessation intervention with varenicline to reduce long-term smoking in elective surgical patients.

Methods: Institution's Research Ethics Board approval and patients consent were obtained. In a prospective, multi-center, double blind, placebo-controlled trial, 286 patients undergoing non-cardiac elective surgeries were randomized to receive either varenicline or placebo. Patients with recent cardiovascular disease or history of psychiatric disorders were excluded. The primary outcome was the 7-day point prevalence abstinence rate 12 months after surgery. Secondary outcomes included abstinence at 3 and 6 months after surgery. Multivariate logistic regression was used to identify independent variables related to abstinence.

Results: With the intention-to-treat analysis, the point prevalence abstinence at 12 months for varenicline vs. placebo was 36.4% vs. 25.2% (RR 1.45; 95% CI 1.01-2.07; p<0.05, Figure 1). At 3 and 6 months, the point prevalence abstinence was 43.7% vs. 31.9% (RR 1.37; 95% CI 1.01-1.86; p<0.05), and 35.8% vs. 25.9% (RR 1.43; 95% CI 1.01-2.04; p<0.05) for varenicline vs. placebo, respectively. The multivariate analysis showed that "treatment with varenicline" (OR, 1.76; 95% CI 1.03-3.01; p=0.04) and "preoperative nicotine dependence" (OR, 0.82, 95%CI 0.68-0.98; p=0.03) were the significant predictors of abstinence at 12 months. The adverse events profile in both groups was similar except for nausea, which occurred more frequently for varenicline vs. placebo (13.3% vs. 3.7%, p<0.01).

Discussion: A perioperative smoking cessation intervention with varenicline vs. placebo increased both short-term (3 to 6 month) and long-term (12 month) abstinence from smoking after elective non-cardiac surgery with no increase in serious adverse events. Further research is required to explore the feasibility of implementation of intensive smoking-cessation interventions in the preoperative clinics.

References: 1-Health Educ Res 2003;18:156-170. 2-Can J Anesth 2008; 55:11-21. 3-BMC Public Health 2006; 6:300



7-day point prevalence of biochemically confirmed abstinence for varenicline vs. placebo using intention to treat analysis. *indicates p<0.05

1344438 - POSTOPERATIVE TRACHEOSTOMY & CARDIAC SURGICAL SITE INFECTION

Louise Sun[1], Munir Boodhwani[2], Heather Baer[3], Bernard McDonald[1]

1. **Division of Cardiac Anesthesiology, University of Ottawa Heart Institute, Ottawa, ON, Canada**
2. **Division of Cardiac Surgery, University of Ottawa Heart Institute, Ottawa, ON, Canada**
3. **Division of General Medicine and Primary Care, Brigham and Women's Hospital and Harvard Medical School, Boston, MA, United States**

Introduction: In the post cardiac surgical patient, the traditionally held belief that soiling of the surgical site from a tracheal stoma increases the risk of sternal wound infection (SWI) continues to influence clinical decision making regarding this intervention. The purpose of this study is to investigate whether tracheostomy is associated with the development of SWI post cardiac surgery.

Methods: Institutional REB approval was obtained for this retrospective database study. All patients undergoing cardiac surgery via median sternotomy from September 1, 1997 to October 31, 2010 were included in the study. Patients with preoperative tracheostomy in situ and those patients receiving tracheostomy following documented SWI were excluded. The primary exposure was tracheostomy performed during ICU admission. Primary outcome was SWI. Secondary outcomes were in-hospital mortality, duration of mechanical ventilation, ICU and hospital lengths of stay. Perioperative patient characteristics and outcomes were compared between tracheostomy and non-tracheostomy groups. Continuous variables were analyzed using two-sample t-tests and are presented as means ± standard deviations. Categorical variables were analysed using Chi-squared tests and presented as proportions. All statistical tests were performed using SAS 9.0, with statistical significance defined as $p<0.05$.

Results: Of the 18845 included patients, 411 had tracheostomy performed prior to onset of SWI with a mean time to tracheostomy of 16 days. The incidences of SWI in the tracheostomy and non-tracheostomy groups were 19.53% (80/411) and 0.84% (154/18434), respectively. On univariate analysis, SWI was associated with age, female sex, higher preoperative risk scores, diabetes, renal replacement therapy, cardiogenic shock, poor LV function, harvest of internal thoracic arteries, redo sternotomy, cardiopulmonary bypass time and prolonged mechanical ventilation (> 72 hrs). Tracheostomy was significantly associated with SWI ($p<0.0001$). SWI was associated with significant increases in ICU length of stay (27.2 vs. 3.0 days; $p<0.0001$) and mortality (33% vs. 2.9 %; $p<0.0001$).

Discussion: The 1.2% (234/18845) incidence of SWI in our cohort is in keeping with previously reported rates of SWI following cardiac surgery ranging between 0.4 to 8.6% {1-4}. However, the relationship between between tracheostomy and SWI has been variably reported and remains uncertain {1-4}. Our findings support an association between tracheostomy and SWI; however this is unadjusted for confounders, as the need for tracheostomy is an indicator of a high risk patient. Based on this analysis, we will have sufficient power to proceed with multivariate analyses to determine whether tracheostomy is an independent predictor of SWI.

References: 1. Ann Thorac Surg. 2005 Aug;80(2):618-21
2. Ann Thorac Surg 1998;65:36–40
3. J Thorac Cardiovasc Surg 1996;111:1200–7
4. Clin Infect Dis 2004;38:1555–60.

Outcomes in patients with tracheostomy versus non-tracheostomy

	Tracheostomy (n = 411)	No Tracheostomy (n = 18434)	p
SWI	80 (19.5%)	154 (0.84%)	<0.0001
Time to SWI(days)	5.9 ± 11.8	2.0 ± 11.3	0.0144
Hospital Length of Stay (days)	66.6 ± 38.8	12.7 ± 13.9	<0.0001
Length of Mechanical Ventilation (hours)	799.3 ± 724.5	24.5 ± 23.2	<0.0001
ICU Length of Stay (days)	44.0 ± 32.3	2.4 ± 3.8	<0.0001
Mortality	125 (30.4%)	472 (2.6%)	<0.0001

1344607 - PREDICTORS OF UNANTICIPATED ADMISSION FOLLOWING AMBULATORY SURGERY

Gregory Kostandoff[1], Amanda Whippey [1], James Paul[1], Jinhui Ma[2], Lehana Thabane[2], Heung Kan Ma[1]

1. Anesthesiology, McMaster University, Hamilton, ON, Canada
2. Clinical Epidemiology and Biostatistics , St. Joseph's Healthcare , Hamilton, ON, Canada

Introduction: Unanticipated admission to hospital following ambulatory surgery can occur for several reasons, including: medical, surgical, and anesthesia complications(1). These admissions stress the health system and greatly increase the cost of ambulatory surgery(2). The primary objectives of this retrospective case-control study was to evaluate the incidence of, the reasons for and the risk factors for unanticipated hospital admissions in adult patients over a 24-month period, in three tertiary care academic Canadian hospitals, following scheduled ambulatory surgery.

Methods: After obtaining approval from the local Research Ethics Board, from the 20,657 ambulatory procedures performed, adult patients who required admission (case patients) were identified retrospectively and compared to those who underwent ambulatory surgery but did not require admission (control patients). A total of 200 case patients and 200 control patients were randomly selected for and included in our study. Data extracted included: demographic data, reason for admission, type of anesthesia, surgical procedure, length of procedure, ASA classification, time of completion of surgery, pre-anesthesia clinic visit, past medical history, medications (classes), and perioperative complications. The reason for admission was classified according to five main groups: (1) surgical, (2) anesthesia, (3) medical, (4) social/administrative, and (5) miscellaneous. The demographic and medical data were displayed as numbers and percentages for both the admitted and un-admitted groups and the values were compared with an ANOVA or t-test. We used multiple logistic regression to assess factors associated with unanticipated hospital admissions.

Results: The overall incidence of unanticipated admission following scheduled ambulatory surgery was 2.67%. The most common reasons identified for admission were surgical (40%) followed by anesthesia (20%) and medical (19%). Patients having orthopaedic, plastic, dental and ENT surgery were significantly less likely to be admitted in comparison with patients having general surgery. Length of surgery >3 hr (odds ratio [OR] 4.31, 95% CI 2.47-7.54), ASA class 3 (OR 4.54 95% CI 1.18-11.36) and 4 (OR 4.87, 95%CI 1.32-17.93), advanced age [>80 years] (OR 5.27, 95%CI 1.54-18), BMI of 30-35 (OR 2.61, 95% CI 1.24-5.51) were all found to be independently associated with an increased odds of unanticipated admission. Two co-morbid conditions were found to be protective of unanticipated admission: atrial fibrillation (OR 0.32, 95% CI 0.10-0.99) and active smokers (OR 0.55, 95% CI 0.30-0.99); the other co-morbid conditions did not have a significant impact on readmission.

Discussion: Unanticipated admission to hospital after ambulatory surgery is not rare, and it occurs mainly due to surgical, anesthesia and medical complications. The length of surgery >3h, higher ASA class, advanced age and increased BMI are all independent predictors of unanticipated admission following ambulatory surgery. No specific disease process or co morbid illness was associated with an increased likelihood of unanticipated admission.

References: 1. Ambulatory Surgery 1995 3(3); 141-146
2. Anesth and Analg 1998 87; 816-826

1328069 - HEMODYNAMIC EFFECT OF 3 LOADING REGIMENS OF DEXMEDETOMIDINE IN ICU

C. David Mazer[1], Jean S. Bussieres[2], Doug Seal[3], Jason Erb[4], Randy Moore[5], Rael Klein[6], George Djaiani[7], Barry A. Finegan[8], Etienne de Medicis[9], Richard Hall[10]

1. Anesthesia, St. Michael's Hospital, University of Toronto, Toronto, ON, Canada
2. Anesthésiologie, Laval University, IUCPQ, Ville de Québec, QC, Canada
3. Anesthesia, Foothills Medical Centre, University of Calgary, Calgary, AB, Canada
4. Anaesthesiology and Critical Care Medicine, Queens University, Kingston, ON, Canada
5. Anesthesia, St. Paul's Hospital, UBC, Vancouver, BC, Canada
6. Anesthesia, VGH, UBC, Vancouver, BC, Canada
7. Anesthesia, UHN, University of Toronto, Toronto, ON, Canada.
8. Anesthesiology & Pain Medicine, University of Alberta, Edmonton, AB, Canada
9. Anesthésiologie, CHUS, Sherbrooke, QC, Canada
10. Anesthesia, Medicine and Pharmacology, Dalhousie University, QEII HSC, Halifax, NS, Canada

Introduction: Dexmedetomidine hydrochloride (Precedex®) is a highly selective alpha-2 adrenergic agonist with sedative, analgesic and anxiolytic properties. In Canada, dexmedetomine is approved for sedation in adult intubated post-surgical ICU patients and/or during monitored anesthesia care and awake fiberoptic intubation. The objective of this study was to characterize the hemodynamic effects of 3 different loading dose regimens in post surgical ICU patients.

Methods: With institutional REB approval and informed patient consent, this open label non-randomized Phase 4 study of adult ASA 1-4 post-operative ICU patients was undertaken in 17 Canadian hospitals. Patients with bradycardia, hypotension or heart block (Mobitz 2 or 3) were excluded. Treatment allocation was done by investigators to one of 3 loading dose regimens: no loading dose (NO LD), slow loading dose: 1 mcg/kg over 20 minutes (S-LD), and fast loading dose: 1 mcg/kg over 10 minutes (F-LD) in approximately a 2:1:1 ratio. In all groups, the load was followed by an infusion of 0.2 to 0.7 mcg/kg/hr for 2-24 hours. The primary outcome was the incidence of a clinically meaningful hemodynamic abnormality (CMHA) within the first 2 hours of study drug administration, defined as low heart rate (<40 bpm or <50 bpm requiring intervention), low systolic blood pressure (SBP<80 mmHg), SBP increase from baseline >20%, pacemaker initiation or addition of a vasoactive agent. Secondary outcomes included other adverse events and sedative and analgesic consumption.

Results: 301 post surgical patients were enrolled and treated (n=156 NO LD, 82 S-LD, 63 F-LD). The incidence of CMHA during the first 2 hours was 42.5% in NO LD, 49.4% in S-LD (p=0.336 vs NO LD), and 61.7% in F-LD (p=0.015 vs NO LD). The higher incidence of CMHA in F-LD group was primarily related to the increased addition of a vasoactive agent (8.5% vs 25.0%; p=0.003). The time to first occurrence of CHMA was significantly shorter in the F-LD and S-LD groups compared to the NO LD group (p=0.013). The mean duration of treatment was 6.9±5.4, 6.3±4.9, and 6.6±5.5 hours, with an average dose rate of 0.40±0.13, 0.56±0.18 mcg/kg/hr, and 0.73±0.92 in the NO LD, S-LD-10 and F-LD-20 treatment groups, respectively. The most common AEs in all groups were procedural pain (26.8% - 37.8%), nausea (22.2% - 30.5%), hypotension (15.9% - 23.1%), pain (12.2% - 14.3%), hypertension (10.9% - 14.6%).

Discussion: Hemodynamic abnormalities occur in 40-60% of postoperative ICU patients receiving dexmedetomidine. The incidence is reduced with a slower (or absent) loading dose of dexmedetomidine.

1344159 - PHARMACOKINETICS OF TRANEXAMIC ACID IN PATIENTS UNDERGOING CARDIAC SURGERY

Vivek Sharma[1], Angela Jerath[1], J. Fan[2], Barbara Bojko[3], Stuart A. McCluskey[1], J. Pawliszyn[3], Marcin Wasowicz[1]

1. Anesthesia and Pain Medicine, Toronto General Hospital, Toronto, ON, Canada
2. Pharmacology, University of Toronto, Toronto, ON, Canada
3. Chemistry, University of Waterloo, Waterloo, ON, Canada

Introduction: Tranexamic acid (TXA) is routinely used during cardiac surgical procedures involving cardiopulmonary bypass (CPB) in order to reduce blood loss [1]. Although the optimum dose of TXA has been a subject of debate, a dosing regimen also sometimes referred to as the BART dose remains a popular choice for high-risk cardiac surgery [2]. The pharmacokinetics of TXA during the perioperative period with this antifibrinolytic dose has not been studied. The primary objective of this study was to measure the TXA plasma concentrations following infusion of the BART dose during cardiac surgery with the use of CPB. The secondary objectives of this study were to ascertain if observed TXA concentrations were within the suggested target range to allow optimal inhibition of tissue plasminogen activator (TPA) and to evaluate elimination kinetics of TXA in the postoperative period following discontinuation of the infusion

Methods: Following REB approval, we recruited and obtained written, informed consent from five patients undergoing elective cardiac surgery with the use of CPB. An initial TXA bolus of 30 mg.kg-1 was infused over 15 minutes followed by a 16 mg.kg-1.hr-1 infusion until chest closure with a 2 mg.kg-1 load within the pump prime [2]. Blood samples were taken at baseline, 5 min after the bolus, post-sternotomy, 5 min after commencing CPB and at 30 minute intervals whilst on CPB. Postoperative samples were taken in the ICU at 5 minutes and 1, 2, 3, 4, 6, 8, 10, 12 and 24 hours after discontinuation of the infusion. TXA was extracted from plasma samples using solid phase microextraction (SPME) and concentrations were measured using tandem liquid chromatography-mass spectrometry as previously described [3].

Results: Plasma concentration of TXA when compared with simulated TXA levels using a two-compartment pharmacokinetic model previously described by Dowd at al [4] are illustrated in figure 1.

Discussion: This is the first study that describes pharmacokinetics of the BART dose of TXA including elimination kinetics up to 24 hours after discontinuation of the infusion.

The results of our study show that infusion of the BART dose of TXA results in plasma TXA concentrations higher than the suggested therapeutic levels (100 µg/ml) at all time points during the intraoperative period. Furthermore plasma TXA concentrations allowing 80% inhibition of TPA activity were demonstrated in majority of our patients up to six hours after discontinuation of infusion. Plasma TXA concentrations were below the limit of detection 12 hours (corresponding to six elimination half-lives) after discontinuation of the infusion in all patients.

Recently several investigators have associated high-dose TXA as a probable etiology of postoperative seizures following cardiac surgery [5]. Our results suggest that further work on TXA pharmacokinetics is required to establish a balance between effective yet safe dose in patients undergoing high-risk cardiac surgery.

References: 1 J Thorac Cardiovasc Surg 1995; 110: 835-42
2 N Engl J Med 2008; 358: 2319-31
3 Can J Anesth 2012; 59: 14-20
4 Anesthesiology 2002; 97: 390-99
5 Anesth Analg 2010; 110: 350-3

Figure 1. Measured TXA concentration when compared with simulated values obtained using a two-compartment pharmacokinetic model

1344220 - PREDICTORS OF INTRAOPERATIVE INTRACRANIAL ANEURYSM RUPTURE IN NEURORADIOLOGY

Tania Bailey[1], Vanitha Sivanaser[1], Anna Perks[1], Ronit Agid[2], Atul Prabhu[1]

1. Department of Anesthesia, Toronto Western Hospital, Toronto, ON, Canada
2. Department of Medical Imaging, Interventional Neuroradiology, Toronto Western Hospital, Toronto, ON, Canada

Introduction: Management of intracranial aneurysms has changed significantly since the advent of interventional neuroradiology. With advances in coil technology and interventional techniques more complex aneurysms are now being coiled. Intraprocedural aneurysm rupture is a recognized complication of coiling (1.4-8.8%)[1,2] and is associated with significant morbidity and mortality[3]. This study was undertaken to identify characteristics associated with intraprocedural aneurysm rupture.

Methods: After Ethics board approval we identified 29 cases of aneurysm rupture during coiling in the period 1998 to 2008. A total of 559 aneurysms were coiled in this time. A random sample of patients who underwent aneurysm coiling without rupture during the same period was also reviewed (n=100). Data evaluated included age, BMI, ASA physical status, and co-morbidities such as hypertension, coronary artery disease, previous myocardial infarction and smoking. Surgical factors including aneurysm site, number of aneurysms (single or multiple), World Federation of Neurosurgeons grading and Fisher grade were also evaluated. These variables were compared between the two groups using a series of chi-square and Fisher's exact tests. The relation between these variables and intraprocedural aneurysm rupture was assessed using univariate analysis and multivariate logistic regression analysis. $P < 0.05$ was considered as statistically significant.

Results: Multivariate logistic regression analysis (see Table) revealed aneurysm number, aneurysm size, hypertension and Fisher grade were all significant predictors of rupture. After controlling for other factors, subjects with Fisher grades of 3 were on average 10 times more likely to rupture than those with Fisher grade 1-2. There was no substantial risk of rupture in subjects with Fisher grade 4. Those with multiple aneurysms were at increased risk for rupture during the procedure. Smaller (<5mm) aneurysms were more likely to rupture compared to larger aneurysms. Those with hypertension were 15 times more likely to rupture than those without.

Discussion: Patients with hypertension, multiple aneurysms, presentation with subarachnoid hemorrhage Fisher grade 3, and interestingly, aneurysm size less than 5 mm all have increased risk of rupture during coiling. It is possible our finding of Fisher grade 4 not being predictive of intraprocedural rupture is related to small sample size.

References: 1. Neurosurgery, 2006. 59(5 Sup3):S93-102
2. Singapore Med J, 2007.48(5):429-33
3. Stroke, 2008. 39(5):1501-6

Multivariate Analysis Results

Effect	Chi-square, df	Statistical Significance	Odds Ratio (95% CI)
Overall Model	52.11, df=5	p<0.0001	N/A
Fisher grade	11.00, df=2	p=0.0041	3 vs 1-2: 9.77 (1.36 , 70.52) 4 vs 1-2: 0.20 (0.01 , 3.57) 3 vs 4: 49.21 (3.53 , 685.73)
Single vs multiple aneurysms	9.89, df=1	p=0.0017	Multiple vs Single: 925.44 (13.10, >999.99)
Aneurysm size	13.85, df=1	p=0.0002	>5 vs <5mm: 0.06 (0.01 , 0.26)
Hypertension	11.29, df=1	p=0.0008	Yes vs No: 15.28 (3.11 , 74.92)

1344308 - DOES THE SEVERITY OF TRICUSPID REGURGITATION AFFECT THE CORRELATION AND AGREEMENT BETWEEN PULMONARY SYSTOLIC ARTERY PRESSURES ESTIMATED TRANSTHORACIC ECHOCARDIOGRAPHY AND INTRA-OPERATIVE RIGHT HEART CATHERIZATION?

Kristina Khanduja[1], Raja V. Lakshmanan[1], Andrew Roscoe[1], Coimbatore Srinivas[1], George Therapondos[1], Stuart A. McCluskey[1]

1. Department of Anesthesia, Toronto General Hospital, University of Toronto, Toronto, ON, Canada

Introduction: In cases of suspected pulmonary hypertension (PHT), Doppler echocardiography forms the initial, non-invasive screening modality of choice when assessing Right ventricular Systolic Pressure (RVSP) and also Pulmonary Artery Systolic Pressure (PASP). The correlation between PASP obtained by TTE and Right Heart Catheter (RHC) has been challenged in a number of patient populations, including those undergoing evaluation for PHT prior to liver transplantation. Limitations in echocardiographic estimates of RVSP may be responsible for these observed discrepancies, especially in patients with trace or severe Tricuspid Regurgitation (TR). The aim of this retrospective study was to determine whether the severity of TR at the time of pre-operative TTE in patients presenting for orthotopic liver transplantation affects the accuracy of calculated RVSP and SASP when compared to intra-operative values obtained by RHC. In addition, we hypothesized that the correlation and agreement of between PASP by TTE and RHC would be improved in patients with either mild or moderate TR.

Methods: With institutional Research Ethics Board approval, all charts of patients who underwent liver transplantation at our institution over a 4 year period were retrospectively reviewed. Estimates of the severity of TR, if present, RVSP and the first PASP following induction of anaesthesia were recorded. Patients, in whom the time period between pre-operative TTE and date of surgery exceeded one year, or those with incomplete data for RVSP and SPAP, were excluded from the final analysis. In eligible patients, we initially established the correlation between pre-operative RVSP and SPAP, irrespective of TR severity. Subsequently, we examined the degree of correlation and agreement in patients with increasing severity of TR.

Results: Of 610 patients, 410 met our inclusion criteria. Both linear regression and Bland-Altman analysis showed a lack of correlation and agreement between PASP estimated by TTE and RHC. When evaluated by severity of TR, 131 of our patients had mild or moderate TR. Here, the mean RVSP was 36.8± 8.4 (range 22-62) and the mean PASP was 43.0±8.1 (range 25-83). Correlation between the two variables remained poor (r=0.05). Using Bland-Altman Analysis, the bias for echocardiographic estimates of PASP was 6.2mmHg ± 10.2 with the limits of agreement ranging from -24.4 to 36.8. This indicates a wide variation in agreement between the two methods, where the use of RVSP to predict SPAP lies well outside a clinically useful range.

Discussion: Whilst RVSP estimated by TTE remains an integral aspect of pre-operative evaluation for patients with liver disease when screening for PHT, the degree of correlation and agreement with intra-operative PASP is poor regardless of the severity of underlying TR. Other potential confounders, such as the non-invasive echocardiographic evaluation of RA, must be considered prior to prospectively re-examining the relationship between the two measurements.

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Liver Transpl. 2000;6(4):453-458
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Hepatology. 2006;44(6):1502-1510

1344730 - CARBETOCIN VS OXYTOCIN: IN-VITRO CONTRACTIONS IN OXYTOCIN PRE-TREATED MYOMETRIUM

Mrinalini Balki[1], Naida Cole[1], Magda Erik-Soussi[1], John Kingdom[2], Jose Carvalho[1]

1. Anesthesia, Mount Sinai Hospital, Toronto, ON, Canada
2. Obstetrics and Gynecology, Mount Sinai Hospital, Toronto, ON, Canada

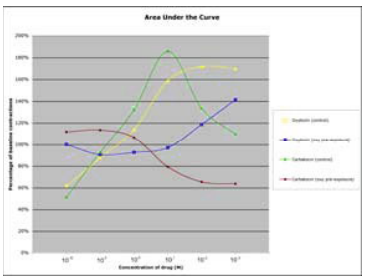
Introduction: Postpartum hemorrhage (PPH) is the most common cause of maternal mortality worldwide. Oxytocin is the first-line agent for prevention of uterine atony and PPH, however, myometrial exposure to oxytocin in-vivo or in-vitro may lead to desensitization of its receptors, reducing the efficacy of subsequent oxytocin administration (1). Carbetocin, a new oxytocin analogue, is recommended by the Society of Obstetricians and Gynecologists of Canada instead of oxytocin in elective cesarean deliveries (CD) (2), yet the supporting evidence is scarce. This study evaluated the relative efficacy of carbetocin vs. oxytocin in-vitro in non-laboring and oxytocin-desensitized human myometrium.

Methods: After REB approval, potential subjects undergoing elective CD were invited to participate, and written informed consent was obtained. Myometrial samples were pre-treated in-vitro with physiological salt solution (PSS) (control) or 10-5M oxytocin for 2 h, then subjected to increasing concentrations of oxytocin or carbetocin (from 10-10 to 10-5M). The amplitude and frequency of contractions during the dose-response period were recorded, and area under the curve (AUC) was calculated and compared between groups.

Results: A total of 25 experiments were performed (oxytocin, n=14; carbetocin, n=11). The AUC of the contractions increased with increasing concentration of the study drug, but the dose-response curves had different slopes for the two drugs (Fig 1). Overall, the AUC during the dose-response period was higher in control groups than in oxytocin pretreated groups, both for oxytocin (Δ17%) and carbetocin (Δ27%) groups. At the peak of the dose-response curve of carbetocin (10-7M), there was a significant difference between the control and oxytocin pretreated groups of carbetocin (p=0.03) and near significant difference between the oxytocin groups (p=0.06).

Discussion: Unlike previous studies (3), we found a higher maximal contractile effect of carbetocin than oxytocin in control groups. Similar to oxytocin (4), myometrial contractions were inhibited in oxytocin pre-treated samples after carbetocin exposure, suggesting that the oxytocin desensitization phenomenon decreases the efficacy of carbetocin. Carbetocin may therefore be preferred over oxytocin for PPH prophylaxis following elective CD, but may be a poor choice for laboring parturients pre-exposed to oxytocin. Clinical studies are warranted to confirm these findings.

References: Am J Obstet Gynecol 2003;188:497–502; J Obstet Gynaecol Can. 2009; 31: 980-93; Acta Endocrinol (Copenh) 1987;115:155-60; Reprod Sci 2009; 16: 501-8.



1344788 - PARAMETERS FROM PREOPERATIVE NOCTURNAL OXIMETER PREDICTING POSTOPERATIVE COMPLICATIONS

Limei Zhou[2], Peter Liao[2], Frances Chung[1]

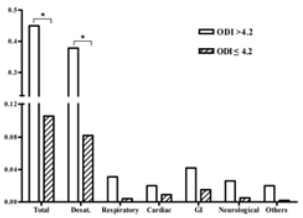
1. Department of Anesthesia, University Health Network, University of Toronto, Toronto, ON, Canada
2. Anesthesia, University Health Network, Toronto, ON, Canada

Introduction: Portable nocturnal oximetry has been shown to be an economic and reliable tool in diagnosing obstructive sleep apnea. The objective of this study is to explore the association of parameters from nocturnal oximetry with postoperative complications in surgical patients.

Methods: Following the approval of Institutional Review Board, patients visiting preoperative clinics for their scheduled surgery were approached for informed consent. Consented patients underwent a preoperative nocturnal oxygen saturation monitoring with a high resolution pulse nocturnal oximetry PULSOX-300i . The oximetry recordings were processed with a computer program (Profox). Cumulative time percentage with SaO2<90% (CT90), Cumulative time percentage with SaO2<80% (CT80), oxygen desaturation index(ODI) , mean and lowest SpO2 were extracted. ODI was the hourly desaturation events with SpO2 drop≥4% for ≥ 10 seconds. Adverse events were collected through follow-up by research staff and chart review.

Results: A total of 548 patients were included in this study: 298 (54.4%) females and 250 (46%) males with average age 60 ± 12 years. Orthopedic surgery (52%) was most common, followed by general (20%) and spine(10%) surgeries. Univariate analysis with logistic regression showed that mean SpO2, ODI and CT90 were significantly associated with the occurrence of postoperative complications ($p < 0.01$). Neither lowest SpO2 nor CT80 was related to complications. The area under receiver operating characteristic curve (ROC) to predict postoperative complication was 0.644 for mean SpO2, 0.588 for ODI and 0.568 for CT90. Based on the highest prediction accuracy, the best cutoff value was 94.4 for mean SpO2, 4.2 for ODI and 1.1 for CT90 . The odds ratio at best cut-off was 3.28 (95%CI: 2.28 -4.72) for mean SpO2<94.4 vs SpO2≥94.4, 1.79 (95%CI: 1.20 – 2.66) for ODI >4.2 vs ODI ≤4.2, and 1.54 (95%CI: 1.07 – 2.22) for CT90>1.1 vs CT90≤1.1. Further analysis showed that desaturation was most common postoperative adverse events (Figure).

Discussion: Mean SpO2, ODI, and CT90 from preoperative nocturnal oximeter were significant indicators for postoperative complications. Preoperative nocturnal oximetry may be useful in stratifying patients for the risk of postoperative adverse events.



Comparison of incidence of postoperative complications between two groups classified by ODI. Y axis is the rate of complications. Total complications were defined as occurrence of any specified adverse events. Desat: oxygen desaturation. * indicates $p<0.05$ for comparison of ODI ≤4.2 vs ODI >4.2.