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138022 - PERI-OPERATIVE STEROID SUPPLEMENTATION FOR ADRENAL INSUFFICIENCY

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Introduction: Adrenal insufficiency is a disorder of the adrenal glands where they do not produce enough of certain hormones, mainly cortisol and aldosterone. Management of patients with adrenal insufficiency presenting for surgery in regards to steroid supplementation remains unclear. Congenital adrenal hyperplasia (CAH), one form of adrenal insufficiency, is a disorder involving a deficiency of an enzyme involved in the synthesis of cortisol, aldosterone, or both. Current guidelines are clear that high dose steroids are recommended for children with CAH undergoing anesthesia. High dose steroids have potential risks such as bradycardia, hypotension and asystole, increased risk of infection, blood glucose disorders, liver & gastrointestinal effects, and psychiatric syndromes. Given the risks identified, it is important to examine if current recommendations reflect clinical practice in providing optimal care for patients.

Methods: Local research ethics board approval was obtained prior to study commencement. A cross-sectional survey was distributed following pretesting and pilot-testing. Invitation to participate in the survey was distributed via the Canadian Pediatric Anesthesia Society members' email list. The initial email invitation was followed with two additional invitations to complete the survey. Responses were analyzed using standard tabulations.

Results: 55% of respondents would not provide stress-dose steroids for a cystoscopy and 21% would not do so for a laparotomy, despite the Endocrine Society Clinical Guidelines on CAH. See Table 1.

Discussion: Our results demonstrate variation in clinical anesthetic practice regarding stress dose steroids in children with CAH undergoing anesthesia. Even when guidelines are provided, many respondents indicated they would not follow them. Our data also highlight that the decision to provide stress dose steroids is related to the proposed procedure. Finally, given the significant variation of practice, a need for future research is identified with an eye to change current practice recommendations.

References:

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Selected Results From a Paediatric Anesthesiologists Regarding the Use of Peri-operative High Dose Steroids For Children With Adrenal Insufficiency

Question	Response Options	Response Frequency
Are you aware of stress dose steroid guidelines for children with CAH undergoing anesthesia?	Yes	51 %
	No	49 %
Recognizing that the Endocrine Society's Clinical Guidelines on CAH state that patients should have stress-dose steroids accompanied by general anesthesia in doses of: Infants and preschool children – Hydrocortisone 25 mg IV School aged children – Hydrocortisone 50 mg IV Adults – Hydrocortisone 100 mg IV		
Would you follow these guidelines for a cystoscopy?	Yes	45 %
	No	55 %
Would you follow these guidelines for a laparotomy?	Yes	79 %
	No	21 %

140763 - POWER AND CONFLICT: CAN RESIDENTS CHALLENGE AUTHORITY DURING A CRISIS

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Introduction

Effective communication is crucial during life threatening crisis situations. Hierarchy is deeply engrained in the culture of medicine, is especially prominent when involving attending physicians and residents, and can result in failures of effective communication. Previous research has shown that residents were unable to effectively challenge a superior's wrong decision during a crisis situation.[1-3] Failure to challenge authority is a problem that can contribute to preventable mortality.[4] The objective of the study was to assess whether a teaching intervention affected the ability of residents to appropriately and effectively challenge clearly wrong clinical decisions made by their staff during a simulated emergency airway life threatening scenario.

Methods

Following local ethics board approval, second year residents were randomized to receive a teaching intervention targeting the cognitive and interpersonal skills needed to monitor and challenge a superior's decision, or a control group which received a general instruction on crisis management. The intervention included the use of 4 crisis resource management tools: The five-step assertive statement process, the 2 challenge rule, the CUS communication tool (Concerned-Uncomfortable-Safety) and the DESC conflict resolution and assertiveness script (Describe-Explain-Share-Compromise). Two weeks later, subjects participated in a simulated crisis (disconnected from the teaching session and unrelated to it) that presented them with five distinct situational opportunities to challenge a staff regarding a clearly wrong decision in a life threatening (can't intubate can't ventilate) scenario. Deliberate deception was used: residents were told that staff/resident teamwork was being evaluated and it was only disclosed that the staff was a confederate at the end of the simulation session during the debriefing. Performances were video recorded and later assessed and scored in random order by two trained independent raters blinded to group allocation and unfamiliar with the subjects using the modified Advocacy-Inquiry Score (mAIS).

Results

Fifty one residents were recruited and 50 completed the study. One video was excluded because of technical issues. All of the trainees had comparable previous experience participating in simulation. The inter-rater reliability of the mAIS scores among raters (ICC=0.87, 95% CI: (0.70, 0.94)) was excellent. The median (IQR [range]) of the maximal mAIS (our primary outcome) across all challenging opportunities and averaged out across raters was significantly better in the intervention group 5.0 (4.50-5.62 [4-6]) than in the control group 3.5 (3.0-4.75 [3-6]) (p

Discussion

The results of this study demonstrate that a short targeted teaching intervention was effective (and clinically meaningful) in significantly improving residents' ability to challenge a wrong decision by a superior. This suggests that residents are not given the proper tools to challenge authority during a life threatening crisis situation. This educational gap can have significant implications for patients' safety. Incorporating a similar intervention into the residency curriculum may address this problem and improve team work during crisis management.

References:

1. Anaesthesia. 2015;70:1119-29
2. Can J Anaesth. 2015;62:576-86
3. Br J Anaesth. 2013;110:463-71
4. Br J Anaesth 2010;105:83-90

141517 - EFFECT OF DIFFERENT SURGICAL POSITIONS ON CEREBRAL VENOUS DRAINAGE

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Introduction

The majority of cerebral venous blood flow passes through the internal jugular vein (IJV).[1] During neurosurgical procedures, patients are often placed in the park bench or prone position for surgical access. Excessive neck flexion and rotation may cause kinking of the IJV and obstruct cerebral venous blood flow resulting in intracranial pressure elevation.[2] The purpose of this pilot study was to measure the IJV blood flow of awake healthy volunteers, with the use of an ultrasound, in the supine, prone, and park bench positions. Our hypothesis was that there would be a decrease in the dependent IJV flow in the park bench position when compared to supine, but both IJV flows would remain unchanged in the supine and prone positions.

Methods

After Institutional Research Ethics Board approval, we evaluated IJV flows bilaterally in healthy and awake adult volunteers. An informed consent was obtained from all participants who met the inclusion criteria. The IJV cross sectional area and Doppler velocity were measured in the supine, prone and right park bench positions. IJV blood flow was calculated using the formula: Flow (ml/min) = Cross sectional area (cm^2) x Doppler velocity (cm/sec) x 60.[3] Two independent investigators performed the measurements and inter-observer variability was calculated using Pearson's correlation test.

Results

Twenty-seven volunteers were recruited. There was no significant difference in both IJV flows between the supine and prone positions (Right IJV: 1430 ± 803 ml/min vs 1924 ± 1140 ml/min; P = 0.071; Left IJV: 1113 ± 578 ml/min vs 1178 ± 832 ml/min; P=0.738). Similarly, we did not find any difference between both IJV flows in the right

park bench position compared to supine (Right IJV: 1430 ± 803 ml/min vs 1403 ± 1006 ml/min; P = 0.914; Left IJV: 1113 ± 578 ml/min vs 1267 ± 960 ml/min; P = 0.478). There was good correlation for IJV cross sectional area measurements made by both investigators but poorer correlation for velocity measurements.

Discussion and Conclusions

The IJV blood flow was not compromised by the prone or park bench positions in healthy volunteers breathing spontaneously. Our results suggest that careful positioning prevents kinking of the IJV and cerebral venous flow obstruction. However, future studies are required to determine if similar findings are obtained in anesthetized and ventilated neurosurgical patients.

References:

1. J Appl Physio 2003 94: 1802-1805
2. J Physiol 2004 560: 317-327
3. Crit Care Res Pract 2012 685481: 1-5

141653 - A DIFFICULT CASE OF ACUTE ON CHRONIC PAIN MANAGEMENT

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Introduction:
Considerable advances in the understanding and management of acute pain have occurred in the last few decades[1]. Despite these, patients with acute exacerbations of chronic pain still experience inadequately treated pain with a substantial impact on their daily lives[2]. Conventional analgesics are often ineffective or high doses are required leading to side effects limiting their use. External factors can contribute to chronic pain including life stressors, social supports and coping skills[3]. This latter "4th Pain Dimension" is poorly addressed in acute pain strategies. Furthermore, the wide variability in clinical presentation and treatment response in this cohort is such that clinical trials of these pain models are unlikely to provide meaningful results. It is increasingly apparent that an individualistic approach is necessary for these complex cases. We present the management of an acute exacerbation of chronic pain in an 18 year-old patient with severe juvenile rheumatoid arthritis (JRA).

Methods:
The patient provided written consent for the reporting and publication of this case report. Details from the acute pain management software (ACUPAM) and hospital charts were used to document the treatment steps taken and the patient's response. A literature search of current analgesic recommendations for rheumatoid arthritis was done to compare our treatment approach to others experience and existing guidelines.

Results:
This case highlights the challenges of implementing a multi-modal approach for severe uncontrolled pain in a complex patient with limited options due to previous analgesic experiences, sedative sensitivity, and the psychosocial impact of chronic disease. Ultimately, the patient required a multi-disciplinary approach with disease management (Rheumatology), anxiety and depression control (Psychiatry), and careful analgesic therapy (Acute Pain). A step-wise, severity-based, opioid-sparing approach was instituted with an epidural initially, followed by an IV lidocaine infusion and a patient controlled analgesia device with morphine and ketamine. His pain was eventually well controlled and he was discharged for rehabilitation with oral multimodal analgesia.

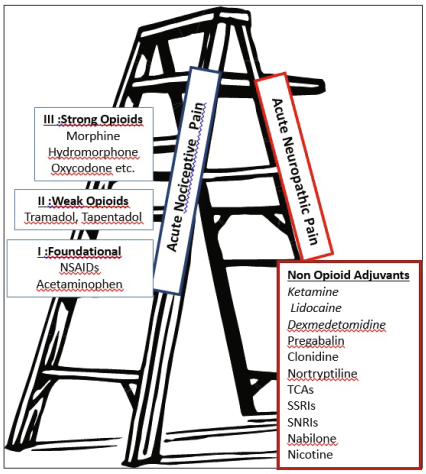
Discussion:
Models of acute pain that are difficult to treat include patients with acute on chronic pain where altered pathways lead to ineffectiveness of conventional pain management strategies[4]. Increased awareness of pro-nociception has led us to modify the

conventional step ladder approach with additional non-opioid anti-hyperalgesic therapies (Figure 1). Our case report is unique in identifying opioid-sparing techniques, including the role of an interventional technique for severe pain during a JRA flare. We also demonstrate the limited effectiveness of conventional opioids to control severe acute JRA flare pain. This case highlights the importance of early recognition and aggressive management of 'pro-nociception' with appropriate anti-hyperalgesic, non-opioid adjuvant therapies- pregabalin, ketamine and IV lidocaine.

References:

1. ***Wisconsin Medical Journal.*** 2003;102(7):14-18.
2. ***The Journal of Rheumatology***. 2015;42:10.
3. ***Reumatismo.*** 2014;66(1):4-13.
4. ***Rheumatology (Oxford).*** 2012;51(8):1416-1425.

Figure1: The New Ottawa Acute Pain Step Ladder



Based on the original WHO step ladder, this concept is based on the step-wise, severity-based, opioid-sparing approach. This also encourages the identification of acute neuropathic pain presenting as 'pro-nociception' and its treatment with non-opioid anti-hyperalgesic modalities. (Courtesy of Dr. Naveen Eipe and Dr. John Penning)

142950 - ANESTHETIC TECHNIQUES IN DIABETIC UNDERGOING DISTAL FOOT AMPUTATION

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Introduction:
To determine factors influencing anesthetic technique selection for patients with diabetes undergoing distal foot amputation, and to evaluate the effects of these techniques on intra- and postoperative clinical outcomes in this population(1, 2).

Methods:
This study was approved by local Ethics Committee. In total, 86 patients with diabetes who underwent distal foot amputation were retrospectively analyzed after being assigned to the general anesthesia (Group GA, n = 27), spinal anesthesia (Group SA, n= 37), and popliteal sciatic nerve block (Group PNB, n = 22) groups. Data regarding comorbid diseases, perioperative hemodynamics, postoperative pain scores, rescue analgesic requirements, postoperative complications, and 6-month mortality rates were evaluated.

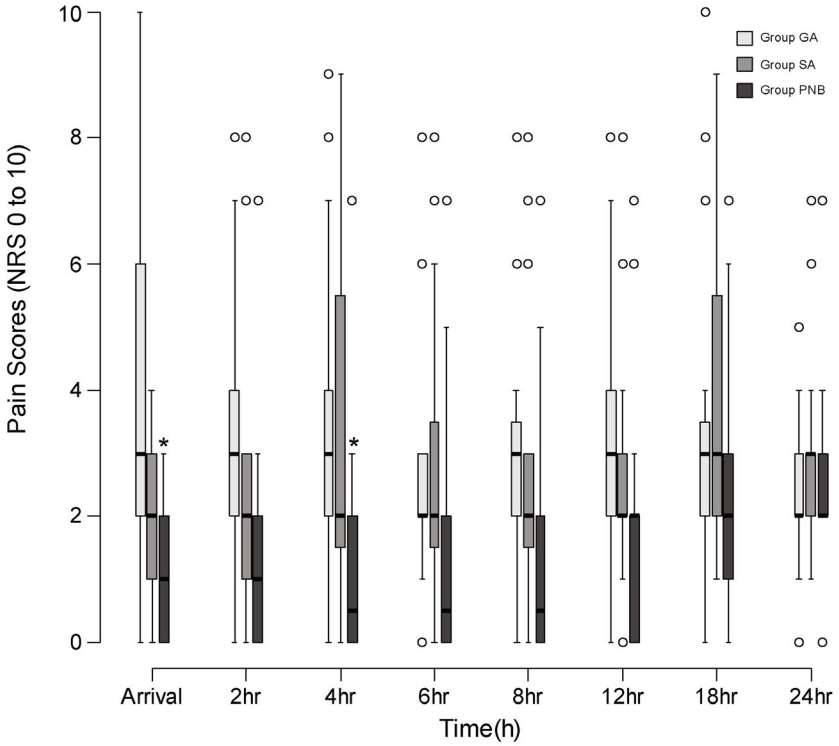
Results:
Disease severity was significantly higher in Group GA and Group PNB than in Group SA. The mean blood pressure was significantly lower in Group GA than in Group PNB at 30 min into the surgery, even though patients in Group GA received greater amounts of ephedrine, while postoperative pain scores were significantly higher in Group GA than in the other groups ($P < 0.001$ for all). Patients in Group PNB required lesser amounts of rescue pethidine during the first 6 h after surgery compared with the other groups ($P = 0.031$). The number of patients requiring intensive care and the incidence of postoperative pneumonia were greater in Group GA than in the other groups. The 6-month mortality rate was comparable among the groups.

Discussion:
Disease severity can significantly influence anesthetic technique selection in patients with diabetes undergoing distal foot amputation. A popliteal sciatic nerve block was more favorable than general anesthesia for these patients, and particularly for high-risk patients.

References:

1.Vascular. 2013;21: 83-6.
2. Ann Vasc Surg. 2014;28: 1149-56

Postoperative pain scores in the first 24 h after surgery



Postoperative pain scores were assessed using the verbal Numeric Rating Scale (VNRS, 0 = no pain and 10 = worst pain imaginable) on arrival in the PACU, and at 2, 4, 6, 8, 12, 18, and 24 h after surgery. The box represents the interquartile range; the solid line is the median; whiskers represent values within 1.5 times the interquartile range; and an outlier is a value outside this range. Group GA; general anesthesia group, Group SA; spinal anesthesia group, Group PNB; popliteal sciatic nerve block group * $P < 0.05$ compared with Group GA

142996 - EXPOSURE TO NEGATIVE INTRAOPERATIVE BEHAVIOR-7465 SURVEY RESPONSES

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Introduction: Negative intraoperative behaviors (NIBs) are linked to decreased communication and teamwork amongst team members[1,2]. This is associated with increased postoperative complications and death[3]. We define NIBs as those that 1) are interpersonal; 2) result in a perceived threat to victims and/or witnesses and 3) violate a reasonable person's standard of respectful behavior. We must understand the context in which NIBs occur in order to design effective interventions. However, no study has identified independent socio-demographic predictors of exposure to NIBs.

Methods: Appropriate REB approval was obtained. Previously, we developed a scale to measure exposure to NIBs. Seventeen perioperative organizations in Canada, Australia, New Zealand, India, the USA, and the UK distributed a survey that included this scale, as well as measures of socio-demographics and other outcomes. To help acquire sufficient response numbers from all professions, we also used focused recruitment efforts at the institutions of the investigators. We evaluated candidate predictors using a general linear model generated using SPSS (v.16, Chicago, SPSS Inc.). Variables correcting for respondent attrition and possible sampling bias were included.

Results: 7465 respondents provided sufficient data for analysis. The general linear model identified respondent country of work, sex, profession, management responsibilities, workplace privatization, and weekly hours in the operating room as significant predictors of exposure to NIBs (all $p < 0.05$). The exposure of various professions to NIBs is shown in the figure. Post hoc analysis identified the clinicians reporting highest exposure to NIBs. These clinicians were female, working as nurses, not in management positions, having less years of work experience, working at for-profit institutions or institutions with mixed funding, and working in the USA.

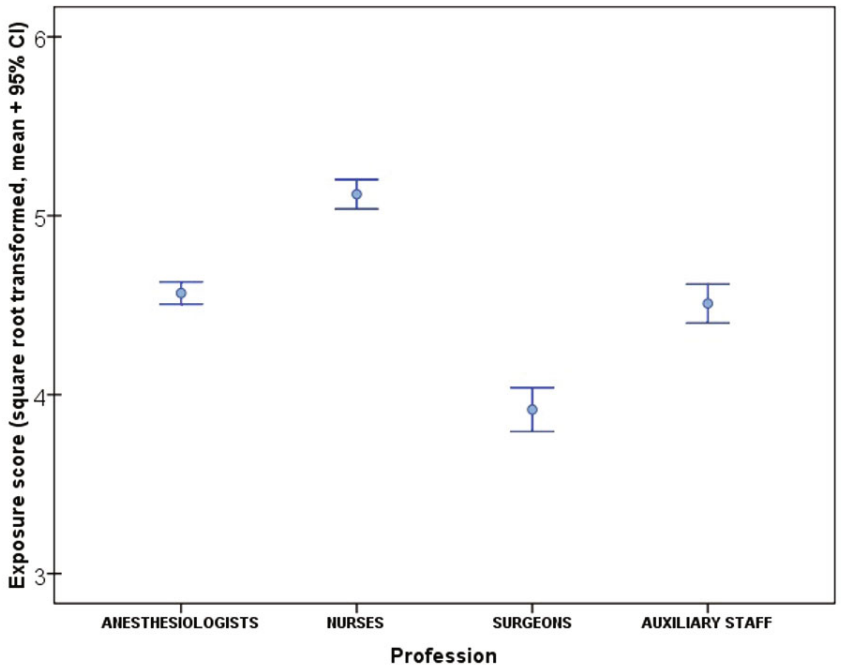
Discussion: Not surprisingly, individuals traditionally considered to have less authority and status report greater exposure to NIBs. This is concerning, as these individuals likely have less power to directly confront the perceived perpetrators. This may force

them to respond indirectly by acquiescing, avoiding, or manipulating others, thus undermining patient care. The worry remains regardless of whether the increased exposure of these individuals is actual or only perceived. Therefore, interventions should not only attempt to reduce NIBs, but also teach groups that report greater exposure to respond appropriately.

References:

1.J Am Coll of Surg 2006 203:96-105.
2.J Prof Nurs 1997 13:48-55
3.Am J Surg 2009 197:678-85.

Exposure of different operating room professions



143038 - DURAL MOVEMENT WITH EPIDURAL LOSS-OF-RESISTANCE IN PIGS

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Introduction: There has long been speculation that loss-of-resistance (LOR) with constant pressure while advancing the needle results in the injectate pushing the dura away from the needle point.[1]This might help prevent inadvertent dural puncture. In an earlier cadaver study we confirmed the theoretical possibility of epidurally-injected liquid (but not air) producing a jet that pushes the dura away from the needle tip at the onset of LOR.[2] In a clinical study in the operating room (manuscript in preparation) we found great variance among practitioners in LOR volume (mean 4ml), injection pressure, and time of injection. We hypothesized that a range of injection pressures would be optimal. In the present study, in a porcine model, we used saline with x-ray contrast to fluoroscope the lumbar spine while a video camera recorded the plunger and barrel during LOR epidural injection at various injection pressures. The primary measurements were the amount of LOR volume injected into the epidural space or the subcutaneous tissue and the amount of dural displacement caused by the LOR injectate.

Methods: Following university ethical approval, and using a device to produce known constant pressures of injection, we performed lumbar epidural injections in 6 male pigs, approximately 30kg and 6 to 8 weeks old, immediately after they were sacrificed in an unrelated hemodynamic study. Seven injection pressures were used that varied from 84 to 3040torr, all with 4ml injection volume. Flouroscopic and video recordings were digitized and analyzed using the VideoPad® computer program.

Results: Sixteen of 18 attempts were technically successful. Results are depicted in the chart below, which shows increasing injection pressures along the X-axis, with 3 outcomes summed in the bar graphs. Ideal outcomes are: 1) all 4ml of injected liquid goes into the epidural space (white bars: epidural injected volume); 2) the dura is moved away from the needle tip by the injection (black bars: mm movement); and 3) no injectate is lost into the tissues (hatched bars: volume lost into the tissues). At the lowest pressure, the injected jet does not move the dura – this is undesirable. At the highest injection pressures, injection of most or all of the liquid is into the tissues – this too is undesirable. Ideal injection pressures occur from 190 to 507torr.

Discussion: This study confirms the speculation, and suggests a range of injection pressures that should be investigated. A study has been done with constant LOR

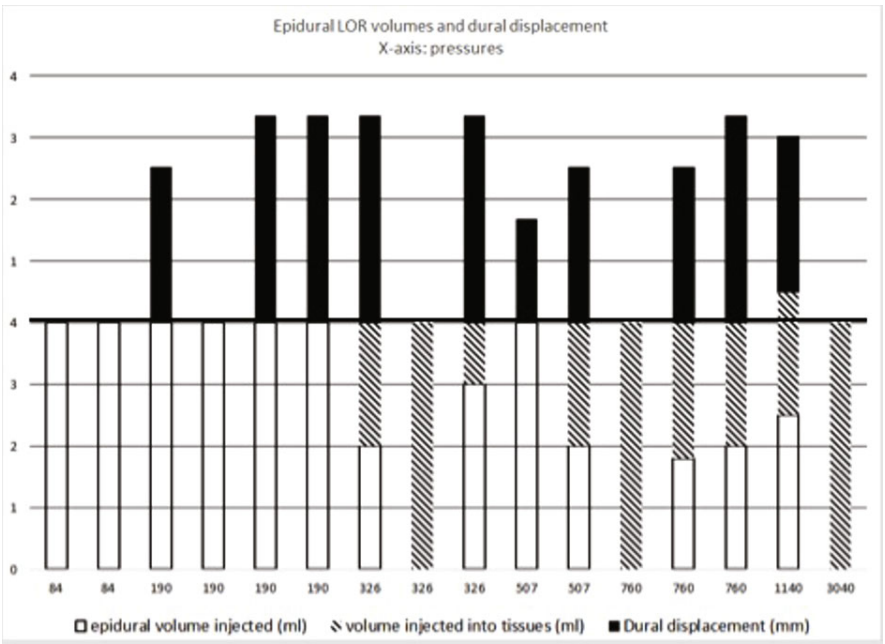
pressure of 50torr[3], and there is a commercially available LOR injection device, the Episure™, that has been shown to be efficacious, but for which the injection pressure is not known. The present study may point the way to future research to find ideal injection pressure and volume. Application of these results in "pediatric" pigs to human adults must be done with caution, especially with respect to injection into the tissues.

References:

1. Anaesthesia 2000;55:497-8.

2. Local Reg Anesth 2010;3:101-7.

3. Journal of anesthesia 2013;27:607-10.



143069 - METABOLOMICS PROFILING IN PATIENTS WITH MALIGNANT HYPERTHERMIA (MH)

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Introduction:
The mechanistic details of MH-induced hypermetabolic state are not fully understood. The unknown characteristics of MH-induced hypermetabolism can explain the phenotypic variability among MH patients. We hypothesized that the differences among MHS (anesthetic induced), MHS-NAI (non-anesthetic induced, sensitive to heat and exercise) and MHN (negative) patients are reflected in measurable differences in myoplasmic metabolites. We explored the characteristics of trigger-induced hypermetabolism by measuring metabolomics (metabolite footprint) in these patients' muscle samples during caffeine-halothane contracture test (CHCT).

Methods:
Following local Ethics Committee approval, muscle samples of 27 patients undergoing CHCT for diagnosis of MH (10 MHN, 8 MHS, 9 MHS-NAI) were collected prior and 10 minutes after exposure to 2mM caffeine and 3% halothane. Samples were prepared using the automated MicroLab STAR® system. The extract was divided into 5 fractions: 3 for reverse phase (RP)/UPLC-MS/MS, 1 for HILIC/UPLC-MS/MS, and 1 was reserved for backup. After log transformation, with the minimum observed value for each compound, analysis by two-way ANOVA with repeated measures identified biochemicals that differed significantly ($p \leq 0.05$) among experimental groups. An estimate of the false discovery rate of q

Results:
Post-treated MHN showed an upregulation of the energy metabolism pathways of glycolysis, TCA cycle and fatty acid beta oxidation. Pretreated MHS-NAI and MHS compared to MHN showed higher levels of glucose and lactose, creatine, creatinine, carnosine and anserine suggesting greater muscle activity. Oxidative and osmotic stress markers (ophthalmate, betaine, and trigonelline) were higher in pretreated MHS-NAI and MHS, compared to MHN. The difference remained significant comparing post treated groups. Pretreated MHS-NAI and MHS groups showed biochemical composition similar to post-treated MHN.

There was significant increase in 3-methylhistidine, 1-methylhistidine, and 1-methylimidazoleacetate (indices of the muscle protein breakdown) in untreated MHS,

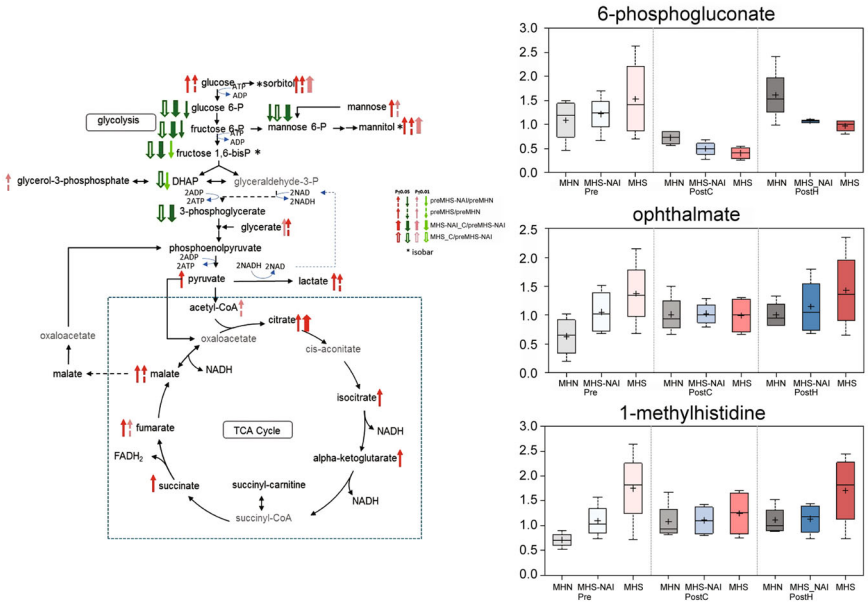
MHS-NAI compared to untreated MHN.

Post-treated MHS-NAI showed a partial impairment in glycolysis and pentose phosphate pathways, but relatively preserved fatty acid metabolism. However, post-treated MHS had impairment in all the energy production pathways (see picture).

Conclusion:
Our preliminary results show that muscle of the MHS-NAI and MHS at rest are in a degradation phase and in constant hypermetabolic state. They are unable to further induce protective processes, in response to increased muscle activity post treatment. Furthermore, the impairment of energy production pathways post-treatment (more in MHS than MHS-NAI), resulting in higher levels of oxidative stress markers that can potentially impair mitochondrial function and cause long term effect. The results of this study should be seen as proof-of-concept investigation. Larger sample size is needed not only to create a comprehensive metabolic database to characterize MH state, but also to explore biochemical markers formulating a diagnostic test for MH, perhaps based on less invasive approach (analysis of plasma or urine).

References:

Some highlights of the results, comparing MHN, MHS, and MHS-NAI



Left panel shows changes in TCA cycle among three groups. Right panel-Top: Significant reduction of 6P-Gluconate in MHS, and MHS-NAI post treatment. Right Panel-Middle:Significant increase in marker of cellular stress in MHS and MHS-NAI. Right Panel-Bottom: Significant increase in protein breakdown in MHS.

143085 - FACTORS PREDICTING IMPACT OF PEDIATRIC ANESTHESIA CASE REPORTS

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Background:
Case reports in pediatric anesthesia provide an opportunity to drive hypothesis generation and testing for future clinical applications and research. However, their quality and impact on anesthesia scientific literature is largely unknown. The goal of our study was to assess the quality of published pediatric anesthesia case reporting using the Case Report (CARE) guidelines and the bibliometric impact of published pediatric anesthesia case reports and identify factors associated with high citation rates.

Methods:
This systematic review was exempt from local ethics board approval. Pediatric anesthesia case reports published over a ten year period from 2005 to 2014 were identified on Medline and Embase and evaluated according to predefined criteria. Quality of case reports was assessed using the CARE guidelines Score. Each report was categorized into low quality (scores 0 to 10), lower medium quality (scores 11 to 18), upper medium quality (scores 18 to 23), and high quality (scores 24 to 30). Patient demographic data were extracted. The Anesthesia Quality Institute (AQI) Pediatric Outcome framework was used to extract patient data such as pre-existing comorbidities (PCM) and untoward events. These data were defined as patient case factors in our study. Bibliometric impact (citations) of case reports published prior to 2011 was assessed using Scopus. Quantitative data was analyzed using descriptive statistics and non-parametric tests as appropriate. Univariate analysis identified patient case factors independently associated with high citation rates which were then included in a multivariate model predicting high citation. A p-value

Results:
628 case reports originating from 51 countries and published across 144 journals (English) were included for analysis. The number of case reports published each year decreased from 87 in 2005 to 37 in 2014. Overall, cases were of upper medium quality reporting with a mean CARE checklist score of 18.6 (median 19; range 0-26). Only 3% (17/628) of case reports were of high quality with the majority being lower medium quality (66%). Only forty percent of cases reported untoward events. The most commonly reported adverse events were death (5%), cardiac arrest (3.8%) and re-intubation (3.5%). Seventy-nine percent of case reports were cited. The median of citations was 3 (range = 0-129). Patient case factors predicting a high citation rate (>10) were low patient weight, cardiac surgery and the occurrence of arrhythmias requiring management. The CARE guideline score did not correlate with the number of citations.

Conclusion:
The number of case reports published in pediatric anesthesia have decreased over a decade, are of moderate reporting quality and are frequently cited. We have identified factors that are associated with citation. Efforts are needed in improving the overall quality of case reports in pediatric anesthesia.

References:

1. J Clin Epidemiol. 2014 Jan;67(1):46.
2. Am J Dermatopathol. 1981 Jul 1;3(2):111–4.
3.A&A Case Reports. 2AD Jan 3;1 (1).
4. BMJ Case Reports [Internet]. 2013 Oct 23;2013.

143302 - DOES TWITTER ENABLE ANESTHESIOLOGISTS' HIGHER ORDER THINKING?

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Background: The use of social media is increasing, in social and professional contexts including anesthesia, on a variety of platforms that include Twitter; however, the scope and breadth of its use in #anesthesia has not previously been reported. AIMS: To determine the frequency, sentiment and trend of Twitter 'tweets' containing anesthesiology identifiers (hashtags) were prospectively tracked and analyzed over a 60 day period. We aimed to determine the level of higher order engagement of anesthesiologists using twitter.

Methods: This study was exempt from IRB. Tweets with the hashtags #anesthesia, #anesthesiology, #anaesthesia were prospectively tracked and analyzed from Feb 1, 2015 to March 31st, 2015 using a social media analysis tool, CyBrand. Data were analyzed for tweet volume, frequency, sender, content analysis, sentiment and acceleration and factors associated with use. An evaluative analysis using Bloom's digital taxonomy was used to assess the level of higher order discourse in twitter. Descriptive statistics were used to summarize data, Chi-Square and univariate analysis for factors associated with use and retweeting.

Results: A total of 4021 tweets with #anesthesia hashtags were sent by 1698 unique Twitter accounts between Feb 1, 2015 and March 31, 2015. These made a total of 8 million impressions. The largest single tweeters by volume were companies/industry (27% of tweets), while individual anesthesiologists contributed to forty percent of tweets. Content analysis showed that 34% of tweets provided scientific information, 30% were commentary, 5% were sharing experiences and 10% were advertisements. Overall, 20% tweets were part of conversations including academic/scientific topics. About 75% of tweets had positive sentiment. 80% of tweets demonstrated the lowest order on cognitive processes of Bloom's digital taxonomy. 10% of tweets demonstrated higher levels (analyse, evaluate and create).

Conclusions: A lot of discussion and content about #anesthesia is taking place on Twitter, and the majority of this is positive. Social media presents a novel opportunity for engagement and ongoing dialogue with public and professional groups. Higher order thinking and discourse can be demonstrated on twitter with 140 characters or less. Further studies are warranted to quantify the quality of interactions and how they

translate to patient care.

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143495 - HOSPITAL VOLUME AND SURVIVAL FOR FRAIL ELECTIVE SURGERY PATIENTS

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Introduction

Frailty is a syndrome based on age- and disease-related deficits that accumulate across multiple domains. Frailty is a risk factor for morbidity, mortality, and increased healthcare resource use. With the rapid aging of the Canadian population, improving the outcomes of frail surgical patients is a priority for the healthcare system. Hospitals and surgeons that perform higher volumes of specific surgeries generally have better outcomes than low volume providers. This volume-outcome relationship is often attributed to improved structures and processes of care at high-volume centers. Since frail patients are sensitive to structures and processes of care, we hypothesized that frail patients having elective surgery at hospitals that cared for a higher volume of similarly frail elective surgical patients would have lower rates of postoperative mortality, complications, and failure to rescue (FTR).

Methods

Following ethical approval, we conducted a population-based historical cohort study. We identified all episodes of adult elective, intermediate- to high-risk non-cardiac surgical care from 2002-2014; frailty status was confirmed using the validated Johns Hopkins ACG frailty indicator. Our cohort was limited to frail patients, and analysis was limited to the first surgery for each frail patient. The number of frail patients operated on at each hospital in the year before each patient's surgery was calculated; hospitals were divided into frailty volume quintiles. We estimated the adjusted association between frailty volume and 90-day postoperative survival using a multivariable proportional hazards regression model that accounted for clustering in individual hospitals, patient characteristics, comorbidities, procedural risk, baseline health resource use, and total hospital surgical volume. The association of frailty volume with complication and FTR rates was analyzed using multivariable logistic regression.

Results

We identified 63 381 frail patients, of whom 1 491 (2.4%) died in the 90 days after surgery. There was a dose-response improvement in postoperative survival for frail patients with each increase in hospital volume quintile (highest quintile vs. lowest: HR=0.65, 95% CI 0.50-0.85, see figure). Higher frailty volume hospitals also had lower complication rates, and significantly lower FTR rates (highest quintile vs. lowest: OR=0.41, 95%CI 0.21-0.77).

Discussion
Frail patients who have elective surgery at hospitals that care for higher volumes of frail patients have improved postoperative survival. This is at least partly explained by lower failure to rescue rates, which may indicate better structures and process of care. Concentration of perioperative care in centers that frequently care for high-risk frail patients could improve outcomes; further study of this association is warranted.

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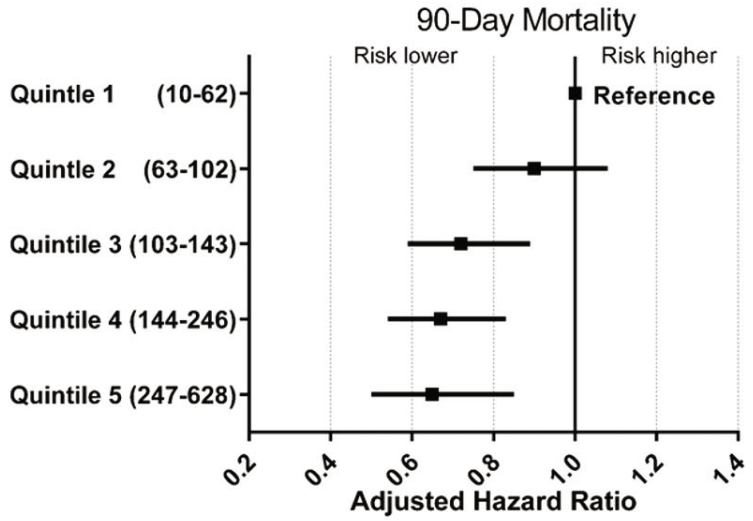
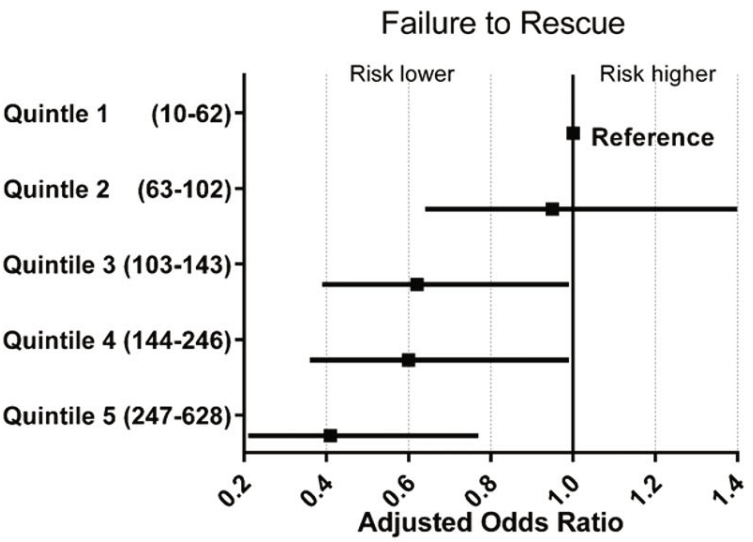
Adjusted association between frailty volume and mortality and failure to rescue





*(bracketed) numbers refer to volume of frail surgical patients at each hospital in the year prior to index surgery

144014 - COMBINED SPINAL EPIDURAL IN PARTURIENT WITH FRONTAL GLIOMA

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Introduction

Intracranial pathology remains a contraindication to neuraxial technique for fear of herniation or neurologic deterioration. Here we present a careful CSE technique in a morbidly obese parturient undergoing urgent cesarean section with recent asthma exacerbation, signs of difficult airway and frontal glioma with past history of seizure.

Case Presentation

The patient consented to this report. Our patient was a G3P2, 32 year old admitted at 35+0 weeks for non-reassuring heart rate and asthma exacerbation. History was remarkable for severe asthma, obesity (BMI of 53), and frontal low-grade glioma, with past seizures.

MR imaging of her lesion from 2013 showed a stable, 2.6x1.2x1.1 cm mass in the right frontal lobe (Figure 1). No findings of increased mass effect were found. A CT head ordered at 26 weeks gestation showed no change. We consulted with the neurosurgery team who felt it would be safe to proceed with neuraxial technique given the stability in the patient's lesion.

The patient was 168cm tall and 148kg. Vitals were normal. Airway examination revealed a thick neck, Class III Mallampatti with otherwise normal features.
Two anesthesiologists were present for the emergent section. A pre-procedure arterial line was placed. Under aseptic technique and in the sitting position, a combined spinal epidural block was performed at the L3-4 level using an 18G Touhy and 26G Pencan pencil point needle. Two attempts were required for loss of resistance at 9.5cm, after which the dura was punctured and 1.5ml of 0.75% Bupivicaine with 15ug Fentanyl and 100ug of Epimorph were injected.

Two units of RBCs were given for blood loss of 1500ml due to uterine atony. There were no other complications.

Discussion

While there are several reports of successful regional procedures performed for patients with intracranial neoplasms, increases in CSF pressure can not be confidently avoided[1,2,3,4,5,6]. Cases of stable, slow growing brain tumours located away from CSF pathways may cause little ventricular compromise due to compensatory caudal displacement of CSF or blood volume instead of brain mass[7]. In hopes of avoiding theoretical dural compression, we opted for a technique that would allow for titratable analgesia achievable with small volumes and avoid a potential high risk general anesthetic. In our case, the patient's physical examination, imaging, and multidisciplinary discussion reassured us that there was no rise in intracranial pressure and her tumour was stable.

Anesthesia for parturients with brain tumours or raised intracranial pressure must be approached with caution[6]. The decision between general or regional anesthesia is one that should be made on an individual patient basis in collaboration with the patient and multidisciplinary care teams.

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6. Leffert L, Schwamm L. Neuraxial Anesthesia in Parturients with Intracranial Pathology: A Comprehensive Review and Reassessment of Risk. Anaesthesiology. 2013;19(3):703-718.

Figure 1

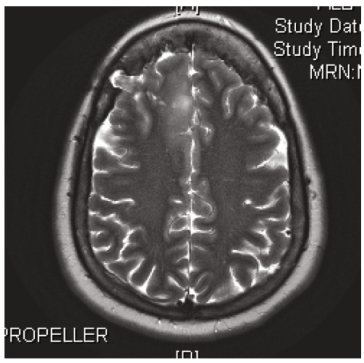

Figure 1. MRI showing ill defined gyral expansion of the right anterior parasaggital frontal lobe

144752 - LEARNING BEHAVIORS OF MEDICAL CLERKS DURING OPERATING ROOM ROTATIONS

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Introduction: Medical schools have an interest in promoting positive learning behaviors in their students. Measuring these learning behaviors can be useful when circumstances do not permit the evaluation of the earning outcomes. Previous research on learning behaviors has focused on medical residents[1] or were not specific to operating room (OR) rotations.[2] We therefore developed a survey tool to measure medical clerk learning behaviors during OR rotations. We then used this tool to generate a preliminary description of the learning behaviors in a sample of medical clerks in the USA and Canada.

Methods: A cognitive model called “brain-based learning" guided question generation.[3] Pretesting included cognitive interviews with five medical clerks and consultation with nine operating room staff and two psychometricians. The questionnaire received REB approval. We distributed the survey to senior medical students in a sample of Canadian and US medical schools. Exploratory factor analysis was used to refine the model. Reliability was assessed using Cronbach’s alpha. Basic descriptive statistics for each learning behavior type were calculated. A Friedman’s test with a Wilcoxon follow-up evaluated differences in the frequencies of the learning behaviors.

Results: A total of 543 medical students completed the survey. The final model had four categories of learning behaviors (three positive and one negative); these were preparatory behaviors performed in anticipation of a curriculum activity (5 items, alpha=0.822), active role behaviors carried out during official learning activities (6 items, alpha=0.795), reflective behaviors occurring after such activities (5 items, alpha=0.789), and a group of avoidant behaviors involving a purposeful evasion of learning activities (4 items, alpha=0.675). Reliability was acceptable to good. Inter-item correlations indicated a lack of question redundancy. The primary finding of the survey was that active role behaviors were significantly the most frequently endorsed type of learning behavior (Figure 1).

Discussion: We have created a tool to measure the learning behaviors of medical clerks during OR rotations. The tool can be used to describe medical clerk learning and may help inform educational interventions. A number of factors may explain the prevalence of active role behaviors, including the likelihood that preparatory and reflective behaviors require an additional time commitment, and that participating in operating room activities is perceived as necessary to ensure that preceptors maintain a positive view of the student.[4]

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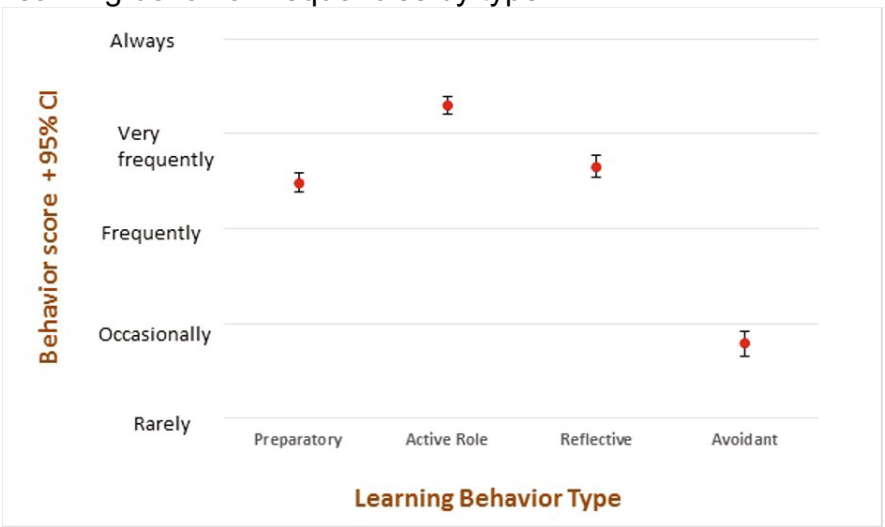
Learning behavior frequencies by type



145417 - BARIATRIC SURGERY TO FACILITATE WEIGHT LOSS FOR CARDIAC TRANSPLANT

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Introduction:
Bariatric surgery for severe obesity is associated with decreased long-term mortality and weight loss in patients with a wide range of comorbidities[1, 2]. Bariatric patients with heart failure needing cardiac transplantation represent a unique subset of this surgical population. The increased risk of mortality with cardiac transplantation makes it a relative contraindication in the morbidly obese[3] and these patients may be denied transplantation based on weight alone[4]. We present a recent case of a patient who is ineligible for cardiac transplantation based on his body mass index (BMI).

Methods:
Consent for publication was obtained in writing from the patient prior to proceeding with surgery.

The patient is a 45 year old male with a BMI = 47.4, ischemic dilated cardiomyopathy with compensated heart failure and an ejection fraction of 17%. Other comorbidities included moderate pulmonary hypertension. Following an extensive multi-disciplinary approach to the patient's care he was brought to the operating room for laparoscopic Roux-en-Y gastric bypass surgery.

Prior to induction of general anesthesia, transthoracic echocardiography (TTE) was performed to assess the patient's baseline biventricular systolic function and determine his response to a small dose of epinephrine (0.02 mcg/kg/min) and milrinone (5mg nebulized). A second TTE was performed approximately 20 minutes after these interventions. General anesthesia was then induced and the patient was monitored with transesophageal echocardiography throughout surgery. Postoperative monitoring occurred in the intensive care unit (ICU).

Results:
Hemodynamic changes pre and post-induction and with creation of the pneumoperitoneum during surgery are summarized in Table 1. The right ventricular systolic pressure (RVSP) dropped from 70-54 mmHg with milrinone pre-induction, and epinephrine helped increase cardiac output prior to induction and in the presence of the pneumoperitoneum (Table 1). The patient was hemodynamically stable throughout surgery with the epinephrine infusion and inhaled milrinone. He was extubated at the end of surgery and required no further inotropic support. He was transferred to the ICU for monitoring in stable condition. His post-operative course was uncomplicated and he was discharged three days post-operatively and continues to do well at this time.

Discussion:
This patient's outcome is in keeping with outcomes from small studies and case series that have shown that bariatric surgery may present an effective way of helping patients achieve the weight loss required for timely cardiac transplantation. Previous small studies have shown improvement n left ventricular function following bariatric surgery in patients with cardiomyopathy to the extent that some of these patients no longer require transplant, while others have gone on to successful transplantation after achieving the needed weight loss[4, 5, 6]. We will continue to follow this patient's outcome and plan to report on his long-term surgical outcome.

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Table 1 Left Ventricle Cardiac Output (CO), Stroke Volume (SV), Right Ventricle Systolic Pressure (RVSP) and Tricuspid Annular Plane Systolic Excursion (TAPSE) Measurements on Transthoracic (TTE) and Transesophageal (TEE) Echocardiography.

Table 1 Left Ventricle Cardiac Output (CO), Stroke Volume (SV), Right Ventricle Systolic Pressure (RVSP) and Tricuspid Annular Plane Systolic Excursion (TAPSE) Measurements on Transthoracic (TTE) and Transesophageal (TEE) Echocardiography.

Measurement	TTE Pre-induction	TTE Pre-induction with Epinephrine & Milrinone	TEE Post-induction	TEE Pneumoperitoneum
Cardiac Output (L/min)	3.0	3.2	2.2	1.9 to 4.7* * epinephrine infusion 0.05mg/kg/min
Stroke Volume (mL)	38	38	38	24-67* * epinephrine infusion 0.05mg/kg/min
Right Ventricle Systolic Pressure (mm Hg)	70	54	45	52-54
Tricuspid Annular Plane Systolic Excursion (cm)	1.26	1.33	0.95	1.12

145876 - DEXMEDETOMIDINE USE AFTER PAEDIATRIC CARDIAC CATHETER PROCEDURES

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Introduction:
Local institutional post-procedure cardiac catheterization guidelines require patients to lie still in the post-anesthetic care unit (PACU) for 1-2 hours. The aim is to reduce the risk of cannulation site bleeding but it is challenging to keep young children immobile for this period. Dexmedetomidine has beneficial sedative, anxiolytic and analgesic properties[1]. It is used in our institution to reduce the need for physical restraint in these patients. However, this may lead to prolonged stays in PACU and attendant risks of continued patient sedation.

Not all centres mandate a period of immobility and few routinely use sedation after cardiac catheterization. There are no reports of post-cardiac catheterization sedation with dexmedetomidine in the literature. The purpose of this study was to gather case-based data to determine whether dexmedetomidine sedation is beneficial after cardiac catheterization.

Methods:
With REB approval, we are conducting a retrospective audit of cardiac catheter cases performed before and after the introduction of dexmedetomidine. Comparison will be made between patients who did and did not receive dexmedetomidine in PACU (20 patients/group). Records were reviewed for procedure details, peri-procedural drugs administered, vital signs, sedation and analgesia use in PACU, and complications; including delay in discharge and puncture site bleeding.

Results:
To date, 24/40 records have been reviewed with data collection to be completed by March 2016.

Sixteen patients were administered dexmedetomidine in PACU (age range 4mth-16yr; median 2.3yrs.). Initial dexmedetomidine infusion rates varied from 0.2–0.7 mcg/kg/hr. The rate was increased in 9 cases (max infusion rate 0.7 mcg/kg/hr). Dexmedetomidine was deemed ineffective in 1 case having reached this maximum rate. Two children had ongoing oxygen requirements (1 delaying discharge) and one was over-sedated. Three patients had mild bleeding; 2 stopped after application of local pressure, the third was receiving a heparin infusion and bleeding stopped when

the infusion was discontinued. No morphine is documented in PACU for this group. Eight patients did not receive dexmedetomidine in PACU (range 4mth-14yr, median 7yrs.). No vascular complications were seen in this group. Morphine was used in 4 patients and was associated with urinary retention (n=2), nausea (n=1) and delay in discharge (n=1).

Discussion:
A retrospective audit is subject to the quality of documentation available in the records; the character of patient recovery is not quantified and sedation scoring limited. Dexmedetomidine did not reduce vascular complications in this small sample. It was associated with more frequent episodes of sedation and oxygen supplementation, but may have an analgesic-sparing effect with less associated opiates related complications. A prospective study to review the validity of the drug in this setting and the need for immobility is proposed.

References:

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146099 - PERIOPERATIVE ASPIRIN IN HEPATO/BILIARY/PANCREATIC CANCER SURGERY

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Introduction: Aspirin (ASA) has been widely used for the secondary prevention of ischemic cardiovascular disorders. In the perioperative period, however, it is not uncommon that the fear of excessive bleeding leads clinicians to stop ASA well in advance of the surgical procedures. Previous small-scale randomized controlled trials (RCTs) [1-2] suggested that ASA was unlikely to increase the bleeding risk to a clinically significant degree, while a recent large-scale RCT; POISE-2 trial[3] did demonstrate that ASA increased the major bleeding risk. In this study, we evaluated if perioperative ASA continuation increases the bleeding risk in such high risk patients as those undergoing hepato/biliary/pancreatic (HBP) malignancy surgery.

Methods: After approval of our institutional ethics committee, a retrospective review of electrical medical records was performed for the patients who underwent HBP malignancy surgery at our institution for 5 years period between 2010 and 2015. Among them the patients who received ASA preoperatively and continued ASA until the day of surgery were included in ASA group and those who did not receive any antithrombotic agents preoperatively were in Control group. The amount of intraoperative bleeding, the incidence of exogenous blood transfusion, the duration of surgical procedure and the length of postoperative stay were compared between ASA group and Control group. Patient characteristics and the surgical procedures performed were also compared between the two groups. Statistical analyses were performed with Chi-square test or Mann-Whitney *U*-test and *P*

Results: As shown in Table, ASA group patients were older than Control group and were more likely to be male. Type of the surgical procedure was similar between the two groups. The concurrent use of anticoagulants was more frequent for ASA group. Outcome data were similar except that the length of postoperative stay was longer for ASA group than for Control group.

Discussion: Our findings have shown, although underpowered but in more detail, that ASA continuation was unlikely to increase the bleeding risk in patients who underwent HBP malignancy surgery. The patients on ASA were older and were presumably associated with more comorbidities than those not on ASA. But this appears not to introduce much bias, since such differences at baseline are unlikely to reduce the

bleeding risk of the patients on ASA. Different results between the POISE-2 trial and ours may be attributable to differences in the surgical procedures performed or differences in the concurrent use of antithrombotic agents; 65% and 4% of the patients in the POISE-2 trial received a prophylactic-dose and a therapeutic-dose of anticoagulants, respectively, as well as 1.2% of them received $P2Y_{12}$ inhibitors.

References:

References: 1. Br J Anaesth 2010; 104: 305-312. 2. Br J Anaesth 2011; 107: 899-910. 3. New Engl J Med 2014; 370:1504-1513

Patient characteristics and outcomes data

	ASA Group (n=41)	Control Group (n=429)	*P*
Age*	74 (70-79)	69 (62-74)	<0.001
Male/Female	32/9	255/174	0.020
Surgical procedure			0.809
Nonanatomical liver resection	7	113	
Anatomical liver resection	12	183	
Pancreatectomy	11	125	
Others	0	4	
Concurrent use of anticoagulants (%)	12.2	0	<0.001
Amount of intraoperative bleeding (ml)*	380 (208-720)	381 (180-770)	0.700
Incidence of exogenous blood transfusion (%)	22.0	17.5	0.476
Duration of surgical procedure (min)*	286 (220-378)	318 (216-415)	0.440
Length of postoperative stay (day)*	17 (9-24)	12 (9-20)	0.002

*: median (quantile 1-3)

146364 - PARAVERTEBRAL BLOCK VERSUS TWO STEP SURGICAL BLOCK IN BREAST SURGERY

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Introduction

Recovery from breast surgery is often complicated by pain, nausea, sedation and impaired functional recovery[1]. Compared to placebo, paravertebral blockade (PVB) decreases postoperative pain and nausea[2]. However, PVB is not without risk[2]; evidence regarding its superiority to other analgesic techniques is limited by factors including small sample size, inadequate blinding and lack of active comparator[2]. This study's objective was examining the impact of PVB compared to surgical field block (SFB) on postoperative quality of recovery (QoR), pain, and shoulder function.

Methods

Following ethical approval we conducted secondary analysis of data collected for a published double blinded randomized trial (NCT01089933)[3]. Breast cancer surgery patients were randomized to PVB or SFB. The PVB group had T1-T6 PVB with 5ml 0.5% Ropivicaine per level and saline injected by surgeon into the wound and in the drain. The SFB group had saline subcutaneous injections at T1-T6 and 0.5% Ropivicaine injected by surgeon into the wound (10ml) and in the drain (20ml). Differences in QoR on postoperative day (POD) 2 were assessed using a Wilcoxon test. Differences in the proportion of patients with pain numeric rating scale (NRS) >3 on POD2 were assessed using a Chi-square test. Differences in Constant score (a validated 100-point scale to measure shoulder function) at first follow up were assessed using a *t*-test. Generalized linear models were used for QoR and NRS repeated measures across the first 7 PODs. *P*-values < 0.05 were considered significant.

Results

129 patients were recruited, 65 were randomized in a concealed manner to the PVB group, 64 to the SFB group. Characteristics between groups were similar. There was no difference in POD 2 QoR (PVB:18,IQR 17-18;SFB:17,IQR 17-18,*P*= 0.83), proportion of patients with NRS>3 on POD 2 (PVB:16.4%;SFB:14.1%,*P*=0.81), or

Constant score (PVB:75 in PVB;SFB: 69,*P*=0.68) between the groups.Differences in QoR and NRS were not significant in repeated measures analysis (*P*=0.76,*P*=0.25 respectively).

Discussion

To our knowledge,this is the first adequately blinded randomized trial evaluating the impact of PVB versus an active comparator on recovery,pain and function after oncologic breast surgery.There does not appear to be significant benefit from PVB compared to SFB on any of our measured outcomes in the early postoperative period,while previous analysis of this data shows no benefit in terms of chronic post-surgical pain[3].We hypothesize that SFB may be superior to surgical local anesthetic infiltration,and may explain the divergence of our findings from previous studies of PVB.These findings should be considered when weighing the risks and benefits of neural versus surgical field block in similar patient populations.

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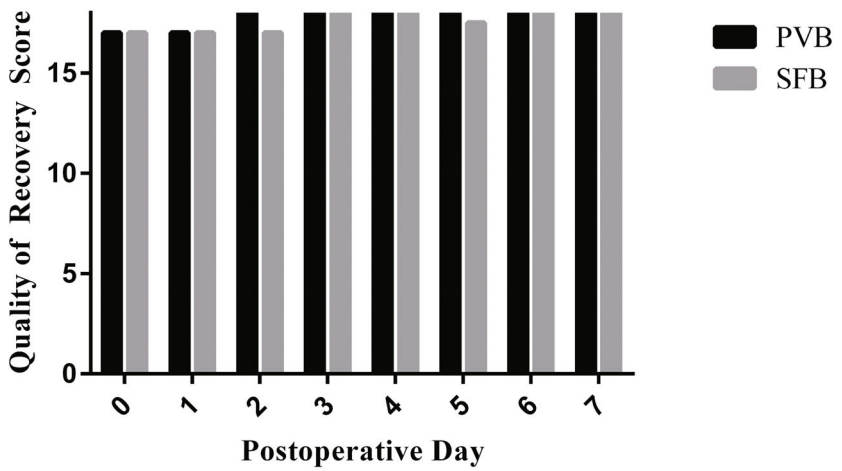
QoR Score vs Postoperative Day



Comparison of QoR scores between PVB and SFB groups on POD 0-7

146489 - INTRAOP ACCU-STIMULATION OF P6 FOR PREVENTION OF PONV IN CRANIOTOMIES

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INTRODUCTION:
Post-operative nausea and vomiting (PONV) can impact recovery, with an average incidence of 38.3% (1). Predictors include: female gender, history of PONV, non-smoker, perioperative opioids, and surgical procedure. Increases in intracranial pressure from Valsalva in craniotomies can result in tissue swelling, hemorrhage, or hematoma, compromising outcome (2). PONV the first 24 hours after craniotomy ranges from 10% to 74% (3).

In 1986 visiting China, J W Dundee was impressed by acupressure at Pericardium 6 (P6; aka Neiguan) for prophylaxis of hyperemesis gravida. Dundee conducted the first study of acupuncture at P6 on patients under general anesthesia(4). Further data demonstrated effectiveness of electrical stimulation at P6 in preventing and treating nausea and vomiting (2,5,6). While well-established in preventing PONV (6), P6 electrostimulation as protection in patients who failed pharmacologic therapy is unknown.

METHODS:
Various methods of stimulating P6 may not differ in effectiveness, but do vary in ease and cost of implementation. Neuromuscular blockade monitors (NMBMs) stimulate P6 intra-operatively at a frequency of 1 Hz at one pulse/ second throughout the anesthetic (7,8,9, 10).

IRB approval was obtained for this case series, and appropriate consent was obtained from these patients.

Table 1

DISCUSSION:

PONV can increase discomfort, unwarranted side effects, and hospital costs (ie. readmission). Current pharmacological approaches for craniotomies focus primarily on selective serotonin receptor antagonists (5HT3) because of favorable safety profiles and lack of sedation (eg. ondansetron) (3). However, the cost of these drugs can be expensive. Single-drug prophylaxis of PONV has a very high failure rate, with the consequential addition of hundreds of millions of dollars annually to the cost of post-op care (11).

The effects of different classes of anti-emetics are additive; thus the standard of care for patients at moderate/ high risk of PONV is multi-agent prophylaxis (12). P6 stimulation should be considered as an adjunct due to low cost and ease of use. The results of this retrospective study suggest that while reducing the incidence of PONV overall, unilateral stimulation of P6 using NMBM also reduces the amounts of antiemetic medications required post-operatively. Futhermore, application of P6 electrostimulation was achieved without skin penetration, or inconvenience/ additional time for the anesthesia team, implying that this is a relatively simple method of preventing PONV that may be utilized.

CONCLUSION:
This retrospective study suggests that P6 electrostimulation with NMBM may decrease PONV when used as an adjunct to pharmacological prophylaxis. Furthermore, its use requires minimal training and additional time or expense. However, a randomized controlled trial is needed to verify that P6 electrostimulation decreases PONV beyond that which would be achieved with pharmacological prophylaxis in the at risk population.

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P6 PONV in Craniotomies

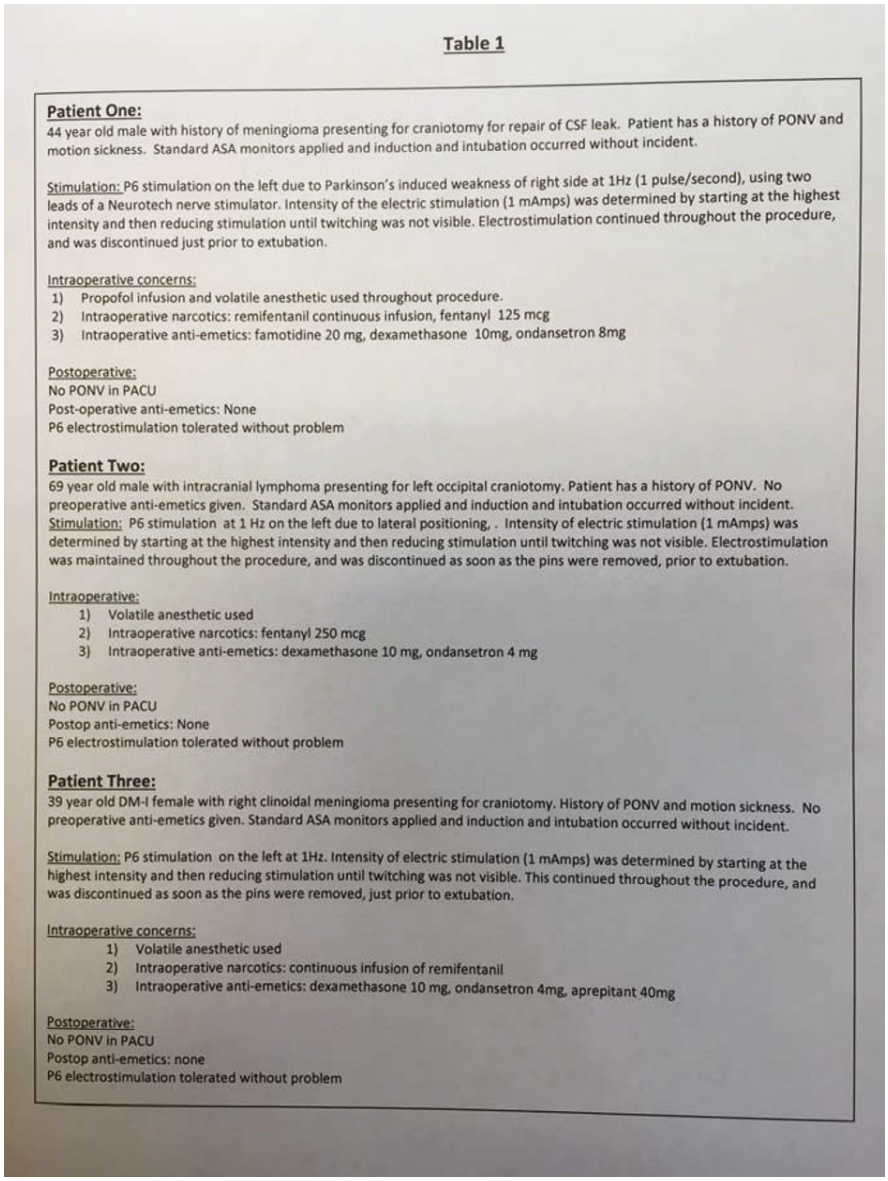

Table 1

Patient One:
44 year old male with history of meningioma presenting for craniotomy for repair of CSF leak. Patient has a history of PONV and motion sickness. Standard ASA monitors applied and induction and intubation occurred without incident.

Stimulation: P6 stimulation on the left due to Parkinson's induced weakness of right side at 1Hz (1 pulse/second), using two leads of a Neurotech nerve stimulator. Intensity of the electric stimulation (1 mAmps) was determined by starting at the highest intensity and then reducing stimulation until twitching was not visible. Electrostimulation continued throughout the procedure, and was discontinued just prior to extubation.

Intraoperative concerns:
1) Propofol infusion and volatile anesthetic used throughout procedure.
2) Intraoperative narcotics: remifentanil continuous infusion, fentanyl 125 mcg
3) Intraoperative anti-emetics: famotidine 20 mg, dexamethasone 10mg, ondansetron 8mg

Postoperative:
No PONV in PACU
Post-operative anti-emetics: None
P6 electrostimulation tolerated without problem

Patient Two:
69 year old male with intracranial lymphoma presenting for left occipital craniotomy. Patient has a history of PONV. No preoperative anti-emetics given. Standard ASA monitors applied and induction and intubation occurred without incident.
Stimulation: P6 stimulation at 1 Hz on the left due to lateral positioning, . Intensity of electric stimulation (1 mAmps) was determined by starting at the highest intensity and then reducing stimulation until twitching was not visible. Electrostimulation was maintained throughout the procedure, and was discontinued as soon as the pins were removed, prior to extubation.

Intraoperative:
1) Volatile anesthetic used
2) Intraoperative narcotics: fentanyl 250 mcg
3) Intraoperative anti-emetics: dexamethasone 10 mg, ondansetron 4 mg

Postoperative:
No PONV in PACU
Postop anti-emetics: None
P6 electrostimulation tolerated without problem

Patient Three:
39 year old DM-I female with right clinoidal meningioma presenting for craniotomy. History of PONV and motion sickness. No preoperative anti-emetics given. Standard ASA monitors applied and induction and intubation occurred without incident.

Stimulation: P6 stimulation on the left at 1Hz. Intensity of electric stimulation (1 mAmps) was determined by starting at the highest intensity and then reducing stimulation until twitching was not visible. This continued throughout the procedure, and was discontinued as soon as the pins were removed, just prior to extubation.

Intraoperative concerns:
1) Volatile anesthetic used
2) Intraoperative narcotics: continuous infusion of remifentanil
3) Intraoperative anti-emetics: dexamethasone 10 mg, ondansetron 4mg, aprepitant 40mg

Postoperative:
No PONV in PACU
Postop anti-emetics: none
P6 electrostimulation tolerated without problem

Table 1

146677 - SEDATION FOR OUTPATIENT ENDOSCOPY: A QUALITY ASSURANCE AUDIT

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Introduction: Outpatient endoscopy presents the challenge of safe analgesia and sedation with seamless recovery. This can be formidable in a high-volume practice with limited resources. We assessed the sedation and analgesia regimen (midazolam & fentanyl; gastroenterologist-supervised, nurse- administered) used during endoscopy at our institution.

Methods: This is a single-sited, prospective observational study on patients scheduled for elective endoscopy (15 June -15 August 2015). This quality assurance audit received approval from our local REB. Main outcome measures were midazolam & fentanyl doses and patient satisfaction (pain, nausea and drowsiness) during & after the procedure (10 point VAS). Gastroenterologists and nurses also scored patients on their perceived comfort during endoscopy (10 point VAS). Other outcomes included supplemental O_2 use, lowest O_2 saturation during & after procedure, time for PACU discharge readiness, and impaired mobility upon discharge. Multiple regression analysis tested possible associations.

Results: 436 patients [198 M/238 F, 57±16 years (mean±SD); BMI 27±7 kg/m^2] were studied (263 colonoscopy, 148 gastroscopy, 25 combined). The midazolam and fentanyl doses were 2.8±1.2 mg [median 2; IQR 2,4: range (min-max) 0-8 mg] and 72±29 µg [median 75; IQR 50, 100: range 0-200 µg], respectively. During the procedure, patient's pain VAS's were higher (2.4±2.2) than those estimated by the gastroenterologists (1.9±1.4) and nurses (2.0±1.4). Baseline O_2 saturation (room air) was 97.8±1.8 % and the minimum O_2 saturation during the procedure was 92.6±4.5 % [range 70-100 %; supplemental O_2 used 13.5%]. Pain, nausea, and drowsiness scores in the PACU were 1.3±1.0, 1.2±0.8, and 2.6±2.1, respectively. PACU baseline O_2 saturation (room air) was 96.2±2.2 % and the minimum O_2 saturation was 95.0±2.4 % [range 88-100 %; supplemental O_2 used 3%]. The average time for PACU discharge readiness was 53±23 minutes [median 50; IQR 40, 60: range 10-185

minutes]. While most patients were able to ambulate (n=350, 80.3%) a wheelchair was occasionally required (n=62, 14.2%). Age, BMI and fentanyl dose were associated with lower O_2 saturation both during and following the procedure (Table). Discharge ready time was related to fentanyl dose and patient's drowsiness score (Table). The drowsiness score was in turn related to midazolam dose (Table).

Discussion: Oxygen should routinely be administered during endoscopy. While nurses and endoscopists estimated lower patient pain scores than did the patients, an adequate level of analgesia was achieved. In the PACU, patients did not experience worrisome desaturation and the pain and nausea scores were surprisingly low. Drowsiness scores were higher and related to midazolam dose. Time for patient readiness discharge was related to patient drowsiness scores and fentanyl dose. Possibly, recovery could be improved by selectively reducing midazolam & fentanyl doses.

References:
Not Appliable

Table. Multiple stepwise regression analyses

Regression Model	ß coefficient	p value	95% CI
1. Lowest SpO_2 in procedure			
Age (y)	-0.343	<0.001	(-0.124, -0.064)
Body mass index (kg/m^2)	-0.161	0.001	(-0.169, -0.042)
Total fentanyl (µg)	-0.243	<0.001	(-0.055, -0.022)
Total midazolam (mg)	-0.225	<0.001	(-1.246, -0.407)
2. Lowest SpO_2 in PACU			
Age (y)	-0.360	<0.001	(-0.068, -0.037)
Body mass index (kg/m^2)	-0.188	<0.001	(-0.103, -0.032)
Total fentanyl (µg)	-0.127	0.019	(-0.019, -0.002)
3. Patient's drowsiness score in PACU			
Total midazolam (mg)	0.190	0.001	(0.130, 0.497)
4. Discharge ready time			
Patient's drowsiness score in PACU	0.268	<0.001	(1.658, 4.125)
Total fentanyl (µg)	0.161	0.006	(0.036, 0.217)

PACU = Post-anesthesia care unit, SpO_2 = percutaneous oxygen saturation

146716 - PARAVERTEBRAL BLOCK IN A MALE PATIENT FOR TOTAL MASTECTOMY

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Introduction: Male breast cancer is an uncommon disease accounting for only 0.6-1% of all breast cancer cases, and approximately 90% of breast cancers in men are invasive ductal carcinomas.(1)

Paravertebral blocks (PVB) are routinely used for pain control in female patients undergoing breast surgery. There is evidence that PVB in addition to general anesthesia provides better postoperative pain control compared with other strategies.(2) A literature search found no articles available regarding placement of paravertebral blocks in males for breast cancer.

We present a case of perioperative management of a male patient undergoing a total mastectomy.

Case: Appropriate consent was obtained from this patient to publish this case report. A 75 year-old man (BMI 35.1) with invasive ductal carcinoma of the left breast was scheduled for a left total mastectomy. He presented with a history of prostate cancer, diabetes (hgbA1c 7.0), hypertension, obstructive sleep apnea with CPAP use, and a difficult airway.

A left paravertebral block (T1-T6) was placed with 20 ml of 1% ropivacaine with 1:400,000 epinephrine, 100 mcg clonidine and 10 mg of preservative-free dexamethasone. The patient received 50 mcg fentanyl, 1 mg midazolam, and 50mg propofol prior to the block. The placement of the PVB was slightly complicated by the thick layer of muscle with some difficulty with passing the needle through the muscular layer. General anesthesia was induced and a videolarygnoscope was used to place an 8.0 endotracheal tube. During the case, the patient received another 50 mcg fentanyl, 10 mg of rocuronium, 120mg of succinylcholine and 140 mg of propofol, 4mg of ondansetron, 6.25 mg of promethazine, 100mg phenylephrine and 15 mg of ephedrine. The patient described pain as 0/10 in the PACU and on the following

morning. He received no additional narcotics. He was discharged home with hydrocodone/acetaminophen 7.5/325. After 7 days, he stated that he had not used any pain medication and was very pleased with the block.

Discussion

In our institution, from 1/1/2012-10/31/2015, 4/534 (0.7%) paravertebral blocks were placed in male patients with breast cancer in our ambulatory setting.

This male patient had disproportionate upper body development. This was offset by relatively easy palpation of spinous processes. He experienced excellent pain relief for over seven days with a reduction of narcotics. In our practice, we have performed paravertebral blocks for male patients and we will continue to study the effect on narcotic reduction.

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146887 - PATENT FORAMEN OVALE AND DELIRIUM RISK IN ELECTIVE HIP OR KNEE SURGERY

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Introduction: Postoperative delirium is a common complication following hip or knee replacement surgeries and is associated with longer hospital stays, impaired recovery and rehabilitation, and increased risk of other complications[1,2]. A Patent Foramen Ovale (PFO) is a common congenital communication between the left and right atria[3], and has been reported to lead to paradoxical embolization[4,5]. This study was designed to investigate if the presence of a PFO is associated with an increased risk of developing postoperative delirium in patients undergoing elective hip or knee surgeries.

Methods: Institutional Research Ethics Board (REB) approval was obtained for this study (this trial was registered at ClinicalTrials.gov). This is a prospective cohort study in which bedside Transthoracic Echocardiography (TTE) with a bubble study was performed perioperatively on patients to look for the presence of a PFO. The primary outcome was to assess for postoperative delirium. Secondary outcomes included duration of hospital stay, major cardiovascular events (myocardial infarction, stroke, heart failure, thromboembolism, arrhythmia), and death. Daily delirium assessments were performed by nursing staff using the Confusion Assessment Method (CAM)[6]. Bubble studies were interpreted independently by two consultant anesthesiologists; initial disagreements were resolved through a consensus.

Results: To date, we have recruited 185 patients, and completed 123 TTE bubble studies. 9 patients (7%) had a positive bubble study (Figure 1). No patients had a positive CAM score. There was no significant difference between the two groups in mean hospital length of stay (2.1 ± 0.26 days for PFO positive group versus 2.3 ± 0.20 days for PFO negative group). No patients had any major postoperative complication. The majority of patients in both groups received a spinal anesthetic (78% in PFO

positive, 84% in PFO negative).

Discussion: In the population studied, delirium was not a common finding as suggested previously[1,2]. Our results showed that the prevalence of a PFO in the specific population investigated was 7%. Overall there was no significant postoperative complication detected in any study patients, which may reflect strict inclusion and exclusion criteria. Based on our results, a TTE with a bubble study can be easily and quickly performed in the perioperative setting, however the utility for routine perioperative PFO screening in this specific surgical population is questionable. Potentially, this tool may be of greater utility in non-elective cases such as for perioperative assessment of hip fracture patients.

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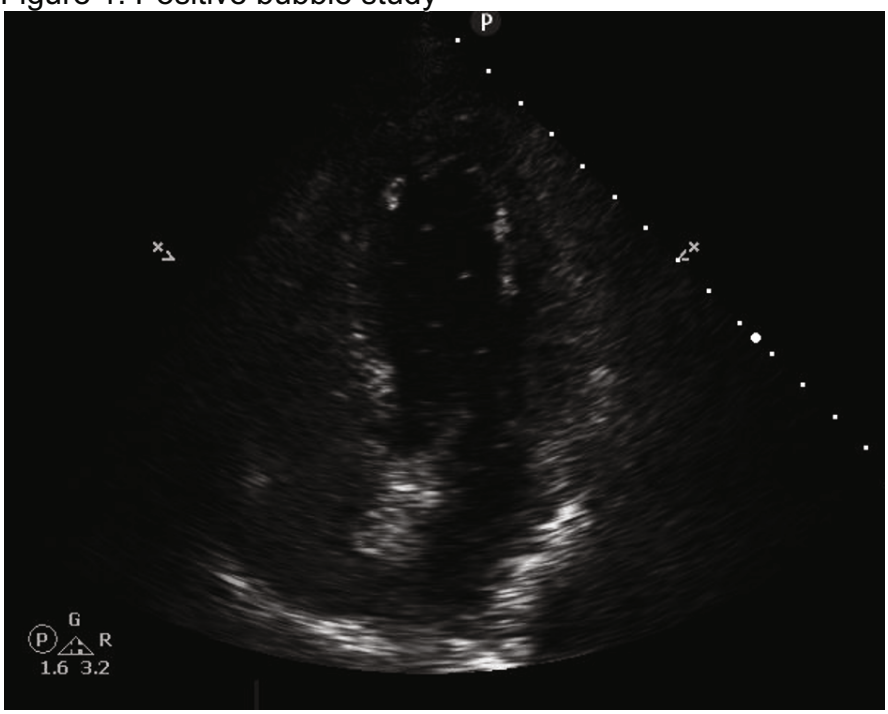
Figure 1. Positive bubble study



Apical four-chamber view demonstrating opacification of the right atrium and ventricle with bubbles appearing in the left atrium and ventricle, consistent with a positive bubble study for a PFO.

146952 - THE PECTORAL NERVE BLOCK FOR PAIN TREATMENT POST BREAST CANCER SURGERY

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Introduction

Chronic pain after breast surgery is common, therefore, adequate pain control in the postoperative period is essential. General anesthesia is often associated with a regional technique for breast surgery which consists of thoracic epidural, paravertebral block and the recently described pectoral nerve block (PNB). The first two are not indicated in ambulatory surgery, thus, we decided to evaluate the effectiveness of the PNB in the treatment of postoperative pain after breast cancer surgery.

Methods

After obtaining two local Ethics Committee approvals, a prospective, randomised, double blind, controlled trial was performed in two international university hospitals between January 2014 and May 2015. The trial was registered to Clinicaltrials.gov. Patients (18-75 yr-old) scheduled for unilateral breast cancer surgery under general anesthesia were recruited, but not those with breast or chronic pain before surgery, metastases or scheduled for breast reconstruction surgery. An echoguided PNB (PECS-1)[1] was performed with 0,4 mL/kg of either bupivacaine 0.25% with adrenaline 1:200 000 or NaCl 0.9% administered between the pectoral muscles at mid-subclavicular level. The primary outcome was pain (verbal numerical rating scale 0-10) in the recovery unit 30 min after admission or when analgesia was requested (pain score > 3/10). Secondary outcome measures were sufentanil consumption (μg) perioperatively and total morphine consumption (mg) in the recovery unit and at 24 h after surgery.

From a preliminary study (n=60), with a power of 90%, a risk a of 5%, a clinically relevant difference in pain score of 2/10 between the groups (population SD of 3.11), and to compensate for 10% of *lost* patients, 128 patients were needed. Quantitative variables are expressed as median - interquartile range [25-75%]. Data were not normally distributed (Shapiro-Wilk test) and were analysed, in intention-to-treat, with a Mann-Whitney test using SAS V9.3 (SAS Institute, NC).

Results

Pain scores and morphine consumption in the recovery were not different between the 2 groups: 3 [1-4] and 3 [1-5], and 1.5 [0-6] and 3 [0-6] for the bupivacaine (n=62; mean age (SD): 59.27 ± 12.21) and placebo (n=65; mean age (SD): 60.71 ± 10.54) groups, respectively. However, for the subgroup of patients (n=29) who underwent major surgery (mastectomies or tumorectomies with axillary clearance) pain scores and morphine consumption were statistically different, 3 [0-4] and 4 [2-5] ($P = 0.04$), and 1.5 [0-6] and 6 [0-12] ($P = 0.016$), respectively. Sufentanil peroperatively and morphine consumption at 24 h were not different between the 2 groups, p = 0.90 and 0.65, respectively.

Discussion

The PNB (PECS-1) is not necessary for minor breast cancer surgery, however, for major surgery it significantly decreases postoperative pain and morphine consumption in the recovery. A prolongation study looking at pain scores and analgesic consumption between 12-18 months after breast cancer surgery is underway.

References:

[1] Blanco R. *Anaesthesia* 2011; 66: 847-8.

146955 - THE IMPACT OF DELAYED EMERGENCY SURGERY ON IN-HOSPITAL MORTALITY

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Introduction

Emergency surgery patients often experience delays between presentation and surgical intervention, the causes of which are multifactorial.[1-4] Surgical delay is associated with mortality in hip fracture patients[5]. Indication bias likely confounds this association because sicker patients tend to wait longer. The impact of delayed surgery on outcomes after other surgeries is poorly described. To improve emergency operating room (OR) access, our institution introduced a 5-level prioritization system, based on acuity and surgical indication; each level was assigned an acceptable surgical wait-time. Patients could not be booked for surgery until they were clinically ready to come to the OR. The objective of this study was to measure the association between surgical delay and in-hospital mortality.

Methods

Following ethics approval, we performed an observational cohort study at a tertiary-care health sciences center. All adult emergency non-cardiac surgery patients were identified between January 2012 and October 2014. Surgical delay was defined as a wait-time from surgical booking to OR entry in excess of priority specific wait-time (see table for wait-time definitions). Delayed patients were propensity score (PS) matched on a 1:1 basis without replacement to non-delayed patients. We used variables that accounted for characteristics of their hospital admission, preoperative hospitalization, patient characteristics, physiologic instability, surgical urgency and risk. The relative and absolute association between delay and mortality were calculated. Pre-specified sensitivity analyses, including a generalized additive model to investigate the continuous association between OR wait-time and in-hospital mortality were used to test the robustness of our primary analysis.

Results

15160 patients were identified; 2820 (18.6%) had delayed OR access. System factors accounted for 86% of all documented delays. Delayed patients had an in-hospital mortality rate of 2.6% compared to 4.9% for non-delayed patients (crude odds ratio 1.59, 95%CI 1.30-1.93). All delayed patients were successfully PS-matched and balance of covariates was achieved between groups. Within the PS-matched cohort, delay was significantly associated with mortality (odds ratio 1.56, 95%CI 1.18-2.06; absolute risk increase 1.67%; number needed to treat to harm=60). This finding was confirmed in sensitivity analyses.

Discussion

In a cohort of emergency surgical patients with known ready for surgery status and detailed patient-level covariates to account for indication bias, delayed operating room entry after booked emergency surgery was associated with increased risk of in-hospital mortality across surgical specialties. For every 60 delayed surgeries, one extra death occurred; this equates to 80 excess deaths at our hospital during the study period. Importantly, system issues underlie most delays, and will need to be addressed to improve patient flow and outcomes.

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Table 1 - SELECTED CHARACTERISTICS OF STUDY COHORT AND MATCHED COHORT

	Pre-match			Propensity Score Matched		
Characteristic	**Non-delayed n=12 340**	**Delayed n=2 820**	**Standardized Difference**	**Non-delayed n=2 876**	**Delayed n=2 876**	**Standardized Difference**
Priority A - wait time < 45 minutes	4.6	7.4	11.8	6.4	7	2.4
Priority B - wait time < 2 hours	7.5	5.4	8.6	5.4	5.5	0.4
Priority C - wait time < 4 hours	10.2	7.1	16.7	7.3	7.4	0.4
Priority D - wait time < 8 hours	29.9	12.2	44.5	12	12.5	1.5
Priority E - wait time < 24 hours	47.9	67.9	41.4	68.9	67.7	2.6
Age*	56.7 (20.7)	60.8 (20.3)	14.7	59.5 (20.8)	60.8 (20.4)	6.3
ASA I and II	32	25.8	13.7	28.3	26.1	4.9
ASA III and IV	65.7	71.8	13.2	69.7	71.7	4.4
ASA V	2.2	2.3	0.7	1.9	2.1	1.4
General Surgery	32.3	21.1	25.5	21.1	21	0.2
Orthopedic Surgery	27.3	26.2	2.5	41.9	42.2	0.6
Urology	12	9.5	37.5	9.9	9.5	1.4
Procedural risk index*	0.7 (1.5)	0.9 (1.5)	10	0.9 (1.6)	0.9 (1.5)	0
Lab physiology score*	22.6 (24.1)	22.0 (37.2)	1.9	22.4 (21.7)	23.1 (21.9)	3.2

- All values are presented as proportions except for variables denoted by an *, which represents a Mean (*Standard Deviation)*
- Wait times refer to acceptable wait time for each priority level

147077 - EFFECT OF A RECRUITMENT MANEUVER DURING BRAIN TUMOUR RESECTION

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Introduction: Patients undergoing neurosurgical procedures are at higher risk of postoperative respiratory failure compared to the broader surgical population. Although alveolar recruitment maneuvers have been advocated as part of a lung protective ventilation strategy during other types of surgery[1], the effect of these maneuvers on the cerebral physiology during elective neurosurgery is not known and may be harmful based on evidence from critically-ill patients.[2] Our primary objective was to determine the effect of an intraoperative alveolar recruitment maneuver on subdural pressure (SDP), a surrogate measure of intracranial pressure, in neurosurgical patients undergoing supratentorial tumour resection. Our secondary objectives were to determine the effect of an intraoperative alveolar recruitment maneuver on 1) surgeon-assessed intraoperative brain relaxation score (BRS) and 2) mean arterial pressure (MAP) and 3) heart rate (HR).

Methods: This study was conducted following approval from our institutional research ethics board. In this prospective crossover study, patients scheduled for resection of a supratentorial brain tumor were randomized to undergo either a recruitment maneuver of 30 cm of water continuous airway pressure for 30 seconds or a “sham” recruitment maneuver of 5 cm of water for 30 seconds. Following a brief equilibration period of 120 seconds, the patient then underwent the alternative intervention. SDP was measured using a sterile 22g/0.9mm catheter (Introcan Safety®, Braun, Melsungen, Germany) inserted tangentially under the dura.[3] SDP, MAP and HR were recorded continuously throughout the study period and the neurosurgeon, blinded to the treatment group, provided a BRS at baseline and with each intervention. The ΔSDP, ΔMAP, ΔHR and ΔBRS were compared between the 2 treatment groups.

Results: 21 patients were recruited and underwent the study procedure. Baseline values were similar between the two treatment groups. The ΔSDP was significantly higher during the recruitment maneuver group compared to the sham maneuver (4.7 *vs* 0.8 mmHg, p=0.0001). MAP and HR decreased more in the recruitment maneuver group as compared to the sham maneuver (MAP -9.2 *vs* -0.2 mmHg, pvs +0.8 bpm, p < 0.0001, for the recruitment and sham maneuvers, respectively). Cerebral perfusion pressure was reduced on average by 14 mmHg during the recruitment maneuver. The brain relaxation scores were similar and did not change significantly with either

maneuver.

Discussion: Our study presents novel data that recruitment maneuvers increase SDP, reduce MAP and reduce cerebral perfusion pressure in patients undergoing elective supratentorial tumor resection. Although recruitment maneuvers may be beneficial in other types of elective surgery, our results suggest that recruitment maneuvers should be used cautiously in the neurosurgical population.

References:

1. N Engl J Med. 2013;369(5):428-37.

2. Intensive Care Med. 2002;28(5):554-8.

3. Br J Neurosurg. 1996;10(1):69-75.

147165 - QUALITY AND BIAS OF PRE-CLINICAL ANESTHETIC NEUROPROTECTION STUDIES

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Introduction: The failure of animal models of stroke to successfully identify clinically useful neuroprotective agents has led to reassessment of research methods[1]. Two of the 'usual suspects' that exaggerate effect size in preclinical studies are publication bias and study quality[2]. Here we evaluated the contribution of publication bias and poor study quality to the effect size estimate in pre-clinical studies of anesthetic neuroprotection in stroke.

Methods: Studies were identified by systematic review of the literature finalized December 15, 2015. A search of databases Ovid and Embase identified 81 studies of focal cerebral ischemia in rats or mice that reported outcomes in terms of infarct volume or neurological deficit scores. Effect sizes were expressed as normalized mean difference (NMD)[3]; point estimates for NMD were determined by meta-analysis using a random effects model[4]. The estimated effects of publication bias were evaluated with funnel plots and Duval and Tweedie's trim and fill method. Study quality was independently assessed by two investigators according to a modified CAMARADES score[1] of 6 items: 1.monitoring of blood pressure and blood gases, 2.randomization to control or treatment group, 3. allocation concealment, 4. multi-level mechanistic study design, 5. statement regarding regulatory compliance, 6. conflict of interest statement. To examine the relationship between study quality and NMD we performed meta-regression analysis of NMD against modified CAMARADES score. Meta-analysis and meta-regression were performed with commercial software (Comprehensive Meta-Analysis - CMA™).

Results: Publication bias: The mean reduction in neurologic injury by exposure to anesthetics (isoflurane, propofol, sevoflurane, desflurane, ketamine) was 27 % (95% C.I. 22-31, k= 81). The funnel plots for all studies, permanent Ischemia (≥3h) and transient ischemia with treatment before (preconditioning) or after (postconditioning) the ischemic period are shown in the figure. The trim and fill method did not identify any missing studies to the left of the means, and no correction in the global estimate

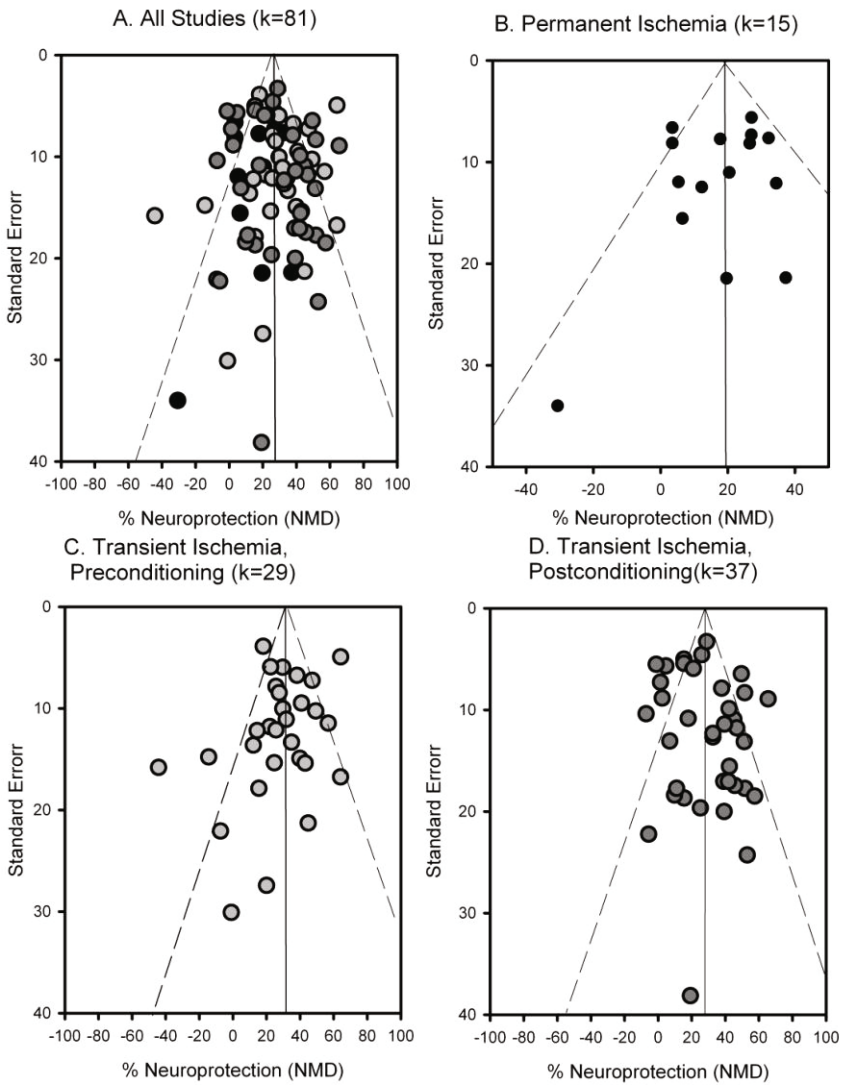
for unpublished studies was suggested. Study Quality: Meta-regression using modified CAMARADES score as the covariate showed an intercept of 27% with a coefficient for study quality of 5.4% (95% C.I. 1.5-9.4, k=81, P=0.004). This result indicates that the size of the neuroprotective effect increased with study quality.

Discussion: The results do not support concerns that neuroprotective effects reported in preclinical studies of anesthetics have been exaggerated by poor study quality or publication bias. These findings support further meta-analysis of preclinical anesthetic studies to define the effects for anesthetics in the setting of focal ischemia.

References:

1. Trends Neurosci 2007 30: 433-439
2. Nat Rev Neurosci 2013 14: 365-376
3. J Neurosci Meth 2014 221:92-102
4. BMC Med Res Methodol 2014 14:25-37

Figure



Evaluation of publication bias in preclinical studies of anesthetic neuroprotection in stroke using Duval and Tweedie's trim and fill method. Individual funnel plots are presented for all studies (A), permanent ischemia studies (B), transient ischemia preconditioning (C) and transient ischemia postconditioning (D).

147462 - THE EFFECT OF NON-INVASIVE BLOOD PRESSURE CUFF INFLATION

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Introduction: Both noninvasive and invasive arterial blood pressure (NIBP and IABP) measurements are routinely used in the perioperative period and intensive care units. These two techniques often produce different values, and the relationship between them is not fully understood. Previous studies in the non-surgical patient population have shown that NIBP cuff inflation at the arm can cause transient rise in BP because of either pain, anxiety resulting from “alerting response” or discomfort and muscular activity.[1,2] Similar data in the perioperative setting is lacking. The aim of our study was to determine the effect of NIBP cuff inflation on the resting IABP measurements, recorded in the contralateral arm. We hypothesize that the mere act of cuff inflation will increase IABP in line with the alerting response.

Methods: After Institutional review board approval, 100 consecutive adult patients undergoing surgery that required IABP monitoring were recruited in this prospective observational study. The study was conducted in the post anesthesia care unit postoperatively. Arterial lines were inserted preoperatively and an appropriate sized cuff was used in the contralateral arm. Baseline IABP, NIBP and heart rate were recorded. NIBP cuff was then cycled every 5 minutes for 3 times and then a rest period of 30 minutes followed by another set of 3 measurements. During each cuff inflation cycle, changes in IABP values, heart rate and the duration of cuff inflation were recorded. After exclusion, a total of 582 measurements were included for data analysis. Statistical analysis was done using paired ‘t’ test, Chi-square and two-way ANOVA.

Results: The mean age of the study population was 54 years and history of hypertension was present in 48.5% and diabetes in 10.3% of patients. The mean duration of BP cuff inflation was 36±10 seconds. Majority (73.4%) of the patients had increase in the baseline systolic blood pressure (SBP) by 0-10mmHg with minimal variation in diastolic blood pressure. The change in IABP was independent of the baseline SBP (Fig 1A). There were no substantial differences in the IABP values with

cuff inflation between hypertensive and non-hypertensive patients (p=0.732) (Fig 1B). Similarly, successive cuff inflation had minimal effect on changes in IABP (Fig 1C). There was no statistical difference in the heart rate with cuff inflation. There was no correlation between duration of cuff inflation and change in the IABP.

Discussion: Our study demonstrated that NIBP cuff inflation does cause a variable increase in IBP values. This is an important information in the perioperative and intensive care settings, where both these measurement techniques are routinely used. The exact mechanism for this effect is not known but may be explained on the basis of alerting response.

References:

1. Int J Psychophysiol 2001; 40:161-5
2. Blood Press Monit 2008; 13:1

Figure 1

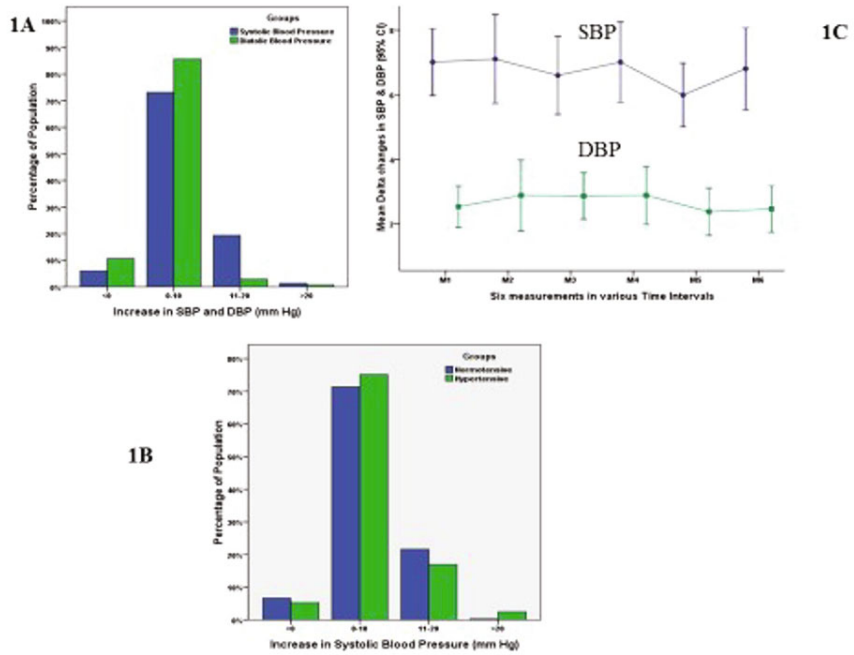

Figure 1: Effect of NIBP cuff inflation on IABP. A. Change in systolic and diastolic BP with cuff inflation. B. The differences in the IABP (systolic) changes with cuff inflation: Comparison of hypertensive and non-hypertensive patients C. Effect of successive cuff inflation on mean systolic and diastolic BP

147468 - EFFECT OF MAGNESIUM PRE-EXPOSURE ON OXYTOCIN-INDUCED CONTRACTILITY

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Introduction: Pre-exposure to oxytocin has been shown to cause desensitization of the oxytocin receptors (OTR) [1] in both a time and concentration-dependent manner [2]. This desensitization phenomenon means that women who have been augmented for labor require higher oxytocin doses for adequate uterine contraction post delivery and are at more risk of postpartum hemorrhage (PPH). Magnesium sulphate ($MgSO_4$) is widely used within obstetric medicine for preeclampsia, eclampsia and fetal neuroprotection, and also as a tocolytic agent in preterm labor. There are suggestions $MgSO_4$ may lead to increased oxytocin requirements or PPH in preeclamptic patients [3], however, its effect on oxytocin-induced contractility in the desensitized myometrium is unknown. The objective of this study was to determine the myometrial contraction patterns induced by oxytocin, in oxytocin desensitized and control specimens exposed to $MgSO_4$. We hypothesize that pretreatment with $MgSO_4$ would reduce oxytocin-induced contractions in both desensitized and control samples.

Methods: With institutional REB approval and the informed consent of each participant, this study was conducted as a prospective *in vitro* study. We included women undergoing elective Cesarean section under spinal anesthesia, who had no risk factors for PPH. A small sliver of myometrium was collected by the obstetrician after delivery of the fetus and placenta, but before the administration of oxytocin. The specimen was divided into six strips and each was mounted into six separate organ bath chambers filled with physiological salt solution (PSS) under homeostatic conditions. After washing and re-equilibration, two of the six strips were pre-treated for 2 hours with $MgSO_4$ 3.5mM (Mg group), two with $MgSO_4$ 3.5mM plus oxytocin 10^{-5}M (Mg-Oxy group) and the other two placed in PSS (untreated control group). After pre-treatment, all strips were subjected to dose-response testing with increasing concentrations of oxytocin from 10^{-10}M to 10^{-5}M, as demonstrated in *Fig. 1*. The primary outcome was the motility index (amplitude x frequency). Sample size was calculated at 20 subjects to provide 120 strips, 40 per group. Numerical contraction data will be analyzed for each sample and with each drug exposure at each increasing concentration. Linear regression models, adjusted for repeated measures through a compound symmetry covariance structure, will be used for analysis.
Results: Recruitment is underway and we plan to recruit the last patient by April 2016.

Discussion: Final discussion and conclusion will be presented at the meeting.

References:

1. Am J Obstet Gynecol. 2003;188:497-502.
2. Anesthesiology. 2013;119:552-61
3. Am J Obstet Gynecol. 1997;176(3):623-7

Experimental Design

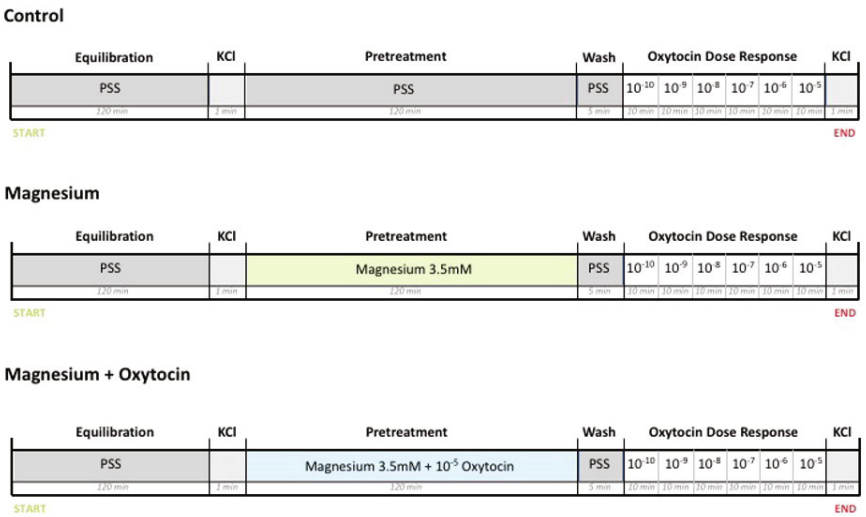

Fig. 1: Magnesium-oxytocin experimental design

147508 - RISK FACTORS FOR POSTOPERATIVE HYPOXEMIA IN CURRENT ERA

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Introduction: Morbidities associated with hypoxemia necessitate routine administration of oxygen in immediate postoperative period.[1]Hypoxemia can occur even with oxygen administration[2]; on other hand oxygen might not be needed in about two thirds of patients in PACU[3]. Identification of various risk factors responsible for development of postoperative hypoxemia can help in improving patient safety and reducing cost by judicious use of O_2 therapy[3].

Material and Methods: After approval from institute's ethics committee and written informed consent patients with age of 18-65 yrs and either sex undergoing abdominal surgery, requiring general anaesthesia with endotracheal intubation were included. Patients requiring emergency surgery, minor procedures, patients with preoperative cardiac disease and those shifted to PACU on ventilatory support were excluded. 490 patients were enrolled, 38 patients were shifted to PACU without extubation, hence excluded from analysis. Oxygen saturation was recorded before induction in operating room (Baseline SPO_2), following extubation on room air, after arrival in PACU, and continuously there after till discharge from PACU and at every 8 hours after that till 72 hours post-surgery. Patients were maintained on room air if SpO_2 remained > 94%, If SpO_2 decreased below 94%, oxygen therapy was provided via face mask. If SpO_2 was 85-89% despite oxygen therapy with face mask, Bi-level positive airway pressure mask was applied. If SPO_2 persisted below 90% on BiPAP then ventilatory support was provided after endotracheal intubation.Correlation of postoperative hypoxemia (or need for postoperative oxygen therapy) with various factors like age, sex, BMI, coexisting respiratory diseases, smoking status and duration of surgery/anesthesia

was performed.

Results: 61 patients developed SpO_2 ≤94% requiring oxygen therapy (13.5%). 51 patients required oxygen therapy by face mask, 8 by BiPAP and 2 required ventilatory support with endotracheal intubation. 60 patients needed it in first 2 hrs after extubation.

Age, BMI, Smoking status, presence of preoperative respiratory disease, SPO_2 (on room air) at baseline and SpO_2 (on room air) immediately after shifting to PACU were independently associated with requirement of postoperative oxygen therapy (Binary logistic regression analysis).

To identify the most significant subgroup for a particular risk factor which might have highest association with development of postoperative hypoxemia, Test of two proportions (Z test) was performed (Table 1)

Discussion: Risk of postoperative hypoxemia and need for oxygen therapy is highest in following subgroups of patients; Age group of 51-65 years, BMI more than 30, Current as well as former smokers, pre-existing respiratory disease esp. COPD, patients with 96% oxygen saturation or less at baseline or after shifting to PACU. Site of incison, duration of surgery, dose and type of opioid administered didnot have significant association with postoperative hypoxemia.

References:

1. Anaesth Intensive Care, 1990;18:509-516.
2. Chest. 1993;104(3):899-903.
3. Anesth Analg.1994 Feb;78(2):365-8.

Table 1

Risk factors	Sub groups	Z TEST(Test of two proportion)	
		Z value	P value
Age (yrs)	(18-35) vs (36-50)	3.54	<0.01*
	(18-35) vs (51-60)	5.38	<0.01*
	(36-50) vs (51-60)	2.49	0.014*
BMI (KG/M²)	(<18.5) vs (18.5-24.9)	1.25	0.21
	(<18.5) vs (25-25.9)	1.51	0.13
	(<18.5) vs (30-34.9)	2.56	0.01*
	(18.5-24.9) vs (25-29.9)	4.56	<0.01*
	(18.5-24.9) vs (30-34.9)	5.31	<0.01*
	(25-29.9) vs (30-34.9)	1.66	0.09
Smoking Status	NON-SMOKER vs SMOKER	7.83	<0.01*
	NON-SMOKER vs REMOTE SMOKER	4.25	<0.01*
	SMOKER vs REMOTE SMOKER	0.80	0.42
Preoperative Respiratory Disease	NO RESPIRATORY DISEASE vs ASTHMA	3.45	<0.01*
	NO RESPIRATORY DISEASE vs COPD	4.97	<0.01*
	NO RESPIRATORY DISEASE vs URTI	0.73	0.46
	NO RESPIRATORY DISEASE vs OLD KOCHS	6.56	<0.01*
	ASTHMA vs COPD	0.04	0.96
	ASTHMA vs URTI	1.54	0.12
	ASTHMA vs OLD KOCHS	1.44	0.15
	COPD vs URTI	1.58	0.11
	COPD vs OLD KOCHS	1.84	0.06
	URTI vs OLD KOCHS	2.21	0.03*
SpO_2(Room Air)at Baseline (%)	96 vs 97	4.65	<0.01*
	96 vs 98	8.83	<0.01*
	96 vs 99	10.42	<0.01*
	96 vs 100	10.39	<0.01*
	97 vs 98	4.33	<0.01*
	97 vs 99	5.80	<0.01*
	97 vs 100	5.93	<0.01*
SpO_2(Room Air)after admission to PACU (%)	95 vs 96	2.06	0.04*
	95 vs 97	3.43	<0.01*
	95 vs 98	8.47	<0.01*
	95 vs 99	10.29	<0.01*
	95 vs 100	6.71	<0.01*
	96 vs 97	2.65	<0.01*
	96 vs 98	7.81	<0.01*
	96 vs 99	7.75	<0.01*
	96 vs 100	5.22	<0.01*
	97 vs 98	5.59	<0.01*
	97 vs 99	5.69	<0.01*
	97 vs 100	3.71	<0.01*

* Statistically significant, BMI: Body Mass Index, COPD: Chronic Obstructive Pulmonary Disease, URTI : Upper Respiratory Tract Infection

Subgroup analysis of various risk factors to find out most significant association with postoperative hypoxemia

147689 - ANESTHETIC NEUROPROTECTION IN PRE-CLINICAL, CO-MORBID ACUTE STROKE

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Introduction: Acute ischemic stroke is a multifactorial disease – risk factors/predictors include hypertension, diabetes, advanced age, and obesity. Subjects (rats or mice) used in preclinical models of transient focal ischemia are commonly young males; reports of increased ischemic tolerance (neuroprotection) in these normal subjects may not translate to subjects with comorbidities. The purpose of this study was to evaluate published evidence of neuroprotection by anesthetics in preclinical studies involving known comorbidities for stroke.

Methods: Studies of anesthetic neuroprotection were identified by systematic review of the literature finalized December 15, 2015. A search of the databases Ovid and Embase identified 81 studies of focal cerebral ischemia in rats or mice that reported outcomes in terms of infarct volume, neurological deficit scores or both. From this set (81 studies), we identified four investigations that reported data from independent subgroups that included normal subjects and subjects with comorbidities. Effect sizes were expressed as normalized mean difference (NMD) [1]; point estimates for % reduction in neurologic injury by anesthetic exposure were determined by inverse variance weighting meta-analysis using a random effects model. We used a Z-test to compare the mean effect of anesthetic exposure between the subgroups[2]. Meta-analysis and graphics were performed with RevMan 5.3 (www.cc-ims.net/RevMan).

Results: Four studies examined the influence of anesthetic exposure on neurological injury after transient focal ischemia in subjects with comorbid conditions (obesity[3], high fat diet[4], diabetes[5], and old age[6]). The forest plot of effect sizes (Figure) shows that whereas exposure to sevoflurane (3 studies) or isoflurane (1 study) decreased the neurologic injury by 36% (95% C.I. 22-50%) in normal subjects, rats with comorbidities did not experience neuroprotection ($Z=3.13, P=0.002$). The meta-analysis showed consistency of results within each subgroup ($Tau^2=0.00$), even though the comorbidity was different in each study. Comorbidity presence changed the average infarct volume in control subjects from 30% to 45% of the hemisphere ($t=-0.982$, $P=0.364$). In the larger study set (n=81), the control infarct volume was not a significant covariant ($P=0.08$) in meta-regression against neuroprotective effect size.

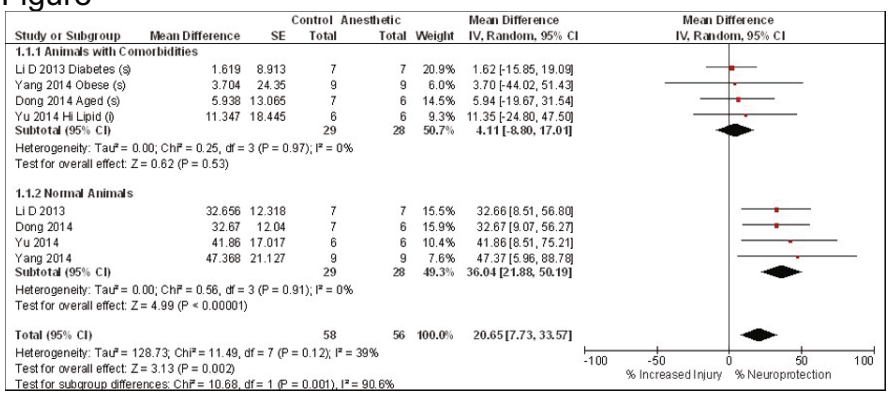
Conclusions: Neuroprotective effects of isoflurane and sevoflurane, which are clearly present in normal animals cannot be extended to subjects with comorbidities. The

consistency of the findings within each subgroup is surprisingly good. Although there is a suggestion that comorbidities may have enhanced the injury induced by transient ischemia, the non-signifance of control infarct volume against neuroprotective effect size in the large study set indicates that injury severity in control subjects did not influence the degree of neuroprotection observed. Instead, findings suggest that either anesthetic action or the pathophysiology of ischemia or both are different in the subjects with comorbidities.

References:

1. J Neurosci Methods 2014 221: 92-102
2. Introduction to Meta-Analysis 2009 John Wiley & Sons: 150-186
3. Mol Med Rep 2014 9: 843-50
4. Obesity 2014 22: 2396-2405
5. PLoS 1 2013 8:e73334
6. Neuroscience 2014 275: 2-11

Figure



Forest plot comparing neuroprotection with isoflurane (i) or sevoflurane (s) in subjects with and without comorbid conditions.

148412 - POST-INTUBATION LARYNGOSCOPY NOT A PREDICTIVE TOOL

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Introduction: When the success of direct laryngoscopy is in question, a convenient and simple test would be to perform direct laryngoscopy after the patient had been successfully intubated by an alternative method [1]. If the glottis opening can be reliably visualized by this strategy, then documentation of the view as the Cormack-Lehane score could be used as a clinical predictor of future laryngoscopies [2]. This may be important for effective planning and preparation of airway interventions, such as emergency intubation or placement of advanced airway devices [3]. Key to the safety of using a *post hoc* Cormack-Lehane score as a clinical predictor is that the presence of an endotracheal tube does not significantly alter the laryngoscopic view. Therefore, we conducted a prospective observational study to compare modified Cormack-Lehane (MCL) scores determined during direct laryngoscopy before and after tracheal intubation.

Methods: After obtaining approval for the protocol from the Conjoint Health Research Ethics Board, human patients were recruited. Informed consent obtained from 173 adults between 18-86 undergoing elective procedures that require general anesthesia and endotracheal intubation. After induction of general anesthesia, direct laryngoscopy was performed and the best view attainable without external manipulation was documented according to the MCL grade. If this view was worse than 1, then bimanual manipulation was applied to attempt to improve the view, and the best possible view with bimanual manipulation was also recorded. After intubation and before resolution of paralysis the same physician as previously described performed a second direct laryngoscopy.

Results: The main finding of this study was that the endotracheal tube altered the MCL in 58/173 patients (33%), 'worsening' the grade in 30 patients (17.34%) and 'improving' the grade in 28 patients (16.18%) (Table 1). When BURP was applied, the view remained altered in a minority of patients (23/173; 14%); in 10 patients (6%) the MCL grade ‘improved’ while in 13 patients (8%) the grade ‘worsened’ (Table 2).

Discussion: It has been suggested that easy emergency re-intubation can be assumed, following awake fiberoptic intubation if direct laryngoscopy in the intubated patient demonstrated a good view of the glottis [3]. However, our results demonstrate that an endotracheal tube does alter the best obtainable view of the glottis in an unpredictable fashion. The presence of the endotracheal tube both increased visualization of the glottis and worsened the view in different subjects. The important outcome was that the presence of the endotracheal tube did, in fact, change the view obtained of the larynx during direct laryngoscopy. In conclusion post-intubation, MCL grades may not be reliable to predict laryngeal grade and should be used with caution in the right clinical context.

References:

1.Anaesth 2002 57: 105-9.

2.Anaesth 1999 53: 1041-4.

3.Anaesth 2006 61: 900-10.

Table 1 And Table 2

Table 1: Primary objective: Best view obtained (with or without BURP)

Patient	Change from Acceptable to Unacceptable -Worsened view-	Change from Unacceptable view to Acceptable - Improved view-	No change of best view
Total	13 (7.51%)	10 (5.78%)	150 (86.71%)
Male	9 (5.20%)	0 (0%)	52 (30.10%)*
Female	4 (2.31%)	10 (5.78%)	98 (56.65%)

*χ^2=4.716, df=1, P=0.03 – Appendix 1.2

Table 2: Secondary objective: Summed views obtained with and without burp, not utilizing best view obtained

Patient	'Worsened view'	' Improved view'
Total	30 (17.34%) [95% CI 12-24%]	28 (16.18%) 95% CI 11-23%]

Primary and secondary objective

148713 - PRE-CLINICAL META-ANALYSIS OF ANESTHETIC NEUROPROTECTION IN STROKE

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Introduction: Endovascular stroke therapy (EST) has become the standard of care for acute ischemic stroke[1] and despite lack of randomized clinical evidence supporting its use[2] and recent guidelines[3], general anesthesia is still widely used for EST. We are not aware of any good quality clinical evidence to guide specific anesthetic selection in this setting, however anesthetics have been evaluated in an appropriate preclinical model of ischemia-reperfusion[4]. Systematic reviews and meta-analysis can provide an overview of experimental findings and describe the size, direction and consistency of the effect of an intervention. Here we report the results of systematic review and meta-analysis of preclinical studies of anesthetic neuroprotection in acute stroke.

Methods: Studies of anesthetic neuroprotection using the filament model of ischemia-reperfusion in rats or mice were identified by systematic review. A search of Ovid and Embase databases identified 81 studies of focal cerebral ischemia that reported outcomes in terms of infarct volume or neurologic deficit score or both. From this set, we identified 37 investigations of clinically relevant doses of the anesthetic administered during or after focal cerebral ischemia was induced. Study quality was evaluated by two independent investigators according to a modified CAMARADES score[5]. Control conditions were scored for 'neuroprotective potential' : sevoflurane, barbiturates, isoflurane, ketamine = 1, α-chloralose, chloral hydrate = 2, 'awake'=3. Effect size was expressed as normalized mean difference (NMD) [6]; summary effect size was calculated by inverse variance weighting meta-analysis using a random effects model. The contributions of study quality, anesthetic and control condition to heterogeneity were assessed by meta-regression. Meta-analysis was performed with commercial software (Comprehensive Meta-Analysis ®).

Results: Anesthetics reduced neurologic injury by 28% (95% C.I. 22-35%, Z=8.27, P=0.0000). Duval and Tweedie's trim and fill method for publication bias adjusted the mean effect to 25% (19-32%) (Z=3.13, P=0.002). Heterogeneity was high between the studies (I^2=76.34). The meta-regression model accounted for 61% of the variance whereupon treatment and control anesthetics were significant covariates for effect size (Table). The ranking of the effect size for these covariate sets was - control state: (isoflurane, sevoflurane, barbiturates, ketamine) **<** (α-chloralose, chloral hydrate) **<** 'awake'; anesthetic: isoflurane **<** propofol **<** sevoflurane.

Conclusions: The results show that isoflurane, sevoflurane and propofol reduce neurologic injury when administered during or after the onset of focal ischemia. The results were not substantially affected by publication bias or study quality. The greatest neuroprotection was observed in studies that used 'awake' control subjects.

References:

1. Ann Neurol 2015;78 doi10.10002/ana.24528
2. J Neurointervent Surgery 2015;7:789-94
3. J Neurosurg Anesthesiol 2014 26: 95-108
4. Animal models for the study of human disease St. Louis: Academic Press; 2013 p.531-68
5. Trends Neurosci 2007;30:433-9
6. J Neurosci Methods 2014; 221: 92-102

Table

Covariate Set	Covariate	Coefficient	S.E.	95% Lower	95% Upper	t-value df=31	1-sided P-value	Set, df=2, dfErr=31
	Intercept	-4.45	9.87	-24.58	15.68	-0.45	0.3276	
	Study Quality	2.62	2.76	-3.01	8.24	0.95	0.1749	
Control	Control 2	9.83	6.22	-2.86	22.52	1.58	0.0622	F=9.06
Control	Control 3	34.61	8.13	18.02	51.19	4.26	0.0001	P=0.0008
Anesthetic	Propofol	20.70	7.84	4.70	36.69	2.64	0.0064	F=5.22
Anesthetic	Sevoflurane	24.09	8.11	7.54	40.64	2.97	0.0029	P=0.0111

Goodness of fit: Tau^2 =107.0841, Tau=103481, I^2=52.26%, Q=64.94, df=31, =0.0003.
Proportion of total between studies variance explained by the model: R^2 analog=0.61.
Reference group for Control Anesthetic: Control 1 (isoflurane, sevoflurane, ketamine, barbiturates)
Reference group for Anesthetic: isoflurane

Results from meta-regression of pre-clinical postconditioning studies using a random effects model with Knapp-Hartung analysis presented using normalized mean difference (NMD).

148825 - APPLYING A QUALITY LENS TO CASE REPORTS IN ANESTHESIA

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Background: Case reports have historically helped shape the education and field of anesthesia, but have recently been met with controversy in their contribution to evidence based medicine (EBM). Moreover, the Canadian Institute for Health Research (CIHR) advocates that medical knowledge should be synthesized into review articles and guidelines before shaping clinical practice to improve the quality of medical knowledge and education[1]. In 2013, Case Report (CARE) guidelines were instituted to improve quality in case reports, yet little is known on how published case reports score on these guidelines. Even less is known on the impact of case reports in medial literature. We performed a systematic review of published anesthesia case reports to identify their quality, literary impact (particularly for review articles and clinical guidelines), and factors associated with high citation rates.

Methods: This systematic review was exempt from REB approval. Case reports published in *Anesthesiology* and *Anesthesia & Analgesia*, from 2007 to 2012 (n=540) were identified using MEDLINE and EMBASE. Following the application of predetermined exclusion criteria, 261 case reports were included for data extraction. Two reviewers independently scored each case report using the CARE guidelines thirty-item checklist. Literary impact was defined as the total number of citations, the average citation frequency, and type of publication citing them. Web of Science was used to find the citation information. Untoward events reported in case reports were evaluated using the Anesthesia Quality Institute (AQI) anesthesia adverse events and near-misses framework. The relationship between the AQI scores and number of citations was analyzed, specifically looking for scores with high citation rates (>10). Quantitative data was analyzed using descriptive statistics and non-parametric tests as appropriate. Factors associated with high citation rates were identified using multivariate analysis.

Results: The mean CARE score for the case reports is 19.6 + 6.4/30, with a median score of 20. The 261 case reports included in our study were cited a total of 2054 times, with a median citation frequency of 4.0 per case report, and 21% of the case reports having high citations (>10). Review articles and guidelines comprised 33% and 3% of all citations respectively (see Figure 1). Factors that were significant for high citations included type of anesthetic and unanticipated difficult airway, *P*= 0.0092 and *P*=0.0082 respectively.

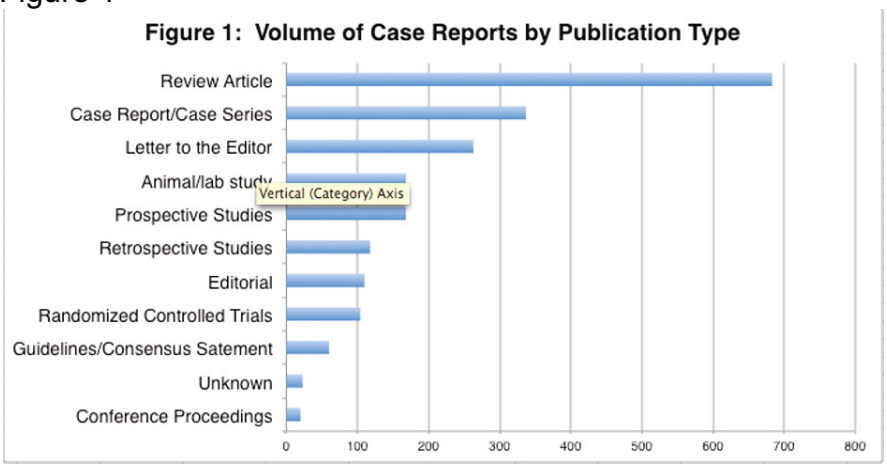
Conclusion: Case reports seem to have a significant impact in the anesthesia literature, as they are frequently cited in review articles and clinical guidelines. These synthesized knowledge tools are often used in teaching materials for anesthesia education[1].However, the quality of case reports needs improvement. Given the role of case reports in anesthesia education and its use in EBM, the introduction of CARE guidelines represents a quality improvement opportunity in case reporting.

References:

1. Albrecht J, Meves A, Bigby M. Case reports and case series from Lancet had significant impact on medical literature. J Clin Epidemiol [Internet]. 2005 Dec;58(12):1227–32. Available from: http://eutils.ncbi.nlm.nih.gov/entrez/eutils/elink.fcgi?dbfrom=pubmed&id=16291 46 6&retmode=ref&cmd=prlink

2. Gagnier J, Kienle G, Altman DG, Moher D, Sox H, Riley DS, and the CARE group. The CARE guidelines: consensus-based clinical case report guideline development. Journal of Clinical Epidemiology;67(1),46-51.

Figure 1



Volume of Case Reports by Publication Type

149205 - PERIOPERATIVE STRESS DOSING FOR CORTICOSTEROID-TREATED PATIENTS

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Introduction: Following historical reports of perioperative cardiovascular collapse and death in corticosteroid-treated patients(1), it has become common perioperative practice to administer supraphysiologic stress doses of corticosteroids for this patient population. However, there is no consensus on the patient population at risk or an optimal stress dosing regimen. Growing evidence suggests that routine perioperative stress dosing may not be required. We conducted a systematic review of the evidence for this practice and explored its historical antecedents.

Methods: A literature review was conducted to include prospective or retrospective studies concerning perioperative clinical outcomes in corticosteroid-treated patients, under varying stress dose regimens. MEDLINE, EMBASE, Proquest, and Cochrane Library databases were searched for studies from 1953 to 2016, and bibliographies for relevant articles were also searched.

Results: 20 studies met our inclusion criteria: 3 randomized trials and 17 cohort studies, with a total of 1105 patients. Comparing stress dosed or non-stress dosed patients, these studies failed to detect clinically significant differences in hemodynamic measures or other clinical outcomes. Episodes of hypotension tended to be responsive to fluid administration, or were self-resolving. There was one reported death, unrelated to adrenal insufficiency. In studies involving biochemical assays, perioperative hemodynamic profile was poorly correlated with serum cortisol levels.

Conclusions: This review does not support the current routine practice of perioperative stress dosing in all patients with a history of corticosteroid treatment. Most historical reports of significant morbidity or death associated with perioperative adrenal insufficiency in patients without primary disease of the hypothalamic-pituitary-adrenal axis are now considered inconclusive(2); overall, this perioperative complication appears rare. In contrast, patients receiving physiologic replacement doses of corticosteroids due to primary disease of the hypothalamic–pituitary–adrenal axis still require perioperative supplementation.

References:

1. JAMA 1952 149 1542-1543.
2. Ann Surg 1994 219 416-425.

149277 - IMPROVED PREOXYGENATION IN MORBIDLY OBESE: POSITION & VENTILATION

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Introduction: Airway management of the morbidly obese is a risky period. This population, at high risk of rapid desaturation[1], requires a fast endotracheal intubation, but poor glottis visualization often makes it more difficult[2]. With good patient positioning[3] and ventilation[4] optimization during preoxygenation, it is possible to lengthen the safe non-hypoxic apnea period.

Objective: The objective of this randomized clinical trial was to compare the effects on the safe non-hypoxic apnea time during general anesthesia induction of: 1) Reverse Trendelenburg position (table inclination 25°) associated with a ventilator assisted spontaneous ventilation (RT/PPV); versus 2) the frequently used combination of beach chair position (back up inclination 25°) with spontaneous ventilation without positive pressure (BC/SV)(Figure 1).

Methods: After approbation of local REB and written consent obtained, fifty morbidly obese patients were recruited in this clinical trial during their preoperative assessment and randomized in the operative room. After standard monitoring was installed, patients were positioned and preoxygenated, according to their randomization, for three minutes with a mouth piece. In the RT/PPV group, the anesthesia ventilator was set with an inspiratory pressure of 8 cm H_2O, positive end-expiratory pressure of 10 cm H_2O, FiO_2 at 1.0, with a fresh gas flow of 18 L/min. In the BC/SV group, the ventilator was set in spontaneous ventilation at FiO_2 1.0, with a fresh gas flow of 18 L/min. After the preoxygenation period, induction and intubation were done according to the anesthesiologist. Endotracheal tube position was confirmed with a fibrescope. The main issue was safe non-hypoxic apnea time (time between induction and saturation (SpO_2) of 92%). Secondary issues were the time to obtain an end-tidal oxygen fraction (EtO_2) of 0.90, maximal EtO_2 during the preoxygenation period, and time to obtain a SpO_2 of 97% during the ventilation resumption.

Results: Forty-eight patients were analyzed (24/group). Subjects were comparable according to age (46 ± 11 vs 41 ± 9 years, p=0.059) and body mass index (47.9 ± 6,4 vs 47.3 ± 5.2, p=0.727). Safe non-hypoxic apnea time was significantly longer in the RT/PPV resulting in an increase of 41.5 seconds (16%). The RT/PPV was also

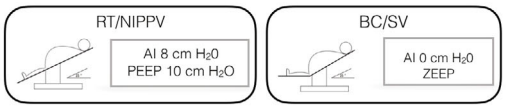
associated with a shorter time to obtain an EtO_2 of 0.90, a higher maximal EtO_2 during preoxygenation and a faster return to 97% during ventilation resumption (Figure 1).

Conclusion: Reverse Trendelenburg position associated with positive pressure ventilation lengthens the safe non-hypoxic apnea time in the morbidly obese population, allowing a greater margin of time available for the endotracheal intubation and minimizing the danger of hypoxemia in this high-risk population.

References:

1. Anesth Analg 1991,**72** :89-93
2. Anesth Analg 2003;**97**:595–600.
3. Obesity Surgery 2003, **13**:4-9
4. Anesth Analg 2005;**100** :580–4

EPO2-A



n	24	24	
Primary Outcome			
Safe Non-Hypoxic Apnea Time	**258 ± 22 seconds**	**216 ± 17 seconds**	**p=0.005**
Secondaries Outcomes			
Time for EtO_2 = 0.90	85 ± 19 seconds	145 ± 16 seconds	p<0.001
EtO_2 Max	0.91 ± 0.01	0.89 ± 0.01	p<0.001
SpO_2 Min	85.3 ± 1.8 %	83.6 ± 3.2 %	p=0.373
Time for SpO_2 97%	68 ± 11 seconds	88 ± 17 seconds	p=0.029

149282 - CAN CHILD LIFE PREPARATION REDUCE PREOPERATIVE ANXIETY?

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Introduction: Induction of anesthesia can be a stressful experience, with up to 60% of children suffering from significant anxiety immediately before surgery [1], which is associated with a higher postoperative analgesia requirement, a higher incidence of emergence delirium, and detrimental effects on sleep and behaviour [2,3]. One strategy for reducing preoperative anxiety is Child Life preparation (CLP), which includes role-play, expectation-setting and teaching of coping strategies [4]. The aim of this study is to determine whether preoperative CLP is effective at reducing anxiety prior to induction of anesthesia.

Methods: REB approval was obtained for a prospective, randomized controlled trial with 60 children aged 3-10 years, undergoing elective day surgery under general anesthesia expected to last ≤2 hours. We excluded children who had previous surgery, pre-identified anxiety, or anticipated mask induction of anesthesia. Upon arrival in the surgical daycare unit (SDCU), the participant was assessed for baseline observational anxiety by a research assistant (RA), using mYPAS-SF [5], which gives a score ranging from 23 (lowest anxiety) to 100 (highest anxiety). The participant was randomly assigned to the intervention (minimum 15 minutes CLP) or control group (without CLP) after the RA had left the SDCU. Participants entered the operating room (OR) with one caregiver (usually a parent), as per institutional practice, and the RA (blinded to group allocation) scored the participant's state anxiety using mYPAS-SF, up to the time of first attempt of IV insertion. Parents and children age ≥5 years were later asked about their pre-operative experience before discharge.

Results: Study recruitment is ongoing (expected to complete Apr/2016). Thus far, 28 children have been recruited, of median (range) age 4 (3–10) years, 16 male. Four children were subsequently excluded: 1 withdrew consent, 3 had re-scheduled surgery. To ensure consistency of scoring, 2 RAs observed 20 cases, with good inter-rater reliability (Spearman's rank correlation coefficient=0.89, $p < 0.0005$). Median (interquartile range, IQR) baseline anxiety was 29 (23–38) in the control group and 29 (23–35) in the CLP group. Prior to IV insertion in the OR, median (IQR) anxiety was 35

(23–47) in the control group and 29 (23–33) in the CLP group, with Mann Whitney test statistic U=56.5, p=0.36. Parents and children expressed positive feedback regarding the CLP.

Discussion: In general, low baseline anxiety levels were observed in these children on arrival in the SDCU. We aim to investigate whether the anticipated increase in anxiety between baseline and the OR is reduced with preoperative CLP, but this interim analysis does not provide a statistical demonstration of this effect. We anticipate being able to present completed study results at the conference.

References:

References: [1] Anesth Analg.2004;99(6):1648–54 [2] Pediatrics.2006;118(2):651–8 [3] Paediatr Anaesth.2011;21(9):969–73 [4] Anesth Analg.1998;87(6):1249-55 [5] Anesth Analg.2014;119(3):643–50

149356 - ANESTHETIC NEUROPROTECTION IN PERMANENT PRE-CLINICAL STROKE MODELS

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Introduction: Anesthetics and sedatives are commonly used during the hyperacute management of ischemic stroke in order to facilitate physiological support and control of intracranial hypertension. The drugs used have potentially beneficial effects upon metabolism/blood flow ratios and molecular pathways involved in necrosis and apoptosis[1]. The contribution of pharmacological factors of anesthetics to clinical stroke outcome is not clear, and we are not aware of any good clinical evidence to guide specific anesthetic selection in this setting. Systematic reviews and meta-analysis can provide an overview of experimental findings and describe the size, direction and consistency of the invention effect. Here we report the results of a systematic review and meta-analysis of preclinical studies of anesthetic neuroprotection in permanent focal ischemia.

Methods: Studies of anesthetic neuroprotection using the filament model of focal cerebral ischemia in rats or mice were identified by systematic review. A search of Ovid and Embase databases identified 13 studies that reported outcomes in terms of infarct volume or neurologic deficit score or both. Effect size was expressed as normalized mean difference (NMD) [2]; summary effect size was calculated by inverse variance weighting meta-analysis using a random effects model. When both neurologic deficit score and infarct volume were reported for the same animals, the average of the two measures was used. Meta-analysis and graphics were performed with RevMan 5.3 (http://tech.cochrane.org/revman). Publication bias was assessed with Duval and Tweedie's trim and fill method.

Results: The selected reports evaluated four anesthetics: propofol (5 studies), isoflurane (5 studies), sevoflurane (2 studies), ketamine (1 study). The average reduction in neurologic injury by exposure to an anesthetic was 24.5% (95% C.I. 19-30%, Z=9.246, P=0.0000) (Figure). The results were homogeneous, (I^2=0.000) and there was no adjustment for publication bias suggested by Duval and Tweedie's trim

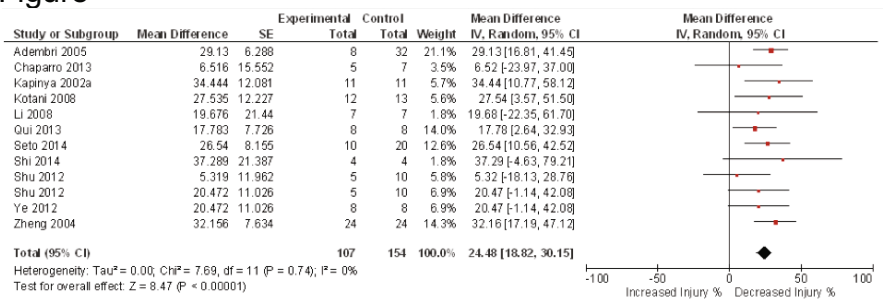
and fill method.

Conclusions: The results show that the anesthetics reduced neurologic injury by approximately 25% in the filament preclinical model of permanent focal ischemia. This finding is similar to the mean reduction in infarct size reported for non-anesthetic drugs (mean ± SE: 26% ± 0.2%)[3]. There was no evidence that the results were affected by publication bias. The present findings support the existence of a 'baseline' positive efficacy in this preclinical model, as suggested by O'Collins and colleagues[4].

References:

1. Curr Pharm Des 2014 20: 5751-65
2. J Neurosci Methods 2014 221: 92-102
3. Animal Models for the Study of Human Diseases St. Louis: Academic Press; 2013. p. 531-68
4. Ann Neurol 2006 59:467-77

Figure



Neuroprotection by anesthetics in permanent focal ischemia as presented using a random effects meta-analysis of normalized mean differences (NMD) (% reduction in Injury)

149505 - MENTORSHIP IN ANESTHESIA: SURVEYING THE LANDSCAPE

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Introduction: Mentorship is an important tool for professional progression and academic growth. However, the role of mentorship in anesthesia is poorly understood. This study explores the prevalence of resident mentorship nationally and resident perceptions regarding the benefits and barriers to mentorship.

Methods: A national survey was conducted that included all of the program directors and anesthesia residents in the 17 Departments of Anesthesia in Canada between July, 2014 and June 2015. Research ethics approval for this study was obtained prior to commencing.

Results: The prevalence of mentorship programs nationally was 73%. Only 63.3% of residents surveyed had a mentor. However, 91.1% of residents agreed that mentorship would be beneficial to their overall success as an anesthesiologist. Female residents had a more positive attitude than males towards mentorship in terms of benefitting their overall success as an anesthesiologist ($p=0.02$). Overall, residents felt mentorship relationships were beneficial for career development, academic productivity, personal goal achievement, development of clinical and teaching skills, and building confidence. Commonly cited barriers included lack of time amongst mentors, lack of formalized meeting times and objectives, lack of connection, and lack of mentors with similar personal and professional goals.

Discussion: Overall, the results from this study highlight the mismatch between residents' perceptions of the importance of formal mentorship programs in anesthesia and their actual prevalence. More needs to be done in Canadian anesthesia residency training programs to address this gap. Mentorship programs may benefit from clear objectives, specified meetings times and residents' input with their mentor selection.

References:
N/A

149529 - HEMODYNAMIC RESPONSES TO INTUBATION BY THE BONFILS COMPARED TO C-MAC

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Introduction

Direct laryngoscopy (DL) produce tachycardia and increased blood pressure that could be fatal in patient with brain injury[1,2,3]. Bonfils fiberscope and videolaryngscope C-MAC are associated with little hemodynamic instability compared to DL[1,4]. Scientific evidence comparing these two alternatives do not exist. In order to determine the comparative hemodynamic effect of Bonfils to C-MAC we conducted a randomized controlled trial in patients undergoing elective surgery.

Methods

After Internal Review Board approval, 50 patients between 18-60 years old, ASA 1-2 and listed for elective surgery were randomly assigned to intubation with Bonfils or C-MAC in a 1:1 ratio. Exclusion criteria were: patient refusal , expected difficult intubation criteria (Cormack - Lehane Grade ≥ 2, Mallampati > 2 , Patil < 4 cm, mouth opening < 3 cm), active smoking and chronic hypertension. After a standardized induction, intubation was made via the retromolar approach (Bonfils group) or via videolaryngoscopy (C -MAC group). Operators had performed a minimum of 30 intubations with Bonfils and 20 intubations with C-MAC to be eligible to participate. A research assistant blinded to the intervention recorded heart rate (HR) and arterial blood pressure (systolic BP, diastolic BP, mean arterial blood pressure [MAP]) at induction and at every minute during the five minutes post intubation. As a secondary outcome, difference in time of intubation between the two instruments were recorded. The sample size was determined for a power of 80 %, a significance level of 0.05 and an increase in MAP of 20 mm Hg. A p value ≤ 0.05 was considered statistically significant. Analysis of the results was conducted in patients who had the procedure ("per protocol analysis") .

Results (cf figure 1a,b)

Fifty patients were enrolled and 47 were analyzed. Two patients in the Bonfils group and one patient in the C-MAC group were excluded for breach of protocol. After randomization, the two groups were comparable except for ASA I/II ratio which was slightly higher in the C-MAC group (p=0.046). HR (p = 0.40) and MAP (p = 0.30) were comparable between the two groups within five minutes post-intubation. Intubation time was shorter with C-MAC than with Bonfils (30 ± 2 seconds vs 38 ± 2 seconds; p =

0.02).

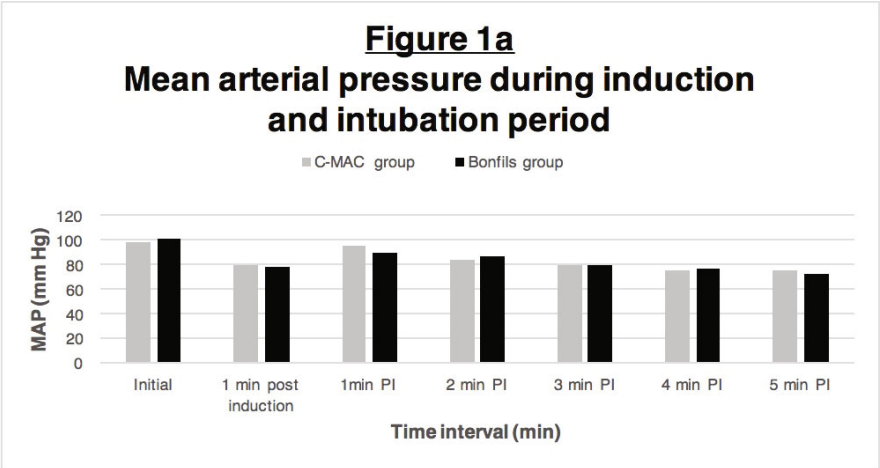
Conclusion

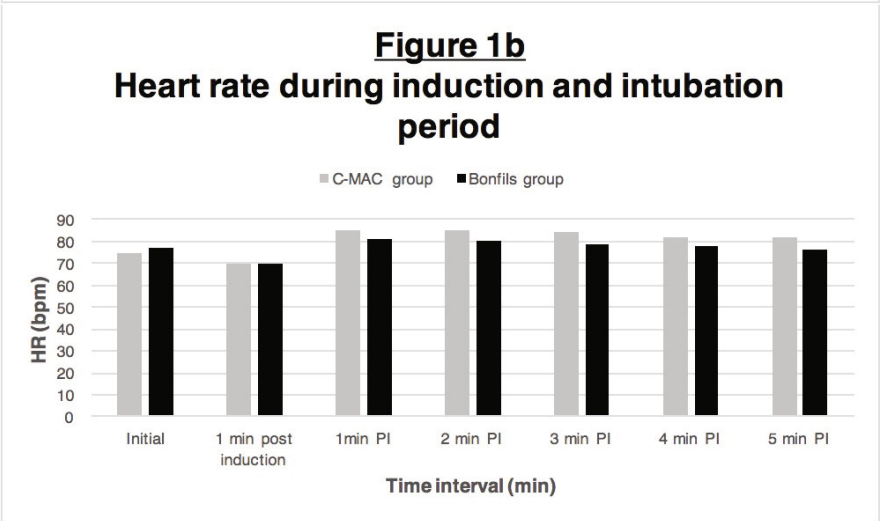
Our study demonstrated that the hemodynamic responses to tracheal intubation using the Bonfils fiberscope is comparable to the C-MAC videolaryngoscope among ASA 1 and 2 patients scheduled for an elective surgery. In light of these findings, using either technics appears reasonable course of action.

References:

1) Middle East J Anesthesiol. 2011 Oct;21(3):385-90.
2) Indian J Anaesth. 2012 Jul;56(4):353-8.
3) J Neurosurg. 1996 Jan;84(1):35-42.
4) Br J Anaesth. 2012;109(3):439-443.

Mean arterial pressure and Heart rate during induction and intubation period





MAP = Mean arterial pressure HR = Heart rate PI = post intubation

149985 - EVALUATION OF INTERNET-BASED RESOURCES ON PREOPERATIVE FASTING

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Introduction: Patients commonly use the Internet to obtain health-related information[1]. Recommended fasting periods provided on the Internet may be inaccurate even though pre-operative fasting is important to avoid morbidity. Our objectives were to 1) describe the characteristics and recommendations of Internet resources on pre-operative fasting, and 2) assess the readability and quality of Internet-based pre-operative fasting guidelines.

Methods: This study was exempt from ethical approval by our institutional research ethics board as it involved exclusively publically available information. We used the Google® search engine from four major English-speaking countries to search common preoperative fasting terms and included the first 30 websites from each search. We excluded non-English websites, websites requiring subscriptions, and websites without explicit fasting recommendations for the general population. Each website was categorized into: 1) Anesthesia society; 2) Government-sponsored; 3) Healthcare institution; 4) Scientific article; 5) Commercial or news/media report; and 6) Forum or personal website. We documented country of origin, date of last update, and recommendations intervals for preoperative fasting of liquids, solids, formula and breast milk. We assessed readability using the Flesch Reading Ease score and Flesch-Kincaid Grade level[2,3]. Website quality was assessed using Health on the Net Foundation certification and two validated tools (JAMA Benchmark Criteria and DISCERN score)[4-6].

Results: We identified 87 unique websites that were included in the analysis. The majority of websites were from North America or the UK/Europe (45% and 22%, respectively) and 53% were from healthcare institutions. Website fasting recommendations were variable, with 54% recommending clear fluid intake up to 2 hours prior to surgery. Anesthesia society websites were more likely to recommend hydration than health care institution websites (62 *vs* 13%,$p < 0.0001$). 45% of health care institution websites and 32% of all websites recommended fasting from solids “after midnight,” rather than specifying a time interval. Overall readability was poor with a mean Flesch Reading Ease of 49 (standard deviation [SD] 15) and Flesch-Kincaid

Grade level of 10.6 (SD 2.7). Scientific articles and anesthesia society websites had the lowest readability ($p < 0.001$ across categories). Overall quality was poor with a median *JAMA* Benchmark score of 1 out of 5 (IQR 0-3) and mean total DISCERN score of 39.8 out of 80 (SD 12.5). The website category and country of origin predicted the mean total DISCERN score ($p=0.04$, $p < 0.0001$, respectively) with the categories of anesthesia society, scientific article and websites from the UK/Europe scoring higher and health care institution websites scoring lower (**Figure 1**).

Discussion: Fasting recommendations provided on the Internet are variable and frequently inconsistent with current guidelines, particularly among health care institution websites. Websites that provide fasting recommendations have poor quality scores and readability. The Internet resources available on preoperative fasting may be confusing and provide inaccurate information to patients.

References:

1. AMIA Annu Symp Proc 2003: 225-9

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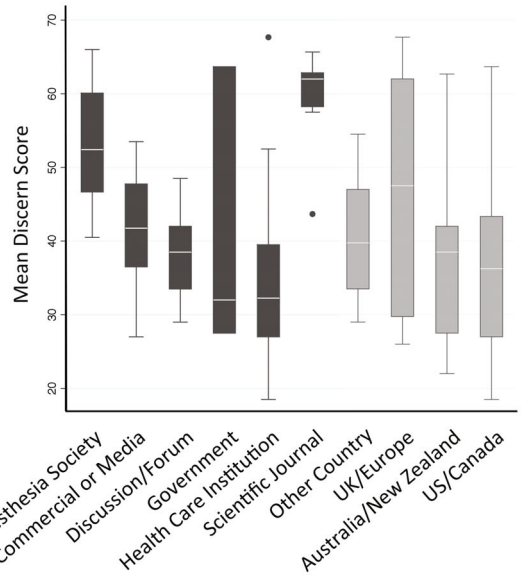
3. Naval Technical Training Command 1975: Research Branch Report 8-75

4. Comput Biol Med 1998 28: 603-10

5. JAMA 1997 277: 1244-5

6. J Epidemiol Commun H 1999 53: 105-11

Figure 1: DISCERN Scores


Mean Discern Score
70
60
50
40
30
20
Anesthesia Society
Commercial or Media
Discussion/Forum
Government
Health Care Institution
Scientific Journal
Other Country
UK/Europe
Australia/New Zealand
US/Canada

150006 - BRIDGING THE GAP -TAPER SCHEDULE FOR APS DISCHARGE

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Introduction: Following discharge, patients requiring high opioid doses may be at risk for both under and overdosing, posing a major challenge to community physicians. The aim of this study was to examine the effectiveness and degree of satisfaction with a personalized taper schedule and physician letter through interviews of patients and physicians.

Methods: This was a one year prospective study. Following REB approval and informed written consent, patients admitted for elective surgery, aged 18-60 years old receiving opioid analgesics were recruited. Prior to discharge, the Acute Pain Service team provided patients with a taper schedule explained in detail. Individualized physician letters were faxed to treating family physician. Patients were contacted by phone 2, 4 and 6 weeks after discharge. Physicians were contacted once, a month after discharge. Patients and physicians were asked to grade the taper schedule on a 1-5 Likert scale. Questions pertained to clarity, usefulness for tapering, ability to follow the instructions and general satisfaction.

Results: 26 patients and 21 physicians completed the study. Physicians were generally satisfied with both the taper schedule and letter and rated all aspects between 3.76-4.38 out of 5. Similarly patients were satisfied with the taper schedule and rated all aspects between 4.08-4.5.

Conclusions: Both physicians and patients generally found the taper schedule and letter helpful in assisting them to taper off their opioid use. This is one way of bridging the continuity of care between the acute care providers and community physicians while reducing the risk to patients during the transition period.

References:

Can Fam Physician. 2014;60:826-32.

Can Fam Physician. 2011;57:324-32.

Pain Manag. 2015;5:97-105.

150031 - INDICATIONS AND THRESHOLDS FOR TRANSFUSION AFTER CARDIAC SURGERY

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Introduction: One of the keystones of anesthesia practice has been to improve the quality and safety of patient care in the perioperative period. It follows that our practice should include treating patient risk factors that are associated with poor outcomes. Recent literature has shown that perioperative anemia is associated with higher mortality, increased length of stay and a number of other adverse events. However, the threshold for transfusing patients after cardiac surgery remains unclear.

Methods: A literature review of cardiac surgery, critical care and blood transfusion-related articles was performed using the PubMed® and EMBASE® databases to identify applicable articles published in English from 1990-2015. 1306 articles met the search criteria, of these, 1170 were excluded based on title and abstract. The remaining 136 articles were reviewed and further articles were identified from the references. Local ethics committee approval was not required for the completion of this study.

Results: Perioperative transfusion threshold data in cardiac surgery is extremely limited, however restrictive transfusion strategies seem to be just as effective as liberal ones. A transfusion trigger of hemoglobin ≤ 70 g/L for asymptomatic, post-cardiac surgery patients appears to be safe.

Discussion: The prevalence of preoperative anemia in patients undergoing cardiac surgery ranges from 16%-54%. The most common causes of anemia are chronic disease, chronic renal failure and absolute iron deficiency. Considering the health risks of anemia, its detection, evaluation and treatment is crucial. Current research suggests that elective surgery in the presence of preoperative anemia should be considered substandard care. However, allogeneic blood transfusion should be undertaken only when medically necessary to treat a clinical condition not a number. Blood transfusion is potentially harmful to the patient and also a strain on healthcare resources.

There are currently no clear guidelines or indications for blood transfusion in patients undergoing cardiac surgery. Consequently, a wide variability in transfusion practices exists based on surgeon preference or institutional policy. Many studies have found that restrictive transfusion strategies appear to be at least equally as effective as liberal ones in most situations. The Society of Thoracic Surgery and the Society of

Cardiovascular Anesthesiologists indicate that: “transfusion is reasonable in most post-operative patients whose hemoglobin is less than 7 g/dL.”

Despite growing evidence supporting perioperative blood management, such a program has not yet been implemented at our institution nor have specific post-operative thresholds for transfusion in cardiac surgery. Current literature supports the use of a restrictive transfusion strategy after cardiac surgery however more high quality research is needed.

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150055 - PERI-OPERATIVE MEDICATION ADHERENCE FOR PATIENTS UNDERGOING SURGERY

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Introduction:
The perioperative medication adherence rate has been estimated at 22-60% (1-2). Non-adherence has been associated with increased age, higher ASA status, race, number of medications, medication cost, insurance coverage and physician-patient communication (2-3). No single clear factor was associated with non-adherence, suggesting that compliance is associated with numerous interacting predictors (3). The primary objective of this retrospective chart review was to determine the proportion of patients undergoing non-emergent surgery who are non-adherent with medication instructions and to identify predictors of non-adherence.

Methods:
Approval was granted by the local Research Ethics Board. A random sample of 650 patients, who were under 18 years, was generated from 6338 surgeries. Emergency surgery and inpatients were excluded from this initial pool. From the 650, 94 patients were removed due to incomplete/illegible charting or not taking any medications, leaving a sample size of 556. Adherence was determined by comparing the medication instructions given to the patient at their anesthesia pre-operative clinic visit and medication reconciliation done by a nurse and undertaken on the day of surgery. Variables in the analysis included: demographics, American Society of Anesthesiologists (ASA) classification, total medication taken, medication classes, language, surgery type, type of anesthetic, patient comorbidities, disposition (home, overnight observation or admission), peri-operative complications, individual at preoperative clinic taking medication history, scheduled and actual case start, and time between pre-operative visit and surgery. A patient was defined as non-adherent if there was a single record of non-adherence (for any medication) in the anesthetic record.

Results:
412 patients were adherent and 144 non-adherent. The non-adherence rate was 25.9%. Predictors of non-adherence from univariate analysis were: regional anesthesia versus general anesthesia (odds ratio [OR] 2.4; 95% confidence interval

[CI] 1.5 to 3.7), ASA class III (OR 5.2; 95% CI 1.8 to 14.9), ASA class IV (OR 3.7; 95 CI% 1.2 to 11.4), pharmacist (versus a nurse) completing the medication list in the preoperative clinic (OR 1.9; 95% CI 1.2 to 2.9), MSK comorbidities (OR 1.5; 95% CI 1.0 to 2.2), increasing age (OR for each increasing year 1.0; 95% CI 1.01 to 1.04) and increasing number of medications (OR for each additional medication 1.1; 95% CI 1.0 to 1.1). Multivariate regression analysis revealed the variables that remained significant predictors of non-adherence were: number of medications (OR 1.1; 95% CI 1.0 to 1.1) and regional anesthesia versus general anesthesia (OR 1.8; 95% CI 1.1 to 3.1).

Conclusions:
The rate of non-adherence was 25.9%, which is in keeping with previously recorded rates. Univariate analysis showed significance for several variables; however, multivariate analysis showed predictors of non-adherence to be increasing number of medications and regional anesthesia.

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150081 - TRANSESOPHAGEAL ECHOCARDIOGRAPHY COMPLICATIONS IN CARDIAC SURGERY

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Purpose/Background: Transesophageal echocardiography (TEE) has played an increasingly important role during cardiac surgery. Although there have been several large reviews documenting the complications following intraoperative TEE, most of the prior reports are almost two decades old and may not reflect current practices. The purpose of this study was to determine the incidence and types of complications following TEE in a contemporary cardiac surgical population.

Methods: Following Research Ethics Board approval, we conducted a retrospective analysis of all cardiac surgical patients having undergone an intraoperative TEE between April 1, 2004 and April 30, 2012. Those who may have suffered a complication related to TEE were identified from our institutional cardiac surgical database using the patient discharge ICD-10 codes related to dysphagia, vocal cord and laryngeal injury, dysphonia, accidental puncture and laceration during a procedure, and hemorrhage and hematoma complicating a procedure. In addition, any case that had a requirement for postoperative bronchoscopy, or consultation with otolaryngology, the gastrointestinal (GI) bleed team, general or thoracic surgery due to a complication potentially related to TEE injury were flagged for manual chart review. Cases that were subsequently identified by investigator consensus as having complications potentially related to TEE were compared to all the cases in the cardiac surgical database during the same time period for which no TEE complication was reported. A multivariable model was developed to identify risk factors for TEE complications.

Results: 7,954 cardiac surgical cases were performed during the study period of which 1,074 had ICD-10 codes that triggered a manual review for potential TEE complications. Of the 111 (1.4%) cases subsequently identified with possible TEE-related complications, 24 (0.3%) experienced dysphagia requiring intervention, 73 (0.9%) experienced esophageal and/or gastric complications. Our multivariable analysis (see Table) showed an increased risk of complications associated with age (OR 1.04 per year), BMI (OR 0.94 per unit), previous CVA or TIA (OR 3.67), procedure

other than isolated CABG (OR 2.09), EF < 35% (OR 1.71) and CPB time (OR 1.01 per minute).

Conclusion: The overall incidence of complications following cardiac surgery related to intraoperative TEE was relatively low at 1.4%. Advanced age, low BMI, complexity of procedure, prior CVA or TIA, EF < 35% and prolonged bypass time appear to be significant risk factors for complications.

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Multivariable model

Table. Independent risk factors for TEE complications in a multivariable analysis.

Variable	Odds Ratio	95% Confidence Interval	*P*-Value
Age (Continuous Variable) per year	1.04	1.02 - 1.05	<0.001
BMI (Continuous Variable) per unit	0.94	0.91 - 0.98	0.01
Previous CVA or TIA	3.68	2.07 - 6.52	<0.0001
Ejection Fraction < 35%	1.71	1.04 – 2.82	0.04
Procedure other than Isolated CABG	2.09	1.36 – 3.20	0.01
CPB Time per minute	1.01	1.01 - 1.01	<0.0001

ǂ Overall Area under ROC Curve (95% CI) for the model: 0.763 (0.716 - 0.809); Hosmer Lemeshow Goodness of Fit ($P = 0.3050$)

BMI = body mass index (kg/m^2). CPB = cardiopulmonary bypass. CVA = cerebrovascular accident. TIA = transient ischemic attack.

Independent risk factors for transesophageal echocardiography complications in a multivariable analysis

150103 - INCREASING UPTAKE OF COGNITIVE AIDS IN CRITICAL EVENTS

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Background:
Crises in the operating room (OR) during a pediatric case are fortunately rare with the incidence of cardiac arrest in non-cardiac patients being 2.7/10000[1]. This rarity means that increasingly few anesthesiologists can claim personal experience of the full range of potential OR emergencies. In order to address this, the Society for Pediatric Anesthesia developed cognitive aids in the form of Critical Event Checklists (SPA CECs). Several studies have demonstrated the benefit of cognitive aids in improving adherence to guidelines, performing critical tasks and improved Anesthesia Non-Technical Skills[2,3]. However, despite the presence of cognitive aids, individuals often do not use the aids frequently or use them incorrectly[4,5]. The way that trainees utilize cognitive aids can potentially be augmented through improved education/orientation surrounding the tool. The objective of the study was to investigate whether the presence of SPA CECs improved the performance of anesthesiology trainees during simulations and whether the mode of orientation (e-module vs. didactic) resulted in improved uptake of the cognitive aids.

Methods:
REB approval was attained from the local institution. A randomized, 2 x 2 factorial design was used. Subjects were randomized twice. The first randomization was whether the SPA CEC was available to the participant during the simulations. The second randomization was the mode of orientation (e-module vs. didactic). The simulations were videotaped and will be rated by two Pediatric Anesthesiologists using the Managing Emergencies in Pediatric Anesthesia (MEPA) scenario specific checklist and GRS.

Results:
In this work in progress, we have conducted 36 simulations. Preliminary results demonstrate that in 28% of simulated scenarios, residents used a cognitive aid when it is available to them. Of the seven MEPA scenarios that residents were exposed to, cognitive aids were utilized exclusively on two scenarios (Malignant Hyperthermia and Local Anesthetic Toxicity). The uptake rate of cognitive aids in these two scenarios was 62.5% amongst residents that had cognitive aids available. Additional results, specifically performance impact of the CECs, will be available for presentation at the time of the conference.

Discussion:
Preliminary results suggest that uptake of the cognitive aid is dependent on the type of critical event occurring as opposed to the orientation that residents receive. Specifically, participants are more likely to use the SPA CEC in events that are task list oriented (i.e. Malignant Hyperthermia and Local Anesthetic Toxicity). The significance of these results is that they indicate that cognitive aids should be created for specific critical events; therefore, this lends insight into ways to improve currently existing resources (i.e. SPA CEC) and direction towards creation of future resources.

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150154 - TAVI AND MITRCLIP: FIRST CASE IN CANADA

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Introduction:
TAVI and MitraClip are proven therapeutic options for aortic stenosis and mitral regurgitation in high risk or inoperable patients.

Our patient was the first in Canada to receive both procedures at the same sitting.

Case:
A 78 year old male was admitted to a regional hospital with NYHA class III failure, chronic atrial fibrillation and valvular disease. Prior cardiac history included CABG in 1996 and PCI in 2011. He was referred to our institution for further evaluation and nonsurgical treatment of his condition. Echocardiography showed severe AS, severe MR and severe LV dysfunction. Coronary angiography revealed two stenoses that were treated with drug eluting stents.

He first underwent transfemoral TAVI with a #29 CoreValve self-expanding prosthesis under general anesthesia. The CoreValve showed excellent function on TEE, with an appropriate transaortic valve gradient and no paravalvular regurgitation. Despite the new valve and cardioversion to sinus rhythm, the severity of MR and LV dysfunction remained unchanged. It was therefore decided to proceed immediately with the MitraClip. After one implantation, TEE showed mild MR. He was extubated and transferred to CCU. Subsequently development of alternating bundle branch block necessitated a biventricular ICD implantation two days later. He was discharged on day 5 post TAVI/ MitraClip. Followup echocardiograms at two and six months remained unchanged and he reported marked functional improvement.

Discussion:
MR improvement after AVR has been described in the literature. [1] Staging of the two interventions can allow for reassessment of the degree of MR after deployment of the TAVI. Many patients have successfully been treated in this fashion. We decided to perform both procedures at the same time.

Conclusion:
The safety and efficacy of TAVI and MitraClip have made therapeutic options for high risk or inoperable aptients. Following careful patient selection and repeated evaluation by an experienced multidisciplinary team, our patient underwent both interventions at the same time with good results.

References:
1. Alghamdi et al. Card Surg 2010;25:182-7.
TEE 3D image post procedures

150158 - LIPID REVERSES HYPOTENSION BUT NOT ANESTHESIC PROFILE OF PROPOFOL

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Introduction: Propofol is a commonly used anesthetic. Despite its favourable safety profile, propofol causes hypotension which ultimately can result in end-organ hypoperfusion. Intralipid is a lipid emulsion that has been successfully used to treat systemic toxicity from a variety of lipophilic medications, most notably local anesthetics. The mechanisms of action may include the “lipid sink” phenomenon, whereby lipophilic medications are removed from their sites of action and partition into a plasma lipid phase established by the lipid emulsion. Propofol is a lipophilic medication, and intralipid can reverse the vasodilatory effects of propofol in isolated vessels; however, whether these effects are recapitulated *in vivo* is not known. The objective of this study was to determine if intralipid reverses the hypotensive effects of propofol when administered *in vivo*. In addition, given the lipid sink theory for intralipid’s mechanism of action, we sought to determine if intralipid reverses the anesthetic effects of propofol, which may contribute to the reversal of the hypotensive effects of propofol *in vivo*. We hypothesize that intralipid reverses propofol-induced hypotension which is a result of reversing propofol’s anesthetic effects by virtue of the lipid sink phenomenon.

Methods: This study was approved by the Animal Policy and Welfare Committee at our institution**.** Under isoflurane anesthesia, male Sprague Dawley rats were instrumented with indwelling catheters in the femoral artery and femoral vein for mean arterial pressure (MAP) assessments and intravenous drug delivery, respectively. In addition, subdural electrodes for cortical activity assessments by electroencephalography (EEG) were utilized. Finally, ultra-performance liquid chromatography (UPLC) was used to determine change in plasma concentrations of propofol over time with intralipid or saline administration.

Results: Propofol (10 mg/kg IV, the typical IV anesthetic dose used in rats) caused hypotension (55±2% drop in MAP, $P < 0.001$) and intralipid (4mL/kg IV) caused greater reversal (80±9%) of blood pressures compared to saline (19±1%; $P < 0.001$). Blockade of the autonomic nervous system with chlorisondamine (2.5 mg/kg IV) caused marked hypotension (56±3% lowering of MAP, $P < 0.001$) which could be reversed with a constant infusion of phenylephrine (300 µg/kg/hr); under these

conditions, propofol nevertheless caused hypotension (12±4% lowering of MAP) which was completely reversed by intralipid. Propofol-induced cortical burst suppression was not affected by intralipid (2±3%), saline (-4%) or 20% albumin (-2±1%; P=0.27). Finally, UPLC revealed an increase in plasma propofol concentration in the presence of intralipid compared to saline; however, propofol elimination in both groups coincided with EEG recovery.

Discussion: These results demonstrate that intralipid reverses propofol-mediated hypotension with minimal effects on its anesthetic profile, suggesting other *in vivo* mechanisms besides a lipid sink may be involved. Intralipid could be particularly useful as a rescue against propofol-induced hypotension in patients prone to hemodynamic instability such as the elderly, without significantly altering their anesthetic state.

References:

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150201 - DEXMEDETOMIDINE FOR DIFFICULT TO CONTROL POSTOPERATIVE PAIN

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Introduction:
Dexmedetomidine is an alpha-2 adrenergic agonist approved for procedural sedation and sedation in ICU patients for up to 24 hours. Emerging evidence supports its use in reducing intraoperative opioid consumption (1,2), prolonging nerve blocks (3) and preventing emergence delirium (4). We report the use of dexmedetomidine for the management of acute postoperative pain. Both patients have consented to the publication of this case series.

Case 1
A healthy 35 year-old man was admitted following an ATV accident with a crush injury to his leg. Surgical management was complicated by wound infection, sepsis and rhabdomyolysis. Acute Pain Service (APS) started with IVPCA hydromorphone and a multimodal oral analgesia protocol of acetaminophen, celecoxib, tramadol and pregabalin. He underwent 5 surgeries over 10 days, and by post-op day (POD) 12, he suffered recurrent acute pain crises. In a fully monitored Trauma Unit, he was administered 1mcg/kg dexmedetomidine iv bolus. Pain reduced to 4/10. An infusion of dexmedetomidine was initiated (0.4 mcg/kg/hr) for 24 hours. Oral clonidine was initiated and titrated to 0.2 mg po tid. He had the benefit of an epidural for his 6^{th} surgery; but once removed, a pain crisis resulted. Dexmedetomidine was restarted and continued for 3 days with monitoring (range 0.1- 0.4 mcg/kg/hr). Pain scores and opioid requirements gradually reduced. Pain was stabilized and controlled with multimodal oral analgesics until discharge.

Case 2
A 70 year-old woman with chronic pain at multiple foci due to severe rheumatoid arthritis required a revision occipito-cervical fusion. Her baseline pain was 8/10 on a regime of acetaminophen, tramadol, oxycodone, fentanyl CADD IV, pregabalin, memantine, methadone and meloxicam. Postoperatively, she was transferred intubated to the ICU for postoperative care and pain control. APS initiated a ketamine infusion (20mg/hr) and fentanyl infusion (100mcg/hr), in place of her CADD. On POD 1, ICU stopped her propofol sedation to assess for possible extubation. She became agitated due to pain. Propofol was restarted along with a dexmedetomidine infusion at

0.2mcg/kg/hr IV as per APS orders. Later that same afternoon, the patient was assessed by APS and she appeared more comfortable with her eyes opening spontaneously and obeying commands. On POD 2, she remained intubated, but awoke easily to voice and was comfortable. The patient was successfully extubated later that day. Dexmedetomidine was discontinued on POD 3 and the patient transferred out of the ICU.

Discussion:
These patients' pain management represents our first APS experiences with dexmedetomidine for the management of severe post-operative pain. Literature review suggests that dexmedetomidine has only been used **pre-emptively** for **intraoperative** pain management. Its use for acute painful exacerbations has not been previously reported. Further investigation is needed to explore the anti-nociceptive role of dexmedetomidine for postoperative pain.

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150736 - CAN WE INTUBATE WITH THE LEKSELL HEAD FAME IN-SITU?

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Introduction

Deep brain stimulation (DBS) insertion involves the placement of electrodes into specific deep brain structures that are identified using sterotactic frame-based imaging, microelectrode recordings and macrostimulation of the awake patient. The electrodes are placed in the brain structures via burr holes while the patient is in the operating room; for the procedure, the patient is given local anesthesia with monitored anesthesia care (MAC) or conscious sedation (1-4)). The Leksell headframe used for sterotactic frame-based imaging remains in situ during the procedure. The frame provides limited access to the airway because it covers all or part of the mouth and nose and limits neck extension (2-4)) . There are currently no studies in the literature examining the ease of emergency airway management with a laryngeal mask airway (LMA) or of intubation using direct laryngoscopy (DL) and video laryngoscopy (VL) with the Leksell headframe in situ.

Methods

The study was approved by the local research ethics board. Twenty-six anesthesia-provider volunteers were recruited. A Leksell sterotactic headframe was placed on a mannequin in the OR. The OR table was placed in a semi-sitting position (30 degrees) to simulate the standard surgical position. The anesthesia providers were asked to insert a #3 LMA with the Leksell headframe in situ. The OR table was then leveled. Next, anesthesia providers were asked to intubate the mannequin using DL and VL (CMAC®) with the Leksell headframe in situ. The anesthesia providers' number of attempts and time to successful LMA insertion and intubation were recorded.

Results

A total of 26 volunteers participated in the study (6 residents, 11 fellows and 9 consultants). Ninety-six percent of participants (25/26) were able to insert the LMA on the 1st attempt. The average time to insert the LMA was 38 seconds (+/-13 seconds). Ninety-six percent of participants (25/26) were able to intubate the mannequin with DL on the first attempt. The average time to intubate the mannequin with DL was 59

seconds (+/- 23 seconds). All participants were able to intubate the mannequin on the 1st attempt using VL, and the average time taken to intubate was 56 seconds (+/- 29 seconds).

Discussion

This study provides useful information for anesthesia providers about the ease of emergency airway management during surgery for DBS insertion in patients with a Leksell headframe in situ. It is the first study to report that LMA insertion and intubation with DL and VL can be performed with the Leksell headframe in in situ.

References:

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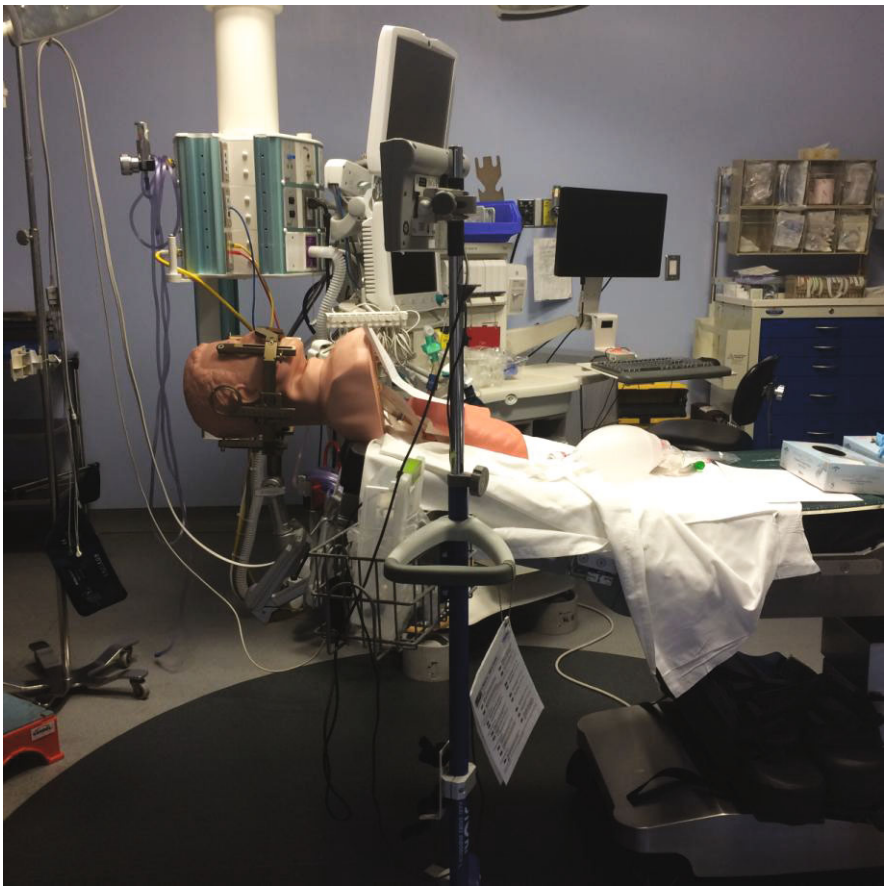
Fig 1



Mannequin with Leksell head frame insitu

150787 - CASE REPORT ON A WOLFF-PARKINSON-WHITE PATIENT FOR SCOLIOSIS SURGERY

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Introduction:

Wolff-Parkinson-White syndrome (WPW) is a congenital syndrome with an increased risk of malignant tachyarrythmias and sudden cardiac death [1]. Inappropriate treatment of this syndrome peri-operatively can quickly cause clinical deterioration[2]. Unfamiliarity with this rare condition (0.1–0.3% of population)[3] and difficult resuscitation in the prone position could further worsen outcomes. WPW poses a significant risk of adverse cardiac outcome. In a patient undergoing major surgery with limited physical access for resuscitation, conscientious preparation and a clear, succinct treatment algorithm could make the difference.

Methods/Results:

In accordance with local institutional guidelines, we obtained signed parental informed consent for the publication of this case report.

We report a 16 year-old girl with WPW and Down syndrome who underwent scoliosis surgery. She was subjectively asymptomatic after the first episode of tachyarrhythmia, had no electrophysiologic study done, and was not on antiarrhythmics. Her parents were counseled on the risk of tachyarrhythmias requiring electrical cardioversion and cardiopulmonary resuscitation. Adenosine and procainamide were made readily available pre-operatively. We instituted invasive haemodynamic monitoring post-induction and defibrillation pads were applied prior to prone positioning. Excessive increases in sympathetic or vagal tone were prevented. Surgery proceeded uneventfully. She had an uneventful recovery in the paediatric intensive care unit.

Discussion:

There have been case reports describing the peri-operative management of WPW, and American College of Cardiology-American Heart Association 2015 guidelines on the management of tachyarrhythmias in these patients. However, we were unable to find a succinct guide to intra-operative arrhythmias in WPW. These resources do not address the unique circumstance of our patient needing prolonged major surgery in the prone position. Unfamiliarity with WPW impacted the anaesthetic plan, a concern mirrored in a survey we conducted in our institution. We thus crystallized information in the literature to formulate an easy reference guide, and find that it would be useful to share our experience.

150828 - ERYTHROPOIETIN IN ACUTE PARAPLEGIC PATIENT: A CASE REPORT

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Introduction: The studies showedthat there are erythropoietin (EPO) receptors in neurons especially in the spinal cord. The central nervous system (CNS) also produces and releases EPO. Erythropoietin has been shown to have protective actions. We report a case of acute paraplegia due to spontaneous hematoma that responded well to EPO.

Case presentation: the patient signed an informed consent. A 27-year-old male patient presented himself with acute lower limbs paralisis and paresthesia. The Magnetic resonance imaging (MRI) showed massive spinal epidural hematoma with pressure on the spinal cord. He was candidate for emergency laminectomy and decompression surgery. On the third postoperative day, there are no changes in the patient‘s condition, and there was not any sign or symptom of lower limb muscle tone return. EPO (Aranesp 130 mcg/day SC three days) was started after the patient had been informed on benefits and risks. The patient recovered progressively after EPO therapy. After one week, the patient could walk by help. Two week after hospitalization, he could walk by cane, and he was transferred to rehabilitation center. One week later, he was discharged from rehabilitation center and returned to his home.

Discussion: Based on patient’s files, his problem was diagnosed as spontaneous spinal epidural hematoma. The muscle paralysis and paresthesia persisted for three days after surgery, and did not respond to routine management. After adding EPO, the muscle force and sensation returned progressively. Based on the studies, we believe that the EPO played an important role in improvement of the patient’s problems. Hematoma pressure over vessels induces ischemia and inflammatory substances release cause swelling and edema. Therefore, these events make a pathological cascade. EPO induces a broad range of cellular responses in the nervous system which could protect injury and accelerate the healing process. In hypoglycemia and hypoxia in-vitro studies, EPO has neuroprotective effects[1]. It has protective effects against oxidative damage, prevents neuronal apoptosis, and necrotic cell death[2,3]. Moreover, EPO attenuates excitotoxicity events in neuronal cultures. Vascular endothelial growth factor secretion stimulation, angiogenesis, and vascular integrity protection are the other tissue-protective mechanisms of EPO[4]. It showed that EPO stimulates vascular endothelial growth factor secretion, axonal regrowth, and dendritic sprouting[3]. In addition, neurotransmitter synthesis, neurotransmitter release, and

intracellular calcium storage are regulated by EPO [1].

A clinical trial showed that a single high dose of EPO has neuroprotection in post radiotherapy[5]. Even though, long-term EPO therapy has thrombotic events, a high single dose of EPO does not show any hematopoietic side effects. Other adverse consequences of EPO should be evaluated in clinical trials.

Conclusion: This case report draws the attention on the beneficial role of EPO in accelerating the neuron recovery and protection in hypoxia and metabolic stress. Future clinical studies are suggested.

References:

1- J Neurosurg Spine. 2006;4(4):310–8

2- Neurocrit Care. 2013;18(1):75–80

3- Eur J Clin Invest.2014;44(12):1230–8

4- J Neurosurg.2014;121(1):55–62

5- Clin Oncol (R Coll Radiol). 2007;19(1):63–70

150837 - GUILLIAN-BARRE HAND PAIN TREATED WITH INFRACLAVICULAR CATHETERS

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Introduction

Pain is a common feature of Guillian-Barré syndrome (GBS) and over a third of patients recovering from this acute illness suffer continued pain one year after GBS symptom onset [1].

This case report documents the novel management of a 56-year old woman with contractures and ongoing severe chronic pain in her hands following an acute episode of GBS. We present the use of brachial plexus catheters and ropivacaine infusion to facilitate hand therapy, decrease pain levels and improve hand function.

Methods

We obtained informed consent from the patient and local ethics committee chair approval to publish this case report. The patient received a left-sided infraclavicular brachial plexus catheter as an inpatient. This was sited under ultrasound guidance with the catheter tip placed adjacent to the posterior cord of the plexus. An initial bolus of ropivacaine was injected and infusion of 0.2% ropivacaine continued for 5 days. The patient received intensive daily hand therapy following which splints were applied to straighten the contractures. Each day before hand therapy, a further bolus of 0.375% ropivacaine was injected.

Four weeks later, the patient received the same treatment to the right side. This time she was treated as an outpatient with daily hand therapy and was fitted with a home infusion pump.

Results

The infraclavicular plexus catheters provided a complete pain blockade after local anesthetic bolussing which facilitated good progress with hand therapy. The infusion decreased pain levels significantly for the period of treatment although daily bolussing was required to facilitate optimal hand therapy.

Pain in the left hand after treatment was much improved, contracture reduced and importantly hand function significantly improved. This permitted the patient to complete many more tasks with this hand than before treatment. The right hand pain and function awaits review. Three month follow-up review is awaited and will be complete

by May.

The patient was very satisfied with her hand improvements during both catheter infusion episodes, especially with the home catheter treatment.

Discussion

Infraclavicular brachial plexus catheters have been previously used to treat Chronic Regional Pain Syndrome (CRPS) [2,3] although this is the first time to our knowledge they have been used to treat bilateral chronic hand pain secondary to GBS.
The pathophysiology of GBS chronic pain is likely to be from the damage caused to peripheral nociceptive nerves by acute demyelination. Similarly to Chronic Regional Pain Syndrome, there may also be changes to neuroaxial control mechanisms [4].
Brachial plexus catheter treatment and hand therapy for suitable patients with chronic upper limb pain as an outpatient avoids the expense of hospitalisation and is supported by the availability of inexpensive programmable portable pump systems.

References:

1. Neuromus Dis in Clin Prac (Textb) 2014. 28; 573- 603
2. Anaesthetist (German) 2002; 51:16-22.
3. Pain Med 2012; 13: 96-106
4. Pain Phys 2004; 7: 265-268

150890 - ASSESSMENT OF COUGH STRENGTH IN PATIENTS WITH TRACHEOSTOMIES

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Introduction:
5% to 15% of patients who require mechanical ventilation will require a prolonged time to liberate from mechanical ventilation. Most of these patients will require a tracheostomy. There are two major approaches to weaning. One is a gradual reduction in ventilator support. The other is the T-piece wean where patients are disconnected from the ventilator and allowed to breath spontaneously. The time off the ventilator is gradually increased until the patient is liberated. Neither method has been shown to be superior (1,2).

A recent study demonstrated that patients liberate more quickly when the tracheal cuff was deflated during spontaneous breathing trials. This was attributed to a decrease in airways resistance (3).

We postulate that tracheal cuff deflation may be beneficial by decreasing airways resistance and may also allow patients to cough more effectively.

Methods:
After Institutional Research board approval, patients with tracheostomies were consented for the study.

Baseline demographic information was collected.

Baseline measurements of respiratory strength were made including vital capacity and maximal inspiratory pressure.

Measurement of cough strength was done using an Air Zone Peak Expiratory Flow meter.

With the tracheostomy cuff inflated, the peak expiratory flow meter was attached to the tracheostomy tube. The patient was instructed to take as big a breath as possible and cough. This was repeated four times and the results averaged.

With the tracheostomy cuff deflated, a one-way valve was attached to the tracheostomy tube. The patient used a mouthpiece to connect to the peak expiratory flow meter. The patient was instructed to take as big a breath as possible and cough.

This was repeated four times and averaged.

Patients were randomized as to whether they started with the tracheal cuff inflated or deflated.

Each patient served as their own control. The values were compared using Student's T test. A p value < 0.05 will be considered significant.

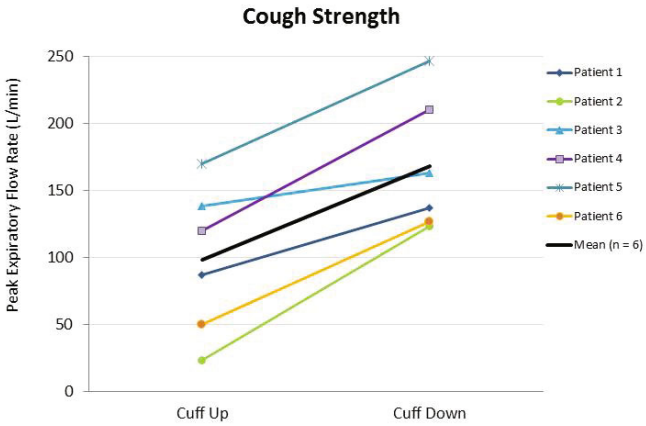
Results:
The study is in progress. Currently six patients have been studied.
All are male. The average age was 66 ± 9.6. At the time of study the patients had been on mechanical ventilation for 64 ± 20 days.
The average peak expiratory flow rate with the cuff inflated was 98.1 ± 55.5 l/min.
The average peak expiratory flow rate with the cuff deflated was 167.9 ± 50.3 l/min.
All patients had greater peak expiratory flow rates when coughing with the tracheostomy cuff deflated (Figure1).

Conclusions:
The study is ongoing but the preliminary results do indicate that patients can cough more effectively when using their glottis. Having a more effective cough may be another reason to wean patients with the tracheostomy cuff deflated.

References:

.1. *Respiratory Physiology & Neurobiology 2013;189, 377-83*
2. *Intensive Care Med 2014;40, 1449-59*
3. *Intensive Care Med 2013;39, 1063-70*

Figure 1


Cough Strength
Peak Expiratory Flow Rate (L/min)
250
200
150
100
50
0
Cuff Up
Cuff Down
Patient 1
Patient 2
Patient 3
Patient 4
Patient 5
Patient 6
Mean (n = 6)

150997 - PALPATION OF SLIDING CUFF TO ASSESS ENDOTRACHEAL TUBE LOCATION

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Introduction

Proper endotracheal tube (ETT) placement is paramount to care during general anesthesia, resuscitation, and intensive care services. Improper placement can lead to hypoxemia and death if left uncorrected. Proper ETT position entails placing the distal tip of the tube mid trachea while the head is in neutral position. We proposed that a specific palpation maneuver - an inflated ETT cuff moving caudally then rostrally following intubation - would enable detection of correct placement of the tip of the ETT within the trachea. This experiment was a proof-of-concept study of the efficacy of the above described palpation maneuver to detect proper ETT placement in comparison to current standards of measurement alignment with upper incisors.

Materials/Methods

Institutional Research Ethics Board approval, Health Region approval and informed consent from 31 patients were obtained. Patients who were ASA class I or II, physiologically stable, not involved with rapid sequence induction, not in respiratory distress and were safe in the attending anesthesiologist's opinion were recruited. Attending anesthesiologists, who had choice of anesthetic and intubation equipment, were instructed to intubate the trachea to the depth of their choice. They inflated the cuff on the ETT to a standard pressure of 25 cm H2O and were directed to palpate the trachea while the tube was advanced another 2 cm. If the cuff was not felt, the anesthesiologist slowly withdrew the ETT until the cuff was palpated midway between the crico-thyroid membrane and sternal notch. Bronchoscopy was used to measure intubation depth. Correct ETT tube placement within the trachea was considered to be more than 2.5 cm above the carina and more than 3 cm below the vocal cords. Furthermore, palpability of ETT cuff was rated between the categories: "not felt," "weakly felt" and "strongly felt."

Results

We recruited 12 men and 19 women with a mean age of 56.1 years (SD 15.05, range 24-82). The ETT cuff was strongly felt by investigators 97% of the time, affirming the ability to palpate the cuff within the crico-thyroid membrane to sternal notch area. No significant differences, using our criteria of correct placement, were found between our palpation method (right:wrong 30:1) and the current measurement methods (right:wrong 26:4; P = 0.19). No significant saves from endobronchial placements were observed.

Discussion

Our study demonstrates the ability of the proposed palpation maneuver to match the accuracy of current ETT depth accuracy methods. Although there were no significant saves from endobronchial placements, the ease of palpability and demonstrated efficacy make this a valuable tool for tube placement verification and education of tracheal surface anatomy.

References:
No references cited.

150998 - RCT OF CONTINUOUS PULSE OXIMETRY AND WIRELESS CLINICIAN NOTIFICATION

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Introduction: Respiratory depression is a serious perioperative complication associated with morbidity and mortality. Recently, technology has become available to continuously monitor patients on regular surgical wards with pulse oximetry and wireless clinician notification with alarms. When a patient's SpO_2 falls below a set threshold (e.g. 90%), the clinician is notified via a pager and may intervene earlier to prevent further clinical deterioration. To date, no randomized controlled trial (RCT) has evaluated this technology on a regular surgical ward.[1] We conducted a pilot RCT to assess the feasibility of implementing a wireless monitoring system to prevent post-operative respiratory depression in adult post-surgical patients.

Methods: The trial protocol was approved by the institutional ethics board. The study was conducted on two regular surgical wards at an academic teaching hospital. Adult surgical patients with an expected length of stay of 1 day or more were randomized to standard care or standard care plus wireless respiratory monitoring during this 24-week pilot study. The wireless monitoring notified the patient's nurse via pager if their SpO_2 decreased below 90%. The randomization sequence was computer-generated and allocation managed by a 24-hour call-in center. Blinding was deemed unfeasible given the intervention. Primary outcomes were average patient recruitment per week and tolerability of the monitoring system. Respiratory events were collected as a secondary outcome and this was defined as a composite of naloxone administration for respiratory depression, transfer to ICU, or cardiac arrest team activation. Other secondary outcomes included the number of alarms per week, the type of alarms, and the response to the alarm by the nursing staff. Data were analyzed by intention-to-treat.

Results: The trial enrolled and randomized 250 patients of the 335 screened for eligibility (CONSORT Flowsheet, Figure). Baseline demographics were similar between groups, except for more women in the wireless group compared to standard monitoring (75.8% versus 61.9%, respectively). Average patient recruitment per week

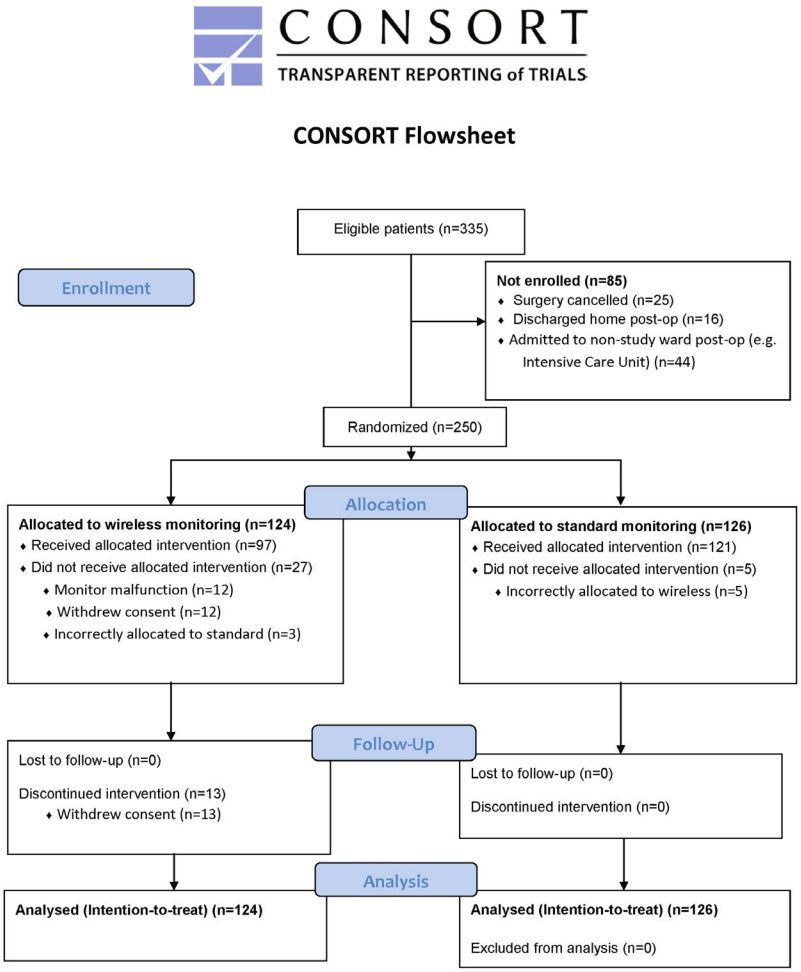
was 13.6 (95%CI 12.0-16.2) patients. The wireless monitoring was quite tolerable with 86.6% of patients completing the course of monitoring. With regard to secondary outcomes, the respiratory event rate was low with only 1 event in the wireless group (p=0.50). The average number of alarms per week was 4.0 (95%CI 1.6-6.4). The most common interventions used to resolve the decreased SpO_2 were applying oxygen, increasing the FiO_2, or encouraging deep breathing and coughing (76.8% of actions).

Discussion: This pilot study demonstrated adequate patient recruitment and high tolerability of the wireless monitoring system. A full RCT that is powered to detect patient important outcomes such as respiratory depression is now underway. Effective interventions to prevent respiratory depression will lead to safer perioperative care and improve patient outcomes.[1]

References:

[1]CochraneSysRev;2014;DOI:10.1002/14651858.CD002013.pub3

CONSORT Flowsheet



Flow diagram showing patient enrollment, randomization, and follow-up. No patients were lost to follow-up and all patients were included in the analysis.

151018 - ERAS: ARE WE MAKING THE MARK? A QUALITY IMPROVEMENT INITIATIVE

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Introduction: Enhanced Recovery After Surgery (ERAS) is a multimodal approach to enable faster recovery and fewer complications for patients having elective surgery[1]. Successful implementation requires a collaborative, multidisciplinary approach that empowers patients. Review of hospitals initiating ERAS programs showed the greatest benefit when centres consistently and cohesively followed a confirmed ERAS protocol[4,5]. Collaboration of healthcare disciplines was a key aspect to successful implementation, resulting in faster recovery and fewer complications for patients[3-5] . Specifically, the perioperative expertise of anesthesiologists plays a valuable role in improving ERAS[2,4]. Since ERAS was initiated at our institution, a formal audit has not been done. The study's aim is to evaluate the ERAS program for elective colorectal surgery patients at our institution through comparison with provincial averages. An ongoing goal of our study is to institute a multidisciplinary quality improvement initiative that aligns with the goals of the provincial ERAS Quality Based Procedures (QBP) for Colorectal Cancer Surgery.

Methods: REB approval was obtained. A retrospective review of all patients (n=94) undergoing elective colorectal surgery at our institution from January 2015 (the implementation of ERAS at our institution) to December 2015 was performed. Length of in-hospital stay (LOS) was the primary outcome. Patients were classified into four procedure categories: 1) laparoscopic colon, 2) open colon, 3) laparoscopic rectum and 4) open rectum. LOS was compared in each of these categories to provincial averages in 2013-2014.

Results: The mean LOS in days for each group is as follows: 1) Laparoscopic colon 6.13
+ 2.99, 2) open colon 6.38

+ 2.19, 3) laparoscopic rectum 7.20
+ 4.09 , and 4) open rectum 11.42
+ 6.72. The median LOS for each group is as follows: 1) Laparoscopic colon 5.0, 2) open colon 6.0, 3) laparoscopic rectum 5.0, and 4) open rectum 10.0. The provincial averages and median LOS in 2013-2014 as well as the QBP targets can be found in Figure 1.

Discussion: Our institution is not meeting ERAS provincial averages or the QBP targets for LOS, with the exception of open colon cancer surgeries. This is concerning given that cost associated with an extended LOS. Consequently, an ongoing multidisciplinary quality improvement initiative was initiated, targeting opportunities highlighted in the QBP clinical pathway. Interventions included educational grand rounds on fluid management to anesthesiologists, a multidisciplinary audit and feedback session, as well as technical interventions such as distinctive labeling of ERAS patients, updating automated order sets for ERAS patients, and ERAS checklists. Optimizing pain management perioperatively was also a major quality improvement initiative. Interventions involved all members of the healthcare team: anesthesiologists, surgeons, nurses, and physiotherapists. Results of these initiatives and its effect on LOS at our institution are being monitored in real-time.

References:

1. Varadha KK, Neal KR, Dejong CH, Fearon KC, Ljungqvist O, Lobo DN. The enhanced recovery after surgery (ERAS) pathway for patients undergoing major elective open colorectal surgery: A meta-analysis of randomized controlled trials. Clin Nutr 2010;29:434–40.

1. Eskicioglu C, Forbes SS, Aarts MA, et al. Enhanced recover after surgery (ERAS) programs for patients having colorectal surgery: a meta-analysis of randomized trials. J Gastrointest Surg 2009;13:2321-9.

1. Lassen K, Soop M, Nygren J, et al. Consensus review of optimal perioperative care in colorectal surgery: Enhanced Recovery After Surgery (ERAS) Group recommendations. Arch Surg 2009;144:961-9.

1. ERAS Compliance Group. The Impact of Enhanced Recovery Protocol Compliance on Elective Colorectal Cancer Resection: Results From an International Registry. Ann.Surg. 2015;261(6):1153-1159.

1. Simpson JC, Moonesinghe S, Grocott M, et al. Enhanced recovery from surgery in the UK: an audit of the enhanced recovery partnership programme 2009–2012. Brit. J. Anaesth. 2015 ;115 (4): 560–8

Figure 1

ERAS Figure 1 (Khemani *et al.*, 2016)

	Surgical Technique	Number of Cases Our Institution	Average LOS Our Institution 2015	Average LOS Provincial 13/14	Relative % Difference from Provincial Average	Median LOS Our Institution 2015	Median LOS Provincial 13/14	QBP Best Practice LOS
Colon	Laparoscopic	16	6.1	5.9	3.81	5.0	4.0	4
	Open	52	6.4	8.7	-26.61	6.0	6.0	6
Rectum	Laparoscopic	5	7.2	6.1	18.03	5.0	4.0	4
	Open	21	11.2	9.3	20.82	10.0	7.0	7

*LOS =Length of stay in hospital, in days

LOS Comparison - Our Institution to Provincial Averages and Median

151019 - ULTRASOUND USE FOR CENTRAL VENOUS CATHETER PLACEMENT

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Introduction

UK's National Institute for Clinical Excellence (NICE) published a guideline in 2002 recommending the use of 2-D ultrasound imaging during the insertion of elective Central Venous Catheters (CVC)[1].

Compliance with this guideline was reviewed in 2012. 54% of CVC insertions were performed using ultrasound imaging and the complication rate was 8.5%. As a consequence more ultrasound equipment was purchased in 2013 and a teaching course for trainees was introduced in 2014.

This study re-examines the compliance with the 2002 NICE guideline and seeks to determine if the new equipment and training has made an impact on patient safety.

Methods

A prospective audit of CVC insertion was performed after local ethics committee approval. Anaesthetic consultants and trainees were asked to complete a questionnaire following CVC insertion. The data was then collected and analysed on a spreadsheet.

Categorical data was tested for significance using Chi-Squared (complicance) and Fisher's Exact Test (complications).

Results

160 CVCs were inserted mainly in the cardiac operating rooms. All CVCs were placed in the internal jugular vein using aseptic technique. 91.3% (146/60) were elective cases the remainder in emergency.

Ultrasound use has increased significantly from 50% (61/122) in 2012 to 84% (122/46) in 2015 (P

Ultrasound was not used in 14% (23 cases) due to 'operator preference', 2% (3 cases) due to equipment non-availability.

There was no overall difference in the complication rate of 8.5% in 2012 and 8.1% in 2015 (14/163 vs 13/160). Subgroup analysis revealed a decrease in arterial puncture rate (6.7% in 2012 to 1.3% in 2015)(11/163 vs 2/160).

The two arterial punctures that occurred both occurred *with* ultrasound use: one noted by a trainee, the other by a consultant.

Discussion

The use of ultrasound has significantly increased for elective cases from 54% in 2012 to 84% in 2015 for elective cases. 'Operator Preference' remains the most commonly cited reason for landmark CVC technique.

Ultrasound guided CVC insertion 24/2009 (1.6%) has been demonstrated in a large meta-analysis to have a significantly lower arterial puncture rate than landmark guided technique 196/2018 (9.7%)[2]. Our ultrasound placement results are similar these rates.

Arterial puncture remains the most serious of complications of CVC insertion if unrecognised and it is import to deliver this intervention in the safest possible manner.

Operators maintaining their landmark technique can improve success and safety by considering the use if a pre-scan/ surface marking technique. It is the authors' recommendation that if clinicians wish to maintain their landmark-guided CVC placement skills and ultrasound is available, then the prescan technique is appropriate[3].

References:

1. NICE guideline Sept 2002 https://www.nice.org.uk/guidance/ta49

2. Anesth 2013 118(2): 361–375

3. J Am Soc Echocardiogr 2011 24: 1291-318

151022 - SPEAKING VALVE TRIALS FOR WEANING FROM MECHANICAL VENTILATION:

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Introduction:
5% to 15% of patients who require mechanical ventilation (MV) will require a prolonged length of time to liberate from MV. The Intermediate Intensive Care Unit (IICU) is a 6-bed unit for patients requiring prolonged weaning. All patients have tracheostomies. Traditional weaning strategies have involved reduction of pressure support ventilation or gradual increase of T-piece breathing (1-3).
Successful weaning is defined as liberation from MV for > 48 hrs.

Objectives:
This report describes a variation of T-piece weaning entitled a speaking valve trial (SVT).

T-piece weaning occurs when the patient is disconnected from all ventilator support and allowed to breathe spontaneously for gradually extended periods of time. The tracheostomy cuff is kept inflated and supplemental oxygen is delivered.

With an SVT, the patient is disconnected from the ventilator, the cuff is deflated and a one-way valve is attached to the tracheostomy tube.

Inspiration occurs through the pharynx and the tracheostomy tube. Expiration occurs around the tracheostomy tube, through the glottis, enabling the patient to vocalize. The time off the ventilator is gradually increased until the patient is liberated.

Methods:
After local ethics board approval, patients admitted to IICU in 2013 and 2014, were identified. The charts were then reviewed and data extracted concerning the use of SVTs.

Results:
In 2013-14, 48 patients were admitted to IICU with an average LOS of 110 days.

16 patients (9 males, 5 female) had SVTs. Data on these patients is shown in Table 1. The average duration of MV was 89 days. The patients had SVTs for 25% of their time on a ventilator, during which the patient was able to speak and communicate.
Three patients died in hospital. Two patients relapsed after being weaned requiring MV.Two patients were transitioned to long-term ventilator support.

Conclusion:
SVTs were successfully used in a diverse group of patients requiring prolonged weaning. All patients had evidence of respiratory muscle weakness as shown by the first recorded VC and MIP. There was no formal protocol regarding the initiation of SVTs.

The major barrier to deflation of the tracheostomy cuff is the risk of aspiration, which must be assessed on an individual basis (4).

The over-riding observation of the IICU team was that the ability to speak, was of enormous psychological benefit to patients and families.

With more experience, SVTs have been initiated earlier in the weaning process, starting with 5 minute trials. The patients appreciate the ability to speak, even for these short periods and are eager to participate and progress.

We plan to initiate a protocol for patients with SVTs.

References:

1. Respiratory Physiology & Neurobiology 2013;189, 373-83
2. Intensive Care Med 2014;40, 1449 –59
3.Cochrane Database Sys Rev. 2014 May 27;5
4. Intensive Care Med 2013;39, 1063-70

Table 1

Age	51.7 years [19 to 75]
Duration of MV	89.1 days [32 to 207]
Time to tracheostomy	18.9 days [7 to 51]
Time to initial SVT	68.8 days [19 to 168]
Time from SVT to liberation from MV	18.9 days [3 to 45]
Duration of initial SVT	253 minutes [5 to 720]
First recorded vital capacity (VC):	830 mls [150 to 1800]
First recorded maximal inspiratory pressure (MIP):	-19 cm H_2O [-6 to -40]

Data is reported as Mean [Range]

Data is reported as Mean [Range]

151037 - TYPE OF ANESTHESIA AND TRANS-CATHETER AORTIC VALVE IMPLANTATION

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Introduction

The purpose of this study was to compare postoperative outcomes after general anesthesia (GA) with tracheal intubation and conscious sedation [1,2,3] with dexmedetomidine in patients undergoing trans-femoral trans-catheter aortic valve implantation (TAVI) procedures. We hypothesized that conscious sedation with dexmedetomidine would be a non-inferior anesthetic modality compared to historical controls with GA approach[4,5].

Methods

After the Research Ethics Board approval, a prospective cohort of 50 consecutive patients undergoing trans-femoral TAVI under conscious sedation with dexmedetomidine (DEX group) were matched by age and sex on 1:1 basis with 50 historical controls receiving general anesthesia (GA group)[6]. In the GA group, anesthesia was induced with fentanyl 1-3mg/kg, and propofol 0.5-2mg/kg. Tracheal intubation was facilitated with rocuronium 0.6mg/kg. Anesthesia was maintained with isoflurane 0.5-2.0%, or sevoflurane 1.5-2.5%[1]. In DEX group, patients received dexmedetomidine bolus 0.4-1μg/kg over 10-20min followed by an infusion 0.5-1.4μg/kg/h until the end of procedure. Transesophageal and transthoracic echocardiography were utilized in GA and DEX groups respectively. Both groups were compared with respect to demographic data, past medical history, medications, surgical characteristics, postoperative morbidity and mortality, and length of hospital stay. Statistical analysis was performed on the intent-to-treat basis. $P < 0.05$ was considered statistically significant.

Results

Both groups were similar with respect to demographic data and surgical characteristics. Four patients in DEX group were converted to GA during the TAVI procedure. All patients in GA group were extubated in the operating room (OR). The OR times were 133 ± 42min in DEX group vs 158 ± 41min in GA group, p=0.0036. There was no difference with respect to postoperative morbidity and mortality between the two groups. (Table) The median difference in hospital length of stay was 2 days favoring DEX group, however, this difference did not reach statistical significance, p =0.07.

Conclusions

Conscious sedation with dexmedetomidine resulted in a non-inferior anesthetic modality compared to historical controls with general anesthesia approach. Potential benefits included shorter OR times and expedited hospital discharge.

References:

1 - J Cardiothorac Vasc Anesth 2014 8: 285-289
2 - Cardiovasc Revasc Med 2012 13: 207-210
3 - Minerva Anesthesiol 2010 76:100-108
4 - Anaesthesia 2011 66: 977-982
5 - Hellenic J Cardiol 2010 51: 492-500
6 - Catheter Cardiovasc Interv 2008 72: 1012-1015

Post Operative Morbidity and Mortality

Postoperative Morbidity and Mortality

	DEX Group (n = 50)	GA Group (n = 50)
Myocardial Infarction	1 (2)	1 (2)
Stroke/Transient Ischemic Attack	1 (2)	1 (2)
Highest creatinine, mmol/L	104 [55, 311]	103.5 [65, 576]
Dialysis	1 (2)	2 (4)
Delirium	3 (6)	5 (10)
Hospital length of stay, days	5 [1, 64]	7 [2, 41]
Death	0 (0)	1 (2)

Data expressed as number of patients (%), and median [range].

Table

151073 - LABETALOL AND TIME TO DISCHARGE IN LAPAROSCOPIC CHOLECYSTECTOMIES

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Introduction: Abdominal insufflation during laparoscopic cholecystectomy produces a profound sympathetic response resulting in elevations in heart rate (HR) and mean arterial pressure (MAP). Intraoperative management often includes opioid boluses but this may lead to opiate related side effects. Studies have shown that an opioid sparing technique with the sympatholytic esmolol can effectively control intraoperative hemodynamics and improve postoperative outcomes[1,2]. We evaluated whether labetalol could effectively maintain intraoperative HR and MAP and whether labetalol would be as effective as esmolol at improving postoperative outcomes compared to fentanyl.

Methods: Local ethics committee approval was obtained and all patients provided written informed consent prior to study enrollment. One hundred and seven ASA class I-II patients undergoing elective ambulatory laparoscopic cholecystectomy at an academic hospital were randomized to one of 3 double blinded groups for management of increased intraoperative HR or MAP over 20% of baseline: 1) IV fentanyl bolus 50 mcg q5 min., 2) IV labetalol bolus 5 mg q5 min. or 3) IV esmolol bolus 0.25 mg/kg followed by a titrated infusion of 5-15 mcg/kg/min. Time from arrival in post-anesthesia care unit (PACU) to readiness for discharge was recorded as the primary outcome. Secondary outcomes included intraoperative and PACU hemodynamics (HR, MAP), total PACU fentanyl requirements, time to first PACU analgesia, the incidence and management of postoperative nausea and vomiting (PONV) and pain scores. Pain was assessed with the Visual Analogue Pain Score (0=no pain, 10=worst pain) and the incidence and treatment of PONV was assessed at 5, 30 and 60 minutes post-arrival in the PACU. Patient satisfaction scores (1= most satisfied, 5=dissatisfied), prescription analgesia requirements and pain scores were recorded at 24 hours.

Results: The following are preliminary *blinded* results of the 107 patients enrolled out of the target of 141 (table 1). No treatment was required for intraoperative or PACU

hypotension or bradycardia following administration of study drugs. Patient satisfaction at 24 hours was equivalent for each group (1.5/5).

Discussion: The preliminary blinded results demonstrate a safe protocol for the three medication groups. We hope the final results of this study will expand on the potential benefits of beta-blockers for managing intraoperative sympathetic stimulation and specifically identify the utility of labetalol. Labetalol may more effectively control intraoperative hypertension given additional activity at alpha adrenergic receptors, is easier to administer since does not require an infusion, and is less expensive than esmolol.

References:

1. Ambulatory Anesthesiology 2007 105(5):1255-62
2. Acta Anaesthiol Scand 1998 42:510–7

Table 1: Preliminary blinded results for currently enrolled patients (N=107)

Variable	Group A (n=36)	Group B (n=35)	Group C (n=36)
Time to discharge (min)	132	129	139
Time to PACU discharge readiness (min)	43	46	50
Time to first PACU fentanyl (min)	15	21	17
Total PACU fentanyl (mcg)	77.2	59.3	59.0
Pain scores at rest (#/10)			
PACU arrival (t=0 min.)	2.8	2.1	2.6
t=30 min.	4.4	3.0	3.7
t=60 min.	3.5	3.1	3.2
t=24 hr.	3.1	2.4	3.1
Incidence PONV (%)			
PACU arrival (t=0 min.)	25	37	8
t=30 min.	22	37	14
t=60 min.	22	29	6
PONV treatment (% required)			
Dimenhydrinate	16.7	28.6	2.8
Metoclopramide	38.9	54.3	25.0
Opiate use at 24 hr. follow-up (# patients prescribed [mean # pills taken])			
No medication used (%)	16.7	14.3	5.6
Tylenol#3	3 [3.7]	5 [4.8]	5 [7.2]
Morphine 5 mg tab	1 [3.0]	3 [4.2]	---
Morphine 10 mg tab	---	---	---
Oxycodone 5 mg tab	2 [4.5]	2 [6.0]	1*
Oxycodone 10 mg tab	4 [3.3]	1 [2.0]	2 [6.0]
Percocet	17 [4.4]	17 [5.4]	22 [4.1]
Hydromorphone 1-2 mg tab	---	1 [4.0]	2 [4.5]

* number of pills taken not recorded

151130 - 3D-PRINTED PEDIATRIC DIFFICULT AIRWAY FOR TEACHING INTUBATION

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Introduction:
The management of congenital difficult airways in children poses unique challenges to anesthesiologists and their trainees. These cases are often by very experienced anesthesiologists who use advanced technics including flexible fiberoptic intubation (FBI) and are still presented with challenging clinical scenarios. A small proportion of these patients have required ‘crash’ tracheotomies due to failed mask ventilation or even failed fiberoptic intubation. We sought to use a case to create a 3D print of a difficult airway to evaluate for education.

Method:
After obtaining patient and parental consent we used old images previously obtained from a 3D helical CT at 2.5 mm of the pediatric airway from apex of skull to C5. Segmentation was done with Amira Visualization RT using Thresholding and Gaussian techniques for the initial 3D model creation. Smoothing done both manually and with embedded Smoothing algorithms. Isolation of the upper airway and hyoid was accomplished resulting in a printable model of a difficult airway.

Results.
We have successfully created a 3D printed model of a difficult airway in a pediatric patient (See Fig 1). The model is real life size and allows for practice of fiberoptic bronchoscupe. We have also created a novel algorithm and process for the creation from CT/MRI of 3D model of the airway.

Discussion
The creation of virtual 3D models is feasible and needs more work to identify processes that can efficiently replicate the process to yield good models for both virtual 3D and 3D printing. Our work will aim to create a library of 3D airways for use in future prospective studies assessing teaching/clinical outcomes from the use of these models. We have identified challenges from this case report and will use the data to inform future prospective studies.

References:

1. Fullerton JN, Frodsham G, Day RM. 3D printing for the many, not the few. Nature biotechnology. 2014.

Figure 1

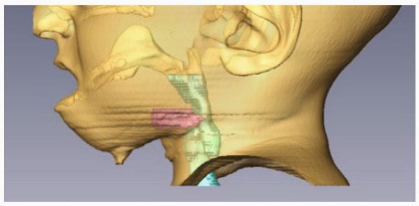

Fig1a. Initial overlay of airway

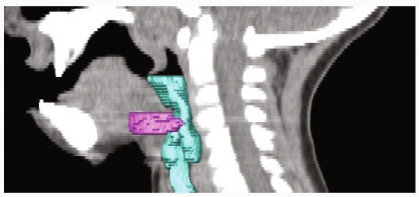

Fig1b. Segmentation of airway

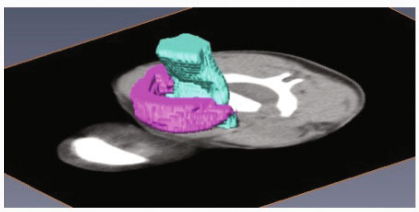

Fig1c. Extruded segment of airway

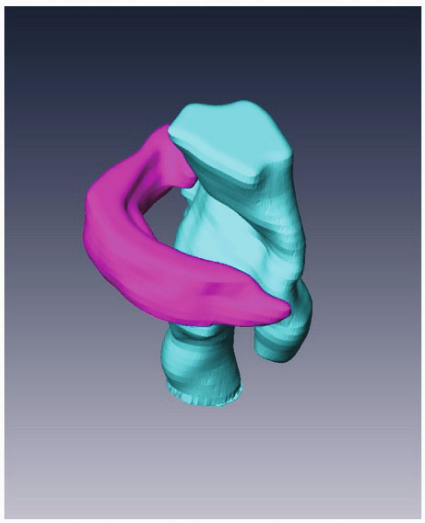

Fig1d Virtual 3D model of a difficult airway for printing

151137 - A NOVEL USE OF BETA-BLOCKERS TO REDUCE POSTOPERATIVE PAIN

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Introduction

Postoperative pain is an important factor that determines the overall quality of recovery after surgery[1]. Beta-blockers have been used as a non-opioid adjuvants to improve postoperative pain. A systematic meta-analysis review was performed to evaluate the effect of intraoperative beta-blockers usage on postoperative outcomes.

Methods

Three databases (Medline, Embase, and the Cochrane Controlled Trials Register) were searched to identify randomized controlled trials that evaluated the effects of beta-blockers on postoperative pain outcomes compared with a control group. Studies were evaluated based on the *Validity and Inter-Rater Reliability Testing of Quality Assessment Instruments*[2]in the Cochrane's Handbook. The aim of the meta-analysis was to assess the postoperative opioid consumption, the postoperative pain score, the incidence of nausea and vomiting, the use of antiemetic medication, the length of hospital stay, and hemodynamic complications.

Results

Five studies were selected. A total of 130 patients received intraoperative esmolol. There was a significant reduction in postoperative opioid consumption in the esmolol group (MD: -8.55 mg; 95% CI -12.31, -4.79 mg). Furthermore, there was also a reduction in the incidence of nausea and vomiting (OR: 0.31; 95% CI 0.18, 0.54), and length of stay in the recovery room (MD:-24.7 minutes; 95% CI -52.6, 3.2 minutes). There was no significant difference in postoperative pain score (MD:-0.49; 95% CI -1.35, 0.37). There was no increase in the incidence of hemodynamic complications.

Conclusion

The use of a continuous beta-blocker infusion during surgery decreased postoperative opioid consumption, the incidence of nausea and the length of stay in the recovery room with little side effects.

References

1. De Oliveira GS, Jr., Fitzgerald P, Streicher LF, Marcus RJ, McCarthy RJ. Systemic lidocaine to improve postoperative quality of recovery after ambulatory laparoscopic surgery. *Anesthesia and analgesia.* 2012;115(2):262-267.

2. Higgins JPT GS. *Cochrane Handbook for Systematic Reviews of Interventions Version 5.1.0.* 2011.

151155 - PREDICTING AND MANAGING THE MORBID OBESITY DIFFICULT AIRWAY (MODA)

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Introduction:
Fiberoptic intubation (FOI) is now performed very infrequently in morbidly obese (MO) patients undergoing elective surgery. Prior to the introduction of videolaryngoscopy, the need for FOI had been estimated at 5-10% [1]. Since then others have estimated the need for FOI to be in the 1-5% [2]. The objectives of this study were to review the literature for predictors of difficult airway (DA) in MO, report its described management and comment on the pharmacology of MODA.

Methods:
Using specific keywords for predictors, management and pharmacology of Difficult Airway (DA) in Morbid Obesity (MO), we performed a search of peer reviewed literature. Using expert opinion and the Delphi technique, we sought to develop consensus for a DA prediction rule specific to MO. We then revised and redeveloped an existing DA algorithm for anticipated difficult airway and customized it with modalities specific to MO.

Results:
We identified multiple predictors of MODA in our search of the literature. Based on our findings and expert opinion, we propose a simple algorithm that incorporates the predictors and management of the MODA in Figure 1.

Discussion:
In the general population, MO was/ is frequently identified as a predictor of anticipated DA [1]. Now extensive experience suggests that in MO other predictors are required to identify patients requiring advanced airway management strategies [3]. Conventional DA algorithms suggest that supraglottic devices and surgical airways are both effective ´rescue´ techniques in certain situations where an unanticipated DA is encountered [4]. Experience in MO suggests that alternative management strategies are required in MODA [5]. Also important is the choice, dose and technique of drugs administered during DA management [6]. The avoidance of succinylcholine and judicious use of propofol, remifentanil and/ or dexmedetomidine can improve the safety, success and outcomes in MODA. While further research and expert opinion are required to standardize the MODA, this preliminary work may be an important first step in this direction.

References:

1. J Clin Anesth 2009 21: 348-51

2. Minerva Anestesiol 201177: 1011-7

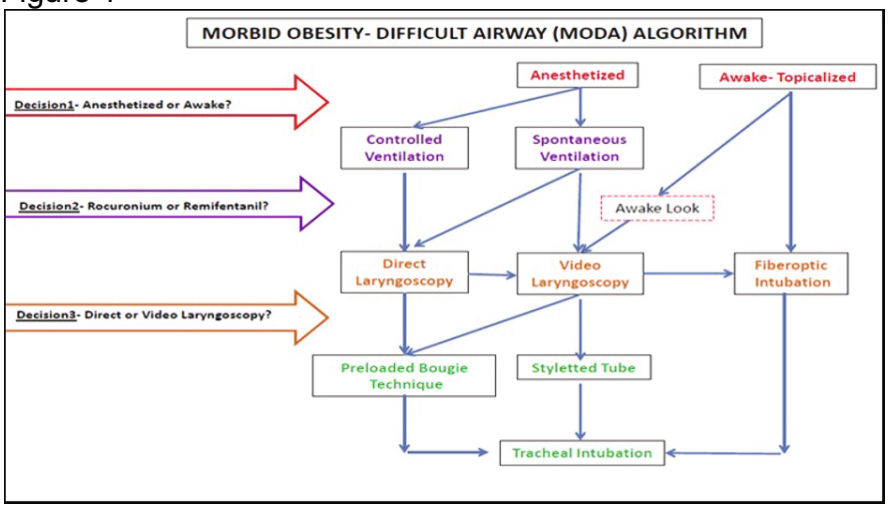
3. Surg Obes Relat Dis 2013 9: 344-9

4. Br J Anaesth 2015 115: 827-48

5. Anaesthesia 2014 69: 515-6

6. Anesthesiol Res Pract 2012: 753107

Figure 1



A practical algorithm that incorporates the predictors and management of DA in MO

151189 - EFFECT OF CLONIDINE ON BLOOD GLUCOSE LEVEL DURING CHOLECYSTECTOMY

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Introduction: Perioperative hyperglycemia in type 2 diabetes patients increases the risk of complications. An improvement in glycemic control has been found to have improved perioperative outcome.[1] Several interventions have been studied to reduce hyperglycemia due to perioperative stress e.g. anxiolytic drugs, β-blockers, perioperative fluid therapy with enough glucose to avoid undue catabolism, epidural blocks along with various adjuvant e.g. fentanyl, clonidine.[2,3]This study was performed to ascertain the efficacy of intravenous clonidine in reducing hyperglycaemia in type 2 diabetic patients undergoing laparoscopic cholecystectomy.

Methods: In this prospective, randomised, double blinded placebo control study; 100 ASA grade 1 and 2 patients scheduled for laparoscopic cholecystectomy under general anaesthesia were enrolled after institutional ethics committee approval. Patients were divided into 2 groups of 50 each and received the designated medication made in 5 ml of normal saline (NS) as infusion over 15 min, prior to induction of anaesthesia. Group 1 (clonidine): received intravenous clonidine 3mcg/kg; Group 2 (Control): received normal saline. Blood glucose levels (BGL) were measured before induction of anaesthesia, every 30 minutes intra-operatively and thereafter at hourly intervals postoperatively for 2 hours. Total amount of insulin administered during the study duration was recorded along with the intensity of pain, shivering and nausea.

Results: The mean BGL (mBGL) was compared and was found to be lower in the clonidine group after drug administration, intra-operatively at 60 min and postoperatively at 1 and 2hour. (Table1). The mean insulin requirement during the study period was significantly lower in the clonidine group (12.7±8.0 IU) as compared to the control group (21.0±6.7) ($P < 0.05$).

Discussion: Clonidine administration in peri-operative period has been found to significantly decrease stress induced plasma cortisol levels.[4]The combined effects of decreased catecholamines and cortisol may be the mechanism behind the significantly better glycemic control with decreased intraoperative insulin requirement in type 2 diabetes mellitus patients undergoing ophthalmic surgery under GA.[5]
This study extends the application of observation of Belhoula et al to a different group of patients i.e. diabetes mellitus patients undergoing laparoscopic procedure under

general anaesthesia and also studies the use of clonidine as an analgesic, anti-shivering and antiemetic adjuvant drug. In this study we found that intravenous Clonidine in dose of 3mcg/kg administered just before induction of anesthesia was able to significantly lower the BGL and also has the potential to decrease pain, shivering and nausea in the perioperative period. To conclude premedication with intravenous clonidine 3mcg/kg in type 2 diabetes mellitus patients undergoing laparoscopic cholecystectomy reduces peri-operative BGL and insulin requirement. It is also associated with better hemodynamic control during laparoscopy along with reduced incidence of pain, shivering and nausea in the postoperative period.

References:

1. Ann 2013; 257(1):8-14.

2. BJA 1990; 65:628-32.

3. Anesthesia Analgesia 2006; 103(2):297-302.

4. Metabolism1983; 32: 568-570

5. BJA 2003; 90:434-439.

Comparison of the mean BGL between the two groups during study interval

Table 1: Comparison of the mean BGL between the two groups during study interval. * denotes P<0.05.

	Mean BGL in clonidine group (mg%)±SD	Mean BGL in placebo group (mg%)±SD	P- value
Baseline	124.3±20.1	116.9±22.2	0.075
After drug administration	142.4±32.8	133.7±15.0	0.003*
30min	181.4±37.1	185.7±22.3	0.171
60min	179.3±31.1	210.7±30.5	0.000*
90min	194.3±31.6	211.0±17.6	0.054
1st postop hour	176.6±29.2	230.4±25.7	0.000*
2nd postop hour	184.0±29.0	232.41±21.1	0.000*

151285 - TRANEXAMIC ACID USE DURING ON-PUMP CARDIAC SURGERY IN CANADA

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Introduction:

Perioperative bleeding is a well-recognized risk of cardiac surgery, particularly in procedures requiring cardiopulmonary bypass (CPB).[1] 50% of patients undergoing cardiac procedures will require a blood transfusion,[2] which is associated with increased morbidity and cost.[2] Tranexamic acid (TXA) is commonly administered during CPB procedures, as its use has been shown to reduce bleeding and mortality.[3] However, an optimal dosing regimen, timing or mode of administration has not been described. Significant heterogeneity exists in the literature and little is known about current practice among cardiac anesthetists in Canada.

Methods

Local ethics approval was obtained. A contact from each university with a medical school was asked to identify all affiliated hospitals performing cardiac surgery. Departments at each hospital were contacted and the number of faculty engaged in cardiac anesthesia was obtained. All cardiac anesthetists working in academic hospitals were included; residents, fellows and anesthetists working in community hospitals were excluded. A survey regarding TXA timing, dose and mode of administration, as well as participant demographics was distributed. A modified Dillman approach was used in survey design and dissemination.[4] The survey will be closed to responses February 1, 2016 but preliminary response data is described.

Results

To date, 217/343(63.3%) of identified cardiac anesthetists have participated. 86.2%

give TXA to all patients while 13.8% give it to some but not all. Most (67.3%) administer it as an infusion after a bolus; other modes include infusion (4.1%), a single bolus (12.5%), 2 or more boluses (12.5%) or another regimen (3.2%). The majority (95.9%) initiate TXA at some point prior to CPB while 4.1% administer it on or after bypass. Multiple factors influence dose administered including: patient weight (72.4%), length of procedure (28.6%), estimated risk of bleeding (27.6%), local practice (32.3%), and published evidence (33.6%). Of those who give TXA as an infusion after a bolus, doses vary widely. They range from 10-50mg/kg bolus followed by a 1-16mg/kg/h infusion when using weight-based dosing.

Discussion

Initial response rates have been excellent.[4] There is substantial heterogeneity in the dosing and administration of TXA to patients undergoing cardiac surgery. Practitioners most commonly identify patient weight as influencing dose given. Initial inspection of survey results suggests that practice is highly regionalized. Once data collection is complete, multiple linear regression will be used to identify participant and practice variables associated with mode of administration and dose given. Final analyses will be used to inform a systematic review and meta-analysis evaluating dose response relationship.

References:

References

1. *NEJM* 2013;368(13):1179-1188.

2. *Circ Cardiovasc Qual Outcomes* 2009;2(6):583-590.

3. *BMJ.* 2012;344:e3054.

4. Dillman DA, Smyth JD, Christian LM, Dillman DA. *Internet, mail, and mixed-mode surveys : the tailored design method.* 3rd ed. Hoboken, N.J.: John Wiley & Sons; 2009.

151293 - MASSIVE TRANSFUSION PROTOCOL AND CLINICAL OUTCOMES IN PPH

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Introduction: Over the past decade, Massive Transfusion Protocols (MTP) have been developed and proposed to advance the severe postpartum hemorrhage (PPH) management. MTPs main goal is to synchronize surgical, anesthesia, laboratory and blood bank responses in an immediate and sustainable manner. The MTPs clinical impact in obstetrics is yet to be determined. This study was undertaken to compare the massive transfusion management and clinical outcomes in a labor and delivery unit where MTP is implemented (MTP+) to a labor and delivery unit where no MTP is implemented (MTP-).

Methods: After obtaining Local Research Ethics Boards approval, Health Record archives of two centres with more than 4000 deliveries a year, were approached to identify all hospitalization of patients that required at least 5 units of red blood cell (RBC) transfusion in the first 24 hours after delivery. In one centre, a specific obstetrical MTP was implemented and running (MTP+) and in the MTP- centre, no MTP was in place. The sampling method was a convenient one including all consecutive obstetric patients between September 2010 and January 2015. The period of time was chosen to comprise the period since when the MTP was implemented at the MTP+ centre. Demographic, Obstetrical, management data (hysterectomy, tranexamic acid usage, transfusion profile: number of units and FFP:RBC ratio) and outcomes (48 hours survival; mechanical ventilation, length of stay in ICU and hospital; sepsis, acute renal failure; acute respiratory distress syndrome and multiple organ failure) were extracted retrospectively from patient hospital records. *Statistical analysis:* Student *t* and Chi-square tests were applied when appropriate (SPSS V20 package; statistical significance at $P < 0.05$).

Results: The main results are presented in Table 1. The 48 hours survival rate was 100% in both centres.

Discussion: Considering the massive transfusion management, the main finding was that the frequency of tranexamic acid administration was significantly higher in the MTP+ centre (P=0.003). Of note, both centres presented low FFP:RBC transfusion ratio (below 0.5). In the MTP+ centre patients stayed longer in hospital but shorter in ICU (P=0.008 and P < 0.001, repectively). As it is a retrospective study, report bias and cofounding factors cannot be ignored. Massive Transfusion in Obstetric is an important but rare event. Larger multicentre studies are warranted to determine the MTP clinical impact in obstetrical settings.

References:

References: **1)** The Journaul of trauma 2010;68(6):1498-1505. **2)** IJOG 2012;21(3):230-5. **3)** AJOG 2013;209(5):449 e441-7. **4)** JOGC 2014;36(1):21-33. **5)** Transf 2014;54(7):1756-68. **6)** Lancet 2014;384(9947):980-1004.

Table 1. Demographic, obstetrical, management and outcomes data (mean± standard deviation/frequencies)

	N	MTP+ 21	MTP- 20	
Demographic data	Maternal age (years)	30±7.5	31.1±7.8	
	Primipara	12 (21)	9 (21)	
	BMI (Kg/cm2)	28.03±4.5	26.97±3.9	
Obstetrical Data	Severe Pregnancy Inducted Hypertension	1 (21)	1 (20)	
	APH	**10 (21)**	**5 (20)**	***P=0.001****
	cesarea delivery	10 (21)	15 (20)	
	induction of labor	6 (21)	7 (20)	
	abnormal placentation	6 (21)	5 (20)	
	placental abruptio	4 (21)	3 (20)	
	chorioamnionitis	2 (21)	2 (20)	
Management Dat	Hysterectomy	8 (21)	9 (20)	
	Tranexamic acid	**12 (21)**	**2 (20)**	***P=0.003****
	RBC 24h (units)	9.05±4.15	10.45±3.73	
	FFP 24h (units)	6.40±4.29	4.26±2.28	
	Platelet 24h (units)	**2.07±1.14**	**1.15±0.67**	***P=0.008****
	FFP:RBC ratio	0.41±0.34	0.38±0.17	
	Cryoprecipitate 24h (pool)	1.69 ±0.63	1.27 ±0.65	
Outcomes	mechanical ventilation (hours)	11.75±8.78	13.53±9.55	
	LOS ICU (hours)	**23.38 ±.10.4**	**42.85 ±19.41**	***P<0.001****
	LOS Hospital (days)	**12.57 ±13.39**	**7.65 ±4.68**	***P=0.008****

APH = antepartum hemorrhage; 24h = transfusion within 24hours after delivery; LOS = length of stay

151368 - EFFECT OF ANTITHROMBOTIC AGENTS ON SURGICAL TIMING AFTER HIP FRACTURE

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Introduction: Numerous studies have shown that patients with acute hip fractures suffer increased morbidity and mortality if their surgery occurs longer than 48 hours after presentation to the Emergency Department (ED).[1,2] Managing patients using anticoagulant and antiplatelet medications may result in delays for surgery following hip fractures. However, there is sparse evidence in the literature delineating reasons for surgical delays and outcomes, despite a rising number of our elderly patients taking these medications.[3]

Methods: Following institutional ethics board approval, a retrospective chart review was conducted on 427 consecutive patients presenting to the ED with suspected hip fracture at a tertiary care teaching hospital between January 2014 and November 2015; of these, 394 had a primary presentation of hip fracture and were managed operatively. Information was collected regarding patient demographics, medications, comorbidities, perioperative investigations and management, operative and anesthetic details, and acute length of stay (LOS). Multivariate linear regression analysis was used to determine the contribution of individual factors to two primary outcomes: time to surgery (TTS) and acute LOS.

Results: Prior to ED presentation, 25% (99/394) of patients were taking warfarin (41/394), a novel oral anticoagulant (NOAC) (20/394) or non-ASA antiplatelet medication (38/394). Mean TTS from ED presentation for all participants was 34.5 hours. Surgery was delayed more than 48 hours in 21% (84/394) of patients, while an additional 20% (80/394) had surgery between 36 and 48 hours. Patients on warfarin and NOACs had a longer TTS compared to those not on an anticoagulant (46.1h and 43.2h vs 32.5h) (Table 1). Patients taking non-ASA antiplatelet agents did not have a significant increase in TTS. Multivariate analysis revealed a significant association between increased TTS and warfarin use (8.0h longer, 95% CI 1.4-14.6, p=0.017). However, the increased TTS did not maintain significance on multivariate analysis for NOACs (7.3h longer, -1.5-16.2, p=0.077), likely due to the small numbers. Mean acute LOS for all participants was 8.5 days. The need for a postoperative transfusion was associated with an increased acute LOS on regression analysis. Preoperative warfarin reversal patterns showed uniform usage of an initial Vitamin K dose but variable use of prothrombin complex concentrates, plasma, and additional Vitamin K.

Discussion: In this retrospective review, patients taking warfarin preoperatively were shown to have increased TTS. Despite recognized guidelines detailing timely INR reversal protocols,[4] those taking warfarin still experienced significant delays. Interestingly, those patients on NOACs did not wait longer than those on warfarin, even though there is no optimal reversal agent. There is opportunity to improve our management of warfarin reversal to minimize delays in TTS and subsequent increased morbidity and mortality.

References:

1. PLoS One 2012 7: e46175
2. Can J Anesth 2008 55: 146-154
3. Clin Geriatr Med 2014 30: 219-227
4. Can J Anesth 2015 62: 634-649

Surgical timing of hip fracture patients on anticoagulants and antiplatelets

Table 1: Factors associated with time to surgery and acute length of stay

Preoperative Medication	Time to Surgery (hours)		Acute Length of Stay (days)	
	Univariate Analysis (95% CI)	Multivariate Analysis Additional hrs; 95% CI, p value **compared to baseline time of 34.2hrs	Univariate Analysis (95% CI)	Multivariate Analysis Additional days; 95% CI, p value
Warfarin n=41	46.1 (39.7-52.5)	8.0; 1.4-14.6, p=0.017	9.1 (7.0-11.2)	
NOAC n=20	43.2 (34.8-51.5)	7.3; -1.5-16.2, p=0.077	7.3 (5.5-9.1)	
No anticoagulation n=333	32.5 (30.2-34.7)		8.5 (7.9-9.2)	
Antiplatelet agent - clopidogrel n=33	36.2		10.8 (7.8-13.8)	
Antiplatelet agent - other n=4	34.5		9.0 (-8.2-26.2)	
No antiplatelet agent n=357	34.3		8.3 (7.7-8.9)	
Preoperative transfusion n=26		10.4; 2.0-18.9, p=0.016		
Postoperative transfusion				3.1; 1.9-4.3, p<0.001
Male sex n=130	38.5 (p=0.013)	5.5; 1.4-9.7, p=0.009		
ASA classification		5.8; 2.6-8.9, p<0.001		0.8; -0.1-1.8, p=0.077

* only factors that were significant on multivariate analysis were included in the table

CI = confidence interval, NOAC = novel oral anticoagulant, ASA = American Society of Anesthesiologists physical status classification

Absolute data of surgical timing of patients after hip fratctures.

151371 - SUBTENON BLOCK IN PEDIATRIC STRABISMUS SURGERY: A META-ANALYSIS

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Introduction:
Strabismus surgery is associated with significant intraoperative oculocardiac events, postoperative pain, nausea and vomiting (PONV). Subtenon block has been shown to provide postoperative analgesia after strabismus surgery in children (1)., and is associated with a decreased incidence of occulocardiac reflex, nausea and vomiting (2, 3). We conducted a systematic review and meta-analysis on the safety and effectiveness of subtenon block for postoperative pain in children undergoing strabismus surgery.

Methods:
We searched Medline, Embase, Cochrane, Scopus and Web of Science up to December 2015 for articles comparing the use of subtenon block with control in children undergoing strabismus surgery. We also searched reference lists of included trials and ClinicalTrial.Gov for completed or ongoing trials. Outcomes included severity of pain, number of children requiring opioid and non-opioid analgesia, PONV and intraoperative oculocardiac events block-related adverse events. Local Ethics board approval was obtained.

Risk of bias was assessed using the Cochrane Risk of Bias instrument and the quality of evidence was assessed using GRADE guidelines.

We analyzed the data using the RevMan Analyses statistical package in Review Manager (version 5.3). We pooled continuous outcomes (pain) using a random-effects model to calculate the Weighted Mean Difference or Standardized Mean Difference with corresponding 95% confidence intervals.

We pooled dichotomous outcomes (requirement for postoperative analgesic, nausea and vomiting, oculocardiac events) using a random-effects model to calculate the

relative risk and corresponding 95% confidence interval.

Results:
Out of the 217 articles identified, 8 studies involving 447 participants were included for the review.

Pain scores on admission to post-anesthesia care unit (PACU) were higher in control group (SMD = 1.53 95% CI 1.07, 2.00). There was no overall difference in postoperative pain scores at 20-30minutes between the subtenon and control group (SMD = 0.74 95% CI 0.04. 1.52). The number of children requiring opioid analgesia in the postoperative period was lower in subtenon group (RR 0.59; 95% CI [0.37, 0.92]). The incidence of oculocardiac events and vomiting was lower in the subtenon group compared with control (RR 0.41; 95% CI [0.18, 0.93]) and RR 0.41; 95% CI [0.18, 0.93], respectively. We found no difference in the number of children requiring post-operative non-opioid. The incidence of chemosis was reported in one study. There was no significant difference between the subtenon and control group.(4)

Conclusion:
Subtenon block decreases the immediate postoperative pain and opioid consumption. It decreases the incidence of intraoperative oculocardiac events and opioid related side effects.

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2. J Aapos. 2004;8(4):314-7
3. Eur J Ophthalmol. 2014;24(5):643-9
4. Regional Anesthesia and Pain Medicine. 2005;30(5):478-83.

151475 - POTENTIAL NOVEL BIOMARKERS OF PERIOPERATIVE ACUTE KIDNEY INJURY

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Background and Goal of Study:
Acute kidney injury (AKI) is very common after cardiac surgery with an incidence of up to 30% and severe AKI results in a 4-fold increase in mortality[1]. There is demand for specific and sensitive kidney injury markers, which would lead to earlier postoperative diagnosis and treatment of AKI. We propose a novel systematic proteomic analytic approach for identifying serum markers of AKI. In this model isolated kidneys are perfused with crystalloid buffer on a Langendorff apparatus and are either exposed to ischemia or not (control). Venous effluent samples, devoid of proteins other than the ones released from the tissue of interest, are collected for proteomic analysis.

Materials and Methods:
Local ethics committee approval for the use of animals was obtained prior to beginning the study. Adult male Sprague Dawley rats were used for the isolated perfused kidney (IPK) experiments. The right kidney was isolated and the renal artery and vein were both cannulated. Kidneys were extracted and perfused ex-vivo at 37ºC by gravity flow at a pressure of 100 mmHg. Kidneys were perfused through the renal artery with a Krebs buffer gassed with 95% oxygen and 5% carbon dioxide for 30 minutes after isolation, to washout any blood and serum proteins. After washout four kidneys were subjected to no flow ischemia for 30 minutes (Ischemia group), then re-perfused with oxygenated buffer and four kidneys underwent time matched oxygenated perfusion (control group). After 60 minutes from the start of perfusion venous effluent, samples from the renal vein were collected for proteomic analysis.

Results and Discussion:
Venous effluent samples in the ischaemia and control groups were analysed by proteomics; cystatin C and uromodulin were identified as potential biomarkers of renal ischemia. Uromodulin is a protein of renal origin and was verified in the venous effluent samples by western blot. Cystatin C is found in all tissues and is a known functional biomarker of AKI.

Conclusion:
The aim of this study was to identify specific and sensitive serum biomarkers for perioperative AKI. Uromodulin was identified as one potential renal specific serum marker in the IPK model, as described above. These results may now be helpful for further assessments of serum markers in patients with postoperative AKI.

References:

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151479 - IMPACT OF REMIFENTANIL ON THE NOCICEPTION LEVEL (NOL) INDEX

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Introduction: Several indices have been recently used to monitor nociception intensity during general anesthesia (GA). Most of them were based on the analysis of a single parameter (1). The PMD-100^{TM} monitor (Medasense Biometrics, Israel) is a novel monitor of nociception, presenting the Nociception Level (NoL) Index. The NoL index is a multiparametric index derived from heart rate (HR), HR variability, plethysmograph wave amplitude, skin conductance and its fluctuations. This index ranges from 0 to 100, with lower value meaning lower pain intensity. It has recently shown to have a high sensitivity and specificity in detecting responses to noxious stimuli in anesthestized patients (2). We tested the NoL alteration during a standardized noxious stimulus at various doses of remifentanil (RF) i.v. infusion, with the hypothesis that the higher the RF dose, the lower the NoL alteration.

Methods: After local Scientific and Ethic Committee approvals, 40 patients received desflurane-RF based GA with an epidural analgesia for laparotomy. A moderate noxious stimulus (electrical stimulation 70mA, 100Hz, 30sec) was applied to the forearm of the patients at 4 RF doses varying from 0.005 to 0.15 $\mu g.kg^{-1}.min^{-1}$. For each RF dosage, the pre- and the post-stimulation NoL peak values and the difference (ΔNoL) were recorded and compared using a linear mixed effects models and CI of 95%. Study # NCT02602379.

Results: The pre stimulation NoL basal values ranged for 4.2 to 6.5 with no significant difference when RF infusion increased. The post stimulation values at RF doses of 0.005, 0.05, 0.1 and 0.15 $\mu g \cdot kg^{-1} \cdot min^{-1}$ were, respectively, 38.3, 19.6, 9.8 and 12, respectively, showing statistical significant difference between 0.005 and 0.05 $\mu g \cdot kg^{-1} \cdot min^{-1}$ (p-1$\cdot min^{-1}$ (p-1$\cdot min^{-1}$ (p=0.49). Accordingly, the ΔNoL was greater at 0.005 than at 0.05 $\mu g \cdot kg^{-1} \cdot min^{-1}$ (28.2 vs 10.7, p-1$\cdot min^{-1}$ (10.7 vs 3.6, p-1$\cdot min^{-1}$ (3.6 vs 4.5, p=0.70).

Discussion: When an anesthetized patient is exposed to a standardized electrical noxious stimulation, NoL reaches higher peak values and shows greater alteration when doses of RF infusion are low. In this study, delta-NoL was significantly higher

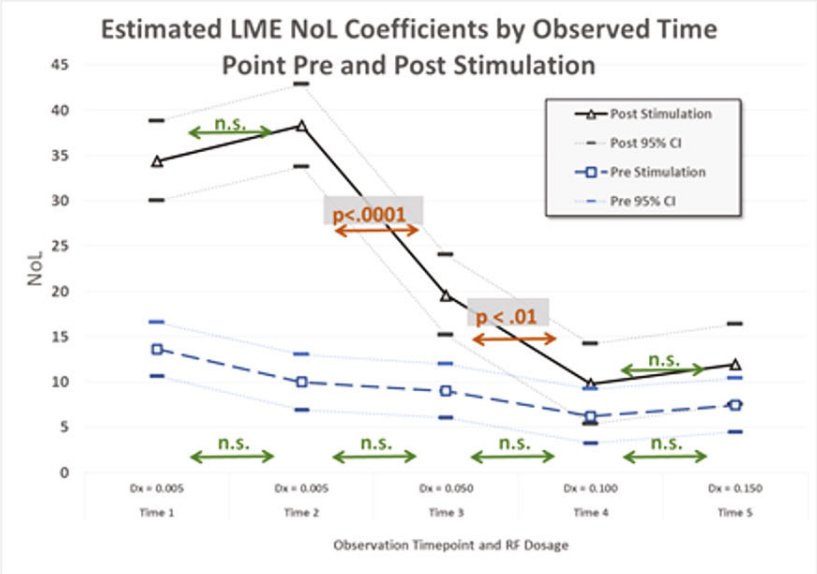
after the electrical stimulation when RF infusion was at 0.005 μg□kg^{-1}□min^{-1} and still existed at 0.05 μg□kg^{-1}□min^{-1}. Above RF infusion of 0.1 μg□kg^{-1}□min^{-1} of RF, delta-NoL was less than 5 and not significant. These results show great potential of the NoL index as a tool to monitor nociception intensity during anesthesia.

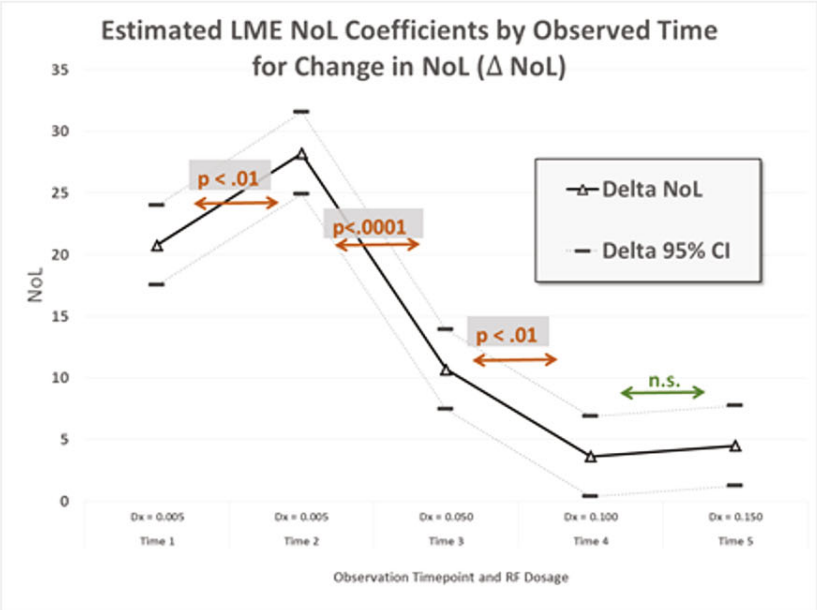
References:

1. Best practice & research Clinical anaesthesiology. 2013 Jun;27(2):235-47.

2. Anesthesiology. 2015 Sep;123(3):524-34.

NoL index responses to noxious stimulations at different infusion rate of remifentanil





Upper picture: Absolute Values of NoL index significantly increase after noxious stimulus at low remifentanil infusion rate but not anymore at higher rates (> 0.1 mcg/kg/min). Bottom picture: Delta NoL at different infusion rate of remifentanil. The delta NoL is high at low remifentanil doses but less than 5 at higher doses.

151480 - EFFECTS OF INTRATHECHAL OPIOIDS AFTER THORACOSCOPY: A CLINICAL TRIAL

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Introduction:
Video Assisted Thoracoscopy Surgery (VATS) is gaining popularity over thoracotomy over the last decade[1]. Thoracic epidural has been shown to significantly reduce postoperative pain in VATS, more specifically in the first 24 hours[2]. Interestingly, the use of intrathecal narcotic (IT) has been studied for thoracotomy and significantly reduces postoperative pain compared to intravenous narcotic administration[3]. However, his effects have never been validated for VATS. The aim of study was to compare IT analgesia to placebo on narcotics requirement in the 24 hours after VATS.

Methods:
After Research Ethics Board approval, 70 patients undergoing VATS; 18 to 75 years old; ASA I-III; weigh >50 kg and able to consent were randomized to group-intrathecal analgesia (group-IT) or to group-control (group-C) in a 1:1 ratio. (Exclusion criteria were: patient refusal; incapacity to use patient controlled analgesia (PCA) device; absolute contraindications to intrathecal injections; Herpes Zoster infection; pregnancy; use of >30 mg of morphine (or equivalent) 24 hours prior surgery; chronic use of pregabalin, gabapentin, duloxetine, amitriptyline, or NSAIDS; allergies to opioids or local anaesthetics; high risk of conversion to thoracotomy determined by surgeons and conversion to thoracotomy. Before anaesthesia induction, patients were placed in a sitting position. Skin preparation and local anaesthesia were similar for both groups. Patients received a dose of 250 mcg of morphine intrathecal + sufentanil 10 mcg (group-IT) or no further intervention (group-C). Anaesthesia induction and maintenance was standardized. After surgery, all patients received a PCA with hydromorphone. A research assistant blind to randomization determined the quantity of hydromorphone self-administered within the first 24 hours after surgery. Postoperative pain using the visual analogue scale, adverse effects (sedation, pruritus, nausea and vomiting) and complications were documented as secondary outcomes. The sample size (N=70) was determined for a power of 80%, p-value of 0.05 and a difference in hydromorphone consumption of 30% between groups. The primary

outcome was analyzed using Student's t-test or Mann-Whitney if not normally distributed.

Results:
The trial was interrupted after enrolling 35 patients in 48 months. The main limitation to randomization was a higher incidence of conversion to thoracotomy than expected. After exclusion criteria application, 22 patients remained in the primary analysis. Mean hydromorphone consumption was 4,6 mg (+/- 3,1mg) for group-IT and 6,0 mg (+/-4,7 mg) for group-C at 24 hours (p =0. 699).

Discussion:
This study could not provide an answer to our research question. Our findings suggest that conversion rate of VATS (23%) is higher than what has been reported in the literature (2-14%)[4]. Inadequate lung isolation and high incidence of superior lobectomy may have contributed to this result. Replication of this study should be considered for a multicentre study or single centre performing a higher rate of VATS.

References:

1. Ann Thorac Surg, 2006. 81(2): 421-6
2. Asian Cardiovasc Thorac Ann 2010; 18: 464-8
3. Anesthesiology, 2006. 104(3): 594-600
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151514 - EFFECTS OF MAGNESIUM SULFATE ON THE ENHANCED PAIN SENSITIVITY

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Introduction: In staged bilateral total knee arthroplasty (TKA), hyperalgesia could be induced by previous surgical injury [1]. Magnesium attenuates the hyperalgesia due to its antagonistic effect on N-methyl-d-aspartate receptors [2]. We evaluated the effects of magnesium on the enhanced pain sensitivity in patients undergoing staged TKA.

Methods: Forty-four patients undergoing staged bilateral TKA were enrolled in this study. The magnesium group (n = 22) received magnesium sulfate at 50 mg/kg for 15 minutes followed by 15 mg/kg/h by continuous i.v. infusion until the end of surgery. The control group (n = 22) received the same volume of isotonic saline over the same period. Postoperative pain (numerical rating scale, NRS) at rest, the amount of patient-controlled analgesic (PCA, i.v. fentanyl), and rescue analgesic (i.v. ketoprofen) administered during the 48-hour period after the operation were compared between the two groups and the first and second periods within groups.

Results: NRS scores were greater in the control group at 24 and 48 hours postoperatively in the first TKA ($P = 0.001$ and $P = 0.001$, respectively) and in the second TKA ($P < 0.001$ and $P < 0.001$, respectively) than in the magnesium group. The amount of rescue analgesics used during the 48-hour postoperative period in the second TKA was greater in the control group than the magnesium group ($P = 0.001$). Patients received more fentanyl via PCA in the first ($P = 0.014$) and second ($P = 0.001$) TKA over 48 hours postoperatively in the control group than the magnesium group. In the control group, at 24 and 48 hours postoperatively, NRS scores ($P < 0.001$ and $P = 0.006$, respectively) and the amount of rescue analgesics ($P = 0.011$ and $P = 0.004$, respectively) were greater for the second than the first operated knee. The cumulative consumption of PCA during the first 48 hours postoperatively was greater after the second than the first TKA ($P < 0.001$). In the magnesium group, there were no significant differences in NRS score at postoperative 24 or 48 hours between the first and second operated knee. The amount of rescue analgesics used during 24 hours ($P = 0.021$) and the cumulative amounts of PCA during first 48 hours ($P = 0.004$) were greater in the second operated knee.

Discussion: Administration of magnesium significantly reduced postoperative pain and the difference in pain intensity between the first and second operated knee in staged bilateral TKA. This suggests that magnesium has an attenuation effect on

hyperalgesia induced by previous surgical injury.

References:

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2. Pain 1991 44: 293-299

151529 - PULMONARY VEINS FLOW VARIATION IN ONE LUNG VENTILATION

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Introduction

Adequate lung isolation can be difficult to determine based on current monitoring techniques. For minimally invasive surgery requires one lung isolation, insertion and manipulation of the TEE probe may also cause tube migration after adequate positioning. Traditionally pulmonary vein flow (PVF) has been used to assess diastolic dysfunction and severity of mitral reurgitation[1,2]. However, its use in thoracic surgery as a means to determine adequacy of lung isolation has recently been studied, with decreases in pulmonary vein flow of up to 60% observed in the non-dependent lung[3].

Owing to differences in positioning, as well as the frequent use of one lung ventilation in patients with severe mitral valve regurgitation, we sought to see if PVF changes were also predictive of lung isolation in patients undergoing minimally invasive cardiac surgery.

Methods

The Office of Research Ethics approved the study protocol.
We recruited patients scheduled for cardiac surgery by minimally invasive techniques (mitral valve surgery or coronary artery bypass surgery), PVF and arterial blood gases were obtained before one lung anesthesia (OLA) and minutes five (5) and ten (10) after OLA was started.

Results

18 patients were recruited (9 per group). Lung isolation and collapse were considered adequate in all cases.

Right Lung Isolation: PVF on right side decreased by 29.2% and 24.4% at 5th and 10th minute respectively following OLA. Flows on the Left side were increased by 17.6% and 37.4%. Partial blood pressure of oxygen over inspired fraction of oxygen (PAFI) values decreased by 48.1% and 63% respectively.
Left Lung Isolation: PVF flow on left side decreased by 23.9% and 31.9% at 5th and 10th minute respectively following OLA. Flows on the Right side also declined by 3.1% and 13.1% at the same time. PAFI values went down by 38.9% and 55.6%.

Discussion

In this study, during right lung isolation there was a considerable increase in left pulmonary flow, while right pulmonary flow decreased. A corresponding decline in the blood oxygenation was also seen. However, during left lung isolation the left pulmonary vein flows dropped and rights flows also decreased, increasing slightly in just one case. The changes in pulmonary vein flow to the upper veins caused by OLA seemed to be affected by the side being isolated, which may reflect the underlying pathology being operated on (all left side down procedures were for coronary artery bypass grafting while right side down was for mitral valve disease). We did not evaluate PVF in the lower veins.

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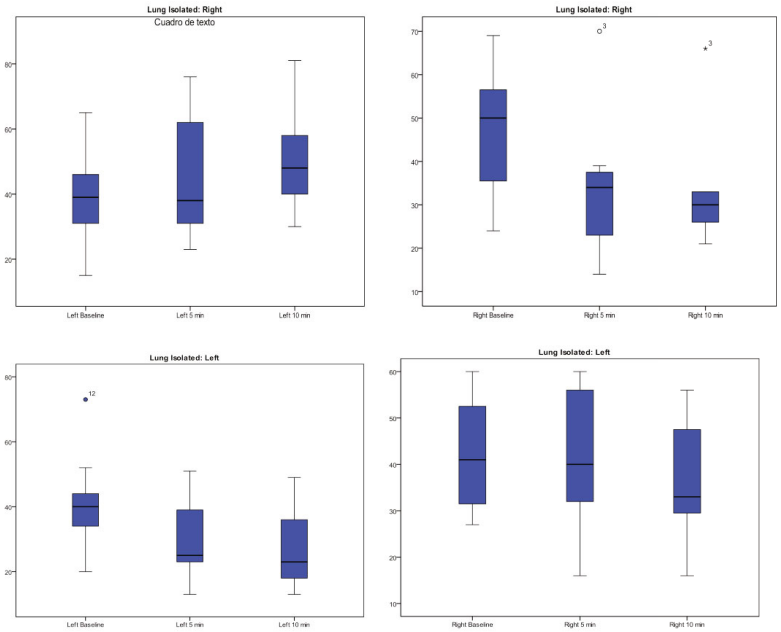
Pulmonary Vein Flow Variation



151541 - POSTOPERATIVE ATRIAL FIBRILLATION IN CARDIAC SURGERY PATIENTS

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Introduction: Postoperative atrial fibrillation (POAF) is still a prevalent cardiac surgery complication that is associated with increased risk of important comorbidities and mortality. This study looked at the epidemiology of patients who had no prior history of atrial fibrillation during their hospital stay after cardiac surgery.

Methods: Approval was obtained from our institutional Research Ethics Board. This is a prospective observational cohort study of 1416 adult patients undergoing non-emergent coronary artery bypass grafting (CABG) and/or valve surgery at a single cardiac hospital between 2014 and 2015. Univariate analysis was performed using Chi-square analysis and Student's t-test to determine risk factors that are predictive of new onset POAF.

Results: A total of 486 (34.3%) patients developed new onset POAF. Patients who had POAF were older (69.3 ± 9.7 vs 64.12 ± 11.4 years, $p < 0.001$), had lower creatinine clearance (84.7 ± 33.6 vs 93.7 ± 38.8 mL/hour, $p < 0.001$), underwent valve surgery (47.5 vs 35.6%, $p < 0.001$), and larger left atrial volumes (34.7 ± 13.0 vs 31.4 ± 11.9 mL/m^2, $p < 0.001$) than those who did not develop POAF. The incidence of postoperative complications was significantly higher in the POAF group for readmission to the ICU (6.4 vs 1.1%, $p < 0.001$), reintubation (4.3 vs 1.3%, $p < 0.001$), prolonged intubation (> 48 hours; 5.8 vs 1.6%, $p < 0.001$), cardiogenic pulmonary edema (5.1 vs 1.1%, $p < 0.001$), time spent in ICU (2.96 ± 5.2 vs 1.89 ± 3.7 days, $p < 0.001$), length of hospital stay (12.5 ± 12.4 vs 7.9 ± 7.1 days, $p < 0.001$), acute renal injury (20.4% vs 8.4%, $p < 0.001$), and need for at least one of red blood cells, platelets, or fresh frozen plasma (16.0 vs 11.8%, $p < 0.05$). We did not find a significant difference in stroke (1.4 vs 0.5%, $p > 0.05$), seizure (1.4 vs 0.5%, $p > 0.05$), malignant arrhythmia (4.9 vs 3.0%, $p > 0.05$), gastrointestinal bleeding (1.0 vs 0.5%, $p > 0.05$), heart block (4.5 vs 3.0%, $p > 0.05$), and death (1.2 vs 0.9%, $p > 0.05$).

Discussions: New onset POAF remains a prevalent complication in the cardiac surgery population, associated with significant perioperative morbidity. This study demonstrated key characteristics of the population of patients undergoing cardiac surgery who develop new onset POAF and the expected complications that can follow.

References:

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151582 - PATIENT SATISFACTION WITH ANAESTHESIA AND PERIOPERATIVE CARE

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Introduction: Over the last decade, patient satisfaction has become an important perioperative outcome [1,2]. We established a postoperative survey as a quality assurance project to measure patient satisfaction with anaesthesia and perioperative care.

Methods: The present project was conducted through the quality assurance (QA) department and the research ethics board of McGill University Health Center, at Royal Victoria Hospital, over a period of 2 weeks in 2013. Fourteen questions were constructed to measure patient satisfaction with anaesthesia and perioperative care. Patient anxiety, comfort level and the communication transferred during their care were measured. The response to each item was on a five-point Likert scale ranging from; (4= very acceptable / very much/ always/ very high; 3= reasonably acceptable/ somewhat /usually/ somewhat high; 2= not very acceptable/ not really/ sometimes/ moderate; 1= unacceptable/ not at all/ never/ poor; and not applicable). The questionnaire was filled by the responders prior to their discharge from the PACU. Mean satisfaction percentage score (MSPS) was calculated for each question (0-100%).

Results: Two hundred patients were approached and 165 responded to the survey. Of the patients who completed the survey 62% underwent ophtalmological intervention, 18% gynaecological and 20% other surgery including general surgery and ENT procedures. Eighty percent were outpatient procedures. Forty percent of the patients were in the age group of >66 years old and 51% were female. Overall the patients were satisfied with the perioperative and anaesthetic care they received (Table 1). The encounter with the anaesthesia provider reduced patients' anxiety level from MSPS of 61.9% at arrival to 89.5%. Patients were very satisfied by the information that the anaesthesia provider communicated with them (MSPS 96.7%). Patients were less

satisfied with the information provided to them to navigate the hospital (MSPS 85.81%) and the quietness of the environment in the OR (MSPS 88.3%).

Conclusion: Patients' views have become an important element in the evaluation of health care. In our survey we established that patients were satisfied with the perioperative and anesthetic care that they received on the day of surgery. Certain areas can be improved such as providing clearer information on how to navigate the hospital and ensuring a quieter OR environment. By improving these variables patients' overall anxiety level may be further reduced. More should be done in evaluating patient satisfaction in the perioperative setting in the hopes of improving patient care.

References:

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2. Anaesth Intensive Care 2000 28: 276-280

Table 1

Table 1

Question	Patient satisfaction with Anaesthesia and perioperative care	Mean Satisfaction percentage score (%)
Q1	As I arrived to the hospital, my level of anxiety was	61.9
Q2	My encounter with the anaesthesiologist helped to reduce my anxiety	89.5
Q3	The time I spent waiting from pre-admission before being transferred to the OR was	92.1
Q4	I found the time waiting at the OR door until actual surgery was	98.1
Q5	I felt everything was done to respect my privacy	99.4
Q6	Once admitted inside the operating room, how often was the OR environment quiet?	88.3
Q7	The temperature of the OR was adequate	91.8
Q8	The OR environment was calm	95.7
Q9	Regardless of the directions provided with the admission package, finding my way to the pre-admission when I arrived to the hospital was easy	85.8
Q10	The pre-admission staff as helpful as I thought they should be	94.8
Q11	The anaesthesiologist introduced himself/herself by giving his/her name and file	95.6
Q12	Every effort made to accommodate you in your language of preference	96.3
Q13	The anaesthesiologist gave me information that was easy to understand about my health questions or concerns	96.7
Q14	The healthcare professionals in the OR treated me with courtesy and respect	100.0

Survey: Patient satisfaction with Anaesthesia and perioperative care

151598 - SUBCUTANEOUS KETAMINE FOR POSTOPERATIVE PAIN RELIEF

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Introduction

Pain control is a fundamental right of every patient, and the ethical obligation of the physician(1,2). Postoperative pain control in low resource and developing countries is often inadequately treated(3,4,5) and may expose patients to an increased risk of perioperative and long-term complications(6,7). We evaluated the efficacy of subcutaneous ketamine administration for the management of postoperative pain in patients undergoing major surgery in a low resource setting.

Methods

Appropriate ethics approval was obtained from all institutions involved. Informed concent was obtaibed from all participating patients. 59 patients undergoing major abdominal, head & neck, plastic, gynecological surgeries were studied in a double blinded randomized control trial. In addition to standard care, patients received 5 subcutaneous injections of ketamine 1mg/kg (*Group K; n = 31)* or normal saline (*Group P; n = 28)* during their post operative period. The first injection was administered immediately after surgery, and then every 12 hrs thereafter starting at 20:00 on the day of surgery. Pain was assessed using an 11-point verbal rating scale three times per day. Patients were also assessed for side effects; PONV, Hallucinations, Nightmares, Sedation, HTN, Seizure.

Results

Patients in the interventional arm had lower visual analog scale pain rating than those receiving placebo; 3.7 vs 4.9 (p value 0.003) respectively. Hallucinations and sedation were associated with ketamine administration when compared to placebo; $p = 0.001$, $p = 0.003$ respectively

Discussion

Subcutaneous administration of Ketamine at a dose 1mg/kg is a safe and effective strategy to reduce post operative pain in patients undergoing major surgery in low resource settings.

References:
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2. International Covenant on Econmoic, Social, and cultural rights. United Nations. 1996 Dec 8;:1–8.
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151648 - PROGRAMMED INTERMITTENT EPIDURAL BOLUSES FOR LABOUR ANALGESIA

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Introduction: Programmed Intermittent Epidural Boluses (PIEB) for labour analgesia have been proposed to decrease motor blockade[1], decrease total local anaesthetic (LA) consumption and increase maternal satisfaction[2] as compared with Continuous Epidural Infusions (CEI). Following anecdotal reports by midwifery staff of excessive motor block in patients having CEI, a PIEB protocol was introduced. Data was collected before and after introduction for comparison with the previous regime.

Method: Following research governance approval at our institution, data was collected using a specially designed form for all women having labour epidurals from August to December 2015. The labour analgesia protocol was changed from CEI to PIEB at the start of October. All patients included in the study had access to patient controlled epidural analgesia (PCEA).

CEI protocol: 0.0625% Bupivacaine + 2.5mcg/ml Fentanyl - 5ml/hr
PCEA dose: 10ml 0.0625% Bupivacaine + 2.5mcg/ml Fentanyl (20min lockout)
PIEB protocol: Mandatory Bolus 10 ml 0.0625% Bupivacaine + 2.5 mcg/ml Fentanyl – hourly first bolus 40 minutes after epidural initiation.
PCEA dose: 5ml 0.0625% Bupivacaine + 2.5mcg/ml Fentanyl (15min lockout)

The primary outcomes were:
Motor Block (using Bromage scores); Duration of second stage of labour; Number of PCEA requests; Number of rescue epidural boluses required; Total LA volume used; Number of instrumental deliveries; Maternal Satisfaction

Results: There were 114 epidurals placed for labour analgesia (with 2 re-sites) between August and September 2015, with 106 (2 re-sites) between October and November. There were less PCEA requests (mean 6.8 vs 4.9) in the PIEB group along with a lower total volume of local anaesthetic administered (mean 74.8mls vs 65.5mls) and less motor block (27/55 events vs 23/78). Maternal satisfaction (Numerical rating scale 0-10) was similar (9.18 vs 9.02). There were also fewer instrumental deliveries (35/112 vs 24/104). Duration of second stage of labour was comparable (84.93 mins vs 83.95 mins).

Discussion: Following institution of the PIEB protocol, the benchmarking showed no major difference in the two regimes, with possibly a slight improvement, suggesting a successful transition to the new protocol.

Given the small size of the sample groups,the benchmarking was not powered to show statistically significant differences in many of the clinically important outcomes. In addition, it was a disappointment that Bromage scores were poorly documented, given that a reported concern from midwifery staff was motor block. Further research would require much higher numbers in this group to ascertain significance. Future studies could also look at specific groups related to gestation and parity, obesity, epidurals for instituted labour vs for induction, and initiating initial analgesia with a combined spinal epidural compared with an epidural.

References:

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151786 - CHRONIC POST-SURGICAL PAIN AFTER MASTECTOMY: SYSTEMATIC REVIEW

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Introduction:
Chronic Post-surgical pain (CPSP) is considered one of the inevitable surgical complications despite all the advances in surgical techniques and the development of new modalities of pain management. CPSP can be defined as a persistent pain for a minimum of two months after a surgical procedure. The reported prevalence of CPSP after mastectomy ranges from 20% to 56%. Neuropathic pain has a crucial role in the CPSP associated with mastectomy. This systemic review focuses on the evidence for perioperative interventions to reduce the incidence of this problem.

Materials and methods:
A literature search was carried out using Medline, Embase and the Cochrane Library for articles for the relevant keywords (mastectomy, breast surgery, chronic post surgical pain, persistent pain after surgery, paravertebral block, regional anesthesia in breast surgery). Additional studies were identified by manually tracking references from published papers. All subject headings were examined for relevant terms that are related to mastectomy. Articles were limited to randomized controlled trials (RCTs) in adult human patients. Studies were assessed for high risk of bias by the Cochrane Risk of Bias Tool. We did not perform a meta-analysis due to the limited number of the studies on each therapeutic mode and also, because most studies' results were in the same direction.

Results:
The initial literature search resulted in approximately 600 citations. After we had removed all duplicates, irrelevant and ineligible articles, **fourteen Randomized Controlled Trials** were met the inclusion criteria. Intravenous lidocaine infusion during surgery reduced the incidence of CPSP after mastectomy (2 RCTs)[1,2] . Paravertebral block before mastectomy reduced the incidence of CPSP (2RCTs). Venlafaxine reduced CPSP after mastectomy (1 RCT)[3,4] . Application of EMLA (Eutectic mixture of local anesthetics) cream reduced CPSP after mastectomy (1 RCT)[5]. Studies on ketamine, gabapentin, mexiletine, amantadine, nonsteroidal anti-inflammatory drugs,

and local anesthetic infiltration failed to provide enough evidences about the reduction in CPSP after mastectomy.

Discussion

Post-surgical pain may persist for months after the surgical procedure and becoming what is called CPSP. Chronic pain represents a serious physical and mental healthcare problem affecting the patient and the community in general. Studies showed that regional anesthesia (paravertebral block) is an effective intervention to reduce CPSP after mastectomy. Among the pharmacological agents, intravenous lidocaine infusion, and to some extent venlafaxine, are the only agents have shown to reduce CPSP after mastectomy. Well-designed clinical trials are required to identify the role of the current pain pharmacological agents in preventing and treating CPSP.

References:

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2-Pain Physician 2015;18:E139-46

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4-Anesth Analg 2006; 103: 703–8

5-Pain Medicine 2000;25 :350–5.

151813 - INTRATHECAL MORPHINE VS. LOCAL INFILTRATION ANALGESIA FOR TOTAL KNEE AND HIP ARTHROPLASTIES

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Introduction

Postoperative pain is significant following total hip (THA) and knee arthroplasty (TKA). Spinal anesthesia is commonly used with the addition of intrathecal (IT) morphine to prolong the analgesic effect. However, this additive may result in adverse effects. Alternatively, the Local Infiltration Analgesia (LIA) technique uses local anesthetics, NSAIDs and epinephrine, injected periarticularly during surgery.[1] The aim of this study was to compare whether IT morphine or LIA provides better analgesia with fewer side effects after total hip or knee arthroplasty.

Methods

We performed a quality assurance project involving a retrospective chart review of total hip and knee arthroplasties between November 2014 and February 2015 at two different local centres. Exemption from ethics review was obtained from our REB. Each centre used a different pathway for postoperative pain management, either IT or LIA. The IT group received spinal anesthesia with intrathecal morphine and oxycontin CR protocol, whereas the LIA group received spinal anesthesia plus a standardized injection of epinephrine 0.5mg, ketorolac 10.5mg and Ropivacaine 0.2% (200mg), in a total volume of 100mL infiltrated periarticularly plus a modified oxycontin protocol postoperatively. Pain scores at rest, postoperative narcotic requirements, PONV and antiemetic use were recorded across specific time intervals from surgical skin incision (T = 0). Ability to complete physiotherapy and time to discharge were also recorded. Statistical tests were completed using SPSS 19.0.

Results

109 charts were reviewed: 57 patients received IT (28 TKA, 29 THA) and 52 patients received LIA (26 TKA, 26 THA). No consistent difference in pain scores was found for TKA patients, with the exception of higher pain the LIA group at the 24-hour postoperative time-point (LIA =5.39, IT=3.57, p= 0.007). For THA patients, the only significant difference in pain scores was at 6 hours postoperatively (LIA=3.92, IT=2.24, p=0.014). Significantly greater PONV was found in the TKA-IT group compared to TKA-LIA between 0-16 hours (64% vs. 31%, p= 0.012), and more antiemetic use was noted in TKA-IT. In both surgical groups, there was no significant difference in ability to complete physiotherapy or hospital length of stay when comparing IT or LIA.

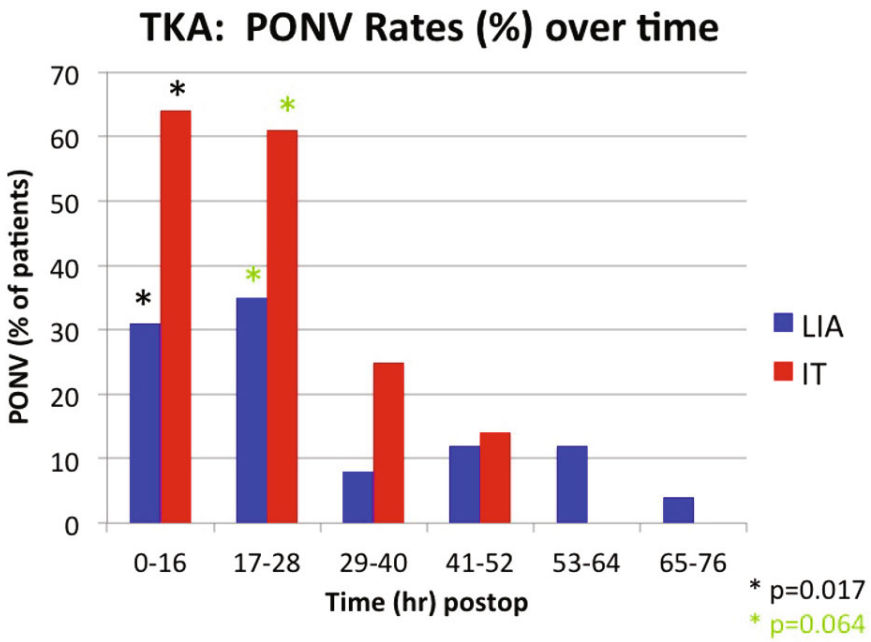
Conclusion

Pain scores were similar between LIA and IT groups at all time points (0-96h), except higher scores in the LIA group at 6 hours (THA) and at 24 hours (TKA) postoperatively. Increased PONV in the IT group may be the result of IT morphine or higher doses of oxycontin CR used at this centre. Although not statistically significant, increased PONV in the IT group was associated with decreased attendance of physiotherapy on postoperative day 1 for TKA patients. LIA appears to yield largely similar pain control to IT, but results in less PONV.

References:

1. Kerr DR, Kohan L. Acta Orthop. 79: 174-183.

TKA PONV Rates Over Time



Comparison of postoperative nausea and vomiting rates (PONV) for local infiltration analgesia (LIA) vs. intrathecal morphine (IT) in total knee arthroplasty.

151847 - INTRAOPERATIVE HYPOTENSION AND STROKE AFTER MAJOR CARDIAC SURGERY

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Introduction: Cerebrovascular accidents (CVAs) occur in 1.8-9.7% of patients undergoing major cardiac surgery and represent a serious postoperative complication.[1-3] While intraoperative hypotension (IOH) is thought to play a role, no model to date has addressed the combined effect of IOH pre-, during and post-cardiopulmonary bypass (CPB). We investigated whether varying magnitudes and durations of IOH pre-, during and post-CPB were associated with postoperative CVA.

Methods: Following local research ethics board approval, we conducted a retrospective cohort study of 7779 patients undergoing major cardiac surgery requiring CPB between November 2009 and June 2014. Patients undergoing off pump procedures were excluded. The primary exposures were, separately, longest durations of MAP < 55, 65 and 75 mm Hg; pre-, during and post-CPB. The primary outcome was postoperative ischemic CVA, defined as new focal or global neurologic deficit of cerebrovascular origin lasting ≥ 24h and non-hemorrhagic in nature. The diagnosis of CVA was verified by reviewing reported postoperative brain CT or MRI studies. Intraoperative invasive blood pressure measurements were recorded every 15 seconds in an electronic patient record, with any artifacts removed using an automated algorithm. The relationship between hypotension and CVA was modeled using logistic regression with propensity score adjustment. Independent CVA risk factors were identified through a non-parsimonious logistic regression model. Measure of association was OR (95% CI). All analyses were conducted using SAS 9.4, with statistical significance defined by a 2-tailed P< 0.05.

Results: CVAs occurred in 148 patients (1.9%) and were associated with any duration of MAP < 75 mmHg during CPB. Specifically, each additional 10 min of IOH with MAP < 55 mmHg was associated with a 17% increased odds of CVAs (propensity-adjusted OR 1.17; 95% CI, 1.07-1.28). Each additional 10 min of MAP < 65 and MAP < 75 were associated with 9% (propensity-adjusted OR 1.09; 95% CI, 1.03-1.16) and 5%

(propensity-adjusted OR 1.05; 95% CI, 1.01-1.10) increased odds of CVAs, respectively. Pre- and post-CPB IOH were not associated with CVA (Table). Other independent CVA risk factors included older age, combined valve and bypass surgery, surgery on the thoracic aorta, emergent surgery, preoperative shock, cooling while on bypass, hemodynamic instability post bypass despite administration of vasopressors and inotropes, new onset postoperative atrial arrhythmias, and reopening following surgery.

Discussion: In this propensity-adjusted analysis, MAP < 75 mmHg during CPB is associated with postoperative CVAs, with evidence of a dose-response relationship with increasing severity and duration of hypotension. The ability to define critical thresholds and durations of hypotension associated with ischemic brain injury may lead to prompt preventative interventions. This study thus provides impetus for future research to develop a personalized goal-directed therapy for high-risk cardiac surgical patients.

References:

1. Stroke 2006;37:2306-2311
2. Stroke 2006;37:562-571
3. N Engl J Med 1996;335:1857-1863

Table Intraop Hypotension and Stokes after Major Cardiac_Surgery

Table: Propensity-adjusted association of mean arterial pressure (MAP) and cerebrovascular accidents per 10 minutes of hypotension.

	Propensity-adjusted OR (95% CI) per 10 min of hypotension		
Timing of Hypotension	**MAP < 55 mmHg**	**MAP < 65 mmHg**	**MAP < 75 mmHg**
Pre-CBP	1.25 (0.94– 1.67)	0.99 (0.82– 1.20)	0.95 (0.85– 1.08)
CBP	1.17 (1.07– 1.28)	1.09 (1.03– 1.16)	1.05 (1.01– 1.10)
Post-CBP	1.19 (0.83– 1.69)	1.03 (0.90– 1.18)	1.01 (0.94– 1.09)

Table: Propensity-adjusted association of mean arterial pressure (MAP) and cerebrovascular accidents per 10 minutes of hypotension.

151903 - KINDERGARTEN ASSESSMENT IN CHILDREN ANESTHETIZED BEFORE AGE 4

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Introduction: Animal studies demonstrate general anesthetic (GA) toxicity in the developing brain[1]. Clinical reports raise concern, but the risk of GA exposure to neurodevelopment in children remains uncertain[2,3].

Method: After obtaining Institutional Human Ethics Board approval, we undertook a retrospective matched cohort study comparing children exposed to GA < 4 yr to those with no GA exposure. We used the Early Development Instrument (EDI), a 104 component questionnaire, encompassing 5 developmental domains, completed in kindergarten as our outcome measure. Mixed effect logistic regression models were developed to generate estimates for single vs multiple GA exposure and to compare both single and multiple exposure by age < or > 2 yr. Sociodemographic and physical confounders were incorporated as covariates in the models.

Results: A total of 18,056 children were studied: 3850 single GA and 620 multiple GA, matched to 13586 non-exposed children. In children < 2yr, there was no independent association between single or multiple GA exposure and EDI test results. Paradoxically, exposure to a single GA between 2-4 yr was associated with deficits, most significant in Communication/General Knowledge (Estimate: -0.7, CI: -0.93 to -0.47, $p< 0.0001$) and Language/Cognition (Estimate: -0.34, CI: -0.52 to -0.16, $p< 0.0001$) domains. Multiple GA exposure at 2-4 yr demonstrated a non-significant trend toward greater deficit. Conclusion: These findings refute the assumption that the earlier the GA exposure in children, the greater the likelihood of long term neurocognitive risk. We cannot confirm an association between multiple GA exposure and increased risk for neurocognitive impairment. These results suggest that either the age of vulnerability occurs at a later stage of brain development in children compared to animals, or time may modulate the potential effects of earlier exposure. Alternatively, confounding by indication cannot be ruled out.

References:

1. J Neurosci 2003; 23:876–82
2. PLoS One 2014; 9:e85760
3. Pediatric Anesthesia 26 (2016) 6–36

151905 - THE PERIOPERATIVE INFLAMMATORY RESPONSE TO BARIATRIC SURGERY

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INTRODUCTION

Obesity is characterized by a chronic low grade inflammatory state which reflects cardiometabolic health and may increase perioperative morbidity and mortality. This is particularly pertinent given that the Canadian incidence of obesity continues to grow and is expected to reach 55 % by 2019. Although several inflammatory cytokines have been implicated, their routine measurement remains costly, cumbersome and impractical. In contrast the neutrophil-lymphocyte ratio (NLR) might be a viable alternative since it is easily calculated by dividing absolute neutrophil (ANC) by lymphocytes (ALC) counts that are readily available on routine complete blood counts (CBC). We hypothesized that bariatric patients with an elevated preoperative NLR would have an increased perioperative inflammatory response leading to a prolonged stay and increased rate of critical events.

METHODS

We conducted a retrospective observational study of all patients undergoing laparoscopic bariatric surgery between April and September 2015. After obtaining approval from the Local Research Ethic Board we used Research Electronic Data Capture (REDCap) to develop a database of all 257 patients who underwent bariatric surgery and included comorbidities, laboratory values, length of stay and perioperative complications. The baseline NLR was calculated using ANC and ALC values obtained during the preanesthetic visit, and patients were divided into either a low or high group based on the median. Subsequent values were obtained for greater than 6months preoperatively during patient's initial bariatric assessment, as well as 24h and 48h postoperatively.

RESULTS

Baseline NLR was calculated and the high group had an NLR greater than the median value of 2.625. In the low group there was an increased proportion of patients with chronic pain (24.4% vs 13.5%, $p < 0.0257$) and GERD (53.4% vs 33.3%, $p < 0.005$), whereas the incidence of all other comorbidities remained non-significant between groups. As expected, NLR was significantly elevated in the high group at baseline (1.997±0.405 vs. 3.813± $p < 0.0001$), 6 months preoperatively (1.893±0.738 vs 2.99±1.19, $p < 0.0001$), 24h (7.709±3.621 vs 10.7±4.6, $p < 0.0001$) and 48h (4.06±2.427 vs 5.279±2.989, $p < 0.0005$) postoperatively. Unexpectedly, patients with

a high preoperative NLR had a 10% reduction in their length of stay (2.29 vs 2.527 days, $p < 0.001$), but tended to experience a greater number of critical events (23 vs 17, $p=0.24$).

DISCUSSION

In summary, an elevated preoperative NLR is associated with a more pronounced post-operative inflammatory response in bariatric patients. Although there was a non-significant increase in the number of critical events this likely reflects the study being underpowered and warrants further investigation. This also raises several important questions including whether these observations can be replicated using other inflammatory markers, are these trends unique to obese patients undergoing bariatric surgery, and whether any perioperative interventions that can modify these responses and outcomes.

References:

N/A

152092 - PHENYLEPHRINE & MATERNAL CARDIAC OUTPUT DURING PLANNED CESAREAN

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Introduction

Spinal induced hypotension often requires intervention during cesarean delivery (CD). Prophylactic phenylephrine infusion (PI) may maintain normotension, however concern exists about compromise to maternal cardiac output (CO) at certain doses[1]. Our objective was to observe the effect of PI, in the dose range used at our institution, on maternal CO using a non-invasive CO monitor (Nexfin™, Edwards Lifesciences LLC Canada).

Method

Ten healthy, consenting parturients undergoing elective CD were included. Local ethics board approval was granted. Following standardized spinal anesthesia, PI was commenced at 50mcg/minute and adjusted at the discretion of the attending anesthesiologist. In addition to standard monitoring, the Nexfin™ recorded CO, systemic vascular resistance (SVR) and heart rate (HR); no changes were made to the anesthetic on the basis of the Nexfin™ readings. Data are presented as percentage change from the pre-anesthetic baseline (T0=100%, when the spinal was administered), indexed to body surface area (CO is presented as CI, SVR is presented as SVRI).

Results

50% of parturients experienced drop in CO < 80% of baseline, in 19% (28/150) of data points. The lowest recorded CI was 53.7% of baseline in one parturient; mean trends, before and after delivery, are shown in figure 1. The incidence of SVRI >2390 dynes.sec/cm^5/m^2 (upper limit of normal) was 25% (38/150) of data points.

Conclusion

Phenylephrine infusion running at 50mcgs/minute significantly increases maternal SVRI with simultaneous reduction in CO. HR and CO correlate directly, confirming previous work[2]. This pilot study included a small number of parturients in uncontrolled conditions, so these results should interpreted with caution. However, the data reflect every day practice when CO monitoring is not routinely employed. Should we titrate PI to HR and symptoms rather than to systolic blood pressure?

References:

1. IJOA 2008; 17(Suppl 1):S9.

2. Anesthesiology 2009; 111:753–65

Change in cardiac index, heart rate and systemic vascular resistance index during spinal anaesthesia for cesarean delivery.

Figure 1: Mean percentage change in CI, HR and SVRI for 15 minutes after spinal/PI commenced. Post-delivery, 10 minutes of data recorded after PI weaned/ceased.

152105 - OUTCOMES IN HIGHER RISK PATIENTS UNDERGOING CANCER SURGERY - AN AUDIT

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Introduction : Patients with severe systemic disease pose increased risk for perioperative morbidity and mortality [1,2]. With advances in medical care, increasing number of such high risk patients are presenting for major cancer surgery [3] We conducted this study to understand the incidence of ASA physical status 3 and above presenting for cancer surgery, their progress through the perioperative period and their outcome in terms of morbidity and mortality.

Methodology : This prospective observational study was conducted in a tertiary care cancer centre after obtaining after approval from institutional review board who granted waiver of consent. All patients classified as American Society of Anesthesiologists Physical Status (ASA PS) grade III and above presenting for elective and emergency cancer surgery were studied. Data was collected from the patients' case notes and electronic medical record. The primary endpoint was in-hospital mortality

Results : 130 patients classified as ASA III and above presented for cancer surgery over 6 months, of which 30 patients underwent emergency surgery. 50 % of patients were more than 55 years old. 28 % patients presented for gastrointestinal (GI) surgery followed by maxillofacial and urogenital surgery (20% each).

The salient features in the high risk patients are given in the table. 50% elective surgery patients required medical optimization and needed more than 1 week to obtain fitness. 25 % elective patients had an extended ICU / HDU stay. 7 % patients required ICU readmission. 20 % patients had a postoperative hospital stay of more than 2 weeks. 2 patients, both with cardiovascular high risk factors, died before discharge, one after thoracic surgery and other after GI surgery.

Discussion: High risk patients underwent cancer surgery in our institute with a 2% and 37 % mortality in elective and emergency surgeries respectively which is similar to that described in literature for non cancer surgeries [1,2]. 90 % patients were ASA III suggesting medical optimization in most of the elective cases prior to surgery. Many needed multispeciality reference/s for evaluation and therapeutic interventions. 33% needed a change in oncological management plan. Whether this impacted on their oncological outcome was not studied, which is a limitation of this study.

We conclude that elective cancer surgery in patients with optimized severe medical disease was not associated with a high mortality.

References:

1. Wolters U, Wolf T, Stützer H, et al. ASA classification and perioperative variables as predictors of postoperative outcome. Br J Anaesth. 1996;77:217–22

2. Daabiss M. American Society of Anaesthesiologists physical status classification. Indian J Anaesth. 2011 ; 55: 111–115

3. Thomas M, George NA, Gowri BP, et al. Comparative evaluation of ASA and ACE-27 index as morbidity scoring systems in oncosurgeries. Indian J Anaesth.2010 ; 54 : 219-225

Salient features of high risk patients undergoing cancer surgery

	Elective cases	Emergency cases
Total	100	30
Common causes of high risk	Cardiovascular (in 45 %)	Sepsis (in 63 %)
	Respiratory, Metabolic (in 20 % each)	Cardiovascular (in 20 %)
Change in oncological plan	35 %	Not applicable
ASA III	90 %	17 %
ASA IV and above	10 %	83 %
Postperative ventilation	20 %	83 %
Mortality	**2 %**	**37 %**

152204 - SIMULATION-BASED ASSESSMENT: A MULTI-CENTRE VALIDATION STUDY

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Introduction

Worldwide there is increasing interest and implementation of multi-modal assessments of physician competence. This may be in the context of maintenance of licensure or evaluation of readiness for progression through the stages of postgraduate medical training. High-stakes simulation-based assessments (i.e. ones which are potentially progression-limiting) are already established in some jurisdictions. In 2015, The Royal College of Physicians and Surgeons of Canada moved to "Competence by Design", which involves the evolution of formative assessment tools to include simulation milestones. Building on our previous work in this field[1], we conducted an international multi-centre prospective validation study of simulation-based assessment tools in pediatric anesthesia as applied to a full range of anesthesia practitioners, from junior residents to veteran Staff. This represents the largest scale study of this topic to date.

Methods

Research ethics board approval was obtained at each of nine centres in Canada and the UK. Participants were recruited to engage in the Managing Emergencies in Pediatric Anesthesia (MEPA) simulation course which consists of seven core scenarios covering high-stakes, low-frequency crises in pediatric anesthesia. The process of design and rigorous validation of the scenario content has been described elsewhere. Participant demographics were collected, including duration of training and experience in anesthesia and pediatric anesthesia. Performances were video recorded. Five expert raters were trained to use two tools for rating each scenario - a scenario-specific checklist (CL) and a global rating scale (GRS). A large random sample of the total video pool were rated by all the raters in order to establish their inter-rater reliability. The remaining videos were divided between the raters for solo rating. Correlations were sought between grade of practitioner and performance, in order to make arguments for the construct validity of our tools in this context.

Results

Over an 18 month period, we collected data on 469 simulation encounters. 140 videos (twenty of each of seven scenarios) were rated by all the raters. Table 1 shows the reliability (by scenario and overall) as measured by the intraclass correlation coefficient (ICC). Despite the slight variation in reliability by scenario, the reliability of the CL and GRS is substantial and overall is near-perfect. Importantly, the GRS which eliminates scenario content specificity (and is designed to distinguish practitioners ready for independent practice from those who aren't) shows excellent reliability. The close correlation between practitioner grade and performance shows that our tools are well-placed to distinguish novice from expert and stratify those grades in between.

Conclusion

The MEPA GRS has been adopted as the principal outcome measure for the Canadian National Anesthesia Curriculum. This study provides further validity evidence for its use in the context of these simulation-based formative assessment of residents' readiness for independent practice.

References:

1. Pediatr Anesth 2013; 23: 1117-1123

Table 1.

Scenario	Scenario Specific Checklist ICC		Global Rating Scale ICC	
	Individual Measures	Average Measures	Individual Measures	Average Measures
Anaphylaxis	0.51	0.84	0.53	0.85
Equipment failure	0.84	0.96	0.75	0.94
Hypovolemia	0.54	0.85	0.55	0.86
LA toxicity	0.66	0.91	0.65	0.90
Laryngospasm	0.69	0.92	0.70	0.92
Loss of Airway	0.78	0.95	0.61	0.89
MH	0.55	0.86	0.61	0.89
OVERALL ICC (p < 0.001 in all cases)	**0.83**	**0.96**	**0.66**	**0.91**

Inter-rater reliability indicating overall near-perfect agreement for checklist and global rating scale. ICC = Intraclass correlation coefficient.

152286 - A NOVEL INTERVENTION FOR REDUCING PERIOPERATIVE ANXIETY

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Introduction: Preoperative anxiety (PA) affects up to 5 million children in North America each year. PA is predictive of multiple adverse outcomes, including an increased risk of separation anxiety, elevated analgesic use, postoperative emergence delirium and delayed recovery[1-3]. The most common interventions used to reduce PA are preoperative sedation and/or complex multi-faceted preparation programs[4]. Unfortunately, these interventions are not always readily accessible, can be time-intensive, or are associated with undesirable side effects and high costs. A recent systematic review suggested that audiovisual interventions are effective at alleviating PA[5], though existing solutions are prohibitively time-consuming and costly. To date, no study has examined the effects of a tablet-based, virtual-reality intervention on PA. Accordingly, we developed a multi-sensory interactive application, Story-Telling Medicine (STM), to prepare children for complex perioperative and surgical procedures. STM is an age-appropriate, customizable program that simulates the children's hospital environment by guiding children through the settings they will encounter prior to surgery. Compared to children who receive Standard of Care (SC), we hypothesize that the use of STM+SC will lead to a reduction in self-reported children's perioperative anxiety.

Methods: The Local Research Ethics Board's approval was obtained. Forty children (aged 8-13 years) undergoing elective outpatient surgery (e.g., tonsillectomy) were randomly allocated to receive either STM+SC (n= 20) or SC only (n= 20) 7-14 days before surgery (T1). Self-rated perioperative anxiety levels were measured using Children's Perioperative Multidimensional Anxiety Scale (CPMAS)[6] at T1, on the day of surgery (T2), and one month postoperatively (T3).

Results: Chi-square analyses revealed no significant differences in baseline

characteristics between the two groups. An independent-samples *t*-test was conducted to compare perioperative anxiety in STM+SC and SC alone. There was a significant difference in the mean change in anxiety scores for STM+SC (ΔM=246.50, SD=127.18) compared to SC alone (ΔM=126.60, SD=122.45); $t(27)=2.59$, $p=0.015$ (Figure 1).

Discussion: Reductions in anxiety were greater in children in the STM+SC than SC group alone, suggesting that STM is effective in reducing children's perioperative anxiety. Future studies should examine whether these behavioural changes have corresponding physiological correlates and to quantify the optimal dosage required. There is a relative paucity of research evaluating the effects of AV interventions in reducing perioperative anxiety in children undergoing surgery. This is the first study to demonstrate the effectiveness of a novel, tablet-based intervention for reducing perioperative anxiety in children undergoing surgery. Since many children do not have access to services to optimize PA, STM has the potential to provide optimal perioperative care for every child in need and can be adapted to many Canadian hospital settings. STM may represent a cost-effective way to improve children's health and ease the familial and societal costs of PA.

References:

1. J Perianesthesia Nursing 2012 27: 69 -81

2. Arch Pediatr Adolesc Med 1996 150: 1238 -45

3. Paediatric Anaesthesia 2010 20: 318 -22

4. Cochrane Database Syst Rev 2009 Jul 8:CD00 doi: 10.1002/14651858.CD006447

5. J Pediatric Psychology 2015 In-press

6. Psychological Assessment 2015 Submitted

Figure 1. Change in CPMAS scores between SC and STM+SC

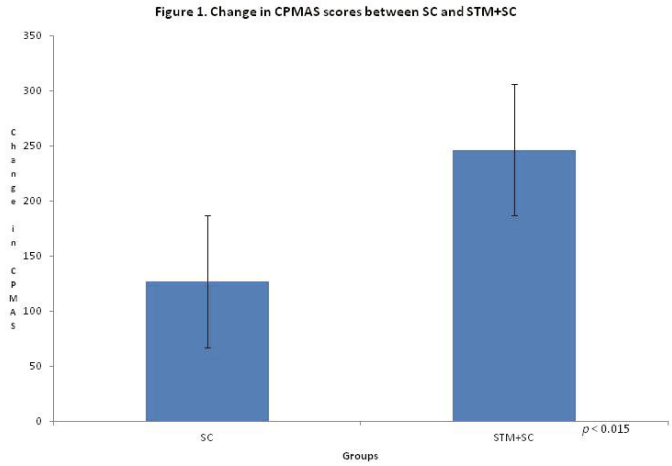

Figure 1 shows a significant difference in the mean change in anxiety scores for STM+SC (ΔM=246.50, SD=127.18) compared to SC alone (ΔM=126.60, SD=122.45); t(27)=2.59, p=0.015.

152354 - HEALTH HABITS OF MEDICAL CLERKS DURING OPERATING ROOM ROTATIONS

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Introduction: Healthy habits have been linked with enhanced learning during medical school, motivating some medical schools to institute healthy self-care programs for students.[1] Previous research has studied the health habits of medical students[2], but none specifically during operating room (OR) rotations, which can be challenging in many ways. Also, none of the previous studies have determined if medical students are meeting recommended healthy living guidelines.[3] This study measured the health habits of medical clerks during OR rotations and compared the results with recommended health guidelines.

Methods: We created a survey examining markers of a healthy lifestyle, including getting adequate amounts of exercise and sleep, and abstaining from excessive consumption of junk food, caffeine, and alcohol. The healthy levels for each habit were determined from scientific guidelines for healthy living (eg. Canadian Society for Exercise Physiology). The survey received REB approval. We distributed this survey to a sample of medical clerks in Canada and the USA. A respondent was considered to meet the guideline if they performed the positive behavior (or conversely abstained from the negative behavior) on a frequent basis.

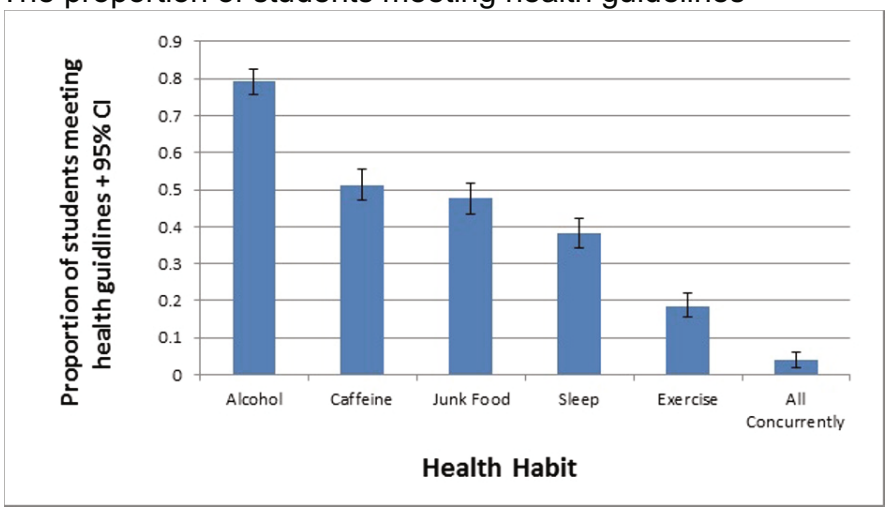
Results: A total of 543 medical students completed the survey. The proportion of respondents meeting recommended guidelines for each health habit are shown in Figure 1. 4.1% of students concurrently met all health guidelines and 4.8% concurrently met none. 45% of medical students met a majority of the health guidelines.

Discussion: It is concerning that medical students report a severe lack of exercise; a lack of exercise has been associated with difficulty learning and ‘burnout’.[4] This study was not designed to determine the causes of unhealthy habits, e.g. whether they stem from a lack of time, energy, motivation, or knowledge. This research supports the need for healthy self-care programs for medical students.[5]

References:

1. Journal of American College Health 2000 49: 125-131.
2. Australian family physician 1996: Suppl 1:S26-9.
3. Academic Medicine 2002 77: 911–917.
4. Medical Education Online 2014 19: 10.3402/meo.v19.25209.
5. Academic Psychiatry 2008: 65-68.

The proportion of students meeting health guidelines



152487 - THE EFFECTS OF GOAL-DIRECTED FLUID THERAPY IN CHILDREN UNDERGOING SCOLIOSIS REPAIR

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Introduction: Scoliosis surgery is a major procedure with potential for significant blood loss and difficult blood pressure management. Currently, intra-operative administration of fluid is variable and primarily guided by hemodynamic parameters[1]. The volume of intra-operative fluid administered in adults is known to affect post-operative outcomes[2]. Historical data from our institution (2006-2009) shows a 14% incidence of acute kidney injury (AKI) following scoliosis surgery[3]. Goal directed fluid therapy (GDT), using algorithms guided by cardiac output measurement[4], has the potential to improve outcomes.

The aim of this pilot study was to compare the effect of GDT against standard practice on intra-operative hypotension, post-operative AKI, and any concerns with intra-operative spinal cord monitoring.

Methods: With REB approval and written informed consent, we recruited adolescents undergoing single-stage posterior spinal instrumentation and fusion surgery for idiopathic scoliosis, excluding any patients with kidney disease or coagulopathy. Participants were randomized to intervention (GDT) or control protocols. Following induction of a standardized total intravenous anesthetic, a CardioQ TED probe (Deltex-Medical, Chichester, UK) was inserted into the patient’s esophagus, with prone baseline measurements then taken. In the control group, fluid was administered using boluses of 2.5ml/kg plasmalyte at the anesthesiologist’s discretion. In the GDT group, 2.5ml/kg boluses were administered when either MAP dropped 20% or stroke volume dropped 15% from baseline. Neurophysiologic monitoring was performed in all patients using motor and somatosensory evoked potentials (MEP/SSEP). For AKI detection, hourly urine outputs were recorded intra-operatively, serum creatinine obtained at baseline and on POD1 and 3, and urine neutrophil gelatinase-associated lipocalin (NGAL) biomarkers were collected at baseline, intra-operatively at 4 hrs and procedure end, and daily in the mornings of POD1 and 2.

Results: Preliminary results from 14 patients, with median (range) age 16 (12.7-18) years and BMI 19.7 (15.5-31.6) are presented. No significant difference was found in administered fluid volumes: median 2.75L in GDT and 2.45L in control group (p=0.75). Similarly, no difference was found for postoperative fluid balance (p=0.16). Vasopressor use was higher in the GDT group (57% vs. 29%). Four GDT participants had MEP changes, at which point the GDT protocol was abandoned; only 1 control participant had MEP changes. No incidence of AKI was observed, based on NGAL biomarkers or serum creatinine (Figure 1). However, one participant had AKI on POD1, based on low urine output.

Discussion: The study was stopped prematurely following difficulties with protocol compliance. Specifically, when encountering MEP changes, surgeons requested supra-physiologic blood pressure increases and, in the control arm, anesthesiologists preferred administering fluid continuously instead of as boluses per protocol. Future work includes revising the protocol and simplifying the endpoints.

References:

[1] AANA J.2007;75:277-85. [2] Acta Anaesthesiol Scand.2007;51:331–340. [3] Can Orthop Assoc;2012.p.#122 [4] Br J Anaesth.2009;103(5):637–46.

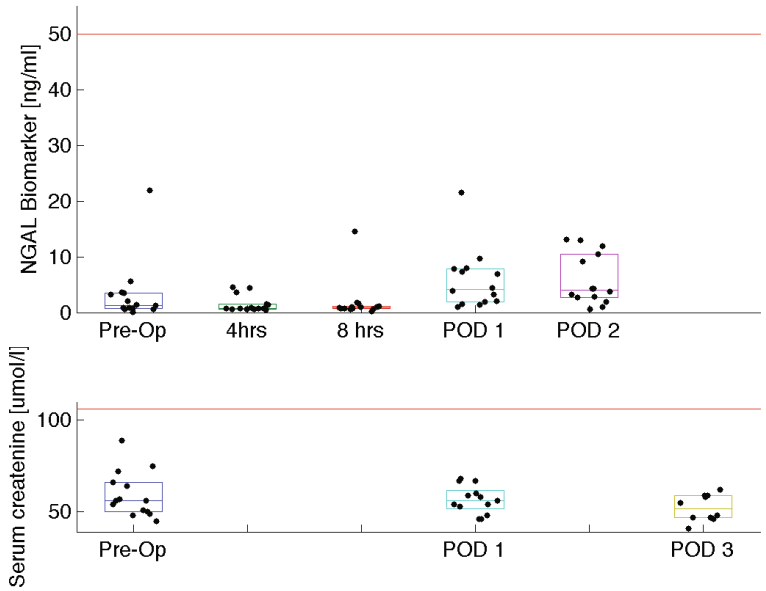

Figure 1: Acute kidney injury results using urine biomarkers and serum creatinine values. Thresholds for abnormal values are indicated using red lines.

152620 - ADHERENCE TO COMPONENTS OF AN ERAS PROTOCOL AFTER IMPLEMENTATION

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Introduction: A prior study had shown improved adherence to a standardized multimodal Enhanced Recovery After Surgery (ERAS) protocol was associated with improved clinical outcomes, indicating a dose-response relationship[1]. We studied the impact of the intraoperative managment and adherence level, after implementing our local ERAS protocol on outcomes following major elective colorectal surgery.

Methods: A multidisciplinary team implemented a full ERAS protocol at our single tertiary centre on November 1, 2013. After obtaining local ethnics approval, the charts of 258 consecutive elective colorectal procedures performed between November 1, 2013 and February 28th, 2015 were audited. The adherence to the main anesthetic components were assessed: maintenance of normothermia, adequate postoperative nausea and vomiting (PONV) prophylaxis, timely administration of antibiotics, the use of multimodal analgesia (>2 non-opioid interventions), and the use of a monitor to provide goal-directed fluid therapy (GDFT). American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP) defined comorbidity and post-operative 30 day complications, surgical approach, and length of stay were also determined. The complication rate was compared between two cohorts, those that had an > 80% compliance to the described anesthetic ERAS components and those that had < 80% complliance. Results are descriptive and both cohorts were compared for continuous variables by independent samples t-tests or median tests and categorical variables by contingency tables, using Chi-squares statistics or Fisher's Exact tests.

Results: 69% of our patients had > 80% compliance to the intraoperative components after initiating our ERAS protocol. The compliance for normothermia was 94.5%, timely administration of antibiotics 85.9%, adequate PONV prophylaxis 85.1%, use of multimodal analgesia 80.6%, and the use of a monitor to direct GDFT 50.8%. A minimally invasive (MIS) approach was performed in 71.7% of cases. 21.9% of these colorectal cases had at least one NSQIP complication. The demographics, and the incidence of major complications, and length of stay(LOS) are seen in Table 1. The two cohorts were comparable with regard to demographics, and there was a decrease in overall complications, and in pulmonary complications (pneumonia, re-intubation, ventilation > 48 hours), however no one specific complication reached statistical significance.

Discusssion: Our overall compliance to intraoperative ERAS components was high with the exception of GDFT. Intraoperative fluid therapy should aim to maintain a near-zero fluid balance and GDFT may be reserved for high risk patients and for procedures with significant intravascular fluid shifts[2.] Increased adherence to the intraoperative ERAS components show a trend to decreasing the incidence of major complications, and highlight the impact of the anesthetic management on postoperative morbidity.

References:

1. Arch Surg 2011 146:571-574
2. Acta Anaest Scand Oct 30, 2015; doi:10.111/aas.12651

Table 1: Demographics and Outcomes

	<80% compliance (N=80)	≥ 80% compliance (N=178)	p values
Age mean (SD)	67.73 (13.26)	66.25 (14.19)	p=.432
ASA 1 ASA 2 ASA 3 ASA 4	3.8% 61.3% 33.8% 1.3%	5,6% 60.1% 31.5% 2.8%	
Male/female ratio	53.8/46.2	56.2/43.8	p=.77
Co-morbidity count mean (SD)	0.51(0.939)	0.41 (0.912)	p=.22
30-day NSQIP morbidity	33.4% (n=27)	15.7% (n=28)	p < 0.05
Overall pulmonary complications Pneumonia Re-intubation Ventilation > 48hrs	15% 6.3% 5.0% 3.8%	3.93% 2.2% 1.1% 0.6%	p < 0.05 p=0.141 p=0.09 p=0.07
Length of Stay --mean (SD)	7.01 (6.44)	7.53 (8.43)	p=0.59

152636 - ARTIFICIAL VENTILATION IN A SIMULATED PEDIATRIC TRANSPORT MODEL

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Introduction:
Positive-pressure ventilation (PPV) in critically-ill patients is commonly administered via a manual resuscitation device or a mechanical ventilator during transport. Strict PPV pressure targets reduces patient morbidity and mortality in this population (1). Few studies have directly compared delivered ventilation parameters amongst the various models of manual resuscitators or against mechanical ventilators. Our group previously compared delivered ventilation parameters between a self-inflating resuscitator (SIR) and a flow-inflating resuscitator (FIR) during simulated in-hospital pediatric transport. However, unequal group access to inline pressure manometry may have biased our results (2). Further, the relative performance of mechanical ventilators is unknown. In this study, we examined the performance of the SIR and FIR, both equipped with inline manometry, and several mechanical ventilators to deliver prescribed ventilation parameters during simulated pediatric transport.

Methods:
Local research ethics board approval and participant consent was obtained. Subjects were randomized in a crossover fashion to hand ventilate a test lung while simultaneously maneuvering a stretcher bed beginning with either a Jackson-Rees circuit (FIR) or a Laerdal pediatric silicone resuscitator (SIR) both employing manometers. The scenario was repeated using several mechanical transport ventilators, five times each, (Hamilton T1, Pulmonetic LTV 1000, LTV 1200). The primary outcome was the proportion of total breaths delivered within the predefined target PIP/PEEP range (30 +/- 3, 10 +/- 3 cm H_2O). Secondary outcomes included proportion of total breaths delivered with operationally defined unacceptable breath variables (PIP >35 or PEEP < 5.). Chi-squared testing was used for statistical analysis.

Results:
A total of 30 participants were recruited into the study (16 Staff Anesthetists, 10 Residents, 4 Anesthesia Assistants). The Hamilton T1 outperformed both manual resuscitators and other mechical ventilators with a total proportion of breaths within target of 100% ($p < 0.001$) and no breaths classified as unacceptable ($P < 0.001$.) Of the manual resuscitators, the FIR outperfomed the SIR among all subjects both in terms of total proportion of breaths within target range (27% versus 19.1%, $p < 0.001$)

as well as total proportion of unacceptable breaths (41.1% versus 51.2%, $p < 0.001$). None of either LTV model breaths were within target range, and all of the LTV 1200 breaths were classified as unacceptable (Figure 1).

Discussion:
This study demonstrates that the Hamilton T1 mechanical ventilator clearly outperforms the other PPV methods with respect to delivery of important ventilation parameters. The FIR outperforms the SIR, and both the hand manual resuscitators outform the LTV 1000 and 1200. The LTV data shows very precisce but inaccuate ventilation pressure delivery, which may respresent calibration error.

References:

1. N Engl J Med. 2000;342(18):1302–130g.

2. Paediatr Anaesth. 2014 Dec;24(12):1281–7.

Proportion of Target Breaths and Unacceptable Breaths by Ventilation Device

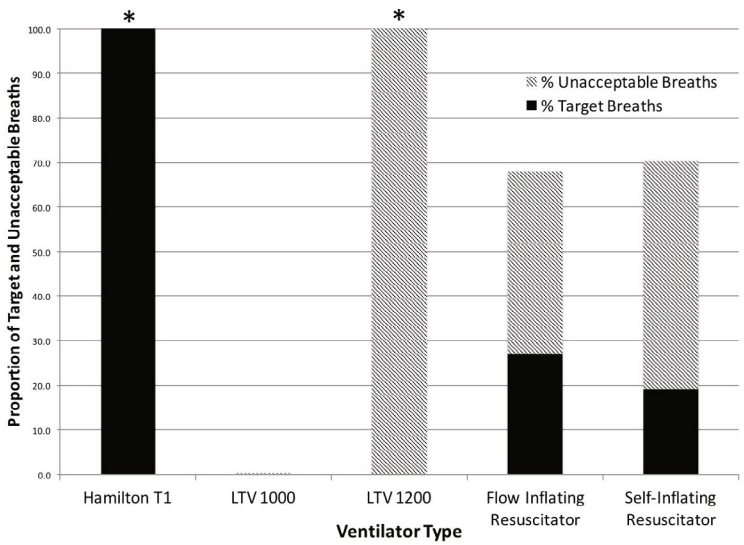

Figure 1 - Pproportions of target breaths (PIP 30 +/- 3 cm H2O, PEEP 10 +/- 3 cm H2O) and unacceptable breaths (PIP > 35 AND/OR PEEP < 5 cm H2O) delivered amongst the various tested ventilation devices. * The Hamilton T1 delivered statistically more target breaths, whereas the LTV 1200 delivered statistically more unacceptable breaths than the other devices respectively.

152674 - HANDOVER IN ANESTHESIA RESIDENCY EDUCATION

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Introduction:
Handover of anesthetic care is routine in our daily work. Review of the literature and resident curriculum revealed gaps in current resident handover education, a key competency in CanMEDS 2015. This Quality Improvement (QI) study aimed to establish a handover process by studying interactions between anesthesia residents and nurses in the post-anesthetic care unit (PACU) at our hospital. The barriers and challenges in implementation were determined.

Methods:
Approval from the QI Department was obtained and expertise was sought from the Patient Safety Office, and anesthesia and nursing educators. The needs assessment was completed by discussion with current residents and PACU nurses, who verbally consented to participation. Handovers were observed at baseline over a 2-week period, timed and content marked by using checklists developed based on literature and current practice. An independent observer and nurses rated handovers on parameters including organization and completeness. Nursing satisfaction was determined.

The handover tool was adapted from IPASS (Table 1) and taught to residents didactically. Laminated cards were provided as visual aids. Regular reminders were provided in-person and via email. Nurses received similar information and were encouraged to prompt for its use when applicable.
Observations and evaluations were repeated before and after informal reminders.

After a 2-month lapse, the observations-reminders-observations cycle was repeated. We then met with nurses and residents individually to obtain feedback on the handover process.

Results:
At baseline (n=14), average handover time was 3 minutes, completeness score was 57%, nursing satisfaction score was 87%. Post-teaching (n=16), handover duration remained the same, completeness score was 71% and nursing satisfaction was 92%. Visual aid use was 25%. Following reminders, observations (n=8) showed the same average duration, completeness score was 80% and nursing score was 95%. Referral to visual aid was 62.5%.

After the 2-month lapse, observations (n=7) were performed, with handover time of 3 minutes, completeness score 48% and nursing score 86%. No residents referred to their visual aid. Repeat observations after further reminders (n=7) showed the same handover duration, completeness score of 77% and nursing score of 91%. Visual aid use was 43%. Residents agreed an established guideline should be introduced early in training. The IPASS protocol was useful to determine gaps in existing practice but was not applicable for everyday use. Nurses reported gaps were uncommon, but they wished for surgeons' input in the handover process.

Discussion:
Handover is poorly done and is not taught in our anesthesia curriculum. Formal teaching, visual aids and reminders to reinforce use of handover tool improved communication during handover and nursing satisfaction scores. Next steps will include early implementation of standardized protocols, continual feedback and reminders, and participation from all members of respective departments, including surgery and intensive care, for systemic change and integration.

References:

1. Anesthesiology 2014, 120(1), 218-29.
2. Br J Anaesth 2008, 101(3), 332-7.
3. Paediatr Anesth 2013, 23(7), 647-54.
4. Anaesthesia, 2002, 57(5), 488-93.
5. Anesth Analg 2015, 121(4), 957-971.
6. Pediatr 2012, 201-204.

IPASS protocol

I	Illness Severity	"Stable" "Watcher" "Unstable"
	Identity	Special info
P	Patient summary	**Pre-op** -Identity (name/age/weight/ASA) -Presenting state/parental state -Medical/anesthetic history -Meds/allergies **Intra-op** -Surgical procedure -Airway/anesthetic type – difficult? -Access/ins and outs -Meds – analgesia, antiemetics, antibiotics -Surgical course and complications
A	Action list	Problems intra-op, and ongoing management (Airway, hemodynamics, blood loss, etc.)
S	Situational awareness & contingency	Anticipate potential issues in PACU and plan Disposition, eg. Home Leaves contact info
S	Synthesis by receiver	Receiver summarizes/asks questions/restates contingency plans Aug/15

A handover tool for anesthesia residents in recovery room. Adapted from Boston Children's Hospital.

152726 - PERIOPERATIVE COMPLICATIONS & STOPBANG SCORES. A METAANALYSIS

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Introduction

Surgical patients with obstructive sleep apnea (OSA) are associated with increased risk of perioperative complications. The STOP-Bang questionnaire are useful tools to identify the high-risk OSA (STOP-Bang ≥3) patients during the perioperative period. We conducted this meta-analysis to compare the perioperative complications in patients with high STOP-Bang score (≥3) versus low STOP-Bang score (0-2).

Methods: A search of the literature databases MEDLINE (from 2008 to January 2016), Medline-in-Process & other non-indexed citations (up to January 2016), Embase (from 2008 to January 2016), Cochrane Central Register of Controlled Trials (up to January 2016), Cochrane Databases of Systematic Reviews (from 2008 to January 2016), Google Scholar, Web of Sciences (from 2008 to January 2016), Scopus (2008 to January 2016) and PubMed (from 2008 to January 2016) was carried out. The search yielded 119 citations. Irrelevant papers were excluded by title, abstract and full-text review, leaving 11 manuscripts for analysis. Inclusion criteria were: 1) Studies that used STOP-Bang questionnaire as a screening tool to identify the high-risk and low-risk for OSA in adult surgical population (>18 year); 2) studies that mentioned the perioperative complications associated with high STOP-Bang score (≥3) and low STOP-Bang score (0-2).3) Publications in the English language. The perioperative complications were cardiac events or respiratory events or any complication requiring ICU admission. The study quality was evaluated using the Cochrane risk of bias tool. Statistical analysis was carried out using the Review Manager 5.3 software. The pooled odds ratio for perioperative complications was estimated.

Results: The meta-analysis was carried out in 11 studies including a total of 20,482 patients (High STOP-Bang score group, n=7,598 and low STOP-Bang score group, n= 12,884). Overall, the odds of having perioperative complications was higher in high STOP-Bang score patients compared to low STOP-Bang score patients (OR 3.83; 95% CI: 1.75-8.36; P=0.0008)

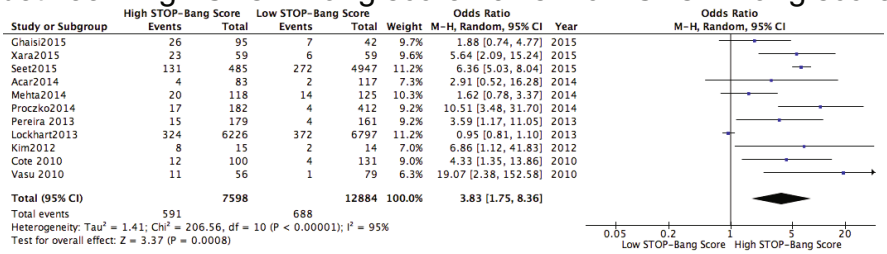
Conclusion: This meta-analysis suggests that patients with high STOP-Bang score (>3) are associated with increased risk of perioperative complications. STOP-Bang questionnaires can identify the high-risk OSA patients and implementing the evidence based perioperative precautions can decrease the risk of postoperative complications. Although patients identified to be at high risk for OSA have been shown to have increased perioperative complications, there was an important caveat to this recommendation. This meta-analysis justifies the implementation of STOP-Bang questionnaires as a screening tool to identify the high-risk OSA patients during the perioperative period.

References:

1. Anesthesiology 2008; 108: 812–21.

2. PLOS ONE 2015 Dec 14;10(12):e0143697. doi: 10.1371

Figure 1 – Forrest plot comparing the association of Perioperative complications between High STOP-Bang score ≥3 vs. Low STOP-Bang score 0-2



152732 - A SYSTEMATIC REVIEW EXAMINING POST-OPERATIVE DELIRIUM ON MORTALITY

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INTRODUCTION: Delirium is a fluctuating disorder that represents a decompensation of cerebral function and can result in acute and reversible cognitive decline. Delirium has been associated with adverse post-operative outcomes, but controversy exists as to whether delirium is an independent predictor of mortality. Our objective was to assess the association between incident post-operative delirium and mortality in adult non-cardiac surgery patients.

METHODS: Ethical approval was not required for this project. The protocol for the systematic review was registered with PROSPERO (CRD42015029805), and was conducted in accordance with the Cochrane Collaboration guidelines. A systematic search of studies was conducted using Cochrane, Medline/PubMed, CINAHL, Embase databases (01/1981 to 09/2015) . Eligible studies included randomized controlled trials, cohort studies and case-control studies with validated measures of incident postoperative delirium, and mortality outcomes. Screening was conducted by two independent reviewers. Study design, demographic, exposure and outcome data were extracted. Pooled effect estimates were calculated with random-effects models using Stata 10.0 and expressed as odds ratios (OR) and 95% confidence intervals (95%CI). Heterogeneity was evaluated with the I^2 index. Risk of bias was assessed using Cochrane Risk of Bias Tool for Non-Randomized Studies.

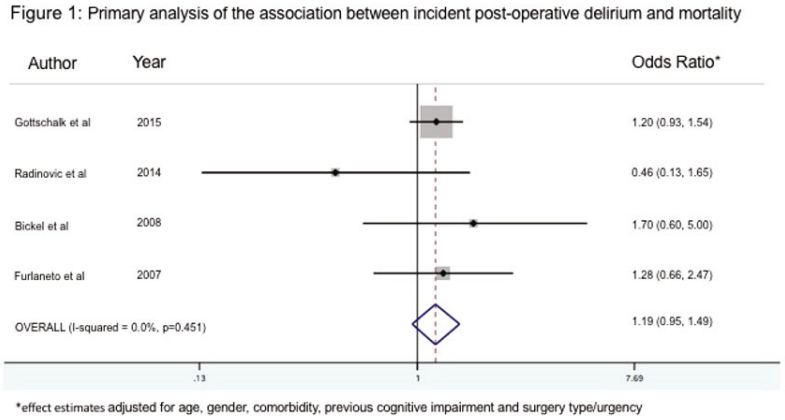
RESULTS: 4626 citations were identified; 38 studies met eligibility criteria, and 28 studies were suitable for pooled analysis (n=6402). Risk of bias in these studies ranged from moderate to high. Primary analysis from observational studies (four studies; orthopedic hip surgery patients; n=1014) that adjusted for *a* priori defined key confounders (age, gender, comorbidity, previous cognitive impairment and surgery type/urgency) showed that incident post-operative delirium was not associated with a significantly increased risk of mortality after an average follow-up of 31 months (OR= 1.19, 95% CI = 0.95 - 1.49; I^2=0.0%). In contrast, post-operative delirium was associated with increased risk of mortality in the secondary analysis using any adjusted estimate (10 studies; n=3085; OR=1.71, 95%CI 1.43 - 2.05; I^2=74.8%) and tertiary analysis using unadjusted event rates (28 studies; n=6402; OR= 4.24, 95%CI 3.56 - 5.06; I^2=38.1%).

DISCUSSION: Few high quality studies are available to estimate the impact of incident postoperative delirium on mortality. Studies that controlled for key confounders did not demonstrate a significant independent association of delirium on postoperative mortality. Larger effect sizes noted when confounding bias was present suggest that delirium may be an indicator of underlying factors that pre-dispose a patient to increased risk of death rather than a true independent risk factor. Given the rapid ageing of our surgical population, adequately powered studies using validated exposure metrics, confounder control, and adequate follow up are needed to address the impact of postoperative delirium on mortality.

References:

1. NEJM 2006 354: 1157-1165.
2. BMJ 2007 334: 842-6
3. JAMA 2010 304: 443-51

Figure 1: Primary analysis of the association between incident post-operative delirium and mortality



152741 - FOCUSED CARDIAC ULTRASOUND TRAINING IN CANADIAN RESIDENCY PROGRAMS

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Introduction: Focused cardiac ultrasound (FoCUS) is being increasingly used by anesthesiologists to assess patients perioperatively. Accordingly, FoCUS training has recently been incorporated into some Canadian anesthesiology residency programs(1). While a recent study demonstrated that FoCUS training in US anesthesiology training programs is uncommon(2), little is known about the particulars of this training across Canada. Given the value of perioperative FoCUS. and the likelihood that it will eventually become a mandatory part of residency training, the purpose of this study is to assess the current state of FoCUS training in anesthesiology residency programs in Canada.

Methods: Local research ethics committee approval was obtained. A survey was sent by mail and email to the 17 Canadian program directors of anesthesiology residency training programs.

Results: Twelve of 17(70.6%) surveys were returned. All but one program(91.7%) felt FoCUS training should be mandatory. Nine programs(75%) currently have mandatory(25%), elective(25%), or medicine elective(25%) rotations in FoCUS. The remaining 3 programs have teaching in FoCUS, but no formal rotation. Supervision of training was exclusively performed by anesthesiologists in 5 programs(41.7%), anesthesiologists in combination with cardiologists or intensivists in 5 programs(41.7%), and by non-anesthesiology specialists in 2 programs(16.7%). Minimum targets for FoCUS studies performed during training existed in 5 programs(41.7%) with the average target being 49.2 studies(range 25 to 90). Details of the amount and type of didactic training are presented in Table 1. Programs with a mandatory rotation all had didactic training greater than 20 hours and a required minimum number of studies performed. Identified barriers to implementation of a FoCUS program included the lack of the following: manpower(50%), expertise(41.7%), a standardized curriculum and standardized training requirements(33%), and necessary equipment(25%).

Discussion: There is high variability in training of FoCUS among Canadian anesthesiology residency training programs. Program directors do, however, recognize its importance for future anesthesiologists, with a large majority offering formal or elective rotations. Most programs offer at least 10 hours of didactic training. Some experts propose that basic FoCUS competence can be achieved with as little as 12 hours of didactic and practical training(3) and these levels are currently surpassed by a majority of the programs. Although no minimum requirements for training currently exist for perioperative FoCUS(4), programs with a formal rotation surpass recent Canadian recommendations for FoCUS training in critical care(5). This study highlights the need for a formal national curriculum and minimum training requirements, which would in turn help with the country-wide adoption of effective FoCUS training in anesthesiology residency programs across Canada. Further efforts will be needed, however, to address other identified barriers to implementation.

References:

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5. Can Respir J 2014;21(6):341-345

Table 1

Table 1: Characteristics of didactic teaching

	Number of Programs (%)
Hours of Didactic Teaching	
1-10 hours	3 (25.0%)
10-20 hours	3 (25.0%)
20-50 hours	5 (41.7%)
>50 hours	1 (8.3%)
Modalities of DidacticTeaching	
Lecture	11 (91.7%)
Online Resource	9 (75%)
Simulation	9 (75%)
Bedside Teaching	9 (75%)
Echo Lab	7 (58.3)

Characteristics of didactic teaching

152752 - OPIOID-INDUCED HYPERALGESIA AND ALLODYNIA IN CHRONIC PANCREATITIS

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Opioid-induced hyperalgesia (OIH) is the paradoxical increase in pain and pain sensitivity despite escalating opioid doses[1]. This may result from central sensitization through increased NMDA receptor activity, increased spinal dynorphin concentrations, and alterations in descending inhibitory control and opioid receptor G-protein activity[1]. We present a case of OIH in a patient admitted with abdominal pain with a history of chronic pancreatitis and chronic opioid use. Patient consent was obtained.

A 46 year old male with 3 year history of alcohol-related chronic pancreatitis was admitted with two weeks of worsening epigastric pain. It radiated to his back, and was associated with diarrhea and nausea. He had several past admissions for abdominal pain. His history includes HIV-related neuropathy, left-sided sciatica treated with lumbar discectomy, fibromyalgia, Bowen's disease, former alcohol abuse, and depression. His medications included oxycodone 5mg/acetaminophen 325mg, 12 tablets per day, cyclobenzaprine, amitriptyline, and marijuana. He was started on parenteral morphine 5mg q6h PRN; though he took it regularly, his pain worsened and became more generalized.

On examination, the patient was in discomfort. Abdominal exam revealed sharp pain and guarding with light and deep palpation of the epigastrium and right upper quadrant. Brush-evoked allodynia was exhibited over the entire abdomen. There was no peritonitis. Upper extremities demonstrated deep allodynia bilaterally, which differed from his fibromyalgia. Investigations revealed normal leukocyte count, liver enzymes, lipase, amylase, and bilirubin.

Given his escalating dose of narcotics without improvement, his oxycodone/acetaminophen was rotated to a 30% less equivalent of morphine sustained release 40mg BID. He started dextromethorphan 15 mg TID and clonidine 0.1-0.2 mg TID PRN for withdrawal symptoms. The patient's pain was significantly reduced and he was discharged within 3 days. His abdominal and arm allodynia resolved.

OIH is a concern with patients receiving opioids in both acute and chronic settings[2]. An

association between higher opioid doses and lower pain tolerance has been found[3]. The differential for OIH includes progression of the disease process, a new disease, fibromyalgia, opioid tolerance. The diagnosis is challenging as the symptoms mimic opioid tolerance. A key feature of OIH is the paradoxical increase in pain with opioid dose escalation. Symptoms suggestive of OIH include presence of new or changed pain, such as brush-evoked allodynia in our patient, and pain in other dermatomes or locations.

Treatment modalities include opioid rotation, buprenorphine, NMDA receptor antagonists (e.g., ketamine, dextromethorphan), methadone, COX-2 inhibitors, and α2 receptor agonists[4]. Treatment can be time consuming and frustrating, and many patients are reluctant to decrease their narcotic dose.

References:

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2. Anesthesiology 2000 93: 409–417
3. Reg Anesth Pain Med 2015 40: 687–693
4. Pain Physician 2011 14: 145–61

152764 - EFFECT OF ORAL DEXAMETHASONE ON QUALITY OF RECOVERY IN BREAST SURGERY

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Introduction: Dexamethasone is routinely used off label to reduce the incidence of post-operative nausea and vomiting. It has been shown to cause a minimal reduction in VAS pain scores after mastectomy(1) and to improve quality of recovery after laparoscopic cholecystectomy(2) and cardiac surgery(3). These studies have all used IV dexamethasone; based on the pharmacodynamics of dexamethasone, an earlier administration time may result in a larger effect. This could be facilitated by oral administration. We hypothesized that pre-operative oral dexamethasone would improve patient quality of recovery (QOR) compared to placebo. Our secondary hypothesis was that oral dexamethasone would reduce clinically significant post-operative nausea and vomiting (CSNV) in the post anesthesia recovery room and this benefit would endure at 24 hours.

Methods: We conducted a single centre, block randomized, double blind, parallel-group(1:1), intention to treat, controlled trial. Local research ethics board approval and consent from every patient was obtained. The trial is registered at clinicaltrials.gov. Eligible patients were adult women (18-90 yrs.) undergoing elective breast surgery(ranging from lumpectomy to breast reconstructive surgery) under general anesthesia of at least 45 minutes duration. Patients of ASA class 4 or 5, pregnant, diabetic, using steroids or anti-emetics in the past month, with chronic pain requiring opioids, history of alcohol or drug abuse, severe renal impairment or conditions precluding them from completing the QOR-40 instrument were excluded from the study. This was an effectiveness trial where we intentionally left most decisions to the anesthesiologists' discretion. Patients were randomly assigned to pre-operative oral dexamethasone (10mg) or placebo; all received 6mg ondansetron at skin closure. Primary endpoint: QOR-40 at 24 hours post operation(4). Secondary endpoints: CSNV on discharge from the post anesthesia recovery room and at 24 hours post operation(5).

Results: Seventy patients completed the study; all patients were tracked per CONSORT guidelines. Analysis was by intention to treat. There was no difference in baseline characteristics between groups. There was no difference between groups in POD1 QOR-40 scores, including the comfort and pain subcategories and controlling for patient baseline scores(delta)(Table 1). Subgroup analysis of outpatients reveals a

statistically and clinically significant reduction in quality of recovery for the experimental group(Table 1). There was a very low incidence of CSNV at both time points; there were no statistically significant differences between groups. Multiple linear regression (refined using least angle regression(6)) demonstrates that the longer between administration of oral dexamethasone and induction of anesthesia, the worse the quality of recovery(Table 1).

Discussion: In our study, delta QOR-40 scores were increased in patients receiving oral dexamethasone when controlling for confounding factors, suggesting that oral dexamethasone is worse than placebo for quality of recovery in breast surgery patients. CSNV was lower than expected and not different between groups.

References:

1. BMC cancer 2010; 10(1):692-698
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4. Br J Anaesth 2000; 84(1):11–15
5. Br J Anaesth 2010; 104(2):158–166
6. *Ann. Stat.* 2004; 32(2):407-99.

Table 1: Results

Table 1

	Dexamethasone (N=34)			Placebo (N=36)			P value
	Mean	**(SE)**	**[95% CI]**	**Mean**	**(SE)**	**[95% CI]**	
Quality of recovery at 24 hours							
QOR-40 score	169.5	(4.1)	[161.2-177.9]	164.0	(4.2)	[155.4-172.5]	0.347‡
Comfort section	49.5	(1.4)	[46.6-52.4]	48.3	(1.2)	[45.8-50.8]	0.521‡
Pain section	28.9	(1.1)	[26.6-31.1]	29.1	(1.0)	[27.1-31.2]	0.862‡
Delta QOR-40 score	18.5	(3.4)	[11.7-25.4]	19.7	(3.1)	[13.3-26.0]	0.808‡
Delta comfort section	7.2	(1.3)	[4.5-9.8]	6.3	(1.0)	[4.2-8.4]	0.613‡
Delta pain section	4.6	(1.1)	[2.5-6.8]	3.2	(0.7)	[1.8-4.6]	0.278‡
Subgroup Inpatient		(N=18)			(N=29)		
Delta QOR-40	23.9	(5.0)	[13.5-34.4]	25.1	(3.0)	[19.0-31.2]	0.843‡
Subgroup Outpatient		(N=15)			(N=7)		
Delta QOR-40	12.1	(3.9)	[3.6-20.5]	-2.9	(4.1)	[-13.0-7.3]	**0.019‡**
	Proportion of study population				Proportion of study population		
Clinically significant nausea and vomiting	0	1	2	3	0	1	2	3	
PARR Vomiting	0.347	0.113	0.013	0	0.375	0.075	0.025	0.013	0.543~
PARR Nausea	0.400	0.050	0.013	0	0.400	0.038	0.025	0.025	0.482~
PARR CSNV	0.486	0	-	-	0.486	0.027	-	-	0.162~
First 24 hours Vomiting	0.325	0.138	0.025	0.013	0.25	0.138	0.088	0.025	0.273~
First 24 hours Nausea	0.425	0.063	0	0.013	0.363	0.050	0.025	0.063	0.159~
POD1 CSNV	0.474	0.013	-	-	0.474	0.039	-	-	0.330~
Safety outcomes									
Blood Glucose (2 hours post skin incision)	7.57 (0.25) Range 4.9-11.4				6.1 (0.2) Range 4.2-8.2				**<0.001‡**
Emergent return to OR	2				2				0.877~
Multiple Linear Regression- Delta QOR-40					**Adjusted R-squared 0.684**				
Predictor Variable					Coefficient		SE		P value
Length of anesthesia (45-689 minutes)					0.0452		0.0120		**<0.001**
Number of PARR rescue anti-emetic doses (0-3)					7.88		2.19		**0.001**
POD1 IV morphine equivalents (0-62.5 mg)					0.373		0.133		**0.007**
Minutes between dexamethasone administration and induction of anesthesia (0 if placebo: 45-335 if dexamethasone group)					0.0533		0.0225		**0.021**
Number of pre-op prescribed medications (0-7)					-1.98		0.874		**0.027**

SE-Standard Error; 95% CI- 95% Confidence interval
Vomiting Categories 0-Never, 1-Once, 2-Twice, 3-Three or more times;
Nausea Categories 0-Not at all, 1-Sometimes, 2-Often or most of the time, 3-All of the time.
CSNV: 1 for Nausea and Vomiting scores whose sum is 5 or 6; 0 for scores whose sum is 0-4[6].
Delta scores are calculated by subtracting patients' POD1 score from their baseline score.
‡ P-value represents the two tailed p-value from Two-sample t-tests assuming unequal variances
~P-value represents X^2 analysis

152766 - EPISTAXIS RATE- PARKER FLEX-TIPTM VS STANDARD NASAL RAE TUBE

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Introduction:
Endonasal intubation is a widely performed technique that allows administration of anesthetic during oral, dental and maxillofacial surgeries. Nasal intubation poses several risks not encountered in oropharyngeal intubation, most commonly epistaxis due to nasal abrasion, which can range from mild to massive epistaxis[1] (Hall). A recent study by Sugiyama et al. (2014) [2] found that an oral Parker Flex-Tip™ endotracheal tube (ETT) with a posterior facing bevel, advanced with the aid of an anteriorly flexed stylette , reduced the incidence of epistaxis to 4% compared to 50%, found with a standard ETT[2]. Our primary aim was to test the hypothesis that the use of the Parker Flex-Tip ™ nasal RAE tube with the posterior facing bevel reduces epistaxis compared to the standard nasal RAE ETT.

Methods:
With local ethics board approval and written informed consent, 60 ASA I and II patients undergoing oral or maxillofacial surgery where a nasal intubation would be appropriate for surgical anesthesia were recruited. Patients were randomized to either a standard nasal RAE ETT or nasal Parker Flex-Tip™ ETT by opening a sealed envelope at induction. Both study groups had the ETT thermosoftened and lubricated prior to insertion, and size of the tube was chosen by the attending anesthesiologist based on clinical judgement prior to unblinding. Intubation was performed by the attending anaesthetist slated for that operating room. After intubation was completed an investigator blinded to tube type scored the presence of epistaxis as none, mild, moderate or severe as per definition by Sugiyama et al. (2014)

Results:
No epistaxis was recorded in 30% of the standard tubes vs only 26.6% for the Parker Flex-Tip™.While for moderate epistaxis Parker Flex-Tip™ 36.6% vs 30.0% for the

standard tube. There were no incidences of massive epistaxis. None of these differences had statistical significance, ($P < 0.5$). Secondary results - ease of insertion and post-op pain (VAS) foound no difference between groups.

Discussion: We found no statistical significant difference in epistaxis during nasal intubation comparing the nasal Parker Flex-Tip^{TM} tracheal tube with a standard nasal RAE ETT. The Flex-Tip tracheal tube thus does not appear to reduce the incidence of nasal mucosal trauma during nasotracheal intubation in this population compared with the conventional tip tracheal tube. Heterogeniety of study population and individual operator technique may have a greater role in the occurence of epistaxis post nasal intubation than the design of the tube studied.

References:

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[2] Kazuna Sugiyama, Yozo Manabe, Atsushi Kohjitani, A styletted tracheal tube with a posterior-facing bevel reduces epistaxis during nasal intubation: a randomized trial. *Can J Anesth 2014 61:417–422*

152769 - HUMANE ENDPOINTS IN ALI: A SYSTEMATIC REVIEW FOR A NATIONAL CONSENSUS

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Introduction:
The mechanisms of organ failure and death in acute respiratory distress syndrome are unknown. Therefore, rigorous preclinical studies of acute lung injury (ALI) with a focus on severe and late stages of disease, are needed to evaluate novel therapies. This leads to unresolved animal welfare issues since true death is not routinely accepted as an experimental endpoint. Instead, surrogate humane endpoints of death are used as they are thought to minimize suffering while allowing a valid assessment. To date, there is no consensus regarding surrogate humane endpoints of death in preclinical ALI. Prior to engaging key stakeholders in a consensus process, we undertook a systematic search to identify existing guidance for surrogate humane endpoints of death in small animal models of ALI.

Methods:
A systematic search of Medline and Embase was performed in collaboration with an information specialist (inception–09/2015). Retrieved citations were screened and general study characteristics were extracted independently in duplicate. Primary studies, reviews, and editorials providing guidance for humane endpoints in small animal models of ALI and critical illness (e.g. sepsis) were included.

Results:
Our search retrieved 1744 citations and 10 articles met eligibility criteria; 7 were primary studies and 3 were review articles (including 1 consensus statement for animal models of sepsis). These articles examined ALI (7 articles) and other models of critical illness (3) in small animals models (6) and large animal models (4). Four articles identified body temperature as a surrogate humane endpoint (surface [< 28.8°C], oral [< 32.0°C] or rectal [< 32.0°C]). Similarly, 3 articles reported the percentage of body weight lost (>20%) and/or appetite as useful endpoints. Fur cleaning behaviour (e.g. presence of piloerection or rough hair coat) and hunched posture were identified as surrogate endpoints by 3 and 2 articles, respectively. Finally, 2 articles suggested severe dyspnea or altered breath sounds as humane endpoints. Additional suggested endpoints included blood pressure (exact pressure not specified), animal activity, closed eyelids when stimulated, the presence of biochemical evidence of organ failure (biomarkers not defined) and an 8-point composite score (endpoint suggested by 1 article each). Eight of 10 endpoints lacked a quantitative method for objective assessment and none were prospectively validated.

Conclusions:
This is the first systematic review of the humane endpoints for preclinical ALI. Although several surrogate humane endpoints were identified, none have been prospectively validated. This highlights the need for consensus guidelines to develop humane endpoints that can be applied in ALI studies across laboratories. Decreasing the variability in endpoints will improve generalizability of preclinical studies. This may increase preclinical to clinical translation of novel clinical therapies.

References:
N/A

152782 - CHOICE OF DIRECT VS VIDEO LARYNGOSCOPY FOR THE EMERGENCY AIRWAY

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Introduction: Emergency department (ED) and intensive care unit (ICU) teams are responsible for the care of a population which is especially vulnerable to conditions requiring immediate and decisive airway control. Our study aimed to determine if physicians performing emergency intubations will choose direct laryngoscopy or Glidescope videolaryngoscopy more frequently, and which intubator or intubation factors influenced the decision to choose direct versus video laryngoscopy.

Methods: Local ethics committee approval was obtained. Emergency intubations occurring in hospital were recorded via an operator-completed survey following emergency intubations over a pre-determined period of time. Collected data included indication for intubation, predicted difficulty of intubation, actual difficulty of intubation, reason for predicted or actual difficulty, location of intubation (ED/Ward/ICU), level of operator training, operator specialty, choice of intubation device, reason for choice, number of attempts, and whether or not a different device was required.

Results: 51 cases were captured, 32 in the ICU, 16 in the ED, and 3 on regular wards. 1 ED case progressed to the operating room for fiber-optic intubation. The average age of our patients was 66, the youngest was 30 and the oldest was 94. 22 patients were female, 29 were male. 17 patients were characterized as obese. 4 had suspected cervical spine injuries. Direct laryngoscopy was the first choice of technique 32 times (63%), and Glidescope videolaryngoscopy was chosen first 16 times (31%). A Glidescope was used to “rescue” failed direct laryngoscope intubations 8 times, and a direct laryngoscope was used to rescue failed Glidescope intubations twice. All intubations were ultimately successful. Combining all attempts, direct laryngoscopy was successful in 71% of cases and Glidescope videolaryngoscopy was successful in 92% of cases. Intubators were more likely to choose the Glidescope for intubations which they predicted to be difficult. Both modalities were chosen across all levels of training and every specialty, with the

exception that all emergency physicians chose direct laryngoscopy first. Intubations which were not predicted to be difficult were noted to be difficult on 4 occasions. Difficult intubation was correctly predicted in 80% of cases. (Figure 1)

Discussion: Physicians working in high acuity care environments use both direct laryngoscopy and Glidescope video laryngoscopy to intubate. The Glidescope video laryngoscope was chosen more frequently than direct laryngoscopy when intubation was predicted to be difficult, and despite this was successful in a greater number of cases (92% vs 71%) in our study. Level of training did not influence the intubation modality chosen. Both devices had notable failure rates, and as it is not always possible to determine which intubations will be difficult, emphasized the importance of ubiquitous training in both techniques and access to both devices for all staff performing emergency intubations.

References:
Nil

Intubations by difficulty

A flowchart of intubations based on predicted difficulty, laryngoscopic device(s) chosen, and actual difficulty.

152793 - MERITS OF WIDESPREAD SINGLE-DOSE DEXAMETHASONE AS PART OF A COMPREHENSIVE PERIOPERATIVE PAIN MANAGEMENT PLAN

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Introduction

Dexamethasone is used perioperatively for the prevention of postoperative nausea and vomiting (PONV). Systemic perioperative dexamethasone has been found to reduce postoperative pain and opioid consumption. Given the concerns surrounding the perioperative use of NSAIDs as an analgesic, dexamethasone may be used to provide analgesia without the side effects associated with NSAIDs. This review provides a detailed account the benefits of perioperative dexamethasone, its merits as an analgesic agent, and potential side effects associated with perioperative single-dose dexamethasone administration.

Methods

Pubmed and Medline searches were conducted for peer-reviewed articles surrounding the analgesic properties of perioperative single-dose dexamethasone. Moreover, separate searches were conducted for articles discussing potential side effects of perioperative dexamethasone use. Articles were not excluded based on time of publication, type of article, or patient population.

Results

Perioperative single-dose dexamethasone administration is an effective antiemetic, and is most commonly administered for this indication. Moreover, dexamethasone has also been shown to reduce hospital length of stay and reduce the incidence of sore throat after endotracheal intubation.

Single-dose IV dexamethasone at 8-10mg has been shown in numerous studies to significantly reduce the severity of pain both at rest and with movement from as early as 1 hour post-op. Dexamethasone administration also resulted in significantly less consumption of both opioids and other analgesics, and delayed the request for post-op analgesia.

Current literature depicts a favourable safety profile for perioperative single-dose dexamethasone. No significant differences in outcomes could be found with respect to postoperative infection rates and delayed wound healing. Perioperative hyperglycemia as well as perineal irritation have been documented, although both can be managed without adverse outcomes.

Discussion

Current literature suggests that dexamethasone at doses similar to those used for PONV prophylaxis provides a significant analgesic effect. This helps to reduce both early and late postoperative pain at rest and with movement, while decreasing opioid demand and delaying patients' demand for analgesics. Perioperative dexamethasone administration also has the added benefit of reducing both length of postoperative hospital stay, as well as helping to alleviate sore throat commonly experienced after endotracheal intubation. Therefore, perioperative dexamethasone should be considered not only for its antiemetic properties, but for use as a co-analgesic agent as part of a balanced multimodal anesthetic.

Overall, evidence in current literature depicts a favourable safety profile of perioperative dexamethasone. In addition, strong evidence demonstrating its efficacy in reducing PONV and postoperative pain suggests that its routine use would benefit most patients in the perioperative setting.

References:

N/A

152801 - TOTAL SHOULDER ARTHROPLASTY SAME DAY DISCHARGE: ERAS PILOT PROJECT

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Background: Patients undergoing Total Shoulder Arthroplasty (TSA) normally stay in hospital for 2-3 days[1,2]. Some barriers to discharge are medical (pain, post-operative nausea and vomiting (PONV) respiratory depression) and some are related to usual hospital practices (timing of allied health professionals' (AHP) assessment, timing of post-operative X-rays etc.). If these barriers are overcome, patients have the potential to return home safely on the day of surgery.

Methods: In this open-label pilot study we evaluate the use of a continuous interscalene block (CISB) for shortening length of stay. After obtaining ethics board approval and using a set of inclusion and exclusion criteria to identify patients without severe medical co-morbidities, we screened and recruited 10 patients undergoing TSA. Following recruitment, we used a modified Enhanced Recovery After Surgery (ERAS) protocol to optimize the patients' in the perioperative period.

We used a set of preoperative, intraoperative and postoperative interventions to reduce pain, nausea and respiratory depression. These included short-acting anesthetic agents, CSIB and PONV prophylaxis. To address non-medical barriers for discharge, we created a streamlined multi-disciplinary process to ensure that patients receive appropriate care from AHP in a timely fashion.

Results*:* 67% of patients met discharge criteria within 23 hours of admission (mean readiness-to-discharge time of 10 hours +/- 1 h post PACU admission). The remaining patients met discharge criteria at a mean of 33 h post-admission to PACU, due to respiratory concerns related to pre-existing but un-identified conditions.

Discussion*:* We have been able to create and test a screening tool to identify patients that can qualify for same day TSA process. Through the use of our modified ERAS protocol including CSIB for analgesia, we can control factors that increase post-operative length of stay. Through the use of pre-admission screening tool, modified

ERAS protocol and streamlined multi-disciplinary process, TSA can be successfully performed as an outpatient procedure in a significant subset of patients. We will perform a formal trial in the near future to evaluate our protocols in a larger setting.

References:

1. Dunn JC. Predictors of length of stay after elective total shoulder arthroplasty in the United States. J Shoulder Elbow Surg 2015; 24: 754-759.

2. Menendez ME et al. Predictors of extended length stay after elective arthroplasty. J Shoulder Elbow Surg; 24: 1527-1533.

Table. Same Day Discharge for Total Shoulder Arthroplasty

Table: Same day discharge for Total Shoulder Arthroplasty:

Patient Screening	Modified ERAS Protocol	Multidisciplinary Process
Exclusion	Preoperative	Post-operative
Significant cardiac and respiratory disease	Preop counseling	Early oral nutrition
Need for hospitalization due to reason other than the planned surgery	Fluid+carb loading	Non-opioid oral analgesia / NSAIDs
Sleep apnea	No prolonged fasting	Early mobilization
Morbid Obesity (BMI>35)	Antibiotic prophylaxis	Stimulate gut mobility
Psychiatric illness	CISB	X-rays after PACU discharge
Lack of informed consent	Intraoperative	OT review
Allergy to drugs used	Short-acting anesthetic agents	PT review
Contraindications to CISB	Avoid of Na and H2O overload	CCAC for CISB
	Maintain normothermia	Audit
	Prevent nausea/ vomiting	

CSIB = Continuous Interscalene Block; carb = carbohydrate; Na = sodium; H2O = water; OT = occupational therapist; PT = physiotherapist; CCAC = Community Care Access Centre

152815 - COMPARING KETOROLAC DOSE OF 15 MG VERSUS 30 MG ON POSTOPERATIVE PAIN

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Introduction: Ketorolac has been supported in medical literature and clinical practice for the treatment of postoperative pain. The standard parenteral dose recommended by manufacturer for healthy non-elderly population is 30 mg based on a number of clinical trials. The smallest effective dose is ideal to avoid side effects. In our randomized controlled trial we hypothesize 15 mg single-shot intraoperative dose to be non-inferior to the standard 30 mg dose in VAS (Visual Analogue Scale) pain score 4 hours after adult decompression spine surgery.

Methods: Ethics approval was granted for this study by the local ethics board. Informed consent was obtained for each participant. Fifty patients scheduled for spine surgery were recruited and randomized to two groups. They received a single dose of either 30 mg or 15 mg of ketorolac at the end of surgery. Nursing staff were instructed to record VAS pain scores 4 hours after administration, and NRS (Numerical Rating Scale) pain scores 4, 8, 12, and 24 hours after administration. The medication was prepared by the hospital pharmacy with the dose blinded to the patient, anesthesiologist, and nursing staff. The a priori set non-inferiority margin was 6 mm on the VAS. All statistical tests were performed in SPSS 19.0. Non-normally distributed data are presented as median (interquartile range). Differences between groups were assessed using the Mann-Whitney U test and Fisher's exact test.

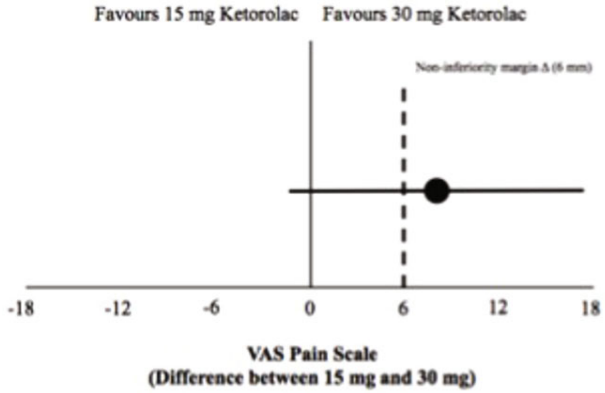
Results: Mean ages were 54 (22.5) and 53 (16) ($p = 0.42$) in the 30 mg and 15 mg groups, respectively. Gender proportions were equivalent in each group (17M:8F). Four-hour VAS scores of 25 mm (26.5 mm) and 35 mm (27.5 mm) in the 30 mg and 15 mg groups respectively, were not significant ($p = 0.189$). Absolute difference in 4-hour VAS scores between the two groups was 7.9 mm (95% CI, -1.5 mm – 17.4 mm) (Figure 1). Although consistently higher in the 15 mg group, no statistically significant differences were noted in 4-hour ($p = 0.12$), 8-hour ($p = 0.38$), 12-hour ($p = 0.06$) or 24-hour ($p = 0.16$) NRS pain scores.

Conclusions: In this study, 15 mg versus the standard dose of 30 mg failed to demonstrate non-inferiority based upon our a priori margin of 6 mm VAS. Further study regarding the optium dose of perioperative parenteral ketorolac is warranted.

References:

1. Acta Anesthesiol Scand 2008 52: 1278-1284
2. Can J Anaesth 2002 49: 461-6
3. Anesthesiology 1994 80: 1277–1286
4. J Spinal Disord Tech 2007 20: 123-126
5. Am J Obstet Gynecol 2003 189: 1559-62
6. Eur J Anaesth 1997 14: 610-615

Figure 1



Absolute difference (7.94 mm, 95% CI = -1.5 mm – 17.4 mm) on the VAS pain scale at 4 hours post-injection of ketorolac between 15 mg and 30 mg doses. Based on our sample size, results suggest no statistically significant difference between 4-hour VAS pain scores (p = 0.189); however, the achievement of non-inferiority is inconclusive.

152817 - OPTIMAL THERAPY OF PREOPERATIVE ANEMIA: PRELIMINARY COHORT RESULTS

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Introduction

Preoperative anemia is common and predicts worse surgical outcome (1). Perioperative allogeneic blood transfusion (ABT) increases proportionally with decreasing serum hemoglobin (hgb) concentration, and has been shown to increase the incidence of postoperative complication rates (2,3). While iron supplementation and erythropoietin are effective perioperative blood management (PBM) strategies, the optimal duration and dosing of treatment to reduce transfusion requirements remain unclear. The aim of this retrospective, single-centre cohort study is to identify the most effective PBM regimen to increase patient hgb and reduce transfusion requirements in anemic patients. Here we report a proof-of-concept for our ongoing large-scale analysis.

Methods

Local hospital research ethics board approval was obtained. Patients undergoing medium to high risk surgery with preoperative hgb ≤125g/L were referred to our hospital PBM program between January 2011 to October 2013. The following data were collected via retrospective chart review: demographic information; surgery performed; preoperative hgb; treatment type (oral ferrous fumarate, IV iron sucrose, erythropoietin), doses, and dates. Patients who received ABT between date of referral and surgery were excluded, as were patients with bleeding diatheses, diagnosed thalassemia, or who refused transfusion of blood products. Change in hgb from date of referral to date of surgery and rate of ABT was compared via multivariate regression analysis within treatment groups, controlling for patient demographics and initial hgb

and ferritin concentrations. Data analysis was performed in R statistical environment.

Results

One hundred and ninety-five preoperatively anemic patients met all inclusion criteria for this preliminary analysis. Only nine patients received erythropoietin and were therefore excluded. Duration of oral iron (ferrous fumarate, ≥300 mg daily) monotherapy for >30 days does not yet show an increased effect on patient hgb or rate of ABT (Figure 1A; P = 0.09). Multiple intravenous iron doses were not found to have any improved benefit over a single dose (Figure 1B; P > 0.05). However, patients ending therapy greater than 30 days prior to surgery showed significantly improved preoperative hgb above those ending treatment within 30 days of surgery. This finding was independent of the number of doses received (P = 0.047 and 0.023, for treatment ending 30-59 and >60 days prior to surgery, respectively). The sample size of patients receiving ABT is presently not adequate to demonstrate the effects of oral or intravenous iron on ABT rate (Figure 1 C and D).

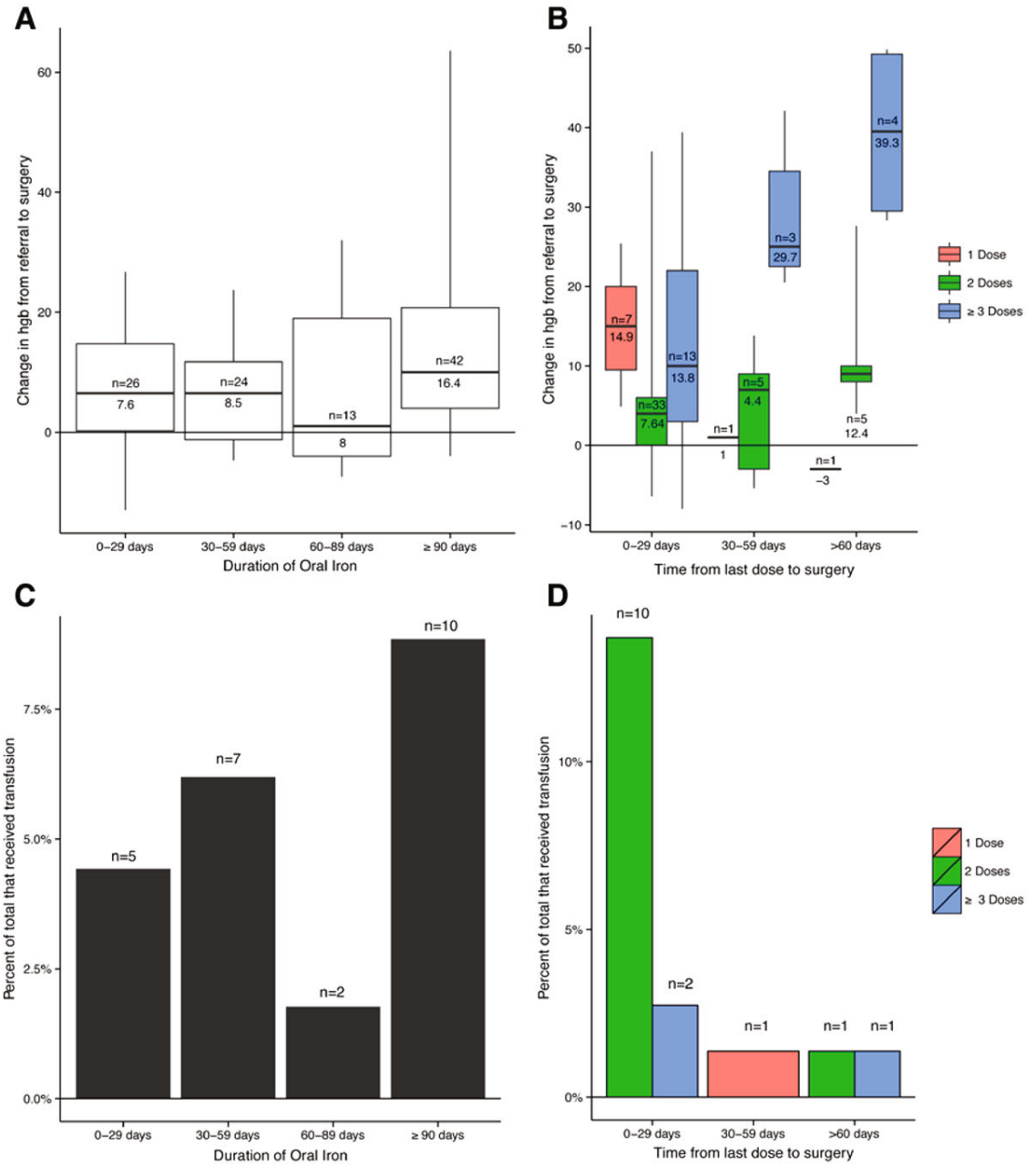
Conclusion

This ongoing single-centre retrospective cohort study is proposed as a proof-of-concept to determine the optimal treatment to increase hgb and reduce the rate of ABT in preoperatively anemic patients. Our large data set includes more than 12 000 patients and should provide valuable insight into optimal management of preoperative anemia. Updated analyses will include erythropoietin-treated patients and comparisons between treatment groups.

References:

1. The Lancet 2011 378: 1396-1407
2. Arch Surg 2012 147: 49-55.
3. Crit Care Med 2008 36: 2667-2674.

Figure 1. Changes in hgb from date of referral to date of surgery by treatment dose and duration for (A) oral iron alone (ferrous fumarate; N = 105) and (B) IV iron sucrose (200mg loading, 300mg maintenance doses) plus oral iron (N = 72). Boxplots demonstrate the median and surrounding quartiles, and whiskers represent the 95% CI. Number of cases and the mean change in hemoglobin for each group are shown. Percent of cases in each group that received a perioperative transfusion for those treated with (C) oral iron alone and (D) IV iron sucrose, are shown.


A
Change in hgb from referral to surgery
60
40
20
0
n=26
7.6
n=24
8.5
n=13
8
n=42
16.4
0–29 days
30–59 days
60–89 days
≥ 90 days
Duration of Oral Iron
B
Change in hgb from referral to surgery
50
40
30
20
10
0
−10
n=7
14.9
n=33
7.64
n=13
13.8
n=1
1
n=5
4.4
n=3
29.7
n=1
−3
n=5
12.4
n=4
39.3
1 Dose
2 Doses
≥ 3 Doses
0–29 days
30–59 days
>60 days
Time from last dose to surgery
C
Percent of total that received transfusion
7.5%
5.0%
2.5%
0.0%
n=5
n=7
n=2
n=10
0–29 days
30–59 days
60–89 days
≥ 90 days
Duration of Oral Iron
D
Percent of total that received transfusion
10%
5%
0%
n=10
n=2
n=1
n=1
n=1
1 Dose
2 Doses
≥ 3 Doses
0–29 days
30–59 days
>60 days
Time from last dose to surgery

152819 - A DECADE OF REGIONAL ANESTHESIA PRACTICE FOR UPPER LIMB SURGERY

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Introduction: Over past eleven years' brachial plexus blocks have become increasingly popular for surgical procedures involving upper limb.[1] The reasons for this include, easy availability of point of care ultrasound equipment, a greater emphasis on decreasing the post-operative pain, duration of hospital stays and associated costs.[2] Brachial plexus can be targeted at various levels along its course (interscalene, supraclavicular, infraclavicular and axillary) to provide reliable anesthesia and analgesia for upper limb and shoulder surgery. Each approach has advantages, disadvantages and roles in specific clinical situations. The aim of this study was to analyze how the clinicians' preference for a specific approach to brachial plexus block has changed over the last eleven-year-period.

Method: We conducted a retrospective review of all brachial plexus blocks performed from April 2004 to April 2015 for upper limb surgeries in our institute. We specifically extracted data on the approach to brachial plexus block, use of continuous catheter technique and the duration of time needed to perform each of these procedures. The data was entered in a spreadsheet and the line diagrams were plotted. Descriptive statistics were performed.

Results: A total of 15,644 brachial plexus blocks were performed from year 2004 to 2015. This included 13,323 single injection blocks and 2,321 continuous catheter techniques. Figure 1 shows the trend of single-shot brachial plexus blocks in the eleven-year-period. Data relating to trends in continuous catheter techniques and performance time will be presented at the meeting.

Discussion: Axillary brachial plexus block was the most popular brachial plexus block before availability of ultrasonography. However, with availability of ultrasound imaging supraclavicular and interscalene approaches are gaining popularity.

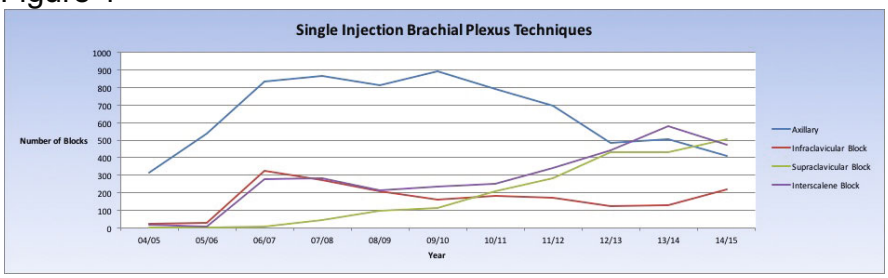
When looking at continuous catheter techniques, the use of interscalene catheters has gained popularity over years. The axillary brachial plexus block catheter has become extinct. The infraclavicular catheter still enjoys a steady popularity but there has been a slow rise in numbers of supraclavicular continuous catheters.

Median time needed to perform the infraclavicular brachial plexus block has reduced with use of ultrasound. Whereas, median time for performing supraclavicular brachial plexus block has increased. Finally, median time needed to perform axillary brachial plexus block and interscalene block have shown little change over years.
This review highlights the changing trends for upper limb peripheral block in our institution and may reflect a global trend. These changes are most likely attributable to the widespread availability of point-of-care ultrasonography. This information may help us plan educational and resource infrastructure for providing regional anesthesia services.

References:

1. J Bone Joint Surg Am 2013; 95: e197(1-13).
2. Can J Anaesth 2004; 51: 41-4.

Figure 1



Eleven-year trend in the number of single injection brachial plexus blocks

152834 - LOWER PAIN RATINGS IN PARTICIPANTS WITH HIGH TESTOSTERONE LEVELS

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Introduction: This study investigated whether the blood testosterone levels before noxious stimulation are associated with pain and pain-related unpleasantness ratings (1).

Methods: Local Ethics Committee approval was obtained. Twenty-six healthy men were recruited to participate in the pain experiment. A venous blood sample was drawn from the right forearm to determine the testosterone levels before the experiment. The participants were classified into two groups (high vs. low testosterone) according to their blood testosterone levels (each group = 13). To induce noxious stimulation, the distal phalanges and distal two-thirds of the middle phalanges of the left-hand middle fingers were immersed in an 850-ml water bath maintained at 50°C. The noxious stimulation lasted 30 s and was repeated five times. The ratings during the noxious stimulation were assessed on a numerical rating scale (0 = no pain, unpleasantness, anxiety, and fear; 100 = maximum imaginable pain, unpleasantness, anxiety, and fear).

Results: The participants with high testosterone levels showed significantly lower pain and pain-related unpleasantness ratings than those with lower testosterone levels (Table 1) ($p = 0.047$). Moreover, the anxiety and fear ratings were statistically significantly lower in the high testosterone group than in the low testosterone group (Table 1). The fear ratings during the noxious stimulation were negatively correlated with the testosterone levels in all participants ($r = -0.40$, $p = 0.043$, $n = 26$).

Conclusion: The results indicated that pain and pain-related unpleasantness ratings were statistically significantly lower for participants with high testosterone levels than for those with low testosterone levels. Those findings also suggested that acute clinical pain may be relieved by controlling patients' testosterone levels.

References:

(1). Anaesthesia 2012 67: 1146-51

Table 1

Table 1. Comparison of participants' characteristics, hormone levels, and self-reported measures between high testosterone and low testosterone groups.

	High testosterone group (n =13)	Low testosterone group (n =13)	P value
Age (years)	23.08 ± 2.33	22.15 ± 2.41	0.330
Height (cm)	177.48 ± 7.95	172.62 ± 8.18	0.137
Weight (kg)	72.46 ± 11.18	69.62 ± 8.03	0.463
Testosterone level (ng/mL)	6.65 ± 1.13	4.32 ± 0.96	<0.001
Pain ratings	39.85 ± 23.33	55.85 ± 14.56	0.047
Pain-related unpleasantness ratings	29.69 ± 21.05	45.00 ± 15.91	0.047
Anxiety ratings	22.31 ± 23.06	42.70 ± 15.90	0.015
Fear ratings	9.23 ± 12.56	33.08 ± 17.97	0.001

The data shown are the mean ± SD. The data were analyzed using an independent samples t-test.

Comparison of participants' characteristics, hormone levels, and self-reported measures between high testosterone and low testosterone groups.

152836 - DESIGN AND ASSESSMENT OF PATIENT SPECIFIC, DYNAMIC MITRAL VALVE MODEL

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Introduction

Mitral valve disease is a common pathological problem occurring in over 2% of the population [1] with many requiring surgical intervention to restore normal valve function. In many instances, complex pathological conditions may make repair more difficult and the suitability of one approach over another may be unclear.
In this study, we propose the use of 3D printing technology in concert with image processing software to create dynamic, patient specific mitral valve models from pre-procedure TEE data. The long term goal is to use these models to simulate different repair/replacement options prior to patient intervention. In this study, the characteristics of our 3D models are validated by comparison of the patient's original echocardiography (2D ultrasound, 3D ultrasound, and Colour Doppler), with the equivalent images form the model.

Methods

Following approval from the local Research Ethics Board, a retrospective study was performed using pre-operative patient 3D TEE data to create 3D geometric models of the valve. These models were adapted to fit into a dynamic heart phantom [2]. Rigid 3D models of the valves were printed and then used to create silicone valves with a modified injection molding technique, with sutures to mimic the valve chordae. The valve was then inserted into the LV phantom which functions as a dynamic beating heart allowing dynamic TEE imaging of the mitral valve. TEE image data was acquired for comparison to the original patient data.

Results

To date we have acquired patient image data and completed one (of ten) mitral valve models (Figure 1). 2D ultrasound data were similar between the model and actual patient's images, although the leaflet thickness was greater on the model compared to patient images. 3D imaging of the model and patient valve appeared similar. Regurgitation occurred in a similar position on both the model and original TEE images based on color Doppler, however the degree of regurgitation appeared greater in the model compared to the patient.

Discussion:

We have demonstrated a workflow to create a patient specific, dynamic mitral valve

model based on 3D TEE data. Current challenges include determining an optimal method to create the model, and the optimal material from which to form the valve. The ultimate aim is to create a dynamic model in which surgical approaches to the mitral valve may be tested, and the optimal approach identified. This work represents a first and important step to achieve this goal.

References:

1 Am J Cardiol. 2001, 87: 298-304.
2 SPIE Medical Imaging, 2015, 941503-941503-10.

Figure 1

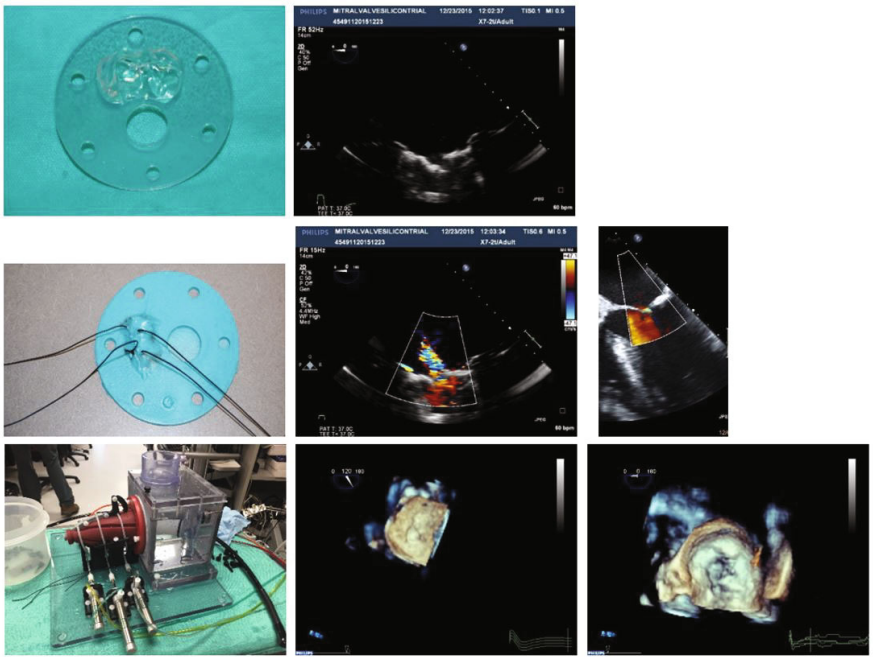

Figure 1: First column: Mitral valve model (3D printed solid), silicone model, and dynamic phantom. Second column: Ultrasound images from the model. Third column: Original ultrasound pictures from the patient.

152866 - TRANSECTION OF SUCTION CATHETER THROUGH DLT DURING PNEUMONECTOMY

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Endobronchial suction catheters (ESC) are provided with double lumen tubes (DLT) to be used for suctioning secretions and blood from the airway. Some clinicians use these catheters to suction air and speed lung collapse of nondependent lung during one lung ventilation (OLV). The ESC is longer than the DLT, and when fully inserted, the distal tip can go deep into the tracheobronchial tree. We report a case where the ESC was stapled within the right main bronchus during a right pneumonectomy.

Case

A consent was obtained from the patient for presentation and publication of this report. A 54-year-old male patient with non-small cell lung cancer was scheduled for a right pneumonectomy. He was otherwise healthy and had a normal pulmonary function test despite being a long time smoker (50 pack/years). A combined epidural and general anesthesia was performed. A left-sided 39 Fr DLT was placed after the induction, position was confirmed with fiberoptic bronchoscopy (FOB) and correct position confirmed when patient in left lateral decubitus position. An ESC was introduced through the tracheal lumen of the DLT for continuous suction in order to improve non-dependent lung deflation. Surgery was performed uneventfully with minimal blood loss and no further issues related to lung isolation. Resistance was noticed when attempting to pull out the ESC after bronchial stapling. With gentle pressure, the catheter was removed. Staples were clearly visible at the tip and approximately 1 cm of the tip was missing. FOB showed a small dehiscence of the bronchial stump. Examination of the surgical specimen identified the missing piece of the ESC included in the staple line. (Figure 1) The stump was sutured manually and reinforced with a pericardial fat pad to protect and minimize the risk of a bronchopleural fistula. No evidence of air leak was found intraoperatively. Patient was discharged on the seventh postoperative day without any further complications.

Discussion

Cases of bronchial blocker entrapment during pulmonary resection has been reported.[1,2]

We report here entrapment of an ESC during open thoracotomy for pneumonectomy. These catheters are longer than length of DLT, narrow and pliable. These characteristics make it difficult to recognize entrapment when stapling the bronchus, even during an open thoracotomy. Tracheobronchial lacerations and lung perforation

have also been reported with the use of ESC.[3]

Clinicians using ESC for continuous suction should ensure ESC remains within DLT, especially at the moment of bronchial stapling, as is recommendation when using bronchial blockers, to avoid this complication.

References:

1. Korean J Anesthesiol, 2015; 68(3):287-91.

2. J Cardiothoracic Vasc Anesth, 2006; 20: 131-2.

3. J Cardiothorac Vasc Anesth, 2015;29(6):1618-20.

Figure 1

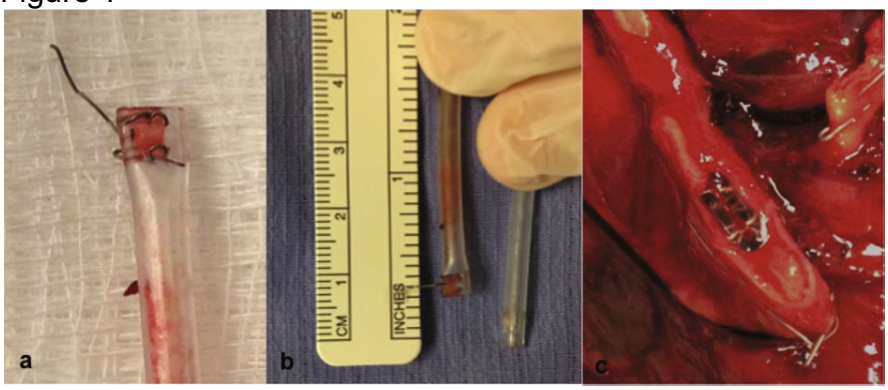

Figure 1: (a)Endobronchial suction catheter tip showing staples, (b)missing 1cm, and (c) portion incorporated into surgical specimen.

152880 - ANESTHESIA CAREER EXPLORATION: A STRUCTURED OBSERVERSHIP PROGRAM

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Introduction

Medical student's exposure to anesthesia is very limited in the pre-clerkship years, and often their only exposure is during their clerkship rotations. This is often late for decisions regarding residency programs. A study of final year medical students found that 50% of students who had not ranked anesthesia in the top three would have considered doing so had they completed their anesthesia rotation prior to deciding on a career pathway. (1) As a remedy to this problem, we developed a learner initiated and led structured anesthesia pre-clerkship observership program.

Methods

The Anesthesia Career Exploration (ACE) pilot program was approved by our undergraduate education program. Students in their second year of medical school were invited to apply to the ACE program. This was held at the end of second year over a one week period. Each morning students would rotate through hospitals with focused areas of expertise. In the afternoon, tutorials led by residents and fellows, were held focusing on topics relating to an introduction to anesthesia, obstetrical anesthesia, pediatric anesthesia, regional/pain management and trauma/resuscitation. This was followed by workshops where students had the opportunity to learn clinical and procedural skills through participation in simulation using part task trainers and high fidelity simulation. The week ended with gamification to challenge students on their new clinical and technical skills. Students completed a pre and post survey assessing motivation, attitudes and impact of the ACE program.

Results

Eighty percent of students enrolled had prior exposure to anesthesia through observerships or faculty mentors. The two highest rated external motivators for participation in ACE were "I was really inspired by an anesthesiologist" and "Someone has suggested to me that I should consider a career in Anesthesia". The most popular internal motivator was "Anesthesia is challenging". The ACE program was highly evaluated with a mean score of 4.67/5. The clinical exposure was the most popular aspect of the program. Students remained highly motivated to explore anesthesia as a career option. Knowledge regarding work/life balance, academic career, scope of clinical work and patient contact increased (see table). Student comments included "This was a fantastic program and I will definitely be recommending it to the first

years."

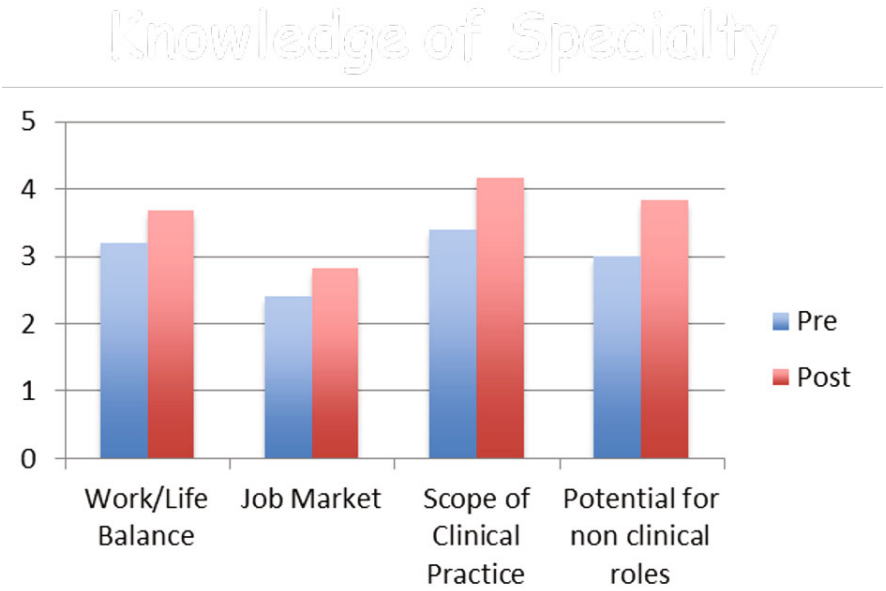
Discussion

While in this initial pilot project, many of the students did have very limited, but prior exposure to anesthesia, as the number of students participating and the competition for available spots increases in this program, this could potentially expose more students to anesthesia with improved impact on career choice and education on the Anesthesiologists role in patient care. This was also an ideal format for increasing the role of resident involvement in formal teaching of medical students.

References:

1. Adudu OP et al Can J Anesth 2010 57:792-793

Knowledge of Specialty



152889 - ANESTHESIA EDUCATION IN HAITI: A NEEDS ASSESSMENT

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Introduction: The developing world faces many obstacles to the delivery of safe perioperative care. Anesthesia mortality in developing countries is estimated to be at least 100 times greater than developed nations(1). These high numbers are attributed to inadequate monitoring, medication, blood supplies and access to adequately trained anesthesia providers(2). Reviews of anesthesia in developing countries focus on the need to improve education and infrastructure(1). Experts agree that in-country training is paramount to building the experience necessary to practice in resource-poor conditions(3). To form lasting relationships that foster continued education exchange, it is imperative to deliver education that the recipient country requests(2). This study was designed to determine Haitian-identified areas of need with respect to anesthesia education with the goal of developing a supplemental curriculum to be delivered by volunteer educators.

Methods: A survey was developed, reviewed by local research ethics, and administered to Haitian anesthesia residents, and their teachers, training at two different hospitals in Haiti. Focus groups were then held and residents interviewed about their difficult experiences. Data was reviewed to identify competencies and deficiencies in anesthesia education, infrastructure and resources as compared to the Canadian Anesthesia National Curriculum and WHO Global Initiative for Emergency and Essential Surgical Care.

Results: Responses were received from twenty anesthesia residents, and two anesthetists, representing two anesthesia programs. Residents identified deficiencies in education concerning monitoring and equipment, paediatric, obstetric, hematologic and renal pathophysiology, regional anesthesia, ethics, management of the difficult airway, trauma, resuscitation, critical care, and postoperative care. All participants had access to computers and internet however none were aware of the WFSA online education resource. 85% had access to a recent edition of Miller’s Anesthesia. Practice in spinal anesthesia was identified as a strength of training in Haiti; limited resources and infrastructure were identified as weaknesses. Pulse oximetry, ketamine, thiopental, halothane, oxytocin, spinal anesthetic, and epinephrine were usually

available, while, ETCO2 monitoring, a defibrillator, difficult airway equipment, chest tubes, emergency surgical airway equipment, newer volatile agents, calcium, ergotamine and tranexamic acid were rarely available. Access to blood gas analysis, x-ray, ultrasound and blood bank services was also identified as limited.

Discussion: According to anesthetists and residents surveyed, Haiti lacks some essential resources deemed necessary by the WHO Global Initiative for Emergency and Essential Surgical Care(4). The country is rebuilding after the 2010 earthquake, and many doctors are currently enrolled in anesthesia education programs. While not comprehensive according to Canadian standards, these programs are providing essential training to resilient, dedicated and eager learners. The deficiencies in education, infrastructure and resources identified draw attention to the resource-poor conditions faced by anesthesia practitioners in Haiti and will help focus volunteer education and fundraising efforts.

References:

1. Curr Op Anesth, 26(6), 32-736.
2. Int Anesth Clin, 48(2), 91-107.
3. Bull World Health Org, 88(8), 637-639.
4. WHO Global Initiative for Emergency and Essential Surgical Care (www.who.int/surgery/globalinitiative/en)

152911 - A RETROSPECTIVE REVIEW OF DECORTICATIONS, 2007-2015

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Introduction: Decortication is a surgical procedure in which the aim is to re-expand the lung by removing a pathological peel. This peel can result from numerous pleural or parenchymal disease processes. There has been an increase in the number of decortications performed at our institution from 5 in 2007 to 59 in 2015. The factors that lead to patients needing decortication, the associated morbidity, mortality and increased use of hospital resources has not been well described previously.

Methods: Approval has been obtained from the Research Ethics Board. A retrospective chart review of all decortications performed at our institution between 2007-2015 was conducted by a single reviewer. The ACS NSQIP Surgical Risk Calculator was used to determine the expected individual risk of serious complications or death. Collected data included: patient demographics, comorbidities, preceding disease processes, culture results and complications. Patients undergoing decortication due to a parapneumonic effusion (i.e. an infection as the preceding disease process) were compared to those undergoing decortication due to a non-infectious disease process.

Results: This study is ongoing and we present our interim data from 100 patients that underwent decortication from 2007-2015. There were 61 patients in the infectious group and 39 patients in the non-infectious group. The average age of patients was similar (54 ± 19 vs. 54 ± 16 years). The presence of medical comorbidities was similar. Postoperatively, patients in the infectious group had a higher incidence of acute kidney injury and sepsis. In the infectious group, at least one pathogen was identified in 44 patients (72.1%) and in 40 patients (65.6%) from pleural fluid or tissue. Gram positive, anaerobic and gram negative organisms were isolated in 35 (57.4%), 7 (11.5%), and 2 (3.3%) patients, respectively. The infectious group required postoperative ICU admission more frequently (19 [31.1%] vs. 6 [15.4%], p=0.08), and required more days of mechanical ventilation (4 [1-8] vs. 1.5 [1-3.75]; median [interquartile range], p=0.23), but these values have not reached statistical significance. The complication rate in the infectious group was higher than predicted by the NSQIP score (39.3% vs. 22.6%, $p < 0.05$).

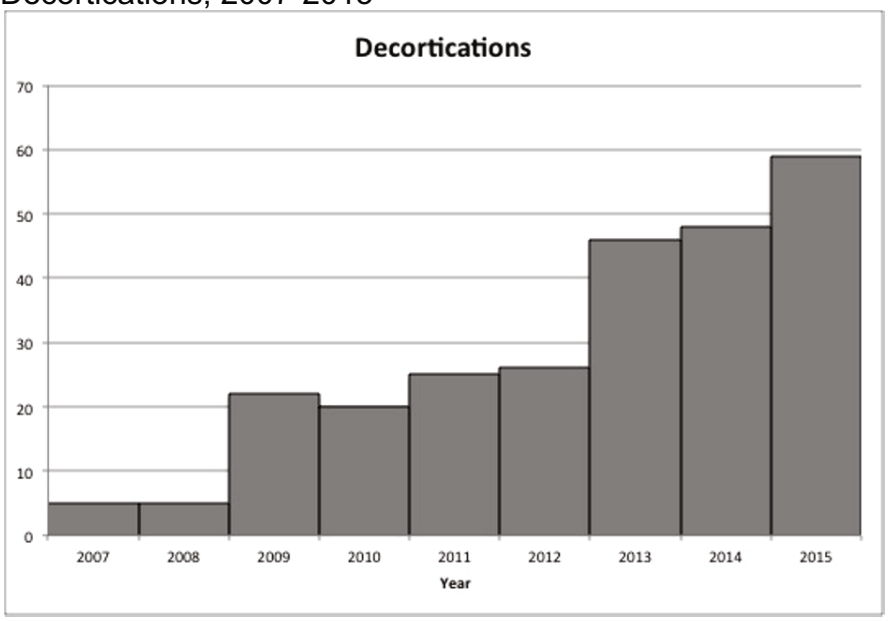
Discussion: Despite similar baseline characteristics, there was a higher incidence of serious complications, greater frequency of post-operative ICU management and longer duration of mechanical ventilation in patients who underwent a decortication due to a parapneumonic effusion. Furthermore, the NSQIP score underestimated the risk of serious complications in this population. These findings suggest that the number of patients developing complications of lower respiratory tract infections is increasing and their risk of perioperative morbidity and mortality may be underappreciated. Further studies are required to better understand why the number of decortications has been increasing at this institution.

References:

1. Ch.64. General thoracic surgery (7th ed.)

2. J Am Coll Surg 2013 217(5):833-42

Decortications, 2007-2015



152914 - ULTRASOUND OF GASTRIC VOLUME IN PREGNANT WOMEN: A PREDICTIVE MODEL

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Introduction: Pulmonary aspiration of gastric content is one of the most feared complications in obstetric anesthesia. Bedside gastric ultrasonography (US) is a feasible imaging tool that can be reliably performed by anesthesiologists to assess gastric content in the perioperative period.[1,2] We studied the relationship between the gastric antral area assessed by US and the volume of clear fluids ingested aiming to develop a predictive model to estimate gastric volume.

Methods: We obtained Local Ethics Committee approval and patient informed consent for participation in this randomized single-blinded study in non-laboring pregnant women at term. We used a standardized scanning protocol of the gastric antrum using a 2-5 MHz curvilinear array transducer in a sagittal to right parasagittal plane on the epigastric area. Subjects were on a 45-degree semi-recumbent position. Firstly, we performed a baseline qualitative assessment of the gastric content after an 8-hour fasting period in supine and in right lateral decubitus (RLD). Women were classified following a 3-point grading system (grade 0: no fluid; grade 1: fluid seen in RLD only; grade 2: fluid seen in both positions). Secondly, subjects were randomized to ingest one of 6 predetermined volumes of apple juice (0-50-100-200-300-400 ml). A quantitative assessment was carried out through a series of sonographic measurements of the cross-sectional area of the antrum (CSA) at baseline and after the volume ingestion. The anesthesiologist performing the US examinations was blinded to the volume allocation. Primary outcome: the relationship between antrum CSA and volume ingested were analyzed through Pearson correlation coefficients. Secondary outcome: multiple regression analysis was used to create a mathematical model to estimate gastric volume.

Results: We examined 60 subjects. Preliminary results show that the CSA in RLD correlated well with volumes ingested (Pearson's correlation r=0.65). Various mathematical models were tested statistically significant, which incorporate CSA in RLD and demographics such as age, gestational age, height and BMI (Coefficient of determination R^2=0.42 to 0.7).

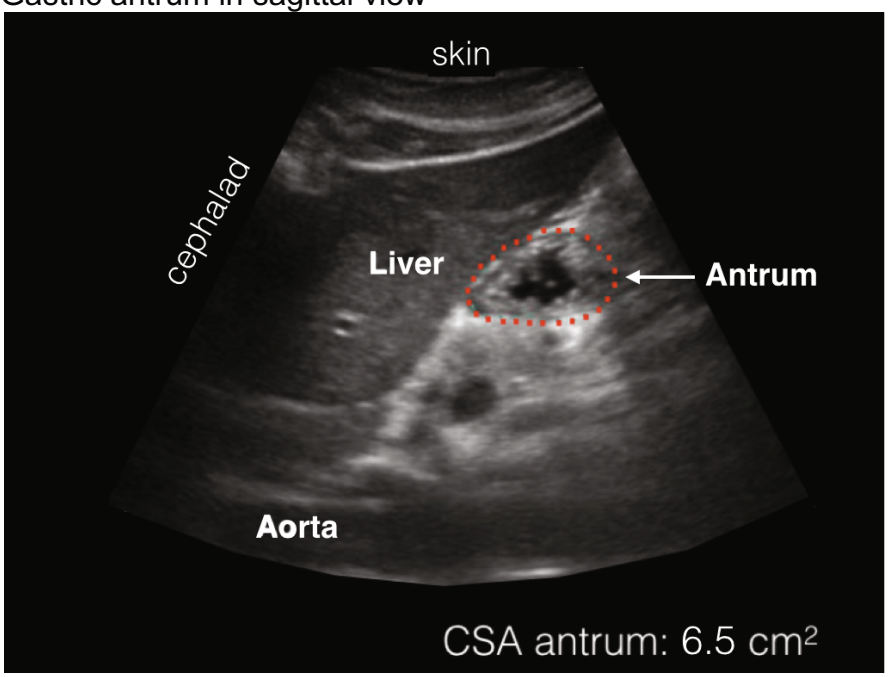
Discussion:
Bedside gastric US is a feasible tool in the assessment of pregnant women. The antrum CSA correlates well with the volume ingested. We developed a predictive model to estimate gastric volumes based on antral CSA and patient demographics. The quantitative measurement of antral CSA is a promising tool. Further research is warranted to identify the best use of this point-of-care diagnostic modality.

References:

1. Can J Anesth 2013;60:771–9.

2. Anesth Analg 2011;113:93–7

Gastric antrum in sagittal view



152919 - CYTOREDUCTIVE SURGERY, HYPERTHERMIC CHEMOTHERAPY AND ANAESTHESIA

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Background: Complete cytoreductive surgery with Hyperthermic Intra-Peritoneal Chemotherapy (HIPEC) has demonstrated efficacy in treating patients with diffuse peritoneal surface malignancies. The procedure involves major abdominal resection, long duration of surgery, significant fluid shifts, fluid and blood component transfusion, thermal impact of hyperthermic chemotherapeutic instillate and postoperative intensive unit care. The present case series details the perioperative management of such patients from a single centre.

Methods: Patient consent was obtained for perioperative data collection and publication. Twenty six patients with peritoneal surface malignancies underwent cytoreductive surgery of which twenty patients received HIPEC. All patients received balanced general anaesthetic technique. Intraoperative monitoring employed ECG, pulse oximetry, invasive blood pressure, central venous pressure, capnography, core temperature, urine output, arterial blood gas analysis, serum electrolytes, and hematocrit. Goal directed fluid therapy composed of crystalloids and colloids. Blood component transfusion was titrated to calculated blood loss, correlating haemodynamic status and maintaining haemoglobin ≥ 8 G/dL. Thermoregulation was done using circulating water mattress. Glycaemic control was done with insulin infusions as per institutional protocols.

Results: Patient demographics and intraoperative observations are presented in Table-1. Eleven patients required Noradrenaline (vasopressor of first choice) infusion. Arterial blood gas parameters and serum electrolytes were maintained within normal range. All patients were electively ventilated postoperatively. Data was collected retrospectively from the patient anaesthesia records and laboratory reports.

Discussion: Peritoneal malignancies show good results with cytoreductive surgery with HIPEC when survival improvement and quality of life are considered. Given the complex nature of the procedure and prolonged surgical time, the procedure is is however not without risks.[1] The present case series describes the perioperative changes in the course of 8 ± 2 hours of cytoreductive surgery including a HIPEC phase of 60 or 90 minutes based on chemotherapy protocol dictated. The blood loss of 1765 ± 1004 mL was replaced with crystalloid of 14.7 mL/Kg/h (calculated) which exceeded the 6-8 mL/Kg/h for major laparotomies but is in the range described in other studies for this procedure.[2, 3] Fluctuations in the blood glucose levels deserve mention here as the large volume of perfusate for the HIPEC contains dextrose (1.5 – 5%).[4] Thermal regulation is needs meticulous attention and continues into the postoperative period. Serum lactate levels were maintained within physiological limits

in all patients.

Conclusions: Cytoreductive surgery with HIPEC imposes significant haemodynamic, metabolic, and thermal alterations. This necessitates a specialized perioperative team with a good understanding of the unique physiologic challenges to ensure proper planning and management for patient safety and satisfactory outcomes.

References:

1. Ann Surg Oncol. 2006;13:635-644
2. Anaesthesia 2008; 63: 389-395
3. World J Obstet Gynecol. 2013; 2(4): 129-136
4. Perit Dial Int 2008; 28: 61-66.

Table 1

Patient population	17 female : 3 male
Patient weight (Kg)	64.4 ± 15.4
Malignancy	Primary Peritoneal 4 Metastatic 16 (including Pseudomyxoma 13)
Mean duration of surgery (min)	497 ± 128
Calculated blood loss (mL)	1765 ± 1004
Fluids administered (mL)	Crystalloids 7850 ± 2725 colloids 1131 ± 515
Blood component transfusion	3.2 units Packed cells (average)
Temperature range (mean)	34.4 – 36.9 °C
Blood glucose level (mean mg/dL)	Baseline 121 During HIPEC 283 End of surgery 169

Patient demographics and perioperative observations

152921 - PERIOPERATIVE COMPLICATIONS & STOPBANG SCORES. A METAANALYSIS

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Introduction

Surgical patients with obstructive sleep apnea (OSA) are associated with increased risk of perioperative complications. The STOP-Bang questionnaire are useful tools to identify the high-risk OSA (STOP-Bang ≥3) patients during the perioperative period. We conducted this meta-analysis to compare the perioperative complications in patients with high STOP-Bang score (≥3) versus low STOP-Bang score (0-2).

Methods

A search of the literature databases MEDLINE (from 2008 to January 2016), Medline-in-Process & other non-indexed citations (up to January 2016), Embase (from 2008 to January 2016), Cochrane Central Register of Controlled Trials (up to January 2016), Cochrane Databases of Systematic Reviews (from 2008 to January 2016), Google Scholar, Web of Sciences (from 2008 to January 2016), Scopus (2008 to January 2016) and PubMed (from 2008 to January 2016) was carried out. The search yielded 119 citations. Irrelevant papers were excluded by title, abstract and full-text review, leaving 11 manuscripts for analysis. Inclusion criteria were: 1) Studies that used STOP-Bang questionnaire as a screening tool to identify the high-risk and low-risk for OSA in adult surgical population (>18 year); 2) studies that mentioned the perioperative complications associated with high STOP-Bang score (≥3) and low STOP-Bang score (0-2). 3) Publications in the English language. The perioperative complications were cardiac events or respiratory events or any complication requiring ICU admission. The study quality was evaluated using the Cochrane risk of bias tool. Statistical analysis was carried out using the Review Manager 5.3 software. The pooled odds ratio for perioperative complications was estimated.

Results

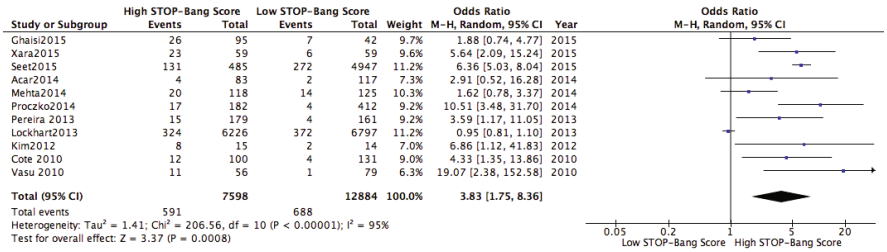
The meta-analysis was carried out in 11 studies including a total of 20,482 patients (High STOP-Bang score group, n=7,598 and low STOP-Bang score group, n= 12,884). Overall, the odds of having perioperative complications was higher in high STOP-Bang score patients compared to low STOP-Bang score patients (OR 3.83;

95% CI: 1.75-8.36; P=0.0008)

Conclusion: This meta-analysis suggests that patients with high STOP-Bang score (>3) are associated with increased risk of perioperative complications. STOP-Bang questionnaires can identify the high-risk OSA patients and implementing the evidence based perioperative precautions may decrease the risk of postoperative complications. This further justifies the implementation of STOP-Bang tool as a screening tool to identify the high-risk OSA patients during the perioperative period.

References:

1. Anesthesiology 2008; 108: 812-21.



152928 - EFFECT OF ACTIVE PREOPERATIVE WARMING ON INTRAOPERATIVE HYPOTHERMIA

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Introduction:
Intraoperative hypothermia, with a core body temperature < 36C [1], is associated with adverse outcomes [1-3], including surgical site infections, coagulopathy, and patient discomfort. Despite effective intraoperative warming techniques, reduction in core temperature inevitable occurs due to peripheral redistribution of body heat [4]. Preoperative forced air warming has been shown to reduce the percentage of the case spent hypothermic in children undergoing spine surgery [5]. However, forced air warming core temperature patterns remain poorly characterized in adults [6]. The aim of this study was to evaluate the effects and patterns of preoperative forced air warming in major adult surgeries.

Methods:
After approval by the local research ethics board, a prospective, randomized study was performed. After written informed consent, adult patients undergoing elective surgery, with scheduled duration over 1 hr, were randomized into two groups: standard passive warming via flannel blankets on patient request or active prewarming via BairPaws gown (3M Canada) starting at least 30 minutes before entering the operating room. Both groups received intraoperative forced air warming. Perioperative temperature was collected using the SpotOn core temperature system (3M Canada). Intraoperative vital signs were continuously recorded using S/5 Collect (GE Healthcare Canada). Outcome data, including 30-day surgical site infection rates using NSQIP criteria, number of transfusions of red blood cells, and administration of opioids in the post-anesthetic care unit, were recorded manually using case report forms. Data were analyzed using MATLAB (The Mathworks Inc), using the Wilcoxon rank-sum test for intraoperative hypothermia data and Fisher's exact test for outcome data.

Results:
Preliminary data from 200 patients (102 males), with median [range] age 60 [20-85] years, with BMI 27.2 [17.5-56.3], were available. Prewarming reduced intraoperative hypothermia, as measured by the area under the 36˚C temperature curve by 0.65˚C*min (95%CI 0.01-2.20˚C*min, p=0.004). Hypothermia was less prevalent in the prewarmed group (37% vs. 53%, p=0.023), and case-end temperatures were 0.3˚C

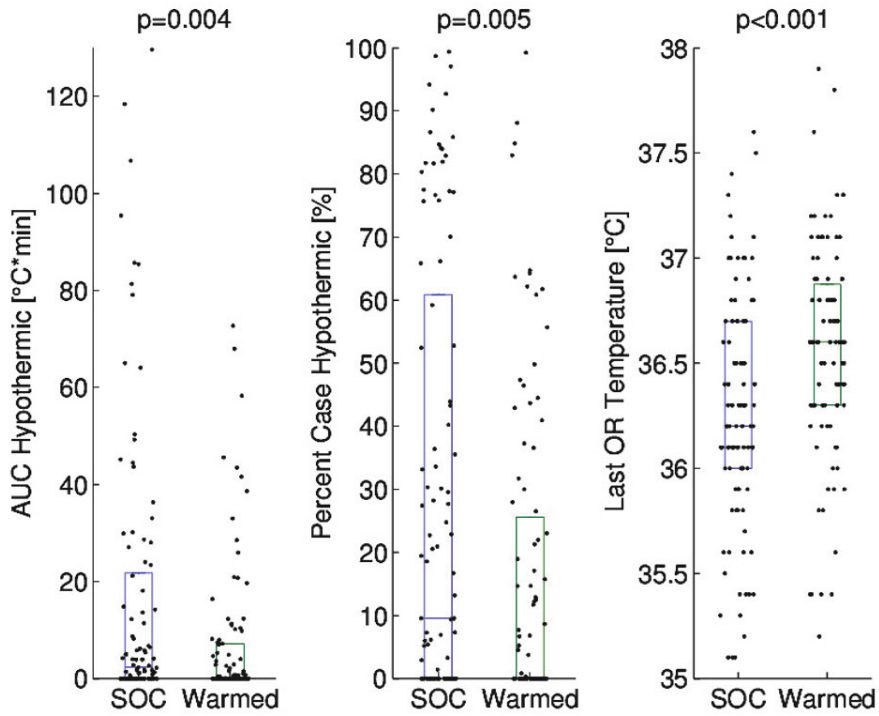
higher as well (95%CI 0.19-0.50˚C, p

Conclusion:
Preoperative forced air warming reduces the magnitude of redistribution hypothermia. This study demonstrates that preoperative forced air warming is associated with a significant reduction in frequency of intraoperative hypothermia and duration of hypothermic exposure.

References:

1. NICE Clinical Guideline 65. 2008.
2. Infect Control Hosp Epidemiol. 2009;30(2):109–16.
3. N Engl J Med. 1996;334(19):1209–15.
4. Anesthesiology. 2008;109(2):318–38.
5. Paediatr Anaesth. 2013;23(11):1054–61.
6. Anesthesiology. 2015 Feb;122(2):276-85.

Standard vs. Prewarmed Core Body Temperature Data



SOC = Standard of care warming with flannel blankets upon patient request. Warmed = Prewarming with BairPaws gown

152933 - SYSTEM ERRORS FOUND IN RURAL HOSPITALS USING IN-SITU SIMULATION

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INTRODUCTION

The primary objective of our study was to use in situ simulation to identify latent system errors associated with high risk, low frequency pediatric anesthetic events in operating rooms (OR) of rural hospitals. The secondary objective was to expose simulation-naïve perioperative personnel to simulation education.

METHODS

Ethics approval was obtained by the Health Research Ethics Board (HREB) and from each respective health region visited. Perioperative personnel from 3 rural hospitals consented to participate in 2 simulated scenarios. Each in-situ visit consisted of a 20 minute briefing, a 20 minute simulated scenario (video recorded), followed by a 40 minute debriefing session with a didactic teaching component. The 2 rare pediatric anesthetic events were malignant hyperthermia (MH) and local anesthetic systemic toxicity (LAST). A qualified member of the research team acted as the embedded simulated anesthesiologist who responded to each event as per predetermined management checklists. These checklists of anticipated latent errors essential for management of these crises were constructed from provincial expert opinion using the Delphi technique. Three anesthesiologists from an urban site with experience in simulation-based medical education determined anticipated latent errors using the Delphi checklists and video footage. Unanticipated latent errors were identified using debriefing notes and video footage. Feedback forms completed by the participants were used to assess the learning experience.

RESULTS

Latent system errors are categorized as medication-related, equipment-related, or policy/protocol-related errors. Latent errors identified from the checklist include the lack of a LAST protocol on the OR crash cart, lipid emulsion not being readily available in the OR, and a delay in arterial blood gas results. Example of unanticipated errors include ICU staff not having card access to the OR when responding to intra-operative code and the use of individual 10cc vials of sterile water to reconstitute dantrolene. Results were communicated with each site via summary documents containing recommendations for resolution of latent system errors. This lead to a change in policy

at each site. Participants rated the sessions very positively based on the feedback forms and most requested that at least 3 simulation sessions per year would be desired at their respective sites.

DISCUSSION

In-situ simulation was a useful method to identify and resolve latent system errors (both anticipated and unanticipated) in ORs in rural hospitals. Feedback on latent errors may improve patient safety and may potentially decrease morbidity and mortality within these clinical environments. This study also provided a meaningful learning experience to simulation naïve participants around rare emergency anesthetic events.

References:

CMAJ 2004 May 25;170(11):1678-1686.
Semin Perinatol 2013 Jun;37(3):161-165.
Semin Perinatol 2013 Jun;37(3):161-165.
Qual Saf Health Care 2010 Oct;19 Suppl 3:i53-6
J Emerg Med 2015 Oct 20
Qual Saf Health Care 2010 Oct;19 Suppl 3:i53-6

152938 - SINGLE VS MULTIPLE INJECTION ULTRASOUND GUIDED PARAVERTEBRAL BLOCKS

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Background: Paravertebral block (PVB) has been shown to provide excellent analgesia for major breast surgeries resulting in reduced narcotic consumption, reduced nausea, improved quality of recovery, reduced chronic pain and possibly reduced metastasis with breast cancer.[1-3] Our objective was to investigate the extent of dermatomal spread of PVB when equal volumes of local anesthetic are injected at one versus five paravertebral sites for patients undergoing major breast surgery. In addition, we wish to compare the performance time and duration of analgesia.

Methodology: After local REB approval, 72 patients undergoing a unilateral mastectomy with or without axillary node dissection were randomized to receive either single or multiple injections PVB. The PVB was performed in prone position under real-time ultrasound guidance using a para-sagittal approach.[4] Patients and assessors were blinded to group allocation. The patients in single injection group received single injection PVB at T3-T4 level with 25 ml of 0.5% ropivacaine and four subcutaneous sham injections. Patients in the multiple injection group received five injections of PVB from T1 to T5 level. 5 ml of 0.5% ropivacaine was injected at each level. Pleural drift was used as a sign of correct needle tip location and local anaesthetic spread. The pinprick method was used to assess the extent of dermatomal blockade, 20 minutes following the completion of procedure. All patients received a standardized general anesthesia for the surgery. Any adverse events including pneumothorax, epidural spread, LA toxicity/seizure, total spinal, were recorded.

Results: Table 1 shows main results. The mean (SD) dermatomal spread was not significantly different for single-injection group [4.1 (1.5)] compared to multiple-injection group [4.5 (1.3)], mean difference 0.4 segments (95% CI: -0.3 to 1.0 segments). The time to perform a single-injection PVB was shorter (6.2 min) when compared to multiple-injection PVB (11.9 min), mean difference 5.7 min (95% CI: 2.7 to 8.6 min). There were no reported complications attributable to PVB in either group.

Discussion: Our study shows that when PVB is performed under ultrasound guidance, single level PVB produces similar dermatomal spread when compared to multiple level PVB. This is contrary to the previous published literature when landmark techniques were used.[5] The cephlad and caudad dermatomal spread was similar in both the groups. The duration of block (as assessed by presence of numbness) was not statistically different between the groups.

We conclude that with ultrasound-guidance PVB is a safe procedure with low complication rate. The single injection PVB is equivalent to multiple injection PVB with regards to dermatomal spread and duration of analgesia. Single injection technique takes less time to perform and may be associated with less patient discomfort. Therefore, single injection PVB should be preferred over multiple injection technique.

References:

1. The breast journal 2009; 15: 483-8.
2. Anesthesiology 2014; 120: 703-13.
3. Anesthesiology 2006; 105: 660-4.
4. Br J Anaesth 2009; 102: 534-9.
5. Reg Anesth Pain Med 2006; 31: 196-201.

Table 1

Table 1: Results. Values in mean (SD) OR median [IQR]

	Single injection PVB	Multiple injection PVB	P-value
Procedure duration (min)	6.2 (4.2)	11.9 (7.5)	<0.001
Number of thoracic segments involved (spread)	4.1 (1.5)	4.5 (1.3)	0.273
Upper level of block, median (IQR)	T2 [T2-T2]	T2 [T1-T2]	0.067
Lower level of block, median (IQR)	T6 [T6-T7]	T6 [T6-T7]	0.885
Duration of block (hours)	13.7 (6.5)	15.1 (6.2)	0.546

Results. Values in mean (SD) OR median [IQR]

152942 - DOES ELEVATED PERIOPERATIVE LACTATE TRANSLATE INTO POOR OUTCOMES?

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Introduction: Lactate is often used as a biomarker of tissue perfusion, with normal values below 2.0 mmol/L among critically ill patients (1). Elevated lactate results from anaerobic glycolysis, reduced lactate clearance, and accelerated aerobic glycolysis (1). Metabolic acidosis is “common” during surgery (2); however, it is unclear what an elevated lactate means for surgical patients. The purpose of this study is to evaluate the hypothesis that adult patients undergoing non-cardiac, non-transplant surgery that have elevated serum lactate during the perioperative period will have worse clinical outcomes including higher 30-day mortality, longer hospital length of stay, and higher likelihood of admission to ICU, compared with those who maintain normal serum lactate.

Methods: Following local research ethics board approval, we completed a retrospective cohort study to investigate whether perioperative lactate levels greater than 2 mmol/l were associated with poor outcomes. A retrograde, consecutive patient sample was selected from our electronic anesthesia database of patients with measured intraoperative lactate values receiving surgery at a major teaching hospital in November 2010 through November 2012. The impact of elevated lactate on expected length of hospital stay was examined using multivariable linear regression models. Logistic multivariable analysis was used to assess the impact of elevated lactate on death within 30 days and on admission to the ICU. Factors related to lactate elevation were also examined.

Results: 1173 patients met our inclusion criteria and 152 patients (13%) had a lactate greater than 2mmol/l. Elevated lactate was associated with a higher risk of 30-day mortality (13% vs. 3%, OR 2.41, 95% CI, 1.23-4.72 p=0.010, adjusted for emergency status and ASA score). Emergent patients with elevated lactate were more likely to be admitted to ICU, with a significant interaction found (p=0.030). We did not find an association between elevated lactate and hospital length of stay (p=0.243). Patients with emergency surgery and those receiving pRBC transfusion were more likely to have elevated lactate.

Discussion: We conclude that elevated perioperative lactate is associated with higher 30-day mortality and greater odds of ICU admission in emergent cases. To our knowledge, this is the largest study to date examining the association between

elevated perioperative lactate and patient outcomes. Identifying this high-risk group of patients is the first step in attempting to alter these outcomes with interventions in the operating room and in the postoperative setting. The heterogeneous population limits the results. We are also not able to determine causation of poor outcomes due to the retrospective nature.

References:

1. Allen M. Lactate and acid base as a hemodynamic monitor and markers of cellular perfusion. Pediatr Crit Care Med 2011; 12[Suppl]: S43-S49.

2. Waters, JH, Miller LR, Clack S et al. Causes of metabolic acidosis in prolonged surgery. Crit Care Med. 1999; 27(10): 2142.

152946 - THORACIC EPIDURAL VS RECTUS SHEATH CATHETER IN RADICAL CYSTECTOMIES

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Introduction

Several analgesic techniques are used following radical cystectomy (RC). The use of thoracic epidural (TE) for postoperative pain control remains a superior choice when compared with systemic analgesia [1]. To date studies evaluating rectus sheath catheters (RSC) following RC are all retrospective case reviews [2].

Aim

Our primary aim is to determine whether surgically placed RSC are non-inferior to TEs with regards cumulative opioid consumption postoperatively, in patients undergoing an open RC. Our secondary aims are to compare visual analogue scores (VAS) of pain postoperatively at 1-4 hours, post operative day (POD) 1, POD 2 and POD 3, time to mobilisation, length of hospital stay, and patient satisfaction between the two techniques.

Methods

Institution ethics board approval was granted and each patient was consented. This is a prospective, randomised, non-blinded, single centre study involving patients having an open RC and formation of ileal conduit or neobladder via a lower midline abdominal incision. Patients were recruited and randomised to receive either a TE or surgically placed RSC prior to their operation. We evaluated our primary and secondary outcomes up to a period of 72 hours post-operatively. We converted all opioid consumption into IV Morphine Equivalents (IVMEQ). As the data set was small, we analysed our data using the median and interquartile range 25-75% (IQR25-75).

Results

Preliminary data evaluated 12 recruited patients. Two patients were excluded due to protocol violations. Of the ten remaining patients, mean age was 69.8 with a mean BMI of 27.9. All ten patients were male. Five patients were randomised to each group. The median cumulative IVMEQ in the TE group was 27 (IQR 21-27) mg compared to 37.8 (IQR 1.8-38) mg in the RSC group. As shown in Table 1, median VAS scores were better in the epidural group. Time to mobilisation was 2 days (IQR2-2) in the epidural group compared to 1(IQR1-1) day in the RSC group. Length of stay was 9 (IQR6-14) days in the epidural group compared with 7(IQR6-9) days in the RSC group. Patient satisfaction was 8 (IQR7-8) corresponding to very satisfied in the epidural group compared to 9 (IQR8-9) corresponding to completely satisfied in the RSC group. Table 1

Conclusion

From our preliminary data, surgically placed RSCs are inferior to TE analgesia in open lower midline RC. The wider variance seen in the RSC group, will be further evaluated once we have a larger data set. However, the data also showed a quicker time to mobilise, shorter length of stay and better patient satisfaction in the rectus sheath group. We are continuing to recruit patients and by June 2016, our results will reflect a more robust outcome.

References:

[1] JAMA 2003; 290: 2455-63

[2] BJU Int 2014; 113: 246- 253

Thoracic Epidural vs Rectus Sheath Catheter in Cystectomies

Table 1

	Epidural		RSC	
	VAS (Rest)mm (IQR25-75)	VAS (Movement)mm (IQR25-75)	VAS (Rest)mm (IQR25-75)	VAS (Movement)mm (IQR25-75)
1-4hrs	16(0-30)	34 (0-48)	29(7-43)	54(8-56)
POD1	8(0-15)	35(10-82)	37(10-53)	50(39-62)
POD2	10(8-15)	37(35-57)	37(12-45)	48(39-54)
POD3	15(8-16)	30(23-54)	5(3-8)	37(12-47)

Table showing median VAS scores and IQR for thoracic epidural and rectus sheath catheter up to POD3

152953 - SYSTEMIC REVIEW OF RECTUS SHEATH BLOCK ON POSTOPERATIVE PAIN

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Introduction: Patients undergoing intraabdominal surgery experience significant pain from incisions to the abdominal wall. The rectus sheath block (RSB) is a regional technique that provides sensory blockade to the anterior midline abdominal wall. Our systematic review aims to examine the analgesic efficacy of the RSB on postoperative pain in adult patients undergoing intraabdominal surgery.

Methods: A systematic search was executed on the US National Library of Medicine database (MEDLINE), Excerpta Medica database (EMBASE), Cochrane Central Database of Randomized Controlled Trials (CENTRAL) and Cochrane Database of Systematic Reviews (CDSR). We searched for randomized controlled trials (RCTs) that compared the RSB to placebo or local infiltration anesthetic (LIA), using keywords such as “rectus sheath”. We also pursued grey literature for additional papers which included Google Scholar and searched through the appendices of relevant papers. We sought opioid consumption in IV morphine equivalent (mg) at postoperative intervals 0 – 24 and 24 – 48 hours (h). Pain outcome was assessed using the 0 - 10 cm Visual Analogue Scale (cm) at postoperative 1, 6, 12, 24 and 48 h. A meta-analysis was performed using random effects model with Review Manager 5.3.

Results: Seven RCTs with a total of 364 patients were included in our meta-analysis. Five trials used single-shot blocks and two trials used catheters for continuous blocks. Compared to control groups, single-shot RSB reduced IV morphine consumption at postoperative 0 – 24 h by 8.55 mg (95% CI: -11.21, -5.88; P < 0.00001) and at postoperative 24 – 48 h by 10.08 mg (95% CI: -17.57, -2.58, P = 0.008). Continuous RSB reduced IV morphine consumption at postoperative 0 – 24 h by 13.85 mg (95% CI: -24.93, -2.76; P = 0.01) and at postoperative 24 – 48 h by 4.00 mg (95% CI: -7.30, -0.70; P = 0.02).

Compared to control groups, single-shot RSB reduced mean VAS score at postoperative 1 h by 3.81 cm (95% CI: -6.06, -1.55; p < 0.00001). We were unable to demonstrate a significant difference in mean VAS score between RSB and control groups at postoperative 24 (95% CI: -0.21, 0.22; P = 0.96) and 48 h (95% CI: -1.40, 0.54; P = 0.03).

Conclusion: Our study shows that the RSB had an opioid sparing effect in adult

patients undergoing elective intraabdominal surgeries up to postoperative 48 hours. Therefore, it may be a useful option to consider as part of multimodal pain management in this population.

References:

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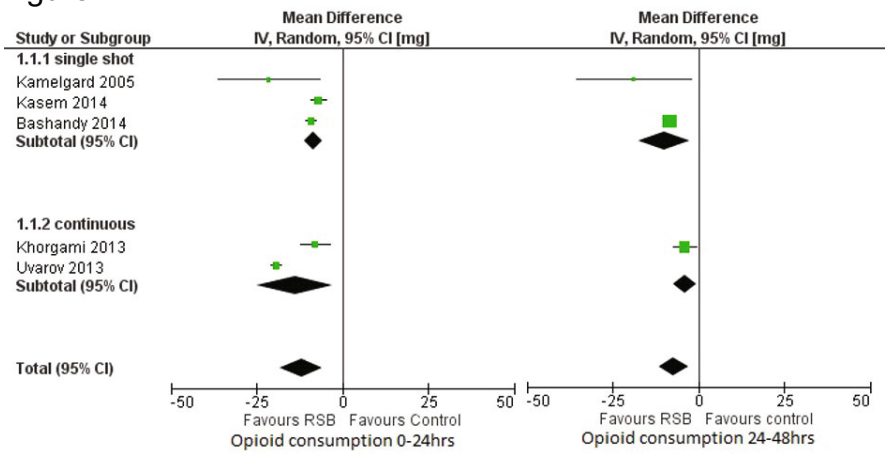
Figure 1



Forrest plot: mean difference in IV morphine consumption (mg) between RSB and control groups at postoperative 0 - 24 h and 24 - 48 h

152960 - COLD INDUCED URTICARIA AND TONSILLECTOMY, A CASE REPORT

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Introduction: This is a case of an 8 year-old girl with a history of cold induced urticarial presenting for tonsillectomy.

Methods: Both parents gave consent for publication. The author has no competing interests. An 8 year-old girl presented with her mother to the pre-op anesthesia clinic booked for a tonsillectomy for obstructive sleep apnea. She had a two-year history of progressive cold induced urticaria. The reaction was described as a pruritic maculopapular skin reaction, which developed minutes after exposure to cold. The rash affected only cold exposed areas. Inducing factors included swimming in a cold pool, exposure to cold air and ingesting cold food. Symptoms were relieved within an hour with diphenhydramine. She was prescribed an epi-pen but has never used it. She gave no history of further systemic effects and has never been hospitalized for these reactions.

Past history is otherwise unremarkable and there was no history of atopy.

On the day of surgery, the child was prepared for surgery in the day surgery area. She was ordered diphenhydramine 12.5 mg po. Shortly after dawning her surgical gown she developed an urticarial rash typical of her cold induced urticaria. She was given warm blankets and the rash resolved. There were no cardio-respiratory concerns and after a short delay, the procedure proceeded.

The operating room was pre heated. Warmed fluids and a heating blanket were utilized.
The procedure and the post op course were otherwise uneventful.

Results: This patient presents with symptoms that are typical of cold induced urticaria. The disease is chronic and affects both children and adults. Among children, most patients have a history of atopy and half have a history of asthma.[1] While the urticarial reaction may occur only in the area exposed to cold, it can involve the whole body and 33% of patients may experience an anaphylactic reaction.[1] The reaction involves IgE mediated mast cell degranulation releasing histamine, leukotrienes and prostaglandin D2.[1] Treatment and prophylaxis is generaly with H1 blockers and one case report notes the resolution of symptoms with omalizumab, an anti IgE antibody.[1]
Cases reported in the anesthetic literature include a successful coronary bypass graft

using cold cardioplegia and pretreatment with H1, H2 blockers, prednisone and montelukast.[2] Also reported is a case of cold induced urticarial provoked by chilled atracurium.[3] Finally, cold surgical compresses have been noted to cause a localized urticarial reaction.[4]

Discussion: Although this case had a good outcome, and much attention was given to prophylaxis and the preparation of the operating room, consideration should also be given to the pre-op and post op areas.

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3) Arino P. Aguado L, Cortada V, et al. Cold Urticaria Associated with Intraoperative Hypotension and Facial Edema. Anesthesiology 3 1999, Vol. 90: 907-909

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152963 - CANADIAN ANESTHESIOLOGY DEPARTMENT INVOLVEMENT IN PRE-CLERKSHIP

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Introduction: The goal of pre-clerkship is to teach general medical competencies, using teachers from a range of specialties [1-3]. Both anesthesiologists and students benefit from anesthesiology's involvement in pre-clerkship. Students benefit from the unique expertise of anesthesiologists, while anesthesiologists benefit by meeting their academic deliverables, increasing the standing of their profession, and improving faculty career satisfaction.

Previously, Canadian anesthesiology departments have played a variable role in pre-clerkship [4]. However, the perceived adequacy of anesthesiology's contribution may vary between the anesthesiology department and the undergraduate medical education (UGME) office. This study describes the involvement of Canadian anesthesiology departments in pre-clerkship for the 2014-2015 academic year. It also examines the perception of three leadership groups i.e. Anesthesiology Department Heads, Anesthesiology UGME Directors, and Associate Deans of UGME, regarding anesthesiology's contribution.

Methods: We acquired a local REB approval and developed three surveys based on a previous survey [4]. We then conducted preliminary testing of the survey validity using computational linguistics analysis and cognitive interviews. In July 2015, we sent the surveys to the three aforementioned leadership groups at the 17 Canadian medical schools. Questions extracted the information uniquely available to each party. Instruction outcomes included the proportion of anesthesiologists taking on teaching responsibilities. Additional questions assessed perceptions regarding the adequacy of anesthesiology's contribution, the ability of anesthesiologists to contribute, the duty of

anesthesiologists to contribute, and the indispensability of anesthesiology's contribution. We compared the perceptions of the three leadership groups.

Results: At the time of this preliminary analysis, all 17 Department Heads and 17 Anesthesiology UGME Directors had responded; 10 of Associate Deans had completed the survey. On a national level, only 12.9% of anesthesiologists had a teaching role in pre-clerkship; participation at individual institutions ranged from 1.1-46.1% of anesthesiologists. The accompanying figure compares the perceptions of the three leadership groups.

Discussion: A minority of academic anesthesiologists in Canada contribute to pre-clerkship education; only 1 in 8 currently teach in pre-clerkship! Not unexpectedly, all the leadership groups think that the current contribution is inadequate. The three leadership groups differ regarding the profession's contribution; compared to UGME Directors and Department Heads, UGME Associate Deans believe more strongly that anesthesiologists have a duty to contribute, but of some concern, they see this contribution as not being indispensable. In summary, anesthesiologists have an opportunity, and likely an unfilled obligation, to teach in pre-clerkship. Increasing the profession's contribution would benefit students, and increase the profile of the specialty.

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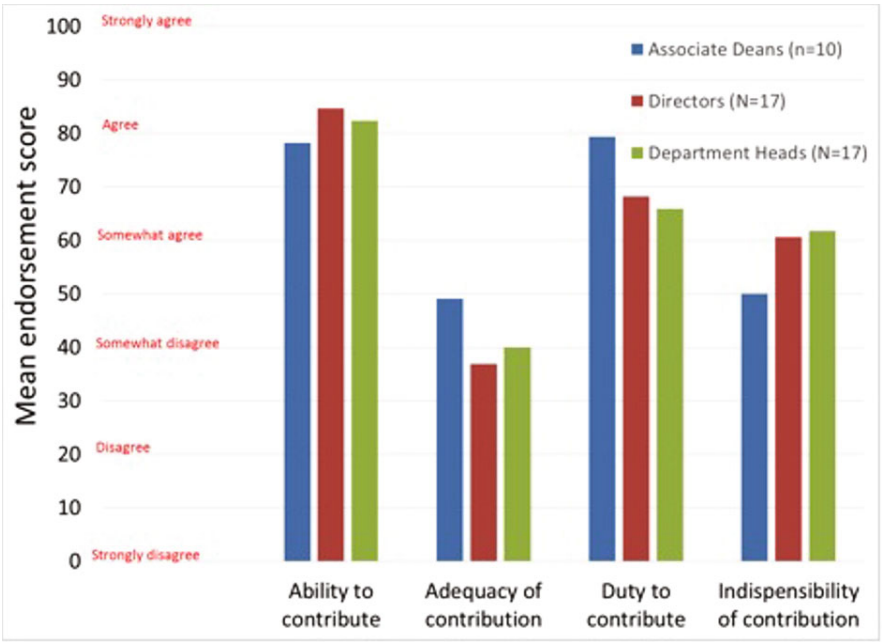
4. Can J Anesthes 2000 48: 147-152.

Perceptions on Anesthesiology's Contribution



The level of agreement among the three leadership groups regarding various opinions on anesthesiology's contribution in pre-clerkship.

152970 - LIDOCAINE PRELOADED IN THE ETT CUFF REDUCES EMERGENCE COUGH

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Introduction

Alkalinized lidocaine in the endotracheal tube (ETT) cuff decreases the incidence of cough and throat pain on emergence after surgery lasting more than two hours (1)(2). However, as alkalinized lidocaine needs 90-120 minutes to cross the ETT cuff membrane(3)(4), its usefulness in shorter duration surgery is unknown. This prospective double-blind RCT tested the hypothesis that prefilling ETT cuffs with alkalinized lidocaine > 90 minutes before intubation would reduce the incidence of emergence cough after surgeries lasting less than 120 minutes.

Methods

After local Ethics Board approval, 200 ASA I-III patients consented to be randomized into one of two groups receiving either alkalinized lidocaine (group AL) or saline (group S) to inflate the ETT cuff.

Cuffs were prefilled > 90 minutes before intubation with either 2 ml of 2% lidocaine and 8 ml of 8.4% bicarbonate (group AL) or 10 ml of normal saline (group S). Cuffs were emptied immediately before intubation. After intubation, either 2 ml of 2% lidocaine (AL) or 2 ml of saline (S) were injected into the cuff. Additional 8.4% bicarbonate (AL) or saline (S) was injected into the cuff until there was no air leak.
Anesthesia was maintained using desflurane, rocuronium and either fentanyl or sufentanil in order to maintain vital signs within 20% of baseline values. Opioids administered in prophylaxis of extubation cough were proscribed.

A standardized "no touch" emergence technique was used (5). A blinded assessor noted any cough above 0.2 MAC of expired desflurane. At 0.2 MAC, once every 30 seconds, the patient was instructed to open his eyes and extubation occurred once a directed response was noted.

Sample size calculation was based on a local incidence of emergence cough of 30%. One hundred patients per group were necessary to detect an absolute 15% reduction in cough in the AL group (power: 80%; alpha 5%). Results were assessed using Student's t test and Fisher's Exact test as appropriate. Logistic regression with the Lack of Fit P being reported (6) evaluated the relation between cough and continuous variables.

Results

Table 1 shows that the total amount of opioids administered, ETT cuff pre-loading times, duration of surgery and extubation times were not significantly different. The incidence of extubation cough in group AL was 12%, significantly (p=0.04) lower than the 22% incidence in the saline group.
Emergence cough was not significantly influenced by smoking (p=0.16) or the use of ACE inhibitors (p= 0.71). Fentanyl dosage was inversely correlated with the incidence of cough (p=0.01), while preloading time (P=0.67) and age (P=0.28) showed no significant correlation.

Conclusion

Preloading alkalinized lidocaine in the ETT cuff significantly decreased general anesthesia emergence cough after surgeries with an average duration of less than one hour.

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6. Statistical analysis was done using: JMP 11 software (SAS institute Inc. Cary, NC)

Table 1: Patient information and intraoperative data by group

Table 1: Patient information and intraoperative data by group			
	Group AL (n=100)	Group S (n=100)	P value
Age	51 ±14	53 ±14	0.57
Sex, Male/female (n)	40/60	33/67	0.38
Non-smokers/smokers (n)	76/24	84/16	0.22
ACE inhibitors yes/no (n)	5/95	9/91	0.41
Fentanyl equivalents received (µg)	213 ±80	199 ±81	0.194
Patients having received remifentanil (n)	31	34	0.763
Remifentanil received (µg)	54 ±31	59 ±81	0.744
Duration of surgery (min)	59 ±28	52 ±29	0.058
Volume in endotracheal cuff (ml)	6.9 ±1.4	6.8 ±1.3	0.961
Pre-loading time (min)	231 ±119	213 ±104	0.259
Extubation time (sec)[a]	513 ±184	483 ±215	0.331
Except where noted values are presented as means ± 1 SD [a]: calculated from the time of desflurane discontinuation			

152971 - TRANSFUSION TRIGGERS IN CRITICAL CARE AND SURGERY: A META-ANALYSIS

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Introduction: After the landmark Transfusion Requirements in Critical Care Trial,[1] there has been much interest in the risks and benefits of restrictive versus liberal transfusion thresholds in the critical care and perioperative settings. Given the clinical importance and conflicting evidence base,[2-5] we sought to perform an updated meta-analysis to address whether outcomes differ for surgical versus critical care patients.

Methods: Comprehensive searches of Medline, Embase, and the Cochrane Library were performed up to 15 October 2015 to identify randomized controlled trials (RCT) of adult surgical or critically-ill patients receiving a liberal versus restrictive transfusion strategy that reported mortality. The primary outcome was 30-day all-cause mortality, separately sub-grouped by surgical or critical care patients. Secondary outcomes included 90-day mortality, morbidity, blood volume transfused, and hospital length of stay. Two researchers independently extracted study demographics, outcomes, and assessed study quality. Random effects meta-analysis was performed to derive odds ratios (OR) and weighted mean differences (WMD), including 95% confidence intervals. The test for interaction across subgroups was used to assess differences in effect size. Additionally, *a priori* subgroup analyses included type of surgery (cardiac and non-cardiac).

Results: The search retrieved 6055 citations, with 25 RCTs (10617 patients) meeting the inclusion criteria. Eleven trials were in the critically-ill and 14 were in perioperative patients. In critical care patients, the restrictive transfusion strategy resulted in significantly reduced 30-day mortality compared with a liberal transfusion strategy (OR 0.82; 95% CI 0.69-0.99; NNT=33; Figure). However, in surgical patients, the restrictive transfusion strategy led to the opposite direction of effect for 30-day mortality (OR 1.33; 95% CI 0.96-1.84; Figure). The test for interaction across the critical care and surgical subgroups was significant (p=0.034), suggesting that the effect sizes differ between the two. With regard to secondary outcomes, sub-group analysis of perioperative patients by type of surgery revealed a higher risk of myocardial infarction among non-cardiac surgery patients receiving a restrictive transfusion strategy (OR 1.66; 95% CI 1.01-2.70; NNTH=120). No other significant differences between the transfusion strategies were found for hospital length of stay or other secondary

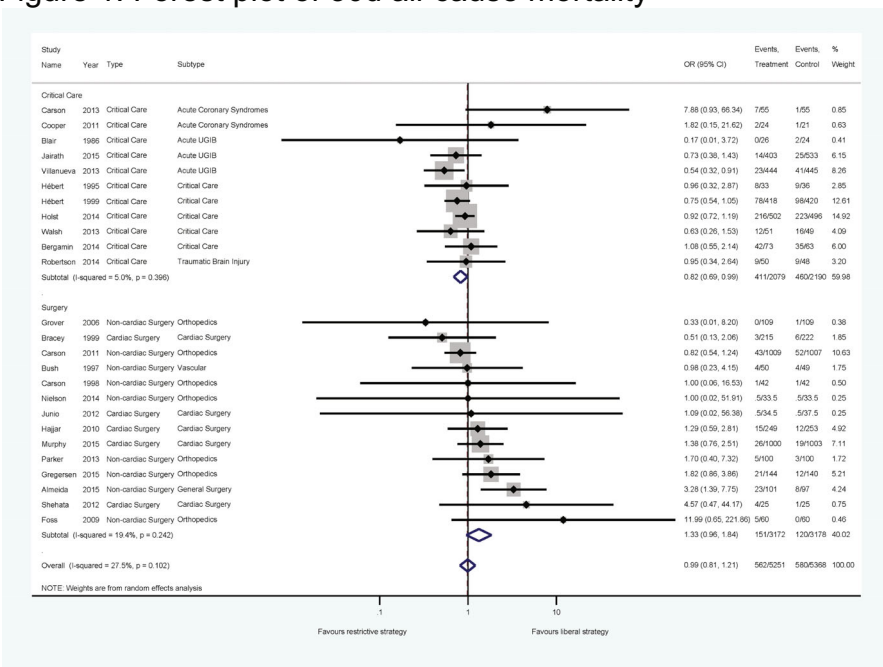
outcomes, including the remaining tests for interaction between subgroups. Overall, the liberal protocol patients received more blood compared to restricted protocol patients (WMD 1.5 units; 95% CI 1.1-1.8 units; $p < 0.001$). Statistical evidence of publication bias was not found and 11/25 RCTs were high quality.[6]

Discussion: The available evidence suggests that a restrictive transfusion strategy significantly reduces the risk of 30-day all-cause mortality in critical care patients, but not in perioperative patients. Whether a restrictive transfusion strategy increases mortality in the perioperative setting remains to be definitively delineated by adequately powered RCTs, particularly in high-risk patients.

References:

[1]NEJM(1999);340:409-417
[2]BJA(2015);115(4):511-19
[3]BMJ(2015);350:h1354
[4]NEJM(2015);372;(11)997-1008
[5]NEJM(2013);368;(1)11-21
[6]BMJ(2011);343:d5928

Figure 1: Forest plot of 30d all-cause mortality



Patients received either a liberal or restrictive transfusion trigger for packed red blood cells. Studies are grouped by critical care versus surgery.

152973 - A COMPARISON OF METHODS USED TO SECURE PEDIATRIC ENDOTRACHEAL TUBES

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Introduction: Endotracheal intubation is a common and life saving procedure preformed in operating rooms, intensive care units, and emergency departments. An in situ endotracheal tube (ETT) must be secured in position to avoid movement thereby preventing accidental extubation or mainstem intubation, both of which are potentially life threatening(1). It is common to use tapes and topical adhesives for ETT stabilization. Although such methods are commonly employed, limited published research is available to guide best practice.

Methods: Local research ethics board approval and participant consent was obtained. A prospective interventional study was conducted using a convenience sample of 150 volunteers. The radial aspect of volunteers' left index finger over the metacarpal phalangeal joint was used as a live dermal model of a human upper lip. Volunteers placed their left arm and hand into a custom experimental apparatus. Experimental tape and adhesive combinations were applied to the volunteer and a pediatric ETT. The study tapes included (all 3M™ products): Elastoplast™ Transpore Clear™, Transpore Cloth™, Medipore™, Micropore™, Cloth Adhesive™. The supplementary adhesives include: none, 3M Cavilon™, tincture of benzoin, and mastisol. An incremental force was vertically applied to the secured ETT until a reference point on the ETT was displaced 3 cm. The force was measured using a force transducer connected to a personal computer. The data was reviewed to determine the peak force applied during each ETT displacement. Three blocks of 50 volunteers were studied. Each block employed unique tape/adhesive combinations. The combined block data were used to compare the 23 total ETT securing methods. A repeated measures ANOVA was used to analyze the data.

Results: Cloth Adhesive Tape with Mastisol required more force to distract the ETT than all other tested methods ($p < 0.01$). See Figure 1.

Discussion: The results demonstrate of the commonly used methods to secure an ETT the combination of Cloth Adhesive Tape and Mastisol provide the greatest resistance to ETT displacement. This may be the preferred method to secure an ETT when displacement is a major concern.

References:
1) Am J Respir Crit Care Med 1998 157: 1131-1137

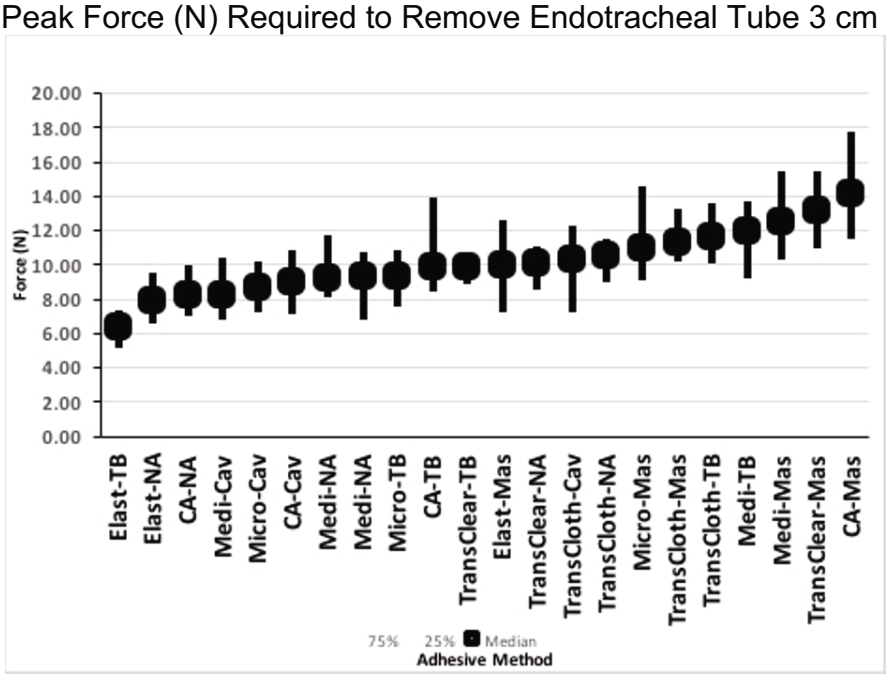

Figure 1 – Force Required to displace the ETT 3 cm, after secured with various tape and adhesive Combinations. Tape type labels: Elastoplast™ (Elast), Transpore Clear™ (TransClear), Transpore Cloth™ (Transcloth), Medipore™ (Medi), Micropore™ (Micro), Cloth Adhesive™ (CA). Supplementary adhesive labels: none (NA), 3M Cavilon™ (Cav) , tincture of benzoin (TB), and mastisol (Mas).

152989 - SCHOLAR IN ANESTHESIOLOGY: A CURRICULUM FOR CANMEDS 2015

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Background

According to the Royal College of Physicians and Surgeons of Canada's CanMEDS 2015 Physician Competency Framework, as Scholars, "physicians demonstrate a lifelong commitment to excellence in practice through continuous learning and by teaching others, evaluating evidence, and contributing to scholarship" (1). Key concepts in training needed to support this commitment include practices of: Lifelong learning, teaching, evidence-informed decision making, and research. Our department has recently updated our curriculum to align with the new CanMEDS framework. Here we describe the development of a 'Scholar in Anesthesiology' curriculum to support the pedagogical needs of anesthesiology residents in their pursuit of the Scholar competencies required by CanMEDS 2015.

Methods

Following publication of CanMEDS 2015, experts in education, research, and clinical practice followed an iterative process to identify methods and metrics to teach and assess competence in the role of Scholar in anesthesiology. The expert panel evaluated longitudinal and episodic curriculum elements that could be appropriately matched to the key competencies outlined in CanMEDS 2015. Chosen curriculum elements were then developed for educational implementation, supported by curated resources and mentorship structures. Specific deliverables were mapped to the overall competency-based residency program curriculum.

Results

Longitudinal curriculum elements were identified and developed to address the key concepts of Evidence-informed decision making and Research. To develop and assess competence in evidence-informed decision making, residents will develop a structured research query to address a clinical topic, search the medical literature to identify a relevant article, and critically appraise this article to address their question. Prior to graduation, residents will address a broader topic and appraise and grade

multiple sources of evidence to address this clinical issue. To develop competency in research skills, residents will complete a project to generate new health-related knowledge and submit for peer-review. There will be structured assessments at established time points.

Residents will complete written reflections to support their development as lifelong learners and teachers, as well as to develop skills in evidence-informed decision-making. For example, residents will reflect on personal learning plans and/or methods for monitoring practice (lifelong learning); case preparation and sources of evidence drawn on to prepare for rare or complex cases (evidence-informed decision-making); and incorporation of medical evidence into teaching roles (teacher).

Development of competency in the Scholar role is further supported by an 'Evidence Based Medicine' seminar in Year 1, a 'Residents as Teachers' workshop delivered by the Postgraduate Medical Education office at the University, and completion of the TCPS-2 Ethical Conduct for Research module.

Discussion

To our knowledge, this is the first 'Scholar in Anesthesiology' curriculum designed specifically for CanMEDS 2015. Implementation and evaluation of this curriculum is ongoing and will be reported in the future.

References:

(1) Frank et al. RCPSC 2015

Curriculum Map

Curriculum Element	Learning Frequency	Key Concept Addressed	Competencies Addressed	Deliverable
Clinical Query	Longitudinal	Evidence-Informed Decision-Making	3.1, 3.2, 3.3, 4.1, 4.5	Critical appraisal rounds
Scholarship Project	Longitudinal	Research	4.1, 4.2, 4.3, 4.4, 4.5	Peer-reviewed new health knowledge
Learning Reflection	Episodic	Lifelong Learning	1.1, 1.2	Reflection post
Evidence-Informed Decision-Making Reflection	Episodic	Evidence-Informed Decision-Making	1.3, 3.1, 3.3, 3.4	Reflection post
Teacher Reflection	Episodic	Teacher	2.1, 2.3,	Reflection post
Residents as Teachers	Episodic	Teacher	2.2, 2.4, 2.5, 2.6	Completion Certificate
EBM Seminar	Episodic	Evidence-Informed Decision-Making	3.2, 3.3, 3.4	Summary of clinical query
TCPS-2	Episodic	Research	4.2	Completion Certificate

152991 - MYOMETRIAL CONTRACTILITY IN ADVANCED AGE AND MORBIDLY OBESE WOMEN

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Introduction

Women with advanced maternal age (AMA) and morbid obesity (MO) are at a greater risk for postpartum hemorrhage (PPH). Oxytocin is the first line drug in the treatment of PPH. Prolonged exposure to oxytocin, as during labor augmentation, can result in the desensitization phenomenon.[1] Desensitization is likely to result in poor uterine tone after delivery leading to PPH, with attenuated response to oxytocin. It is unknown if oxytocin desensitization specifically affects contractility in women with AMA and MO when compared to younger or normal weight populations. Further it is not known if the higher incidence of PPH seen in these women is due to poor uterine contractility. We aimed to investigate the effect of oxytocin- desensitization on oxytocin-induced myometrial contractility in these patient populations.

Methods

The in-vitro study was conducted after REB approval and written informed consent from patients undergoing elective cesarean deliveries. Three groups of patients were studied: control (≤35 yr,BMI 20–24.9 kg/m^2), AMA (≥40 yr,BMI 20–24.9 kg/m^2), and MO (≤35 yr,BMI≥40 kg/m^2). Myometrial tissue obtained from the uterine incision was dissected into six strips. Each strip was mounted in a single organ bath with physiological salt solution (PSS) and then pretreated with oxytocin 10^{-5}M (desensitization model[2]) or left in PSS (untreated) for 2 hours. This was followed by a dose-response testing to oxytocin 10^{-10}M to 10^{-5}M. The primary outcome was motility index (MI;amplitude x frequency) of myometrial contractions. Data was analyzed using the % response during the dose response relative to the baseline contractions.

Results

So far 126 experiments have been performed (required n=168) with samples from 33 women: control(n=56), AMA(n=48), MO(n=22). The MI, calculated as a cumulative dose-response average, was higher in the control group(457%) compared to the AMA(414%) and MO(321%) groups in samples not pretreated with oxytocin. In the

oxytocin-pretreated samples, the MI was lower in the control group(111%) compared to the AMA(158%) and MO(281%) groups (Fig 1). We plan to complete this study by March 15, following recruitment of 7 more patients.

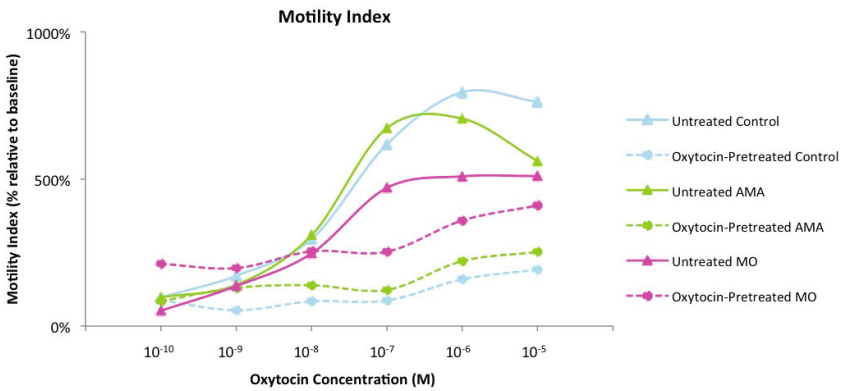
Discussion

Our results validate the desensitization phenomenon, as the MI of oxytocin-induced contractions was higher in untreated than oxytocin-pretreated groups for all patient populations. In the absence of oxytocin pretreatment, women with AMA and MO exhibit poor oxytocin-induced myometrial contractility compared to the control group. While, in the setting of oxytocin-pretreatment, women with AMA and MO exhibit enhanced myometrial contractility compared to the control group. These results indicate that the higher incidence of PPH seen in AMA and MO patients may be due to not only the desensitization phenomenon, but also their poor intrinsic uterine contractility.

References:

1.Am J Obstet Gynecol **2003**;188:497-502
2.Anesthesiology **2013**; 119: 552-561

Figure 1. Motility Index



The dose-response curves for motility index of the myometrial strips stimulated with oxytocin after pretreatment with oxytocin 10-5 M concentration or PSS for 2 hours.

152992 - LUMBAR SPINE ANATOMY IN PREGNANT WOMEN SUSTAINING DURAL PUNCTURE

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Introduction: Unintentional dural puncture is one of the most frequent complications of the epidural technique. One previous study suggested that atypical sonoanatomy of the ligamentum flavum-dura mater unit may be a risk factor for this complication; however, this study lacked confirmation by MRI. (1) The objective of this study was to describe the sonoanatomy of the lumbar spine, as assessed by both MRI and ultrasound, in women sustaining unintentional dural puncture during epidural catheter placement for labor analgesia.

Methods: With institutional ethics committee approval and patient informed consent, we approached women who sustained a recognized unintentional dural puncture during labor epidural placement. Those agreeing to participate had detailed documentation of the technical aspects of the epidural placement, including: use of pre-procedural ultrasound assessment or palpation, number of attempts, overall difficulty of placement, level of placement and operator experience. An MRI of the lumbar spine was performed in the immediate postpartum period to investigate for any spinal abnormalities, particularly those of the ligamentum flavum and dura mater. Additionally, all women had their lumbar spine scanned with ultrasound in both transverse and longitudinal paramedian oblique views. Ultrasound images of the ligamentum flavum-dura mater unit in the transverse view were classified as typical, atypical or inconclusive. An atypical image was defined as that depicting all elements of the interspace, except for the ligamentun flavum-dura mater unit. (1) All MRI images were reviewed by a neuroradiologist, who was blinded to the ultrasound images and to the level at which the unintentional dural puncture occurred.

Results: We included 10 women in the study. Half these punctures occurred despite experienced practitioners and no woman had an extremely low or high body mass index. The depth to loss of resistance varied from 4 to 6 cm; 9 punctures were at L3/4

and 1 at L2/3 level. Two women suffered two dural punctures each. Seven of the ten women developed postdural puncture headache and went on to have an epidural blood patch. Ultrasound imaging in the longitudinal paramedian oblique view produced typical images in all patients. However in the transverse view 7 of 10 women showed atypical or inconclusive scans, the atypical images being at either L4/5 or L5/S1 interspace. The MRI results for all women revealed no anatomical abnormalities, with the exception of 1 woman who had a ligamentum flavum gap left of midline at the L2/3 level (away from the puncture site).

Discussion: Our results suggest that unintentional dural punctures occur in likely anatomically normal women. Furthermore, the transverse ultrasound views may fail to demonstrate typical ligamentum flavum-dura mater unit at the lower lumbar levels despite its confirmed presence by MRI.

References:

1) Reg Anesth Pain Med 2008; 33: 266–270

152993 - TWO MODELS OF CENTRAL ARTERIAL PRESSURE DURING SPINAL ANESTHESIA

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Introduction: Two methods of central blood pressure analysis are Windkessel and wave propagation modeling. Each has its composite parts, including Reservoir Pressure (RP) from the former and Backward Reflected Waves (BRW) from the latter. Though derived from independent mathematical equations based on unique assumptions, it has been recently demonstrated using radial tonometry that BRW and RP are both strongly correlated and arithmetically related (RP= 2 x BRW). [1] This would suggest that information derived from either model could be interchangeable, which is clinically relevant given that central blood pressure and its components have been shown to independently predict long term cardiovascular outcomes [1,2]. This pressure analysis relationship has not been evaluated in a dynamic state such as initiating neuraxial anesthesia, has not been reproduced in a proximal arterial site, and has not been assessed for potential bias introduced through the different derivation methods.

Methods: Local ethics approval was obtained. Carotid pressure waveforms using tonometry were obtained in 6 healthy males prior to and 20 minutes following a standardized spinal anesthetic for TURP, including 15mg of 0.75% Bupivicaine and a 10 mL/kg bolus of Lactated Ringers. The waveforms were analyzed using the previously mentioned methods [1]. Linear regression and Altman-Bland analysis were used to evaluate correlation and bias in the proportional relationship between BRW and RP.

Results: Patient information and waveform analysis results are summarized on Table 1. A strong correlation exists between RP and 2 x BRW both prior to (R^2=0.97, $p < 0.01$) and following (R^2=0.96, $p < 0.01$) spinal anesthesia. There was also a demonstrable bias at both of these measurement points with RP being greater than 2 x BRW by 5.58 mmHg-s (p=0.02) before and 6.28 mmHg-s ($p < 0.01$) after neuraxial blockade.

Discussion: This study evaluated the performance of two commonly used arterial physiologic models for central aortic pressure in a dynamic perioperative setting. The results confirm that the previously demonstrated strong correlation between RP and BRW is maintained during spinal anesthesia when measured at a proximal artery. A novel result is the detected bias, representing a 5-10% discordance of the total pressure-time integral, suggesting the two models are not interchangeable. Error

associated with the use of the triangulation method instead of physiological flow to quantify reflected waves has been described [3]. Also, a portion of diastolic pressure is accounted for differently in the model used to calculate RP. Either of these may in part explain the detected bias. Central blood pressure analysis is a tool in predicting long-term cardiovascular health. It may hold further value in predicting perioperative outcomes or evaluating the physiologic effects of anesthesia. Before such studies can be undertaken the mechanisms for model discordance and possible methods to reduce them should be further investigated.

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2. J Am Coll Cardiol 2012;60(21):2170-7.

3. Hypertens 2009;53(2):142-49.

Table 1

Variable	Mean	SD
Age (years)	63	5
Ringers Lactate Bolus (mL)	883	130
Spinal Level	T9 (*median*)	T5-T12 (*range*)
MAP PRE (mmHg)	98.3	19.9
MAP POST (mmHg)	96.5	13.0
Pulse Pressure PRE (mmHg)	48.7	9.8
Pulse Pressure POST (mmHg)	47.8	12.8
BRW PRE (mmHg)	37.4	10.3
BRW POST (mmHg)	35.6	8.6
RP PRE (mmHg)	80.4	20.2
RP POST (mmHg)	77.5	17.0

Table 1. Note: All values are mean and standard deviation (SD) unless otherwise noted. Abbreviations: BRW, backward reflected wave; MAP, mean arterial pressure; RP, reservoir pressure.

152998 - CADAVER LAB BOOSTS RESIDENT CONFIDENCE IN INVASIVE AIRWAY MANAGEMENT

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Introduction:
Airway patency is required to maintain ventilation and oxygenation under general anesthesia. The “can’t intubate, can’t ventilate” (CICV) scenario is a life-threatening emergency, occurring in less than approximately 0.01-2 per 10,000 elective cases.[1] Without rapid expert management, this situation can rapidly lead to brain injury, cardiopulmonary arrest, and death of the patient.[2] The American Society of Anesthesiologists‘s Difficult Airway Algorithm ends with “emergency invasive airway access,” defined as “surgical or percutaneous airway, jet ventilation, and retrograde intubation.” Given the low incidence of CICV cases, most anesthesiology residents graduate without this important clinical experience.

In 2011, the Royal College of Anesthetists recommended that the technique of cannula cricothyroidotomy be taught to the highest standards, and that anesthetists should be trained to perform a surgical airway.[3] "*Local University*" Uhosts an annual workshop where anesthesiology residents practice surgical and percutaneous airway skills on deceased porcine tracheas. In an effort to improve anatomical fidelity and practice procedural skills, senior anesthesiology residents recently participated in an invasive airway workshop utilizing fresh-frozen human cadavers.

Since this was the first such workshop at "*Local University*", we aimed to determine if the experience made a difference for the positive.

Methods:
Ethics**:** Approval was obtained from the local Behavioural Research Ethics Board.

Study Design: Prospective pre- and post-educational.

Inclusion Criteria: PGY-4 anesthesiology residents in the 5th month of the academic year.

Exclusion Criteria: Formal invasive airway training prior to anesthesiology residency. (Not found to be applicable to any of the participants.)

Number of participants: 8 (limited by cadaver availability).

Surveys: Documented previous invasive airway training and/or experience, and used a unipolar horizontal visual analogue scale (VAS) to measure resident confiedence, before and after the workshop, in the following four areas:
i. Management of a CICV scenario.
ii. Use of a cricothyroidotomy kit.
iii. Performing surgical cricothyroidotomy independently.
iv. Performing Seldinger cricothyroidotomy independently.

Interventions:
1. Didactic lecture reviewing the following:
i. ASA difficult airway algorithm.
ii. Anatomy and surface landmarks of the adult airway.
iii. Invasive airway equipment
iv. Step-by-step video demonstration of surgical & Seldinger cricothyroidotomy techniques.
2. Wet-lab utilizing fresh-frozen human cadavers and the Cook Medical Melker Universal Emergency Cricothyrotomy Catheter Set, allowing residents to practice the following emergency airway procedures:
i. Surgical cricothyroidotomy.
ii. Seldinger technique (wire-guided) cricothyroidotomy.

Results:
Please note that this online interface is not allowing me to insert my data set.
In brief, all residents showed an improvement in confidence in all categories (management of a CICV scenario, use of a cricothyroidotomy kit, performing surgical cricothyroidotomy independently, and performing Seldinger cricothyroidotomy independently.) In relative terms, the residents were 2.8, 1.9, 7.5, and 2.5 times more confident in the previously mentioned categories, respectively.

Discussion:
All subjects demonstrated an increase in confidence across all categories. We believe the hands-on cadaver lab played the greatest role in increasing resident confidence; however, we cannot ignore the potential contributions of the didactic lecture and airway videos. Also, the pre- and post-intervention survey were conducted on the same day, so we do not know if the observed increase in confidence is permanent or if it declines with time. Subsequent study design might consider surveying participants three, six, and twelve months after the intervention.

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153015 - A SCOPING REVIEW OF PODCASTS IN E-LEARNING: DETERMINANTS OF SUCCESS

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Background & Introduction:
Podcasting has become popular in medication largely for the advantages such as easy to create, cheap costs for distribution and ease of portability. However, there is no data describing factors associated with success or quality of podcasts. The goal of our study was to identify successful podcasts in anesthesia and identify factors associated with success.

Methods: Independent reviewers performed a systematic search of anaesthesia related podcasts on iTunes Canada. Data and metrics recorded for each podcast included: podcast's authorship, number posted, podcast duration target audience, format, and social media presence. Descriptive statistics and ANOVA were used to analyze data.

Summary of Results: 21 podcasts related to anesthesia were included in the final analysis. Only a third were still active. The median longevity of the podcasts series was only 15 months (IQR: 3-28 months). Less than 10% of podcasts had user ratings. Factors associated with success were: podcasts created by professional associations and industry; content that included clinical topics and procedural topics of posting (P

Discussion and Conclusions: We have developed a novel tool for assessing the success for a podcasts. The majority of anesthesia podcasts have a short halflife of only 15 months. Successful podcasts are associated with professional associations or industry. Inclusion of review process may help with increasing usage of podcasts. Reasons for this may be the need for fresh and quality content and good editing by users. The lack of these maybe associated with the early demise of a podcast series.

Take-home messages: Podcast creators and users should consider these factors associated with success when creating podcasts.

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153020 - EPIDURAL ANALGESIA IN HEPATIC RESECTION PATIENTS

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Introduction:
Epidural analgesia is often the preferred choice for pain management following partial liver resections at our academic center. However, the improved postoperative pain control must be balanced against the risks of bleeding in the setting of an anticipated perioperative coagulopathy. With the potential for significant intraoperative blood loss and associated reduction in the clotting factors, hepatic resections are frequently associated with administration of fresh frozen plasma and vitamin K (1). In this quality improvement initiative, we sought to retrospectively assess how the use of epidural analgesia, influenced postoperative recovery with a particular emphasis on the perioperative utilization of fresh frozen plasma to correct the post operative coagulopathy in patients receiving epidural analgesia.

Methods:
Following research ethics board approval, charts of patients who have undergone liver resection surgeries at our institution in the past 5 years were reviewed retrospectively. Several parameters such as patient demographics, use of epidural analgesia, timing of epidural removal, laboratory values (INR, CBC) and the use of FFP and/or vitamin K were recorded. Pain scores (static and dynamic) were obtained from the electronic database of structured daily assessments performed by our acute pain service on each postoperative day.

Results:
The majority of the patients reviewed (142/176, 81%) received an epidural catheter. The average time to removal of these epidural catheters was 3.4 ± 1.2 days with a range from 0-7 days. On the day of removal the average INR was 1.25 ± 0.16 and a delay in removal due to an elevated INR was documented in 15 patients. On the day of removal, 18 patients had an INR >1.4 and FFP was effectively administered to 8 patients to reverse the coagulopathy without any noted complications. Vitamin K was administered to 48 patients during the postoperative period. Furthermore, of the 142

epidurals, 25 were converted to PCA pumps due to epidural failure and 44% patients reported moderate to severe pain upon activity on POD1.

Discussion:
Following an initial review, the authors believe that our current practice of using epidural analgesia is safe and has the potential to facilitate postoperative recovery of patients undergoing hepatic resections. However, this preliminary review suggests that there is room for improvement in particular: addressing mechanisms to further reduce the failure rate, and educating all those involved in the postoperative care regarding the unique concerns regarding perioperative coagulation. The changes in postoperative coagulation altered management in a minority of cases (11%) and even fewer involved the utilization of blood products (6%). We intend to conduct further analysis of the database to help determine predictors of the extent of postoperative coagulopathy and options for management that are acceptable to the perioperative team involved in the care of these patients.

References:
1) Anesthesia 2013 68: 628-635

Table 1: Preliminary statistics from the recorded data of patients who received an epidural for liver resection in the past 5 years.

Table 1: Preliminary statistics from the recorded data of patients who received an epidural for liver resection in the past 5 years.

	N
Total charts reviewed	176
Number of epidurals	142 (81%)
Major: Minor resection	65:77
ASA (2/3/4)	14/112/16
Average blood loss	1161 ± 1537 mL
Patients with intraoperative RBC transfusion	33 (23%)
Patients with intraoperative FFP transfusion	8 (6%)
Intraoperative platelet transfusion	7 (5%)
Days to removal of epidural catheter post operatively	3.4 ± 1.2 days (Range = 0-7)
Average INR on day of removal	1.25 ± 0.2 (Range 1-1.7)
Coagulopathic patients on day of catheter removal (INR>1.4)	18 (13%)
Patients with delayed catheter removal	15 (11%)
Patients given FFP for catheter removal	8 (6%)
Patients given Vitamin K as prophylaxis or rescue measure for catheter removal	48 (34%)
Epidural failure (documented conversion to PCA due to failed sensory block) post operatively	25 (18%)
Resting pain on POD1	Mild (scores of 1-3): 109 (83%) Moderate (scores of 4-6): 13 (10%) Severe (scores of 7-10): 9 (7%)
Activity pain on POD1	Mild (scores of 1-3): 72 (56%) Moderate (scores of 4-6): 31 (24%) Severe (scores of 7-10): 26 (20%)
Resting pain on POD2	Mild (scores of 1-3): 109 (90%) Moderate (scores of 4-6): 7 (6%) Severe (scores of 7-10): 5 (4%)
Activity pain on POD2	Mild (scores of 1-3): 71 (59%) Moderate (scores of 4-6): 34 (28%) Severe (scores of 7-10): 16 (13%)

153022 - PERIOPERATIVE MI- ANALYSIS & LEARNING FROM TERTIARY CENTRE NSQIP DATA

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Introduction

Patients with pre-existing coronary artery disease are at increased risk of developing a myocardial infarction (MI) in the perioperative period due to a mismatch in the balance between myocardial oxygen supply and demand. Preoperative anesthesia consult clinics (ACCs) are essential in identifying patients at risk of developing a perioperative MI, in addition to optimizing patients prior to undergoing surgery.

The American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP) aims to enhance a hospital's ability to focus on preventing preventable postoperative complications. The NSQIP definition of a postoperative MI is an acute MI occurring within 30 days following surgery as manifested by indicative ECG changes, new troponin rise or with a physician diagnosis of MI. Our NSQIP risk adjusted odds ratio of a perioperative MI or cardiac arrest was 1.28 (CI 0.91-1.79*)- because of this we retrospectively reviewed the perioperative management of each case meeting this criteria to identify potential improvements for patient care.

Methods

- Local Ethics Committee approval was obtained

- Qualitative analysis

- Retrospective review of charts of patients meeting NSQIP criteria for postoperative MI over 3 year period 2012-2014

- Patients were identified by NSQIP- involving a random selection of 20% cases based on specific surgical booking codes

- Data collected:

- Preoperative- patient demographics, cardiac risk factors, presence of coronary artery disease, medication history, preoperative cardiac investigations Preoperative optimization, including the continuation/withholding of cardiac medications

- Anesthetic management

- Postoperative events, up to the event identified as a postoperative MI

- Postoperative day of MI

- Gupta index and NSQIP surgical risk calculator used to measure the perioperative risk of each patient

- Rates of postoperative MI and 30 day mortality compared with NSQIP data.

Results

75 cases meeting NSQIP criteria postoperative MI 2012-2014
55 cases confirmed as developing MI postoperatively (angiography, echocardiography or physician diagnosis, or without other disease processes such as sepsis or PE) of which:

- 76% patients attended ACC preoperative

- 31% patients underwent emergency surgery

A qualitative analysis was conducted on all cases, with a focus on cases of perioperative MI that had attended ACC prior to elective surgery. Results regarding perioperative MI cases and 30 day mortality are highlighted in table 1.
Issues identified:

- Lack of preoperative appreciation of coronary artery disease- without the use of a cardiac risk score

- Inappropriate cessation of aspirin in 24% patients undergoing elective surgery

- Lack of invasive monitoring in high risk cases

- Lack of cardiology followup of patients with confirmed postoperative MI

Discussion

Qualitative analysis of NSQIP data is essential such that improvements can be introduced into our institutions. The use of risk scores such as Gupta index/NQSIP surgical risk calculator at the ACC level may aid in highlighting patients at increased risk of perioperative morbidity.

References:

NA

Table 1- Incidence perioperative MI & 30 day mortality

	2012	2013	2014
Number of perioperative MI cases reviewed by NSQIP for our institution	2222	2382	2488
% incidence perioperative MI in our institution	1%	0.9%	0.8%
NSQIP incidence perioperative M I	0.4%	0.4%	0.4%
Number of perioperative MI cases revie w e d	22	18	35
Confirmed M I	20	16	19
Confirmed MI cases with preop anesthesia revie w	20	11	11
Perioperative MI cases- % emergency	25%	31%	37%
30 day mortality our institution % (number of patients)	17.4% (4)	19% (4)	16% (3)
30 day mortality Canadian NSQIP collaborative	21.9%	19%	16%
30 day mortality NSQIP	16%	16.8%	16.4%

153029 - 3D PRINTED HEART MODEL FOR TEACHING FOCUSED CARDIAC ULTRASOUND VIEWS

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Background:

Focused Cardiac Ultrasound (FCU) is become integral part of clinical assessment in many acute care areas including anesthesia and perioperative care.

FCU consists of obtaining as five transthoracic cardiac views and integrate the information obtained into the clinical assessment [1].

The complex three dimensional structure of the heart poses a great challenge in understanding the orientation of the ultrasound plane of cut in respect to each cardiac structure.

Continued cost-reduction of commercially available 3D printers represents a viable method to produce customized medical-anatomical models. Coupled together with free, open-source 3D modelling/image segmentation software enables the fabrication of highly detailed and accurate, yet inexpensive, medical-anatomical models for education and training. This case study **hypothesizes** that a 3D printer-centric workflow can produce a detailed and useful training module understanding FCU views.

Methods: After REB approval, an anonimized patient DICOM CT scan of a normal heart was selected. The heart was semi-automatically segmented using open-source medical segmentation tool ITK-SNAP™. Models were imported into free 3D printing slicing Meshmixer™ and sliced along the standard FCU views' ultrasound plane of cut (Parasternal long axis, short axis and four chambers). The obtained files were

exported as a .gcode toolpath file describing speed, temperature and geometric details necessary for 3D printing. The models were finally uploaded to a fused deposition modelling 3D printer, Series 1 Pro by Type A Machines, for fabrication.

A parametric model of a phased array adult transthoracic cardiac porbe was laso greated with a transparent ultrasound plane of cut. After printing, accuracy of the models was assessed by two staff anesthesiologists (MM, AM) and was visually compared with on line 3D model [2].

Results: The three heart models (Fig.1) were deemed accurate and provided an enhanced feeling of the three dimensional structure of the heart most useful for teaching and self learning. Accounting only for raw mass of materials used, each patient-specific models cost approximately $13.40 CAD.

Conclusions: Minimal software costs and low model cost has made it possible to fabricate accurate model of the heart from real patient's 3D data. Infrastructure required for the 3D printers will continue to see reductions in cost and once established can be used to rapidly produce other customized medical models. Future studies will test the impact of these models on learning cardiac anatomy and ultrasound planes of cut.

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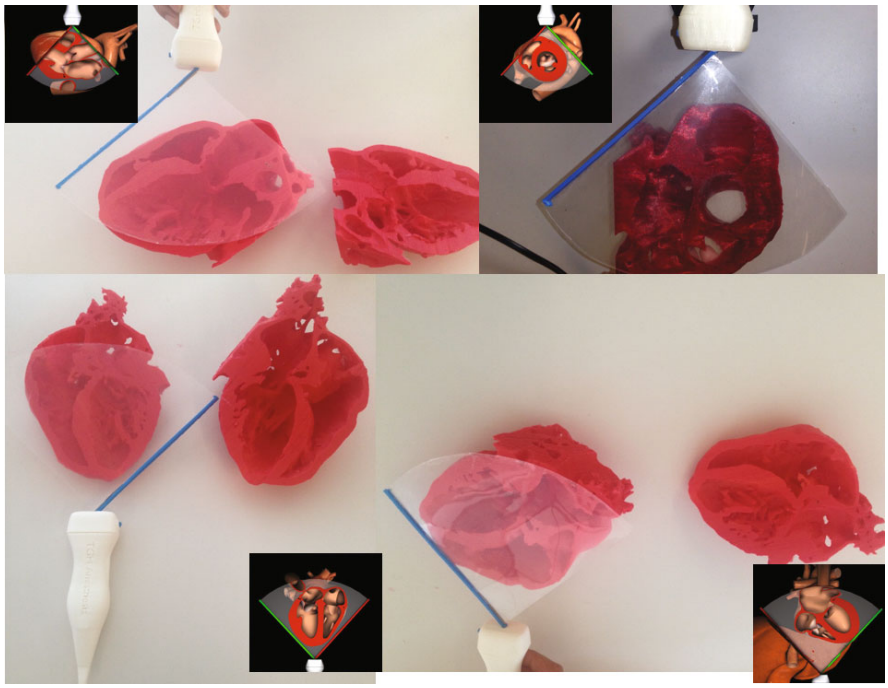
Fig.1



153034 - A LOW-COST 3D PRINTED AIRWAY MODEL FOR LUNG ISOLATION TRAINING

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Introduction: The price of commercially avaible 3D printing technologies has steadily decreased. Additionally, the availability of free and open-source programs and the wide array of 3D printable thermoplastics with varying material mechanical properties has allowed for the fabrication of a wide range of medical training tools that were either previously prohibitively expensive or did not exist. Presently, we demonstrate the usability of a commercially available and highly flexible thermoplastic elastomer, NinjaFlex (Fenner Drives, Inc., Lancaster, PA, USA), to rapidly print a low-cost double lumen intubation training tool based on patient airway CT data.

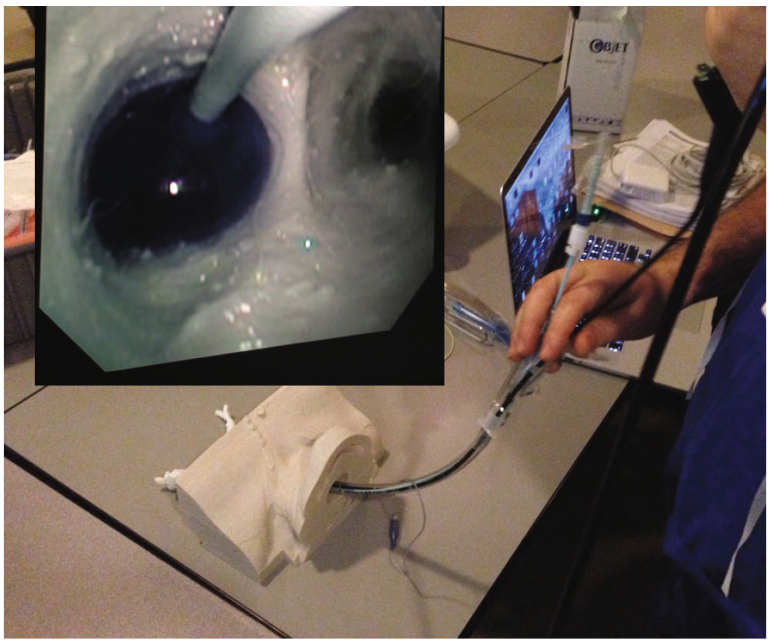
Methods: After REB approval was obtained, anonymized patient CT data was downloaded as a DICOM data series from a free and publically available DICOM repository www.osirix-viewer.com/datasets/. Patient DICOM data was imported into freeware segmentation software ITK-SNAP. The airway was semi-automatically segmented from the DICOM series as a voxel model which was then exported as a stereolithography (.stl) file. The .stl file was imported into freeware 3D editing software Meshmixer (Autodesk Inc., San Rafael, CA, USA). Within Meshmixer, the airway model was edited to be hollow, designed with sculpted carina and posterior longitudinal muscle tracts and support structures were added manually to facilitate 3D printing of the airway's complex geometry. The modified airway model was then imported into free and open-source program, Slic3r, for conversion into a .gcode file for 3D printing. Finally, the .gcode file was uploaded to the commercially available FDM 3D printer Series-1 Pro (Type A Machines, Inc., San Leandro, CA, USA) with settings specifically for NinjaFlex thermoplastic. After printing, the airway was tested for its ability to facilitate a left double lumen tube.

Results: the airway model required approximately 10 hours to print. Raw material cost of 128 g of NinjaFlex was $5.00 USD. The model displayed realistic compliance with

the insertion of a 37F left and right sided Double tube the tube position was checked with a pediatric flexible bronchoscope. Two different types of bronchial blockers (Fuji and EZ-Block) were inserted thorugh a 7 mm endotracheal tube under direct vision with a pediatric flexible bronchoscope (fig. 1). No damage to the model or double lumen tube, nor compromise in strength and surface quality were found with repeated intubations. Three staff anesthesiologists deemed the model realistic.

Conclusion: the present study demonstrated the creation of a low-cost, patient-specific model for procedural training. The use of NinjaFlex, an elastomeric, thermoplastic filament illustrated the capacity for anatomically accurate 3D-printed models to adequately simulate a variety of procedures, including double-lumen intubation. Experiments are underway to determine the feasibility of improving the anatomical landmarks of the airway, such as the carina and posterior longitudinal muscle bundles. These will be evaluated by trained physicians via bronchoscopy following their development. This study adds to the evidence in favour of the use of 3D printing in creating low-cost, accurate models for medical education.

References:
None



153037 - OVERNIGHT OXIMETRY AT HOME BEFORE AND AFTER ADENOTONSILLECTOMY

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Introduction: Obstructive sleep apnea (OSA) affects 2-6% of children, the most common cause being enlarged tonsils and adenoids.[1,2,3] Prompt diagnosis and treatment of OSA is vital as untreated OSA is linked to behavioral deficits, growth and metabolic disorders and negative cardiovascular consequences.[2]The presence and severity of OSA is difficult to establish on clinical history alone, and polysomnography (PSG) is the gold standard diagnostic tool. PSG is resource intensive and not widely available, resulting in around 90% of children undergoing adenotonsillectomy without PSG. Severity of OSA is relevant in peri-operative planning to ensure safe management of these patients. Several pediatric deaths have been attributed to post-operative inflammation compounded by respiratory depression from opiate administration following adenotonsillectomy, in patients with OSA. This study aims to demonstrate the feasibility of using smartphone-based pulse oximetry at home to provide an objective measure of OSA severity and provide an additional tool in the management of adenotonsillectomy patients.

Methods: With Research Ethics Board approval and written, informed consent, smartphone-based pulse oximetry and sleep quality data is collected and compared for 3 nights pre-operatively and 3 consecutive nights immediately post-adenotonsillectomy using a non-invasive adhesive sensor attached to the subject's toe overnight, linked to a custom-built application. This records heart rate, blood oxygen saturation (SpO_2), photoplethysmography and a signal quality index ranging from 0 to 100. Pulse oximetry recordings lasting at least 5 hours, with a signal quality exceeding 70 throughout, are considered successful. This study is ongoing, and is anticipated to include 150 subjects over a 3-year period.

Results: 20 subjects have been recruited so far. Median age 5.49 years, median weight 23.8kg. N=2 cases withdrew from the study after initial recruitment. Only n=2 cases (10%) had previously undergone in-hospital PSG; Pre-operative diagnosis: n=16 (80%) sleep-disordered breathing; n=2 (10%) recurrent tonsillitis; n=1 (5%) combined tonsillitis and sleep-disordered breathing; n=1 (5%) nasal obstruction. Adenotonsillectomy was performed in n=16 (80%) cases, isolated tonsillectomy n=2 (10%), adenoidectomy n=2

(10%). Of those continuing in the study 85% had at least one pre-operative successful recording and 67% of the post-operative recordings performed so far (n=9) were successful.

Conclusion:
The initial phase of this study has shown it is feasible to obtain recordings of sufficient quality at home, by parents, to enable an objective measurement of OSA severity that may help to minimize post-operative risk. Once data collection is complete, we plan to use advanced signal processing to characterize overnight $Sp0_2$ dynamics and additionally use an estimation of heart rate variability to augment assessment of OSA severity. This tool may be capable of assisting clinicians in their management of peri-operative adenotonsillectomy cases.

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153038 - OPEN-SOURCE SOFTWARE TO DEVELOP LOW-COST 3D MEDICAL PHANTOMS

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Introduction: Studies have advocated for the extended use of medical simulators as an adjunct teaching methodology to increase the comfort and competency of medical practitioners in a variety of tasks[1-2]. A variety of simulators, referred to as phantoms, are available as teaching tools. These phantoms range from home-brewed solutions to professional grade, expensive, mannequins. Increasingly, 3D printed patient-specific phantoms have been described[3-6], however, many of these were printed with industrial-grade printers and proprietary software suites[6]. The maturation of commercially-targeted 3D printers has significantly reduced the cost of 3D printing infrastructure while increasing printer capabilities and the range of usable materials. Additionally, the ever-growing library of free/libre open-source software (FLOSS) suites allows for streamlined medical image segmentation and low-cost 3D model augmentation. Presently, we demonstrate the efficacy of a FLOSS, low-cost 3D printer tool-chain to develop accurate, functional and extremely low-cost 3D printed patient-specific phantoms.

Methods: After REB approval, anonymized patient CT DICOM data sets were downloaded from a free, online DICOM repository www.osirix-viewer.com/datasets. For this experiment, two DICOM sets were chosen: one with adequate resolution of the patient's spine and the other focused on the patient's upper airway. DICOM data was viewed in free medical segmentation software ITK-SNAP**;** a semi-automated, region-growth selection module was used to generate a voxel model of the patient's thoracic spine and upper airway. These voxel models were exported as a

stereolithographic (.stl) file type and opened in free 3D modelling suite Meshmixer (Autodesk, Inc., San Rafael, CA, US). Within Meshmixer, models were repaired and surface deformities were smoothed. Modified spine/airway models were prepared for 3D printing within the FLOSS program, Slic3r, as a 3D printer readable .gcode file. Models were then uploaded to commercial 3D printer Lulzbot Taz 5 (Aleph Objects Inc.) for fabrication. The Produced spine model was tested via ultrasound to examine the model's imaging quality and the airway model was examined via bronchoscopy.

Results: In total, thoracic spine and patient airway phantoms required approximately 17 and 7 hours respectively to print. The raw materials cost for the spine and airway phantoms were approximately $7.00 and $3.00 to produce. Imaging the spine with ultrasound resulted in slightly hyperechogenic surface quality; however, still represented anatomical features accurately. Furthermore, bronchoscopy revealed a realistic view of the internal geometries of the airway and very closely replicated the techniques necessary to manipulate a bronchoscope *in vivo* **(table 1)**.

Discussion: We have demonstrated the efficacy of FLOSS software and low-cost 3D printers to develop patient-specific thoracic spine and upper-airway medical phantoms. Relatively fast print-times extremely low production costs and demonstrated efficacy for medical training collectively provide impetus for further investigationinto the development of more complex and accurate 3D printed phantoms.

References:

[1]Udani AD, Macario A, Nandagopal K, Tanaka M a., Tanaka PP. Simulation-Based Mastery Learning with Deliberate Practice Improves Clinical Performance in Spinal Anesthesia. Anesthesiol Res Pract. 2014;2014:1-10. doi:10.1155/2014/659160.

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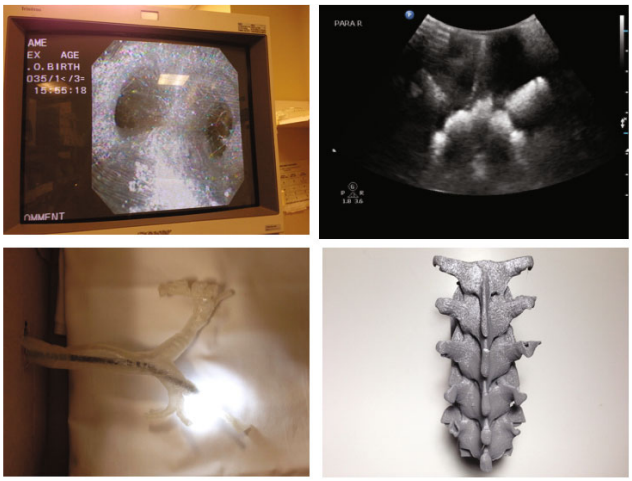
Tab. 1



153042 - ECHOGENIC NEEDLES AND BEAM-STEER TO ASSIST ULTRASOUND VISUALIZATION

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Introduction: Proper visualization of the needle is of paramount importance during ultrasound-guided procedures. As the angle of needle insertion in relation to the ultrasound probe increases the needle becomes more difficult to visualize. Echogenic needles use special coatings or reflectors to improve visualization[1]. As well, beam-steering technology allows the ultrasound beam to be angled to increase reflection of the needle at more acute angles[2]. Currently there is no appreciation for what is the best technology to use at moderate angles of insertion. We sought to compare the effects of medium and steep angle beam steering on visibility of echogenic and non-echogenic needle at 40, 50 and 60 degrees of angle insertion.

Methods: The local research ethics review board waived the need for ethics approval for this study. Non-echogenic and echogenic needles were individually inserted into uncooked pork loin under ultrasound guidance at 40°, 50°, and 60° with respect to the ultrasound probe by an experienced regional anesthesiologist. Ultrasound still images of the needle were obtained at each angle with or without the use of beam-steering (medium or steep setting). Participants were either consultant anesthesiologists with current clinical experience in regional anesthesia, or anesthesia residents who had completed a one month rotation in regional anesthesia. Participants were blinded to needle type or whether beam-steer was used to obtain each of the images and were asked to assess needle visualization of the still images on a 0-10 scale. Needle visualization score (0-10) were compared using a repeated-measures ANOVA. Tukey's test was used for pairwise comparison (not presented in abstract). Scores were defined as poor (0-3.3), intermediate (3.4-6.6), or good (6.7-10).

Results: Twenty participants completed the study. Mean scores (SD) and p-values by repeated measures ANOVA are found in Table 1:

At 40° non-echogenic needle scores improved from poor to good with both medium and steep beam-steering. For echogenic needles, the score improved from intermediate to good with steep beam-steering. At 50° and 60° non-echogenic needle scores were poor with or without beam-steering. Echogenic needles scores at 50° were good with or without beam-steering. At 60° echogenic needle scores were intermediate and improved to good with steep beam-steering.

Conclusions: At 40 degree needle insertion, beam-steer offers benefit to both echogenic and non-echogenic needles. At 50 and 60 degrees, echogenic needles are superior in terms of visualization and beam-steering might have a limited role.

References:

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153051 - THE EFFECTS OF EPIDURAL ANALGESIA ON POSTOPERATVEI BOWEL MOVEMENTS

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Introduction:
Sympathetic hyperactivation is one of the causes of postoperative ileus, which occurs frequently after abdominal surgery and adversely influences the patient's prognosis. (1) We aimed to investigate whether sympatholytic effect of epidural analgesia could attenuate postoperative ileus in patients undergoing laparoscopic gastrectomy.

Methods:
This study was approved by local Ethics Committee. Thirty-nine patients were randomized to receive general anesthesia combined with either epidural analgesia (n = 19) or intravenous analgesia (n = 20). The primary goal was to compare postoperative bowel movements by evaluating the time to first flatus. The balance of the autonomic nervous system, duration of postoperative hospital stay, and pain scores were assessed.

Results:
The time to first flatus was significantly shorter in the Epidural group than in the Intravenous group (63.9 ± 9.1 h vs. 81.2 ± 19.2 h, $P = 0.006$). During pneumoperitoneum, the low-frequency/high-frequency powers ratio was maintained in the Epidural group compared with the baseline value, whereas it was increased in the Intravenous group ($P < 0.05$). The length of postoperative hospital stay was 5.6 ± 0.5 days in the Epidural group and 6.2 ± 1.9 days in the Intravenous group ($P = 0.076$). Patients in the Epidural group had lower pain scores and required fewer additional analgesics at 1 h postoperatively.

Discussion:
Epidural analgesia facilitated bowel movements and reduced early postoperative pain in patients undergoing laparoscopic gastrectomy. This may be attributed that epidural analgesia provided better sympatholytic and analgesic effects compared to intravenous analgesia.

References:
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153053 - RISK FACTORS FOR LONG TERM OPIATE USE AFTER TOTAL KNEE REPLACEMENT

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Introduction

Total knee arthroplasty (TKA) can be associated with moderate to severe post-surgical pain. During the initial perioperative period this can generally be managed with a multimodal analgesic strategy, including the use of opiate based agents. [1]
With time most patients are able transition to simple oral analgesia however a percentage of patients develop a state of persistent or chronic post-surgical pain where the use of oral opiates may be considered. [2]

Although pain needs to be treated, long term use of opiate agents is not without complication or risk. With a move towards new pathways of TKA care in our institution we have performed a review to determine the incidence and risk factors for long term opiate use.

Methods

Hospital Research Board approval was obtained prior to study conduct. Patients admitted for primary unilateral TKA between 1st January 2014 – 31st December 2014 were retrospectively enrolled. Demographic, anaesthetic, surgical and pharmacy data were collated from pre-existing departmental databases.

The primary endpoint was the need for an opiate prescription (either morphine or oxycodone) between 7 and 90 days' post-surgery.

Factors associated with the primary end point were determined through univariate then multivariate modelling. Analysis was completed with Deducer for R, Version 2.15.0 with a threshold for significance of 0.05 on two tailed testing.

Results

Three hundred and thirty-six patients underwent primary unilateral TKA during the study period. There were 135 males and 201 females. The median age (± interquartile range) was 67 (± 13) years. Pharmacy data was unavailable for 100 patients who were excluded from subsequent analysis.

Between day 7 and 90 post surgery 65 patients (65 / 236 = 27.5%) required an opiate prescription. The predictors for a patient requiring an opiate prescription and the results of multi-variate modelling are shown in Figure One.

Factors associated with the primary outcome in the final version of the model were length of hospital stay (p=0.003), pre-operative use of morphine or oxycodone preparations (p=0.003), post-operative paracetamol (p

Conclusion
These results confirm that a significant percentage of patients require prescriptions for opiate medications in the first 3 months after surgery. The factors associated in this series point to a group who experience greater levels of both pre and post-operative pain and may have longer or more complex hospital stays.

Future work in this area should focus on strategies which optimise peri-operative care such that patient satisfaction and outcomes can be maximised. This may include the use of multi-disciplinary pathways which may allow earlier recognition of complications or abnormal pain states.

References:
[1] *Drug Aging*, 2014; 31: 83-9
[2] *BMJ Open* 2012 ; **2**:e000435

Figure One

Figure One – Results of Univariate and Multivariate Analyses

Univariate Analysis	p-value
1. Binomial Variables	
(A) Pre-Operative Medications	
Morphine or Oxycodone	0.001
Warfarin	0.003
(B) Post-Operative Medications	
Codeine	0.016
Paracetamol	0.001
Tricyclic Anti-Depressants	0.003
Benzodiazepines	0.022
HMG-CoA Reductase Inhibitors	0.023
ACE Inhibitors / Angiotensin II Receptor Blockers	0.001
Beta-Blockers	0.003
Calcium Channel Blockers	0.005
Diuretics	0.007
Warfarin	0.009
Aspirin	0.029
(C) Demographics	
European	0.002
Indian	0.024
Surgery at Secondary Hospital Site	0.016
(D) Operative Factors	
Pre-Operative Gabapentin	0.019
Use of Bupivacaine Based LIA	0.044
(E) Post-Operative Factors	
NSAID Post-Operatively	0.004
Gabapentin Use Post-Operatively	0.006
Readmission to Hospital at 30 days	0.002
Readmission to Hospital at 90 days	0.001
(F) Complications While in Hospital	
Post-Operative Stroke	0.042
Hallucinations	0.042
Atrial Fibrillation	0.001
2. Continuous Variables	
Length of Hospital Stay	0.009
Requirement for further surgery within 6 months	0.025
Time to Assisted Weight Bearing Post Surgery	0.030

Multivariate Analysis	p-value
Length of Hospital Stay	**0.003**
Pre-Operative Morphine or Oxycodone Use	**0.003**
Pre-Operative Warfarin Use	0.052
Post-Operative Paracetamol Use	**<0.001**
Gabapentin Post-Operatively in Hospital	**0.009**
Readmission to Hospital at 30 days	**0.018**
Readmission to Hospital at 90 days	0.078

Results of Univariate and Multivariate Analyses

153056 - INTRAPERITONEAL LIDOCAINE INSTILLATION FOR POSTCESAREAN ANALGESIA

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Introduction: The incidence of persistent pain after cesarean delivery is high.[1,2] Acute severe pain following surgery is a strong predictor of chronic pain. Multimodal analgesia, including intraperitoneal instillation of local anesthetics has been shown to be effective in reducing postoperative pain.[3,4] We sought to investigate the effect of intraperitoneal instillation of lidocaine at cesarean delivery on post-operative pain scores and maternal satisfaction, as part of a multimodal pain management strategy inclusive of intrathecal morphine.

Methods: Following local ethics approval and informed consent, 204 healthy women scheduled for elective cesarean delivery under spinal anesthesia were recruited. After administration of standard spinal anesthetic (bupivacaine, fentanyl and morphine) patients were randomized into either a treatment (20 mL 2% lidocaine with epinephrine 1 in 200,00) or placebo (20 mL normal saline) group. The study solution was instilled into the peritoneum by the surgeon following uterine closure. The parietal peritoneum was left open or sutured depending on the preference of the obstetrician. Postoperative analgesia including standing orders of acetaminophen and diclofenac PO and PRN morphine/hydormorphone IV/SC was prescribed for both groups. The primary outcome was pain on movement at 24 hours measured on a visual analogue scale (VAS 0-100 mm). The secondary outcomes included pain scores at rest and on

movement; maternal satisfaction; opioid consumption and side effects measured at 2, 24 and 48 hours post-op.

Results: Patient characteristics were similar in both groups (Table 1). Pain on movement at 24 hours was not significantly different between the two groups. There was a significantly higher pain score at rest and on movement at 2 hours in the placebo group. A sub-group analysis of patients with peritoneal closure showed significantly higher pain scores in the placebo group at 2 hours (at rest and on movement) and at 24 hours (on movement) and lower maternal satisfaction at 2 hours. Patients with self-reported high anxiety scores (NRS ≥ 7/10) showed significantly higher pain scores at 2 hours (at rest and on movement) and lower maternal satisfaction in the placebo group. A higher opiate use was seen in the placebo group, however the number of opiate related side effects was similar in both the groups.

Discussion: Intraperitoneal instillation of lidocaine during elective cesarean delivery reduces pain scores in the early postoperative period. This analgesic benefit is demonstrated at 24 hours in a sub-set of patients with peritoneal closure. Further studies controlling for peritoneal closure, and using long acting local anesthetics or continuous infusion catheters are warranted.

References:

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2. Pain 2008 140: 87-94
3. Clin J Pain 2010 26: 121-27
4. J Family Reprod Health 2015 9: 19-21

Table 1

	Placebo (N=94) Median (IQR)	Lidocaine (N=99) Median (IQR)	p-value
VAS rest at 2 hour	8.5 (0, 21)	0 (0, 10)	0.0020
VAS movement at 2 hour	25 (4, 44)	13 (0, 29)	0.0073
VAS rest at 24 hour	10.5 (1, 27)	11 (2, 24)	0.9514
VAS movement at 24 hour	39.5 (25, 61)	39 (23, 61)	0.7590
VAS rest at 48 hour	8 (1, 19)	7 (1, 17)	0.7708
VAS movement at 48 hour	31 (17, 53.5)	30 (11, 49)	0.2499
Opiates requested postpartum –N (%)	61 (65)	40 (40)	0.0007
Peritoneal closure sub-group:			
VAS rest at 2 hour	17 (4, 33)	0.5 (0, 12)	0.0006
VAS movement at 2 hour	33 (15, 50)	14 (0, 29)	0.0002
VAS movement at 24 hour	59 (25, 78)	31.5 (20, 56)	0.0313
Satisfaction at 2 hour	91 (74, 99)	99.5 (87, 100)	0.0227
Anxiety NRS ≥ 7/10 sub-group:			
VAS rest at 2 hour	10 (0, 37)	0 (0, 5)	0.0051
VAS movement at 2 hour	30.5 (7, 66)	3 (0, 20)	0.0020
Satisfaction at 2 hour	84 (62, 99)	100 (93, 100)	0.0021

VAS = Visual Analogue scale for pain and satisfaction (0-100mm)
NRS = Numeric Rating scale for anxiety (0-10)

153065 - UNKNOWN PERSISTENT LEFT SUPERIOR VENA CAVA IN HIATUS HERNIA PATIENT

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A 71-year-old male with was scheduled for urgent surgical cardiac revascularization. The preoperative echocardiography demonstrated essentially normal left ventricular function with a mild apical hypokinesia. The intraoperative transesophageal echocardiography showed an extrinsic compression of the posterior wall of the left atrium and left ventricle by a large mass. A moderate dilation of the coronary sinus was noted. Suspecting a persistent left superior vena cava, agitated saline was injected into a venous cannula in the left arm, with the contrast entering right ventricle via an intensely opacified coronary sinus. These findings were shared with the surgeon. After median sternotomy, the surgeon confirmed the presence of persistent left superior vena cava.

Coronary arteries were challenged to identify. The circumflex was grafted to the left internal thoracic artery. Coming off-pump the patient had severe left ventricular dysfunction. High doses of inotropes were started and intra-aortic balloon pump was inserted. The following morning after hemodynamic instability persisted, an urgent angiogram was performed and his left anterior descending artery was stented. The balloon pump was removed on postoperative day 4 and on postoperative day 5 he was transferred to the ward.

Discussion

Embryologically, isolated failure of the left cardinal vein system to regress leads to persistent left superior vena cava in the presence of right superior vena cava in about 0.3–0.5% of the population. (1) Clinically, although mostly asymptomatic, these patients present the clinician and surgeon with dilemmas in certain situations, such as central venous cannulation, pacemaker insertion, and myocardial protection. Similarly, in a setting of open-heart surgery, perfusion techniques need to reflect the changed anatomy for adequate venous drainage and myocardial protection. (2) Hiatus hernia is a common condition and its incidence increases with age. (3) Cardiac compression with haemodynamic collapse has been reported in patients with complicated or large hiatus. Hiatus hernia may mimic a left atrial mass on transthoracic echocardiography, which could increase pulmonary capillary wedge pressure and subsequently contributed to the development of acute heart failure. (4) This report emphasizes the need for the anesthesiologist, cardiologists, and cardiac surgeons to familiarize themselves with this rare abnormality of venous system and

others unexpected findings that could change the course of the surgical procedures.

References:

1. Oguni H, Hatano T, Yamada T, et al: A case of absent right superior vena cava with persistent left superior vena cava: Cross sectional echocardiographic diagnosis. Heart and Vessels 1985;1:239-243.
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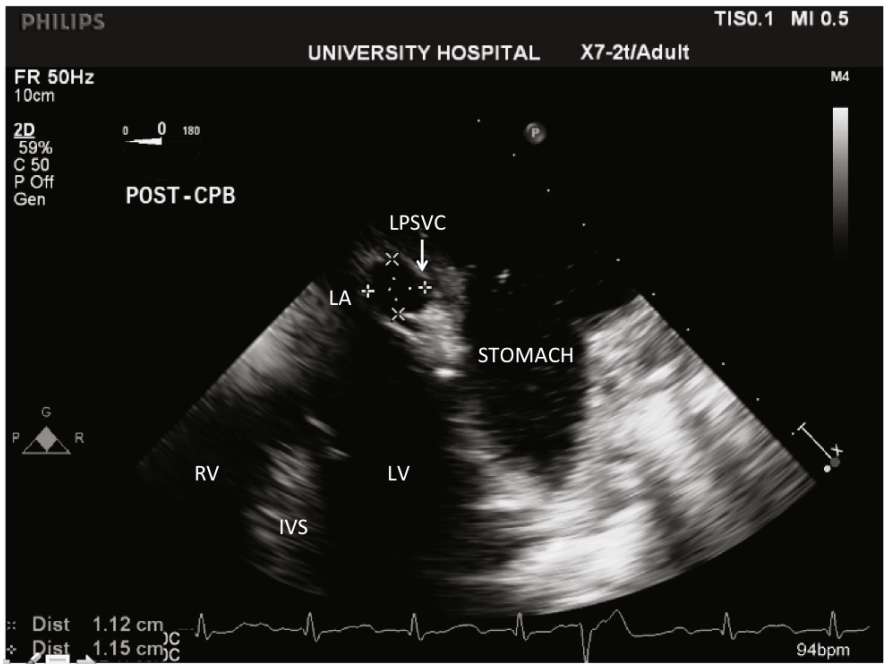
HIATUS HERNIA AND PLSVC



LV: LEFT VENTRICULE LA: LEFT ATRIUM IVS: INTERVENTRICULAR SEPTUM PLSVC: PERSISTENT LEFT SUPERIOR VENA CAVA

153077 - ANXIETY TRIGGERS WITHIN THE OPERATING ROOM - A PILOT STUDY

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Introduction

The perioperative stress response is thought to begin when the surgical procedure is planned (Jawaid 2007). Anxiety is a manifestation of this stress response and is described as an unpleasant state of uneasiness or tension, which may be associated with physiologic and psychological changes (Jawaid, 2007). With a reported incidence of up to eighty percent (Moerman 1996), preoperative anxiety is a very common problem. During the patient's stressed state, otherwise ordinary events can significantly increase anxiety. Multiple studies have identified modifiable stressors that patients experience prior to entering the operating room, however only 1 study has addressed the presence of stress-provoking elements within the operating room before induction of anesthesia. The objective of this study is to identify the presence of unpleasant experiences in the operating room that may cause or increase a patient's level of anxiety.

Methods

Local research and ethics approval was obtained and a multi centre pilot study will be conducted to assess potential anxiety triggers in the operating room before induction of anesthesia. Specific attention will be paid to those that are easily modifiable. Triggers that will be investigated include:
1) Operating room temperature
2) Positioning on the operating room bed
3) Routine application of the oxygen face mask
4) Discussion by operating room personnel not directed at the patient
5) Music playing in the operating room prior to the induction of anesthesia

Three hundred patients will be recruited during the research period. Inclusion criteria are: ASA 1 or 2, age 18 to 60, and elective non-emergency surgery. Exclusion criteria include: inability to provide informed consent and a pre-existing diagnosis of dementia. Patients will be recruited from existing elective slates and telephoned prior to their surgery date. Consent will be formally obtained prior to surgery.

Results

Recruiting began in March 2015 and to date we have surveyed 256 patients. A preliminary review of the data shows that a colder room temperature and being positioned flat on the OR bed potentially serve as anxiety triggers. A smaller signal is seen with conversations in the OR.

Discussion

Should the observed trends continue through to completion of the study, they will serve as the basis for hypotheses in studies where anxiety is directly measured. The targeted potential anxiety provoking factors should be risk and cost free to eliminate from the perioperative experience and thus represent potential steps for reducing patient anxiety that are not accompanied by drawbacks.

References:

1. Jawaid M, Mushtaq A, Mukhtar S, and Khan Z: Preoperative anxiety before elective surgery. *Neurosciences* 2007; 12(2); 145-8
2. Moerman M and Dam F: The Amsterdam Preoperative Anxiety and Information Scale. *Anesthesia and Analgesia* 1996; 82(3): 445-51

153083 - BARRIERS TO COLLABORATION: ANESTHESIOLOGISTS VS OBSTETRICAL NURSES

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Introduction: The practice of obstetrical anesthesia relies on the collaborative efforts between anesthesiologists and nurses. Teamwork remains a challenge in health care[1] and studies continue to demonstrate a disparity between how physicians and nurses perceive collaboration in the workplace.[2] While the reasons for this are varied,[1,3,4] it is known that interventions to improve inter-professional collaboration may improve patient care.[5] We sought to identify barriers to collaborative care between anesthesiologists and nurses in a busy Canadian tertiary labour and delivery unit and to validate these findings in other units across Canada and the United States.

Methods: With institutional ethics committee approval and informed consent of each participant, we conducted this double-blind cross-sectional consensus building study based on the Delphi technique.[6] The study was carried out in two phases. The first phase was completed at our institution. A panel of obstetric anesthesiologists and nurses responded to four parallel sequential rounds of questionnaires. The first round comprised of a set of three open-ended questions: “What are the barriers to collaborative care between anesthesiologists and nurses that affect patient care during the provision of anesthetic care on the labour and delivery unit? What are the reasons they exist? What are some interventions that may address them?" The second round sought consensus on those open-ended questions within the same group of professionals, and items that scored >70% of agreement were used in the third round. The third round (cross-over) sought consensus (>70% agreement) on items gathered by the opposite profession. In the fourth round (ranking), both groups were asked to rank the top ten barriers to collaborative care out of a single list. The second phase of the study was a multicenter validation of the top ten barriers with their associated reasons and interventions. We included 10 tertiary labour and delivery units across Canada and the United States. Program directors for obstetric anesthesia and nursing were consulted seeking consensus on the findings of the first phase (>70% agreement).

Results: For the first phase, we recruited 22 anesthesia providers (10 staff, 5 fellows, 7 residents) and 18 nurses (6 junior, 4 intermediate, 8 senior/leader). The open-ended questions revealed 56 and 30 barriers with corresponding reasons and interventions from the anesthesia and nursing group, respectively. Identified barriers included

themes such as professionalism, availability, dissonance, role clarity, team coordination, communication environment, organizational structure and educational gaps. Final results will be presented at the CAS meeting.

References:

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2. J Interprof Care 2009 23: 331-40
3. BMC Nurs 2006 5: 1
4. Medsurg Nurs 2008 17: 35
5. Cochrane Database Syst Rev 2009: 3.
6. J Adv Nurs 2003 41: 376-82

153088 - ORGAN DONATION TRAINING FOR PROFESSIONALS IN INTENSIVE CARE

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Introduction

Organ donation has changed many Canadian lives and continues to do so. Canada's need in organs is greater than the numbers that are available for transplant. In fact, in 2012, 160 out of 3400 Canadians on the waiting list for organ transplant died while waiting.[1]

Evidence suggests that health care providers commonly exhibit concern about their lack of knowledge on organ donation.[2] It has been acknowledged that formal training about organ donation increase the consent rate.[3] Consequently, a survey was designed to better identify the needs in training on organ donation for the health professionals in the intensive care units of our hospital center.

Methods

Ethic: The local ethics committees' approval was obtained before the realization of this study.

Design: Paper and online surveys were self-administered.

Population: The health professionals of the intensive care unit (ICU) in an academic hospital.

Measurement: A literature review was performed and experts on organ donation were consulted in order to generate questionnaire items. The latter were refined through assessment of clinical sensibility, pilot testing and test-retest reliability. The identification and referral process of organ donation as well as the family approach were explored through 27 multiple choice questions. The survey was conducted during

a one month period. It was taken by nurses, respiratory therapists, residents and intensivists working in the ICU.

Analysis: The data was analyzed using SPSS. Depending on the distribution, ordinal variables were analyzed using ANOVA or Kruskall-Wallis. Categorical variables were analyzed using Chi-square test. The difference between groups was considered to be significant if the p-value was ≤ 0,05.

Results

135 surveys were compiled during the first week, which corresponds to 55% of expected replies. Out of the 135 surveys answered, 61 were by nurses, 42 by residents, 25 by respiratory therapists, 5 by intensivists and 2 were undetermined.

Preliminary results indicate that, in the past 5 years, 75% of respondents have gone through the organ donation process and 59% have had a training session on organ donation. Only 16% of participants felt completely at ease with explaining the concept of brain death. Furthermore, 66% of respondents did not feel comfortable answering family questions about organ donation.

Conclusion

These initial results show that a considerable amount of health care providers are uncomfortable with answering questions related to brain death. Therefore, additional training is required in order to inform the health professionals in the ICU. By doing so, they will be more comfortable with the organ donation process which will help them answer family questions when required, thereby potentially optimizing the organ donor consent.

References:

1-Canadian Organ Replacement Register, Canadian Institute for Health Information 2012: 5-6.
2-Transplantation proceeding 2011 43(5): 1429-1433.
3-Transplant International 2011, 24(4): 333-343

153108 - MACROGLOSSIA AS A COMPLICATION OF NEUROSURGICAL PROCEDURES A REVIEW

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Introduction
Macroglossia is a potentially devastating airway complication (1-2). The purpose of this study was to review published case reports of macroglossia following neurosurgical procedures, possible causes, treatment, and prevention.

Methods
A literature review was conducted using Pubmed (1974-2015). Additional articles were manually located by reviewing article references. Twenty articles were reviewed.

Results
A total of 26 cases of macroglossia following neurosurgical procedures were reported. Seventy percent occurred after posterior fossa/subocciptal craniotomies. Results are in Table 1. Duration of macroglossia varied, lasting from 24 hrs to 3 months. Fourteen patients had macroglossia lasting ≥ 1 week. Information about duration was missing for 8 patients. In 13 cases the swelling was isolated to the tongue. There was documentation that four patients had bite blocks, 3 patients had oral airways and 6 patients had throat packs. Complications due to macroglossia included airway obstruction, difficult intubation, need for emergency and late tracheostomy, prolonged intubation, tongue necrosis and need for glossectomy. Treatment in case studies included head up position, steroids, analgesics, and keeping the tongue moist to prevent desiccation (2 -6).

Discussion
The incidence of macroglossia has been reported at 1%. We found that macroglossia was most commonly reported after posterior fossa/suboccipital craniotomies in the parkbench, sitting and prone positions. The pathophysiology of macroglossia is likely multi-factorial. Potential contributing factors may include local mechanical compression interfering with venous and/or lymphatic drainage and/or arterial inflow, regional venous and/or lymphatic obstruction, local or regional venous thrombosis, reperfusion injury, and neurogenic origin. As there is no standardized treatment for macroglossia, prevention measures should include avoiding use of an oral airway, use of a soft bite

block, avoidance of mouth crowding and extreme flexion of the head against the chest or shoulder. The onset of macroglossia can be acute or delayed. Prevention is the best way to avoid the potentially serious complications of macroglossia (2-6).

References:

1.) J Spinal Disord Tech 2006 19: 226-229
2.) Anesthesiology 2000 92: 1832-1835
3.) J Neurol Surg A 2012 73: 171-174
4.) Anesth Analg 1999 88: 220-223
5.) Anasthesia 1988 43: 382-385
6.) J Neurol Surg A 1998 10: 34-36

Table 1 - Results

	Number of cases
Position during surgery	
Park Bench	8
Sitting	7
Prone	4
Lateral	1
Supine	2
Unknown	4
Duration of procedure	
≥ 4hrs	22
≥ 8hrs	16
unknown	4
Onset time of macroglossia	
Prior to extubation	12
≤ 30 min post-operative	4
≤ 8 hrs post-operative	3
≤ 24hrs post-operative	1
≥ 24hrs post-operative	2
Unknown	4

153121 - IMPACT OF SURGICAL SPECIAL CARE UNITS: A SYSTEMATIC REVIEW

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Introduction:
Perioperative intermediate care units (termed surgical special care unit, or SSCU) may improve surveillance of at-risk surgical patients. Institution of an SSCU may lead to global improvements across patient outcomes, as well as reduce the workload and financial burden at a systems level. Accordingly, we conducted a systematic review in order to investigate the effect of a 3-level model of care delivery (i.e. ward, SSCU, ICU) compared to a 2-level model of care (i.e. ward, ICU) on post-operative mortality, morbidity, and healthcare resource utilization.

Methods:
The protocol for this systematic review was registered with PROSPERO (CRD 20154025155). Randomized controlled trials (RCTs) and non-randomized comparator studies (NRCTs) that compared a three vs two level model of care of perioperative non-cardiac surgery patients were included. A systematic search of Medline, CINAHL, Embase, and the Cochrane library was performed (inception-01/2015). Retrieved citations were screened and data extracted independently in duplicate. Data were extracted for mortality (primary outcome) as well as serious adverse events (SAEs), length of stay, and hospital costs (secondary outcomes). We planned pooling data (relative risk) using random effect models with the DerSimonian and Laird method, if applicable.

Results:
1868 citations were retrieved by our search and 21 studies met eligibility criteria (2 RCTs, 19 NRCTs, 44134 patients). SSCUs were variably characterized by continuous monitoring (11 studies), absence of mechanical ventilation (7 studies), nursing:patient ratios (range 1:2-1:4), and number of beds (5, 3-33; median, range). Thirteen studies reported on mortality, three of which reported overall in-hospital mortality in a 2 vs. 3-level model of care. Significant methodological heterogeneity precluded pooled analysis, however two of the three studies demonstrated no difference in overall hospital mortality, and one demonstrated an increased mortality in a 3-level model of care vs 2-level model. Four studies reported ICU-specific mortality, two of which demonstrated an increased ICU mortality in a 3-level model of care. Four studies compared total in-hospital costs, two of which demonstrated reductions with a 3-level model of care. Nine studies reported on hospital length of stay and demonstrated no significant difference. Four studies reported SAE data, however heterogeneity in reporting precluded meaningful analysis.

Discussion:
In this first systematic review of SSCUs, we observed significant heterogeneity in SSCU design and reporting of outcomes. Available data may suggest a 3-level model of care may increase in-ICU mortality with no difference in overall in-hospital mortality. This may reflect a ‘decanting’ of lower acuity patients from the ICU to the SSCU in a 3-level model of care. The potential effects of a 3-level model of care on hospitalization costs warrants further investigation.

References:
N/A

153145 - RETROCLAVICULAR BLOCK IN OBESE PATIENTS: A FEASIBILITY STUDY

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Background and objectives: Regional anesthesia has many advantages in obese patients.[1] However, needle angulation as well as depth of structures may diminish visibility and thus create a technical challenge. The aim of this feasibility study was to determine, in an obese population, the surgical success rate of the novel retroclavicular block, which allows a more perpendicular needle angle than the coracoid approach.[2]

Methods: After ethics committee approval, 32 patients with BMI≥30 kg/m^2 scheduled for upper limb surgery received an in-plane, single-shot, ultrasound-guided (US) retroclavicular block with 20 mL of mepivacaïne 1,5% and 20 ml ropivacaïne 0,5% with epinephrine 2,5 µg/mL under the axillary artery (figure 1). Exclusion criteria were pregnancy and classic contraindications to regional anesthesia. At 10, 20 and 30 minutes, sensitive bock (SB) and motor block (MB) were assessed on three points for each nerve of the forearm (SB ; 0 : no effect, 1 : analgesia, 2 : anesthesia; BM ; 0 : no effect, 1 : weakness, 2 : paralysis). Primary outcome was defined as adequate anesthesia for surgery. At 30 minutes, patients with sum of SB scores of less than 9/10 were offered a complement block.. Needling time, SB, MB, discomfort, complications and patient satisfaction were evaluated. Blocks were filmed for further needle assessment by two independent evaluators. Demographic data were correlated to block success with a Fisher Exact Test or a Two Sample Test, depending on applicability, with bilateral statistical significance set at p

Results: Mean patients' BMI was 34,4±4,1 kg/m^2. Surgical success was obtained in 87,5% (28/32); one patient required complement block and two general anesthesia, including one for unrelated positional discomfort. One technique was not completed due to unfavourable anatomy. Mean needling time was 5,6±3,3 minutes. Needle visibility, evaluated on a five-point Likert scale was good for needle tip (3.0±0.9) and

shaft (3.7±0.9). Excluding the uncompleted technique, 28/31 patients had SB≥9/10 and 26/29 patients had MB≥9/10 (two patients had casts limiting evaluation). Two transient paresthesias, one vascular puncture and no late complications were recorded. The procedure was well tolerated with mean discomfort score of 2.5±1.8 on a Visual Analogue Scale (VAS) and good satisfaction at 48h (9.3±1.4, VAS). No correlation between BMI and block success was found.

Conclusion: Retroclavicular approach for anesthesia of the brachial plexus has a success rate and needling time similar to other approaches described in the literature, even for this obese population. The perpendicular needle-US beam angle theoretically increases needle visibility, which could increase block success and reduce complications. A comparative study with the classic coracoid approach will be necessary to clarify the potential benefits of this novel approach.

References:

1. International Anesthesiology Clinics, 2013 51(3), 90-112
2. Reg Anesth Pain Med, 2015 40(5): p. 605-9

Figure 1

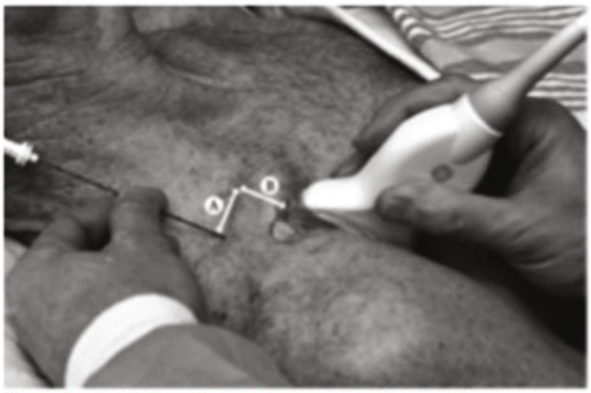

Figure 1 – Needle insertion point posterior to the clavicle

153165 - PROGRAMMED INTERMITTENT EPIDURAL BOLUS FOR LABOR ANALGESIA

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Introduction: Most studies comparing Programmed Intermittent Epidural Bolus (PIEB) with Continuous Epidural Infusion regimens have included patient controlled epidural analgesia (PCEA) and/or manual bolus as rescue analgesia for breakthrough pain (1,2). Consequently, the optimal time interval between programmed intermittent boluses is yet to be determined. We designed a study to establish the optimal time interval between programmed intermittent boluses of 10 ml of bupivacaine 0.0625% with fentanyl 2 mcg/mL to produce effective analgesia in 90% of women during first stage of labor without the need of rescue boluses.

Methods: With institutional ethics committee approval and patients' informed consent, we conducted a double-blind sequential trial with a biased coin up-down design to obtain the effective interval 90% (EI90) for the PIEB regimen. We included ASA 2-3 nulliparous women at term undergoing spontaneous or induced labor requesting epidural analgesia. An ultrasound-assisted epidural was inserted at L2/3 or L3/4. A test dose of 3 ml of bupivacaine 0.125% plus fentanyl 3.3 mcg/ml was followed by a loading dose of 12 ml of the same solution. PIEB was then started in women whose pain scores achieved VNRS ≤ 1/10 within 20 min after the loading dose. In all subjects the programmed bolus dose was fixed at 10 mL, and the first bolus was delivered 1 hour after the loading dose. The PIEB interval was set at 60 min for the first patient and at varying time intervals (60, 50, 40 and 30 minutes) for the subsequent patients, according to a biased coin design. The primary outcome was effective analgesia,

defined as no requirement for a PCEA or a manual bolus for 6 hours after the initiation of the epidural or until the patient was fully dilated, whichever event occurred first. Pain scores, sensory block levels to ice, degree of motor block and blood pressure were assessed hourly.

Results: We studied 40 women. The calculated EI90 was 42.6 min (95% CI: 38.9 - 46.4) using the Dixon and Mood method and 36.8 min (95% CI: 31.0 - 49.0) using the Isotonic Regression analysis. Peak sensory levels, degree of motor block and incidence of hypotension in each subgroup is presented in table 1.
Discussion: The optimal time interval between programmed intermittent boluses of 10 mL of bupivacaine 0.0625% with fentanyl 2 mcg/mL is approximately 40 minutes. Further studies to determine the efficacy of this regimen throughout the entire duration of labor are warranted.

References:
1) Can J Anesth 2004; 51: 581-585; 2) Int J Obstet Anesth 2005; 14: 305-309

Table 1. Sensory block levels, motor block and hypotension

	PIEB interval			
	30 min (n=13)	40 min (n=9)	50 min (n=9)	60 min (n=9)
Highest sensory block over study period (n, %)				
T2	3 (23.1)	1 (11.1)	0 (0.0)	0 (0.0)
T3	1 (7.7)	0 (0.0)	1 (11.1)	0 (0.0)
T4	1 (7.7)	0 (0.0)	0 (0.0)	0 (0.0)
T5	4 (30.8)	3 (33.3)	1 (11.1)	1 (11.1)
T6	0 (0.0)	2 (22.2)	5 (55.6)	3 (33.3)
T7	2 (15.4)	2 (22.2)	1 (11.1)	2 (22.2)
T8	2 (15.4)	1 (11.1)	0 (0.0)	3 (33.3)
T9	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
T10	0 (0.0)	0 (0.0)	1 (11.1)	0 (0.0)
Degree of motor block (n, %)				
Bromage score 0	8 (61.5)	9 (100.0)	9 (100.0)	9 (100.0)
1	3 (23.1)	0 (0.0)	0 (0.0)	0 (0.0)
2	1 (7.7)	0 (0.0)	0 (0.0)	0 (0.0)
3	1 (7.7)	0 (0.0)	0 (0.0)	0 (0.0)
Hypotension (n, %)	1 (7.7)	1 (11.1)	2 (22.2)	0 (0)
Pts requiring treatment (n,%)	0	0	0	0

153167 - RETROCLAVICULAR BLOCK VS INFRACLAVICULAR BLOCK : A STUDY PROTOCOL

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Background: Infraclavicular block is associated with sub-optimal needle visibility thus increasing needling time and potential complications. The novel retroclavicular approach, a variant of the coracoid approach has been recently described. His needle insertion point posterior to the clavicle is associated with perpendicular needle-US beam angle and theoretically increases needle visibility, which could increase block success and reduce complications.[1] The aim of this randomized controlled trials is to compared coracoid approach to retroclavicular approach on performance time.

Methods/Design: This multicentre randomized controlled, non-inferiority trial of patients requiring surgery of the lower arm will be submitted for ethic approval and will take place in one community hospital and one teaching centre. Eligible patients will be adults with ASA class I-III able to provide consent. Eligible consented patients will be randomized either to have a coracoid approach or the retroclavicular approach, in a 1:1 ratio. They will receive a single-shot, ultrasound-guided brachial plexus block with 20 mL of mepivacaïne 1% and 20 ml ropivacaïne 0,5% with epinephrine 2,5 µg/mL under the axillary artery (figure 1). The primary outcome, the performance time, is defined as the sum of the imaging and needling times. Secondary outcomes include (i) sensitive [SB] and motor [MB] block of the forearm at 10, 20 and 30 minutes measured on a three-point scale for each nerve [SB; 0: no effect, 1: analgesia, 2: anesthesia; BM; 0: no effect, 1: weakness, 2: paralysis], (ii) block success [absence of complemental block, deep sedation or general anesthesia for the surgery] (iii) use neurostimulation use, (iv) procedure-related side effects and adverse events, (v) patient satisfaction at 48 hours and (vi) needle visibility assessed by two independent adjudicators with a five-point Likert scale. The trial interventions preclude blinding of patients and clinicians, but outcome adjudicators will be blinded to group allocation. Performance time will be analyzed with a non-inferiority test of the averages, in the objective of finding that the retroclavicular approach is no longer to perform than the

coracoid approach. Secondary outcomes will all be analyzed in superiority analysis with student T test, Mann-Whitney, Chi square or Fisher exact test, depending on the type of variable studied. To detect non-inferiority with a non-inferiority margin of 5%, a 90% power and a level of significance of 0,05, a sample size of 110 patients will be required.

Discussion: This study will evaluate the effectiveness of the novel retroclavicular approach compared to the coracoid plexus approach. It will allow the anesthesiologist to properly learn and use this approach, while having similar procedure time and better needle visibility, which could be associated with better success and fewer complications.

References:

1. Reg Anesth Pain Med 2015 40(5): 605-9.

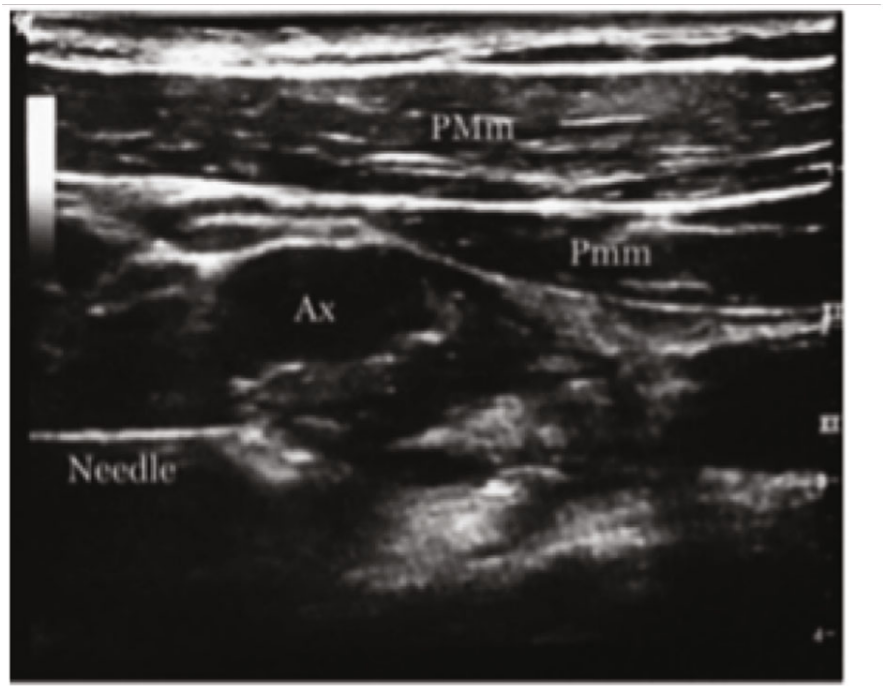

Figure 1: Echographic view of the retroclavicular approach.

153201 - GOAL DIRECTED FLUID THERAPY AND POST-OPERATIVE COMPLICATIONS IN AN ENHANCED RECOVERY PROGRAM

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Introduction: ERAS is a peri-operative protocol with guidelines aimed to reduce complications and length of stay following colorectal surgery. One of the main areas of focus is maintaining euvolemia and fluid balance during the peri-operative period. One method to achieve this is using non-invasive cardiac monitoring to assess fluid responsiveness known as goal-directed fluid therapy (GDFT). Our study objective was to compare the effect of goal-directed fluid therapy using non-invasive cardiac monitoring to conventional fluid management on the incidence of post-operative complications.

Methods: Following ethical approval, we collected data on all elective colorectal surgery patients going through our institute's ERAS program between November 1st 2013 and February 28th 2015. Data collected included patient demographic information, intra-operative variables (monitoring and fluid administration) and post-operative complications as defined by NSQIP. Comparison was made between patients given fluids according to arterial waveform or photoplethysmography analysis with similar patients managed at the anesthesiologist's discretion but with suggested infusions rates/hour. R Stats was used to create a propensity model matching these groups. Post-operative complications of matched groups were compared using weighted chi-squared tests.

Results: During the study period, 258 cases were identified (51% GDFT). Unadjusted analysis demonstrated 30 complications in the GDFT group (22.6%) and 25 in the conventional therapy group (20%) yielding an odds ratio of 1.16 (0.61-2.2). Propensity scoring improved the balance of co-variables (table 1). The weighted odds ratio following this matching process was 1.15 (0.63-2.11). Mean crystalloid volumes administered in conventional and goal-directed groups were similar; 1626 (SD 646)ml vs 1540 (SD 734) mL, respectively (p=0.318). Lengths of stay were similar between GDFT and conventional management groups (7.6 (SD 9.3) vs 7.1 (SD 5.1) days, respectively, p=0.52).

Discussion: The use of goal directed fluid therapy in this study showed a similar volume of fluids administered and incidence of post-operative complications as compared to conventional management. Our results are consistent with results published in the POEMAS study (1) and two meta-analysis (2, 3). With a larger sample

size, it may be feasible to perform subset analysis on higher risk patients as some experts advocate GDFTs use in this population (4). ERAS patients are more likely to be euvolemic during surgery and thus may not benefit from targeted fluid boluses as much as patients in a traditional care setting(3). Despite the lack of evidence to support the use of GDFT in the general population of ERAS patients, the propensity scoring model was able to successfully improve the balance of confounding variables between groups. Though propensity scoring did not significantly change the estimation of treatment effect in this study due to the initial similarity between groups, its ability to balance co-variables could provide a useful analytical tool for future observational studies.

References:

1. Abesth Analg 2014 119(3): 579-587
2. Br J Surg 2013 100(13): 1701-1708
3. Ann Surg 2015 e-pub ahead of print, Intraoperative Goal-directed Fluid Therapy in Elective Major Abdominal Surgery
4. Can J Anesth 2015 62:158-168

Table 1

	GDFT	Unmatched Controls	Matched Controls
Age	67.6	65.8	68.4
Gender (%)	55.6	55.2	55.1
ASA	2.35	2.29	2.36
NSQIP Comorbidity	0.459	0.456	0.480
% MIS	82.0	81.6	81.6
BMI	26.6	26.3	26.8
Surgical Time	3.52	3.50	3.51
Distance	0.519	0.512	0.521

Table 1: Comparison groups pre- and post- matching. Gender=% male, NSQIP comorbidities = pre-operative comorbidities measured by NSQIP, % MIS= percent of cases performed laparoscopically, Distance = Mahalanobis Distance, a measure of distance from a population mean used to detect outliers

Comparison groups pre and post matching

153208 - A CROSS SECTIONAL COMPARISON OF OR HAT BACTERIA

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Introduction: Surgical site infections (SSIs) occur in 2 - 5% of patients, increase length of stay by 9.7 days and increase patient morbidity and mortality (1). Most pathogens are from patients own skin flora, mucous membranes or hollow viscera (1). Additionally patient's age, diabetes, smoking, obesity, nutritional status, length of preoperative hospitalization, hypothermia, immunosupression and concomitant infection increase SSI rates (2). Sterile gloves and surgical technique, proper ventilation, and antibiotic prophylaxis are preventative. (2). OR attire outside the sterile field has not been shown to affect SSIs, however outbreaks from scalp organisms while wearing disposable hats are described (2). Home laundering of scrubs is equivalent to hospital laundering when ironed or dried with heat. (3). Our local policy requires paper hats.

Methods: We conducted a convenience sample of OR staff to compare bacterial counts on paper vs. cloth OR hats. Nine unopened boxes of paper hats were also sampled. Local REB approval was obtained. Following informed consent we sampled OR staff between noon and 16:00. In addition to demographic data, laundering habits were collected for cloth hats. Using a swab moistened with TSP broth each hat was sampled at the same external location. The swab was incubated overnight in TSP broth. Day 2, broth turbidity was measured using a Genesys™ 10S Vis Spectrophotometer (Thermo Fisher Scientific). Undiluted samples were plated on selective MacConkey and Denim-blue plates for Gram-negative and MRSA respectfully. Turbidity guided dilution for non-selective Sheep blood plating. After incubating overnight, plates were scored and photographed. Questionable plates were gram stained to identify MRSA.

Results: There were 64 paper and 41 cloths hats included, 36 of 41 were personally owned / laundered and 5 owned by a private surgical facility. None of the hats grew MRSA. Turbidity of cloth hats were higher than paper (P = 0.003). Paper had less colony forming units than cloth on non-selective sheep blood agar (P=0.014). There was no statistical difference in gram-negative culture growth between paper & cloth. (P = 0.150). Cloth worn more than once without washing had higher turbidity than all hats worn only once (p=0.045). Hats worn more than once did *not* have more colony forming units on sheep blood agar (p=0.101). Eight of nine new boxes of paper hats

had positive growth on sheep blood agar, 75% had CFU's too numerous to count. Two of the eight boxes had turbidity among the highest in the study but none grew gram negative or MRSA bacteria.

Discussion: Cloth hats grew more bacteria on non-specific media but did not grow more pathogenic bacteria than disposable hats. No hats grew MRSA and new boxes of disposable hats had higher than expected bacteria counts. Cloth hats should be washed / dried after each use.

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3. J Hosp Infect.2006 62(1):89-93.

Turbidity and CFU's from Boxes of Unopened Paper Hats

#	Site	Turbidity	Sheep CFU	Sheep Morphology	2nd Sheep CFU	2nd Sheep Morph	Macconkey CFU	Macconkey Morph
NB1C	1	0.674	999	small grey			0	n/a
NB2C	1	0.096	93	small grey	46	irregular grey	0	n/a
NB3B	1	0.016	999	irregular grey			0	n/a
NB4A	1	0.006	0	0			0	n/a
NB5A	1	0.009	999	small grey			0	n/a
NB6A	1	0.01	999	small grey			0	n/a
NB7C	1	0.063	999	small grey			0	n/a
NB8D	1	0.839	999	large grey			0	n/a
NB9C	1	0.116	50	small white			0	n/a

NB= New box, A=undiluted, B= 1/10 dilution, C= 1/100 dilution, D=1/1000 dilution. CFU = colony forming unit, 999 = too numerous to count, Sheep = non-selective sheep blood agar, MacConkey = plate selective for gram-negative bacteria.

153213 - EVALUATION OF A LOW COST, 3D-PRINTED MODEL FOR BRONCHOSCOPY TRAINING

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Background*:* Flexible bronchoscopy is a common and fundamental procedure in anesthesia and critical care medicine. Learning this procedure is a complex task, which encompasses heterogeneous and multifaceted components. The use of simulation-based training provides significant advantages that include enhanced patient safety, and it has been proven to be superior to non-simulation-based training. Interestingly, even low fidelity simulators proved to be effective, and in certain areas such as basic bronchoscopy tasks they may be superior to high fidelity computerized simulators. Unfortunately, access to a bronchoscopy simulator may be limited in low resources settings. We developed a low cost, highly portable model for bronchoscopy training, using a 3D printout of a normal trachea-bronchial tree from a CT scan image set.

Aim*:* The aim of this mannequin study was to test the validity of a newly developed bronchoscopy training model.

Methods*:* Institutional board review approval was obtained. Aparametric airway model was derived from an online medical model repository. The parametric airway was separated into seven distinct regions: trachea, bifurcation, left & right bronchi and primary bronchi to upper left, lower and middle right lobes. Anatomical regions were printed with different colours using a fused deposition modelling 3D printer. Participants were physicians with self-reported no previous experience with bronchoscopy. They received an introductory 30 minutes lecture on flexible bronchoscopy, and were then administered a 15-items questionnaire on bronchoscopy

derived from previously published modules of bronchoscopy training.
Following this pre-test questionnaire, participants were separately invited to use flexible bronchoscopy on the designated model, and instructed to perform a series of predetermined tasks in 4 consecutive occasions. The time to perform the tasks and the quality of the performance (based on a standardized score assessing ability to identify bronchial anatomy, technique and dexterity, lack of trauma) were recorded. After completion of the mannequin tests, participants were administered again the 15 items questionnaire (post-test). Participants' satisfaction data on the perceived usefulness and accuracy of the model were collected. Statistical analysis was performed using t-Test. Data are reported as mean (± standard deviation).

Results*:* The time to complete all the requested tasks was 152.9 (± 71.5) sec on the 1st attempt vs 98.7 (± 40.3) sec on the 4th attempt (p=0.03). The quality of performance score improved from 8.3 (± 6.7) on the 1st attempt to 18.2 (± 2.5) (p

Conclusions*:* We developed 3D-printed model for bronchoscopy training. This model improved trainees' performance, and may represent a valid, low-cost adjunct to the teaching of bronchoscopy.

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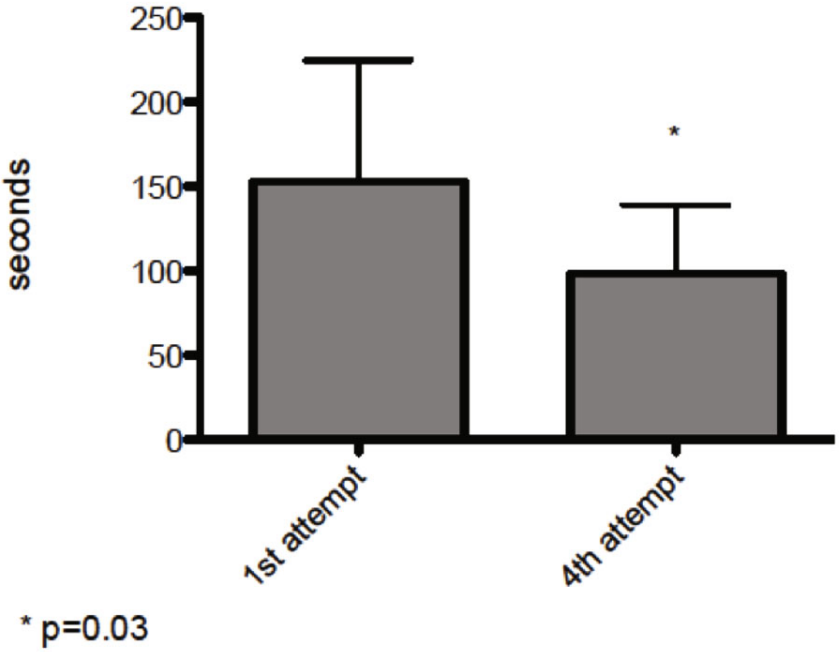
Fig. 1



Time to complete all the requested tasks

153215 - ASSOCIATION BETWEEN LOW BIS VALUES AND PATIENT OUTCOMES IN CARDIAC SURGERY

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Introduction

Recent observational trials in the non cardiac surgical setting have associated low processed EEG values with poor perioperative outcomes However, this relationship has not been assessed in cardiac surgical patients where management of anaesthetic depth is uniquely challenged by patient co-morbidities, physiologic goals, and alterations in pharmacokinetics and pharmacodynamics seen with CPB. We sought to determine the association of intraoperative BIS values on important postoperative outcomes.

Methods

Following institutional REB approval, a retrospective database review was undertaken. All patients undergoing major cardiac surgical procedures with CPB between July 1, 2012 and June 30, 2015 were included. Patients who underwent emergency surgery, hypothermic circulatory arrest, or had ketamine administered were excluded. Post anesthetic induction BIS values (processed with a resolution of 15 seconds) were extracted from archived electronic anesthesia records and individually linked with our institutional perioperative database. Logistic regression analyses were then performed to assess the association of average BIS value per case and delirium occurring in the ICU, length of ventilation, length of ICU stay and in-hospital mortality. For each outcome, we fitted a model that included other known baseline demographic and intra-operative predictors of outcome as shown in Table.

Results

2372 patients were included in the analysis. Median ICU LOS was 1 day (0.9-2.7 IQR); 62 patients were diagnosed with delirium (3.5%) and 32 patients died in hospital (1.8 %). Average BIS values per case were normally distributed with a per case mean of 40.0 ± 6.14. On logistic regression BIS was an independent predictor of delirium occurring in the ICU (p = 0.007) but was not an independent predictor of length of ventilation, length of ICU stay or in-hospital mortality.

Discussion

This is the first large scale study of the association of BIS values in cardiac surgical patients with post operative outcomes. Low BIS values are associated with an

increased incidence of delirium but not other outcomes measured in this study. It remains to be seen whether there is a threshold value for BIS that is associated with poor outcomes in this patient population and whether intraoperative management of BIS values can alter these outcomes.

References:

1. Sessler DI, Sigl JC, Kelley SD, et al. Hospital stay and mortality are increased in patients having a "triple low" of low blood pressure, low bispectral index, and low minimum alveolar concentration of volatile anesthesia. *Anesthesiology.* Jun 2012;116(6):1195-1203.

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4. Kertai MD, Whitlock EL, Avidan MS. Brain monitoring with electroencephalography and the electroencephalogram-derived bispectral index during cardiac surgery. *Anesth Analg.* Mar 2012;114(3):533-546.

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Table: Summary data for all study patients.

Number		2372
Average BIS		40.0 ± 6.1
Demographics	Age (yrs)	68.2 ± 11.8
	Female (n)	637 (35.8%)
	Body Mass Index (kg/m^2)	28.5 ± 5.8
	CARE Score	2.6 ± 0.8
	Diabetes	758 (42%)
	Ventricle Class	1.3 ± 0.6
	NYHA Class	1.4 ± 1.3
	Hemoglobin (g/L)	132 ± 18.0
	GFR (mL/min/1.73 m^2)	82.6 ± 32.0
Procedure Type (n)	CABG Alone	1076 (60.4%)
	Valve Replacement	384 (21.6%)
	CABG + Valve	384 (21.6%)
	Valve Repair	213 (12.0%)
	Multiple Valve	130 (7.3%)
	Aorta (± Valve, CABG)	97 (5.5%)
	Other	88 (4.9%)
CPB Duration (minutes)		98.5 ± 38.8

Data presented as mean ± standard deviation or as count (percentage) where appropriate. BIS – Bispectral Index, CARE – Cardiac Anesthesia Risk Evaluation, NYHA – New York Heart Association functional class, GFR – Glomerular Filtration Rate, CABG – Coronary Artery Bypass Grafting, CPB – Cardiopulmonary Bypass

153225 - MINIMALLY INVASIVE MITRAL VALVE REPLACEMENT IN A REDO PATIENT WITH SEVERE PULMONARY HYPERTENSION

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Introduction:
Partial lateral decubitus and one lung ventilation (OLV), technical conditions used for most of the minimally invasive mitral valve surgery (MIMVS) approach, may cause mismatching of ventilation and perfusion, hypoxic pulmonary vasoconstriction and hypercapnia. These changes increase pulmonary vascular resistance (PVR) in a patient with underlying pulmonary hypertension may trigger hemodynamic instability and deoxygenation.
We report the procedure and the precautions we took for OLV in a patient with severe PH.

Case Presentation:
A 70 yr old male scheduled for a third-time redo minimally invasive mitral valve replacement, tricuspid valve repair and patent foramen ovale closure via right anterolateral mini-thoracotomy was schedule.

He has a history of bioprosthesis aortic valve replacement and posterior aortic mechanic replacement plus coronary artery bypass graft involving the left anterior descending and its diagonal.

Cardiac catheterization demonstrated significant PH with pulmonary arterial pressures (PAP) of 80/45 with a mean of 56. After general anesthesia was induced and a 39F left side double lumen tube was placed. Inhaled nitric oxide (iNO) was started at 20 ppm. His blood gases showed pCO2 35 pO2 500. PAP was 53/22 mmHg, mean 22 mmHg. The patient was prepped in a 20-degree left lateral decubitus position. The patient was placed on OLV. PAP was 52/19 and the arterial blood gases reported ph 7.46, PCO2 35, PO2 193 and HCO3 25.6.

The patient was cooling down to 28. The patent foramen ovale was closed. A mechanical prosthesis was placed and tricuspid annuloplasty was performed.
The patient was hemodynamically stable on moderate doses of inotropic support: epinephrine, norepinephrine and milrinone.

He was successfully extubated after 12 hours. The iNO was gradually discontinued after 6 hours and the inotropic support stopped after 48 hours. Patient was discharged

postoperative day 7

Discussion:
Reoperative mitral valve surgery can be safely performed through a right mini-thoracotomy with good early and late outcomes. The avoidance of extensive surgical dissection, optimal valve exposure and low blood transfusion are the main advantages of this technique. (1)

A major issue for pulmonary hypertension and minimally invasive surgery is OLV. In patients with PH, HPV during OLV may cause an intolerable increase in PVR. (2) There is considerable interest that inhaled pulmonary vasodilators may attenuate this disturbance nevertheless we couldn't find solid evidence to support this practice since all the experience reported comes from animal studies and isolated cases in thoracic surgery.

To date, the use of ONi in adult cardiac surgery has been limited with few satisfactory studies in revascularization or heart valve surgery.(3)

In patients with PH, intraoperative physiological abnormalities should be avoided and corrected if present. In particular, hypoxia, hypercarbia, hypothermia, high airway pressures, PEEP, and acidosis can all cause increased PAP or PVR.

New surgical techniques and a decrease morbidity and mortality of the cardiac surgical patients are facing us with more challenging cases where the experience has an important role since studies with more solid evidence are still missing.

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153256 - EMERGENCY DEPARTMENT VISITS FOR OPIOID ANALGESICS IN CHRONIC PAIN PATIENTS

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Introduction: Opioids are widely used for treatment of severe acute pain and chronic cancer pain. Although there was no sufficient evidence to support the use of opioids in chronic noncancer pain, long-term opioid therapy for noncancer pain increased rapidly in the past two decades. In the meantime, the safety of long-term opioid use attracted more and more attentions. Because of the concern about abuse, overdose, and adverse effects of opioid analgesics, clinical recommendations suggested that clinicians should avoid the routine prescribing of opioids for patients with an exacerbation of chronic pain in emergency departments. There were few studies investigating the reasons of emergency department visits for opioid analgesics in chronic noncancer pain patients.

Methods: We used National Health Insurance Database to conduct a retrospective population-based cohort study. The chronic noncancer pain patients who received opioid analgesics for more than 90 days were included in this study. We used logistic regression to examine factors associated with the emergency department visit during the one year follow-up period. This study was approved by local Institutional Review Board with a waiver of informed consent.

Results: A total of 4,834 chronic pain patients were included in this study. We found that 16.4% of these patients had at least one emergency department visit and received parenteral opioid therapy during the follow-up period. The most common reasons for chronic pain patients to receive opioid injections in the emergency department were abdominal pain, back pain, and fracture.

Discussion: The results of this study suggest that we have to pay more attention to those chronic patients who visited emergency department for parenteral opioids. Future studies are needed to investigate the clinical outcomes related to the additional opioid therapies in emergency department.

References:

1. N Engl J Med 2010; 363: 1981-1985.
2. Am Emerg Med 2012; 60: 499-525.

153261 - SERIOUS ADVERSE REACTION FOLLOWING PROSTAGLANDIN ANALOGUE USE IN OBSTETRIC PRACTICE

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Background: Misoprostol is a synthetic analogue of Prostaglandin E1. Misoprostol is widely used by obstetricians and gynecologists for various purposes: medical termination of pregnancy, cervical priming before hysteroscopy, induction of labor and management of postpartum hemorrhage (PPH), due to its uterotonic and cervical priming action. It is generally considered safe, but fatal and non-fatal complications have been reported.[1-3] The present report describes three cases of severe hypertensive crises to administration of this drug.

Case Report: Patient consent for publication of case data obtained.
Case 1: A 24 year old primigravida at perceived risk of PPH received prostaglandin analogue Misoprostol 600 mcg prophylactically per-rectally to prevent PPH. An hour later when she developed PPH, a second dose of 250 mcg was administered. She adversely reacted to this medication with restlessness, hyperpyrexia (105^{o}F), absent peripheral pulses and sinus tachycardia of 180/min and validated invasive blood pressure recordings of 190/120 mm Hg. She was treated in the intensive care with intravenous fluids, sedation and ventilatory support, packed red cell transfusion and recovered over 12 hours.

Case 2: 32 year old lady, for hysteroscopic resection of submucosal fibroids received 200mcg of misoprostol vaginally 30 minutes prior to the procedure. During resection of the second fibroid there was profuse hemorrhage (loss of about 800ml). An emergency laparotomy was performed. Second dose of 600mcg misoprostol was administered per rectally. After 20 minutes, the peripheral pulses were not felt, non-invasive and invasive monitoring showed systemic hypertension of 204/140 mm Hg and she developed pulmonary edema with peak airway pressures 45 cm H_2O which resolved over 2 hours on treatment with crystalloid infusions, increasing depth of anaesthesia and removal of the per-rectal Misoprostol tablet.

Case 3: A lady aged 29 was undergoing caesarian section under general anaesthetic in the cath-lab for placenta accreta in anticipation of profuse bleeding. Femoral vascular access sheaths were placed for possible vascular embolization to control bleeding. Following extraction of new-born, misoprostol 600 mcg was placed rectally. 15 minutes later, peripheral pulses were not palpable and blood pressures were 190/110 mm Hg, heart rate 124/min and blood loss of 1600 mL. Suspecting

Misoprostol reaction, she was treated with crystalloid infusions, packed cell transfusions and recovered over 4 hours.

Discussion: All the patients had a few common features; they suffered significant blood loss, received one or more doses of prostaglandin analogues via different routes, peripheral pulses were absent and systemic hypertension was noted. In a study of oral misoprostol (400 mcg) versus placebo, decrease in leg blood flow volume occurred with increase in peripheral vascular resistance in the misoprostol group.[4]

Inference: Based on the three cases, we opine that minimal effective dose may be administered to minimize the side effects, especially in hypovolemic patients.

References:

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2. Midwifery Today. Issue 71, Autumn 2004
3. Lancet 2006; 368: 1216-8
4. Bull World Health Organ. 2009; 87(9): 666-67

153265 - EVALUATION OF A SEMI-AUTOMATED NON-INVASIVE SSEP DEVICE

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Introduction: In anesthetised patients, positional neuropraxia may occur related to inadvertent compression or traction of peripheral nerves. Depending on the duration, patient positioning, and patient comorbidities,[1] the incidence of clinically relevant neuropraxia has ranges from 0.2% to- 37.5%[2] in studies. Intraoperatively, peripheral nerve function can be monitored noninvasively using somatosensory evoked potentials (SSEP) but conventional SSEP monitoring utilises needle electrodes and requires a trained SSEP technician; this may not be practical for routine clinical usage. In this case report, we report our initial experiences with a semi-automated non-invasive SSEP device (EPAD, SafeOpSurgical, Hunt Valley, MD).

Methods: Following review board approval and written patient consent,10 non-cardiac patients were enrolled. Surgeries included mastectomy, nephrectomy (robotic), laminectomy, craniotomy, and gastrectomy. Case positions included supine, lateral, and prone positions.

Adhesive stimulating electrodes were placed bilaterally in median and either ulnar or peroneal nerve distributions with the receiving electrode placed on the posterior neck in C5 position and the ground electrode placed on the forehead. The SSEP monitor screen alternately displayed a ‘good’ or ‘alert’ homunculus of relevant nerve signals, or a time-based display of current SSEP data for each nerve, with the alert threshold set at > 10% increase from baseline latency or 50% decrease in signal amplitude.

Results: Of 10 patients, electrode failure in 3 patients prevented data collection. One patient suffered from severe diabetic neuropathy with complete “stocking” sensory loss preoperatively. In another case, the electrode was contaminated by surgical bleeding; the electrode adhesive was modified and transparent film dressings applied to subsequent cases. Of the 7 remaining patients with complete SSEP data, an intraoperative ‘alert’ was detected in 1 case, which had resolved by end of surgery after patient repositioning. No relevant symptoms were reported in any of the patients post-operatively.

Although the system was dramatically easier to implement than standard SSEP measurement, care was clearly required for placing the leads and making sure that the multitude of wires were not kinked or under strain; this was especially the case when compression stockings and sequential compression devices were employed, and when repositioning the patients to lateral or prone position. Although theoretically

possible, we were unable to reliably measure train-of-4 neuromuscular blockade using the device.

Conclusion: This pilot study showed the relative ease of use of a non-invasive automated SSEP device. Although no neuropathies were detected in this small sample, the potential for, and serious implications of, such complications warrant continued study. A blinded randomized clinical trial is underway to determine whether intraoperative interventions can decrease neuropraxia morbidity in cardiac patients, and we are designing a parallel non-cardiac study.

Disclosure: Dr. ****** is a member of the Scientific Advisory Board for ******

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[1] Interact Cardiovasc Thorac Surg. 2013; 17: 157–158
[2] Anesthesiology 2009; 111:490–7

153300 - LACUNAR EMBOLIC STROKES, THE UNDISCLOSED RISK OF PARADOXICAL GAS EMBOLI DURING LAPAROSCOPIC SURGERY?

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Introduction: Laparoscopic surgery utilization for hysterectomy and prostatectomy is rapidly growing. These procedures are becoming a standard of practice, as they result in shorter hospital stays and better patient satisfaction. They are longer in duration and require maximal head down (Trendelnburg) position to facilitate surgical exposure. There is good evidence that virtually all patients have significant venous gas embolization (VGE) during these procedures. For some reason, however, these CO2 gas emboli are considered benign and risks of paradoxical cerebral gas embolism is not usually discussed with patients.

Clinical Features: Consent of the patient in accordance with local REB guidelines was obtained. We report an incident of multiple lacunar strokes consistent with embolic shower in a 59 patient undergoing otherwise uneventful transvaginal laparoscopic hysterectomy. Standard anesthetic technique and monitoring was used, all vital signs were within normal range with exception of progressive difficult controlling end-tidal CO2 levels which rose to mid 60's. Otherwise the intraoperative course was uneventful. During the emergence patient was slow in rousing and confused. Right facial droop and right hand weakness was noted. Immediate cerebral CT scan was normal, however, a diffusion weighted (DWI) MRI scan performed three days later was consistent with multiple acute bilateral embolic infarctions. Transthoracic 2D echocardiogram with saline contrast revealed a small patent Foramen Ovale/Secundum atrial septal defect. Patient progressively improved and was discharged home on the fifth postopearative day with a residual right thumb and right index finger moderate weakness.

There are numerous previously reported cases of delayed wakening, stupor, focal neurological injury after laparoscopic procedures. Invariably they are presented as extremely rare complications in patients with, and without intracardiac shunt in a form of atrial septum defect identified on postoperative echocardiograms. Prospective studies with the use of intraoperative transesophageal echocardiography found that up to 38% of patients have very large amounts of venous gas embolization during laparoscopic hysterectomy (1).

Conclusions: Assuming that 25% of patients have pro-patent Foramen Ovale and that right sided atrial pressure is significantly elevated in steep Trendelnburg position, it is possible that up to 10% of patients undergoing prolonged laparoscopic lower

abdominal procedure are exposed to high risk of cerebral CO_2 emboli. Diffuse gas embolisation of the brain is difficult to diagnose and may not produce focal syndrome. Long term effects of CO_2 cerebral emboli are unknown. Lacunar strokes of other etiology have been associated with early onset dementia. Do we have a right to assume that those caused by gas emboli are not?
Do our patients have right to know that undergoing laparoscopic procedure may expose them to this very rare but potentially life changing complication? Further research is required, in the mean time , should we stay silent or obtain an informed consent?

References:
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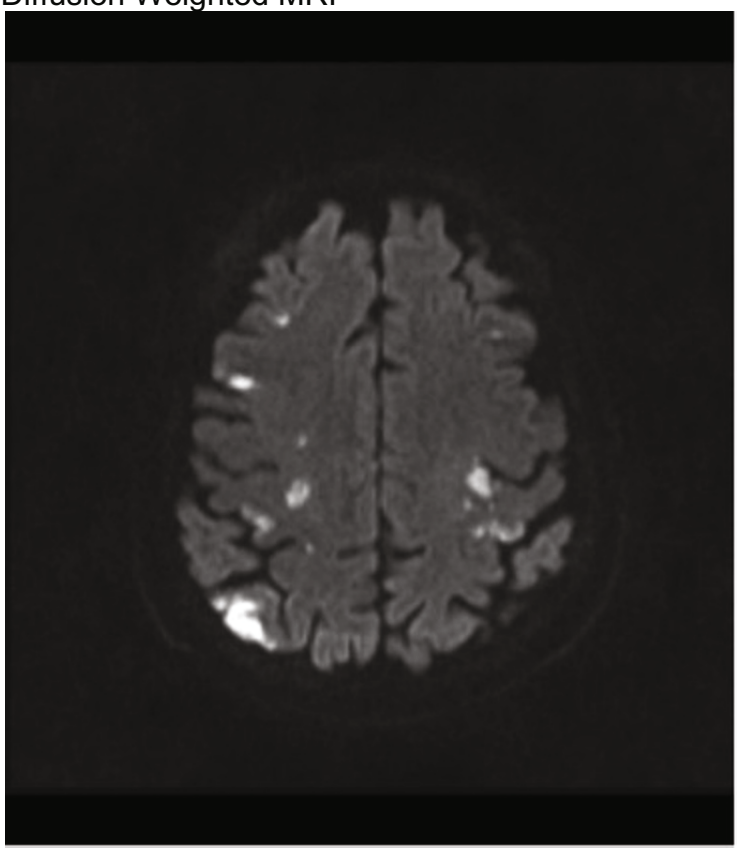
Diffusion Weighted MRI



multiple bilateral acute infarcts

153304 - HYDROXYETHYL STARCH IN PRECLINICAL SEPSIS: SYSTEMATIC REVIEW AND METAANALYSIS

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Introduction

Hydroxyethyl starch (HES) fluid resuscitation has recently been demonstrated to increase in mortality and acute kidney injury in patients with septic shock.[1] It is unclear whether an analysis of preclinical HES studies may have helped predict the adverse effects of these fluids. We therefore conducted a preclinical systematic review and meta-analysis to investigate the safety of HES compared to other resuscitation fluids in animal models of sepsis. Here we report on the outcome of mortality.

Methods

A systematic search of Ovid MEDLINE and Embase was performed in collaboration with an information specialist (inception-01/2015). Citations were screened independently in duplicate. Studies comparing HES vs other resuscitation fluid in preclinical in vivo sepsis models were included. The Cochrane Risk of Bias Assessment Tool was used to assess internal validity of each included study. Construct validity (i.e. clinical generalizability) was assessed using a previously proposed 8 point framework.[2] Results are expressed as risk ratios (RR) and 95% confidence intervals (95% CI). Meta-analysis was performed using an inverse variance random effects model. A priori determined outcome ascertainment windows were also analyzed (≤2 days, 2-4 days, ≥4 days).

Result

10 articles met eligibility criteria (n=439 animals). Animal models included rat (5 studies), swine (3), and sheep (2). To model disease, studies used IV endotoxin (4), cecal ligation and puncture (3), live bacteria implant (1), live bacteria infusion (1), and fecal peritonitis (1). Comparison fluids included gelatin (5), ringer's lactate/acetate (5),

saline (3), sterofundin (2), albumin (1), and pig plasma (1). Risk of bias was variable: 8 studies reported randomizing but did not describe the method, no studies described allocation concealment, personnel and outcome assessment were low risk of bias in 4 and 2 studies, respectively. Studies incorporated a median of 2 (range 1-4) of 8 suggested construct validity criteria to increase clinical relevance (e.g. no studies included animals with comorbidities). Mortality of animals was described in 6 studies and no statistically significant effect of HES on mortality was noted (RR 1.45, 95%CI 0.75-2.75, I^2 = 43%). One study reported on animals ≥4 days, with 7/7 animals treated with HES and 0/7 treated with plasma dying, respectively.

Conclusion

There is a paucity of preclinical evidence regarding the long term safety of HES in animal models of sepsis. Available evidence suffered from variably risk of bias and potentially lower construct validity. Pooled analysis suggested a non-significant trend towards harm with HES. The single study performed with a longer outcome ascertainment window demonstrated harm with HES.

References:

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2. Crit Care Med 2010 38:2401-2408

153311 - PREOPERATIVE MENTAL HEALTH CHARACTERISTICS AMONG ADULTS UNDERGOING NON-CARDIAC SURGERY: A PRELIMINARY STUDY

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Introduction: Non-cardiac surgery is a highly stressful event for patients. Preliminary evidence suggests that adults undergoing non-cardiac surgery may have higher rates of mental disorders than in the general population given that there is a strong relationship between compromised mental and physical health. Very little research, however, has examined the prevalence of mental disorders and distress pre-operatively. The current study aims to assess prevalence rates of affective disorders and levels of distress the day of surgery in a large sample of non-cardiac surgery patients.

Methods: The local Research Ethics Board previously approved this research as an amendment of a larger cohort study. The study cohort is a representative sample of 1118 adults over the age of 45 undergoing non-cardiac surgery between 2011 and 2012. Patients required a general or regional anesthetic and overnight hospital stay. Patients were approached the day of surgery and self-reported on (1) a current mood or anxiety disorder that was diagnosed by a health professional, and (2) a number of distress symptoms in the 4-week preoperative period indicated by the Kessler's 6-item Psychological Distress Scale (K6).

Results: Results indicated that 2.4% of adults indicated a current diagnosis of a mood disorder, with depression as the most prevalent; 1.4% of adults indicated a current diagnosis of an anxiety disorder, with generalized anxiety disorder as the most prevalent. Results further indicated that 75.9% endorsed low levels of distress (K6 score 0 to 4), 22.7% endorsed moderate levels of distress (K6 score 5 to 12), and 1.5% of patients endorsed severe levels of distress (K6 ≥ 13). Patients who indicated the presence of an anxiety or mood disorder had significantly higher levels of distress pre-operatively than those who did not indicate a diagnosis. Patients were significantly more likely to indicate that "everything was an effort" in the past 4 weeks compared to other distress symptomatology.

Discussion: Although a small proportion of adults in the pre-operative period endorsed a mental disorder and severe distress, over a quarter of the sample indicated at least moderate distress, which has been previously found to be associated

with impairment (1, 2). These rates are slightly higher than rates observed in the Canadian population (3). It is essential to understand the relationship between distress pre-operatively and specific post-operative outcomes. Recent evidence suggests that poor psychological health in the pre-operative period predicts negative outcomes such as delirium (4). The K6 may be a valuable screening tool in perioperative medicine.

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153555 - EPIDEMIOLOGY OF MATERNAL CARDIAC ARREST IN CANADA: A NATIONWIDE STUDY

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Introduction:
Cardiac arrest during pregnancy is a rare event with an estimated incidence of 1:30,000 to 1:50,000 deliveries.[1,2] Such events can be catastrophic, leading to a significant potential for major morbidity and mortality for the mother and the neonate. The maternal and neonatal case fatality rates have been reported to be 83% and 58%, repectively.[3]

Objectives:
The objective of this study was to generate information about maternal cardiac arrest in Canada by examining the frequency, temporal incidence, associated conditions, maternal survival and fatality rates.

Methods:
This retrospective cohort study was conducted after institutional Research Ethics Board approval. It was based on the hospitalization database for childbirth in Canada (except Quebec) for 12 fiscal years from 2002/03 to 2013/14. The database is housed at the Public Health Agency of Canada (PHAC), prepared under strict confidentiality guidelines by Canadian Institute for Health Information (CIHI). The study population was all women with gestational age 20 weeks and higher with cardiac arrest during hospitalization for childbirth. Cardiac arrest was defined based on ICD-10-CA diagnostic (I46.0, I46.1, I46.9, I49.00, I49.01) and intervention codes (1.HZ.30.^^, 1.HZ.09.JA-FS, 1.HZ.09.LA-FS, 1.HZ.09.LA-CJ). The study population and maternal mortality rate were summarized using descriptive statistics. Multivariable logistic regression analysis was used to identify medical and obstetrical conditions independently associated with maternal cardiac arrest.

Results:
There were 261 cases of maternal cardiac arrest among 3,282,150 hospitalizations for delivery. The records included about 70% of all obstetric deliveries in Canada. 185 women survived to hospital discharge (70.9%, 95% confidence interval [CI] 65.2% to

76.2%). The fatality rate was 28.8%. The frequency of cardiac arrest in 2002-2014 varied from 5 to 11 per 100,000 deliveries; there was no significant difference between the years (p=0.26). There was no significant variation in the incidence among Canadian provinces (p=0.42). Women who suffered cardiac arrest were more likely to be 35 yr and older (odds ratio 2.34; 95% CI 1.69 to 3.26). Aortic aneurysm and dissection was the most common condition associated with maternal cardiac arrest, followed by obstetric embolism and heart failure. Table 1 lists statistically significant associations between maternal obstetric/ medical conditions, and cardiac arrest.

Discussion: This is the first Canadian population based cohort study on the epidemiology of maternal cardiac arrest. The event rate is 8:100,000, and agrees with that reported in the US cohort. [4] Survival rate reported in this study is higher than previously reported, potentially owing to the differences in case identification between the studies, using the population database and those relying on active surveillance.[3] The information from this report could be used to develop prospective database of the cases and guide development of the system approach in dealing with this condition.

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Table 1. The association between maternal medical and obstetric conditions, and cardiac arrest

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Maternal obstetric and medical conditions	Adjusted OR*
Chorioamnionitis	2.30 (1.19-4.42)
Morbidly adherent placenta	3.06 (1.19-4.42)
Placenta praevia	1.62 (1.30-1.76)
Placental abruption	2.91 (1.05-8.07)
Stillbirth	3.03 (1.69-5.46)
Polyhydramnios	2.31 (1.01-5.30)
Gestational hypertension	1.97 (1.35-2.87)
Diabetes in pregnancy	1.87 (1.25-2.80)
Diseases of the nervous system	2.84 (1.52-5.32)
Maternal infectious and parasitic diseases	3.26 (2.19-4.85)
Complications of anesthesia	3.17 (1.22-8.20)
Eclampsia	11.04 (5.61-21.73)
Aortic aneurysm and dissection	21.95 (5.73-84.06)
Postpartum hemorrhage	1.46 (1.04-2.06)
Sepsis	4.03 (2.18-7.44)
Pulmonary edema	3.03 (1.32-6.99)
Trauma	9.34 (4.08-21.38)
Heart failure	13.00 (8.56-19.76)
Obstetric embolism	18.21 (8.92-37.18)
Amniotic fluid embolism	7.56 (3.10-18.46)

*ORs adjusted for maternal age, parity, gestational age, anesthesia type, maternal and obstetric conditions.

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