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2019 CAS ANNUAL MEETING ABSTRACTS

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ABSTRACTS ARE ARRANGED BY LEARNING TRACK AS FOLLOWS:

AIRWAY/AMBULATORY MANAGEMENTT

606923 - SIMULTANEOUS (EN BLOC) ENDOTRACHEAL TUBE INSERTION WITH GLIDESCOPE USE: A RANDOMISED CONTROLLED TRIAL

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Purpose: Intubation-associated trauma with the GlideScope is rare,(1-5) but when it occurs, it is likely due to the fact that the endotracheal tube (ETT) is advanced blindly between the direct view of the oropharynx and the video view of the glottic aperture. It is also occasionally difficult to advance the endotracheal tube into the trachea despite a good view of the glottis.(1,3,6)

We present a novel technique that may be utilized to potentially address both issues: introduction of the ETT en bloc with the GlideScope, thus visualizing the ETT tip throughout its entire path to the glottis. This has the advantage of eliminating the "blind" advancement of the ETT. In addition, as soon as the glottic aperture is visualized using the GlideScope, the ETT is already on screen and easy to advance through the vocal cords. This randomized, single blinded trial assessed whether en bloc orotracheal intubation with the GlideScope is faster and/or easier than the standard technique.

Methods: Local ethics approval was obtained. 50 patients with normal-appearing airways who required orotracheal intubation were randomly allocated to intubation with either: the en bloc technique, or the standard GlideScope-first-then-ETT technique. In the en bloc group, the ETT was held with a clip while the GlideScope was advanced. The primary outcome was time to intubation, recorded by a blinded observer. Secondary outcomes were subjective ease of intubation (100 mm visual analog scale [VAS], 0 = easy; 100 = difficult), number of attempts/failures, and incidence of oropharyngeal bleeding.

Results: Baseline demographics were similar between the two groups. Histogram results confirmed the anticipated non-parametric statistical testing. Median time to

intubation was 35.6 seconds [interquartile range, IQR, 31-42] with the en bloc technique versus 41.4 seconds [IQR 37-50] with the GlideScope-first technique (difference in medians, 5.8 seconds; 95% CI, 2.3 to 10.6; p = 0.008). The median ease of intubation VAS was 11 mm [IQR 9-21] with the en bloc technique, and 15 mm [IQR 11-24] with the standard technique (p = 0.19). There was no difference between the groups for number of laryngoscopic grade, number of intubation attempts, or incidence of oropharyngeal bleeding.

Discussion: In this study of GlideScope laryngoscopy for elective patients, the en bloc technique was viable to visualize the ETT for its entire path to the glottic aperture for all patients. It was faster to perform than the standard GlideScope intubation technique. No trauma was observed and no statistically difference in ease of intubation was seen. Larger randomised controlled studies are suggested to confirm these findings.

References:

1. Chin KJ et al. "Palatal injury associated with the GlideScope". Anaesthesia and intensive care. 2007;35(3):449.

2. Hsu WT et al. "Penetrating injury ... GlideScope". A&A. 2007;1609-10.

3. Cooper RM. "Complications ... GlideScope". CJA; 2007Jan;54(1):54-7.

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5. Allencherril JP, and Joseph L. "Soft palate trauma ..." JCA. 2016Dec;35:278-280.

6. Agro' FE, Doyle DJ, and Vennari M. "Use of GlideScope® in adults: an overview". Minerva Anestesiol. 2015Mar;81(3):342-51.

Figure 1: Percentage of patients intubated vs Time

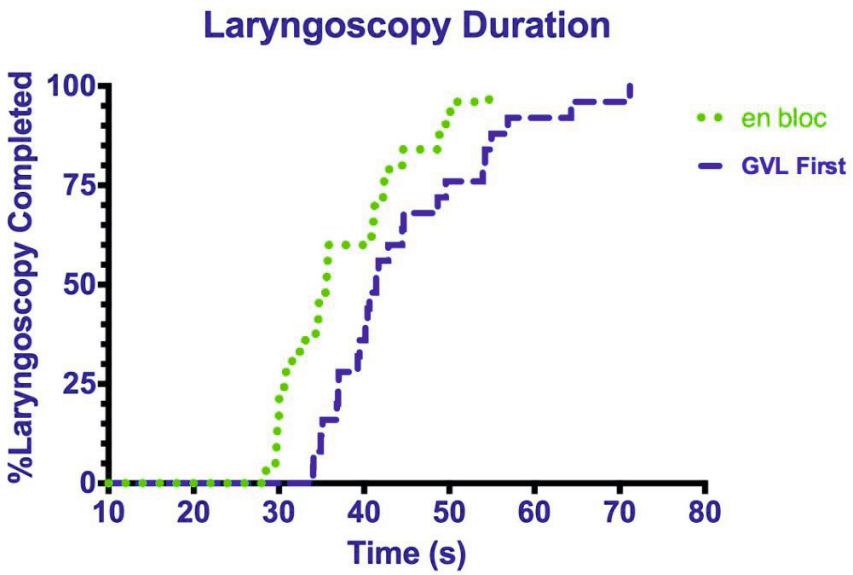

Figure 3 – Laryngoscopy duration presented as a Kaplan-Meier curve demonstrating the Percentage of patients intubated vs. time. (p = 0.008) The probability of being intubated at any given time in the en bloc group vs. the control group is 2.1 (95% confidence interval [1.2, 3.8]).

637328 - IN THE EYE OF THE BEHOLDER: TRANSORBITAL INTUBATION AFTER CRANIOFACIAL RESECTION MAY NOT BE AS DIFFICULT AS IT APPEARS

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Introduction

Patients with obvious anatomical deformities following extensive craniofacial surgeries are often labeled as difficult airway and subjected to repeated distressing awake intubations. We report a patient presenting for revision of a maxillary wound. Despite the impressive facial deformity, airway assessment revealed normal oropharyngeal and laryngeal anatomy with no discernible factors causing difficult intubation. An asleep fiberoptic transorbital tracheal intubation was performed without difficulties, thus sparing the patient an awake intubation.

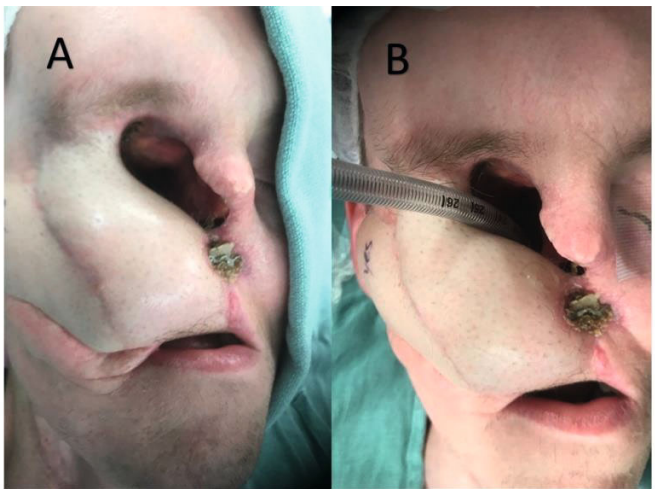
Clinical Features

Patient consent was obtained for publication of this case report. A 34 year old male with carcinoma of the right maxillary sinus underwent maxillectomy, orbital exenteration, rhinectomy and plastics reconstruction. Subsequently, he developed wound dehiscence with exposed maxillary plate.

Preoperatively, the patient was interviewed and examined. He recalled having very distressing awake fiberoptic intubations. He was very apprehensive about having to undergo another awake intubation.

Physical examination revealed an anxious white male with obvious facial asymmetry (A). There was absence of the right eye and surgical deformity of the right side of the nose. He had a facial wound superior to the upper lip with an exposed maxillary surgical plate. Mouth opening was 6 cm with normal neck motion.

The empty right orbit and nasal cavity was packed with gauze. An occlusive dressing was applied to prevent air leak during mask ventilation. After induction with propofol, adequate bag-mask ventilation was ensured and rocuronium was given. The gauze packing was removed. A flexible fiberscope was inserted through the open orbital floor to the oropharyngeal cavity and advanced to the glottis for successful intubation (B).



Discussion

Patients who have had extensive craniofacial surgeries may be labeled as difficult airway and subjected to repeated distressing awake intubations. In this patient, airway assessment showed that his anatomical abnormalities were located above the hard palate, while oropharyngeal and laryngeal anatomy was completely normal. Mouth opening and neck motion were also normal. Intubation difficulties were thus not anticipated. However, loss of ventilation during bag-mask ventilation due to leak from the open orbital cavity and nasal remnant was a concern. By packing the cavity with an occlusive dressing before induction, the patient was able to be ventilated with ease. As there were no obstacles along the path for intubation from the open orbital floor to the oropharyngeal cavity to the glottic opening, tracheal intubation was achieved without difficulties. Transorbital tracheal intubation has been achieved using direct laryngoscopy with a Macintosh blade.[1] A history of prior awake intubations may not necessarily dictate subsequent awake intubation. Airway assessment in patients with marked craniofacial abnormalities should focus on the anticipated difficulties of ventilation and intubation. A plan to secure the airway should be individualized, taking into account the airway challenges, provider expertise and patient safety and comfort.

References:

- Anesthesiology 2014 121(3): 654

634709 - POSTOPERATIVE SORE THROAT IN CHILDREN: COMPARISON BETWEEN AMBU® AURAONCE™ LARYNGEAL MASK AIRWAY (LMA) AND I-GEL®

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Background: Sore throat is minor but well recognized complaint after receiving general anesthesia. The study is conducted to compare the severity and frequency of postoperative sore throat in children undergoing elective surgery following the use of Ambu AuraOnce LMA and I-gel.

Method: This study was approved by Ethics review committee of the Hospital. Seventy children, 6 years to 16 years, undergoing elective surgery randomly allocated to either Ambu® AuraOnce™ LMA group or I-gel® group. After procedure, patients were interviewed in recovery room immediately, after 1 hour, 6 hour and 24 hour postoperatively by an independent observer blinded to the device used intra-operatively.

Results: On arrival in recovery room 17.1% (n=6) of children in LMA group complained of postoperative sore throat vs.5.7% in I-gel group (n=2). After 1 hour, the results were similar.

After 6 hours, postoperative sore throat was found in 8.6% (n=3) of children in LMA group vs. 2.9% (n=1) in I-gel group. After 24 hours, 2.9% (n=1) in LMA group compared to none in I-gel group. There was no significant difference found in incidence of postoperative sore throat in both devices on arrival (p= 0.28), after 1 hour (p=0.28), after 6 hours (p=0.30) and after 24 hours (p=0.31).

The duration of insertion was shorter in LMA group and it was easier to insert then I-gel (p=0.029). Oropharyngeal seal pressure of I-gel was higher than that of LMA (p=0.001).

Discussion: In this randomized controlled trial, we found out that the frequency and severity of postoperative sore throat in children undergoing elective lower abdominal or orthopedic surgery was lesser but not clinically significant following the use of I-gel as compared to Ambu AuraOnce LMA for up to 24 hours. The duration of insertion is shorter in LMA group as compared to I-gel group. LMA is easier to insert and have higher first attempt success rate then I-gel. Oropharyngeal seal pressure of I-gel is higher than Ambu AuraOnce LMA. Immediate complications in both devices were not

found to be clinically significant. Our experience with both the devices was good as they both were successfully used for maintaining airway without any major and significant complication. Further multicenter trials are required to assess the efficacy, performance and complications related to these two devices. Also in infants and young children who are not able to self-report postoperative sore throat, there is a need for a method to be formulated which can help in assessment of this complication and further studies are required in this age group as well.

References:
N/A

636010 - MEDICATIONS TO REDUCE EMERGENCE COUGHING AFTER GENERAL ANESTHESIA: A SYSTEMATIC REVIEW AND NETWORK META-ANALYSIS

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INTRODUCTION: Emergence coughing and bucking occurs frequently after the general anesthetic recedes in 40 to 76% of patients [1, 2]. Besides general unpleasantness, coughing has important physiological and clinical sequelae that may be detrimental to the postoperative patient. Multiple medications have been studied. However, few head-to-head trials have been published, and no prior publication determined the best pharmacological method to minimize peri-extubation coughing. Our systematic review and network meta-analysis's primary objective is to determine the relative efficacies of different common medications on decreasing emergence coughing (none to mild compared to moderate to severe, as defined by the modified Minogue scale) after general anesthesia with endotracheal intubation for elective surgery. Medications of interest are lidocaine or lignocaine (intravenous (IV), intracuff, topical or endotracheal application), dexmedetomidine IV, remifentanil IV, and fentanyl IV. These medications were selected based on a preliminary review of the literature.

METHODS: We systematically searched MEDLINE, Cochrane Central Register of Controlled Trials, Embase, Cochrane Database of Systematic Reviews, ACP Journal Club, Database of Abstracts of Reviews of Effects, and the Cochrane Methodology Register, with no date or language restrictions. Gray literature search encompassed

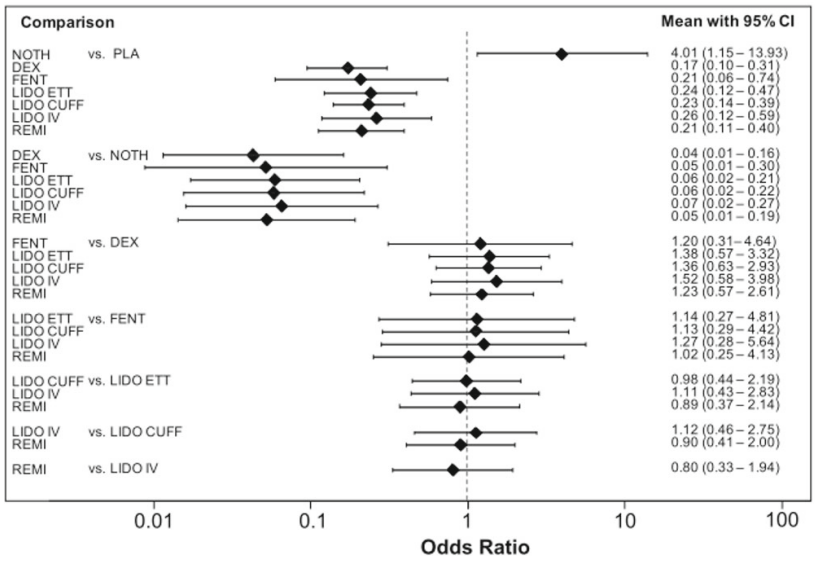
conference abstracts, Web of Science, and references. Two reviewers independently screened the retrieved literature; selected publications for full text review based on predetermined inclusion criteria; extracted data; and evaluated the studies for bias using the Cochrane risk of bias assessment. Pooled odds ratios (OR) and 95% confidence intervals for each direct and indirect treatment comparison were calculated for moderate and severe coughing versus none to mild, and mean differences in extubation times. A surface under the cumulative ranking curve (SUCRA) analysis determined the cumulative ranking of each treatment.

RESULTS: Literature database and gray literature searches (June 30, 2018) resulted in 485 records. After removing duplicates and ineligible studies, 70 studies were included in the final network meta-analysis. All study medications had favourable odds in reducing the incidence of moderate and severe peri-extubation coughing compared to nothing or placebo. No study medication was favoured over another. SUCRA showed that dexmedetomidine had the highest probability of decreasing the incidence of moderate and severe coughing peri-extubation, followed by remifentanil, fentanyl, lidocaine intracuff, lidocaine topical/ETT, and lidocaine IV in that order. Intracuff lidocaine had higher odds of prolonging extubation times in pairwise comparisons to placebo, dexmedetomidine, fentanyl, and remifentanil.

DISCUSSION: Dexmedetomidine IV had the highest probability of decreasing moderate and severe peri-extubation coughing after a general anesthetic with endotracheal intubation. However, any study medication (dexmedetomidine, remifentanil, fentanyl, lidocaine intracuff/topical/ETT/IV) may be considered for reducing emergence coughing, because all study medications were better than placebo or nothing, and equivalent to each other. Only intracuff lidocaine prolonged extubation times, which may make it less ideal for rapid room turnover.

References:
1. Anesth Analg. 2005;101:1536–41.
2. Anesth Analg. 1998;87:1170–4

Interval plots of pairwise comparisons of study medications in decreasing moderate and severe emergence coughing



NOTH: Nothing, PLA: Placebo, DEX: Dexmedetomidine, FENT: Fentanyl, LIDO ETT: Lidocaine Endotracheal Tube, LIDO CUFF: Lidocaine Intracuff, LIDO IV: Lidocaine Intravenous, REMI: Remifentanil

636092 - A PILOT STUDY OF A NOVEL ORAL AIRWAY FOR AWAKE FIBRE-OPTIC INTUBATION

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INTRODUCTION

For predicted difficult intubation, patients have awake fibre-optic intubation (AFI) using a flexible bronchoscope to protect the airway until the endotracheal tube is in place.(1) To protect the bronchoscope, a device is used to prevent inadvertent biting by the patient. Currently used devices protect the scope, but may not position the jaw or bronchoscope optimally. This is not a problem for experienced bronchoscopists such as respirologists, but can be for anesthesiologists, who scope infrequently. A novel bite block device, the AIMairway (Aa), was studied to assess functionality for AFI by novice bronchoscopists (off-service residents).

METHODS

With Ethics Board approval, consenting patients booked for bronchoscopy were recruited. Excluded were those who did not wish to participate and those with any health conditions that the attending respirologist felt put them at any added risk by participating. We compared Aa with a standard bite block (BB) and with the William's airway (WA) that are commonly used in our hospitals. Experimental design was an unblinded repeated measures interventional clinical trial with concealed randomized allocation of device order. The primary outcome was stopwatch time from beginning insertion of the bronchoscope until visualization of vocal cords. Random numbers transcribed to paper cards in numbered opaque envelopes were opened after recruitment and just prior to bronchoscopy to determine what order the devices would be used. Secondary outcomes included rating ease of insertion and assessment of gag reflex. Comments about overall impression were recorded. Observational demographic and rating data were tabulated. Time measurements were compared by paired T-tests because we had not included the William's airway in the study for the first ten participants. When the data failed the Shapiro-Wilk normality test, Wilcoxon Signed Rank Test was performed with Yate's continuity.Corrections for multiple

comparisons were not done because of the exploratory nature of the experiment.

RESULTS

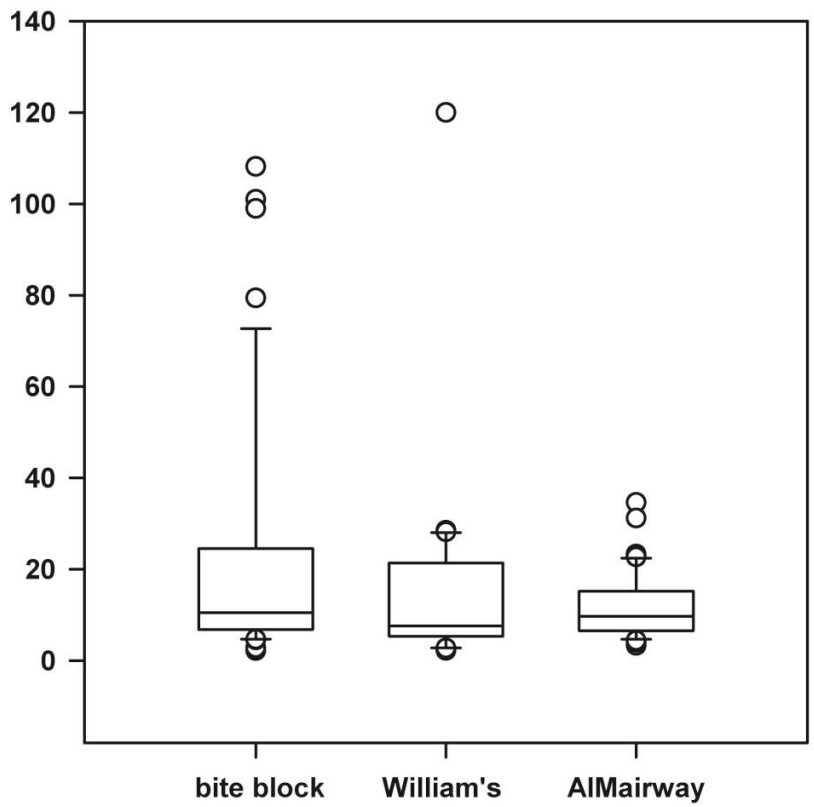
Forty-six patients were approached, 42 agreed to the study, and 41 completed it. One was unable to tolerate bronchoscopy because of severe back pain. See figure (box ends: 25th and 75th percentiles; error bars:10th and 90th percentiles) Times (s) to visualize the vocal cords (median (range)[25th to 75th percentiles] p compared to Aa): BB 11(2 to 108)[7 to 25] p = 0.03; WA 8(2 to 120)[6 to 21] p = 0.15 and Aa 10(3 to 35)[6 to 15]. All airways were easy to insert and well tolerated except for the two participants who gagged on the William's airway.

DISCUSSION

The AIMairway was well tolerated with faster cord visualization than BB and possibly more consistent time to visualization without the risk of gagging found with William's airway. The figure suggests that time to cord visualization is more consistent with Aa.

References:
1 Collins SR, Blank RS. Respiratory care 2014; 59:865-78; discussion 78-80.

Time to Visualize Cords (s)



637404 - LEARNING CURVES FOR THE NOVEL C-MAC® VIDEO STYLET AND THE C-MAC® MACINTOSH VIDEO LARYNGOSCOPE: A MANIKIN TRIAL.

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Introduction:

Difficult airways can be managed with a range of devices, with video laryngoscopes (VLs) being most common.Here we present an alternative device: the C-MAC®Video-Stylet (VS) (Karl Storz, Tuttlingen, Germany), a hybrid between a flexible and a rigid intubation endoscope. Given the novelty of the VS, we hypothesize that learning to use the VS for endotracheal intubation on an airway mannequin might take longer and result in slower intubations compared to the VL.

Methods:

Local research ethics board approval was obtained prior to study commencement. This is a single-center, prospective, randomized, crossover study involving seventeen anesthesia residents performing intubations on a Bill 1™mannequin airway model (VBM, Sulz, Germany). After a standardized introduction, six randomized attempts with the C-MAC Macintosh #3 VL and C-MAC VS were performed on the airway mannequin. This was followed by an intubation in a simulated “difficult airway” (cervical collar and inflated tongue) with both devices in a randomized fashion. The primary end-point of this study was the total time to intubation. All continuous variables were expressed as the median [interquartile range] and analyzed using the Mann-Whitney U test. A 2-way ANOVA with Bonferroni’s post hoc test was used to compare both devices at each trial. All reported *p* values are two sided.

Results:

On the first trial with the normal airway, the total time to intubation was similar between devices (VS 21.0s [15.2-27.2s] versus VL 21.5s [14.0-27.7s], p=0.76). Subsequent trials also showed similar total time to intubation between the two devices (Figure 1). On the sixth trial, the total time to intubation was similar between devices (VS 12.0s [9.2-15.7s] versus VL 14.0s [13.0-17.0s], p= 0.20); however, the total time to intubation was significantly shorter compared to the first trial for each corresponding device (VS 21.0s versus 12.0s p=0.0028 and VL 21.5s versus 14.0s p=0.027). Comparison by two-way ANOVA confirmed trial number as a statistically significant interaction: device

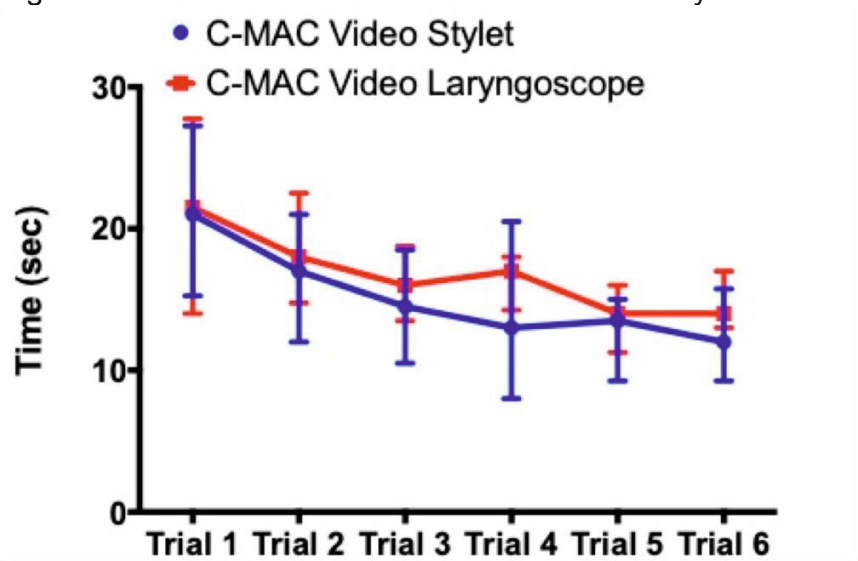
effect, *p*=0.47; trial number effect, *p*p=0.14). The first attempt success rate was 100% in both groups<./p>

Discussion:

In this mannequin-based study, the novel C-MAC video-stylet was comparable to the C-MAC VL in terms of total time to intubation in a normal and simulated difficult airway. While keeping in mind the limitations of a mannequin-based study, one could extrapolate that the C-MAC video-stylet has a comparable learning curve to a Macintosh video laryngoscope. Further human clinical trials are necessary to fully describe the VS and delineate any potential differences to video laryngoscopes.

References:
N/A

Figure 1: Total time to intubation in a normal airway manikin



Learning Curve (n = 17) for C-MAC Video Stylet and C-MAC Video Laryngoscope; median with 95% confidence interval (CI) over trials 1 to 6.

637523 - MANAGEMENT OF DIFFICULT AND FAILED TRACHEAL INTUBATION - A RETROSPECTIVE STUDY

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Introduction

Serious complications related to airway management are rare and most of our learning comes from large litigation, critical incident databases and retrospective chart reviews that help to identify patterns and areas where care can be improved (1). The objective of this study was to describe the management of difficult and failed intubation cases in general surgical population in our hospital.

Method

After REB approval, we performed a retrospective cohort study of all cases of difficult intubation in general surgical patients from January 1, 2011 to December 31, 2017. Cases were identified using ICD-10 codes, health records and electronic hospital databases. Intubation was graded as difficult if there were 2 attempts requiring intubation equipment other than Macintosh blade for direct laryngoscopy, or there were 3 or more intubation attempts regardless of the device used (2). The primary outcome was the incidence of difficult intubation. The secondary outcomes were intubation devices used, number of attempts and complications.

Results

We identified 112 cases of difficult or failed intubation in 47,462 general surgical cases requiring endotracheal intubation over seven-year period. The first intubation attempt was made with direct laryngoscopy using Macintosh blade in 95 and with video-laryngoscope in 17 cases. Of 95 cases with failed intubation after direct laryngoscopy, second intubation attempt was made with video-laryngoscope in 60 patients and 53 were successful (88% success rate). Those with first failed attempt at video-laryngoscope, had success after subsequent video-laryngoscopies. Direct laryngoscopy with adjuncts such as bougie, flexible bronchoscopy and laryngeal mask airway were used for second intubation attempt in 20, 8 and 4 cases, respectively (Table 1).

Intubation attempts failed in 12 cases, 3 of which required surgical airway, while the surgical procedure was carried out with laryngeal mask airway in 4 patients, and 5 patients were woken up from the surgery. The median (range) number of intubation attempts in failed intubation were 3 (3 to 4). Major cause for failed intubation was airway bleeding (7 out of 12 cases).

Discussion

The incidence of difficult and failed intubations in our study was 2.3 and 0.25 per 1000 cases respectively. Video-laryngoscopy demonstrated a high success rate as a rescue device and should be considered as first intubation device to reduce the incidence of unanticipated difficult intubation. Multiple intubation attempts should be avoided to minimize airway bleeding. Proper identification of cases, training and utilization of various techniques may help to reduce the incidence of difficult/failed intubation.

References:

1. Cook TM et al. Br J Anaesth. 2012;109:68–85.

2. Nørskov et al. Trials. 2013;14:347.

Table 1. Success rates of rescue devices after failed initial intubation attempts using a Macintosh laryngoscope (n=95 of 112 difficult intubation cases)$

Table 2. Success rates of rescue devices after failed initial intubation attempts using a Macintosh laryngoscope (n=95 of 112 difficult intubation cases) $

Rescue Devices	Number	Success	Failure	Success rate (%)
Direct laryngoscope with adjuncts *	20	4	16	20
Video laryngoscope	60	53	7	88
Flexible bronschoscopy	8	5	3	62
Laryngeal Mask Airway	4	4	-	100
Surgical Airway	3	3	-	100
Overall cases	95	69	26	73

*Adjuncts – Bougie, stylet

$ Glidescope was used for first and subsequent intubation attempts in 17 out of 112 difficult intubation cases.

638231 - FEASIBILITY OF A NOVEL POINT OF CARE ULTRASOUND (POCUS) - OBSTRUCTIVE SLEEP APNEA (OSA) PREOPERATIVE SCREENING TOOL

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Background: Obstructive sleep apnea (OSA) is a common sleep disordered breathing condition leading to upper airway obstruction, oxygen desaturation and postoperative complications.[1] A Point-of-Care Ultrasound (PoCUS) screening tool can help mitigate the pitfalls of OSA screening questionnaires such as poor specificity. We present our preliminary experience and feasibility data with this novel PoCUS-OSA screening tool in the perioperative setting.

Methods: After institutional REB approval, patients who were scheduled to undergo elective, non-cardiac surgeries, with prior OSA diagnosis but non-compliant to treatment or those at high risk (STOP-Bang score>3) were consented. Preoperative

clinical and airway examination, OSA screening using the STOP-Bang questionnaire and other demographic data were collected. Pre-defined surface airway ultrasound scanning of the upper airway and head neck structures was performed as part of the PoCUS-OSA tool.[3] The following dimensions were measured: tongue base thickness (TBT), distance between the lingual arteries (DLA), upper airway length (UAL), mandible to hyoid distance, pharyngeal air passage - the transverse diameter of the pharynx in the retropalatal (RPD) and retroglossal (RGD) region, lateral pharyngeal wall (LPW) thickness, internal carotid artery intimal media thickness (CIMT), anterior neck soft tissue thickness at the hyoid bone, subcutaneous fat tissue thickness in the anterior neck and at the umbilicus. For the TBT, and pharyngeal passage examinations, images were captured during expiration, forced inspiration, and Muller maneuver. The quality of US image acquisition and the ease of performance was rated qualitatively as very good to very difficult on a 5-point Likert scale.

Results: We prescreened 243 patients in the preoperative clinic, enrolled 100 and completed the PoCUS scanning protocol in 87 patients. Majority of patients were scheduled to undergo orthopedic, general surgery and bariatric procedures. The demographic data of the participants is presented in Table 1. We were able to complete data acquisition of all included PoCUS parameter in the preoperative period. The total time required for a complete US examination and acquire all study PoCUS parameters was 29±7 minutes. Qualitative assessment for image acquisition and ease of performance was good to very good for TBT, UAL, mandible to hyoid distance, thyrohyoid membrane, and subcutaneous fat tissue thickness at hyoid bone; fair for DLA, CIMT, and anterior neck soft tissue thickness at hyoid bone; and difficult to very difficult for pharyngeal air passage (RPD, and RGD), and LPW thickness. Overall the comprehensive examination could be completed in 29±7 (mean±SD) minutes for the complete cohort. Most of the PoCUS parameters could be captured within 1-3 minutes, individually.

Discussion: Our preliminary data indicate that it is feasible to perform a PoCUS-OSA screen within 30 min in the pre-operative setting. The clinical implications of this novel tool on OSA screening remains unclear and requires further validation.

Funding Statement: This study is funded by the 2017 Canadian Anaesthesiologists' Society New Investigator grant.

References:
1. *Anesth Analg*. 2016;122(5):1321-1334.; 2. *Ann Intern Med*. 2011;155(8):529; 3) *Anesth Analg*. April 2018;126 (4):S-393

Table 1: Demographics Variables of the study population

	All (n=87)	Males (n=49)	Females (n=38)
Age, years, (mean, SD)	52.27±14	54.8±15	49±13
Neck Circumference	44±16	46±21	42±6
BMI (mean, SD)	40±12	36.3±11	45±12
STOP-Bang score (median, range)	5 (3-8)	5.5 (3-8)	5 (3-6)

BMI: Body Mass Index; SD: Standard Deviation

638239 - IMPROVING THE QUALITY OF DIFFICULT AIRWAY DOCUMENTATION: ARE ELECTRONIC MEDICAL RECORDS BETTER THAN WRITTEN?

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Introduction:

Difficult airway management remains a challenge and requires accurate and quality documentation for each encounter. Our institution recently moved to an Anesthesia Information Management System (AIMS) that allowed for documentation of a structured electronic airway note. We sought to evaluate whether the transition to an AIMS improved difficult airway documentation quality and completeness compared to the legacy paper record. Currently there is no published standard on documenting an airway encounter; we also developed a novel checklist for assessing the quality and completeness of airway encounter notes.

Methods:

Our project received approval from the institutional quality and risk management board. Following literature review and discussion among experts, we developed the Difficult Airway Note Quality Checklist and Score (DANQ-CS); an 18 item checklist that assesses the quality and completeness of the difficult airway note. The DANQ-CS checklist includes items such as equipment successful at securing the airway, personnel involved and the sequence of steps required to secure the airway. Using the validated CRABEL score (1) approach we determined a high quality note would have 15 out of 18 items completed (approximating to a CRABEL score of 85%). A priori, we determined a sample size of 60 would allow us to detect a 50% improvement in the proportion of charts with a score of 85% or higher. A total of 30 charts in each group were reviewed retrospectively and scored using the DANQ-CS checklist. Included were charts tagged as ‘difficult airway’ in the medical record in patients undergoing non-airway surgery where intubation was intended. A two-tailed P value less than 0.05 was deemed as significant.

Results:

In 60% of AIMS notes there was a score of 85% versus 13% of paper charts (Chi-Square = 14.9, P = 0.0002), resulting in a 400% improvement in the difficult airway notes scoring a high quality and completeness score. There was also improvement in notes with key information related to identifying the equipment (P = 0.2) and personnel successful at securing the airway (P = 0.01).

Discussion:

Our study demonstrates that transition to an AIMS significantly improved the quality and completeness of difficult airway documentation. We have developed a new tool (DANQ-CS) for assessing the quality of difficult airway documentation. The use of structured difficult airway notes should be considered by institutions transitioning to AIMS. Furthermore the DANQ-CS could be used to audit and monitor the quality of difficult airway documentation to ensure vital information is captured.

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638246 - FIVE YEARS ON FROM THE CANADIAN AIRWAY FOCUS GROUP FOR DIFFICULT AIRWAY: DISSEMINATION AND IMPACT ON PRACTICE

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Introduction

Cognitive aids, including algorithms and checklists, have been successfully utilised in healthcare to establish a higher standard of baseline performance for both routine and crisis situations (1). The 4th National Audit Project (UK), report of morbidity and mortality associated with airway management, recommends all anesthetic departments endorse an explicit policy for management of difficult or failed airway management (2). In 2013, the Canadian Airway Focus Group (CAFG) published updated recommendations on the management of the difficult airway (3,4). This study examines regional culture of algorithm use for difficult airway management and how effectively the CAFG management recommendations have been disseminated and implemented into clinical practice.

Methods

Institutional research ethics board approval was obtained for the study protocol. This regional survey was conducted between November 2018 to January 2019. Paper questionnaires were distributed to local consultant and resident anesthesiologists to determine individual clinical practice. Electronic questionnaires were distributed to clinical leads for anesthesia departments within an established Health Care Partnership. Clinical leads reported on personal and departmental clinical practice.

Results

The response rate among resident and consultant anesthesiologists was 71% (27/38) and 66% (62/94) respectively. Regarding individual practice, 24 (27%) respondents did not endorse the use of a formal algorithm for management of the unanticipated difficult airway. With regards to dissemination, 55 (62%) respondents were aware of the CAFG recommendations, with 14 anesthesiologists reporting use of CAFG recommendations in clinical practice. The regional clinical leads response rate was 52% (11/20). Departmental endorsement of a specific clinical guideline was reported by 4 respondents, all reporting use of the American Society of Anesthesiologists' guideline. The publication of the CAFG recommendations led to changes in clinical practice in 10% of regional anesthesia departments. However, none of the departmental leads identified the Canadian guidelines as the primary airway algorithm within their department.

Discussion

There is much variation in the use of cognitive aids for the management of the unanticipated difficult airway in regional hospitals. Variation exists within departments and between hospitals. Departmental policies to aid the time-critical management of the unanticipated difficult airway, through locally endorsed cognitive aids, seem to be area for quality improvement. The recommendations for difficult airway management by the CAFG were disseminated to the majority of local anesthesiologists, although application of this guidance into practice is lacking. Future guideline development should include a focus on effective strategies for dissemination and implementation to foster widespread adoption of airway algorithms. This is a particular challenge in Canada, as marked variation in departmental structures exists and geographical limitations impact regular societal meetings. Potential development of airway networks and e-learning technologies may allow collaboration between departments and promote adoption of a national airway guideline such as that seen in the UK.

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636776 - INTRAVENOUS PATIENT CONTROLLED ANALGESIA VS PRN OPIOIDS IN FAST TRACK ORTHOPEDIC PROCEDURES? AN RCT

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INTRODUCTION: Major orthopedic cases such as total knee arthroplasty (TKA) surgery is associated with moderate to severe postoperative pain which can contribute to immobility-related complications and delay in hospital discharge. Effective postoperative pain relief is a prerequisite for successful "fast-track" recovery[1,2]. The standard method of administrating IV opioid for these patients is the use of Patient Controlled Analgesia (PCA) via IVPCA pumps. Side effects of opioid drugs including constipation, nausea, vomiting, dizziness, pruritus, urinary retention, insomnia, sedation, mood irritability[3,4], are a very common reason for patient complaints and contribute to delayed hospital discharge and patient dissatisfaction[5]. The present study aimed to compare the use of IVPCA versus the delivery of pain relief (per oral medications and IV as rescues analgesia) on an as needed basis within a well-defined fast track protocol that includes multimodal analgesia for patients who are undergoing

elective primary knee replacement surgery. The proposed study postulates that patients who are included in the fast track protocol with a multimodal analgesia regimen may not require IVPCA and the use of IVPCA may be associated with an increased consumption of postoperative opioid, opioid related side effects and increase length of stay in the hospital.

METHODS: After REB approval and informed written consent patients who are undergoing elective primary knee replacement surgery were enrolled . Post-operatively, patients were randomized by a computer-generated sequence into IVPCA group (A) and as per needed regime (Non-IVPCA) group (B). We performed a follow up with them for 48 hours after surgery in the hospital. The outcomes were the postoperative opioid consumption within 24 and 48 hours, patient's length of hospital stay, the side effects of opioids using a validated opioid symptom distress scale[6], patient satisfaction and pain scores using a verbal analogue scale (VAS) scoring system. The outcomes were compared based on intention-to-treat principle using Wilcoxon-Rank-Sum test.

RESULTS: 102 patients were recruited, with 76 completing the study. The use of IVPCA was not found to significantly reduce the opioid consumption at 24 hr. However, was significant at 48 hrs (median 16.5 vs. 30; 95% CI in first 24 hours) and (median 32.5 vs. 65; 95% CI in 48 hours post-operatively). There was no significant difference in overall length of hospital stay between the two groups measured in hours (median 49.8 vs. 49.5; 95% CI). There was no difference in patient satisfaction about pain treatment reported (median 5 in both groups; 95% CI) (Table1).

DISCUSSION: Administration of intravenous patient controlled analgesia may be associated with reduced opioid exposure in elective primary knee replacement surgery. However, there was no difference in overall length of hospital stay and patient satisfaction in both IVPCA and Non-IVPCA group.

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2. Annals of Surgery 2008 248: 189-198
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4. Anesth Analg 2018 107: 1384-9
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6. Anesth Analg 2011 113: 369-77

Table 1. Comparison of outcomes

Outcomes	Group A	Group B	p-value	Difference in median (A-B) (95%CI)*
# patients	36	40		
Opioid used in first 24 hours, median (IQ range)	16.5 (5.5, 37.2)	30.0 (15, 50)	0.09	-9.0 (-20.0, 1.0)
Opioid used in second 24 hours, median(IQ range)	16.3 (4, 28.3)	27.5 (10, 50)	0.07	-8.0 (-20.0, 0.0)
Opioid used within 48 hours, median(IQ range)	32.5 (21, 71)	65 (39.8, 82.5)	0.046	-21.5 (-38.0, -0.50)
Duration of Hospital stay	49.8 (45.6, 68.0)	49.5 (44.3, 69.0)	0.63	1.07 (-3.7, 6.4)
Patient satisfaction, median(IQ range)	5 (4, 6)	5 (4.5, 6)	0.55	0.0 (-1, 0)
				Difference in rate (A-B) (95%CI)**
Patient satisfaction (score>4), %(n/N)	63.9 (23/36)	75.0 (30/40)	0.29	-0.11 (-0.32, 0.10)

Notes: Group A=IVPCA group. Group B=Non-IVPCA group The p-values were based on the comparison between two groups using Wilcoxon-Rank-Sum test. *Difference: Hodges-Lehmann estimator. ** Difference in rate: determined using probability linear model.

638261 - OPTIMIZE PERIOPERATIVE EFFICIENCY FOR AMBULATORY LOWER LIMB ORTHOPEDIC PROCEDURES: A COHORT STUDY

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Introduction

Ambulatory surgery has been shown to improve patient satisfaction, maintain perioperative safety while reducing wait time and cost.[1] With regional anesthesia and sedation, patients undergoing ambulatory surgery can have shorter recovery, excellent analgesia and reduced side effects from anesthetic agents and opioids.[2] We implemented an optimized and standardized perioperative process for patients undergoing ambulatory lower limb orthopedic procedures. We conducted a prospective cohort study to determine its impact on perioperative cost and survey for postoperative length of stay, staff and patient satisfaction when compared to the traditional management.

Method

This study is approved by the institution Research Ethics Board. Eligible patients were ASA I to III and scheduled for ambulatory unilateral below-knee procedures including foot osteotomy, toe arthrodesis, foot tendon repair, soft tissue excision and hardware removals. In the Traditional Group (TG), all patients received general anesthetic with optional preoperative blocks. Surgeon-specific instrument trays were used and both

scrub and circulating nurses were available. In the high efficiency Pilot Group (PG), all patients underwent preoperative surgical block, received intraoperative sedation and bypass Phase I recovery. Surgical instrument was standardized, and scrub nurse eliminated.

Results

One hundred and 101 patients were recruited for TG and PG respectively. On average, 6 cases are performed in PG versus 4 in TG during the 7-hour operating day. Perioperative cost including operating room, anesthesia and post-anesthetic recovery was $812 for TG and $336 for PG. Patient in the PG group felt their postoperative length of stay was generally shorter (less than 3 hour, TG: 64%, PG: 82%; more than 3 hour, TG:32%, PG: 14%, p = 0.015). There was no difference between anesthesia, nursing and patient satisfaction between the two groups. Emergency department visits within 14 days of operation was similar between the two groups<./p>

Discussion and Conclusion

Fiscal responsibility in perioperative care has gained wide attention as the government strives to curb the ever-increasing health care budget. While similar high efficiency care models are a common place in the American private care system, it remains rare in the Canadian public health care. Many Canadian institutions are currently utilizing regional anesthesia to allow Phase I recovery bypass. Our implementation went further by standardizing surgical instrument and eliminating one nursing position and was associated with reduced cost and postoperative stay while maintaining patient and staff satisfaction. Many factors may confound our findings: better functioning patient population in PG, and the possible recall bias from the survey. Through optimization and standardization, surgery and recovery can be made more efficient while not jeopardizing safety and satisfaction.

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Cost Breakdown

	Traditional Group	Pilot Group
Cost		
Operating Room Cost	$469	$172
Phase I Recovery	$136	$0
Surgical Prep & Phase II Recovery	$155	$129
Miscellaneous	$29	$18
Anesthetic Drugs	$23	$17
Total Cost	$812	$336

All figure in Canadian Dollar

Cost figure broken down by stages of perioperative care.

638279 - RCT OF MORPHINE VERSUS HYDROMORPHONE FOR SATISFACTORY ANALGESIA WITH MINIMAL EMESIS IN DAY SURGERIES (SAME DAYS)

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Introduction: After ambulatory surgeries, uncontrolled pain and postoperative nausea and vomiting (PONV) continue to affect the recovery, discharge, and overall satisfaction of patients.[1]Although opioids remain the main stay for postoperative pain, they have several side effects. PONV caused by opioids can directly interfere with the provision of adequate analgesia. Both morphine and hydromorphone are potent long-acting analgesics. Because of its potency and pharmacokinetics many believe that hydromorphone has a more favourable side effect profile than morphine.[2, 3] A recent systematic review and meta-analysis reported that that analgesia was better with hydromorphone than morphine for acute pain, demonstrated by a small difference in effect size (Cohen's d = –0.228, *P*=0.012).[3]Our primary objective was to compare morphine with hydromorphone for achieving satisfactory analgesia with minimal emesis (SAME). Secondary objectives were, comparing the incidence of severe itching, significant sedation, and respiratory depression; comparing analgesic doses,

time to discharge and patient satisfaction.[4]

Methods: After ethics approval, we performed a multicentre, two-arm parallel design randomized controlled trial in 402 patients having ambulatory surgeries. Adult patients having elective day surgeries of >1-hour duration with a potential to cause moderate to severe pain were included. Patients were excluded if the surgery would involve a regional or neuraxial analgesia. We randomized patients using a random computer-generated allocation stratified by site and concealment was achieved by allocating patients to study groups by nurses using sequentially coded study medication syringes having equi-analgesic doses, made available in the postoperative recovery room. Patients, health providers and research personnel were blinded. Operating room protocol allowed for routine anesthetic management, excluding study medications. Study medications were administered by recovery nurses as per an algorithm. Analyses utilized the intention-to-treat principle, and regression analyses were used for outcomes as appropriate and using multiple imputation.

Results: Among 402 patients, 199 were randomized to morphine and 203 to hydromorphone. Baseline and intraoperative variables were comparable. The odds of achieving SAME was similar between the groups with an odds ratio of 1.00 (95% CI: 0.56, 1.78). There were no differences in the incidence of severe itching, respiratory depression or sedation. However, the total opioid analgesia used, when considered with an equivalent morphine unit ratio of 5:1, was significantly less in the hydromorphone group: –0.73(95% CI: –1.43, –0.03), perhaps indicating that the intravenous potency of hydromorphone is more than five times that of morphine. There were no other major side effects. Discharge times from the recovery room and hospital, and patient satisfaction scores were also comparable.

Conclusions:There were no differences between morphine and hydromorphone regarding analgesia and common side effects in patients having day surgeries causing moderate to severe pain. Appearance of dose limiting side effects are idiosyncratic and clinical decision must be based on individual patient responses.

References:

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3. *Br J Anaesth*2011; 107: 319–28
4. *BMJ Open*2018; 8: e022504

Table 1

Table 1: Summary of primary and secondary outcomes

Outcome	Hydromorphone	Morphine	Estimate# (95% CI); P
SAME; n (%)	175 (86.63) n= 202	172 (86.43) n=199	1.00 (0.56, 1.78); 0.997
Severe itching; n (%)	5 (2.48) n= 202	2 (1.01) n=199	Not enough events to estimate
Severe sedation; n (%)	8 (3.96) n=202	5 (2.51) n=199	Not enough events to estimate
Respiratory depression; n (%)	10 (4.95) n=202	11 (5.53) n=199	Not enough events to estimate
Opioid analgesia used in PACU as EMU; mean (SD)	4.94 (3.31) n=202	5.69 (3.88) n=199	−0.73 (−1.43, −0.03) 0.040
Discharge time from PACU (minutes); mean (SD)*	92.81 (50.63) n=201	91.21 (58.65) n=198	0.01 (−0.07, 0.09) 0.870
Discharge time from hospital (hours); mean (SD)	3.31 (1.08) n=197	3.22 (1.07) n=199	0.03 (−0.03, 0.09) 0.267
Patient satisfaction score at discharge; mean (SD)	9.29 (1.25) n=177	9.11 (1.77) n=184	0.842@

*# estimate has been calculated using imputed analysis; SAME: satisfactory analgesia with minimal emesis; n: number; CI: confidence interval; EMU: equivalent morphine units; PACU: post anaesthetic care unit; SD: standard deviation; * natural log transformation for regression analysis; @: P value reported based on unadjusted non-parametric Mann–Whitney U test.*

Summary of primary and secondary outcomes

638323 - RISK FACTORS FOR COMPLICATIONS AFTER AMBULATORY ARTHROSCOPIC SHOULDER SURGERY WITH INTERSCALENE BLOCK

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Introduction: Arthroscopic shoulder surgery (ArthSS) is a common procedure that is routinely performed on an ambulatory basis.[1] The anesthetic technique commonly employs interscalene block (ISB) as the sole anesthetic or in combination with general anesthesia to provide effective anesthesia and analgesia, despite temporary ipsilateral phrenic nerve block.[2] Previous studies of risk factors for postoperative complications have been limited to some small series[3] and large administrative database studies with limited clinical data[4]. We conducted this study to better understand clinical risk factors for postoperative emergency room visits and hospital admissions in patients undergoing ambulatory ArthSS.

Methods: With appropriate ethics appovals, this retrospective, nested case control study examined residents within a large health region at least 18 years old who underwent ArthSS between 1 January 2009 and 31 March 2015 at a freestanding surgical clinic. ISB is routinely performed at this site. Within an administrative database repository, patients with complications (death, emergency room visit or hospital admission within 5 days of surgery), the primary outcome, were identified and 4 controls randomly selected for each such case. Then a chart reviewer blinded to outcome extracted patient, surgical and anesthetic related data from patient charts for cases and controls. Logistic regression analysis was used to calculate odds ratios. Crude rates were calculated from a cohort size estimated from the administrative

database study population.

Results: The primary outcome occurred in 61/2600 (2.3%) patients and there were no deaths. 49/61 (80%) of complications presented within 2 days of the day of surgery. Multivariable analysis identified that patients who received a non-steroidal anti-inflammatory medication as part of their management (adjusted odds ratio (OR) 0.53; 95% confidence interval (CI), 0.28 – 0.99) were less likely to present to hospital; while preexisting hypertension (OR 2.60; 95% CI, 1.41 - 4.82), operation done in the lateral decubitus position (OR 2.14; 95% CI, 1.15 - 4.00), or increased use of antiemetics in the recovery room were found to be risk factors for the primary outcome.

Predefined serious adverse events (SAE's) occurred in 24/2600 (0.9%) of patients, including 10 patients with dyspnea and 6 patients with syncope or altered level of consciousness. Increased body mass index (BMI) and lateral decubitus positioning were the most significant univariate predictors of SAE's.

Discussion: This study suggests multimodal analgesia and aggressive antiemetic prophylaxis could reduce postoperative emergency room visits for ambulatory ArthSS patients. Further research is required to better understand how increased body mass index, lateral decubitus positioning and preexisting hypertension increase the risk of postoperative complications in ambulatory ArthSS patients receiving ISB. We postulate that altered respiratory mechanics[2] and increased irrigation fluid pressure and absorption may play roles.

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PEDIATRIC ANESTHESIA

637521 - COMPARATIVE ANALGESIC EFFICACY OF CAUDAL ADJUVANTS: A NETWORK META-ANALYSIS OF RANDOMIZED CONTROLLED TRIALS.

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Background

Caudal epidural block, commonly performed for perioperative analgesia in pediatric patients undergoing infraumbilical surgeries, is limited by the duration of analgesia. Several adjuvant medications including clonidine, dexmedetomidine, dexamethasone, ketamine, magnesium, fentanyl, morphine, tramadol and neostigmine have been studied to extend analgesia, but it is unknown which adjuvant offers the best efficacy. This network meta-analysis synthesizes and ranks the comparative effectiveness of common caudal adjuvants for pediatric infraumbilical surgeries.

Methods

We performed a network meta-analysis (NMA) of indexed randomized controlled trials following PRISMA guidelines for NMA(1) and registered a protocol for this study with PROSPERO (CRD42018108345). IRB approval was not sought as this was a review of existing literature. We searched three major databases (Medline, Embase and Pubmed) for RCTs, comparing a single-shot caudal epidural block using long-acting local anesthetics with or without other caudal adjuvants. Our primary outcome was the duration of analgesia, while total acetaminophen dose (24h) and the number of acetaminophen doses (24h) constituted other efficacy outcomes. We employed a frequentist model for NMA (STATA 14.0), assessed study bias using the Cochrane Collaboration Risk of Bias (RoB version 2) tool (2), and appraised the evidence using

Grading of Recommendations Assessment, Development, and Evaluation system (GRADE) for network meta-analysis.(3–5)

Results

Mixed evidence synthesis from 70 RCTs (n=4258) indicates that neostigmine prolongs the duration of analgesia most compared to control (WMD = 442.40, 95% 275.36 - 609.44 min), followed by dexmedetomidine (WMD = 377.74, 95% 270.00 - 485.49 min). Caudal fentanyl and magnesium were not superior to control, while the latter was the worst ranked as expected. For total dose of acetaminophen (mg) (24h) postoperatively, only dexmedetomidine was superior to control (WMD = -1470.62 mg, 95% CI -2376.86 to -564.37 mg) and therefore ranked the best treatment (23 RCTs, n = 1448). The number of doses of acetaminophen (24h) required was reduced most by dexmedetomidine (ranked best, WMD = -1.31, 95% CI -1.72 to -0.90) (13 RCTs, n = 883). All the outcomes had well-connected networks, good global consistency, and no loop inconsistencies. Table 1 summarizes these results. The overall risk of bias was low among 27 RCTs, some concerns in 45 RCTs and high in 1 RCT. All outcomes have as 'Moderate' level of evidence. The clusterank analysis suggests dexmedetomidine represents the best treatment overall.

Conclusion

Compared with no adjuvant, dexmedetomidine was the only adjuvant to improve all efficacy outcomes. It prolongs the duration of analgesia, reduces the total dose of acetaminophen consumed and the number of doses required within 24h. Furthermore, the cluster rank analysis established dexmedetomidine as an adjuvant with best overall efficacy when the joint outcomes of prolongation of the duration of analgesia and a reduction in the required total dose of acetaminophen (24h), are considered.

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Table 1

Mixed evidence from NMA (Reference treatment – Standard Caudal block without any adjuvant)						
	Duration of Analgesia 70 RCTs (n=4258)		Total acetaminophen dose (mg) (24h) – 13 RCTs (n= 883)		Number of acetaminophen doses (24h) – 23 RCTs (n=1448)	
Agent	WMD (min)	Rank	WMD (mg)	Rank	WMD	Rank
Neostigmine	442.40 (275.36,609.44) *	1 (Best)	-118.48 (-741.81,504.85)	7	-0.54 (-1.21,0.12)	5
Dexmedetomidine	377.74 (270.00,485.49) *	2	-1470.62 (-2376.86, -564.37) *	1 (Best)	-1.31 (-1.72, -0.90) *	1 (Best)
Tramadol	336.83 (184.23,489.44) *	3	-138.77 (-852.16,574.62)	6	-0.89 (-1.43, -0.35) *	4
Clonidine	331.91 (233.53,430.29) *	4	-144.38 (-1364.64,1075.88)	5	-0.93 (-1.31, -0.55) *	3
Ketamine	311.05 (193.02,429.08) *	5	-184.41 (-1023.06,654.23)	4	-1.20 (-1.83, -0.57) *	2
Dexamethasone	281.50 (105.77,457.23) *	6	-103.02 (-935.76,729.71)	8	-0.33 (-0.74, 0.09)	7
Morphine	247.47 (69.66,425.27) *	7	-1067.92 (-3005.54,869.70)	2	N/A	-
Magnesium	155.84 (-53.32,364.99)	8	N/A	-	-0.47 (-1.38, 0.44)	6
Fentanyl	78.09 (-75.17,231.35)	9	-864.85 (-3132.73,1403.02)	3	N/A	-
Control	N/A	10 (Worst)	N/A	9 (Worst)	N/A	8 (Worst)

Abbreviation: NMA – Network meta-analysis; RCTs – Randomized controlled trials; h – hours; WMD – Weighted mean difference; N/A – not applicable; * - significantly superior to control; min – minutes; mg – milligram.

Summary of mixed evidence from network meta-analysis.

637582 - TRANSNASAL HUMIDIFIED RAPID-INSUFFLATION VENTILATORY EXCHANGE IMPROVES OXYGENATION IN PEDIATRIC BRONCHOSCOPY

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Introduction

Pediatric patients undergoing microdirect laryngoscopy and bronchoscopy (MDLB) pose anesthetic challenges of maintaining adequate oxygenation and ventilation while providing motionless surgical fields without tracheal tubes.[1] Given this challenge, we conducted a prospective, randomized controlled trial to evaluate high flow nasal cannula (HFNC) as transnasal humidified rapid-insufflation ventilatory exchange (THRIVE) in pediatric patients undergoing MDLBs.

Methods

After IRB approval, patients were randomized to control or THRIVE. Controls received 100% oxygen via the side port of a Parson's laryngoscope to insufflate the oropharynx at 6-10 L/min, titrated by the anesthesiologist. THRIVE received 100% oxygen via HFNC at 2L/kg/min using an Optiflow machine. Inclusion criteria were patients from birth to 18 years. Exclusion criteria included papillomatosis, tracheostomy, or unrepaired heart disease.

The primary aim was surgical interruptions. A priori power calculation based on 15 pilot surgeries demonstrated the frequency of interruptions in the control to be 0.93 and 0.33 in THRIVE. Assuming a Poisson regression, 80% power, and 95% confidence interval, 27 patients in each group (54 total) were needed to demonstrate a significant difference. To account for incomplete data and dropouts, an additional 20 patients (74 total) were targeted for consent. The secondary aims were to compare oxygen desaturation index (ODI), desaturations below 90%, transcutaneous carbon dioxide (tCO_2), and adverse events.

Demographics and postoperative diagnoses were collected. Interruptions were defined as the need to pause surgery to provide airway support, such as mask ventilation or intubation. Pulse oximetry was recorded by second in the electronic medical record. ODI was defined as a 4% decrease in saturation from a 120 second rolling mean for greater than 10 seconds.[2] TCO_2 was recorded at procedure start and end. Adverse events (nausea, vomiting, sinus pain, throat pain, epistaxis) were recorded prior to discharge.

Outcomes were calculated using negative binomial regression with case duration as an offset in the unadjusted and adjusted models, with the exception of tCO_2. Models were adjusted for postoperative diagnoses.

Results

210 patients were screened and 67 (control = 36, THRIVE = 31) were included in the final analyses. There were no demographic group differences. P values are reported as (unadjusted value,adjusted value), respectively (Table 1). There were no significant differences in surgical interruptions, tCO_2, or adverse events. There were significant differences in ODI between groups (p=0.003,0.005) and number of oxygen desaturations below 90% in the unadjusted model (p=0.039,0.082).

Discussion

This is the first prospective study examining THRIVE's effectiveness during pediatric MDLBs. There were no significant differences in surgical interruptions, but there were significant differences in ODI and oxygen desaturations when not adjusting for postsurgical diagnoses. Although THRIVE has been reported to potentially contribute to ventilation, these results do not support a difference.

References

1. Curr Anaesth Crit Care 2001; 12:213–7
2. Anesth Anal 2012; 114:993-1000.

Table 1

			THRIVE vs. control	
			β	p-value
Primary outcome	**Number of Interruptions**	Unadjusted	-0.70	0.13
		Adjusted for post-surgical diagnosis	-0.41	0.37
Secondary outcomes	**ODI**	Unadjusted	-1.78	**0.003**
		Adjusted for post-surgical diagnosis	-1.74	**0.005**
	Desaturations below 90%	Unadjusted	-1.25	**0.039**
		Adjusted for post-surgical diagnosis	-1.08	0.082
	Adverse Events	Unadjusted	-0.23	0.72
		Adjusted for post-surgical diagnosis	-0.33	0.64
	Final CO2*	Unadjusted	-1.93	0.55
		Adjusted for post-surgical diagnosis	-1.04	0.75

* = linear regression result, with case duration included as a covariate in both unadjusted and adjusted models

Outcomes

637588 - MEASUREMENT OF GASTRIC RESIDUAL VOLUME BY ULTRASOUND IN CHILDREN AFTER FASTING AND 2 HOURS AFTER DRINKING FRUIT JUICE

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Introduction: Gastric ultrasound has shown good reliability and validity for non-invasive bedside assessment of the nature and volume of gastric contents [1]. To quantify the difference in gastric antral diameter and residual gastric volume in children in fasting state as well as 2 hours after intake of oral carbohydrate rich fluid ingestion, using bedside ultrasound.

Material and Methods: After institute ethics committee approval and written informed consent from parents, 50 children were enrolled in study and study protocol could be completed in 42 of them. Age group of children was 2-12 years. Measurement of gastric antrum diameter was done by ultrasonography, in fasting state and after 2 hours of pulp free fruit juice ingestion. Antero-posterior and cranio-caudal diameters of gastric antrum were measured. Cross sectional area of gastric antrum and gastric residual volume were calculated by a validated mathematical model [2].

Paired sample T test was used to compare the mean between fasting and post fluid ingestion observations. P value of <0.05 was considered as statistically significant.

Results: Mean diameter and cross sectional area of antrum were compared between fasting and post fruit juice ingestion. There was significant decline in mean gastric residual volume 2 hours post juice ingestion as compared to fasting state (10.10 ±7.3 ml vs. 12.14 ±7.38 ml, p value = 0.015). There was moderate correlation between fasting and 2 hours post juice ingestion gastric residual volumes. (r = 0.746).

Discussion: Gastric residual volume decreased in children 2 hours after carbohydrate rich fluid ingestion in comparison with that of fasting state. Children with normal gastric emptying could be given carbohydrate rich fluids up to 2 hours before elective surgery. Studies with large sample size are needed to make recommendations on this issue

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CRITICAL CARE

630790 - MODIFIABLE RISK FACTORS OF PROLONGED DEPENDENCE ON VASOPRESSORS AFTER CARDIAC SURGERY: RETROSPECTIVE COHORT STUDY

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Introduction

Cardiac surgery performed with cardiopulmonary bypass (CPB) is frequently complicated by hemodynamic [1] instability due either to an inflammatory response [2] or to cardiac dysfunction during or immediately after the weaning from CPB [3]. There are limited studies on the incidence and the risk factors of prolonged vasopressor dependence following cardiac surgery [4]. The objective of the study was to identify risk factors related to prolonged dependence on vasopressors after weaning from bypass.

Methods

Approval has been obtained by our Research Ethics Committee. In this single-center retrospective cohort study, we analyzed data from consecutive adult patients who underwent cardiac surgery with CPB enrolled in two prospective studies between November 2016 and July 2017 in a specialized cardiac surgery center. The study excluded all cardiac surgery without CPB, heart transplantation and ventricular assist devices. Postoperative prolonged vasopressor dependence was defined as the need for at least one vasopressor agent from the end of CPB for a duration greater than 24 hours. Vasopressor agents included norepinephrine, vasopressin, epinephrine, dopamine and phenylephrine. A follow-up was conducted for all patients until the end of intensive care unit (ICU) day 1. A multivariable logistic regression model using a forward stepwise selection approach was developed to identify independent predictors of vasopressor dependency.

Results

A total of 247 out of 263 patients underwent cardiac surgery with CPB between November 2015 and July 2017 using our exclusion criteria. The mean age of the study patients was 65 ± 12 years old and 126 (51%) were female (Table 1). The incidence of prolonged vasopressor dependence was 40% and was associated with more prolonged mechanical ventilation (5h (IQR4-9) vs. 4h (IQR3-5); p<0.001), prolonged ICU stay (3 days (IQR1-2) vs. 1 day (IQR1-2); p<0.001) as well as hospital stay (7 days (IQR6-10) vs. 5 days (IQR4-7); p<0.001). In multivariable analysis, pre-existing reduced left ventricular ejection fraction (LVEF<30%) (OR: 9.52, 95%CI:1.14-79.24; p=0.03), preoperative pulmonary hypertension (PH) (moderate PH (sPAP≥30 but <55mmHg) OR:2.5, 95%CI:1.14-5.52, severe PH (sPAP>55mmHg) OR:8.12, 95%CI:2.53-26.02; p=0.001) and first 24h cumulative fluid balance (OR:1.78, 95%CI:1.41-2.24; p<0.0001) were independently associated with the development of prolonged vasopressors dependence: with a good ability to predict vasoplegia after cardiac surgery based on ROC analysis (AUC=0.80, 95%CI: 0.73-0.86; p<0.0001).

Conclusion

Vasopressor dependency remains a frequent complication after CPB surgery. Its associations with PH and large fluid balance is unreported and potentially reversible. Prospective studies and clinical trials should explore the role of these two factors in future studies.

References:

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2. J Card Surg 2000;15:347-353.

3. Curr Opin Anaesthesiol 2013;26:71-81.

4. Anaesthesia 2006;61:938-942.

Table 1. Characteristics of included patients

Characteristics	Absence of prolonged vasopressor dependence (N=149)	Prolonged vasopressors dependence (N=98)	*p*-Value
Male gender, n (%)	76 (51%)	45 (46%)	0.43
Age ± SD, years	64 ± 12	67 ± 12	0.01
EuroSCORE II, % (IQR)	2 (1-3)	3 (2-6)	<0.001
BMI, kg/m²	29 ± 5	28 ± 5	0.08
Co-morbidities			
Hypertension, n (%)	117 (79%)	76 (78%)	0.85
Diabetes, n (%)	48 (32%)	33 (34%)	0.81
Previous cardiothoracic surgery, n (%)	14 (9%)	16 (16%)	0.10
Previous myocadiac infarction, n (%)	24 (16%)	19 (19%)	0.50
LV dilation, n (%)	19 (13%)	26 (27%)	0.004
Low LVEF ≤30%, n (%)	1 (1%)	13 (13%)	<0.001
Preoperative PH			
Moderate PH (30mmHg < sPAP <55mmHg)	60 (51%)	52 (62%)	
Severe PH*(sPAP> 55mmHg)	7 (6%)	19 (23%)	<0.001*

Abbreviations: IRQ, interquartile range; BMI, body mass index; LV, left ventricular; LVEF, left ventricular ejection fraction; PH, pulmonary hypertension; sPAP, systolic pulmonary arterial pressure.

634448 - INTRAOPERATIVE LUNG PROTECTIVE VENTILATION IN PERITONITIS PATIENTS UNDERGOING EMERGENCY LAPAROTOMY

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Introduction:

Lung protective ventilation improves survival and is recommended in ARDS. It's role in elective major abdominal surgery is controversial[1]. Peritonitis and abdominal sepsis patients undergo emergency laparotomy and often develop ARDS[2]. Whether use of lung protective ventilation in comparison to conventional ventilation strategy during emergency laparotomy in peritonitis patients affects mortality and other morbidity were investigated in this randomized controlled trial (RCT).

Methodology:

After institutional ethics committee approval and informed written consent, 100 adult patients undergoing emergency laparotomy for peritonitis were randomized in to two groups after induction of general anesthesia. In group 1: Tidal volume (Vt) 6-8ml/kg,

PEEP 6-8cmH2O and recruitment maneuver every 30min and in group 2 Vt 10-12ml/kg, no PEEP and no recruitment were used. All the patients were followed up till death/discharge. Post-operative data collection was performed by a resident doctor who was blinded to the intra-operative group allocation.

Results:

One hundred patients were recruited in this and all of them received allocated treatment. However, three patients left hospital against medical advices & three patients were transferred to another medical facility as per their wishes. So, data from n=94 patients (n=45 patients in group 1 & n=49 patients in group 2) were analyzed.

Baseline demographic & laboratory parameters were comparable in two groups. During hospital stay 26.7% patients died in group 1 versus 26.5% patients in group 2 (risk difference 0.14%, 95% CI -17.7- 18.0; p=0.98, Chi- square test). A Kaplan Mayer survival analysis also confirmed risk of death during hospital stay was similar in two groups (p=0.79, log-rank test). Duration of hospital stays [median (IQR) 13(9- 18) days in group 1 versus 13(8- 21) days in group 2; p=0.82] & duration of ICU stay [median (IQR) 7(4- 10) days versus 6(3- 12) days; p=0.88] were also similar in both groups. Postoperative pulmonary complications (POPC) during hospital stay were also similar [median (95% CI) of POPC grade in group 1 was 2(1-4) versus 3(1-4) in group 2; p=0.45].

Discussion:

Intraoperative lung protective ventilation strategy failed to provide any benefit in terms of mortality, length of ICU stay and hospital stay and incidence of post-operative pulmonary complications.

Intraoperative lung protective ventilation does not have any role in peritonitis patients undergoing emergency laparotomy.

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1.

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637598 - QUALITY OF LIFE DURING SIX MONTHS FOLLOW-UP AFTER ICU STAY FOR CRITICAL ILLNESS

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Introduction:

Survival rates have improved after critical illness now a days and this requires alternate measures to evaluate outcome [1]. Present study examines health related quality of life and factors assumed to be important for quality of life for former ICU patients. We aimed to quantify health related quality of life during six months follow up after ICU discharge and to estimate changes in physical, social, emotional and psychological status during six months after ICU discharge.

Methods:

After institutional ethics committee approval and written informed consent from patient or next of kin, this prospective observational study was conducted. Adult patients who got discharged from a medical-surgical ICU after receiving > 7 days of critical care were included. Patients were followed up at 1 month and 6 months after discharge. Questionnaire based Short Form Health Survey (SF-36) was utilized for assessment.

Results:

Survivors had lower Physical as well as Mental Component Summary Scale as compared to Pre ICU admission values. Quality of life of most survivors showed an improvement at six months post discharge in comparison to that at 1month post

discharge but was still poor than that before admission. Strong correlation was found between age and severity of illness (based on APACHE II and SOFA scores) with quality of life 6 months post discharge. Number of days on mechanical ventilation affected both physical and mental health scores, whereas length of ICU stay affected only Physical functioning.

Discussion:

Measuring health related quality of life in essence, is evaluating the health status of individuals, both mental and physical together with their own sense of wellbeing [2]. Quality of life in survivors in our study was substantially reduced in respect to all health related parameters as compared to their preadmission status and affected them physically, mentally, socially and emotionally.

References:

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637748 - 6 POINT LUNG USG AS SCREENING TOOL TO DIAGNOSE RESPIRATORY PATHOLOGY IN ICU PATIENTS AT ADMISSION

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Introduction:

The commonest imaging modality for lungs in intensive care units (ICU) is bedside chest x-ray (CXR) as it is inexpensive and readily available, but has several limitations namely; changes in lung parenchymal density due to suboptimal exposure and rotation leading to incorrect interpretation of lung disease, exposure without adequate inspiration leading to obscuration of lung bases, day today variation in film exposure leading to difficulty in comparing serial CXR[1,2]. We evaluated the diagnostic performance of bed side 6-point lung ultrasonography (LUS) as screening tool, performed by ICU physician[3,4,5]

- 4 common pathological conditions of lung; alveolar consolidation, pleural effusion, interstitial syndrome and pneumothorax, were detected in ICU patients by LUS
- We compared these findings with bedside chest X-ray (CXR) and high resolution CT scan thorax.

Methods

- Observational, pilot study of adult patients
- Informed consent and ethical approval taken from all patients or next of kin
- Inclusion criteria: All patients admitted to our Medical Surgical ICU with acute lung injury score of ≥1.
- Exclusion criteria:Inability to transfer to CT room because of hemodynamic or respiratory instability
- Imaging protocol: Bedside imaging by CXR & 6-point LUS as per BLUE protocol using convex probe, followed by transfer to radiology department for CT thorax.

Results

- Enrolled (n=106)
- Could not be transferred to CT room(n=16)
- Imaging protocol completed (n=90)
- Final analysis of 180 hemithorax
- CXR was unable to differentiate between consolidation and pleural effusion in 18 hemithorax
- Sensitivity and diagnostic accuracy of LUS >> CXR
- Specificity of LUS was 100% for all pathologies except Interstitial syndrome

Discussion

- Our results demonstrate that LUS imaging protocol used in this study, yielded greater sensitivity and diagnostic accuracy than CXR, as well as had >85% accuracy as compared to CT thorax, in detecting common lung pathologies

- 6 points LUS can be a useful diagnostic tool, better than CXR in diagnosing respiratorypathologies in critically ill patients.

May help to minimizethe requirement of CT thorax, thereby reducing the need for potentiallyrisky transfer of ICU patients toradiology department.

References:

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Diagnostic performance of LUS in comparison to CXR and CT scan thorax for various lung pathologies for each hemi-thorax

Pathology		No. of hemithorax	No. of hemithorax	Sensitivity (%)	Specificity (%)	Diagnostic Accuracy (%)
		CT+	CT-			
Consolidation	CXR+	53	28	49.1	61.1	53.9
	CXR-	55	44			
	USG+	82	0	75.9	100	85.6
	USG-	26	72			
Pleural Effusion	CXR+	62	12	48.1	76.5	56.1
	CXR-	67	39			
	USG+	113	0	87.6	100	91.1
	USG-	16	51			
Interstitial Syndrome	CXR+	21	7	25.0	92.7	61.1
	CXR-	63	89			
	USG+	70	11	83.3	88.5	86.1
	USG-	14	85			
Pnuemothorax	CXR+	0	0	0	100	95.0
	CXR-	9	171			
	USG+	8	0	88.9	100	99.4
	USG-	1	171			

CT+: detected by CT scan thorax, CT-: not present on CT scan thorax, CXR+: detected by chest x-ray, CXR-: not seen on chest x-ray, LUS+: detected by lung ultrasound, LUS-: not detected by lung ultrasound

637987 - IRON RESTRICTION A NOVEL ADJUVANT TREATMENT FOR SEPSIS

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Introduction

Sepsis is characterized by a dysregulated host immune response to infection (1) and associated with an excessive release of reactive oxygen species (ROS). Various immune cells produce ROS through iron-catalyzed reactions in order to eliminate bacteria, but ROS overproduction can also damage host cells (2). The aim of this project was to study the efficacy of DIBI, a novel highly specific iron chelator, to attenuate ROS-related inflammation.

Methods

Institutional Animal Care Committee approval was obtained. Toxins from Gram-positive (Staphylococcus aureus: lipoteichoic acid – LTA, peptidoglycan – PGN) and Gram-negative bacteria (Escherichia coli: lipopolysaccharide – LPS) were injected i.v. in anesthetized animals (8 weeks old male C57bl/6 mice). Control animals received normal saline. Two hours after the administration of toxins or saline, intravital microscopy (IVM) of the intestinal microcirculation was performed. The IVM parameters evaluated were leukocyte adhesion in intestinal submucosal venules and functional capillary density (FCD) of the muscle and mucosa layer. Plasma samples were collected to measure inflammatory markers.

Results

The Gram-positive and Gram-negative toxins induced an inflammatory host response characterized by a prominent rise in intestinal leukocyte adhesion and a significant FCD decrease. DIBI was able, for each toxin, to significantly reduce the increase of leukocyte adhesion in venules and improve capillary perfusion. Moreover, DIBI reduced the plasma levels of inflammatory markers.

Discussion

Iron chelation by DIBI showed anti-inflammatory effects in experimental toxin models of sepsis. Since bacterial growth is iron-dependent too, additional experiments are on the way studying anti-bacterial effects of iron deprivation in vivo (3). Our preliminary results strongly suggest iron restriction as a potential novel adjuvant treatment for sepsis.

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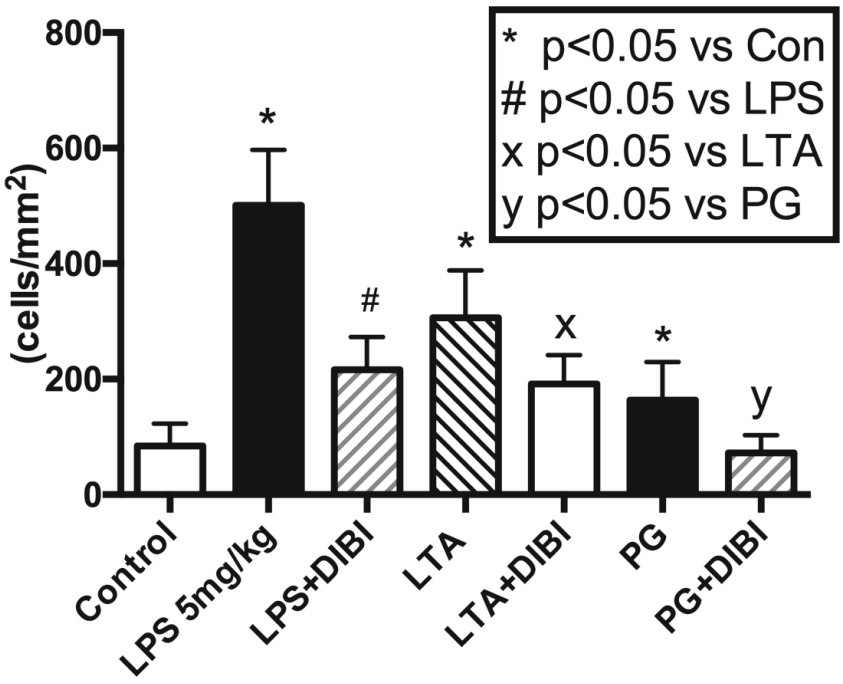
2 - Microcirculation 2011;18:152-62
3 - Medical Hypotheses 2016;89:37–39.

Leukocyte Adhesion



Leukocyte adhesion in intestinal submucosal collecting venules. LPS - lipopolysaccharide, LTA - lipoteichoic acid, PG - peptidoglycan. n=5/group

638230 - THE IMPACT OF FRAILTY ON OUTCOMES IN ADULT TRAUMA PATIENTS: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Introduction: Many geriatric trauma patients have frailty, a multidimensional syndrome relate to accumulation of age-and disease-related deficits, which contributes to poor outcomes. Frailty tools have been systematically reviewed in trauma, however the association of frailty with outcomes after a traumatic injury has not been synthesized. The objective of our stufy was to measure the association between frailty and outcomes after multisystem trauma.

Methods: A systematic search was developed and underwent the PRESS checklist. The search was applied to MEDLINE, EMBASE and CINAHL from inception to May 2018. Epubs ahead of print, in-process and other non-indexed citations were included. Keywords for frailty were combined with trauma specific keywords. No language limitations were applied. Studies where the majority of patients were not trauma admissions or had isolated fragility fractures, isolated burns or isolated head trauma were excluded. A protocol was registered. The primary outcome was mortality. Studies included in the primary analysis had to adjust for injury severity and mechanism of injury to decrease risk of confounding bias. Secondary outcomes included health, resource use, and patient experience outcomes.

Results: We identified 1181 titles; 56 underwent full text review; 14 were included for final analysis. Included studies represented 3704 total participants (range from 63-879). Ten included studies were prospective and 4 were retrospective. Studies used 8 different frailty instruments, including muscle cross-sectional area (n=2), Vulnerable Elders Survey (n=2), comorbidity-polypharmacy score (n=1), Clinical Frailty Scale (n=1), psoas: lumbar vertebral index (n=1), upper-extremity function (n=1), Frailty Index (n=3), and Trauma-Specific Frailty Index (n =3). Of 772 people without frailty, 37 died (5%). Of 1189 people with frailty, 145 died (12%). On an unadjusted basis, frailty was associated with mortality (odds ratio 2.76, 95%CI 1.90-4.01, P<0.01). Full results of the meta- analysis will be presented at the conference.

Discussion: A growing literature describes the association between frailty and outcomes in adult trauma patients. Findings of our study hope to inform prognostication for patients, families and clinicians and identify important knowledge gaps for future studies.

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636823 - FIRST CANADIAN FACIAL TRANSPLANTATION: A CASE REPORT OF THE ANESTHETIC MANAGEMENT

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Background

Globally, facial transplantation has been performed by only a few teams (1). This complex procedure presents many surgical and anesthetic challenges (1,2,3). Here, we report on the anesthetic management of the first Canadian face transplant.

Case presentation

Extensive preparation and coordination were key to the success of this procedure. The face harvest and transplantation were performed simultaneously in one operating theatre. Each patient had a primary and secondary anesthesiologist at all times. It was understood by all that the viability of the solid organs took precedence over the face.

The recipient, who consented to this report's publication, was a 64-year-old man who suffered ballistic trauma to the lower two thirds of the face. His surgery started four hours before the donor's face was harvested in order to minimize the time of graft ischemia (4). Major blood losses and hemodynamic instability were anticipated (3,5). Thus, two arterial lines — a cardiac output monitor (NICOM cheetah Medical) and femoral central access — were installed. As the patient had a background of chronic pain, a pain monitor (NOL Medasense) was utilized. The airway was managed with an armored endotracheal tube in the existing tracheostomy. Anesthesia was maintained with sevoflurane, remifentanil, and ketamine infusions. The surgery lasted 36 hours and total blood loss was 2000 ml. Antibiotics and immunosuppressants were meticulously administered to prevent graft rejection and infection (1). The patient was extubated on postoperative day 12 and was discharged from the hospital on day 60. Acute pain management was the cause for the prolonged intubation and hospital stay.

The donor was a 48-year-old man who was declared brain dead after a cerebral hemorrhage. The organs selected for transplant were face, heart, kidneys, and liver. He developed anemia, thrombocytopenia, and insipidus diabetes, which were corrected prior to harvesting. In preparation for the facial harvest, a tracheotomy and jaw fixation were performed the day prior to the transplant. Femoral venous and arterial access with cardiac output monitoring (FloTrac, Edwards medical) were utilized as most of the neck was part of the graft. The face was harvested first, followed by the liver, kidneys, and heart. Major blood losses were anticipated during the facial osteotomies and the hepatectomy. Dissection of the facial nerves prevented the patient from being paralyzed, while remifentanil and sevoflurane were used to prevent spinal reflexes. The facial harvest lasted 14 hours and the other organs were successfully harvested afterwards. The total blood loss was 1400 mL. A silicone mask was created with the donor's facial impression and sutured to his face to preserve dignity.

Conclusion

This case report illustrates the anesthetic challenges that were encountered during the first Canadian facial transplantation and credits its success to the coordinated efforts of the entire team.

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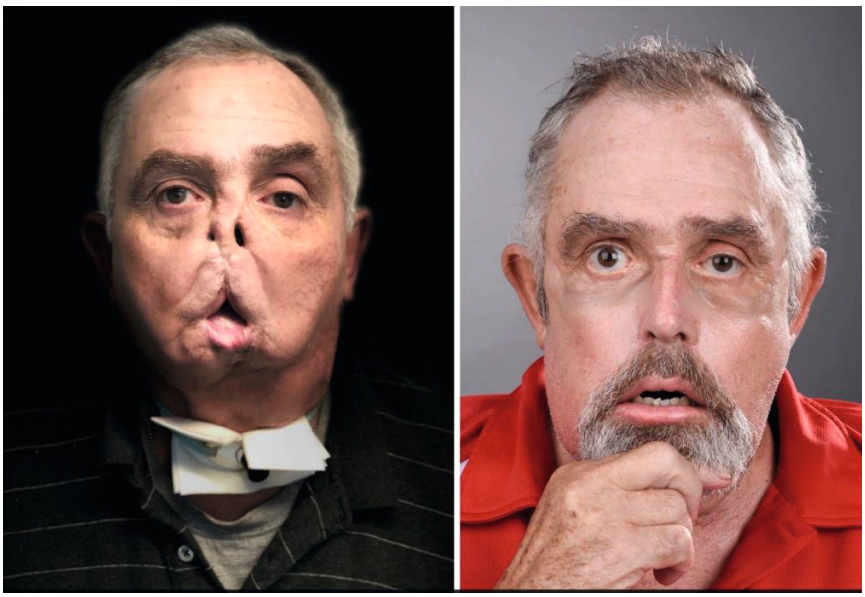

CARDIOVASCULAR AND THORACIC

636475 - THE EFFECT OF KETAMINE ON PAIN CONTROL POST-CORONARY ARTERY BYPASS SURGERY

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Introduction:

Pain control following coronary artery bypass surgery (CABG) is an essential element to hasten patient recovery. Multimodal analgesia options are often limited, leaving opioids as the main analgesic option. Ketamine is an N-Methyl-D-Aspartate receptor (NMDA) receptor antagonist that has been shown to improve postoperative analgesia in other types of surgery. The primary objective of this study was to quantify the effect of ketamine on the postoperative opioid requirement in the first 48 hours after coronary artery bypass surgery. The hypothesis was that Ketamine would reduce opioid consumption by at least 25%.

Methods:

This was a prospective, randomized, double-blind placebo-controlled trial. Ethics approval was obtained from the local ethics review board. Inclusion criteria were patients undergoing CABG surgery at our institution. Patients were randomized to receive either Ketamine 0.5 mg/kg as a bolus prior to skin incision, followed by 0.5 mg/kg/hr until the end of surgery, or a normal saline placebo at the same rate for a given weight. Postoperative pain and opioid requirements were tracked for 48 hours after surgery, along with other relevant variables. Patients were also contacted at three months and six months postoperatively to determine whether any persistent pain was present at the operative site.

Results:

A total of 80 patients were randomized. Descriptive statistics of each group can be found in Table 1. The primary outcome of total Dilaudid consumption over the first 48 hours postoperatively was 9.78mg (8.58-10.99mg) in the intervention group, and 10.23mg (8.81-11.65mg) in the placebo group. Visual analog scale of maximum pain on postoperative day one was 5 (1-9) in the intervention group and 5 (1-9) in the placebo group, and on day two was 1 (0-3) in the intervention group and 1 (0-3) in the placebo group. Visual analog scale of average pain on postoperative day one was 3 (0-6) in the intervention group and 2 (0-6) in the placebo group, and on day two was 2 (0-4) in the intervention group and 2 (0-5) in the placebo group.

Discussion/Conclusion:

The intraoperative administration of Ketamine, with a bolus of 0.5mg/kg and an infusion of 0.5mg/kg/hr, during coronary artery bypass surgery did not result in a decrease in postoperative opioid use, or reported pain levels over the first 48 hours postoperatively.

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3. Duale, C., et al., *Perioperative ketamine does not prevent chronic pain after thoracotomy.*Eur J Pain, 2009. 13(5): p. 497-505.
4. Nesher, N., et al., *Ketamine spares morphine consumption after transthoracic lung and heart surgery without adverse hemodynamic effects.*Pharmacol Res, 2008. 58(1): p. 38-44.

Table 1: Baseline Data

Table 1: Baseline Data

Variable	Placebo	Ketamine
Number	38	42
Age	67	66
BMI	28	29
CPB	108	105
X-Clamp	83	83
Sufentanil Dose	156	187

Analysis of demographics, bypass procedure, and intraoperative sufentanil dose between groups

637438 - IMPACT OF INVASIVE VERSUS CONSERVATIVE TREATMENT STRATEGIES ON LEFT VENTRICULAR FUNCTIONAL RECOVERY

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Introduction: Coronary artery disease (CAD) is the most common cause of death globally. The prevalence of CAD with reduced left ventricular ejection fraction (LVEF) is rising, but the optimal treatment remains unclear, as this patient group has routinely been excluded from randomized clinical trials (RCTs). The present study aims to investigate the impact of invasive (i.e., coronary artery bypass grafting; CABG) versus conservative treatment strategies (i.e., percutaneous coronary intervention (PCI), or medical therapy (MT) alone) on LVEF recovery in patients with CAD and LVEF ≤ 40%.

Methods: A systematic literature search up to May 31, 2017 was performed on

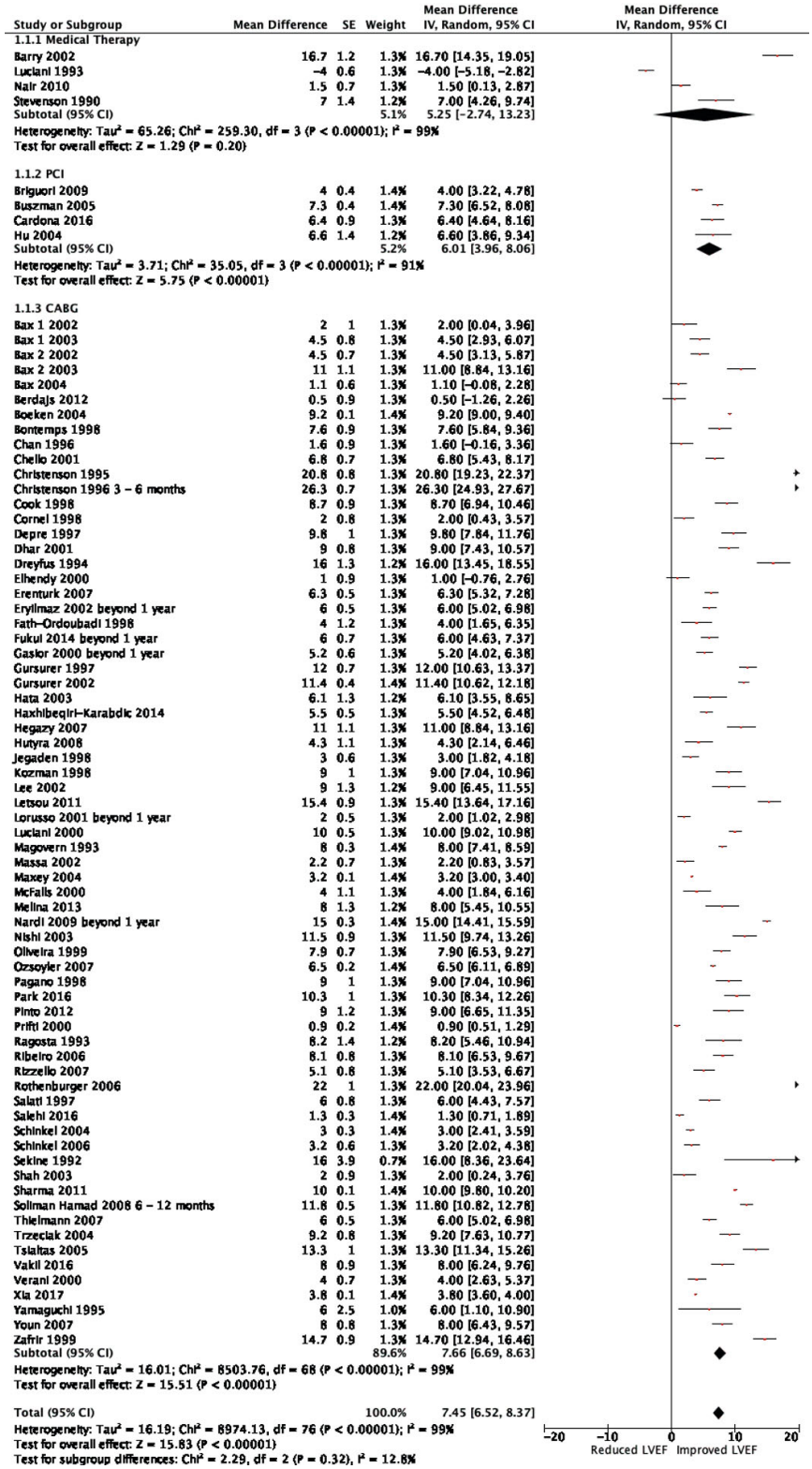
MEDLINE, EMBASE and the Cochrane Library in Ovid (PROSPERO: CRD42017069849). The search identified a total of 6,192 studies for review. Title and abstract screening removed 5,552 articles for failing to meet inclusion criteria, leaving 640 studies for full text screening. Detailed review of these articles lead to the exclusion of 563 papers, leaving 77 studies for final analysis. We performed random effect meta-analysis on available studies of patients undergoing CABG, PCI or MT. The primary outcome was the mean difference (MD) in LVEF before and after the intervention. Risk of bias assessment was performed using the Newcastle-Ottawa Scale for cohort studies.

Results: Seventy-seven observational studies (CABG = 69; PCI = 4; MT = 4) including 20 single-armed cohort studies (1,855 patients) and 57 case series (4,832 patients) were included (Figure 1). In the meta-analysis, there was a statistically significant increase in LVEF following CABG that was greater than that found with either MT or PCI (MD 7.66; 95% CI: 6.69 – 8.63; p less than 0.00001; I^2=99%). There was no significant improvement in LVEF following medical therapy (MD 5.25; 95% CI: -2.74 – 13.23; p = 0.20; I^2=99%), but an increase in LVEF was seen following PCI (MD 6.01; 95% CI: 3.96 – 8.06; p less than 0.00001; I^2=91%).

Discussion: Among common treatment strategies for patients with CAD and reduced left ventricular systolic function, CABG was associated with the greatest improvement in LVEF compared to PCI and MT. Improvement in LVEF may be associated with a reduction in fatal arrhythmias and improved quality of life, future prospective studies are needed to address this important clinical outcome.

References:
N/A

Figure 1



Forest plot illustrating the results of the meta-analysis with respect to LVEF recovery following CABG, PCI, and MT.

637446 - THE EFFECT OF INTRAOPERATIVE BENZODIAZEPINES ON DELIRIUM IN FRAIL PATIENTS AFTER CARDIAC SURGERY

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Introduction: Delirium has been shown to occur in approximately 26% of patients after cardiac surgery[1]. It has been associated with an increased morbidity and mortality, increased hospital length of stay, and long-term cognitive dysfunction [2]. Both preoperative and postoperative benzodiazepine administration in elderly patients are widely cited as modifiable risk factors for delirium[1, 3-5]. To our knowledge, there is no evidence indicating whether the intraoperative administration of benzodiazepines affects postoperative delirium outcomes. The hypothesis was that, in the context of frailty, an increase dose benzodiazepines administered intraoperatively would be associated with postoperative delirium.

Methods: The project was approved by the local institutional review board. Five hundred eighty-two patients who underwent cardiac surgery at a university center between July 2012 and May 2018 were selected from the local cardiac surgery frailty database. Intraoperative benzodiazepine doses were determined via retrospective chart review. Multivariate logistic regression was performed to determine whether an increased intraoperative benzodiazepine dose had any effect on incidence of delirium. A patient was considered to have received an increased dose of benzodiazepine if they received more than 5mg in the OR. Patients were considered to be frail if they had a Short Physical Performance Battery (SPPB) score less than or equal to five. Known risk factors for delirium were included in the model, including age, sex, body mass index (BMI), the presence of cardiovascular disease, diabetes, preoperative cognitive dysfunction which was defined as a Mini Mental Status Exam score less than 24, procedure type, and cardiopulmonary bypass (CPB) time[6]. Patients were considered to have received an increase dose of benzodiazepines if the total dose received in the operating room was greater than 5mg. Patients were considered to have had delirium if they had a positive confusion assessment method for the ICU

(CAM-ICU) score over the first 4 days post-operatively.

Results: Odds ratios with their corresponding 95% confidence intervals are listed in Table 1. Of the co-variates entered in the model, age, sex, BMI, and CPB time were statistically significant predictors of delirium in patients with an SPPB score greater than 5. In patients with an SPPB score greater than five, an increased dose of benzodiazepine administered in the operating room was not associated with having a positive CAM-ICU score postoperatively. In patients with an SPPB less than or equal to 5, having a positive CAM-ICU score postoperatively was associated with and odds ratio of 1.23 (1.03 – 1.47) of having received an increase dose of benzodiazepines intraoperatively, and was the only statistically significant variable.

Discussion: Increased doses of benzodiazepines administered intraoperatively are associated with an increased prevalence of delirium after cardiac surgery in frail patients.

References:

References:

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Table 1. Odds Ratio

Table 1:		
Variable	**Odds Ratio SPPB ≤ 5**	**Odds Ratio SPPB > 5**
Age	1.01 (0.94-1.09)	1.04 (1.01-1.07)
Female Sex	0.62 (0.19-2.03)	2.67 (1.42-5.06)
BMI (kg/m^2)	0.97 (0.87-1.08)	1.06 (1.01-1.12)
Cardiovascular Disease	1.40 (0.28 – 7.07)	1.63 (0.67-3.2)
Diabetes Mellitus	1.80 (0.55-5.92)	0.95 (0.52-1.74)
Mini Mental Exam Score < 24	3.44 (0.68-17.27)	0.66 (0.17-2.55)
Cardiopulmonary Bypass Time (mins)	1.01 (1.00-1.02)	1.01 (1.01-1.02)
Valve-Only vs CABG-only	2.85 (0.59-13.72)	1.03 (0.47-2.29)
Combined vs CABG-only	0.80 (0.17-3.59)	1.23 (0.55-2.74)
Benzodiazepine Dose > 5mg	**1.23 (1.04-1.47)**	**0.95 (0.87-1.05)**

637505 - PREDICTORS OF ACUTE KIDNEY INJURY AFTER THORACIC SURGERY

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Objective

Acute kidney injury (AKI) is an important perioperative complication, resulting in substantially increased morbidity, mortality, and health care expenditures[1]. In the effort to improve perioperative prediction, diagnosis, and management of AKI, a thorough understanding of the risk factors is necessary. Age, hypertension, diabetes, and preexisting chronic kidney disease, known risk factors for postoperative AKI[2]. Specific risk factor data in surgical subgroups are lacking, and further delineation of these factors is needed[3,4].

The thoracic surgery population represents a high-risk group of perioperative AKI.When compared to other areas, lung resection surgery has unique physiologic considerations that could impact the incidence, etiology, and management of perioperative AKI. These considerations include volume of lung resected, the duration of one-lung ventilation (OLV), and the practice of intraoperative fluid restriction. The objective of our study was to identify the independent risk factors for postoperative AKI (Using KIDGO critertia) in thoracic surgery patients.

Methods

Institutional research ethics board approval was obtained prior to study commencement. We conducted a retrospective review of all patients presenting for elective lung resection surgery to our institution between June 2013 and June 2017. Demographic variables, baseline and postoperative serum creatinine levels , and risk factors previously shown to be independently associated with perioperative AKI, were collected by chart review process. Specific to the thoracic surgical population, we also looked at the effect of duration of one lung ventilation and amount of lung resected as predictors of AKI. The data was analyzed using multivariate logistic regression to identify independent predictors of AKI.

Results

Of the 1326 patients who underwent elective lung resection surgery,1062 had medical charts that were available for review, and 77 were excluded using our exclusion criteria. A total of 985 patients were analyzed. Overall, 44/985 (4.5%) of patients suffered an AKI within 48 hours. On univariate analysis, age, sex, hypertension, eGFR, angiotensin converting enzyme inhibitor (ACE-I) and angiotensin receptor blocker (ARB) use, duration of one-lung ventilation, and volume of lung resected were predictive of AKI. On multivariate analysis, our model of best fit included preoperative serum creatinine, eGFR, male sex, ACE-inhibitor or ARB use, and duration of one-lung ventilation. Volume of lung resection did not appear to be associated with the development of AKI. Patients who experienced a kidney injury had a higher rate of postoperative cardiorespiratory complications (30% vs. 5.6%, OR 7.0, 95% CI 3.4-14.3), ICU admission (15.9% vs. 2.5%, OR 7.5, 95% CI 2.8-18.7), and death (15.9% vs. 2.5%, OR 7.5, 95% CI 2.8-18.7)

Discussion

In our cohort of elective lung resection patients, eGFR, sex, and ACE-inhibitor or ARB, and duration of one-lung ventilation use were independently predictive of AKI. Our hypothesis that volume of lung resected was a predictor was proven incorrect.

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638224 - PREOPERATIVE FRAILTY PREDICTS PATIENT-CENTRED OUTCOMES IN CARDIAC SURGERY

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Introduction

Frailty is a geriatric syndrome resulting from age- and disease-related deficits (1). In cardiac surgery, frailty is associated with mortality, cardiac morbidity and impaired function (2,3). Limitations of this evidence include: a lack of validated frailty instruments, lack of long-term outcomes, and lack of patient-centered outcomes. Older people have identified time out of hospital as a core patient-centered outcome (4), therefore, our objective was to measure the association of preoperative frailty with the number of days patients were alive and at home in the month and year after cardiac surgery.

Methods

Ethical review for this analysis was legally waived based on the legal privacy policy of the database. We conducted a historical cohort study (2009-2015) using linked population health data. Individuals >65 years having open cardiac surgery were included. Frailty was defined using a validated frailty index (FI).(5) The outcome was days alive at home (i.e., the number of days an individual was alive and not in a hospital, rehabilitation, or nursing home) within 30 (DAH_{30}) and 365 (DAH_{365}) days after surgery. Our primary analysis measured the association between the FI and DAH_{30} using multilevel negative binomial regression, adjusting for age, sex, procedure and urgency. Quantile regression and dichotomization of the FI were also employed.

Results

We included 61 389 patients (mean age 74, *SD*5); 35 270 (59%) had frailty (FI> 0.21).

Median $DAH_{30}$was 22 (IQR 9) and DAH_{365} was 355 (IQR 16).

Prior to adjustment, each 10% increase in the FI was associated with a 23% (95%CI 21%-25%; *P<0.0001)*. After covariate adjustment a significant decrease in DAH_{30} remained (21%, 95%CI 19%-22%;*P*<0.0001). When frailty was definted dichotomously, the presence of frailty was associated with a 20% decrease in DAH_{30} (95%CI 19%-21%;*P*<0.0001). Using quantile regression, the adjusted median reduction in DAH_{30} for each 10% increase in the FI was 2 days (95%CI 2-3 days; *P*<0.0001).

For DAH_{365}, the adjusted relative decrease was attenuated, an 8% decrease for every 10% increase in FI (95%CI 8%-9%; *P*<0.0001), however, the total adjusted median decrease in total days at home in the year after surgery DAH_{365} for each 10% increase in FI was 85 (95%CI 82-89 days; *P*<0.0001).

Discussion

Older people seeking medical care value returning home after their hospital admission. Frailty before cardiac surgery is associated with a significant decrease in the number of days that older people can expect to spend at home in the month and year after surgery. These data suggest that frailty assessment before cardiac surgery could support communication and informed consent related to an important patient centered outcome.

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634748 - BILATERAL WHOLE LUNG LAVAGE FOR RECURRENT PULMONARY ALVEOLAR PROTEINOSIS AFTER DOUBLE LUNG TRANSPLANTATION

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Title: Bilateral Whole Lung Lavage for Recurrent Pulmonary Alveolar Proteinosis after Double-Lung Transplantation

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Introduction: Pulmonary alveolar proteinosis (PAP) is a rare condition characterised by excessive accumulation of surfactant within the alveoli due to macrophage dysfunction, resulting in progressive respiratory failure. It may be primary or secondary in its aetiology. Whole lung lavage (WLL) is the accepted first - line treatment for PAP. It facilitates physical removal of the proteinaceous material in order to improve lung function, and is associated with improved lung volumes, gas exchange, and 6-minute walk test at 6 months.[1]

Methods: We describe an exceedingly rare case of a patient who underwent bilateral sequential WLL as a single procedure, for recurrent primary PAP 5 years following double-lung transplantation for end - stage lung disease due to PAP with pulmonary fibrosis. He had originally been diagnosed with PAP approximately 20 years prior and had undergone multiple WLL procedures in the period between the original diagnosis and transplantation. Prior to the current lung lavage, there was a concern that repeat WLL might contribute to the development of bronchiolitis obliterans. We outline the conduct of anaesthesia and perioperative management of this technically challenging multidisciplinary case, with its unique patient - specific concerns, and technical aspects, including the potential need for extracorporeal support in the event of severe hypoxaemia and/ or pulmonary hypertension. [2, 3, 4.]

Informed consent, in accordance with institutional ethical guidelines, was provided by the patient for presentation of this case report.

Results: To the best of our knowledge, this is only the second such described case in the literature of WLL for recurrent PAP following double lung transplantation. [5]

Discussion: Bilateral sequential WLL for PAP performed as a single procedure is feasible and safe in carefully selected patients. Extracorporeal support should be immediately available if required for severe refractory hypoxaemia and/ or severe pulmonary hypertension.

References:

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PORTABLE CHEST X-RAY IMAGES DURING THE SEQUENTIAL WHOLE LUNG LAVAGE (WLL) PROCEDURE

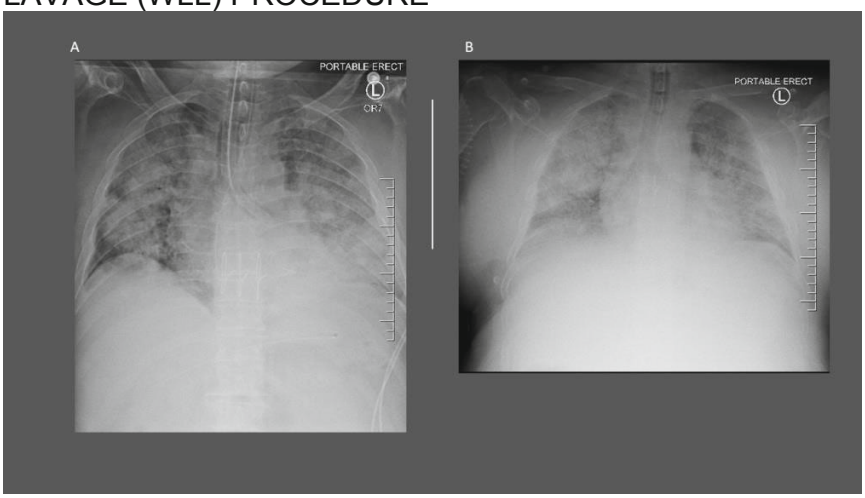

Image A = CXR after whole lung lavage of the left lung (1st side). The left-sided endobronchial double-lumen tube (DLT) and bilateral pulmonary infiltrates are demonstrated. No overt evidence of pneumothorax/ hydrothorax. Image B = CXR after sequential whole lung lavage of the right lung (2nd side). The DLT was exchanged for a standard endotracheal tube at the end of the procedure, and this is seen in a satisfactory position above the carina. Extensive bilateral infiltrates are again demonstrated. No overt evidence of pneumothorax/ hydrothorax.

MIXED CATEGORY

631356 - SUGAMMADEX IN ONTARIO HOSPITALS: ACCESS AND INSTITUTIONAL POLICIES

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Background:Sugammadex is a novel neuromuscular blockade reversal agent which rapidly reverses the effects of rocuronium and vecuronium. Compared to neostigmine, sugammadex has a significantly faster onset of action, a more predictable dose-dependent response, and lower rates of postoperative complications[1,2]. However, sugammadex is significantly more expensive per dose compared to neostigmine (~CAD$95 vs $4). Interestingly, some economic models suggest possible cost-saving benefits of sugammadex through improved operating room efficiency[3]. Nonetheless, given the high price of sugammadex, many hospitals either do not stock the drug, or have specific policies on when the drug may be administered.

Methods: We identified 60 Ontario hospitals with surgical services, and obtained contact information for 45 of the anesthesia departments. A survey on sugammadex access and policies was sent to department chiefs.

Results: Thirty-four (75.6%) departments completed the survey. Twenty-seven (79.4%) of the respondent hospitals had sugammadex. Of the hospitals with sugammadex, 16 (59.3%) had specific policies on when sugammadex may be used.

Based on policies, sugammadex is most frequently allowed to be used in emergency situations, especially failed intubations or “can’t intubate, can’t ventilate” situations where all (100%) policies allow its use. After recurarization in the post-anesthetic care unit, 12 (75.0%) hospitals allow sugammadex use. For regular operative procedures, hospitals less commonly allow sugammadex use. For planned intraoperative reversal of neuromuscular blockade (e.g. for intraoperative nerve monitoring), five (31.3%) hospitals allow its use. For a post-operative reversal of moderate-to-deep neuromuscular blockade, 11 (68.8%) hospitals allow sugammadex use. For reversal of neuromuscular blockade during overnight hours, six (37.5%) hospitals allow sugammadex use. After early completion or cancellation of a surgery, 13 (81.3%) hospitals allow sugammadex use. After a rapid sequence induction with rocuronium or vecuronium, eight (50.0%) hospitals allow sugammadex use (Figure 1a).

Policies on specific patient populations for sugammadex use are uncommon, with seven (43.8%) hospital policies not specifying any patient populations. For patients with myasthenia gravis, twelve (75.0%) hospitals have no specific policies and three

(18.8%) allow sugammadex use. For bariatric patients, ten (62.5%) hospitals have no specific policy and five (31.3%) allow sugammadex use. For pediatric patients, twelve (75.0%) hospitals have no specific policy and two (12.5%) allow sugammadex use. For patients with a known contraindication to neostigmine, nine (56.3%) hospitals have no specific policy and six (37.5%) allow sugammadex use (Figure 1b).

Discussion: Though most Ontario hospitals have sugammadex available, there is a marked heterogeneity in hospital policies on its use. Given the high price of sugammadex, it is worthwhile to have evidence-based policies on its use. Policies should consider the potential cost-saving benefits of sugammadex through increased operating room efficiency and decreased complication rates. Further economic analyses may be useful in developing evidence-based policies.

References:

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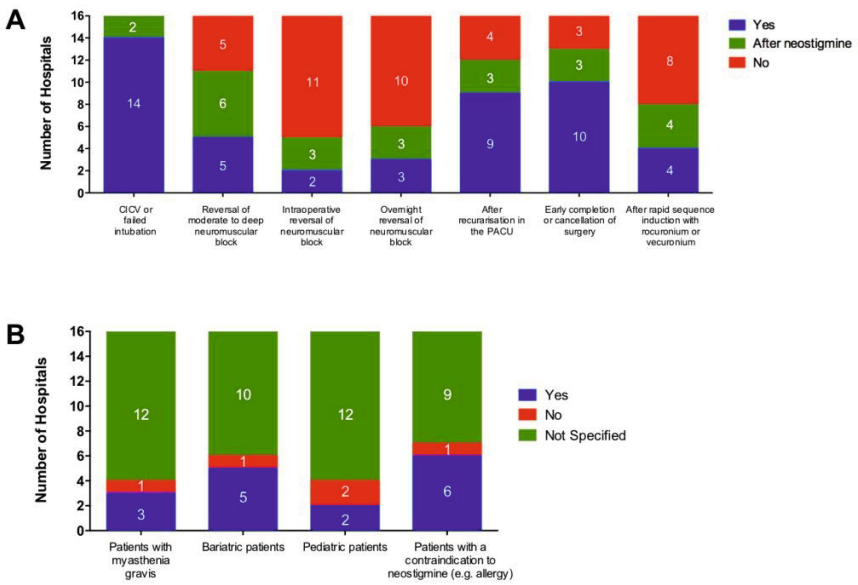
Hospital policies on sugammadex use.



A. Hospital policies for specific clinical scenarios. B. Hospital policies for specific patient populations.

631148 - NOL INDEX SHOWS HIGH SENSITIVITY TO DETECT NOCICEPTION INDUCED BY INTUBATION UNDER DIFFERENT REMIFENTANIL DOSAGES.

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Introduction: The use of heart rate (HR) and blood pressure as proxies for nociception is common but imperfect as they have poor sensitivity and specificity. This study used a novel nociception monitoring device, the PMD200 and its NOL multiparametric index (references: 1, 2, 3) to detect nociception after the clinical stimulus intubation.

Methods: 80 patients with normal airway criteria undergoing surgery requiring intubation received 0.5, 1, 1.5, or 2 mcg/kg of remifentanil as part of a standardized induction regimen. Standard anesthetic monitoring as well as the NOL index (generated by analyzing parameters associated with autonomic tone) and HR were recorded every 5 seconds before and after intubation. Receiver operating

characteristic (ROC) curves were constructed to evaluate the ability of the individual parameter to discriminate between noxious and non-noxious states and confidence intervals of the area under the curves (AUCs) were calculated. This study was registered under clinicaltrial.gov. Scientific and Ethic committees' approval was obtained prior to the start of the study.

Results: Data for 74 patients were fully analyzed. Airway evaluation criteria were identical for the 4 subgroups receiving either 0.5, 1, 1.5 and 2 mcg/kg of remifentanil at the time of induction of general anesthesia. NOL and HR values before and after the clinical stimulus intubation are presented in the figure. Five minutes after intubation, NOL values had returned to pre-stimulus baseline values whereas HR remained elevated despite the absence of further nociceptive stimuli (Figure parts A and B). Area under the curve (AUC) of NOL variation after the stimulus intubation as well as AUC of HR were significantly smaller after a 2 mcg/kg remifentanil bolus vs 0.5 mcg/kg ($p<0.05$). Receiver operating characteristic (ROC) curves for sensitivity and specificity showed higher ROC AUC for NOL (0.97[0.95-0.99]; $p<0.001$) vs HR (0.82[0.76-0.88]; $p<0.01$) (figure part C, red x mark for NOL threshold at 25). Mean arterial blood pressure and bispectral index were also reported in figure 2 and showed lower sensitivity than NOL and HR.

Discussion: The NOL index appeared to have greater sensitivity and specificity for detecting nociception at the time of intubation than HR, in anesthetized patients.

References:

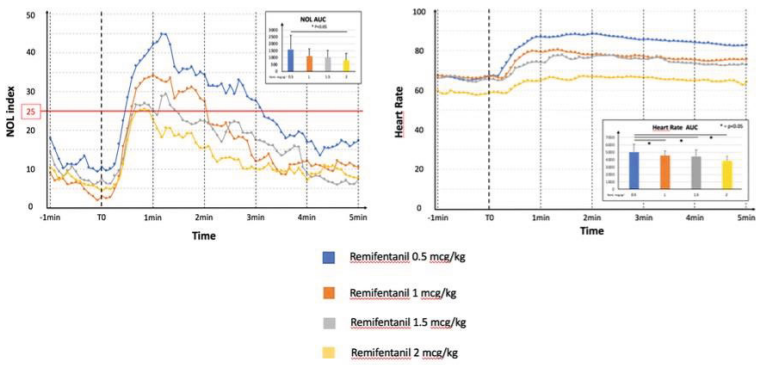
(1) Minerva Anestesiol. 2018 Oct;84(10):1160-1168.Validation of the PMD100 and its NOL Index to detect nociception at different infusion regimen of remifentanil in patients under general anesthesia.Stöckle PA, Julien M, Issa R, Décary E, Brulotte V, Drolet P, Henri M, Poirier M, Latulippe JF, Dorais M, Verdonck O, Fortier LP, Richebé P

(2) Anesthesiology. 2016 Jul;125(1):193-203. Preliminary Intraoperative Validation of the Nociception Level Index: A Noninvasive Nociception Monitor.Edry R, Recea V, Dikust Y, Sessler DI.

(3) Anesthesiology. 2015 Sep;123(3):524-34. Ability of the nociception level, a multiparameter composite of autonomic signals, to detect noxious stimuli during propofol-remifentanil anesthesia.Martini CH, Boon M, Broens SJ, Hekkelman EF, Oudhoff LA, Buddeke AW, Dahan A.

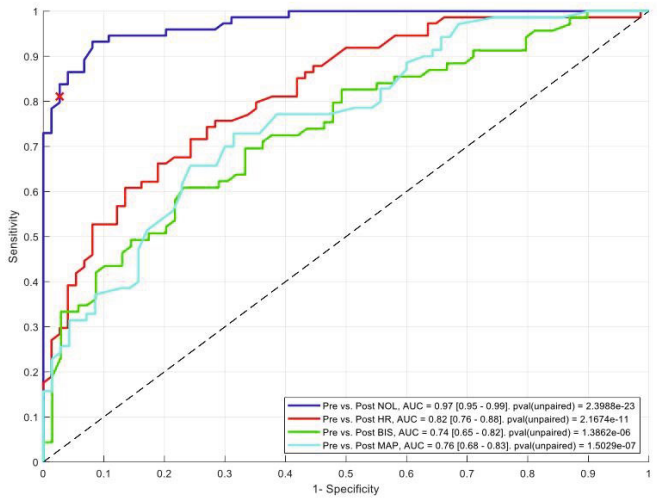
Figure

A


NOL AUC
NOL Index
Time
-1min
T0
1min
2min
3min
4min
5min
Heart Rate AUC
Heart Rate
Remifentanil 0.5 mcg/kg
Remifentanil 1 mcg/kg
Remifentanil 1.5 mcg/kg
Remifentanil 2 mcg/kg

B

C


Sensitivity
1- Specificity
Pre vs. Post NOL, AUC = 0.97 [0.95 - 0.99]. pval(unpaired) = 2.3988e-23
Pre vs. Post HR, AUC = 0.82 [0.76 - 0.88]. pval(unpaired) = 2.1674e-11
Pre vs. Post BIS, AUC = 0.74 [0.65 - 0.82]. pval(unpaired) = 1.3862e-06
Pre vs. Post MAP, AUC = 0.76 [0.68 - 0.83]. pval(unpaired) = 1.5029e-07

632010 - IDENTIFYING BARRIERS TO THE USE OF PERIOPERATIVE ULTRASOUND: A SURVEY OF SOUTHWESTERN ONTARIO ANESTHESIOLOGISTS

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Introduction: Ultrasound (US) can be used for many perioperative procedures, but evidence is lacking as to its frequency of use and barrier of application. A previous survey (1) of anesthetic practice in Ontario at 2011 found a slow adoption of US for central venous catheter (CVC) insertion and regional nerve blocks, and identified lack of training and perceived need as the major barriers of US utilization, indicating a knowledge gap and deficit of training opportunities. The objectives of this survey were to determine i) how often US guidance was used perioperatively for vascular access placement, nerve blocks, and heart and lung assessment, and ii) to identify the barriers and the limitations of using US amongst anesthesiologists in southwestern Ontario.

Methods: After local Ethics Committee approval was obtained, we conducted a web-

based survey in over 40 academic or community hospitals at southwestern Ontario.

Results: Of 266 surveys sent, 66 complete surveys were obtained (response rate of 25%). Most respondents (>80%) reported that US was commonly used for CVC insertion, followed by regional blocks; the uses were less frequent for neuraxial blockade and cardiopulmonary assessment. Most respondents wanted to use US more frequently as part of their practice and felt that they already had adequate US training. However, most respondents (59%) reported limited access to US machines in their working institutes as being the major barrier to incorporating US in their daily practice; 9% had no US machine, 27% had 1 machine, 24% had 2 machines, and 17% had 3 machines. There was an average of 6.2 (SD 3.3) operating rooms per US machine. Nine percent of respondents did not have any US machine available in their institutes.

Discussion: The most common uses of US in anesthesia practice in southwestern Ontario were for CVC insertion and regional blocks. Most anesthesiologists in southwestern Ontario are interested to incorporate US in their daily practice but most were limited by the lack of US resources. Apparently, only providing knowledge and skills teaching may not be sufficient to further improve the US utilization in our region; a matched administrative effort appears to be the next challenge.

References:

1. Can J Anaesth 2011;58:929–35.

637491 - DEVELOPMENT OF A CANADIAN ANESTHESIA RETURN TO WORK PROGRAMME PROJECT AFTER A NON-REMEDIAL LEAVE OF ABSENCE

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Introduction: During anesthesiologists' careers, taking a wanted but not required leave of absence (LOA) (i.e., non-remedial) is not uncommon. After prolonged leaves, a period of updating may be beneficial in reducing practitioners' anxiety and stress related to concerns about decreased knowledge and skills during their absence from work. While no formalized return to work (RTW) programmes exist in Canada, they exist in other countries but may not be based on needs of practicing anesthesiologists, and may not be applicable to Canadian anesthesiologists.

Methods: As a Quality Assurance activity, this project was deemed exempted from review by the local Research Ethics Board. As part of a QA project, a Needs Analysis survey was sent to all practicing anesthesiologists in our province, asking about requirements for an RTW programme. Survey results are intended to guide development of a Canadian RTW programme based on a course currently used in the UK adapted to the context of the Canadian system.[1]

Results: The 21% survey response rate (73/350) was one-third females (23/73). The majority of respondents worked in urban centres (61/73). Most respondents were in later career stages (46/73); many had taken at least one LOA (33/73), often early in practice (17/33), with the average duration being 10 months. Respondents thought the average duration of an LOA requiring formal RTW updating was 12.2 months (range 0.5-36 months) with an average updating duration of 14.3 days (range 0-90 days). Those who had previously taken an LOA thought that an RTW programme should occur after a shorter absence from work (9.1 months vs. 14.4 months, P=0.002) but be shorter (8.6 days vs. 18.2 days, P=0.019). Free-text comments indicated RTW updating should be flexible, designed for the individual, and with variable content and duration according to each anesthesiologist's needs. Respondents also felt LOAs of longer duration would need longer updating, but could be decreased for more experienced physicians. Upgrades of various knowledge components of computer

systems and equipment, plus specific skills retraining, were also identified.

Discussion: LOAs are common among practicing anesthesiologists, with leaves averaging 10 months. Formal courses and checklists assist practitioners returning to work in the UK.[2] Australia mandates a one month RTW programme for every year away from practice.[3] Our respondents who had previously taken an LOA felt RTW programmes were required after LOAs of shorter duration but with a shorter 'retraining' time. Appropriate support from an Anesthesia Department before, during, and after a gap in clinical practice should be provided by an RTW programme, to help increase anesthesiologists' knowledge, skills and confidence when returning to work. Results of this survey provide insight into the current needs of Canadian anesthesiologists and will provide initial guidance for design of a user-centered RTW programme.

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1. RCoA. Giving Anaesthesia Safely Again (GASagain). https://www.rcoa.ac.uk/GASAgain. Accessed February 7, 2019.

2. RCoA. *Returning to Work after a Period of Absence*.; 2015. doi:10.1016/B978-1-4831-4218-0.50008-1

3. ANZCA. PS50 2017 Guidelines on Return to Anaesthesia Practice for Anaesthetists. 2017. http://www.anzca.edu.au/documents/ps50-2016-guidelines-on-return-to-anaesthesia-prac.pdf Accessed February 7, 2019.

637510 - SYSTEMATIC REVIEW OF PREDICTORS OF ADHERENCE TO EXERCISE THERAPY IN OLDER ADULTS WITH A MEDICAL CONDITION

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Introduction
The role of preoperative exercise for improving patient outcomes after surgery has been identified as a research priority in perioperative care.[1] In patients at high risk of complications, prehabilitation improves postoperative outcomes after elective major abdominal surgery.[2,3] However, adherence to exercise programs is variable in older adults.[4-6] This systematic review aims to identify predictors of adherence to exercise therapy prescribed to older adults with a medical or surgical indication.
Methods
Ethical approval was not required. The systematic review protocol was registered with PROSPERO (CRD42018108242). A search strategy was developed in consultation with an information specialist and citations were extracted from MEDLINE/PubMed, EMBASE, Cochrane and CINAHL. Studies of patients 65 years and older with a medical or surgical condition who were prescribed an exercise program were included. Study designs were limited to randomized controlled trials or prospective observational studies that evaluated predictors of adherence using adjusted analyses. Studies where exercise was prescribed for chronic musculoskeletal conditions were excluded. Two authors screened all studies for inclusion and data was then extracted using a form designed for this review. Risk of bias was evaluated with the Cochrane Risk of Bias Tool for randomized controlled trials, and with the Quality in Prognosis Studies (QUIPS) tool for observational studies.
Results
A total of 978 citations were identified and 24 studies were included in the final analysis (Table 1). There were 4 randomized controlled trials and 20 observational studies. Within the observational studies, 6 were observational analyses of the exercise treatment arm of a randomized trial. The studies in the final analysis included 11,201 patients participating in cardiac rehabilitation (7 studies), pulmonary rehabilitation (7 studies) and other exercise programs (10 studies). All exercise programs were done on an outpatient basis and exercise therapy was supervised in 20 programs. Adherence was reported as a continuous measure (16 studies, average adherence 75%) related to the amount of exercise performed, or using a categorical

threshold (8 studies, average adherence 50%) to define participants as adherent. We identified the following clusters of variables as important predictors of exercise adherence: demographic, medical condition severity, comorbidities, psychological, program, and other.

Conclusion

There is limited research on exercise adherence in the preoperative setting for older patients. Future research on preoperative exercise therapy in older patients should consider the predictors of adherence identified in this review.

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2. Anesthesiology. 2014 Nov;121(5):937–47
3. Ann Surg. 2018 Jan;267(1):50–6
4. J Aging Phys Act. 2001;9(2):91-114
5. COPD. 2008 Apr;5(2):105–16
6. J Cardiopulm Rehabil Prev. 2013 Jun;33(3):185–8

Table 1. Predictors of exercise program adherence in older people with a medical condition

First author	Year	Design	*N*	Average age	Medical indication	Exercise program	Adherence	Predictors of adherence (significant results)
Montfort	2016	OBS	409	66	PCI	CR[a]	26%[b]	N/A
McDonall	2013	OBS	5331	68	CVS	CR[a]	12%[cd], 67%[ce]	Age, distance from site, having a partner, non-surgical diagnosis, sex
Pakzad	2013	OBS	30	66	CVS	CR[a]	N/A[b]	Anxiety, HDL-cholesterol
Casey	2008	OBS	600	66	CVS	CR[a]	78%[c]	Age, depression BDI score
Gallagher	2003	OBS	196	67	CVS	CR[a]	32%[c]	Age, diagnosis, employment status, perceived control, personal stressful event, retirement status
Tooth	1993	OBS	30	66	MI	CR	93%[bf], 87%[bg]	Social standing
Ades	1992	OBS	226	70	MI or CABG	CR[a]	21%[c]	Denial of illness severity, depression, physician recommendation
Brown	2016	OBS	440	66	COPD	PR[a]	52%[c]	Smoking status
Selzler	2016	OBS	64	69	COPD	PR[a]	81%[b]	Task self-efficacy
Rizk	2015	RCT	35	67	COPD	PR[a]	75%[b]	Type of exercise
Covey	2014	RCT	113	68	COPD	PR[a]	93%[b]	N/A
Hogg	2012	OBS	812	> 65	COPD	PR[a]	54%[c]	Depression HADS score, deprivation IMD score, dyspnea MRC score, source of referral
Selzler	2012	OBS	814	68	COPD	PR[a]	83%[b]	Age, bodily pain, mental health, vitality, social functioning, smoking status
Fan	2008	OBS	1218	67	COPD	PR[a]	79%[b]	Anxiety STAI score, depression BDI score, distance from site, education, FEV1, randomized to surgery, sex
Aherne	2017	OBS	98	69	PVD	Other[a]	N/A[b]	Smoking status
Pandey	2017	RCT	40	67	Diabetes	Other[a]	70%[b]	Type of exercise
Jensen	2016	OBS	50	69	Bladder cancer	Other	66%[c]	None identified
Craike	2016	OBS	52	67	Prostate cancer	Other[a]	80%[b]	Hormonal symptoms, role functioning
Cox	2013	OBS	170	68	Cognitive impairment	Other	73%[b]	BMI, cognition, injury, self-efficacy
Mudge	2013	OBS	140	> 65	CVS, pulmonary disease	Other[a]	42%[b]	Familiarity with the program, prior exercise program participation, prior number of days exercising per week, retirement status
Pickering	2013	OBS	70	73	Parkinson's disease	Other[a]	79%[b]	Age, Berg Balance Scale, disability, EQ-5D score, functional reach, mental health problem
Tiedemann	2012	OBS	76	67	Stroke	Other[a]	60%[b]	Choice stepping reaction time, 6-minute walk test
Messer	2007	OBS	164	66	Incontinence	Other[a]	70%[c]	Task and regulatory self-efficacy
Mangione	2005	RCT	23	79	Hip fracture	Other[a]	98%[b]	N/A

BDI = Beck Depression Inventory; BMI = body mass index; CABG = coronary artery bypass graft; COPD = chronic obstructive pulmonary disease; CR = cardiac rehabilitation; CVS = cardiovascular disease; FEV1 = forced expiratory volume in 1 second; HADS = Hospital Anxiety and Depression Scale; HDL = high density lipoprotein; IMD = Index of Multiple Deprivation; MI = myocardial infarction; MRC = Medical Research Council; OBS = observational; PCI = primary coronary intervention; PR = pulmonary rehabilitation; PVD = peripheral vascular disease; RCT = randomized controlled trial; STAI = State-Trait Anxiety Inventory
a = supervised exercise program; b = adherence as a continuous measure, c = adherence as a categorical threshold; d = % participation; e = % completion; f = % duration; g = % frequency

637587 - IMPLEMENTATION OF AN ENVIRONMENTALLY RESPONSIBLE DISPOSAL PROCESS FOR WASTE PROPOFOL; A QUALITY IMPROVEMENT STUDY

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Introduction

The proper disposal of pharmaceuticals is a concern given their potential to act as environmental pollutants (1). Propofol, an intravenous anesthetic in widespread clinical use, is of special concern given its aquatic toxicity and stability within the environment (2). Previous studies have suggested that propofol is the most wasted anesthetic drug by volume (2,3). Proper disposal is via incineration, however, there are concerns that it could be entering other disposal pathways. This project examined whether propofol could be captured for proper disposal through a voluntary collection mechanism. It also investigated whether an educational intervention regarding the risks of improper disposal could increase propofol capture.

Methods

Local ethics committee approval was obtained for this project. Waste propofol from two operating theaters was collected over two, sequential, four-week periods. Waste syringes and vials were deposited in labeled containers placed within each OR, and the collected liquid was weighed and disposed of on a weekly basis. Anesthesiologists assigned to these locations were individually emailed in advance and asked to participate on a voluntary basis. Between the first and second four-week collection periods, additional educational materials regarding the potential environmental impact

of propofol were posted within the ORs. Anonymized electronic anesthetic records were analyzed to determine the collective amount of propofol administered to patients during the study period.

Results

A total of 730.5g of liquid propofol waste was collected during the eight week study period; the equivalent of approximately 37 standard twenty mL vials or 7,500mg of the drug. During the same period, 24,250 mg of propofol was administered to patients, suggesting that for every 100mg used in clinical practice, at minimum an additional 30mg of drug is disposed of as waste. The addition of educational materials intended to encourage greater usage of the disposal bins had no appreciable effect, as the ratio of waste-to-administered drug was unchanged (31.0% pre-intervention vs 30.8% post-intervention).

Discussion

With the potential for both negative environmental impacts as well as inappropriate drug diversion, the proper disposal of waste anesthetic drugs is worth consideration. This QI study piloted a simple collection system for a single anesthetic agent. It supports the statement that a significant quantity of propofol drug waste is created through routine practice. Working with other stakeholders, we are continuing to explore mechanisms to safely and effectively capture liquid anesthetic drug waste to ensure appropriate disposal. This study further demonstrates that there may be a role for interventions aimed at reducing the proportion of anesthetic drugs that ultimately become waste. The use of printed educational materials within the OR was not an effective intervention for increasing propofol capture, however, as participation was both voluntary and anonymous, it is unclear how much further improvement was possible.

References:

1) J Environ Manage 2015 160: 324-332

2) Anesth Analg 2012 114: 1091-1092

3) Curr Opin Anaesthesiol 2012 25:221-225

637693 - BARRIERS TO IMPLEMENTING THE CCS PERIOPERATIVE GUIDELINES FOR PATIENTS UNDERGOING NON-CARDIAC SURGERY

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Background: In order to facilitate identification of patients with perioperative cardiovascular complications, the 2017 Canadian Cardiovascular Society (CCS) guidelines recommend routine post-operative surveillance of high-risk patients (1). The

process of implementation, and barriers to implementation, have not been described. Here we describe our experience implementing the guidelines at a tertiary academic health sciences center.

Methods: This was a quality improvement initiative; therefore, ethical review was waived. An interdisciplinary committee was formed to implement the new CCS guidelines, including staff and trainee anesthesiologists, surgeons, cardiologists, internists, and nurse practitioners. A Plan-Do-Study-Act approach was applied with an established implementation checklist at monthly meetings (2). Feedback from multiple stakeholders was considered, including anesthesiologists and nurses screening patients in preassessment unit (PAU) and following up on bloodwork and ECGs in the post-anesthetic care unit (PACU), surgeons, and consultant internists/cardiologists. Following three months of implementation, we used an established framework to identify and thematically categorize experienced barriers and mitigation strategies (3).

Results: Barriers and potential solutions included: 1. Physicians' and nurses' knowledge, including a lack of awareness and familiarity with the guidelines. Multiple educational activities including seminars, emails, and newsletters were used to increase knowledge. 2. Lack of motivation and clear intervention goals. Anesthesia and Internal Medicine trainees identified the lack of clearly specified treatments as a barrier. In response, opinion leaders were identified to provide re-education, and standardize both assessments and treatment pathways. 3. Lack of resources (time restrictions and workload) resulted in staff being reluctant or unable to take on additional work to screen patients preoperatively or follow-up tests (e.g. leaving the OR to check an ECG in PACU). This was mitigated by further simplifying screening and implementing an electronic system to allow anesthesiologists to assess PACU ECGs without leaving the operating room. 4. Social and clinical norms were an overarching challenge. Implementation-related tasks disrupted established workflow in the PAU, PACU, and Internal Medicine consult service. Despite positive responses to mitigation strategies, residual negative perspectives toward guideline implementation persist and are being further explored. 5. Organizational constraints were minimized by developing standardized forms and procedures as well as by funding of specific research personnel to perform process evaluation, audit practices, and provide feedback.

Conclusion: We have identified multiple barriers and mitigation strategies to implementing the new CCS guidelines at a tertiary academic health sciences center. However, identifying front-line issues and educating all front-line healthcare providers will be an important part of future implementation projects. Lessons learned may be used by other centers as they consider adoption of these guidelines.

References:

1. Can J Cardiol 2017 33(1):17-32.

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637981 - A SYSTEMATIC REVIEW AND META-ANALYSIS OF SURGICAL OUTCOMES IN INDIGENOUS POPULATIONS

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Introduction: Approximately 1.67 million Canadians (4.9%) have Indigenous identity (1). Among the Indigenous population, several well documented health inequities exist compared to the non-Indigenous Canadian population (2-5). However, literature describing the differences in surgical outcomes between Indigenous and non-indigenous Canadians has not been systematically reviewed. The objective of this study was to conduct a systematic review and meta-analysis of available literature to determine if there is a difference in surgical outcomes between patients of Indigenous identity in Canada, compared to the non-Indigenous Canadian population.

Methods: Research ethics board approval was not required for this meta-analysis. Indigenous community members and organizations representing Indigenous people were included from the time of study inception. A systematic literature search was conducted using Medline, EMBASE, Cochrane, and CINAHL. All phases of study selection and data extraction were conducted by two independent reviewers in accordance with a pre-registered protocol (CRD42018098757). Mortality was the primary outcome. Risk of bias assessment is ongoing using the ROBINS-I tool. Meta-analysis, following the recommendations of the Meta-Analysis of Observational Studies in Epidemiology group, is ongoing.

Results: We identified 707 titles and abstracts for full text review of which 29 studies met all inclusion criteria. Four large studies reported a significant association between Indigenous identity and increased post operative mortality (hazard ratios 1.09 for liver transplant recipients, 1.93 for renal transplant recipients, 1.37, 1.53 and 1.3 for surgical management of hip, wrist and vertebral fracture respectively, and 1.38 post

percutaneous intervention for acute myocardial infarction). 21 studies reported on outcomes related to access to surgical care in Indigenous populations. Indigenous patients were found to be significantly less likely than non-Indigenous patients to receive renal transplant for end stage renal disease, angiography and revascularization for acute myocardial infarction, hip or knee arthroplasty for osteoarthritis, and caesarian section. Indigenous identity was associated with significantly increased rates of amputation for diabetic complications.

Discussion: The majority of studies identified in this systematic review provide pre operative data only - specifically differences in rates of surgery between Indigenous and non-Indigenous patients. The remaining studies which do provide post operative outcome data are limited to very specific surgical procedures – cardiac revascularization, peripheral vascular bypass, orthopedic surgery for fractures and lower extremity amputation, cholecystectomy, orthodontic surgery for malocclusion and liver and kidney transplants. Meta-analysis of mortality data is ongoing and may reveal an association between Indigenous identity and post-operative mortality. This systematic review reveals that there is a paucity of data and a need for further research on post operative outcomes in Indigenous populations for most surgical procedures.

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5. CMAJ 2000 163:561-66

638267 - ARE WE DEFICIENT? THE CASE FOR A PREOPERATIVE HEMOGLOBIN OPTIMIZATION PROGRAM IN ST. JOHN'S HOSPITALS

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Introduction

Perioperative anemia has been recognized as a contributory factor in patient morbidity and mortality, as a result many Canadian hospitals have implemented preoperative hemoglobin optimization programs. [1, 2, 3] These programs have demonstrated significant success in orthopedic surgery given that 15-33% of patients undergoing total joint arthroplasty (TJA) have preoperative anemia.[4] A preoperative hemoglobin optimization program has not yet been implemented at our institution. The purpose of our research is to determine whether preoperative anemia in patients undergoing lower extremity total joint replacement at the two major hospital sites in St. John’s, Newfoundland increases the risk of requiring blood transfusions in the perioperative period. This is the first step indetermining the feasibility of a preoperative hemoglobin optimization within our facility.

Methods

This study received all appropriate ethical approvals. A one-year retrospective chart

review of all elective lower extremity joint arthroplasty in St. John's Hospitalswas completed. Nine hundred and sixty-four charts were reviewed, compiling information on patient demographics, procedural data, co-morbidities, length of hospitalization, medications, laboratory data, and blood product utilization. This information was entered in to a Microsoft Excel spreadsheet and the data was analyzed using SPSS.

Results
964 charts were reviewed and 18 excluded that did not meet inclusion criteria. Using WHO definition, 11.8% of patients in the chart review were identified as anemicpreoperatively. Using a chi square analysis, a significant increase in perioperative blood transfusion among anemic patients was found (p less than 0.0005) and regression analysis showed anemic patients were 4.669 times more likely to receive a transfusion perioperatively (CI 1.883-11.577). Other predictors of blood transfusion included female gender (p=0.002), LOS (p=0.006) and use of iron preoperatively (p=0.006). Use of tranexamic acid was shown to decrease the risk of blood transfusion (p=0.001). Mean hemoglobin level at which patients were transfused was 88.5 (SD 12.93).

Discussion
This study supports the body of evidence that preoperative anemia increases the risk of perioperative transfusion. Other factors identified in this study that were associated with increased risk of transfusion may be related to anemia itself. This emphasizes the importance of identifying anemic patients and treating prior to elective procedures. This study suggests hemoglobin optimization and intraoperative use of tranexamic acid are key to reducing perioperative blood transfusions as well as health care provider education on transfusion medicine key practices.

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636569 - HEMODILUTION WITH COLLOID AUGMENTS CARDIAC OUTPUT BUT INCREASES HYPOXIC GENE EXPRESSION IN THE KIDNEY

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Introduction: The role for colloid solutions for optimal fluid resuscitation remains controversial [1, 2]. Defining optimal intravenous fluid utilization has become increasingly important as transfusion trials continue to provide evidence in support of restrictive transfusion thresholds [3]. Furthermore, non-invasive methods for assessing cardiac output responsiveness have been used to set optimal targets for fluid resuscitation; methods which do not necessarily reflect tissue perfusion [4]. We assessed the impact of colloid vs. crystalloid hemodilution protocols in terms of their impact on cardiac output and parameters of tissue perfusion. We hypothesized that

hemodilution with colloid would be no different than crystalloid in maintaining tissue perfusion following acute hemodilution.

Methods: Following institutional animal care committee approval, Sprague Dawley rats (400-600g) were randomly allocated to undergo 40% isovolemic hemodilution with colloid (1:1 hydroxyethyl starch or albumin), vs. crystalloid (3:1 saline), or sham procedure (control) (n=4-8). Rats were anesthetized (2% isoflurane) and hemodilution was performed by exchanging blood for infused solution via the tail artery and vein over a 10 minute period. Heart rate, MAP, and core temperature were monitored continuously. Hemoglobin concentration (Hb) and arterial blood gases were measured and echocardiograms (Doppler ultrasound) were performed at baseline and 10 and 30 minutes post-hemodilution. Renal tissue RNA levels for hypoxia sensitive compounds including erythropoietin (EPO), GLUT-1 and VEGF were assessed by quantitative PCR. Data from the albumin and starch treated animals were grouped together for all outcomes (colloid group). All data were analyzed by ANOVA. Significance was assigned at p below 0.05.

Results: Hemoglobin levels were significantly lower following hemodilution with colloid (69±9g/L) versus crystalloid (85±11g/L; p 0.001). Arterial blood gas values were not different between groups. After hemodilution, lactate values were higher in the colloid group relative to the crystalloid group (p 0.03). Post-hemodilution MAP was comparable between both groups (66 ±11 vs. 74 ±8 mmHg; p=0.46). Hemodilution with colloid increased cardiac output (p 0.015) and stroke volume (p 0.025) transiently at 30 minutes, relative to the crystalloid group in which these parameters did not change. Renal tissue RNA values for EPO, but not Glut-1 or VEGF, were elevated in the colloid group relative to the crystalloid group (p 0.05).

Discussion: Resuscitation protocols with colloid vs. crystalloid resulted in different, and seemingly paradoxical, changes in cardiac output and tissue perfusion. Hemodilution with colloid resulted in a transient increase in cardiac output, but with concurrent evidence of inadequate systemic and renal perfusion (elevated lactate and renal EPO RNA). By contrast, hemodilution with crystalloid did not change cardiac output, but parameters of inadequate tissue perfusion were not increased. These data demonstrate that utilization of hemodynamic changes in cardiac output do not necessarily reflect parallel changes in microvascular tissue perfusion during acute hemodilution and fluid resuscitation.

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NEUROANESTHESIA

635201 - CO2-MRI BRAIN STRESS TEST FOR THE DIAGNOSIS OF CONCUSSION

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Introduction:
Concussion has become a significant public health concern and currently there is no reliable, diagnostic imaging biomarker for detection of concussion in individual patients. Emerging evidence indicates that the relationship between blood flow and brain activity is unbalanced following concussion.[1] One of the measures of functional alteration in brain blood flow is called cerebrovascular reactivity (CVR), which is the change in cerebral blood flow, to a change in vasoactive stimuli.[2] It has been suggested that CVR will be altered in patients with concussion compared to healthy controls and the degree of CVR impairment will correlate with post-concussion symptoms.[3] The aim of the study was to determine the utility of Co2-MRI Brain stress test in measuring CVR in patients with acute concussion.

Methods:
After REB approval and patient consent, twelve adults (18-40 years) within a week of concussion and twelve age and sex matched healthy subjects were recruited for the study. Symptoms were assessed with the Acute Concussion Evaluation (ACE) tool. In each subject, CVR was assessed using Blood oxygen dependent (BOLD) MRI in combination with precise changes in end-tidal PCo_2. End tidal PCo_2 changes were achieved using sequential gas delivery breathing circuit connected to an automated gas blender (RespirAct, Thornhill Research Inc., Toronto, ON, Canada). CVR is expressed as % change in BOLD/ change in PCo_2 (mmHg). Change in magnitude of CVR and the speed of change (Tau) were calculated in both gray and white matter. Group differences were analyzed using a non-paired t-test

Results:
Anatomical MRI was normal in both patients and healthy controls. All subjects had 2 patterns of hypercapnic (resting PCo_2+10mmHg) challenge; a fast (120 seconds) step change and a slow (4min) ramp change. All subjects tolerated the study without any serious adverse events. Magnitude of CVR changes was higher and the speed of response was faster in concussed subjects compared to healthy controls.(Figure 1) White matter is more sensitive than GM in patients with concussion. This implies an inability of the vascular system to control blood flow in concussion.

Conclusion:
Concussion is associated with patient-specific abnormalities in cerebrovascular responsiveness to a vasodilatory stimulus. This study demonstrates that measurement of CVR using BOLD MRI and precise CO_2 control is safe, reliable, and clinically useful imaging biomarker in patients with concussion.

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Figure 1

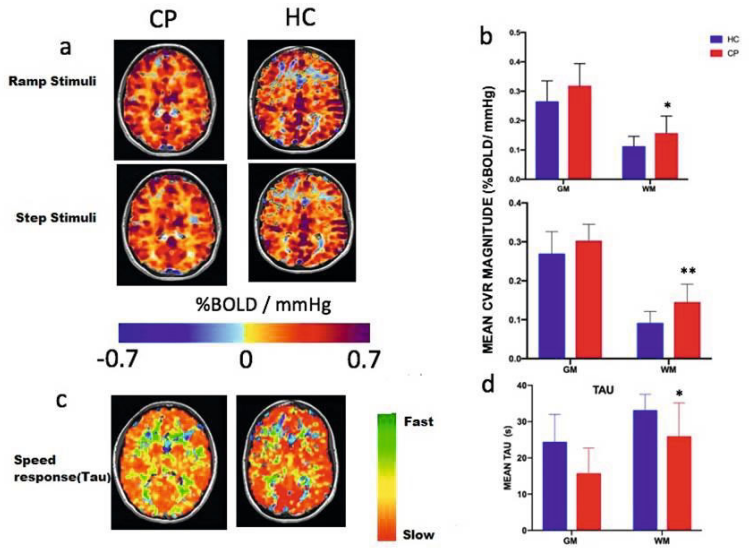

Figure showing magnitude of CVR changes and the speed of response (Tau) between patients with concussion (CP) and healthy control (HC) during 2 patterns of Co2 changes (slow ramp and a step stimuli). Axial images of magnitude of CVR and speed of response are shown in Figure 1a& c. Corresponding error bar graphs are in figure1b & d. GM- Gray matter, WM- White matter. *,** indicates statistical significance ($p < 0.05$).

636455 - INTRODUCING A NOVEL EVOKED EEG INDEX TO DETECT RECALL UNDER SEDATION - A PROOF OF CONCEPT STUDY

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Background

Awareness under general anesthesia (GA) is a dreadful complication[1]. Various EEG-based technologies (like BIS) were developed in order to identify it [2]. However, studies assessing BIS been unable to demonstrate detection of awareness. Moreover, BIS is influenced by the effect of muscle activity [3], further confounding its ability to detect anesthesia depth, especially under sedation. Previous studies shown that alpha activity anteriorizes under anesthesia, thus the process of anteriorization might correlate also with the depth of anesthesia and sedation [4]. We developed a novel index, posteriorization/anteriorization (P/A) index, based on analyzing auditory evoked

EEG signal from posterior versus anterior EEG channels (O1, O2/ F3, F4) [5]. Due to low % of recall under GA, we elected to assess recall in surgical patients undergoing sedation in order to validate this novel evoked EEG index.

In this pilot study, we hypothesized that the new index would differentiate between patients with or without recall under sedation.

Methods

With institutional ethics approval (NIH number: NCT02938325), we assessed 26 patients undergoing sedation. We utilized awake volunteers (n=14) and patients under GA (n=12) as positive and negative controls for recall, respectively. During the surgery evoked EEG and BIS were recorded. All participants were assessed for recall using the BRICE questionnaire [6]. Data were analyzed by one-way ANOVA on ranks and linear regression.

Results

Of the 26 sedated patients, 18 received midazolam [MD] and 8 received propofol [PR] as the primary sedating drug. Recall was identified in 100% of awake patients and in none of patients who received general anesthesia. Twelve patients in the sedated MD group experience recall [MD+R]. None of the patients sedated with propofol experienced recall.

The P/A index was able to differentiate between patients with recall (MD+R) (median 66.75, IQR 53-78) and those with no recall (MD-R) (median 27.5 IQR 15.5-50, p=0.006). There was no relationship between PA index and EMG (P=0.693 R 2 = 0.009) (figure1A, C). By contrast, BIS could not separate between [MD+R] (median 83.5 IQR 81.5-84) and [MD-R] (median 69.76, IQR 67-83, p=0.348). Further, linear regression showed that EMG contributes 31% for the variation of the data to BIS (P=0.013 R 2 = 0.311) (figure 2A, B). The area under the receiver operating curve (ROC) was 0.9583 for the P/A index.

Discussion

In this pilot study, we evaluated the ability of a novel evoked EEG P/A index to predict recall under sedation. Within midazolam-induced sedation, the P/A index was able to discriminate between patients with recall vs. those without recall. This ability to detect recall was not influenced by muscle activity. Further research is required to further validate this novel index.

This work was partially supported by grant from the ISA (Israel Society of Anesthesia)

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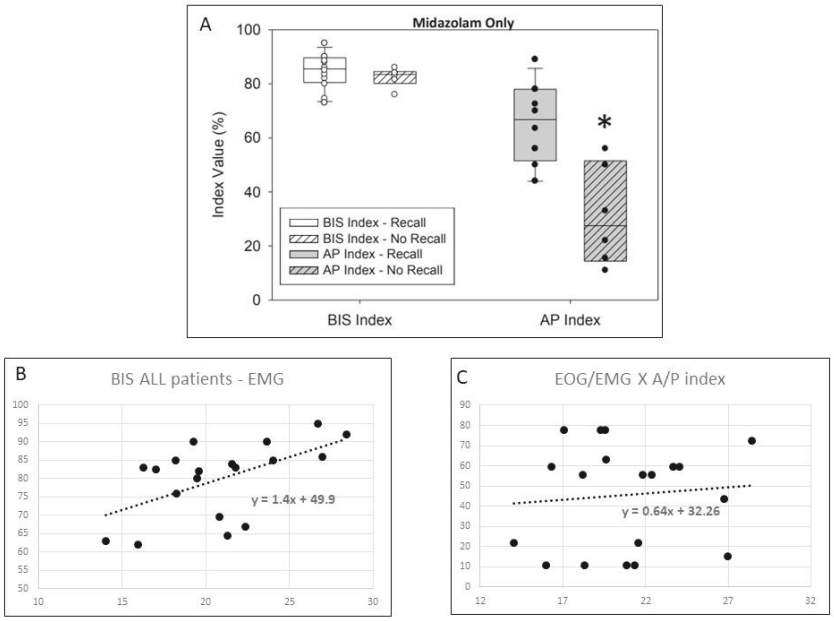
BIS and P/A index description in midazolam group and in correlation to EMG



A. Comparison in P/A index and in BIS separately, between Yes/NO recall in patients in the MD group, using Rank Sum Test. Left: BIS can not differentiate between patients with recall (median 85.5, IQR 81-89.25) or without recall (median 69.76, IQR 67-83, p=0.348). Right: A/P index differentiate between patients with recall (median 66.75, IQR 53-78) or without recall (median 27.5 IQR 15.5-50, p=0.006). B. BIS in correlation to EMG in Awake volunteers. All Data points: P=0.013 R2 =0.311 . Thus, the relationship between EMG and BIS Index accounts for 31% of the variation of the data. C. P/A in correlation to EMG in Awake volunteers. All Data points: P=0.693 R2 = 0.009. Thus, The relationship between EMG and AP Index accounts for 0.9% of the variation of the data.

636566 - DECREASED FRONTAL SYNCHRONIZATION: NEW EVOKED EEG INDEX THAT CORRELATES WITH POST OPERATIVE COGNITIVE DYSFUNCTION

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Background

Post-operative cognitive dysfunction (POCD) is a term used to describe changes in cognition, such as memory and executive function. The incidence of POCD is 20-40%, depending on the population, surgery type, diagnostic criteria and timing [1]. The mechanisms leading to POCD have not been fully elucidated. Currently, there is no gold standard monitoring available to predict the occurrence of POCD following anesthesia and surgery [2-3].

We have developed a novel algorithm analyzing evoked EEG (from F3, F4, P3, P4 electrodes), generating an index of synchronization between left and right frontal hemispheres [4-5]. The interhemispheric synchronization (IS) index, is in the range of [0,1], where 1 indicates complete synchronization and 0 indicates complete desynchronization. We have recently demonstrated that brain hypo-perfusion is expressed by decrease in the IS index [6].

The primary outcome was a decrease in IS index is associated with POCD as defined by a 20% reduction in the MOCA score

Methods

With institutional ethics approval, two cohorts of patients were assessed (NIH trial registration: NCT02691338): 1) Patients older than 65 years of age undergoing total knee or hip replacement (TKR/THR) under regional anesthesia and sedation or general anesthesia (GA)(total n=26); 2) Patients undergoing coronary artery bypass

graft (CABG) or valve replacement under GA (n=35). Cognitive evaluation was performed by administering MOCA/ HADS/ CAM-ICU, Neurotrax and pain assessment tests before the surgery, on post-surgery day 3-7, at 6 weeks and 3 months after the surgery. POCD was considered when there was a decrease of 20% in MOCA score, compared to pre-operative baseline. During the surgery auditory evoked EEG were recorded. The proportion of the time the IS index was below 0.8 was calculated for patients with or without POCD. Mann Whitney test was used to compare between two groups<./p>

Results

Following TKR/THR, 23% of the patients (n=6) experienced POCD on discharged home after surgery. Five patients (14%) had POCD after cardiac surgeries. The IS index of patients with POCD (all cohort) was below 0.775 for 73% of the surgery time (IQR 20-39%) (Figure 1a,b). This value was lower than data from patients without cognitive complications, who had IS index below 0.775 for only 5% of the surgery time (IQR 5-12%, p

Discussion

This study demonstrates that a decrease in IS index is associated with POCD, after sedation for THR/TKR and after GA for cardiac surgery. An acute decrease in IS index may point possible brain hypo-perfusion during surgeries, which might lead to POCD. This preliminary data supports the hypothesis that evoked EEG synchronization (IS index) might be used as an intra-operative monitor for brain dysfunction and POCD.

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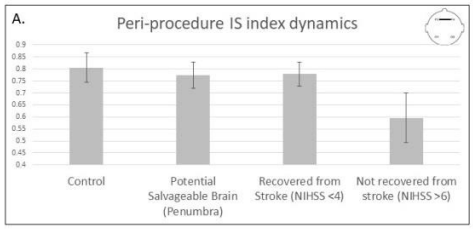
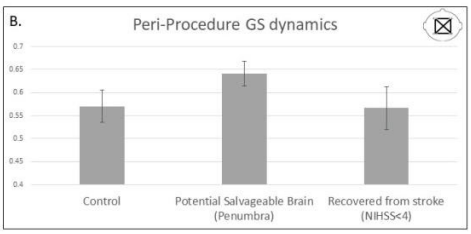
IS index description during the surgery and in the cohort population





C.

Index	Control	Potential Salvageable Brain (Penumbra)	Recovered from stroke (NIHSS<4)
IS	High	High	High
GS	Low	High	Low

A. Example of an IS index over time of a patient, during cardiac surgery, with no cognitive deterioration. The IS index is above 0.775 most of the time. B. Example of IS index over time of a patient, during cardiac surgery, who suffered from POCD. Most of the surgery the IS index is below 0.775. C. IS index in normal/ patients with POCD after orthopedic or cardiac surgeries. Median of % operating time below threshold and [25%-75]% IQR. Patients with POCD had a lower index (<0.775) for a relative longer period. The difference is statistically different, whereas; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.0001$.

637425 - IS INCREASE IN BLOOD PRESSURE A COMPENSATION FOR CEREBROVASCULAR STEAL IN PATIENTS WITH INTRACRANIAL STENOSIS?

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Introduction: Carbon dioxide (CO_2) is a vasoactive stimulus and increases in CO_2causes corresponding increases in cerebral blood flow (CBF). In addition, CO_2also increases catecholamine levels and the cardiac output causing a variable small increase in blood pressure (BP) in awake healthy adults.[1,2]In patients with intracranial steno-occlusive disease (IC-SOD) hypercapnia can cause a cerebrovascular steal phenomenon leading to cerebral ischemia.In these patients, BP elevation may be a compensatory mechanism by which CBF is maintained and regional ischemia avoided. Aim of this study was to determine the effect of CO_2on BP in patients with IC-SOD. We hypothesize that in patients with IC-SOD, hypercapnia will increase mean arterial pressure (MAP) as a compensation for cerebrovascular steal.

Methods: After REB approval and informed patient consent, patients with IC-SOD undergoing cerebrovascular reactivity (CVR) testing in a 3T MRI were recruited for this prospective observational study. All patients were breathing spontaneously via a face mask and the end tidal CO_2($P_{ET}Co_2$) changes were achieved using a sequential gas delivery breathing circuit connected to an automated gas blender (RespirAct, Thornhill Research Inc., Toronto, ON, Canada).After baseline assessment of $P_{ET}Co_2$and BP, three (2 increase and 1 decrease) separate alterations in $P_{ET}Co_2$were induced in sequence (Figure 1) Non-invasive BP measurements were taken before, during, and after each $P_{ET}CO_2$alteration. Cerebrovascular steal was quantified using blood oxygen

level-dependent MRI. Data were analyzed to determine the changes in MAP from the baseline with the changes in $P_{ET}Co_2$using paired t-tests.

Results: 60 consecutive patients [mean (±SD) age 47 (±15.5) years, 61.6% female] were enrolled. 16.6% and 33.3% had comorbid diabetes mellitus and hypertension respectively. The mean baseline $P_{ET}CO_2$was 39 (±4) mmHg. All patients had impaired CVR with a vascular steal phenomenon. 98.3% of patients had an increase in their MAP with hypercapnia with a mean increase during 'step' and 'ramp' stimuli of 7.9 (±8) mmHg (p = 0.01) and 8.3 (±8.8) mmHg (p = 0.008) respectively. 48% of patients had a MAP increase > 10mmHg. Hypocapnia showed a trend towards decreased MAP (-2.8 (±6.4) mmHg, p = 0.34). [KR1]

Conclusion:In patients with IC-SOD, hypercapnia is accompanied by an increase in BPwhile hypocapnia produces the opposite effect. These BP changes may serve to counteract any steal phenomenon by increasing cerebral perfusion pressure as well as by causing vasoconstriction in responsive vessels outside of the area at risk for ischemia.[4,5]Volatile anesthetics have cerebral vasodilating properties that may contribute to a steal phenomenon while also depressing compensatory autonomic responses. These findings support the need to maintain, if not increase, BP above baseline in patients with IC-SOD undergoing surgery.

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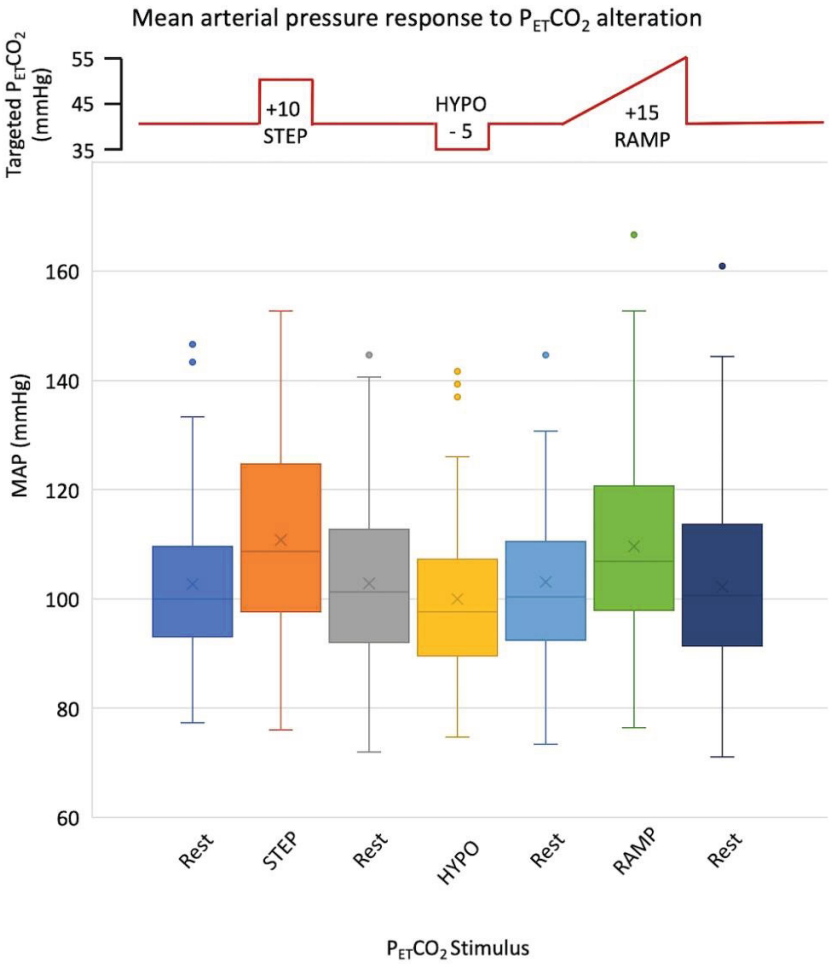
Figure 1



Box-whisker plot showing changes in mean arterial pressure (MAP) with changes in end tidal Co2 (PETCo2). Rest = eucapnia baseline, STEP = 10mmHg square-wave increase in PETCo2, HYPO = hypocapnia, RAMP = 15mmHg gradual increase in PETCo2.

637675 - EFFECT OF A NECK COLLAR ON BRAIN TURGOR: ROLE IN PREVENTING CONCUSSION

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Introduction:

Concussions have become a growing epidemic in both competitive sports and recreational activities and incur significant personal and socio-economic costs [1]. It has been shown that mild jugular venous compression causes an increase in intracranial blood volume and brain turgor resulting in a protective effect by minimizing brain “sloshing” within the cranium [2, 3]. A recent study on competitive football players has shown that wearing a neck collar reduces harmful microstructural brain changes following a concussion [4]. However, the effect of wearing a cervical neck collar on intracranial volume has not been demonstrated in the upright position. Therefore, the aim of this study was to investigate the effect of IJV compression on brain turgor using transorbital ultrasound of the optic nerve sheath diameter (ONSD) as a surrogate of changes in intracranial volume [5].

Methods:

Following Research Ethics Board approval and informed consent, 19 healthy adult (>18 years) volunteers were recruited for a prospective observational study. Ultrasound measurements were performed on the right IJV cross-sectional area, and the change on right eye ONSD before and after application of IJV compression (Figure 1A). Compression was achieved with a neck collar comprising two rectangular sponge pads (2 cm x 3 cm) designed to sit over the IJV’s. A 100 mL saline bag was attached to a calibrated pressure transducer, which was placed between the collar and the back of the volunteer’s neck, and the transducer was zeroed at the level of the pads. The

neck collar was tightened by traction of the Velcro elastic straps until a pressure of 20 mmHg was achieved (Figure 1B). All volunteers were in the sitting position and ultrasound of the IJVs was performed at the level of the cricoid cartilage cephalad to the neck collar. Statistical analysis was performed using a paired t-test with Bonferroni correction.

Results:

Two independent investigators performed ultrasound measurements on 19 healthy volunteers. Mean (SD) cross-sectional area for the right IJV at the level of the cricoid was 0.10 (0.05) cm^2 at baseline with a corresponding ONSD of 4.6 (0.5) mm. After application of the neck collar, IJV cross-sectional area increased to 0.57 (0.37) cm^2 with a corresponding increase of ONSD to 4.9 (0.5) mm which was significant when compared to the baseline value *(P = 0.001)*. (Figure 1C)

Discussion:

We present the first study to demonstrate that mild IJV compression in subjects in the sitting position increases the intracranial volume as demonstrated by an increase in ONSD. Therefore, our finding may support the use of a neck collar in minimizing the harmful effect of concussions.

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Figure 1
CAS 2019 Collar Figure.tif

Figure 1. A) The IJV and ONSD before and after the application of the neck collar. The ONSD is measured 3 mm behind the papilla in a perpendicular axis. B) Neck collar C) Individual and mean (SD) changes in optic nerve sheath diameter (ONSD) at pre-collar and post-collar. *Values are significant; $p < 0.001$.

638158 - ANESTHESIA CARE FOR ENDOVASCULAR THERAPY IN ACUTE ISCHAEMIC STROKE: A QUALITY IMPROVEMENT PROJECT

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Introduction:

Acute ischaemic stroke (AIS) for endovascular therapy is a time-critical emergency, with the number of patients who undergo this procedure currently on the rise. SNACC published an expert consensus statement in 2014[1], however very little is known about current involvement and anesthesia care strategies in the treatment of these patients. In order to identify current anesthesiologists' approaches and potential improvements, we initiated a quality improvement (QI) project in our tertiary center.

Methods:

After REB approval, AIS cases that underwent endovascular therapy from March 2015 to October 2017 were retrospectively reviewed. In November 2017 a standard operational procedure (SOP) was introduced ("intervention") and the second cycle of data review was initiated covering November 2017 to December 2018. The SOP addressed an interdisciplinary management approach. A paging system, monitoring requirements, indications for anesthesia technique and physiologic targets were defined. According to SQUIRE guidelines, [2] patient characteristics, the timing of

procedures, anesthesia techniques, and post-interventional transfer were evaluated. Data is presented as either an absolute number, percentage, or median (IQR). Mann-Whitney or Chi-square tests were performed where appropriate. A $p<0.05$ was considered as statistically significant.

Results:

265 patient records were analyzed (before intervention: 139, after 126). Presence of anesthesia was in 88/139 (63%) cases before and 126/126 (100 %; $p<0.001$) after. Time from hospital arrival until the start of anesthesia was 57 minutes (40-80), compared to 46 minutes (30-62; $p=0.002$). General anesthesia was used in 34/139 (24%) before, and in 25/126 (20%; $p=0.37$) after the intervention. Total procedure time was 110 minutes (85-145) and 100 minutes (66.25-130; $p=0.03$), respectively. After the introduction of SOP, fewer patients were transferred to ICU after endovascular therapy (19/126 (15%) vs. 36/139 (25%); $p=0.03$).

Conclusion:

Use of a SOP for endovascular therapy in patients with acute stroke results in a frequent involvement of anesthesia, and reduces the time until the start of intervention, total length of procedure time, and ICU admissions. The next step is to evaluate the impact on neurologic patient outcome.

References:

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638269 - ENHANCED RECOVERY AFTER POSTERIOR FOSSA SURGERY FOR MICROVASCULAR DECOMPRESSION OF CRANIAL NERVES

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Background:Enhanced recovery after surgery (ERAS) is an evidence-based standardized perioperative care program designed to achieve early recovery for patients undergoing any major surgery.[1]The application of ERAS in neurosurgical practice is a relatively new concept and there are minimal literature on the application of ERAS in neurosurgical patients.[2]. Aim of our study is to determine if ERAS care is feasible in posterior fossa craniotomy for microvascular decompression (MVD) of cranial nerves and to compare the outcomes before and after implementation of enhanced recovery care in our institution.

Methods: After REB approval, we did a retrospective review of patients who underwent posterior fossa craniotomy for MVD of cranial nerves from 2007-2017. Enhanced recovery pathway consisting of standardized surgical and anesthesia care to facilitate early discharge after MVD of cranial nerves was implemented in our institution 7 years ago. Data from 100 patients operated before the change in the perioperative care protocol (Conventional Care Group) were compared to the data from 100 patients operated after the introduction of ERAS pathway (ERAS Care Group). Our primary outcome was length of stay in the hospital. The secondary outcomes include the need for postoperative ICU care, the incidence of postoperative nausea and vomiting (PONV) and pain. Data analyses were done using Chi square test and student t-test as indicated.

Results: Patient demographics were similar between the groups except for higher number of patients with sleep apnea in the ERAS group (Table 1) There were no differences between the groups with respect to meanlength of stay in hospital between the groups (3.3±3.3 vs 3.22±3.76, p=0.94) Similarly, the total number of intervention needed to prevent and/or treat nausea and vomiting (5.96±2.5 vs 5.02±2.1) and the total morphine equivalence dose (MED) to treat post operative pain (18.69±11.8 vs 17.32±10.9) were also similar. However, there was a significant reduction in number of

patients needing postoperative ICU care (73%vs 39% p=

Conclusions:Our study shows that implementation of ERAS pathway is feasible in patients undergoing post fossa craniotomy for MVD of cranial nerves. Though there was no differences in the length of stay in hospital, the implementation of ERAS pathway did decrease the need for routine postoperative ICU admission. More studies are needed for better understanding of multimodal pathways for optimizing perioperative care in patients undergoing elective neurosurgeries.

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Table 1

	Conventional Care Group (n=100)	ERAS Group (n=100)	*P* value
Age (Years) *	54±13	56±15	0.28
Sex (M/F), (n)	32/68	43/57	0.10
Body Mass Index *	27.5±6.2	28.4±6.6	0.33
Co-morbidities, n (%)			
Hypertension	21(21%)	31(31%)	0.10
OSA	7(7%)	17(17)	**0.03**
Smoker	34(34%)	32(32%)	0.76
Diabetes	5(5%)	4(4%)	0.73
Operation time (hours) *	3.11±1.4	3.05±1.4	0.6
PACU time (min) *	103±0.03	152±0.05	**<0.001**
Length of Stay (days) *	3.3±3.3	3.22±3.76	0.964
Postoperative Destination (n)			
ICU	73	39	**0.001**
Ward	27	61	**0.001**

* Data presented as mean (SD) n= number , OSA- obstructive sleep apnea, PACU- Post anesthesia care unit, ICU- Intensive care unit

636512 - NEW EVOKED TWO EEG COMPLEMENTARY INDICES FOR IDENTIFYING STROKE AND SALVAGEABLE BRAIN IN PATIENTS UNDER ANESTHESIA

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Background

Perioperative stroke incidence in high risk surgical patients is 2-5% with associated mortality of up to 60% [1-3]. Currently, there is no accepted brain monitoring for identification of stroke under anesthesia. We developed two new evoked EEG based indices [4-6]; 1. Interhemispheric synchronization (IS) for correlation between the left and the right frontal hemispheres [6]. 2. Global synchronization (GS) index for correlation between whole brain regions. The IS and GS indices, are in the range of [0,1], where 1 indicates complete synchronization and 0 indicates complete desynchronization.

Due to the low incidence of stroke in the operating room, we selected a special population: the acute ischemic stroke (AIS) patients who undergo endo-vascular thrombectomy (EVT), and thus exhibit 3 clinical brain conditions during the procedure under anesthesia; Potential salvageble brain (penumbra), recovered from stroke (NIHSS < 4), non-recovered stroke (NIHSS >6).

The objectives were: 1. Identifying stroke under anesthesia, using IS index 2. Differentiating between potential salvageable brain (penumbra) and normal brain, using dual interpretation of IS and GS indices.

Methods

With institutional ethics approval, 24 anesthetized patients undergoing EVT for AIS under sedation or general anesthesia (GA) were recruited (NIH trial registration: NCT02691338). Evoked EEG was recorded, after induction of anesthesia, at the beginning before EVT (to identify penumbra / potential salvageable brain) and at the end of the thrombectomy (to identify recovered brain, NIHSS 6). The IS and GS indices were extrapolated based on algorithmic analysis of the EEG data. The control groups contained sedated patients with no known brain pathology. Data were analysed by one-way ANOVA for multiple comparisons.

Results

The IS index was low with non-recovered stroke patients (0.6±0.1, n=12) compared to control (0.81±0.06, n=26), to patients with penumbra (0.77±0.05) and compared to patients who recovered from stroke (0.78±0.04, n=8, p

Conclusions

In this pilot study we aimed to identify stroke (non-recovered brain) and penumbra (potential salvageable brain) under anesthesia. The IS index was low in brain with non-recovered stroke compared to control or recovered brain. The addition of the GS analysis enables to differentiate between penumbra to control (in both the IS index is high); GS index is high in the presence of penumbra (compare to control), since presumably with penumbra there is reduced focal differentiation of activity. Further prospective studies are required to confirm these findings.

This work was supported by Grant from the European Society of Anesthesia (ESA)

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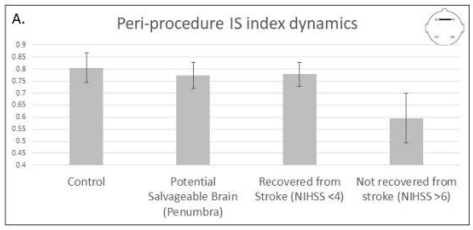
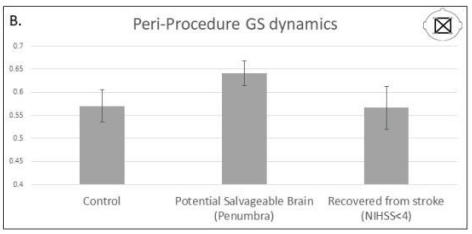
Peri-procedure IS and GS indices dynamics





C.

Index	Control	Potential Salvageable Brain (Penumbra)	Recovered from stroke (NIHSS<4)
IS	High	High	High
GS	Low	High	Low

A. One Way Anova for multiple comparisons revealed that the IS index is significantly different ($p<0.01$) between Control (0.81±0.06), Potential salvageable brain (0.77±0.05), Recovered from Stroke (0.78 ±0.04) to patients with non recovered stroke (0.6±0.1).Thus, IS index can identify stroke under anesthesia. B. Differentiation between patients with Potential Salvageable brain (Penumbra) to control or to patients who recovered from stroke (all have high IS index) can be achieved by utilizing GS index: The GS is higher in patients with Salvageable Brain (0.64 ± 0.02) compare to control (0.57 ± 0.03, $p<0.05$), or compared to patients who recovered from stroke (0.57 ±0.04, $p<0.05$) C. Summary; IS index could identify stroke under anesthesia. The dual interpretation of IS and GS indices could identify penumbra under anesthesia.

637683 - PREOPERATIVE PREDICTION OF HEMODYNAMIC INSTABILITY DURING AND FOLLOWING CAROTID ANGIOPLASTY WITH CT ANGIOGRAPHY

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Introduction:

Carotid stenosis predisposes individuals to ischemic events within the central nervous system and when symptomatic requires intervention. This can be achieved intravascularly through carotid angioplasty and stenting (CAS), particularly in patients of high surgical risk. While a minimally invasive procedure, these patients commonly, but not always, display hemodynamic instability (HI) during balloon inflation and following the procedure, increasing risk of adverse outcomes. Thus, preidentification of individuals at high risk of HI can guide anesthetic management and potentially reduce complications. Patient demographics have limited success in predicting HI[1–3]. Preoperative computed tomography angiography (CTA) has become standard of care, providing a new source of information for risk stratification. Here, we sought to identify whether plaque characteristics on CTA are capable of predicting HI during and after CAS, define any link between intraoperative and postoperative HI, and determine any association between HI and adverse outcomes.

Methods:

After IRB approval we conducted a retrospective chart review of all CAS procedures performed at our centre between January 2013 and December 2018 (N = 298). Patient demographics, medications administered, as well as intra- and post-operative hemodynamic variables were collected. Independently, variables of interest were collected from CTAs by a neuroradiologist and a prediction was made. We defined an event of HI as a 20% or greater drop in either heart rate or blood pressure at angioplasty compared to 5 minutes prior. Correlations between the prediction and presence of HI were determined through a Fisher's exact test.

Results:

Of the 181 patients currently analyzed, 54 displayed intraoperative HI and 19 displayed continued HI. We first assessed whether the radiologist could predict intraoperative HI from the collected CTA variables. Indeed, individuals with a positive prediction have a relative risk (RR) of 1.94 (95% CI 1.28 to 2.99, p = 0.0066) for intraoperative HI. We then assessed whether we could predict prolonged HI. Similarly, patients with a positive prediction have a RR of 2.98 (95% CI 1.30 to 6.84, p = 0.0177) for ongoing HI. Thus, an aggregate assessment of CTA characteristics by the radiologist can predict both intraoperative and ongoing HI. Next, we looked at the association between intraoperative and ongoing HI. Here, we see a strong association between both, where patients with intraoperative HI have a RR of 4.54 (95% CI 1.94 to 10.62, p = 0.0006) for continued instability. Thus, patients with an intraoperative event have a high likelihood of continued instability.

Conclusions:

This study provides a framework for risk stratification prior to CAS using plaque characteristics from the preoperative CTA. Moreover, we show that patients with intraoperative HI are highly likely to have ongoing instability postoperatively. Ongoing analysis will determine the specific CTA variables with predictive capacity and the relative weights, allowing for the development of a generalizable tool. Further, we will define the association between HI and adverse outcomes.

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638294 - USING SUGAMMADEX AS THE REVERSAL AGENT FOR ROCURONIUM IN A PATIENT WITH AUTOSOMAL DOMINANT CEREBELLAR ATAXIA

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Introduction: Autosomal dominant cerebellar ataxia (ADCA) represents a group of rare neurodegenerative disorders with cerebellar ataxia as the main clinical feature. The anesthetic management of hereditary ataxias raises a number of concerns. The use of regional anesthesia may cause progression of the neurological deficits (1). These patients may have unpredictable responses to neuromuscular blockade, including a tendency to hyperkalemia with administration of succinylcholine and variable sensitivity to non-depolarizing neuromuscular blockade (2). Sugammadex reverses neuromuscular blockade by directing binding to aminosteroid non-depolarizing muscle relaxants, such as rocuronium. It was first approved in Canada in February 2016. One of its main indication is for use in patients with muscular or neuromuscular disease. To our knowledge, this case report is the first to discuss the use of sugammadex as the reversal agent for rocuronium in a patient with ADCA undergoing general anesthetic.

Clinical features: Written consent for publication was obtained from the patient. A 43-year-old female with ADCA was scheduled for laparoscopic bilateral tubal ligation under general anesthesia. She first presented 2 years ago to her family practitioner with a 6 month history of neurological symptoms, including poor hand coordination, imbalance with frequent falls and slurred speech. On examination she has mild dysarthria, wide-based, staggering gait, dysmetria and dysdiadochokinesia. She was induced with propofol 3mg/kg, fentanyl 2mcg/kg and rocuronium 0.6mg/kg. She was intubated with a size 7 ETT 90 seconds later. Anesthesia was maintained with 50% oxygen in air and 1 MAC of desflurane. Hydromorphone 0.5 mg in total was given intraoperatively in divided doses. She did not require any further muscle relaxant during the procedure. The hemodynamics were stable. No anesthetic nor surgical complications were encountered during the operation. At the end of the hour long procedure her train of four score was 3/4 with fade and she was reversed with sugammadex 2mg/kg. She was extubated uneventfully and transferred to the recovery area breathing spontaneously.

Discussion: Anesthetic management of patients with hereditary ataxias, such as ADCA, have not been studied through large scale randomized control trials. Clinical practice is mainly informed by anecdotal evidence and case reports. One of the major anesthetic concerns in our patient is the potential variable response to non-depolarizing neuromuscular blockers (2). Hypersensitivity to rocuronium can cause

incomplete reversal, impaired respiratory function, possible desaturation, re-intubation, unplanned ICU admission, and delayed recovery and discharge. We opted to use sugammadex as the reversal agent instead of neostigmine. Neostigmine is a cholinesterase inhibitor that indirectly reverses non-depolarizing neuromuscular blockade. It has limited and unpredictable efficacy with undesirable autonomic responses. In contrast, sugammadex is a selective relaxant-binding agent with benefits including fast and predictable reversal of any degree of block, increased patient safety, and reduced incidence of residual block on recovery (3).

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OBSTETRIC ANESTHESIA

629939 - USE OF ROTATIONAL THROMBOELASTOMETRY TO DETECT LMWH IN VIVO IN OBSTETRICAL PATIENTS

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Introduction

The Practice Guidelines for Obstetrical Anesthesia recommend neuraxial technique to general anesthetic (GA) for most caesarean deliveries[1]. However, impaired coagulation increases risks of epidural or spinal hematoma. The American Society of Regional Anesthesia and Pain Medicine guidelines recommend 12-hours after prophylactic Low Molecular Weight Heparin (LMWH) before neuraxial procedures[2]. Although plasma anti-Xa levels are the gold standard for assessing LMWH activity, the relationship between anti-Xa level and anticoagulation effect is inconsistent[3].

Rotational thromboelastometry (ROTEM) produces a graphical representation of coagulation. Standard measures include[4]:

- Clotting time CT
- Clot formation time CFT
- Alpha angle
- Maximum clot firmness MCF
- Lysis index 30 minutes after CT: Li30

ROTEM can differentiate control, prophylactic and therapeutic dose LMWH in vitro[5]. An observational study was undertaken to assess this in vivo.

- Primary objective: To determine if ROTEM®can detect prophylactic dose LMWH in vivo, assessed by changes in CT, CFT, alpha angle, or MCF before LMWH.
- Secondary Objective: To assess the correlation between anti-Xa activity and ROTEM parameters.

Methods

After obtaining Ethics Approval, 45 women undergoing Caesarean delivery were consented and recruited. Inclusion criteria included prophylactic LMWH prescription. Exclusion criteria included multiple pregnancy, post-partum hemorrhage, severe comorbid disease, thrombophilia or coagulopathy; medications affecting bleeding, pre-eclampsia or abruption. ROTEM profiles were assessed before and 4, 12, and 24 hours after LMWH. Post 4-hour LMWH samples were assessed for Anti-Xa levels.

Results

Significant differences were observed in CT, CFT, and alpha angle 4 hours post prophylactic LMWH, demonstrating that ROTEM can detect prophylactic LMWH in vivo. Significant differences were seen in CT and alpha angle 12 hours post LMWH (Figure 1).

4 hour anti-Xa activity levels were converted to a dichotomous variable, 0: less than 0.2 anti-Xa, 1: ≥0.2 anti-Xa. Receiver operator characteristic curves were generated to understand the discriminatory ability of each metric to identify patients with anti-Xa levels consistent with LMWH for venous thromboembolism prophylaxis (≥ 0.2 anti-Xa). 10 patients had ≥0.2 anti-Xa levels. CT was the lone parameter with acceptable discrimination between groups.

Discussion

ROTEM can detect prophylactic LMWH in vivo; of the measured parameters, CT has the greatest sensitivity to identify patients with anti-Xa level >0.2U/mL. ROTEM is better able to discriminate residual LMWH effects than anti-Xa levels. Anti-Xa levels did not correlate with ROTEM.

CT has a high negative predictive value for detecting clinically significant

residual LMWH. CT may be an ideal point of care test to guide management in situations such as atypical LMWH dosing or when GA carries especially high risk. CT less than 0.2U/mL anti-Xa activity indicates low risk of neuraxial hematoma. By providing additional coagulation information, ROTEM could support safe neuraxial obstetrical anesthesia.

References:

References

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Figure 1

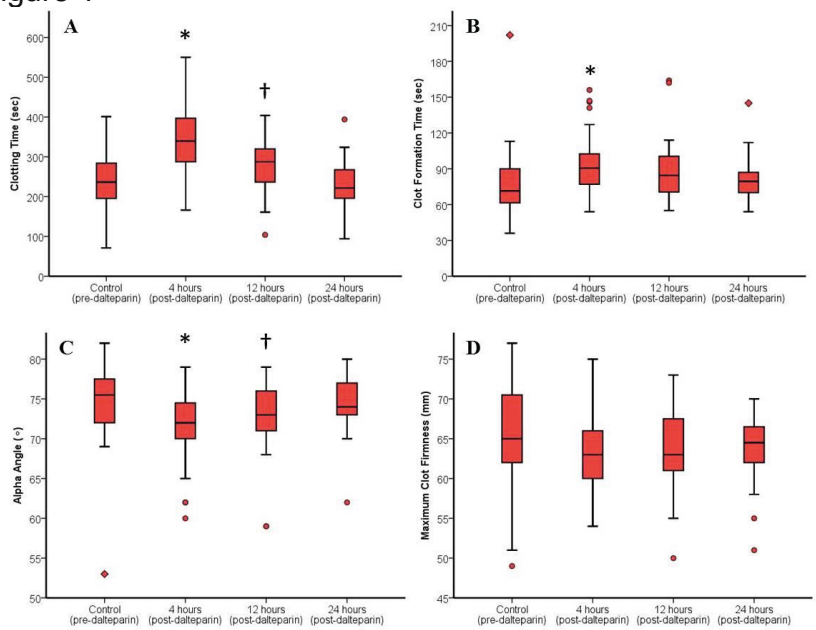

Figure 1. Change in ROTEM® parameters (A. Clotting Time; B. Clot Formation Time; C. Alpha Angle; D. Maximum Clot Firmness) from pre- to post-dalteparin administration.
* Significant difference between pre-dalteparin administration and 4 hours post-dalteparin administration (adjusted $P < 0.017$)
† Significant difference between pre-dalteparin administration and 12 hours post-daltepairn administration (adjusted $P < 0.017$)

635253 - WOMEN'S PREFERENCES FOR ANALGESIA OUTCOMES ASSOCIATED WITH LABOUR EPIDURALS

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Introduction

Labour epidural analgesia (LEA) is an important part of childbirth for women undergoing vaginal deliveries. However, women's preferences for LEA outcomes has been incompletely evaluated. The objective of this study is to determine women's preferences for LEA outcomes and whether they differ between antenatal and postpartum women.

Methods

This prospective cohort study was approved by the institutional ethics board. Questionnaires were distributed to two cohorts screened for eligibility: pregnant women (≥ 24 weeks gestation) at an antenatal visit and postpartum women during their childbirth admission. Common LEA outcomes were compiled using research published in leading anesthesia journals from June 2016 – May 2018. The list was appraised by two obstetric anesthesiologists to evaluate content validity. Volunteer

patients, anesthesiologists and obstetricians reviewed the questionnaire for face validity. Participants ranked the outcomes according to perceived importance. They assigned each a number from 1 to 10 (priority ranking; 1 indicated the highest priority outcome and 10 the least). They also ‘spent’ $100 towards the outcomes (relative value scale), allocating more money to outcomes more important to them. Lastly, they were questioned (1 to 10 numeric ranking scale) regarding LEA expectations (antenatal) or satisfaction (postpartum).

Results

There were 220 questionnaires completed, 105 in the antenatal group and 115 in the postpartum group. The groups were not significantly different in terms of demographics. Achieving desired pain relief was the most important outcome for both groups. It was valued significantly more by the postpartum group who gave it an average of $46, while the antenatal group gave it an average of $35 (*P*=0.004). Postpartum women ranked 'experiencing a short time to achieve pain relief’ as more important compared to antenatal women (Avg 5.2 vs. 3.8 (*P*P=0.004)). While both groups expected/experienced the same level of pre-epidural pain, the postpartum group experienced less post-epidural pain than the antenatal group expected (Avg 3.0 vs. 4.1 (*P*

Discussion

Achieving desired level of pain relief and overall satisfaction with pain management was the greatest concern for women. Side effects such as leg weakness and pruritus were only mildly concerning.

References:

N/A

Table 1 - Ranking and Relative Dollar Value of Potential Labour Epidural Outcomes

Table 1 - Ranking and Relative Dollar Value of Potential Labour Epidural Outcomes

	Rank			Relative Dollar Value		
	Antenatal	Postpartum	*P*-value	Antenatal	Postpartum	*P*-value
Achieving desired pain relief	2.1 ± 1.9	1.6 ± 1.5	0.013	35 ± 26	46 ± 27	<0.004
Overall satisfaction with the pain management	3.9 ± 2.2	3.4 ± 1.9	0.108	14 ± 18	13 ± 16	0.061
Experiencing a short duration of labour	5.0 ± 2.3	5.5 ± 2.2	0.069	11 ± 15	6 ± 10	0.010
Experiencing a short time to achieve pain relief	5.2 ± 2.4	3.8 ± 2.1	<0.001	6 ± 9	10 ± 11	0.009
Avoiding complications such as low blood pressure	5.3 ± 2.5	6.3 ± 2.3	<0.002	8 ± 11	4 ± 6	0.006
Avoiding nausea and/or vomiting as a side effect	5.8 ± 2.4	6.3 ± 2.1	0.127	6 ± 9	6 ± 11	0.578
Receiving the smallest effective dose of pain medication	6.0 ± 3.0	6.5 ± 2.5	0.201	7 ± 11	4 ± 7	0.022
Avoiding anxiety related to labour pain	6.3 ± 2.7	5.9 ± 2.4	0.266	7 ± 11	5 ± 7	0.100
Avoiding leg weakness as a side effect	6.9 ± 2.3	7.3 ± 2.2	0.268	4 ± 7	4 ± 6	0.555
Avoiding itching as a side effect	8.5 ± 1.9	8.4 ± 2.1	0.757	2 ± 3	3 ± 6	0.073

Data are mean ± standard deviation. Rank = 1 to 10 from the highest priority (1) to the least (10). Relative dollar value = dollar value patients would pay out of $100 to achieve an outcome, e.g., postpartum women would pay $46 of their $100 to achieve their desired pain relief.

637361 - DE-CODING OBSTETRIC CODES: A RETROSPECTIVE COHORT STUDY IN A HIGH-RISK TERTIARY CARE CENTRE.

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Introduction: The World Health Organization estimates that for every maternal death there are just over five near misses [1]. Obstetric specific rapid response teams (RRTs) have been developed for obstetric emergencies, but there is limited literature on their role and impact. This study aimed to better understand obstetric near misses by examining obstetric codes, RRT efficiency and patient outcomes.

Methods: After local Research Ethics Board approval, we conducted a retrospective chart review on obstetric codes from Jan 1, 2014 to May 31, 2018. This included: “Code 77” (C77, obstetric emergency), “Code Blue” (CB, cardiopulmonary compromise) and “Code Omega” (CO, massive transfusion). Data on maternal, obstetric and RRT characteristics, etiology, resuscitation and maternal/neonatal outcomes were collected.

Results: 147 codes were identified in 29,862 deliveries (C77 n=110; CB n=12; CO n=25). The incidence of obstetric codes was 492 per 100,000 deliveries. The incidence of maternal and neonatal mortality after codes was 0.68% and 7%, respectively. The most common code etiologies were fetal bradycardia (63%) and cord prolapse (32%) for C77 and postpartum hemorrhage and amniotic fluid embolism for both CB (23%,23%) and CO (68%,16%) (Table 1). The most common obstetric conditions associated with C77 were premature rupture of membranes (28%) and preterm labor (18%); for CB were preeclampsia (36%) and placenta previa (18%); for CO were invasive placentation (43%), placenta previa (24%) and gestational diabetes (24%). 61% of codes were called after hours. The median (IQR) time (min) for RRTs to arrive was 2 (1,3) for C77, 3.5 (2,5) for CB and 6.5 (3,11) for the first blood product to arrive for CO. The decision to delivery interval (DDI) was 8 (5,15) min after C77. An obstetrics and anesthesia staff/fellow, respiratory therapist/anesthesia assistant were present at least 80% of the time. Emergency cesarean delivery (CD) was performed after most (57%) codes and general anesthesia was administered in 62% of CDs. Five

patients who had CB received chest compressions and four received defibrillation. Ten women required hysterectomy after CO. Major maternal morbidity was seen in 31%. Debrief was done in only 4% of codes and documentation was poor.

Discussion: We identified high-risk patients for various codes who may benefit from closer peripartum monitoring and immediate intervention considering one-third of these cases develop major maternal morbidity. Such high-risk conditions include fetal bradycardia, cord prolapse, postpartum hemorrhage and amniotic fluid embolism. Code teams in our study were effective in having rapid arrival time and DDIs within the recommended 30-minute timeframe. Adequate staffing, education, documentation and debriefing, as well as resources to handle emergencies are essential to ensure safe and timely CD and resuscitation.

References:

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Table 1. Characteristics of Code 77, Code Blue and Code Omega in Obstetric Patients, 2014-2018

Variable	Overall N=147	Code 77 N=110	Code Blue N=12	Code Omega N=25
Etiology of code, N (%)				
Fetal bradycardia	73 (49.6)	69 (62.7)	2 (16.7)	2 (8.0)
Cord prolapse	35 (23.8)	35 (31.8)	0 (0)	0 (0)
Postpartum hemorrhage	20 (13.6)	0 (0)	3 (25.0)	17 (68.0)
Placental abruption	13 (8.8)	12 (10.9)	0 (0)	1 (4.0)
membranes	13 (8.8)	13 (11.8)	0 (0)	0 (0)
Precipitous labor	13 (8.8)	13 (11.8)	0 (0)	0 (0)
Footling breech	9 (6.1)	9 (8.2)	0 (0)	0 (0)
Amniotic fluid embolism	8 (5.4)	1 (0.9)	3 (25.0)	4 (16.0)
Difficult fetal extraction	7 (4.8)	7 (6.4)	0 (0)	0 (0)
Cardiac arrest	5 (3.4)	1 (0.9)	2 (16.7)	2 (8.0)
Preeclampsia	4 (2.7)	2 (1.8)	2 (16.7)	0 (0)
Seizure	2 (1.4)	0 (0)	2 (16.7)	0 (0)
Atrial fibrillation	1 (0.7)	0 (0)	1 (8.3)	0 (0)
Uterine rupture	1 (0.7)	1 (0.9)	0 (0)	0 (0)
Timing of code, N (%)				
During labor	87 (59.2)	87 (79.1)	0 (0)	0 (0)
Postpartum	27 (18.4)	n/a	8 (66.7)	19 (76.0)
Antepartum	23 (15.6)	20 (18.2)	1 (8.3)	2 (8.0)
During delivery	12 (8.2)	3 (2.7)	3 (25.0)	6 (24.0)
Location of code, N (%)				
Labor and delivery	70 (51.5)	64 (60.4)	3 (33.3)	3 (14.3)
Operating room	33 (24.3)	10 (9.4)	5 (55.6)	18 (85.7)
Antenatal floor	23 (16.9)	22 (20.8)	1 (11.1)	0 (0)
Outside labor and delivery	10 (7.4)	10 (9.4)	0 (0)	0 (0)
Unknown	11 (7.5)	4 (3.6)	3 (33.3)	4 (16.0)
Personnel calling code, N (%)				
Obstetrician	59 (40.1)	54 (49.1)	3 (25.0)	2 (8.0)
Registered nurse	38 (25.9)	36 (32.7)	2 (16.7)	0 (0)
Anesthesiologist	27 (18.4)	1 (0.9)	6 (50.0)	20 (80.0)
Emergency medicine physician	5 (3.4)	5 (4.5)	0 (0)	0 (0)
Midwife	4 (2.7)	4 (3.6)	0 (0)	0 (0)
Hospital security	4 (2.7)	4 (3.6)	0 (0)	0 (0)
ICU team	2 (1.7)	0 (0)	0 (0)	2 (8.0)
General practitioner	1 (0.7)	1 (0.9)	0 (0)	0 (0)
Unknown	6 (4.1)	4 (3.6)	1 (8.3)	1 (4.0)
Personnel present at code, N (%)				
Obstetrics staff/fellow	143 (97.3)	108 (98.2)	10 (83.3)	25 (100.0)
Respiratory therapist	125 (85.0)	95 (86.4)	9 (75.0)	21 (84.0)
Anesthesia staff/fellow	122 (83.0)	87 (79.1)	10 (83.3)	25 (100.0)
Obstetrics resident	105 (71.4)	83 (75.5)	7 (58.3)	15 (60.0)
Neonatalogy resident	68 (46.3)	62 (56.4)	1 (8.3)	5 (20.0)
Anesthesia resident	63 (42.9)	42 (38.2)	7 (58.3)	14 (56.0)
Anesthesia assistant	61 (41.5)	41 (37.3)	6 (50.0)	14 (56.0)
Neonatalogy staff/fellow	29 (19.7)	28 (25.5)	0 (0)	1 (4.0)
ICU staff/fellow	12 (8.23)	2 (1.8)	5 (41.7)	5 (20.0)
ICU resident	10 (6.8)	2 (1.8)	5 (41.7)	3 (12.0)
Internal medicine physician	10 (6.8)	0 (0)	7 (58.3)	3 (12.0)
Midwife	7 (4.8)	6 (5.5)	0 (0)	1 (4.0)
ICU nurse	6 (4.1)	2 (1.8)	2 (16.7)	2 (8.0)
Emergency medicine physician	4 (2.7)	4 (3.6)	0 (0)	0 (0)
Hematology physician	3 (2.0)	0 (0)	1 (8.3)	2 (8.0)
Response time, minutes [Median,(IQR)]				
Code call to team arrival		2 (1,3)	3.5 (2.3,4.8)	6.5 (3.3,10.8)*
Code call to patient in operating room		2 (1,3)		
Operating room to skin incision		6 (4,9)		
Decision to delivery interval		8 (5,15)		
Maternal morbidity, N (%)				
ICU Admission	26 (18.4)	1 (0.9)	8 (72.3)	17 (81.0)
Post-code transfusion	17 (12.1)	6 (5.5)	4 (36.4)	7 (33.3)
Surgical site infection	11 (7.8)	5 (4.6)	1 (9.1)	5 (23.8)
Re-admission to hospital	10 (7.1)	6 (5.5)	1 (9.1)	3 (14.3)
Sepsis	6 (4.3)	2 (1.8)	2 (18.2)	2 (9.5)
Cardiac failure	3 (2.1)	0 (0)	3 (27.3)	0 (0)
Acute kidney injury	3 (2.1)	0 (0)	2 (18.2)	1 (4.8)
Pulmonary edema	2 (1.4)	0 (0)	1 (9.1)	1 (4.8)
Neurological impairment	1 (0.7)	1 (0.9)	0 (0)	0 (0)
Return to operating room	1 (0.7)	0 (0)	0 (0)	1 (4)
Maternal mortality, N (%)				

637481 - A RETROSPECTIVE COHORT ASSESSMENT OF PIEB COMPARED TO CONTINUOUS EPIDURAL INFUSION FOR LABOUR ANALGESIA

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Background: Programmed intermittent epidural bolus (PIEB) is the next evolution of labour analgesia that may replace continuous epidural infusion (CEI). PIEB may result in a decreased amount of local anesthetic consumption, decreased duration of second stage of labour, and potential reduction in instrumental vaginal delivery (IVD) rates.(1) At the authors' institution the primary method of labour analgesia was CEI in conjunction with PCEA. Since 2015, PIEB with PCEA has been exclusively offered for labour analgesia. The goal of this study is to evaluate the impact on obstetrical outcomes after the institutional change in labour analgesia from CEI to PIEB.

Methods: With institutional ethics and data access approval, a population-based cohort analysis was conducted using data from a provincially validated database. This database collects information on all pregnancy outcomes from our institution. Information on patient demographics, such as maternal age, gestational age, length of second stage of labour, fetal outcomes, and mode of delivery are available. The study population included parturients with term, singleton pregnancies of vertex presentation, receiving epidural labor analgesia, that delivered at the authors' institution in 2014 (CEI) or 2017 (PIEB).

Results: The sample includes 7,967 patients; 4,299 who delivered in 2014 with CEI and 3,668 who delivered in 2017 with PIEB (Table 1). The patients were demographically similar except for parity and race/ethnicity. Patients in the CEI cohort less frequently had labour induced or augmented. The cesarean delivery rate was similar in each cohort. CEI was associated with lower IVD rates for forceps and vacuum deliveries. The second stage of labour was shorter compared with PIEB. The PIEB cohort experienced more perineal injuries.

Discussion: Despite initial evidence suggesting possible improved analgesia with less motor blockade and possibly reduced IVD, institutional data from real life implementation suggests PIEB is associated with higher rates of IVD.

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Table 1

Table 1

	CEI N = 4,299	PIEB N = 3,668	*P*-value
Age (years)	31 [7.6]	31 [7.5]	0.15
Race/Ethnicity (% Caucasian)	1,965 (46%)	1,457 (40%)	< 0.001
Gravidity	2 [2]	2 [2]	0.83
Parity	1 [1]	0 [1]	0.04
Gestational Age (weeks)	39.4 [1.9]	39.4 [2.0]	0.13
Induced Labour	1,381 (32%)	1,352 (37%)	<0.001
Augmented Labour	776 (18%)	724 (20%)	<0.001
Length of 2nd Stage (minutes)	83+/-97	89+/-96	0.01
Perineal Injury	2,232 (52%)	2,030 (55%)	0.002
Spontaneous Vaginal Delivery	3,032 (70%)	2,496 (68%)	0.02
Forceps Vaginal Delivery	155 (3.6%)	183 (5%)	0.002
Vacuum Vaginal Delivery	159 (3.7%)	206 (5.6%)	< 0.001
Cesarean Delivery	953 (22%)	783 (21%)	0.38

Data presented as Median[IQR], n(%), or Mean+/-SD
Continuous variables were assessed for normality, and all were found to be skewed and kurtotic; therefore non-parametric comparisons were made. Categorical variables were assessed using Pearson's chi squared or Fisher's exact tests.

636996 - ANESTHETIC MANAGEMENT OF SEXAGENARIAN UNDERGOING CESAREAN DELIVERY COMPLICATED BY UTERINE ATONY: A CASE REPORT

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Introduction: Though rare, pregnancy at very advanced maternal age (AMA) is becoming more frequent in high-income countries(1). Assisted reproductive technology (ART) now allows post-menopausal women to conceive, but has been associated with increased risk of adverse maternal and neonatal outcomes(2). Anesthetic literature addressing pregnant women of extreme AMA is sparse.

Case Description: Informed consent was obtained from the patient for this case report. Research ethics board approval is not required for case reports at our institution. A 64 year-old G1P0 healthy female presented for elective cesarean delivery (CD) at 36+1 weeks. She had undergone in-vitro fertilization with embryo donation and returned to Canada for prenatal care. Though her pregnancy was uncomplicated, it was felt by obstetrics that CD was preferred due to concern regarding vaginal elasticity, uterine tone, and risk of spontaneous intrauterine fetal death.

Anesthetic management consisted of two 18g peripheral intravenous catheters and a spinal anesthetic with hyperbaric bupivacaine, fentanyl, and morphine. The patient was co-loaded with lactated Ringers and phenylephrine infusion was started. The patient developed second degree heart block and bradycardia shortly after introduction of the spinal anesthetic that responded to glycopyrolate.

Following delivery (APGARS 9,9), poor uterine tone was noted despite oxytocin infusion. A bolus of oxytocin was given; then with no improvement, it was followed by carboprost and ergonovine. Given the failure of uterotonics and possible postpartum hemorrhage, tranexamic acid was administered. Uterotonics and tranexamic acid were given without adverse effect. On closure of the hysterotomy, the myometrium was noted to be unusually rigid and tore easily. Estimated blood loss was 1000 ml. The

patient remained hemodynamically stable, holding her infant. She had an uneventful postoperative course and breastfed. The neonate was later admitted to the NICU due to possible transient pulmonary hypertension of the newborn which resolved without intervention.

Discussion: CD in a healthy parturient over 60 years of age may safely be performed with standard spinal anesthetic technique. Though hyperbaric bupivacaine may result in a higher level of block and increased latency to maximal level of spread with increasing age(4), a high block was not observed in this patient. Baroreceptor reflex sensitivity decreases, risk of conduction defects increases with age; therefore an elderly parturient's response to phenylephrine infusion may be unpredictable. It is not known how a uterus of this age would respond to these uterotonic agents. Though the risk of postpartum hemorrhage has been found to be increased with advanced maternal age(5), it is unclear whether this patient's advanced age contributed to the uterine atony.

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638130 - ANESTHETIC MANAGEMENT OF PATIENTS POST HEART TRANSPLANT HAVING CESAREAN DELIVERY: CASE STUDY AND LITERATURE REVIEW

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PURPOSE: Anesthetic management of parturients post heart transplant (HT)is challenging. Preload dependence, the need for direct vasoactive drugs, immunocompromise, and additional comorbidities must be recognized. We report our experience of CD in a patient post HT and review similar published cases.

CLINICAL FEATURES: Informed patient consent was obtained in accordance with local institutional guidelines. A 36 yo G1P0 woman with a known HT secondary to viral dilated cardiomyopathy, recent PE, hypertension, asthma and chronic kidney disease was admitted at 35 weeks with increasing dyspnea. Medications included tinzaparin, ASA, methyldopa, lansoprazole, salbutamol, escitalopram, azathioprine and tacrolimus. After multidisciplinary planning, elective CD was performed at 36 weeks gestation because of severe anxiety. After application of monitors, aspiration prophylaxis, Lactated Ringer's co-load, and a phenylephrine infusion were administered. Combined spinal-epidural (CSE) anesthesia was performed under strict asepsis. Anesthesia was achieved with Bupivacaine 0.75% 1.0mL, morphine 200mcg, and fentanyl 15mcg intrathecally. A T4 block was achieved and the infant was delivered uneventfully. Carbetocin 100mcg was given slowly. Hemodynamic parameters were followed closely. Two doses of 5mL Lidocaine 2% with epinephrine were given via epidural. Blood loss was 500mL. The patient was admitted to the ICU for 24 hour monitoring and was discharged on post-operative day 4.

LITERATURE REVIEW: Pubmed was searched for reports of anesthetic management of parturients post HT having CD. Three reports were identified describing 5 cases. All

described a multidisciplinary approach. All patients received neuraxial anesthesia, two had spinals, two had epidurals, and one had a CSE. Only one patient had an arterial line. None had central venous access. Post-operatively, three had a planned ICU admission. All patients recovered well and were discharged home within one week. Neonatal outcomes were good.

CONCLUSION: Reports of these cases are rare. With careful titration, neuraxial anesthesia appears to be well tolerated in parturients with HT undergoing CD. Standard monitoring is usually adequate. ICU for post-partum monitoring should be available. A multidisciplinary approach is advised.

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638181 - THE PARTURIENT WITH SEVERE SICKLE CELL DISEASE UNDERGOING CESAREAN DELIVERY: A CASE STUDY AND LITERATURE REVIEW

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INTRODUCTION: Anesthetic management of parturients with severe sickle cell disease (SCD) is challenging. Despite progress in treatment of SCD, morbidity in pregnancy remains high. Goals of management include avoiding hypoxia, hypotension, hypothermia, and acidosis. We present our management of a parturient with severe SCD complicated by multiple red blood cell (RBC) alloantibodies, as well as a literature review.

CLINICAL FEATURES: Informed patient consent in accordance with local institutional guidelines was obtained. A 25 year old G2P0 woman with known SCD was admitted to hospital at 29 weeks gestation with severe anemia. A multidisciplinary case conference was held to guide management. With supportive measures and darbepoietin, her hemoglobin (Hb) returned to baseline levels. Induction of labour at term was planned, with epidural analgesia. Crossmatched blood remained severely limited because of multiple alloantibodies. At 36 weeks gestation her Hb dropped to 41, platelet count to 64, and ultrasound demonstrated severe fetal intrauterine growth restriction. The decision was made to proceed to cesarean delivery (CD). One unit packed RBC was transfused preoperatively after transient immunosuppression. CD was performed under general anesthesia in the main operating room. After uneventful delivery of an infant, the uterus was initially noted to be atonic. Carbetocin, tranexamic acid and carboprost were administered with improvement of uterine tone. Total blood loss was 700 mL. She did not receive further transfusion intraoperatively and was admitted to the intensive care unit intubated and ventilated. Hb was 42 on postoperative day (POD) 1. Her postpartum course was complicated by an acute chest

crisis and ongoing anemia requiring a second unit of packed RBC transfusion. She was discharged home POD 15.

LITERATURE REVIEW: PubMed was searched for reports of anesthetic management of parturients with SCD. Four reports were identified describing 60 cases. Of these, 30 parturients underwent CD, 23 with neuraxial anesthesia and 9 with general anesthesia. CD rate in this population is reported as 31-47%, and general anesthesia has been associated with increased postnatal sickling complications. There have been no published reports of anesthetic management of the parturient with SCD and alloimmunization to RBC antigens, despite rates of RBC alloantibodies being 18-38% amongst SCD patients.

CONCLUSION: A multidisciplinary approach was paramount to achieve a successful outcome in a parturient with severe SCD and RBC alloimmunization undergoing CD.

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PAIN MANAGEMENT

616182 - EFFICACY OF ROPIVACAINE ALONE OR IN COMBINATION WITH DEXAMETHASONE FOR SUBCOSTAL TAP BOCK IN CHOLECYSTECTOMY

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Intrduction: Postoperative pain following open cholecystectomy is severe, sustained and causes significant morbidity to patients. Recent randomized trials indicate that oblique subcostal transversus abdominis plane (OSTAP) block provides effective analgesia in upper abdominal surgery. Addition of dexamethasone to local anesthetic agent increases its analgesic efficacy along with decreased requirement of opioids and other analgesic drugs.[1-3]

Methods: In this randomized, double blind trial, 60 patients undergoing open cholecystectomy were allocated in two groups to receive unilateral oblique subcostal TAP block. Group R received OSTAP block with18 ml of 0.75% of ropivacaine and 2ml of normal saline, while group RD was administered 18 ml of 0.75% ropivacaine with 2 ml of dexamethasone, after induction of anesthesia. Postoperative pain treatment consisted of intramuscular tramadol 100 mg in surgical ward when VAS score was ≥ 4. The primary outcome was total tramadol consumption postoperatively. Secondary outcomes include time to first request for tramadol, VAS score, sedation score, nausea score, requirement of rescue antiemetic, any side effects and quality of healing. Paired comparisons at each time interval were performed using the t-test. Categorical data was analyzed using chi-square test.

Results : The total amount of tramadol consumption was significantly lower in group RD as compared to group R (p=0.009). The time to first request for tramadol was also significantly increased in group RD as compared to group R (p

Discussion: Oblique subcostal TAP block is effective in providing post operative pain relief following open cholecystectomy. Addition of dexamethasone to ropivacaine in OSTAP decreases the total amount of tramadol consumption for 24 postoperative hours.

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632257 - PREVENTION OF EPIDURAL CATHETER MIGRATION: A COMPARATIVE EVALUATION OF TWO TUNNELING TECHNIQUES

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Introduction: Epidural analgesia failure episodes can be reduced by catheter fixation technique with a lower incidence of catheter migration; in this clinical study we have compared the role of two epidural catheter tunneling techniques for the prevention of epidural catheter migration.

Methods: Following approval from institutional ethical committee and informed consent; patients undergoing major abdominal surgery were randomised into three groups of fifty each on the basis of method of securing epidural catheter; the epidural catheter was secured without tunneling in the Control group, with tunneling along with a catheter loop in the Tunneling group 1 and with tunneling without a catheter loop in the Tunneling group 2. Primary outcome measure was migration of epidural catheter; secondary outcome measures were adequacy of analgesia and signs of inflammation. All patients were followed up by the acute pain service team twice daily in the post-operative period till the epidural catheter was removed. Results were analyzed by the one way ANOVA, Chi square test and Fisher's exact test. P value

Results: The three groups were similar with respect to patient characteristics; Catheter migration was significantly reduced in the tunneling group 2 (3 patients) as compared to other 2 groups i.e. tunneling group 1 (8 patients) (P0.05).

Discussion: Catheter migration was significantly reduced by tunneling without a catheter loop technique as compared to other two groups<./p>

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632267 - THORACIC PARAVERTEBRAL VS EPIDURAL ANALGESIA FOR PAIN RELIEF IN PATIENTS UNDERGOING OPEN NEPHRECTOMY

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Introduction: The aim of this prospective, double-blind, randomized trial was to compare the thoracic paravertebral and epidural analgesia for post-operative pain relief in patients undergoing open nephrectomy.

Methods: Following approval from institutional ethical committee and informed consent, ninety two adult patients undergoing open nephrectomy under general anaesthesia were randomized to receive a continuous thoracic paravertebral infusion (Group 1) or continuous thoracic epidural infusion (Group 2) of bupivacaine 0.1% with 2μg/ml fentanyl @ 0.1 mL/Kg/h. Both infusions were started before skin incision; Visual analog scale (VAS) scores at rest, deep breathing and coughing, postoperative nausea and vomiting (PONV), sedation, and respiratory depression were assessed till the morning of third post-operative day. Results were analyzed by the one way ANOVA, Chi square test, Mann Whitney U test and Fisher's exact test. P value.

Results: The two groups were similar with regard to demographic factors. The VAS scores at rest, deep breathing and coughing were similar in the two groups ($P>0.05$); the incidence of side effects were also similar in the two groups ($P>0.05$). The mean systolic blood pressures were lower in the epidural group (group 2) as compared to the paravertebral group (group 1); but the difference was not significant ($P>0.05$).

Discussion: Post-operative pain relief provided by thoracic paravertebral analgesia was similar to the thoracic epidural analgesia in patients undergoing open nephrectomy.

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634163 - HOW DO VARIOUS COMBINATIONS OF MULTIMODAL ANALGESIA FOR TOTAL KNEE ARTHROPLASTY IMPACT READINESS TO DISCHARGE?

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Introduction: In the current Canadian healthcare climate of diminishing funds, there is a need for treatments to be both successful and cost effective. In order to reduce costs, the goal is often to reduce hospital stays through earlier discharge. For total knee arthroplasty, post-operative pain is significant. Various studies have compared multimodal analgesia, including periarticular infiltration, single shot femoral nerve block, and intrathecal morphine, with conflicting results.[1,2,3,4,5] The goal of this study was to investigate which combination of techniques would facilitate early readiness to discharge for patients undergoing primary total knee arthroplasty.

Method: Research ethics board approval was obtained to conduct a prospective five-arm, single-center, double blinded, randomized controlled study on patients undergoing primary total knee arthroplasty. 258 participants were randomized to one of the following study arms:

1. Intrathecal Opioid + Femoral Nerve Block + Periarticular Injection

2. Intrathecal Opioid + Femoral Nerve Block + Normal Saline Periarticular injection

3. Intrathecal Opioid + Normal Saline Femoral Nerve Block + Periarticular Injection

4. Normal Saline intrathecal + Femoral Nerve Block + Periarticular Injection

5. Intrathecal Opioid + Normal Saline Femoral Nerve Block + Normal Saline Periarticular injection

All groups received a spinal anaesthetic (15 mg bupivacaine, 15mcg fentanyl), a femoral nerve block and a periarticular injection. With medication, periarticular injections consisted of 150mg Ropivacaine, 30mg Ketorolac, 600mcg epinephrine, femoral nerve blocks consisted of 150mg Ropivacaine, 7.5mcg epinephrine and intrathecal opioid injections consisted of 150mcg epimorphine. Normal saline of exact injectate volumes were used for all three modalities when medication was not indicated, as determined by computer-generated randomization. Postoperatively, all groups were given routine acetaminophen, anti-inflammatories, and intravenous opioids for the first 24 hours followed by oral opioids. The primary outcome was time to discharge readiness (in half day increments) once all standardized physiotherapy discharge criteria were met. Secondary outcome included postoperative total narcotic consumption.

Result: In total, 258 patients were randomized. Data from 231 subjects was analysed. The intrathecal morphine control group (n= 43) required significantly more post-operative analgesia (230mg morphine; p=0.0027), as compared to those who received periarticular infiltration + femoral nerve block + intrathecal morphine (n = 46; 156mg morphine), femoral nerve block + intrathecal morphine (n=51; 164mg morphine), periarticular infiltration + intrathecal morphine (n=45; 156mg morphine), and periarticular infiltration + femoral nerve block (n=46; 148mg morphine) arms. We observed a similar time to meeting discharge criteria (2 days) across all groups (p>0.05).

Discussion: Preliminary results suggest that by combining multimodal intraoperative analgesia for primary total knee arthroplasty, patients' pain management and postoperative experience is improved. However, in our study, this did not result in earlier discharge. Other factors, such as patient education, expectations, and motivation, may be more important to leaving hospital sooner.

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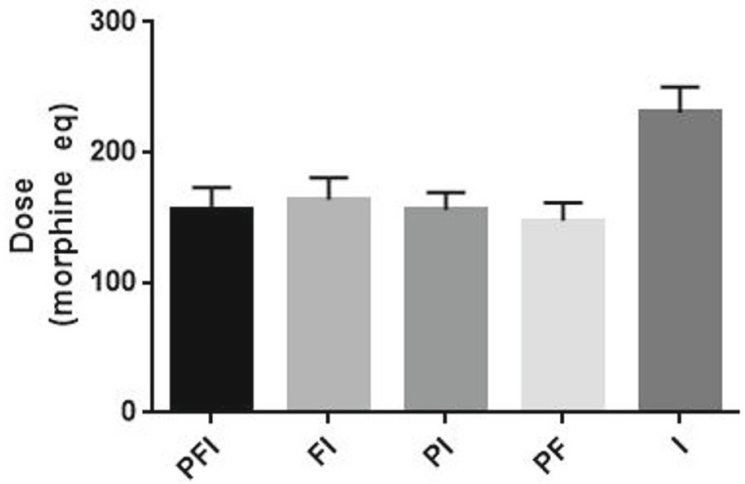
Comparison of total opioid consumption in morphine equivalence



Total dose of opioid consumption inmorphine equivalence (mg) for each study arm : (PFI) Intrathecal Opioid + Femoral Nerve Block + Periarticular Injection, (FI) Intrathecal Opioid + Femoral Nerve Block + Normal Saline Periarticular injection, (PI) Intrathecal Opioid + Normal Saline Femoral Nerve Block + Periarticular Injection, (PF) Normal Saline intrathecal + Femoral Nerve Block + Periarticular Injection, (I) Intrathecal Opioid + Normal Saline Femoral Nerve Block + Normal Saline Periarticular injection

637841 - CHRONIC POST-SURGICAL PAIN AFTER BREAST CANCER SURGERY: A SYSTEMATIC REVIEW & META-ANALYSIS

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Introduction:

Chronic post-surgical pain (CPSP) is a common complication after breast cancer surgery; but reported prevalence rates range from 10% to 69%. A recent systematic review reported persistent pain after breast cancer treatment was 21.8% from 106 studies[1]; however, there are some limitations, including outdated search, the inclusion of randomized trials and observational studies, a simple calculation of the events among total sample sizes without considering variation between studies, and no pooling analysis. We conducted a systematic review and meta-analysis to address these limitations and uncertainty.

Methods:

REB is not required for a systematic review. We searched MEDLINE, EMBASE, CINAHL and PsycINFO from inception to October 2018, to identify observational studies that reported the prevalence and intensity of CPSP after breast cancer surgery. We performed a random-effects meta-analysis with Freeman-Tukey transformation[2] for overall, neuropathic pain, moderate and severe CPSP prevalence, and pooled pain intensity after converting all pain scales to the 10cm VAS.

Results:

We included 184 observational studies with 298,549 patients. The overall prevalence of any CPSP was 34.8% (95%CI 30.2% to 39.5%).

The pooled prevalence of moderate and severe pain was 14.9% (95%CI 11.5% to 18.7%) and 4% (95%CI 2.7% to 5.5%) respectively.

CPSP prevalence was 36.2% (95%CI 29.5% to 43.2%) at 3 months to 1 year after surgery, 33.7% (95%CI 15.3% to 55.1%) at 1 to 2 years, 26.6% (95%CI 11.3% to 45.5%) at 2 to 4 years and 36.6% (95%CI 21.1% to 53.7%) at 4 years or later.

The prevalence of neuropathic pain was 33.7% (95%CI 22% to 46.5%). The average pain intensity on a 10cm VAS was 2.7 (95%CI 2.2 to 3.1).

We will also perform subgroup analyses for risk of bias, any pain vs. specific pain, axillary lymph nodes dissection and radiotherapy, and meta-regression for the association between CPSP and length of follow-up and proportion of loss to follow-up.

Discussion:

CPSP after breast surgery is common and affects approximately 1 in 3 women undergoing this procedure. Of those who develop persistent pain, 43% will report at least moderate pain and 12% will experience severe pain although the average pain is mild.

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Figure 1 Overall prevalence of CPSP after breast cancer surgery

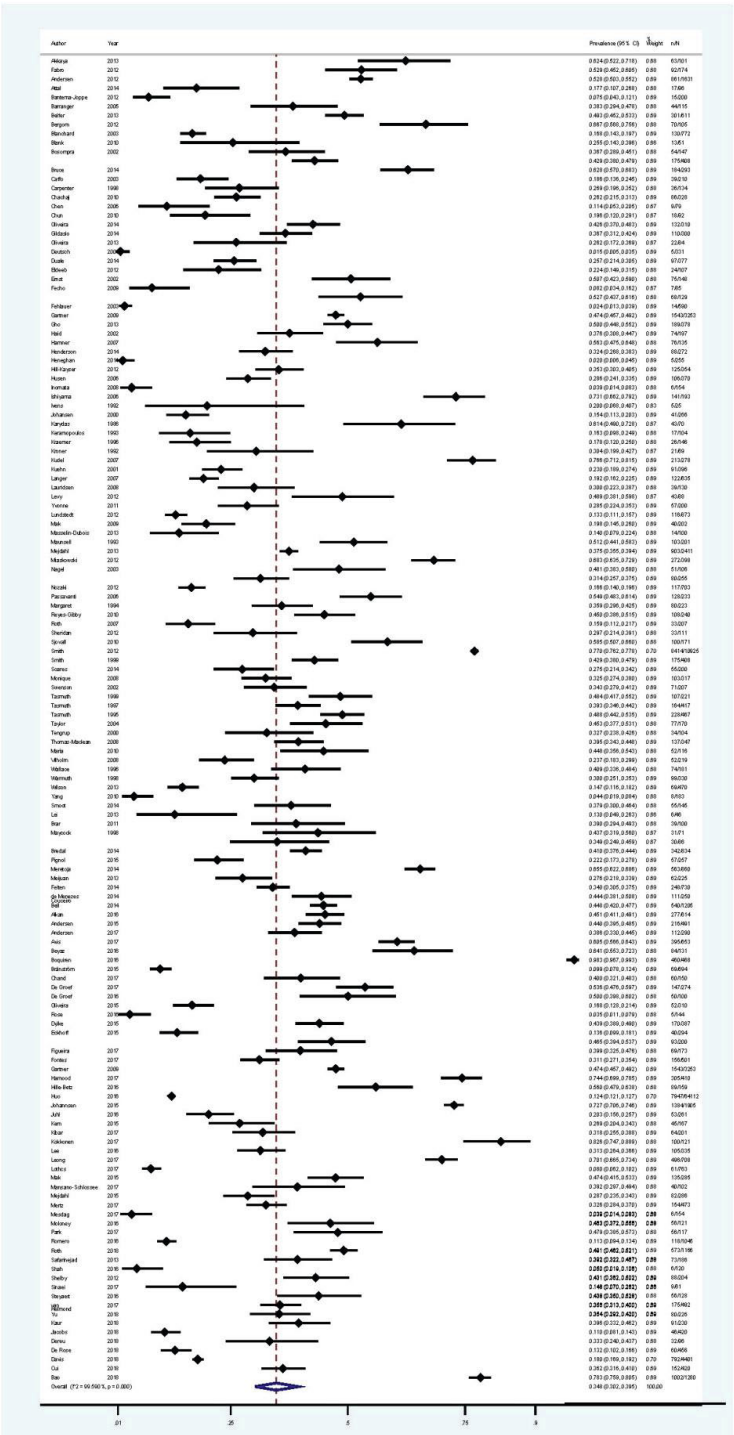

Figure 1 Overall prevalence of CPSP after breast cancer surgery

638307 - THE ASSOCIATION BETWEEN SELF-REPORTED PAIN SCORES AND PHYSICAL ACTIVITY IN THE POSTOPERATIVE PERIOD

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Introduction: Pain intensity in the postoperative period is routinely measured using the 11-point Numeric Rating Scale (NRS). Using the NRS is quick and simple but its validity and clinical utility in the postoperative period has been brought to question. For instance, postoperative pain reported in this way has been demonstrated to be neither useful for guiding clinical pain management[1] nor assessing perioperative anesthesiologist performance[2]. This study aimed to determine if pain intensities reported by a cohort of thoracic surgery patients using the NRS were clinically useful predictors of objectively measured physical activity in the postoperative period.

Methods: Following approval from the institutional research ethics board, we conducted a prospective observational study of adult patients undergoing thoracic surgery from 2013-2017 at a major Canadian academic care centre. Immediately following surgery, patients were equipped with an Actiwatch-64® (Phillips Respironics) that recorded their physical activity until hospital discharge. Only postoperative days where the device was worn for greater than 10 hours were eligible for analysis[3]. Daily average pain intensity was reported by patients using the NRS every postoperative day until discharge, or for up to a maximum of seven days. Covariates were selected a priori based on biologic plausibility and included the amount of daily morphine equivalents consumed, use of epidural analgesia, multimodal analgesia, history of

arthritis and chronic pain, preoperative opioid use as well as demographic variables such as age, sex, body mass index and type of incision. The unadjusted association between proportion of active time per day and daily average pain intensity was determined using a Pearson correlation coefficient. To assess this relationship while adjusting for covariates, we used a generalized estimating equation model with an auto-regressive correlation structure to account for repeated measures and clustering within patients. Significance was defined as a p-value <0.05 and all tests were two-tailed.

Results: We enrolled 127 patients who had a combined total of 419 postoperative days of eligible data. On average, patients were considered active for 28.5% ± 17.9% (411± 257 minutes) of each postoperative day. The Pearson correlation coefficient between proportion of active time per day and pain intensity was 0.066 (p=0.160, 95% CI: -0.026 to 0.158). After adjustment for covariates, the coefficient for pain was not statistically significant at a value of -0.93 (p=0.815, 95% CI: -0.875 to 0.688).

Discussion: Our study demonstrated no correlation between proportion of active time per day and pain intensity. Patient-reported pain intensities using the NRS in the postoperative period are not clinically useful predictors of postoperative physical activity. Wearable activity monitors may be an important tool to objectively measure patient-centered outcomes, however further studies are needed to assess their validity against established tools.

References:

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631533 - EPIDURAL BUPIVACAINE VS ROPIVACAINE FOR DYNAMIC PAIN RELIEF AFTER UPPER ABDOMINAL SURGERY: A RANDOMIZED TRIAL

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Introduction: The aim of this prospective, double-blind, randomized trial was to evaluate epidural bupivacaine and ropivacaine for post-operative dynamic pain relief in patients undergoing major upper abdominal surgery.

Methods: The study protocol was approved from the institutional ethical committee and a written informed consent was obtained from all the patients participating in the study. Sixty patients undergoing major upper abdominal surgery under general anaesthesia and thoracic epidural analgesia (T8-9 or T9-10 interspace) were randomly allocated into two groups; Group Ropivacaine: 0.1% epidural ropivacaine with 2μg/ml fentanyl @ 7ml/hr; Group Bupivacaine: 0.0625% epidural bupivacaine with 2μg/ml fentanyl @ 7ml/hr. Primary outcome was dynamic pain as assessed by Visual analog scale (VAS) scores (at deep breathing, coughing, rising from supine position) and secondary outcomes were the side effects, assessed till morning of third post-operative day. Results were analyzed by one way ANOVA, Mann Whitney U test and Fisher's exact test. P value

Results: The two groups were similar with regard to demographics and dynamic pain VAS scores during deep breathing, coughing and rising from supine position. Mean Systolic blood pressures were lower in the bupivacaine group during the first 24 hours as compared to the ropivacaine group (P>0.05); motor blockade in lower limbs was recorded in one patient in bupivacaine group; PONV was present in two patients in bupivacaine group and four patients in ropivacaine group; no other side effects were recorded; these differences were not significant.

Discussion: The bupivacaine and ropivacaine provided similar pain relief during deep breathing, coughing and rising from supine position; the incidence of side effects was

found to be higher with bupivacaine but the difference were not significant.

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637725 - COMPLEX REGIONAL PAIN SYNDROME ASSOCIATED WITH HENOCH-SCHONLEIN PURPURA: A RARE OCCURRENCE- A CASE REPORT

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Introduction: Henoch-Schonlein Purpura (HSP) is an acute, systemic, immune complex-mediated, leukocytoclastic vasculitis, most commonly affecting children. It is a small-vessel vasculitis which is characterized by a tetrad of palpable purpura (without thrombocytopenia), abdominal pain, arthritis and renal impairment. Although, most commonly affecting skin, joints, gastrointestinal tract, and kidneys, other organs may also be affected. Association of HSP with Complex Regional Pain Syndrome (CRPS) has not been reported in literature. In the present case report we are describing successful management of CRPS of upper limb in a diagnosed case of HSP.

Case presentation: The consent for the publication of this case report has been obtained from parents fof the patient.

A 14 year old female patient, who was a diagnosed case of HSP, presented with features characteristic of CRPS in right hand and forearm, based on Budapest Diagnostic Criteria. Bone scintigraphy showed increased tracer uptake in joints of right hand, also suggestive of CRPS. Pain was severe (VAS- 90/100) and not controlled with conservative management Patient was administered a series of 3 stellate ganglion blocks over the course of 2 weeks, which led to resolution of her symptoms.

Conclusion: HSP is a small vessel vasculitis and may lead to peripheral nerve vasculitis. As reported in other cases, small vessel vasculitis has led to development of

CRPS and thus may possibly influence the development of CRPS in patients with HSP. CRPS as a complication of HSP has not been reported in literature to date. Thus in a patient with HSP, CRPS could present as a rare complication and early intervention with the sympathetic blockade of affected region may lead to resolution of symptoms.

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PHARMACOLOGY

635004 - REMIFENTANIL DOSING - NOT ALL INFUSIONS ARE THE SAME.

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Introduction: Remifentanil infusions may be delivered either using manual dosing, where the anesthesiologist determines the bolus dose(s) and infusion rates or using a target-controlled infusion (TCI) pump where the anesthesiologist enters the desired 'target' concentration to be achieved in the patient's plasma or brain – measured in ng/ml.

In the United Kingdom and Europe, a TCI pump is generally used. The TCI algorithm for remifentanil is based on the Minto model which uses sex, height and weight to determine the lean body mass (LBM) via the James formula.

In Canada, remifentanil infusions are most commonly administered via a manual pump dosed in mcg/kg/min. Observed practice suggested that anesthesiologists generally use total body weight (TBW) when programming pumps and we believed that this could result in clinically significant differences in plasma concentration. We sought to determine the extent of this practice and model how different TBWs and body mass index (BMI) could affect the projected plasma remifentanil concentration.

Methods: The project had two parts. Firstly, a multi-centre survey was undertaken to determine current practice. Secondly, using the Tivatrainer X software programme, we modelled how inputting TBW could affect the plasma concentration of remifentanil as body mass index changed in both men and women. We used a 1mcg/kg bolus followed by a 0.1mcg/kg/min fixed rate infusion as the basis of the models.

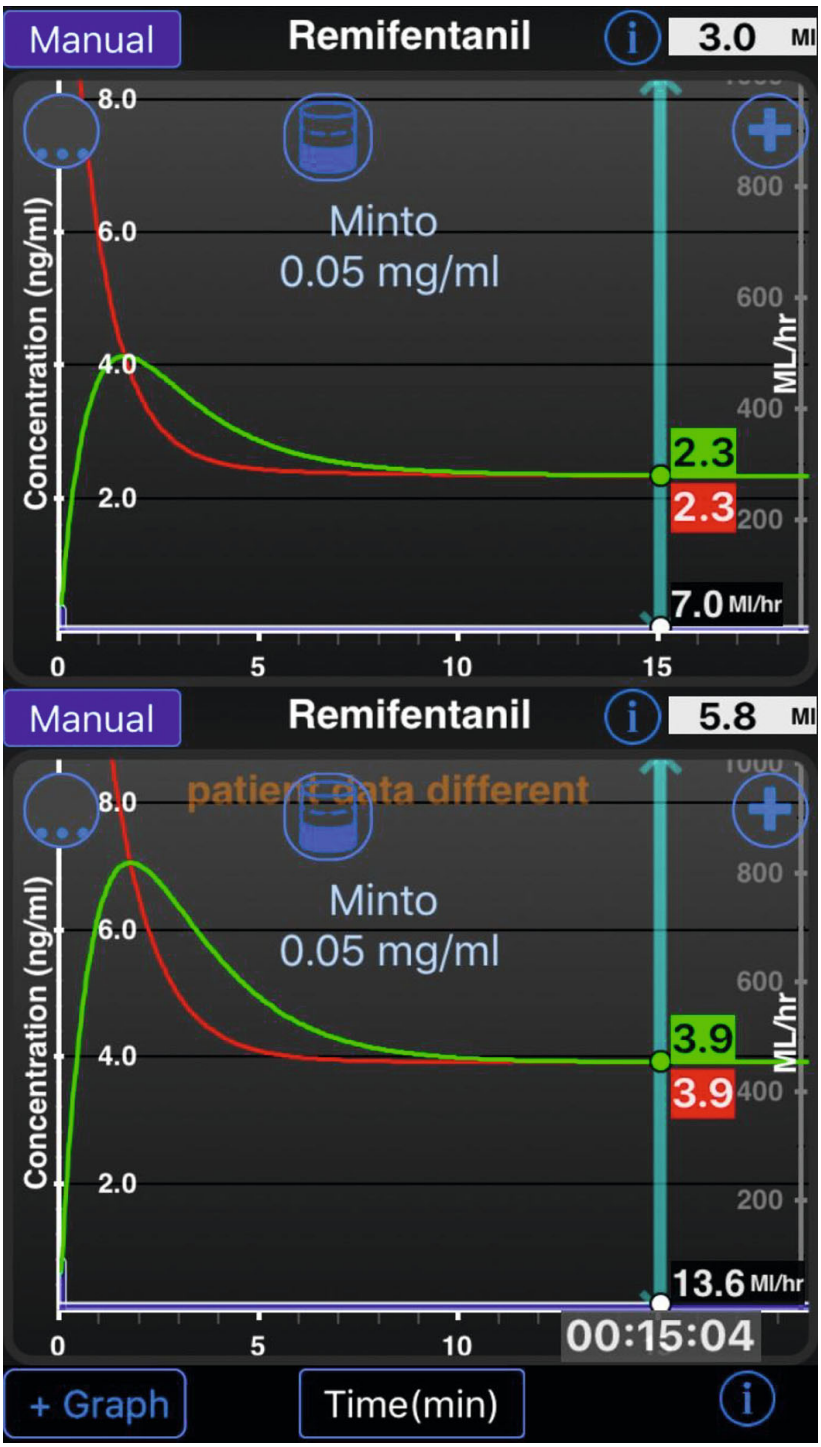
Results: The survey revealed that whilst most anesthesiologists knew that LBM should be considered when programming manual remifentanil infusions only a small minority adjusted the weight. The effect is compounded in the increasing use of multi-channel pumps where the same weight is used to control both anaesthetic and vasoactive infusions.

Using TBW to programme manual remifentanil infusions produced wide variations in plasma concentrations. In men using a TBW of 58kg (BMI 20) this generated a steady state plasma concentration of 2.3ng/ml with a peak of 4.1ng/ml whereas a TBW of 116kg (BMI 40) produced a plasma concentration of 3.9ng/ml and a peak of 7.0ng/ml. This is shown in Figure 1.

In women corresponding steady state values were 2.4ng/ml and 4.3ng/ml.

Discussion: The use of TBW for manual remifentanil infusions can lead to a clinically significant difference in drug concentration. Remifentanil has powerful synergistic properties when combined with a hypnotic agent such as sevoflurane or propofol. By not accurately estimating the remifentanil concentration it would be easy to under- or overdose the hypnotic agent during both induction and maintenance with the associated side effects. Careful consideration should be made to the LBM of patients when programming manual remifentanil infusion pumps<./p>

Two models of remifentanil infusions



This figure demonstrates the different plasma concentrations that are produced with the "same" manual infusion - a 1mcg/kg bolus followed by a 0.1mcg/kg/hr fixed rate infusion. The upper model is that of a 58kg (BMI 20) man and the lower model of a 116kg (BMI 40) man.

638256 - TRAMADOL-INDUCED HALLUCINATIONS

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INTRODUCTION
Tramadol prescriptions are rising amidst government-led sanctions targeting other commonly prescribed opioids [1]. Despite tramadol's growing popularity, little remains known about tramadol-induced hallucinations (TIH), a rare complication of tramadol use defined by isolated sensory disturbances without additional clinical findings. TIH may have lasting psychological repercussions [2]. The following review aims to increase provider awareness of this potential adverse complication stemming from tramadol use.

MATERIALS AND METHODS
A literature search was performed on PubMed, Cochrane Review, and LILACS, using the key words, "tramadol", "hallucinations", "hallucinosis" and "delirium". IRB approval was not required.

RESULTS
The search yielded eighty-one results. Eleven articles specifically described hallucinations secondary to tramadol use. Among these, seven described actual incidences of TIH, three described other medical conditions, and one reported on both TIH and other medical conditions.

DISCUSSION
Most cases of TIH in the literature describe auditory or visual disturbances [3]. This contrasts with serotonin syndrome which, in addition to hallucinations, can be accompanied by cognitive, autonomic, and somatic disturbances. The mechanism underlying TIH may be related to tramadol's effects on muscarinic, serotonergic, and norepinephrine receptors [4, 5].

New-onset hallucinations coinciding with recent tramadol initiation, combined with symptom resolution after tramadol discontinuation, increases clinical suspicion for TIH [3]. Several risk factors likely predispose patients to TIH, including advanced age, polypharmacy, and comorbid psychiatric illness. Obtaining a thorough patient history

and reviewing current medications may facilitate TIH prevention. Currently, discontinuing tramadol therapy is the most effective treatment [3, 6]. Additional research may enable practitioners to better understand and manage this potential adverse effect of tramadol utilization.

References:

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2. Anesth Analg 2016 123: 836–843.
3. An Med Interna 2003 20: 493.
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6. Acta Clin Belg 1996 51: 184-6.

638303 - ESTIMATION OF LEAN BODY WEIGHTS USING BODY MASS INDEX

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Introduction

There has been a major increase in clinical obesity over recent years, with altered pharmacokinetics and pharmacodynamics requiring changes in drug dosing.[1] The objective of this study was to develop and verify a practical method for estimating lean body weight (LBW) via calculations based on body mass index (BMI).

Methods

Using published clinical data [total body weight (TBW) and height] as testing data, a series of linear regression analyses and Bland-Altman plots were computed comparing the estimated LBWs, derived from four commonly used LBW equations (i.e. Hume, Boer, James and Janmahasatian)[2-4], with the proposed simplified equations [i.e. (100 - BMI) x TBW for males (M), and (90 - BMI) x TBW for females (F)].

Results

Comparisons of LBWs estimated using our simplified equations, and estimations calculated using the 4 other formulas, displayed percentage differences in the mean values as follows: Hume (M -3.54 % and F 3.4%), Boer (M 3.86 % and F 3.4%), James (M 3.31%; F 3.2%) and Janmahasatian (M 2.61 % and F 3.4 %). The magnitudes between the upper and lower limits of agreement were 12.65% (M) and 10.2% (F) for Hume, 10.46 % (M) and 9.3 % (F) for Boer, 8.9 % (M) and 8.8% (F) for James and 6.57% (M) and 5.5% (F) for Janmahasatian.

Conclusions

The simplified equation utilizing BMI can provide a more practical way to estimate LBW by replacing complex equations with one equation (gender specific) that is easier to remember and provides equivalent results (table 1).

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Table 1

Table 1. Lean Body Weight Formulas

	Male	Female
Hume	LBW=(0.32810 × W) + (0.33929 × H) − 29.5336	LBW=(0.29569 × W) + (0.41813 × H) − 43.2933
Boer	LBW=0.407weight(kg) + 0.267height(cm) - 19.2	LBW=0.252weight(kg) + 0.473height(cm) - 48.3
James	LBW=1.1weight(kg) - 128(weight(kg)/height(cm))2	LBW=1.07weight(kg) - 148(weight(kg)/height(cm))2
Janmahasatian	LBW=0.32810weight(kg) + 0.33929height(cm) - 29.5336	LBW=0.29569weight(kg) + 0.41813height(cm) - 43.2933
Simplified Formula	$LBW = \frac{(100 - BMI)weight(kg)}{100}$	$LBW = \frac{(90 - BMI)weight(kg)}{100}$

Lean Body Weight Formulas

PATIENT SAFETY

607487 - EFFECTS OF INTUBATION WITH DOUBLE-LUMEN TUBE ON INTRAOCULAR PRESSURE IN PATIENTS WITH OR WITHOUT HYPERTENSION

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Introduction: Tracheal intubation is closely associated with increase in intraocular pressure (IOP). However, the relationship between double-lumen tube (DLT) placement and changes in IOP has not been elucidated. Systemic hypertension (HTN) is another factor that influences the IOP. Through animal studies, the relationship of HTN and IOP has been established as HTN being one of the major causes of glaucoma. However, it has not yet been validated on the relationship between HTN and IOP under circumstances such as tracheal intubation. The purposes of this study are to observe the difference in IOP increase between DLT and single-lumen tube (SLT), and to evaluate the influence of underlying HTN on IOP during tracheal intubation.

Methods: The study was approved by the Institutional Review Board of our hospital (approval number: KC16OISI0689). Each patient gave verbal and written informed consent in advance. Sixty-eight patients were allocated into one of following groups; SLT/normal blood pressure (NBP) (n = 17), SLT/HTN (n = 17), DLT/NBP (n = 17), and DLT/HTN group (n = 17). Every patient with HTN has been treated with antihypertensive agents before surgery. The mean arterial pressure (MAP), IOP, and ocular perfusion pressure (OPP), which was calculated as MAP minus IOP, were measured before anesthetic induction (baseline T1), before tracheal intubation (T2), right after tracheal intubation (T3), 1, 3, 5 and 10 minutes after intubation (T4-T7). IOP was measured with hand-held tonometer (Tono-Pen AVIA®).

Results: In SLT/NBP and SLT/HTN group, IOP after tracheal intubation was 5.0 and 4.9 mmHg higher, respectively, compared with baseline T1. Such increase in IOP was greater in DLT/NBP and DLT/HTN group with 7.9 and 12.2 mmHg higher, respectively, compared with baseline T1 ($P = 0.019$ and 0.009 vs. SLT/NBP and SLT/HTN group, respectively). The values of IOPs between patients with underlying HTN and NBP were comparable. The changes in the OPP were similar for all groups. The OPP decreased at T2 compared with baseline value and increased at T3, T4 and T5.

Conclusions: Tracheal intubation with DLT was associated with much increase in IOP than that with SLT. Underlying systemic HTN did not affect the degree of increase in IOPs after tracheal intubation with DLT or SLT.

Discussion: The mechanism of the increase in IOP following tracheal intubation is related to venoconstriction, which leads to increased central venous pressure and resistance to the outflow of aqueous humor in the trabecular meshwork. The reason DLT was associated with much increase in IOP during tracheal intubation can be explained as follows; the external diameter of DLT is thicker than that of SLT, therefore, intubation with a DLT is considered more stimulating to trachea, which leads to higher sympathetic responses and venoconstriction than intubation with a SLT.

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Time course of intraocular pressure (IOP) for patients with high blood pressure
Figure.tif

Patients who were intubated with double-lumen tube showed higher IOPs immediately, 3, 5, and 10 min after tracheal intubation than those who were intubated with single lumen tube. Symbols and error bars indicate means and SD, respectively. *: $P < 0.05$, †: $P < 0.01$ vs. single lumen tube.

619997 - VALIDATION OF POINT-OF-CARE HEMOGLOBIN TESTING IN ANEMIC ADULT PATIENTS

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Introduction:
Point of care and indirect testing (POCT) of hemoglobin has been proposed as a means of improving patient care in perioperative and critical care environments. There is currently not enough information to recommend the use of one device over another. When clinicians make decisions to transfuse blood products, a criteria is that the patient have anemia. If devices that measure hemoglobin lead clinicians to transfuse patients more often, this may increase adverse events. In order to manage the balance between benefits of a red blood cell transfusion and the associated adverse effects, clinicians require accurate, reliable POCT to guide their judgement, especially while providing care for the hemorrhaging patient. The objective of this study was to investigate the accuracy of the available POCT hemoglobin devices, with the hypothesis that amongst Hemocue, i-STAT and EPOC, the Hemocue would provide the most accurate sampling of hemoglobin in adult patients with moderate to severe anemia in the perioperative and intensive care setting.

Methods:
Ethics approval was granted by the local Research Ethics Board in May 2018. Fifty-eight patients were enrolled in the study. Adult patients (greater than 18 years old) with a central venous or arterial line who recorded a hemoglobin level less than 100 g/L by the hematology laboratory analyzer were considered for this study.
All hemoglobin readings were obtained simultaneously within a 20-minute time window, and were all done within a 2-hour time frame of the blood collection. All 3 samples recorded were then compared against the target hematology laboratory analyzer value.

Results:
Eighteen patients were excluded as a result of having a hematology laboratory analyzer hemoglobin value of greater than 100 g/L. Overall, 40 patients with recorded hematology laboratory analyzer hemoglobin results of under 100 g/L were used for comparison with the Hemocue, EPOC and i-STAT.

Deming regression analysis of Hemocue displayed a coefficient correlation of 0.8403,

a -1.8 bias (-2.1%) and standard deviation of 5.1. EPOC showed a coefficient correlation of -0.0896, bias of 11.6 (12.8%) and standard deviation of 19.5. i-STAT showed a coefficient correlation of -0.169, bias of -1.3 (-1.6%) and standard deviation 18.3.
Bland-Altman analysis for Hemocue showed a bias of 1.73 and limits of agreement of -8.44 to 11.91. EPOC showed a bias of -11.37 and limits of agreement of -50.07 to 27.34. i-STAT showed a bias of 2.41 and limits of agreement of -30.61 to 35.44

Discussion:
To our knowledge, this is the first study to compare the accuracy of the Hemocue, EPOC, and i-STAT in anemic patients. Hemocue was the most accurate POCT instrument. The number of clinically valid measurements was markedly higher with the Hemocue than the remaining instruments, and was shown to be considerably more accurate to the laboratory values.

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Bland-Altman Plots for Hemocue, EPOC and i-STAT

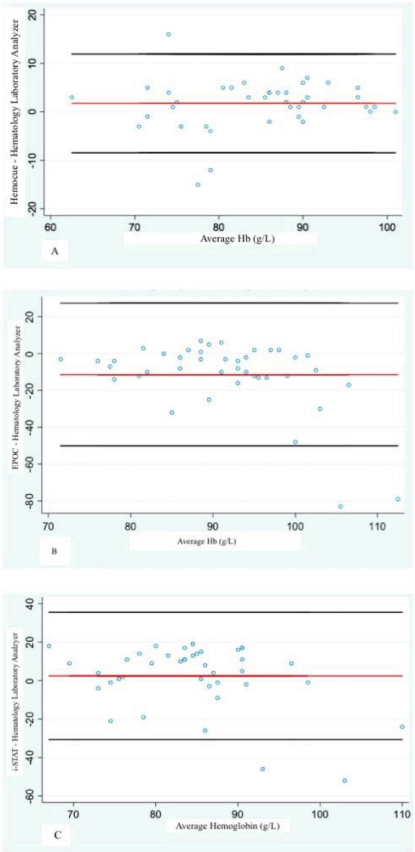

Fig 1 Bland-Altman plots comparing between the Hematology Laboratory Analyzer and Hemocue (A), EPOC (B) and i-STAT(C). Mean of difference is demonstrated by the continuous red line. Limits of agreement (bias + 1.96 · SD) are demonstrated by the continuous black lines.

636763 - AWARENESS OF CHLORHEXIDINE PERIOPERATIVE ANAPHYLAXIS: QUALITY IMPROVEMENT SURVEY OF AN ACADEMIC TERTIARY CARE OR

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Introduction: Chlorhexidine is an increasingly utilized antimicrobial agent which has seen a concomitant rise in cases of chlorhexidine anaphylaxis in the perioperative period. Emerging evidence shows chlorhexidine to be one of the top three agents causing Perioperative Anaphylaxis (POA) with an incidence of 9% throughout the United Kingdom (1). Additionally, one third of diagnosed patients have had subsequent anaphylactic episodes from repeated exposure to chlorhexidine (2). This survey is the first in Canada to report on awareness of chlorhexidine as an allergen amongst perioperative staff in a large academic tertiary care operating room. We hypothesized awareness of chlorhexidine's POA would be low and less than 50% would be aware it is reported as one of the top three agents causing POA.

Methods: Ethics was approved by the institutional ethics board prior to a ten-question survey distributed through one large academic tertiary care center by work associated email addresses over 30 days span. Six questions collected data with four distractor questions in the survey to increase validity. Statistical analysis was performed on the dichotomous answers with a Z-test (2-sided hypothesis, significance level of $p=0.05$). Subgroup analysis was performed through contingency tables using Microsoft Excel^{TM}.

Results: 83% were aware that chlorhexidine causes POA. Further, only 31% were aware that chlorhexidine is part of the top three causes of POA ($p<0.0001$). Sub-analysis demonstrated no statistically significant difference in awareness between physicians and non-physicians, 87% vs 74% respectively ($p=0.129$) (Figure 1). However, there were statistically significant reductions between awareness of chlorhexidine causing anaphylaxis versus its presence among top three causes of POA: physicians 87% vs 36% ($p<0.0001$). 53% encountered patients with skin reactions to chlorhexidine, of which only 25% referred the patient to an allergist. Lastly, 8.7% had exposed a patient to chlorhexidine who had identified themselves as previously reacting to chlorhexidine.

Discussion: Awareness of chlorhexidine's allergen potential was higher than we hypothesized, but the frequency with which it causes anaphylaxis is overall underestimated by physicians and allied health care in the operating room. One concerning aspect demonstrated is 8.7% of staff recall administering chlorhexidine products to patients who identified as having a reaction to chlorhexidine. This correlates with reported cases of repeated anaphylaxis even after diagnosis of chlorhexidine allergy (3). We hope to demonstrate an imperative need for widespread education of chlorhexidine's role in POA aimed at reducing re-exposures. Additionally, there is need for streamlined patient referral for allergy testing to diagnose cases of chlorhexidine anaphylaxis and increase safety of patients in the perioperative period.

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1. Br J Anaesth 2018 121: 159-71.
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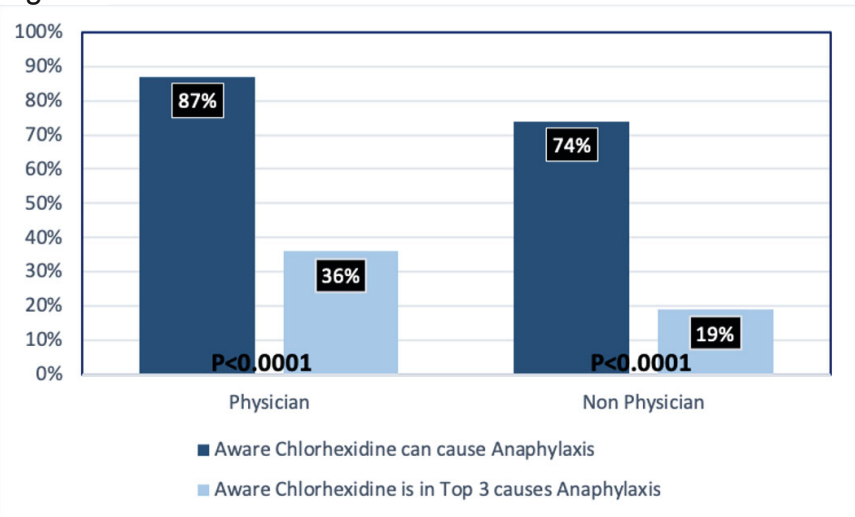
Figure 1



Sub-analysis of respondent's awareness that chlorhexidine causes anaphylaxis and awareness that chlorhexidine is one of the top three causes of POA among operating room personnel. Physicians included Anesthesiology Residents, Surgical Residents, Staff Anesthesiologists, and Staff Surgeons. Non-Physicians included Pre-operative Nursing, Operating Room Nursing, Anesthesiology Assistants. Z-scores were calculated comparing each proportion and statistically significant P values were included on graph.

637080 - THE EDMONTON FRAIL SCALE AS A PRE-OPERATIVE ASSESSMENT TOOL IN ELECTIVE OUTPATIENT SURGERY

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Introduction: Frailty is defined as a state of heightened vulnerability to acute and chronic stressors as a consequence of reduction in physiologic reserves.[1] It is well-documented that compared to age-matched controls, frail elderly patients have poorer post-operative complications.[2-6] While current evidence suggests quantifying frailty improves precision of pre-operative risk assessment, the best method for measuring frailty pre-operatively, to our knowledge, has yet to be determined. The Edmonton Frail Scale (EFS) is a frailty assessment tool which can be used preoperatively, does not depend on formal medical training to administer, has been validated for use by non-geriatricians, requires less than 5 minutes to administer and is available as an iPad application.

Methods: Health Research Ethics Board approved this pilot study. The purpose was to determine whether increasing frailty in elderly patients, as determined by the EFS, relates to an increased likelihood for seeking medical attention in the 30-days following elective outpatient surgery. A research assistant pre-operatively administered the EFS to patients who consented to participate in the study. EFS scores were recorded into three levels, (0-3 = not frail, 4-7 = mildly frail, 8-17 = very frail). Postoperatively, a research assistant contacted the patient-participants by telephone on 5-follow up calls, corresponding to post-operative days 1, 3, 7, 14 and 30. questionnaire was used to evaluate seeking medical attention in the post-operative period.

A descriptive analysis was utilized for gender breakdown, number of participants and drop outs. Responses (Yes/No) relating to seeking medical follow-up (emergency,

family physician, surgeon, nurse practitioner) were combined and summed for each follow-up call. Chi-square tests were conducted for each post-operative call which compared frailty stratification (not frail, mildly frail, very frail) to frequency of seeking medical attention. Chi-square tests were used to evaluate and determined that there was no difference in frailty for the group that answered or did not answer the phone.

Results: N= 60 (55.0% females) were enrolled in the study, 10 were lost to follow up. Those that were very frail sought medical attention significantly more so than those who were less frail for follow-up call for day 1, $X^{2,}$ (2, N = 47) = 9.860, p = .007, for day 3, $X^{2,}$ (2, N = 49) = 6.524, p = .04, and for day 7, $X^{2,}$ (2, N = 48) = 7.452, p = .02, however post-op days 14 and 30, p=ns.

Discussion: Frail elderly patients, determined by the EFS, are more likely to seek medical attention after elective outpatient surgery compared to non-frail counterparts, and they are more likely to do so within the first seven days post-operatively. The EFS may be a quick, validated tool to determine frailty, influence surgical decision making and post-operative follow-up in the elderly population.

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637207 - PREOPERATIVE FRAILTY: IDENTIFYING BARRIERS AND FACILITATORS TO ROUTINE PREOPERATIVE FRAILTY ASSESSMENT

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Introduction: Preoperative frailty assessment is recommended by practice guidelines (1,2) however, it is not routinely performed (3). The barriers and facilitators to routine preoperative frailty assessment have not been explored, nor have effective interventions been developed to support implementation of frailty assessment. Therefore, the objective of this study is to identify the barriers and facilitators of routine

preoperative frailty assessment in order to inform the develop a future knowledge translation intervention to support the performance of routine preoperative frailty assessment in people >65 years of age.

Methods: This was a research ethics board approved, qualitative study involving clinicians who perform preoperative assessment including staff and resident anesthesiologists, and surgeons. A quasi-experimental sampling strategy was used to select key informants. Semi-structured interviews were conducted by a trained research assistant using an interview guide informed by the Theoretical Domains Framework (TDF). The TDF is a behaviour change framework that was developed using a systematic consensus approach to simplify psychological theories relevant to behaviour change (4,5). The framework includes 14 'theoretical domains' derived from 128 constructs from 33 health and social psychology theories that may explain health-related behaviour change. The TDF-informed interview guide was used probe the key informants about reasons they do or do not perform preoperative frailty assessment consistently in their clinical practice. Interviews were coded by two independent research assistants to identify barriers and facilitators to conducting preoperative frailty assessments.

Results: We recruited 9 staff anesthesiologists, 9 staff surgeons and 10 anesthesiology residents, respectively from a single hospital. Key findings from 28 interviews include: staff and resident anesthesiologists are more likely to consider frailty assessment as a standard part of their practice; all clinicians identified benefits to performing frailty assessments (helps with risk assessment, tailor anesthetic); time constraints impacted whether or not an assessment was completed. Findings also showed that while the majority of clinicians were aware of the concept of frailty, they were not aware of any best practice guidelines in relation to assessing frailty. Half of clinicians identified that they would need a reminder, while others used patient characteristics to trigger the performance of a frailty assessment (e.g. patient's age, visibly frail appearance, multiple co-morbidities).

Discussion: This study, based in behaviour theory, identified barriers and facilitators to anesthesiologists and surgeons' performance of frailty assessments.Key findings from different domains could be targeted by knowledge translation interventions to improve the performance of frailty assessments. Once developed, we plan to pilot the intervention to assess the feasibility and acceptability of the intervention.

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1. *J Am Coll Surg* 2012;215:453–66

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5. Qual Saf Health Care. 2005;14(1):26–33

637246 - EXPERIENCE WITH EXERCISE PREHABILITATION BEFORE CANCER SURGERY FOR OLDER PEOPLE WITH FRAILTY

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Introduction: Frailty is a well-established predictor of adverse postoperative outcomes in older surgical patients. Improving the care of older people with frailty has been identified as a key area of focus to improve the quality and efficiency of perioperative

care. Exercise before surgery (prehabilitation) may improve postoperative outcomes and patient quality of life. The complexity and risk profile of frail patients make them a population who may significantly benefit from prehabilitation. However, adherence with exercise therapy is often low, especially in older populations (typically 55-75%)(1). The purpose of this study was to qualitatively asses the experience of older people with frailty participating in a randomized trial of exercise before surgery to understand patients' experience with prehabilitation.

Methods: This was a research ethics approved, nested qualitative study within a single center, parallel-arm, randomized controlled trial of home-based exercise prehabilitation vs. standard care among patients ≥60 years having elective cancer surgery (intraabdominal/intrathoracic), and who had frailty (Clinical Frailty Scale ≥4). The intervention consisted of ≥3 weeks of prehabilitation (strength, aerobic, and stretching). After completing the prehabilitation program and prior to their surgery, participants were asked to partake in a semi-structured interview using an interview guide informed by the Theoretical Domains Framework (TDF). The TDF is a behaviour change framework that was developed using a systematic consensus approach to simplify psychological theories relevant to behaviour change (2,3). Interviews were double-coded and analysis was guided by the approaches outlined in the TDF.

Results: To date, 7 qualitative interviews have been completed. Preliminary findings indicate that participants believed that completing the exercise program provided health benefits, and that motivation to keep up with the program came with monitoring their progress and seeing an improvement in strength. In addition, participants reported a sense of empowerment and control over their health when participating in the program. While it was reported that the program was easy to follow and well-suited to be completed at home, participants identified potential improvements to the program: more individualized, a variety of resistance bands of different strengths, and more exercise equipment.

Discussion: Home-based prehabilitation is feasible and acceptable to older people with frailty preparing for cancer surgery. Participants identified that our program is easy to follow, and they report self-perceived health benefits. Areas for future research include understanding the predictors of adherence to prehabilitation programs for older adults with frailty.

References:

1) *J Physiother*. 2014;60(3):151-156.

2) *Implement Sci*. 2012;7:37.

3) *Qual Saf Health Care*. 2005;14(1):26–33.

637733 - IMPACT OF PERI-OPERATIVE DIABETES OPTIMIZATION ON HYPERGLYCEMIA AND MORBIDITY IN ELECTIVE SURGICAL PATIENTS

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Objectives: Recent literature has found that both HbA1c and post-operative hyperglycemia are independently associated with morbidity, with elevated HbA1c increasing the likelihood of hyperglycemia[1,2]. Further, treating post-operative hyperglycemia with insulin in both diabetics and non-diabetics appears to be protective[1]. Given the presence of potentially modifiable risk factors, the pre-operative consultation may reflect an opportunity to identify at-risk patients. Our study compared rates of post-operative hyperglycemia, surgical morbidity, and length of stay (LOS) both before and after implementation of a peri-operative optimization program. A bundle of care was developed and implemented by a multidisciplinary team. Changes included: (1) Standard HbA1c preoperative testing on all patients regardless of diabetic status if not done in the prior 90 days. Non-diabetics identified as pre-diabetic (HbA1c 6.0-6.4%) or as having undiagnosed diabetes (HbA1c >6.5%) were referred to their GPs. Diabetic patients were referred back to their GPs for HbA1c between 7.0-8.5%, or referred to endocrinology if HbA1c was >8.5%. (2) Post operatively all patients had regular glucometer readings (3) Pre-printed standard orders for a sliding scale insulin were part of the postoperative order set.

Method: After obtaining local ethics approval, retrospective chart review was performed on elective gyne-oncology cases during the pre-intervention (October 2016-April 2017) and post-intervention (January–September 2018) time periods. Patients were excluded if they did not receive glucometers, or National Surgical Quality Improvement Program (NSQIP) review. NSQIP defined 30-day postoperative morbidity and the highest glucometer reading on each post-op day were recorded. Patients prior to the implementation of the intervention protocol (n=129) were compared to patients post intervention (n=116). We compared postoperative morbidity, SSI, and LOS between groups using a Student's t-test, Fisher's T-test or a Chi-squared test.

Results: Patient demographics including the percentage of open cases, wound contamination, and the prevalence of diabetes were similar in both groups. There was a trend towards decreased rates of hyperglycemia (>10mmol/L) in the post intervention group among diabetics (p=0.281), see Table 1. Overall 30-day morbidity between diabetics was 24% in the pre-intervention and trended down to 13% in the post-intervention group (p=.472). SSI was not significantly affected, with overall rates of 6% in the pre- intervention group, and 3% in the post intervention group (p=0.321).

Conclusions: Implementation of a peri-operative bundle of care showed a non-significant trend towards improved post-operative hyperglycemia rates in diabetics. Overall rates of morbidity, SSI, and LOS were unchanged. Weaknesses of this study include small sample size and uncontrolled confounders. The trend to decreasing hyperglycemia is encouraging and we plan to expand our review to other surgical procedures with a higher incidence of complications.

References:

[1]Annals of surgery. 2012. 257: 8-14.

[2] Diabetes Care 2018 Mar; dc172304.

Table 1

Pre-Intervention (n=129)			Post-Intervention (n=116)		
Diabetes Status	Occurrence	Percentage	Occurrence	Percentage	p value
Non-diabetics	108	84%	97	84%	0.983
Diabetics	21	16%	19	16%	0.983
Surgical Site Infections					
Non-diabetics	7	6%	3	3%	0.263
Diabetics	1	6%	1	7%	0.928
30-day Morbidity (one or more events)					
Non-diabetics	10	9%	9	9%	0.996
Diabetics	4	24%	2	13%	0.472
Mean Length of Stay					
Non-diabetics	2.5		2.3		0.272
Diabetics	2.1		1.9		0.704
Post operative Hyperglycemia >10mmol/L					
Non-diabetics	18	18%	10	13%	0.397
Diabetics	15	68%	17	53%	0.281

Table 1.

638249 - CANADIAN HOSPITALS' WEBSITES AS A PORTAL FOR ANESTHESIOLOGY RELATED KNOWLEDGE DIFFUSION: A QUALITY BASED REVIEW

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Introduction

Anesthesiologists educate patients about anesthetic options, post-operative pain control, risks of surgery, and advanced procedures including spinal, epidural or peripheral nerve blocks and invasive monitoring[1]. However, unless patients are seen in a pre-admission clinic, which recent guidelines suggest should be reserved for high risk cases, patients are often educated about their anesthetic healthcare plan just before their surgical procedure[2]. Patients often find it difficult to process complex medical information and don't get the opportunity to discuss their anesthetic options with family members. In a patient-centred care approach, it is imperative to educate and empower patients in advance, so that they become active participants in their safer healthcare plan[3]. This quality improvement study reviews Canadian hospitals' websites to assess availability of anesthesia related information and provides suggestions to improve awareness of anesthesiology to the patients.

Methods

REB approval was not required for this study. We obtained a list of Canadian hospitals

from the Canadian Institute for Health Information[4]. All acute care hospitals with a bed size of 50 or more from all provinces and territories except Quebec (data unavailable) were included in our analysis. Extended care hospitals, rehabilitation hospitals, mental health and addiction facilities were excluded. Two researchers independently reviewed each hospital website and recorded a binary response (yes/no) to availability of anesthesia related information. Pre-specified categorical variables included anesthesiology listing as a program/service, link to anesthesiology under surgical services and link to pre-admission clinic. These links were searched for information regarding anesthesia related pre-op preparation, options/techniques, pain management options (acute/chronic), risks of anesthesia and FAQs.

Results

From a list of 595 hospitals across the country, 281 hospital websites were reviewed and 185 were analyzed (Table 1). Only 21 (11.4%) hospital websites listed anesthesiology as a program/service with Alberta as top scorer, contributing to 12 websites. A link to anesthesiology under surgical program was available on 32 (17.2%) websites. 35 (18.9%) websites only describe anesthesia options to patients with a significant variation among provinces, ranging from a low of 0% in Manitoba to a high of 44% in BC. Information such as risks related to anesthesia, post-operative pain control options, anesthesia related FAQs were available on only 8.1%, 11.9% and 3.2% of all hospital websites, respectively.

Discussion

This study demonstrates underutilization of hospital web-based resources for anesthesia related patient's education and learning in Canada. An informed patient choosing evidence based treatment options leads to improved clinical outcomes. We recommend that anesthesiologists make a concerted effort to integrate anesthesiology as a program/service on their respective hospitals' websites. They should create a patient education resource tailored to their own anesthesia practice to facilitate knowledge diffusion and patient safety.

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References

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Summary of Anesthesiology Related Information on Canadian Hospitals' Websites

Table 1: Summary of Anesthesiology-related Information on Canadian Hospital Websites

Description	Alberta	BC	Manitoba	Ontario	Nova Scotia**	New Brunswick	Newfoundland & Labrador	NWT	PEI	Saskatchewan	Yukon Territory	Total
Total Hospitals from CIHI* list	107	99	72	145	37	25	34	4	7	62	3	**595**
Hospitals with 50 beds or more	50	51	16	98	16	13	17	2	3	14	1	**281**
Hospitals excluded as per criteria	6	16	5	20	2	3	2	0	1	2	0	**57**
Hospitals (included) excluded for not providing surgical services	18	1	2	4	0	1	3	0	0	3	0	**32**
Hospitals (included) not analyzed	1 (error page)	-	-	1 (under construction)	0	0	3 (error page)	1 (under construction)	0	1 (error page)	0	**7**
Hospitals analyzed	**25**	**34**	**9**	**73**	**14**	**9**	**9**	**1**	**2**	**8**	**1**	**185**
Website link to anesthesiology as a program / service	12 (48%)	1 (3%)	0	7 (9.6%)	0	0	1 (11%)	0	0	0	0	**21 (11.4%)**
Website link to anesthesiology under surgical services	1 (4%)	15 (44%)	0	15 (20.5%)	0	0	1 (11%)	0	0	0	0	**32 (17.2%)**
Website link to pre admission / assessment clinic	5 (20%)	23 (67.6%)	1 (11%)	36 (49.3%)	0	0	1(11%)	1 (100%)	0	3 (37.5%)	1 (100%)	**71 (38.3%)**
Pre-op preparation for anesthesia	1 (4%)	16 (47%)	1 (11%)	36 (49.3%)	0	0	1 (11%)	1(100%)	0	3 (37.5%)	1 (100%)	**60 (32.4%)**
Options for anesthesia (GA/ Spinal/MAC)	1 (4%)	15 (44%)	1 (11%)	15(20.5%)	0	0	0	0	0	3 (37.5%)	0	**35 (18.9%)**
Risks of anesthesia	0	8 (23.5%)	0	7 (9.6%)	0	0	0	0	0	0	0	**15 (8.1%)**
Pain control options	1 (4%)	2 (6%)	0	19 (26%)	0	0	0	0	0	0	0	**22 (11.9%)**
Anesthesia FAQs	0	0	0	6 (8.2%)	0	0	0	0	0	0	0	**6 (3.2%)**
Navigation user friendly: Yes	24 (96%)	15 (44%)	5 (55.5%)	64 (87.6)	NA	0	2 (22%)	0	2 (100%)	4 (50%)	1 (100%)	**117 (63.2%)**
Surgical Services availability	24	34	9	73	NA	9	9	1	2	8	1	**170**
Link to Pain Management (chronic)	1	8 (23.5%)	0	13 (17.8%)	0	0	0	0	0	0	0	**22 (11.9%)**
Department Website	0	2 (6%)	0	4 (5.5%)	0	0	0	0	0	0	0	**6 (3.2%)**

Notes: * Canadian Institute for Health Information; ** No clinical information available on hospitals' website in Nova Scotia; BC: British Columbia, MAC: Monitored Anesthesia Care, NA: Not Applicable NWT: Northwest Territories,

REGIONAL ANESTHESIA

618969 - INTRAARTICULAR INFILTRATION ANALGESIA FOR SHOULDER SURGERY: A SYSTEMATIC REVIEW AND META-ANALYSIS

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INTRODUCTION

Shoulder surgery is associated with significant postoperative pain.[1] While the interscalene brachial plexus block (ISB) is the preferred approach for postoperative analgesia,[2] its risks have stimulated interest in less-invasive alternatives. Intraarticular infiltration analgesia (IA) has shown to be an effective modality in hip and knee orthopedic procedures,[3] but evidence of its benefits for shoulder surgery is conflicting. Importantly, recent literature has raised concerns around the risk of chondrolysis, particularly with the use of continuous intraarticular infusions.[4] We conducted this systematic review and meta-analysis to evaluate the potential risks and benefits of IA in ambulatory shoulder surgery.

METHODS

Institutional Review Board approval was not required for this review. We searched literature for randomized controlled trials (RCTs) comparing IA to either ISB or to a Control (placebo or systemic analgesia) group. Cumulative 24-hour postoperative opioid consumption (oral morphine equivalents) was the primary outcome. Secondary outcomes included Visual Analogue Scale (VAS) scores during the first 24-hours postoperatively, time-to-first analgesic request, incidence of adverse events, patient-reported satisfaction scores, and incidence of chondrolysis. Results were pooled using

random-effects modeling, and a meta-regression analysis was performed to analyze heterogeneity limitations. The quality of pooled evidence was assessed according to GRADE guidelines.[5]

RESULTS

14 RCTs (885 patients) were included, of which eight compared IA vs. Control, three compared IA vs. ISB, and three performed both comparisons. Compared to Control, IA significantly decreased 24-hour postoperative analgesic consumption (weighted mean difference [95% confidence interval] -30.9 mg [-38.9, -22.9], $p < 0.00001$). IA also reduced pain scores up to 12 hours postoperatively, with the greatest reduction observed at 4 hours postoperatively (-2.2 cm [-4.4, -0.04], $p < 0.05$). Compared to ISB, there was no difference in opioid consumption (26.2 mg [-3.3, 55.8], $p = 0.08$); but patients in the ISB group had better initial VAS scores (2.4 cm [0.5, 4.3], $p = 0.02$ at 4 hours) compared to the IA group. There was no difference in the incidence of adverse events, and no patients experienced chondrolysis.

DISCUSSION

This review demonstrates that IA provides better postoperative analgesia compared to Control but may be inferior to ISB for shoulder surgery. To our knowledge, this is the first quantitative synthesis of data to examine and to support the utility of IA for patients in whom ISB may be contraindicated or not technically feasible.[6] These benefits must be weighed against concerns relating to chondrolysis, which may be more significant when prolonged IA infusions are employed. We acknowledge limitations posed by the small number of included RCTs and variabilities in IA technique and regimens, which was reflected in the significant heterogeneity of the results. Despite its efficacy, further research is needed to confirm that single-injection IA is not associated with a chondrolytic effect.

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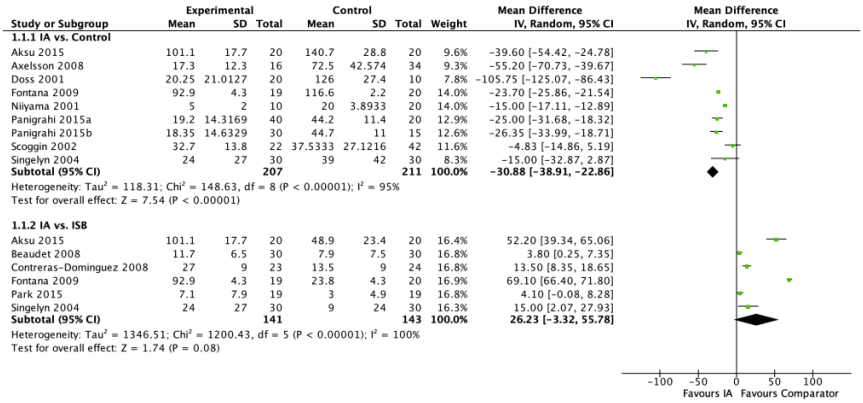
Figure 1



Forest plot of pooled effect sizes for 24-hour post-operative analgesic consumption. The lower and upper limits of the 95% confidence intervals are represented by black horizontal lines for individual trials, and by larger black diamonds for pooled estimates.

635823 - INCIDENCE OF HEMI-DIAPHRAGMATIC PARALYSIS AFTER INTERSCALENE BRACHIAL PLEXUS BLOCK

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Interscalene block (ISB) of the brachial plexus provides effective analgesia for arthroscopic shoulder surgery.[1] An incidence of 33-100% phrenic nerve involvement resulting in hemidiaphragmatic paralysis has been reported.[2.3] Diaphragmatic ultrasound has been shown to have high sensitivity (93%) and specificity (100%) in diagnosing phrenic nerve dysfunction.[4] We undertook this study to determine the incidence of hemidiaphragmatic paralysis at our institution where we have implemented low volume ISB with ultrasound guidance to place the nerve block.

METHODS

This is an observational study. All patients had an ultrasound-guided ISB performed in the block room with standard monitoring in place. Intravenous sedation, volume and concentration of the local anesthetic were at the discretion of the procedural anesthesiologist.

Ultrasound imaging of diaphragm thickness on the surgical (blocked) side and unblocked (control) side was done immediately prior to,15 minutes following the block and 30 minutes post extubation. Oxygen saturation and any evidence of dyspnea were noted. Data recorded included demographic details, diaphragm thickness at end-inspiration and end-expiration, and peak expiratory flow rates (PEFR). Reduction in diaphragm thickness (end-expiration to end-inspiration) from pre-block to post-block over 75% was considered complete paralysis.

RESULTS

This is an ongoing study. After IRB approval and informed consent, 65 patients of the

total 200 have been enrolled to date. Mean volume of Ropivacaine used was 10.51± 2.16 ml, mean concentration was 0.48 ± 0.05% (range 0.3 - 0.5%) and the mean total dose was 50.23 ± 8.72 mg.

Prior to the block, the diaphragmatic thickening from end-expiration to end-inspiration was similar on the surgical and non-surgical sides. Following the block, there was a reduction in the thickening of the diaphragm on the blocked side. Hemidiaphragmatic paralysis was complete in 56.92 % of patients, 26.15% had partial paralysis and 16.92% had no paralysis (change less than 25% in thickness). In the PACU post-surgery, 49.23% continued to have complete paralysis, 27.69% had partial paralysis and 23.08% had no paralysis. PEFR post block and in PACU is shown in table 1. Reduction of more than 50% is considered to require urgent medical attention, however, no patients exhibited clinical signs of dyspnea or desaturation.
Both diaphragms function as separate units. The hemi diaphragmatic weakness therefore may be compensated by the opposite hemi-diaphragmatic function and recruitment of external intercostal muscles. This may explain why patients were asymptomatic and there was no significant reduction in PEFR despite a high incidence of diaphragmatic weakness.

CONCLUSION

In this observational study, the incidence of hemidiaphragmatic paralysis following an ISB is still high at 56% despite ultrasound guidance and lower local anesthetic volumes. The reduction in PEFR did not correlate with the degree of paralysis. Despite the high rate of hemidiaphragmatic paralysis, no patients exhibited any clinical signs of respiratory distress.

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Table 1

Table 1 Change in Diaphragmatic thickness and PEFR

Change in diaphragm thickness (Tinsp-Texp)/Texp	**Patients (%) 15 minutes post block**	**Patients (%) in PACU**
Complete >75% change	56.92% (37/65)	49.23% (32/65)
Partial >25%-50% change	26.15% (17/65)	27.69% (18/65)
No change <25% change	16.92% (11/65)	23.08% (15/65)
Reduction in PEFR (%)	**Patients (%) 15 minutes post block**	**Patients (%) in PACU**
≤ 20%	45	85
20%-50%	54	14
≥ 50%	2	2

Change in Diaphragmatic thickness and PEFR

636380 - FEASIBILITY AND USABILITY OF PANDA-NERVE BLOCK, A PAIN MANAGEMENT APP FOR PERIPHERAL NERVE BLOCK PATIENTS

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Introduction: Peripheral nerve blocks (PNBs) provide patients with excellent perioperative analgesia. However, it also places them at an increased risk of severe post-operative pain once the block wears off, often due to poor adherence to discharge instructions [1]. Smart phone applications have shown promise for managing the pain of post-operative patients [2]. Panda-Nerve Block (Panda-NB) is an app that alerts the patient regularly to assess the status of their nerve block, measure

their level of pain, and take the scheduled pain medication. This study assessed the usability and feasibility of Panda-NB for patients managing their own post-operative pain.

Methods: Ethics approval was obtained from the local ethics board. 29 patients were recruited across three rounds of testing. Patients used Panda-NB for two to seven days post-operatively to manage their pain and assess their block. Patients then provided feedback via phone interview and a standardized Computer System Usability Questionnaire (CSUQ). Each user's app usage log was audited and quantitatively analyzed. Feasibility was measured by the median proportion of responses before the next alert. Compliance was measured as the median proportion of alert response within one hour; usability and user satisfaction were determined from both CSUQ scores and interviews.

Results: Across three rounds, the median proportion of alert responses occurring before the next alert was 68% (IQR 34% - 93%); during the first 48 hours, the median proportion of responses before the next alert was higher at 83% (IQR 54% - 92%). Compliance was high with a median proportion of alert responses within one hour of 87% (IQR 75% - 96%). There were no significant differences between rounds in response times, responses with one hour, responses before the next alert, median pain scores, pain scores recorded as no pain, doses of analgesic medication taken or median interval between analgesic medications taken. Patients reported the app was easy to use and was helpful in managing their pain. 79% of patients said they would use the app again, with many saying it would also be useful for managing their chronic medications. Critical themes included changes to the appearance of the app, clarification of the phrasing of the nerve block check, and requests for a "smarter" app that could dynamically adjust the medication schedule based on user responses.

Discussion: Panda-Nerve Block is a feasible and usable way for patients to manage their pain post-operatively. The similarly high rate of responses to the app alerts throughout the study suggests the first-round version of the app may have already been ready for regular patient use. Future work should include providing a two-way communication function for patients and clinicians, as well as clinical trial data assessing its effects on pain outcomes.

References:

[1] Reg Anesth Pain Med 2016 41(1):22-7.

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636417 - PERIPHERAL NERVE BLOCKS FOR AMBULATORY SHOULDER SURGERY: A COHORT STUDY OF OUTCOMES AND RESOURCE UTILIZATION

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Introduction: Ambulatory surgeries are increasingly common. Compared to inpatient surgery, ambulatory surgery results in lower costs with similar safety.[1-2] Peripheral nerve blocks (PNBs) improve early pain after ambulatory shoulder surgery but impact on post-discharge outcomes is poorly described.[3-4] Our objective was to measure the population-level association between PNBs and health system outcomes after ambulatory shoulder surgery.

Methods: After local ethics committee approval was obtained (REB #: 20160800-01H), we conducted a population-based historical cohort study using linked administrative data from 118 hospitals. Adults having elective ambulatory shoulder surgery (open/arthroscopic) from April 1, 2009 to December 31, 2016 were included. Following validation of physician billing codes to identify PNBs, we used multilevel, multivariable

regression to estimate the independent association of PNBs with a composite of unplanned admissions, emergency department visits, readmissions or death within 7 days of surgery (primary outcome) and healthcare costs (secondary outcome). Neurology consultations and nerve conduction studies were measured as safety indicators.

Results: We included 59 644 patients; PNBs were placed in 31 073 (52.1%), 1 508 (4.9%) of which were catheters. In the total cohort, 6 234/59644 (10.4%) experienced the primary outcome (no patients died in the 30 days after surgery). Physician billing codes were highly accurate in identifying PNBs (likelihood ratio +16.83/-0.03). The odds of composite outcome was not significantly different in patients with a PNB compared with those who had no PNB (9.0% versus 12.0%; adjusted odds ratio=0.96, 95% CI = 0.89 to 1.03; *P*= 0.243). Healthcare costs were greater in the group who received a PNB (adjusted ratio of means=1.06, 95% CI = 1.02 to 1.10; *P*= 0.005). Prespecified sensitivity analyses supported these results. Safety indicators were not different between groups.

Conclusion: In ambulatory shoulder surgery, PNBs were not associated with a statistically significant difference in a composite of adverse postoperative outcomes, but healthcare costs were higher with PNBs. Future prospective randomized trials should include patient-centred post-discharge outcomes (such as functional recovery and return to work).

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Association of peripheral nerve blocks with outcomes in ambulatory shoulder surgery (primary and secondary)

Table 1: Association of peripheral nerve blocks with outcomes in ambulatory shoulder surgery (primary and secondary)

	No PNB	PNB	Unadjusted Odds Ratio (95% CI)	P value	Adjusted analysis† Odds Ratio (95% CI)	*P* value
Primary analysis	n=28,571	n=31,073				
• Composite Outcome (7 days), n (%)	3,424 (12.0)	2,808 (9.0)	0.73 (0.69 to 0.77)	<0.0001	0.96 (0.89 to 1.03)	0.243
○ Unplanned Admission §, n (%)	1,784 (6.2)	1,132 (3.6)	0.57 (0.53 to 0.61)	<0.0001	0.88 (0.79 to 0.98)	0.020*
○ Readmission within 7 days, n (%)	85 (0.3)	98 (0.3)	1.06 (0.79 to 1.42)	0.693	1.00 (0.73 to 1.39)	0.987
○ ED visits within 7 days, n (%)	1,779 (6.2)	1,732 (5.6)	0.89 (0.83 to 0.95)	<0.001	1.02 (0.94 to 1.12)	0.583
Secondary Analysis ‖						
• Composite Outcome (30 days), n (%)	4,400 (15.4)	3,754 (12.1)	0.76 (0.72 to 0.79)	<0.0001	0.95 (0.89 to 1.02)	0.137
○ Unplanned Admission §, n (%)	1,784 (6.2)	1,132 (3.6)	0.57 (0.52 to 0.61)	<0.0001	0.88 (0.79 to 0.98)	0.020*
○ Readmission within 30 days, n (%)	229 (0.8)	207 (0.7)	0.83 (0.69 to 1.00)	0.053	1.00 (0.73 to 1.39)	0.987
○ ED visits within 30 days, n (%)	2,837 (9.9)	2,727 (8.8)	0.87 (0.83 to 0.92)	<0.0001	1.00 (0.93 to 1.07)	0.983
• Cost after surgery** (7 days)	4,391 (3,910 to 4,836)	4,681 (4,337 to 5,066)	1.07 (1.07 to 1.07) §	<0.0001	1.06 (1.02 to 1.10) §	0.005*
• Cost after surgery** (30 days)	4,528 (4,014 to 5,019)	4,840 (4,451 to 5,258)	1.07 (1.07 to 1.08) §	<0.0001	1.06 (1.02 to 1.10) §	0.007*
• Neurology consultations in the 90 days after surgery	74 (0.3)	92 (0.3)	1.14 (0.84 to 1.55)	0.391	1.04 (0.71 to 1.53)	0.839
• Nerve conduction studies in the 90 days after surgery	235 (0.8)	274 (0.9)	1.07 (0.9 to 1.28)	0.432	1.02 (0.84 to 1.24)	0.834

* p<0.05 is statistically significant.
† variables included in the model include patient demographics, surgery location, surgery type, healthcare resource use, comorbidities as outlined in Table 1.
‡ NOTE: weighted frequencies of outcomes for the "No PNB" group are presented.
§ Unplanned admission refers to admission on the day of surgery only.
‖ Using a log-gamma regression model given the distribution of the cost data (right-skewed). These are also ratio of means, no Odds ratios.
** Cost after surgery include the day of surgery costs.

637119 - PERIPHERAL NERVE BLOCKS TO DECREASE HEALTHCARE RESOURCE USE AFTER HIP FRACTURE SURGERY

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Introduction: Mortality and adverse events are common after hip fracture surgery.[1-2] Strategies to improve outcomes and decrease healthcare resource use after hip fracture surgery are needed. Our objective was to measure the association of receipt of a peripheral nerve block for hip fracture surgery with postoperative healthcare resource use.

Methods: Because data used were routinely collected and deidentified, our study is legally exempt from research ethics review according to institutional policy. Following protocol registration (osf.io/ts658/), a retrospective cohort study using linked population-based health administrative data between 2011-2015 was carried out. Multilevel multivariable regression, instrumental variable and propensity score methods were used to determine the association between nerve blocks and outcomes. Ina population of individuals who had emergency hip fracture surgery, we compared

patients that received a peripheral nerve block (using a validated case-ascertainment algorithm) to those that did not. Our main outcome measures were length of hospital stay (primary), 30-day healthcare costs, 30-day mortality and in-hospital pneumonia.

Results: We identified 65 271 individuals who had emergency hip fracture surgery; 10 030 (15.4%) received a nerve block. Median length of stay was 7 (IQR 4-13) days for people with a nerve block and 8 (IQR 5-14) days without. Following multilevel, multivariable regression analysis nerve blocks were associated with a 0.62 day decrease in length of stay (95%CI 0.47-0.77). This finding was confirmed in instrumental variable (1.05 days, 95%CI 0.87-1.19) and propensity score (0.23 days, 95%CI 0.16-0.30) analyses. Costs were also significantly lower (adjusted cost difference -$1 421, 95%CI -$1 579 to -$1 289). There was no difference in mortality (adj-odds ratio 0.99, 95%CI 0.89-1.11) or pneumonia (adj-odds ratio 1.01, 95%CI 0.88-1.16).

Conclusions: In older people who require emergency hip fracture surgery, receipt of a peripheral nerve block is associated with a decrease in length of stay and health system costs. These findings support the potential effectiveness of nerve blocks in improving outcomes after emergency hip fracture surgery.

References:

1. JAMA 2009;302:1573–9.
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Table 1 - Unadjusted and adjusted secondary outcomes

Table 1 - Unadjusted and adjusted secondary outcomes

Process		PNB n=16,162	No PNB n=6,499	Crude effect estimate 95% CI	Adjusted effect estimate 95% CI
30-day health system costs	Mean (SD)	$20 158 ($21 746)	$22 221 ($30 186)	0.91 0.89-0.92	0.95 0.92-0.98
30-day mortality	n (%)	685 (6.8)	3 683 (6.7)	0.94 0.89-1.00	0.99 0.89-1.11
In-hospital pneumonia	n (%)	245 (2.4)	1 492 (2.7)	0.90 0.79-1.04	1.01 0.88-1.16

OR: odds ratio; CI: confidence interval;*all adjusted analyses included: age, neighborhood income quintile, rurality, procedure, Hospital One Year Mortality score, each Elixhauser comorbidity, each specified drug class, year of surgery, resource utilization band, frailty, and long-term care residence; †Description of adjusted probability methods provided in Appendix 2

637498 - INTERSCALENE BLOCK ANALGESIA WITH INTRAVENOUS DEXAMETHASONE, DEXMEDETOMIDINE OR BOTH: A RANDOMIZED TRIAL

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Introduction: Dexamethasone[1] and dexmedetomidine[2] are commonly used as

intravenous adjuncts to prolong the analgesic duration of interscalene block (ISB) in patients undergoing ambulatory arthroscopic shoulder surgery (AASS). Studies comparing their relative effectiveness are lacking and the benefit of using them in combination is unknown[3]. This study determined if analgesic duration with one adjunct was superior to the other and if their combination provided additional benefit over the individual adjuncts.

Methods:

Ethics: Approvals for study protocol and off-label drug use were obtained.

Design: Pragmatic, single-centre superiority trial with three parallel groups randomized 1:1:1.

Participants: Adult, AASS surgery patients, excluding those with contraindication to study interventions, conditions that could alter study drug metabolism or daily opioid use.

Interventions: Ultrasound guided ISB with 30mL 0.5% bupivicaine and one of the following intravenous adjuncts:

(i) 50 mcg dexmedetomidine[2]

(ii) 4 mg dexamethasone[1]

(iii) Both of the above

All other aspects of care were at the caregivers' discretion.

Outcomes: The primary outcome was analgesic block duration measured to time of first pain at the surgical site and assessed by daily telephone follow up. Secondary outcome reporting deferred for lack of space.

Randomization: Computer generated sequence in blocks of 21. A clinical assistant not directly involved in patient care prepared two saline mini bags with dexmedetomidine, dexamethasone or placebo for each patient.

Blinding: Allocation sequence and group assignment were concealed from enrolment staff, patients, caregivers and outcome assessors.

Intention to treat analysis: Sample size was based on 90% power to detect 3.0h difference in block duration with two-tailed alpha = 0.05 and standard deviation of 5.0h.(34) However, block duration data skewness necessitated log transformation prior

to linear regression analysis.

Results: Between 19 September 2017 and 13 April 2018, 391 patients were assessed for eligibility and 198 were randomized (n = 66 per group). One patient withdrew and two patients experienced no pain leaving n = 65 per group for analysis in their assigned groups (Table). No important differences in baseline characteristics or perioperative care were observed between groups. Compared to dexmedetomidine alone (reference group), dexamethasone prolonged block duration by 59% (95% confidence interval (CI) 28% to 97%) and dexamethasone with dexmedetomidine prolonged block duration by 46% (95% CI 18% to 80%) (both p less than 0.001). Addition of dexmedetomidine to dexamethasone did not prolong block duration compared to dexamethasone alone -8% (95% CI -26% to +14%, p = 0.5).

Discussion: Compared to intravenous dexmedetomidine alone, intravenous dexamethasone alone prolongs ISB analgesic duration. However, giving both adjuncts is unlikely to provide a clinically significant benefit compared to dexamethasone alone.

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2. Anesthesiology. 2016 24(3):683-95.
3. Best Pract Res Clin Anaesthesiol. 2018 32(2):83-99.

Table. Interscalene block analgesic duration.

	Dexmedetomidine	Dexamethasone	Combination
n	65	65	65
Block duration (h)	16.0 [1.3-153.8]	24.6 [2.0-339.5]	24.2 [1.7-157.2]

Block duration is measured from time of block injection to reported time of first pain in operative shoulder. Values expressed as median [range]

637527 - EFFICACY OF CAUDAL DEXMEDETOMIDINE: A META-ANALYSIS & TRIAL SEQUENTIAL ANALYSIS OF RANDOMIZED CONTROLLED TRIALS.

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Caudal block is a commonly performed regional anesthesia technique for perioperative analgesia in pediatric patients undergoing infraumbilical surgeries. Its use is constrained by the limited duration of analgesia afforded by the conventional local anesthetics alone. Several adjuvants have been studied and dexmedetomidine has emerged as an effective alternative. This meta-analysis aims to update and expand previous meta-analyses, summarizing the efficacy and safety of caudal dexmedetomidine in pediatric infraumbilical surgeries.[1,2]

Methods

We performed a pair-wise meta-analysis and trial sequential analysis of randomized controlled trials following PRISMA guidelines[3] and registered a protocol for this study with PROSPERO (CRD42018106027). IRB approval was not sought as this was a review of existing literature. We searched 10 databases for RCTs, comparing a single-shot caudal block using long-acting local anesthetics with or without caudal dexmedetomidine. Our primary outcome was the duration of analgesia, while other efficacy end-points (total number of doses used and total analgesic dose used) and safety end-points (relative risk of hypotension, bradycardia, PONV, urinary retention,

respiratory depression, emergence delirium; emergence time and motor block duration) were analysed. Study screening, data extraction, risk of bias assessment (Cochrane ROB Version 2)[4] and appraisal of evidence (GRADE)[5] was done. We used STATA 14.0 routines, using random-effect model to pool results (weighted mean differences - continuous measures; relative risk - dichotomous events). We used I^2 to quantify heterogeneity, explored it using meta-regression and subgroup analysis; employed Funnel plots to assess publication bias and trial sequential analysis to inform the risk of type I error.

Results

We included 32 RCTs. The use of caudal dexmedetomidine prolonged the duration of analgesia by 443.85 min (95% CI 367.65 - 520.05; p = 0.000; I^2 = *99.8%;* 'MODERATE' evidence) while the motor block was minimally prolonged. It also reduced the number of 24-h analgesic doses by 1.15 doses and the total dose of 24-h acetaminophen by 199.77 mg, on average. Relative risk of hypotension, PONV, urinary retention or respiratory depression was unchanged, whilst that the of bradycardia was increased 4.2 times. Emergence time was extended by 1.94 min and RR of emergence delirium reduced by 60-92%. Univariate meta-regression suggested a positive impact of dose (ml/kg) of caudal injectate on primary outcome, as well a minimal benefit of increasing dexmedetomidine dose (1 vs 2 mcg/kg). These results were non-significant in multivariate MCMC analysis. The analysis of Funnel plot & Egger's test suggested a lack of publication bias and TSA confirmed the validity of the primary outcome.

Conclusion

The addition of dexmedetomidine prolongs the duration of analgesia, reduces 24-h acetaminophen consumption and reduces the risk of emergence delirium. It may however increase the risk of bradycardia and delayed emergence. Given lack of neurological safety data, future studies need to evaluate effect of intravenous dexmedetomidine on a caudal block.

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Table 1

OUTCOMES	RCT (n)	WMD or RR	P-VALUE	I^2
ANALGESIC				
Duration of analgesia*	27 RCTs (n = 1644)	443.85 (367.65 - 520.05) min	0.000	99.80
Duration of motor block	4 RCTs (n = 219)	8.26 (1.22 - 15.29) min	0.021	82.30
Number of analgesic doses	8 RCTs (n = 493)	-1.15 (-1.53, -0.77) doses	0.000	95.70
Total analgesic dose	5 RCTs (n = 242)	-199.77 (-349.99, -49.55) mg PCM	0.009	93.50
ADVERSE EFFECTS				
Emergence time	10 RCTs (n = 548)	1.94 (0.66 - 3.22) min	0.003	93.50
Hypotension	6 RCTs (n = 297)	1.39 (0.48 - 4.04)	0.548	0.00
Bradycardia	6 RCTs (n = 331)	4.24 (1.34 - 13.40)	0.014	0.00
PONV	18 RCTs (n = 1002)	0.91 (0.61 - 1.35)	0.623	0.00
Urinary retention	8 RCTs (n = 412)	0.69 (0.29 - 1.67)	0.410	0.00
Respiratory Depression	2 RCTs (n = 97)	2.09 (0.28 - 15.54)	0.471	0.00
Emergence Delirium	5 RCTs (n = 275)	0.18 (0.08 - 0.40)	0.000	0.00

Abbreviations: RCT – Randomized controlled trial; WMD – Weighted mean difference; RR – Relative risk; I^2 – heterogeneity scale (0-100%); * - primary outcome.

Summary of efficacy and safety outcomes (Caudal Dexmed + LA vs LA alone).

638236 - CONTINUOUS PERIPHERAL NERVE BLOCKADE FOR MIDLINE LAPAROTOMY: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Introduction: Midline abdominal surgery frequently leads to significant postoperative pain. Epidural anesthesia has been shown to improve postoperative outcomes, including postoperative pain, compared to systemic analgesia.[1-3] However, it is limited by contraindications and complications.[4,5] Continuous peripheral nerve blockade (CPNB) may circumvent these concerns, but its efficacy compared to epidural and systemic analgesia has yet to be clearly established. Therefore, the objective of this study was to compare CPNB to 1) epidural and 2) systemic opioids in terms of pain scores and opioid consumption at 48 hours after elective midline abdominal surgery.

METHODS: MEDLINE, EMBASE, and the Cochrane Library databases were searched up to July 1, 2018. We included randomized controlled trials (RCT) and cohort studies comparing CPNB to epidural and/or systemic opioid analgesia in patients older than 18 years old undergoing elective abdominal surgery via midline laparotomy. We excluded obstetrical, gynecologic, or trauma surgery, and studies with greater than 20% of patients undergoing laparoscopic or emergency surgery. The primary outcomes were pain score (Visual Analogue Scale) and cumulative opioid consumption at 48 hours. Data extraction and risk of bias assessment were performed by two independent reviewers. We synthesized the data using random-effects meta-analysis with Revman software.

RESULTS: We screened 15,954 titles/ abstracts and assessed 294 full texts for inclusion. Twenty-six RCTs and two cohort studies encompassing 1,654 patients met inclusion criteria. Six catheter types were evaluated: rectus sheath, paravertebral, intraperitoneal, preperitoneal, wound, and transversus abdominal plane. At 48 hours, when compared to opioid based analgesia, all CPNB types studied significantly reduced opioid consumption (mean difference: -25.74mg; 95% CI -34.67 to -16.81; standard mean difference: -1.20; 95% CI -1.70 to -0.70). Patients had similar pain scores with CPNB versus opioid based analgesia (mean difference: -0.33; 95% CI -0.79 to 0.13). When comparing CPNB to epidural analgesia, patients had similar pain scores (mean difference: 0.48; 95% CI -0.28 to 1.24) and opioid consumption (mean difference: 14.28mg; 95% CI -4.84 to 33.40). These findings are limited by high heterogeneity and high risk of bias among and within the included studies.

Discussion: In adult patients undergoing elective midline laparotomy, CPNB is superior to opioid based analgesia, but not statistically significantly different from thoracic epidural. CPNB is an effective strategy to reduce postoperative opioid consumption in patients who have undergone elective midline laparotomy. Further research is needed to determine the impact of regional catheter techniques on functional outcomes after midline laparotomy.

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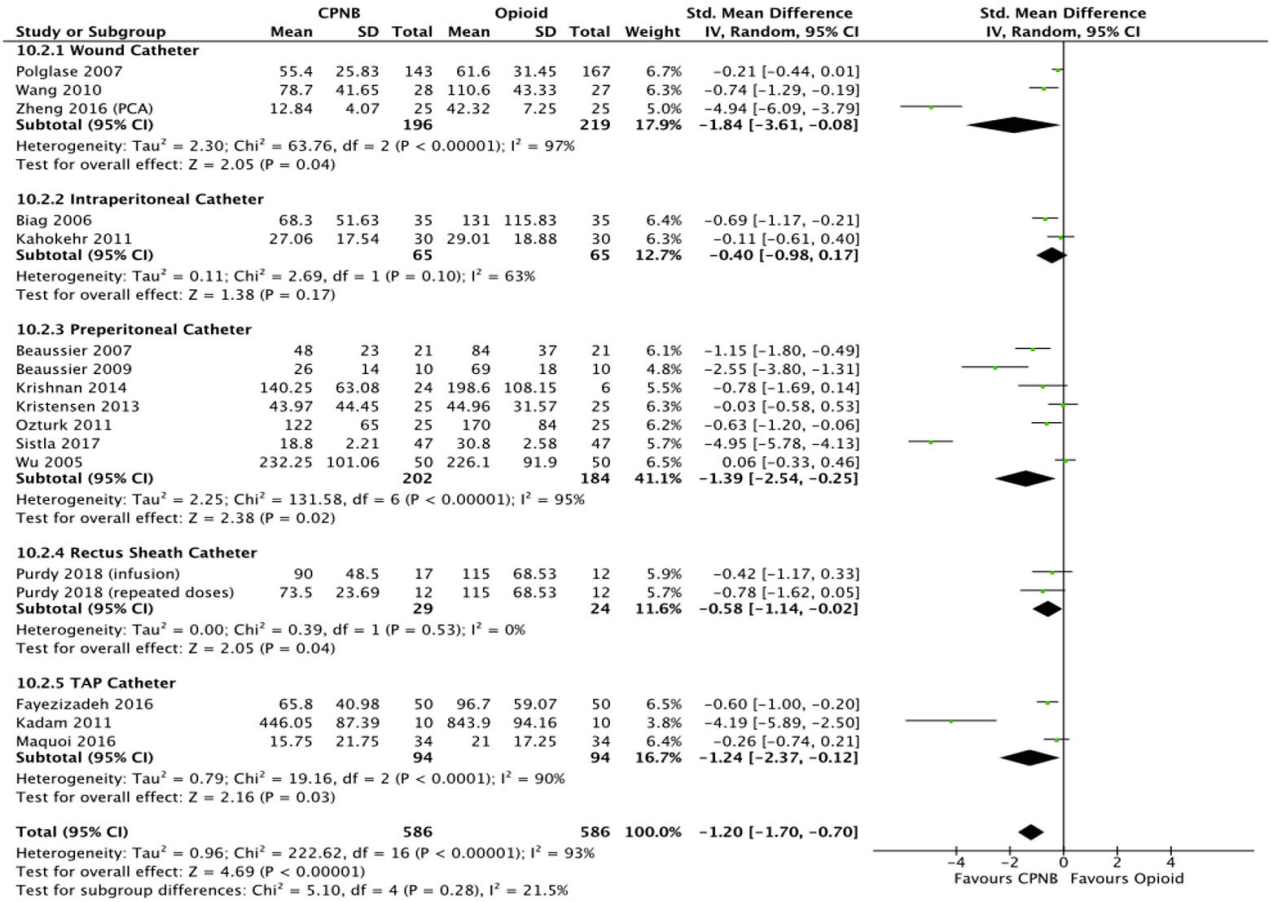
Opioid consumption over the first 48 post operative hours in patients using continuous peripheral nerve blockade (CPNB) compared to opioid based analgesia

Figure 1: Opioid consumption over the first 48 post operative hours in patients using continuous peripheral nerve blockade (CPNB) compared to opioid based analgesia



630937 - COMBINED SPINAL-EPIDURAL ANESTHESIA FOR EMERGENCY BOWEL RESECTION IN A PATIENT WITH A LARGE LUNG TUMOUR

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Case Description:
An 80-year-old female with rheumatoid arthritis, hypertension and osteoporosis presented with a one day history of generalized abdominal pain with a non-reducible right groin lump associated with obstipation and vomiting. Incidentally, she had a newly discovered right upper lung mass measuring 7.4cm with compression on the mediastinum including the SVC (Image 1). There was also evidence of distant pulmonary metastases and likely pleural involvement. She had just been discharged from hospital the previous day and was waiting for an outpatient bronchoscopy and lung biopsy. Physical examination and radiological investigations showed an incarcerated right inguinal hernia with possible bowel ischemia and she was listed for emergency open repair of right inguinal hernia keep in view tissue repair, bowel resection and stoma.
In view of the large lung tumor, which could cause significant airway and cardiorespiratory compromise under a general anesthesia, a joint decision was made with the surgeons to avoid general anesthesia and proceed with the surgery (mini laparotomy) under combined spinal-epidural. With the patient in the right lateral position, a combined spinal-epidural was done at L3/4 under full aseptic technique. Intrathecal 2.5ml of 0.5% heavy Bupivacaine with 15mcg Fentanyl was given and the epidural catheter was then inserted and secured. The surgery began with a right inguinal skin incision 15 minutes after the spinal. The patient was given oxygen supplementation via nasal cannula and sedated with Propofol target controlled infusion. An epidural top up of 2ml 0.75% Ropivacaine was given 20 and 60 minutes into the surgery. 15cm of unhealthy small bowel was resected and an anastomosis was done. The patient remained comfortable and hemodynamically stable throughout the 1h 50min surgery.
She was discharged to the general ward from recovery, epidural catheter was removed on postoperative day 3 and she was discharged well from the hospital on postoperative day 6.

Discussion:
Mediastinal and intrathoracic masses require special anesthetic consideration as they may cause mechanical compression on the airways or the great vessels, possibly resulting in acute respiratory and hemodynamic insufficiency (1). These effects can be caused or worsened by sedation and paralysis during induction of anesthesia and/or

changes in position during surgery (2).
While there is time for preoperative investigations and optimization in an elective surgery, there was no such luxury of time in this case. Combined spinal-epidural (CSE) anesthesia for laparotomy has been reported in the literature in case reports (3,4). This is an anesthetic technique that should be considered for patients requiring laparotomy who have mediastinal or thoracic masses with the risk of mass effect under general anesthesia.

Acknowledgement:
Published with the written consent of the patient. No external funding or competing interests declared.

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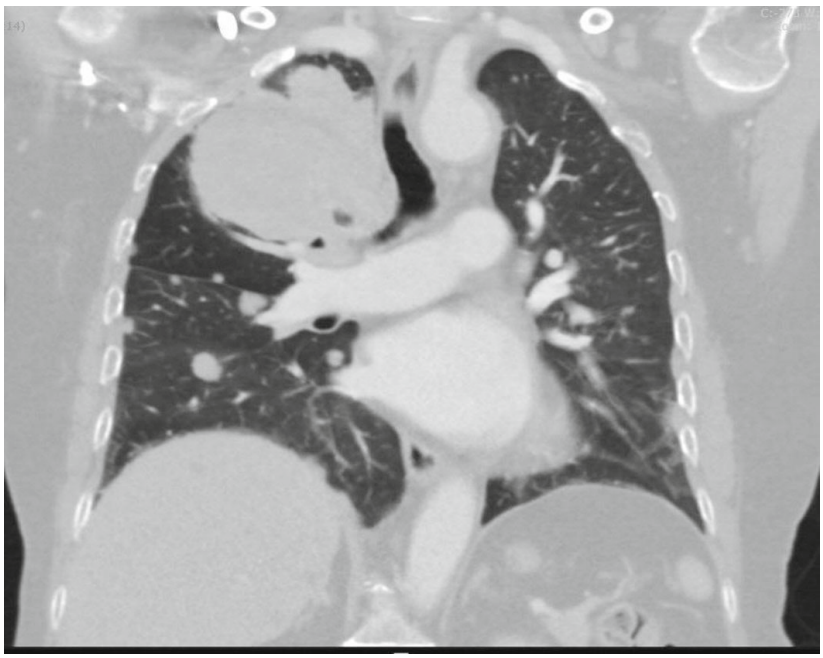
Image 1

CT Thorax showing the large right upper lobe mass with pressure effect on trachea and superior vena cava.



633750 - FUNCTIONNAL RECOVERY WITH PERIPHERAL NERVE BLOCK VS GENERAL ANESTHESIA FOR UPPER LIMB SURGERY: A SYSTEMATIC REVIEW

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Introduction

Peripheral nerve block is the injection of local anesthetic to inhibit the transmission of nerve impulse to the central nervous system commonly use to perform orthopedic surgeries. The inhibition of nociceptive impulses may decrease the occurrence of muscle spasm when mobilizing postoperatively, potentially improving functional recovery following upper limb surgery. The aim of this systematic review was to evaluate the impact of peripheral nerve block on functional recovery after upper limb surgery. If regional anesthesia improved functional outcomes, it would lead to its wider adoption in clinical practice and a greater emphasis on regional anesthesia in training.

Methods

We searched CENTRAL, MEDLINE (ovid), CINHAL, EMBRASE and Scopus from inception to November 2018. We included randomized controlled trials comparing the post-operative period for upper limb surgery under locoregional (LR) anesthesia versus general anesthesia (GA) for full-text review. In duplicate, we assessed studies and collected data on functional recovery at latest follow-up, range of motion, patient satisfaction regarding the anesthesic technique used, quality of life and time from surgery to return to work. We summarized the quality of evidence for each outcome with the GRADE approach. Studies were pooled with a random effect.

Result

Our search identified 174 citations. After title and abstract review, 11 full-text articles were assessed for eligibility and 3, after full reading, met eligibility criteria. None of the studies reported on functional recovery following upper limb surgery under LR anesthesia versus GA. For the secondary issues, satisfaction score was assessed at 2 week and was significantly higher in LR group versus GA. (2 studies, N = 78; Odd Ratio (OR) 4.47 95% confidence interval (CI) 1.53-13.02; I^2=0%). The quality of evidence is low due to lack of blinding of participant, indirectness, impression, small total event size.

Discussion

No study has compared functional recovery after LR and GA for upper limb surgery. However, based on low quality evidence, LR is associated with a better satisfaction following the intervention. Considering the potential impact on clinical practice and clinical training, this aim to perform a study comparing functional recovery after upper limb surgery under LR versus GA at short and long term using appropriate psychometric evaluation and physical examination.

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634161 - DOES INTRACUFF LOCAL ANESTHETIC REDUCE POSTOPERATIVE SORE THROAT - A RANDOMIZED CLINICAL TRIAL

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Introduction: Post-operative sore throat is a common complication following tracheal intubation.[1] Prophylactic intracuff lidocaine, which provides short duration analgesia has demonstrated reduced postoperative sore throat.[2] Ropivacaine is a longer acting local anesthetic.[3] We hypothesized a decrease in the severity and incidence of sore throat following endotracheal tube cuff inflation with ropivacaine compared to lidocaine or air.

Methods: After local Ethics Committee approval, we conducted a randomized blinded clinical superiority trial. Participants requiring endotracheal intubation for surgery were recruited and randomized to one of three groups: cuff inflation with lidocaine 2%, ropivacaine 0.5%, or air. The primary outcome was the severity of sore throat on postoperative day one. Participants and data collector were blinded to participant allocation.

Results: Seventy-three participants were assessed for eligibility and 65 were randomized. Five participants deviated from the protocol, resulting in 20±1 participants being analyzed in each group. The primary outcome, severity of sore throat on postoperative day one using the median numerical rating scale, was similar between the three treatment groups for intracuff lidocaine (0, IQR 0-1, ropivacaine (0, IQR 0-2.5), and air (0, IQR 0-0 p =.662). No harms or complications resulted from the three treatment groups<./p>

Discussion: General anesthesia requiring tracheal intubation has numerous morbidities, the most common being post-operative sore throat. The use of the longer-acting local anesthetic, ropivacaine 0.5%, as the medium to inflate the endotracheal tube cuff did not reduce the severity of post-operative sore throat in this study.

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Table 1. Outcomes from an RCT

Outcome	Lidocaine N=19	Ropivacaine N=21	Air N=20	Effect size	P-value
Primary Outcome					
Post-operative Day 1					
Sore throat pain score, median [IQR]	0[0-1]	0[0-2.5]	0[0-0]	0.021[a]	0.662[b]
Secondary Outcomes					
PACU					
Sore throat pain score, median [IQR]	0 [0-0]	0 [0-0.5]	0 [0-0]	0.012[a]	0.263[b]
Surgery pain score, median [IQR]	3[0-6.74]	5[3-8]	2[0-4]	0.079[a]	0.039[b]
Dysphagia (Yes), n/total N(%)	1/19(5%)	3/21(14%)	1/20(5%)	0.158[c]	0.605[d]
Hoarseness (Yes), n/total N(%)	15/19(79%)	11/21(52%)	12/20(60%)	0.230[c]	0.221[e]
Time in PACU (minutes), median [IQR]	90[73-128]	118[74.5-118]	89[71.75-121.50]	0.024[a]	0.186[b]
Post-operative Day 1					
Surgery pain score, median [IQR]	3.5[1-6]	3[1-5]	3.5[1-6.75]	0.031[a]	0.879[b]
Dysphagia (Yes), n/total N(%)	1/19(5%)	1/21(5%)	2/20(10%)	0.095[c]	0.836[d]
Hoarseness (Yes), n/total N(%)	13/19(68%)	8/21(38%)	9/20(45%)	0.257[c]	0.144[e]
Participant very satisfied, n/total N(%)	15/19(79%)	19/21(95%)	16/20(80%)	0.875[c]	0.922[d]

Note: All the percentages are rounded off to nearest integer. a Eta squared (η2) b Kruskal-Wallis test c Cramer's V d Fisher's Exact test e Pearson Chi-square test

637551 - SERRATUS ANTERIOR PLANE BLOCK ANALGESIA IN PATIENTS WITH ISOLATED POSTERIOR RIB FRACTURES: A CASE SERIES

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Introduction:

Traumatic rib fractures carry significant morbidity and effective analgesia is essential for prevention of associated pulmonary complications[1]. Guidelines recommend epidural analgesia yet trauma patients frequently have contraindications to epidural analgesia[2].

The Serratus Anterior Plane (SAP) block provides analgesia of the hemithorax and has fewer contraindications than an epidural technique[3]. Case reports describe SAP block analgesia for patients with anterior and lateral but not posterior rib fractures[4].

We present four consecutive patients with isolated posterior rib fractures effectively managed with SAP blocks for analgesia.

Methods:

Being a case series Research Ethics Board approval was waived. Subjects provided written consent for presentation of clinical information.

Results:

Case 1: A 69-year old male with obstructive sleep apnea and on therapeutic ticagrelor with posterior fractures of ribs 1-3.

Case 2: An 86-year old female with dementia and opioid intolerance with posterior fractures of ribs 3-11 unable to position for safe epidural insertion.

Case 3: A 64-year old male with posterior fractures of ribs 4-7 and unmanageable pain despite multimodal systemic analgesia. The patient refused epidural anesthesia.

Case 4: An 84-year old male with dementia and opioid intolerance on therapeutic apixaban with posterior rib fractures 4-8 and 11.

For SAP block insertion patients were positioned supine. The mid-axillary point of the designated rib was approached anterior-posterior using ultrasound and a Tuohy needle was advanced deep to the serratus muscle. Ropivacaine 0.5% with epinephrine 1:400,000 was injected to 20ml. A catheter was then inserted and additional solution, based upon patient mass, was injected through the catheter. An infusion was started with Ropivacaine 0.2% at 5ml/hr, with an 8ml patient controlled bolus.

All four patients achieved reduced pain with inspiration and rib palpation within 30 minutes. All patients reported reduced pain scores and had reduced daily opioid consumption in the 72 hours after SAP block insertion (Table 1).

Discussion:

The SAP block covers lateral cutaneous branches of intercostal nerves as they pierce the serratus anterior muscle posterior to the mid-axillary line[5]. The anterior and posterior segments of the lateral cutaneous branch are also reached by local anesthetic as they reflect anteriorly and posteriorly at this point[5]. The posterior segment of the lateral cutaneous branch extends to innervate a component of the posterior thorax. A previous case series described inadequate analgesia with a SAP block in posterior rib fractures[4]. In these cases, SAP blocks were inserted posterior-to-anterior from a point depicted as anterior to the mid-axillary line. This approach may spare the posterior segment of the lateral cutaneous branches and subsequently analgesia of the posterior thorax.

Our cases suggest SAP blocks provide a reasonable analgesic option for patients with posterior rib fracture pain and contraindications to epidural anesthesia, when performed using the technique we have described.

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Table 1: Opioid Consumption and Pain Numeric Rating Scale

Patient	Pre-block MME (mg)	Day 1 MME (mg)	Day 2 MME (mg)	Day 3 MME (mg)	Pre-block NRS	Day 1 NRS	Day 2 NRS	Day 3 NRS
1	17	16	12	5	9/10	3/10	3/10	3/10
2	21	4	4	9*	8/10	2/10	3/10	2/10
3	82	8	20	20	8/10	1/10	1/10	2/10
4	17	1	0	0	8/10	0/10	4/10	4/10

Legend: Pre-block (24 hour period prior to nerve block insertion), MME (daily morphine milligram equivalents), NRS (pain numeric rating scale), *SAP catheter dislodged Day 3.

EDUCATION AND SIMULATION

608095 - GENDER BENDING: A NATIONAL PERSPECTIVE ON LEADERSHIP AMONGST FEMALE ANESTHESIOLOGISTS IN CANADA

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Introduction

Despite the *"feminization'* of Medicine and the increasing number of female anesthesiologists in Canada,[1] women remain underrepresented in the higher echelons of Medicine and in leadership positions.[2,3] Stipulations to explain the *pipeline effect* have been described, but research in gender equity and equality in anesthesiology remains scarce. To address the gender disparity problem, elucidation of barriers and facilitators to leadership positions for female anesthesiologists is essential. We sought to determine facilitators and enablers to leadership positions in female anesthesiologists as well as concepts around gender as expressed by these women.

Methods

This study was approved by our institutional research ethics board; participants provided written, informed consent. This research project used qualitative methods sensitized by critical feminist theory.[4] Purposeful stratified sampling was used, and semi-structured interviews were conducted with staff anesthesiologists in leadership positions until saturation was achieved. Interviews examined participants' beliefs and experiences around both gender and leadership concepts. Interviews were transcribed verbatim and preliminary analysis of the semi-structured interviews occurred concurrently with data collection and was an iterative process. The team read each transcript in full, with initial open coding of the data; subsequently, a thematic analysis of the transcribed interview codes was conducted inductively to uncover broad, emergent themes. NVivo12 (QSR International, Australia) was used for cross-referencing and for thematic analysis.

Results

Seven female anesthesiologists practicing at tertiary-level academic centres individually participated in a semi-structured interview. Our iterative process identified six themes: *gender as complexity and self-identification, voice and vision of leadership, mentorship: mutualistic relationship demonstrating respect-trust dualism, gender discrimination as a lived experience, acknowledgement of systemic bias,* and *self-underrepresentation of women.*

Overt discrimination is now emerging in forms of covert discrimination in academic anesthesiology. Female anesthesiologists reject gender discrimination for themselves yet discuss gender disparity, discrimination, harassment, and bias in third person. These women stumbled around gender discrimination, thereby illuminating that these issues remain pervasive in anesthesiology. These women also expressed mentorship as a social support system *en route* to leadership positions but voiced both external (e.g., held to higher standards) and internal (e.g., pregnancy, breast feeding) obstacles encountered.

Conclusion

Our qualitative study examining leadership barriers and catalysts in anesthesiology identified six key themes. Mentorship was viewed as a support system although gender discrimination was pervasive. These results identify critical areas for future research to increase female participation in leadership in anesthesiology.

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610837 - WOMEN IN ANESTHESIOLOGY: PLAYING IN THE SANDBOX IS NOT A ONE "MAN SHOW

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Introduction

Despite the increasing number of female anesthesiologists in Canada, women remain underrepresented in academic medicine and leadership.[1] The reasons behind this are not fully understood but may include family responsibilities, inadequate mentorship, and lack of desire.[2] Even when adjusted for part-time work, maternity leave and productivity, women are less likely to be promoted. A less frequently proposed issue is gender discrimination.[3] The purpose of this study was to assess gender differences in career experiences, satisfaction, and advancement in academic anesthesiology.

Methods

This cross-sectional survey was approved by our institutional research ethics board. The web-based survey consisting of a 53-item questionnaire was distributed to all staff anesthesiologists at a tertiary academic center. The survey included questions about six important domains: (1) demographic information, (2) career aspects and advancement, (3) family planning and commitments, (4) mentorship, (5) discrimination, and (6) career satisfaction. Responses from male and female respondents were compared using a student t-test, Chi-squared and Fisher's exact test, as appropriate. Text boxes were analyzed with initial open coding of the data followed by an inductive, thematic analysis of the transcribed interview codes to uncover broad, emergent themes.

Results

The response rate was 26.8% (57/213); 63% male and 37% female. Respondents had a median of 2 (IQR 1-2) children, 84% were married and 80% had been in practice more than 10 years. Women took longer parental leaves than men (17 [IQR 9-30] vs 2 [IQR 1-2] weeks, respectively, *P*P=0.039). Men and women responded similarly in terms of leadership positions held, publications, mentorship, rank, and career satisfaction. More women than men had experienced discrimination on the basis of gender (52 vs 11%, respectively, *P*=0.001) and career challenges influenced by gender (38% vs 14%, respectively, *P*=0.036). Women were more satisfied with their relationships with their colleagues than men, although both expressed high rates of satisfaction. Our iterative process identified three themes: *the Canadian Anesthesiologists' Society as a voice for our profession*, *prevalence of gender discrimination*, and *advancing anesthetic care delivery*.

Discussion

Our survey identified key similarities and differences between male and female anesthesiologists practicing within a single academic center. Our results suggest that challenges related to gender discrimination are more common amongst female anesthesiologists, although male and female respondents reported achievement of similar career milestones and satisfaction. As our analysis was limited by a low sample size, data from other centers would be useful to better understand these issues.

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610840 - REPRESENTATION OF WOMEN ON THE EDITORIAL BOARD OF THE CANADIAN JOURNAL OF ANESTHESIA

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Introduction

The National Academy of Sciences and Institute of Medicine placed a call for "reasonable representation of women on editorial boards and in other significant leadership positions."[1] However, previous research has demonstrated that women are underrepresented on the editorial boards of other anesthesia journals, despite increasing numbers of women in anesthesiology. The proportion of women on the editorial board of the *Canadian Journal of Anesthesia* (CJA) over time has not been described. Our study objectives were to describe the gender composition of both (i) CJA editorial board members over the past decade; (ii) authorship of editorial articles published in the CJA during the same time period.

Methods

We conducted a cross-sectional, retrospective analysis of the gender composition of members of the CJA editorial board. We identified editorial board members in the print version of the CJA published in the January issue in 2010 to 2018, inclusively. We identified authors of editorial articles published between January 1, 2010 and December 31, 2018 on the CJA website. We then determined the gender and country of origin for each board member and author in each year. We compared the gender composition of Canadian *vs* international members and authors using a Chi-squared or Fisher's exact test, as appropriate. Institutional research ethics board approval was not required as we analyzed only publically-available data.

Results

We identified 239 member positions on the CJA editorial board and 246 authors of

editorial articles. Gender was confidently assigned to all but one author, leaving 245 articles for the analysis. The percentage of women on the CJA editorial board was 10% [24/239] overall, ranging from a low of 0% [0/27] in 2014 to a high of 19% [5/27] in 2017. Women made up 4% [1/28] of deputy or associate editors and 0% [0/24] of guest editors. Women represented 23% [56/245] of first authors, and 23% [90/390] of all authors of editorial articles. There was no clear trend in the gender composition of either editorial board membership or authorship over time (Figure 1). Canadian editorial board members were more likely to be female compared to international members (24/187 [13%] vs 0/52 [0%], *P*=0.003). Similarly, Canadian first authors were more likely to be female compared to international first authors (49/181 [27%] vs 7/64 [11%], *P*=0.008).

Conclusion

Women were significantly underrepresented on the CJA editorial board between 2010 and 2018 relative to their representation in the anesthesiology workforce and in authorship of editorial articles during the same time period. This effect was more pronounced amongst the international subset of board members and authors of Editorial articles. These results are consistent with analyses of other medical journals.[2,3]

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623866 - POINT-OF-CARE ULTRASOUND AS AN ADJUNCT TO PREOPERATIVE ANESTHETIC ASSESSMENT IN NON-ELECTIVE SURGERIES

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INTRODUCTION:

Point-of-care ultrasound (POCUS) is emerging as an important bedside assessment tool in the anesthesiologist's armamentarium [1]. In patients presenting for emergency noncardiac surgeries, a POCUS assessment may provide valuable information. The clinical impact of its adoption as an assessment tool in this setting however, is unclear [2].

METHODS:

In this randomized single-blinded controlled trial and after the local ethics committee approval, 101 adults presenting for emergency intermediate to high risk noncardiac surgery were allocated to the use of POCUS as an adjunct to standard preoperative assessment (n=49) or standard assessment only (n=51). POCUS examination included a protocolized focused cardiac, pulmonary, and gastric ultrasound. The impact of this modality on post-anesthesia care unit discharge times, perioperative management, and health care resource utilization was examined.

RESULTS:
The primary outcome, time in post-anesthesia care unit, was similar between groups (median 99 min, IQR [80, 143] in POCUS group, median 102 min, IQR [73, 135] in control group, log-rank P: 0.347). Secondary outcomes, including hospital length of stay, intensity of intraoperative management, rates of surgical delays for investigation, frequency of postoperative investigations, new ICU admissions, and in-hospital mortality were also not significantly different between groups. The use of point-of care ultrasound however, revealed new pathologic findings in 42.9% (21/49) and changed anesthetic management in 22.4% (11/49) of cases.

DISCUSSION:
Use of point-of-care ultrasound as an adjunct to standard anesthetic assessment in emergency noncardiac surgeries is unlikely to affect recovery time in the post-anesthetic care unit. It's utilization in this setting however, may reveal previously unknown diagnoses with implications on anesthetic management.

References:

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635651 - DEVELOPMENT OF SIMULATION-BASED TRAINING SCENARIOS FOR TRAINEES IN CHRONIC PAIN MEDICINE

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Introduction: Managing patients presenting with chronic pain is one of the most complex tasks in medicine. Simulation-based training (SBT) is a particularly useful tool to practice intricate scenarios in a safe learning environment. However, SBT was not available for the Pain Medicine residents and fellows at our university. Our goal was to develop SBT for the most relevant scenarios in chronic pain medicine that will optimize the trainees' skills and ultimately, the patients' experience, safety, and outcomes.

Methods: Ethics approval was waived by the local ethics board, as the study fell within quality improvement work and course evaluation. After consent from all participants was obtained, the development process included the following key steps: 1) a formal

needs assessment including detailed interviews with 6 clinicians and analysis of 386 patient experience surveys to select the most relevant competences, gaps in training, and clinical situations; 2) a formal Delphi consensus study among faculty members and trainees to select two SBT scenarios for development; and 3) the systematic development and refinement of the two scenarios using multiple focus group discussions and test-runs.

Results: The needs assessment identified the following most relevant challenges in pain medicine: 1) management of patients with high-dose opioids, poor pain control, signs of misuse, or co-dependencies; 2) use of effective communication for de-escalation, active listening, and motivational interviewing; and 3) detection and therapy of mental health issues. We developed two SBT scenarios addressing the management of chronic pain patients with 1) concomitant mental health issues, and 2) opioid addiction. Learning objectives included the identification of symptoms, assessment of suicide risk, demonstration of effective communication skills, evaluation of effectiveness and adverse effects of opioid therapy, and risk stratification. Test-run participants (n=6) found the scenarios to be relevant to their clinical practice, instructive and appreciated their authenticity.

Discussion: Based on a thorough needs assessment with clinicians, students, and patients, we identified and developed SBT scenarios for two highly relevant clinical situations in chronic pain medicine. The preliminary participant evaluations indicate that our SBT scenarios have been a beneficial complement to the existing curriculum. Further testing and evaluation, incorporating the benefits of mini-debriefs, will be conducted. At the conference, we will share the final scenarios and discuss possibilities to ensure positive engagement from learners and instructors.

References:

N/A

637504 - ACADEMIC ANESTHESIOLOGISTS AND BURNOUT THE ROLE OF CLINICAL TEACHING IN BURNOUT

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Introduction

In the academic setting, the role of the consultant anesthesiologist is that of both a clinical provider and a medical educator to fellows, residents and medical students. Prior literature has shown participation in clinical teaching reduces stress levels, likely due to increased peer recognition and a greater sense of satisfaction with one's lasting impact on the medical field through training of young generations of physicians (1).

However, within the field of anesthesia, clinical teaching can be particularly tasking, given that it is often in an acute care setting where high stress and pressure are common. This additional responsibility can significantly increase workload, which could have potential implications on physician wellness, including the development of 'burnout'. (2). Burnout is a work-related syndrome characterized by emotional exhaustion, difficulty finding meaning in work, lack of feelings of accomplishment at work, and difficulty viewing others as people. (3) As both physicians and teachers, academic faculty may be at increased risk of burnout, which can have impacts on their perceived effectiveness as teachers.

A particularly sensitive measure of the impact of burnout on teaching is through measuring teacher self-efficacy (TSE), defined as a teacher's self-assessment of the ability to successfully help students learn. Previous literature has suggested that burnout and teacher self-efficacy are inversely related. (4)

This study aims to assess the relationship between burnout and TSE in Canadian academic anesthesiologists, with the objective to better characterize the potential impacts of the high demands of clinical teaching on physician wellness within anesthesia.

Methods

Following REB approval, the Maslach Burnout Inventory (MBI) and Teacher Self-Efficacy Scale (TSES) were mailed to two large academic anesthesiology departments. Participation was voluntary and data was anonymized. Scores from the TSES and the Emotional Exhaustion (EE) subscale of the MBI were analyzed using a t-test for unequal sample sizes. To examine whether EE predicted TSE, a linear regression analysis was used.

Results

The response rate for both centers was 26% (41/156). No significant difference in EE and TSES were found. EE did not predict TSE (F (1, 38) = .79, p >.05).

Discussion

The impact of clinical teaching does not appear to correlate with rates of EE within this subset of anesthesiologists. This may be due to the dilution of clinical duties within large academic departments, where staff may not be called upon to act as clinical teachers on a regular basis. Furthermore, the impact of non-teaching activities may provide a stronger correlate for burnout within this population (5). Future studies will focus on the possible protective impacts of clinical teaching as well as the relationship between burnout and teaching evaluations generated by students to clarify these findings.

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RESIDENTS' COMPETITION

624396 - DOES FRAILTY ASSESSMENT ENHANCE PREOPERATIVE RISK PREDICTION? A COMPARISON BETWEEN THREE LEADING INSTRUMENTS

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Introduction: Preoperative frailty assessment is recommended by practice guidelines(1,2) however, it is not routinely performed.(3) One barrier is a lack of studies that compare different frailty instruments. Therefore, the objective of this study was to provide guidance in selecting a preoperative frailty instrument by comparing three leading instruments head-to-head. Specifically, we measured the increase in accuracy achieved by adding each frailty instrument to traditional preoperative risk factors when predicting adverse postoperative outcomes.

Methods: This was a research ethics board approved, multicenter, prospective cohort study enrolling people aged 65 years and older having major elective, non-cardiac surgery. Frailty assessments were performed in preoperative clinic (Clinical Frailty Scale (CFS), Fried Phenotype (FP) and Frailty Index (FI)). The primary outcome was death or new disability. Secondary outcomes were prolonged length of stay (LoS) and adverse discharge. Accuracy measures were based on Steyerberg's framework (model fit, discrimination, calibration, reclassification, explained variance).(4) Logistic regression models for each outcome were fit using traditional risk factors only (age, sex, ASA Score, procedure) to estimate baseline predictive accuracy. Next, models were fit by combining the traditional risk factors PLUS each frailty instrument (separate models for each instrument). We then determined the increase in predictive accuracy gained through the addition of each frailty instrument. Internal validation was performed using 5000 bootstrap samples.

Results: We included 645 older surgical patients; 72 (11.2%) died or experienced a new disability. The CFS, FP and FI all improved model fit, discrimination, overall reclassification and explained variance. Calibration was maintained with the CFS and FP, but addition of the FI led to under-prediction of risk in

higher risk patients and improperly reclassified individuals who experienced an event (Table 1). Addition of the CFS led to the greatest increase in discrimination and explained variance. Prolonged LoS occurred for 164 (25.4%) individuals. The CFS improved each accuracy measure as much or more than the FP or FI and was the only instrument to improve reclassification of events and non-events (Table 1). Sixty (9.3%) individuals experienced an adverse discharge. The CFS was the only instrument to improve model fit, provided the greatest increase in discrimination and explained variance (Table 1), and provided the best calibration across the risk spectrum.

Discussion: In a prospective, multicenter study we found that, when added to traditional preoperative risk factors, frailty instruments lead to improved predictive accuracy across a variety of key measures when assessing risk of postoperative death or new disability, prolonged length of stay and adverse discharge. Clinicians should consider using the CFS, as it consistently provided the greatest increase in accuracy across all three outcomes.

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Table 3 - Change in predictive accuracy with addition of frailty scores

Table 1 - Change in predictive accuracy with addition of frailty scores

	Model fit	Discrimination		Reclassification			Explained variance	
Model	Improved? (*P*-value**)	AUC	Change in AUC	Events	Non-events	Overall	Adjusted R-squared	Change in R-squared*
Death or new disability								
Base		0.67					0.08	
Plus CFS	Yes <0.02	0.71	0.04	20%	18%	0.38	0.11	0.03
Plus FP	Yes <0.02	0.70	0.03	9%	34%	0.43	0.11	0.03
Plus FI	Yes <0.01	0.69	0.02	-43%	76%	0.33	0.09	0.01
Prolonged length of stay								
Base		0.73					0.18	
Plus CFS	Yes <0.001	0.76	0.03	7%	22%	0.28	0.22	0.04
Plus FP	Yes <0.05	0.74	0.01	-18%	35%	0.17	0.19	0.01
Plus FI	Yes <0.05	0.74	0.01	50%	-40%	0.1	0.19	0.01
Adverse discharge								
Base		0.78					0.16	
Plus CFS	Yes <0.001	0.82	0.04	13%	35%	0.48	0.25	0.09
Plus FP	No <0.2	0.80	0.02	30%	36%	0.66	0.20	0.04
Plus FI	No <0.2	0.78	0.00	-10%	50%	0.29	0.18	0.02

**-refers to likelihood ratio chi-square P-value; *-refers to Nagelkerke's adjusted R-squared value; Base-basline risk model included age^3, sex, American Society of Anesthesiologists' Score, procedural risk; AUC-area under the receiver operating curve; CFS-Clinical Frailty Scale; FP-Fried Phenotype; FI-Preoperative frailty index

628674 - EFFECTS OF QUADRATUS LUMBORUM BLOCK ON POSTOPERATIVE PAIN AFTER COLORECTAL RESECTION: A RANDOMIZED CLINICAL TRIAL

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Introduction: Postoperative pain following colorectal surgery requires significant opioid use. Recently, regional anesthesia has been proposed to improve pain relief and reduce opioid use. In this context, the posterior quadratus lumborum block (QL2) is newly employed but its effectiveness remains controversial.[1]

Methods: We conducted a double blind randomized controlled trial evaluating the effect of quadratus lumborum block on pain control. Institutional review board committee ethical approval and patient informed consent were obtained for the study. In the QL2 group, an ultrasound-guided injection of 20 mL of ropivacaine 0.375% was performed on each side before the surgical intervention. A sham injection (superficial cutaneous puncture) was performed in the placebo group. Our primary outcome was opioid administration at 24 hours. Our secondary outcomes were opioid administration, pain (visual analogue scale), delay in resumption of intestinal transit, nausea and vomiting, and hospital length of stay. Sixty-two patients were required to evaluate a 50% reduction in opioid use (alpha 5%, beta 20%) with the QL2.

Results: Our population was composed of 63% men and 37% women aged of of 63 years old, on average. In the QL2 group, 100.2 mg (95%CI 68.9-131.5) of PO morphine equivalent were administered on average compared to 88.7 mg (95% CI 59.3 - 118.0) in the placebo group. (p = 0.80). Postoperative pain was better controlled in the placebo group than in the QL2 group (3.8 (95%CI 2.8-4.7) vs 5.7 (95%CI 4.7-6.6); (p = 0.005)). Other outcomes were comparable across groups.

Discussion: In our trial, we did not observe a decrease in opioid administration with the posterior quadratus lumborum block regional anesthesia in a context of colorectal surgery.

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635242 - ASSOCIATION AND PREDICTORS OF OPIOID DISCONTINUATION AFTER SURGERY AMONG CHRONIC OPIOID USERS

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Introduction Previously opioid naïve patients can sometimes develop new chronic opioid use after undergoing surgery. However, many patients are already using opioids chronically even prior to their surgery; it is unclear if surgery alters the trajectory of opioid consumption in these patients. We sought to determine if surgery is associated with opioid discontinuation among chronic users, and the factors associated with opioid discontinuation after surgery.

Methods Following research ethics board approval, we performed a population-based matched cohort study using linked health administrative data. We identified adults aged ≥18 who underwent one of 16 surgical procedures between July 2013 - March 2016 and were chronically using opioids in the year before surgery. We defined chronic opioid use as (1) an opioid prescription that overlaps the index date and (2) a total of 120 or more cumulative calendar days of filled opioid prescriptions or 10 or more prescriptions filled in the prior year. Each surgical patient was matched by age, sex, Charlson comorbidity index and daily opioid dose to three non-surgical patients who were also chronic opioid users. We used multivariable Cox proportional hazards modeling, adjusting for potential confounding variables, to evaluate the association between surgery and time to discontinuation (TTD) of opioids in the following year. We defined discontinuation as the longer of: (1) opioid-free for greater than twice the number of days supplied by the previous prescription or (2) 30 opioid-free days. Next, using multilevel, multivariable logistic regression, we evaluated factors associated with discontinuation of opioids in the year after hospitalization among surgical chronic opioid users.

Results The cohort included 4,755 surgical and 14,265 matched non-surgical patients with chronic opioid use. A greater proportion of surgical than non-surgical patients discontinued opioids in the year of follow-up (36% vs. 29%, p≤0.001). The median TTD in each group was 133 days (IQR:119-150 days) and 236 days (IQR:225-247 days; p≤0.001), respectively. After adjusting for comorbidities and

sociodemographic characteristics, surgery was associated with an increased likelihood of opioid discontinuation (adjusted hazard ratio:1.34; 95%CI:1.27, 1.42). Among surgical patients, factors associated with a reduced odds of discontinuation in the year after hospitalization included an average opioid dose greater than 90 morphine equivalents (aOR:0.39; 95%CI:0.32, 0.49), filling a prescription for oxycodone (aOR:0.73; 95%CI:0.56, 0.98), history of chronic obstructive pulmonary disease (aOR:0.75; 95%CI:0.64, 0.88) or history of dementia (aOR:0.60; 95%CI:0.38, 0.95).

Discussion Having surgery was associated with a decreased time to discontinuation of opioids among chronic opioid users. Among surgical patients, oxycodone use, higher opioid dose, as well as COPD and dementia were associated with a reduced odds of discontinuation. Further research is needed to evaluate whether pre-operative opioid weaning or in-hospital interventions can influence post-operative opioid discontinuation or clinical outcomes, particularly in high risk patients.

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Can J Public Health. 2012;103(8):eS12-eS16.
Med Care. 2005;43(11):1130-1139.

Table 1. Factors associated with discontinuation of opioids in the year after surgery.

Table 1. Factors associated with discontinuation of opioids in the year after surgery.

	Adjusted Odds Ratio (95% CI)[a]	p-value
Demographic Factors		
Age > 65	1.43 (1.21, 1.70)	<0.001
Female	1.12 (0.99, 1.27)	0.10
Comorbidities on Index Date		
COPD	0.75 (0.64, 0.88)	<0.001
Dementia	0.60 (0.38, 0.95)	0.03
Diabetes	1.14 (0.99, 1.31)	0.05
Psychiatric Diagnosis	1.07 (0.93, 1.22)	0.32
Pre-operative Drug Use[b]		
Benzodiazepine	0.97 (0.85, 1.11)	0.67
Pre-operative Opioid Use[c]		
>90 MME	0.39 (0.32, 0.49)	<0.001
Primary Opioid Medication[d]		
Morphine	-	
Oxycodone	0.73 (0.56, 0.98)	0.04
Fentanyl	1.36 (0.92, 2.01)	0.12
Hydromorphone	1.18 (0.87, 1.59)	0.29
Codeine	1.80 (1.33, 2.45)	<0.001
Tramadol	2.32 (1.58, 3.39)	<0.001
Cough[e]	4.43 (1.77, 11.20)	0.002
Meperidine	1.90 (0.63, 5.95)	0.25

[a]Generalized estimating equations evaluated the association between specific variables and discontinuation of opioids in the year of discharge from surgery among chronic opioid users, while accounting for hospital-level clustering. The dependent variable was discontinuation within one year of follow up. Also adjusted for access to care (rural dwelling, income quintile), year of surgery, surgery type, length of stay, hospital teaching status, receipt of APS, and severity of illness (Charlson comorbidity index).
[b]One or more prescription(s) filled in the year prior to index date.
[c]Average daily dose (MME) of all prescriptions overlapping the day before index date.
[d]Medication contributing the greatest proportion of the average daily MME dose on the day before surgery.
[e]Medications primarily used as antitussives and most commonly contain either hydrocodone or codeine.

Abbreviations: CI, confidence interval; COPD: Chronic Obstructive Pulmonary Disease, MME: Milligram Morphine Equivalents; APS: Acute Pain Services

637440 - THE GENDER STUDY: GENDER EQUALITY IN NEWLY DESIGNED MEDICAL EDUCATION RESOURCES

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Introduction: Sex and gender play an important role in disease and treatment. Current evidence demonstrates that women suffer more morbidity and mortality when compared to men with the same diagnosis (1). Furthermore, gender bias is a risk factor for substandard care across all specialties (2,3). However, there is minimal attention paid to gender in medical educational materials. Often there is little or no training in gender perspective for those constructing medical educational materials (4). This lack persists despite evidence demonstrating the influence of teaching methods on medical learners' attitudes to gender issues (5). A lack of training in this important health determinant may be perpetuating subconscious gender bias amongst health professionals. This study aims to determine whether gender bias is present in educational materials from an anesthesiology residency program.

Methods: Following institutional Research Ethics Board approval, we reviewed 115 resident learning cases that were written between 2014 and 2018. These cases were retrospectively analyzed according to the framework developed by Hamberg and Larsson (6). Data was collected on gender, disease and psychosocial characteristics assigned to the fictional patient as well as the gender of the author. Qualitative and quantitative analyses were applied.

Results: Over 70% of case patients were created by male authors. Male gender was assigned to 70 (58%) of the total number of patients from the learning cases. Of the female case patients created by male authors, 17 (49%) were allocated a stigmatizing disease or psychosocial characteristic compared to 12 (71%) when authored by women ($p = 0.001$) (Figure 1A). Of the male case patients, 18 (38%) had a stigmatizing characteristic when authored by men and 11 (55%) when authored by women ($p = 0.016$) (Figure 1B).

Discussion: Patients of female gender are underrepresented in this established residency curriculum compared to the population served by the program. Stigmatizing characteristics were significantly more often associated with female case patients, regardless of sex of the author. Female authors were more likely to assign stigmata to case patients and, in particular, female case patients. These results suggest the presence of gender bias in assignment of characteristics to fictional patients for educational purposes. This, in turn, may influence physician thoughts and behavior in treating male and female patients in future generations of Anesthesiologists.

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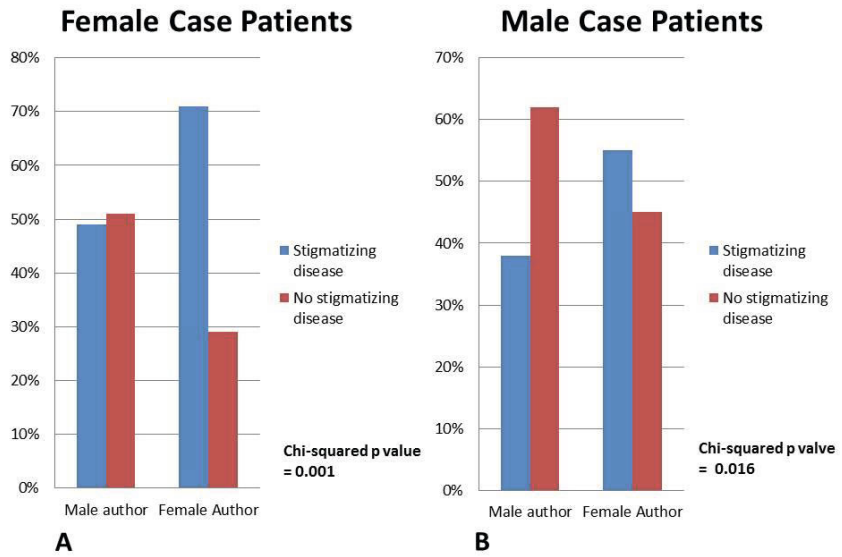
Figure 1



Bar graphs comparing allocation of stigmatizing disease according to gender of author for fictional female case patients (A) and fictional male case patients (B). Chi-squared test of independence was applied to 1 degree of freedom and demonstrated a significant relationship between gender of author and assignment of stigma to fictional case patients.

637631 - COGNITIVE OUTCOMES OF PREMATURE INFANTS EXPOSED TO SEDATION AND ANESTHESIA

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Background: Uncertainty exists regarding the effects of early exposure of infants to anesthetic and sedative agents on their subsequent neurocognitive development[1,2,3]. Preclinical results suggest that premature infants may be particularly vulnerable to possible detrimental drug effects. The primary objective of this study was to determine whether there is an association between exposure to anesthetics/sedatives/opioids and cognition, as measured by Full-Scale intelligence quotient (FSIQ) at 36 months of age.

Methods: The local ethics board approved and certified the study. We performed a retrospective study of 493 very premature infants born at ≤ 29 weeks gestational age between January 1, 2006, and December 31, 2012 identified from the register of the local Neonatal Follow-up Clinic. Data extraction was performed by investigators blinded to the outcomes. Exclusion criteria were: complex congenital anomalies, metabolic/chromosomal abnormalities, severe intrauterine growth restriction, premature white matter injury, and intraventricular hemorrhage. Exposed patients received anesthetics/sedatives/opioids during the first 44 weeks of life. Medication exposure was further quantified by dose and duration. Patients who received medication for a single brief procedure were classified as 'unexposed'. The primary outcome was FSIQ measured by the Wechsler Preschool and Primary Scale of Intelligence at 36 months of age. Mean FSIQ for exposed infants was compared to that from the unexposed group using a two-sample t-test. We quantified the difference of FSIQ associated with exposure on FSIQ with the corrected standardized mean difference (SMD, Hedge's g). Univariate comparisons of other variables were performed with Mann-Whitney U tests, Chi-square tests or Fisher's exact tests. Propensity score matching was performed using covariates of the FSIQ that were identified as significant by lasso regression.

Results: Primary outcome data were obtained for 304 infants (182 exposed, 122 non-exposed, representing 62% of infants in the study). Medication exposures included volatile anesthetics, intravenous anesthetics, barbiturates, benzodiazepines, and opioids. After propensity score matching there was no significant difference in mean FSIQ between groups: non-exposed (n= 121) 96.7 SD ± 16; exposed (n=121) 94.0 SD ± 14, *P*= 0.21. The standardized mean difference in mean FSIQ was negligible -0.18 (95 % C.I. -0.51 to 0.04). Patients without FSIQ data do not differ from patients with this data. The baseline characteristics and the proportion of patients who were medication-exposed were similar [(37% in the No FSIQ Group versus 42% in the FSIQ Group (X^2= 1.33, df = 1, P = 0.25)]. Medication exposure was not a significant predictor of availability of FSIQ data (odds ratio = 0.77, P =

0.35).

Conclusions: Our findings do not support an association between exposure of premature infants to opioids, benzodiazepines, ketamine, propofol, or volatile anesthetic agents during the neonatal period and FSIQ at 36 months of age. Larger studies with longer follow-up are warranted.

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637697 - PROTAMINE-HEPARIN NEUTRALIZATION RATIO IN CARDIAC SURGERY: A PROSPECTIVE COHORT STUDY

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Introduction
For the majority of operations using cardiopulmonary bypass, heparin (UFH) and protamine are used for anticoagulation and reversal, respectively. Controversy exists over the ideal method to dose protamine for heparin reversal. Excess protamine is known to cause platelet inhibition, prolong the ACT, and increase the risk of bleeding. The Society of Thoracic Surgery recommends neutralization of unfractionated UFH with protamine using either titration method or empiric low-dose regimens, e.g. 50% the total amount of UFH administered. This low-dose regimen has not been substantiated by quantifying factor anti-IIa and Xa activity. We sought to identify the amount of protamine needed to neutralize the activated clotting time (ACT), anti-IIa and anti-Xa activity for patients undergoing cardiac surgery on cardiopulmonary bypass (CPB).

Methods
This study protocol was approved by and carried out according to the instructions of the local Research Ethics Board. Written consent was obtained from all study participants. Twenty-five elective cardiac surgery patients were enrolled in this ongoing, single centre, prospective cohort study. Elective cardiac surgery patients 18 years of age and older were included. Patients with a history of any known coagulopathies, liver dysfunction, previous cardiac surgery, preoperative abnormal coagulation profiles, recent exposure to heparin (unfractionated or low molecular weight), warfarin, clopidogrel or other direct thrombin inhibitors were excluded.
UFH was administered as per institutional guidelines (400 Units/kg). The dose of protamine was decided by the attending anesthesiologist and administered according to the study protocol. A test dose of 25 mg protamine was administered via an infusion pump (at 25 mg/min). After a 3-minute period, an additional 125 mg protamine was administered at the same rate followed by further aliquots of 50 mg protamine until the total protamine dose was reached. Blood samples were drawn for quantifying ACT, anti-IIa and anti-Xa activity at baseline, prior to any protamine (after discontinuation of CPB) and after 150, 200, 250, 300, and 350 mg protamine.

Results
Twenty-five patients in the age range of 65±8.6 yrs (mean±sd), weighing 87±19 kgs were enrolled. Total UFH administered was 64480±21335 U; CPB time was 1.5±1.32 hrs. Anti-IIa and Xa activity could be completely neutralized by a Protamine:UFH ratio of 0.34±0.1. Protamine administered was 310±102 mg while the lower protamine:UFH ratio would have required 219±73 mg.

Conclusion
A protamine:UFH ratio of 0.34:1 was found to be sufficient in neutralizing UFH induced anti-IIa and anti-Xa activity following cardiopulmonary bypass. This is lower than the 0.5:1 protamine:UFH ratios

previously recommended. While excess protamine is known to impair platelet function and increase bleeding, the clinical significance of these lower doses of protamine in cardiac surgery needs to be established. Furthermore, concerns regarding heparin rebound would continue to require investigation with lower protamine administration.

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4. J Thorac Cardiovasc Surg 1995 110 1(36-45)

RICHARD KNILL COMPETITION

602686 - STANDARDIZATION OF PRESCRIPTIONS TO DECREASE EXCESS OPIOIDS AFTER APPENDECTOMY AND CHOLECYSTECTOMY

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Introduction:

There has been a parallel increase in opioid usage and opioid-related deaths in Canada[1,2]. Opioid quantities prescribed to surgical patients have similarly increased[3]. The aim of this study was to assess post discharge opioid consumption in patients undergoing laparoscopic appendectomy (LA) and laparoscopic cholecystectomy (LC) compared to the amount prescribed and determine whether a standardized prescription could affect opioid consumption without impacting patient satisfaction with pain management.

Methods:

After REB approval was obtained, patients undergoing LA or LC at a Canadian center were recruited prospectively during two separate time periods (April to June 2017 and November 2017 to January 2018). In the first phase of the study, surgeons continued their usual postoperative analgesia prescribing patterns. During the second phase, a standardized prescription was implemented based on results from the first phase. Patients were contacted by telephone on postoperative day seven and a standardized questionnaire was completed. The primary outcome was the quantity of opioid medication prescribed and consumed. Secondary outcomes included patient satisfaction with analgesia and disposal methods for unused opioids. Outcomes were compared between the two phases. Multivariable linear regressions were used to determine factors independently associated with opioid prescription and use.

Results:

In the first phase, 166 patients were recruited who underwent laparoscopic appendectomy (LA) or laparoscopic cholecystectomy (LC) and 127 patients (76.5%) completed the follow-up at 7 days. The median number of opioid pills prescribed was 20 and the median number consumed was 2. Over 95% of patients reported satisfaction with their analgesia. Fewer than 10% of patients received education regarding proper disposal of unused opioids and fewer than 5% had disposed of the unused opioids. Based on these results, a standardized prescription for multimodal analgesia was implemented consisting of ten opioid pills, which was used for the second phase. During the second phase, 129

patients were recruited who underwent LA or LC and 109 (84.5%) patients completed the follow-up at 7 days. There was a significant decrease in the median number of opioid pills filled (10) and consumed (0). Over 95% of patients reported satisfaction with their analgesia. The number of patients receiving opioid education increased (44%) but still fewer than 5% had disposed of the unused opioids.

Discussion:

Patients are prescribed excess opioids after undergoing LA or LC at our institution. Implementation of a standardized prescription based on a quality improvement intervention was effective at both decreasing the number of opioids prescribed and increasing patient education but did not affect disposal habits of patients' unused opioids.

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Comparison of Opioid Related Outcomes Before and After Intervention

	Before Intervention (n=127)	After Intervention (n=109)	p-value
Number of Pills Filled, median (IQR)	20 (15 – 30)	10 (10 – 10)	<0.001
Number of Pills Consumed, median (IQR)	2 (0 – 5)	0 (0 – 4)	0.006
Number of MME Consumed, median (IQR)	15 (0 – 36)	0 (0 – 20)	0.001
Received Education on Opioids, n (%)	10 (7.8)	48 (43.6)	<0.001
Pain Score (out of 10), median (IQR)	4 (2 – 5)	4 (3 – 5)	0.97
Satisfaction Score Somewhat satisfied or better, n (%)	122 (96.1%)	105 (96.3%)	0.61

635370 - HEART RATE VARIABILITY PREDICTS POST-INDUCTION HYPOTENSION IN PATIENTS WITH CERVICAL MYELOPATHY

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Introduction
Multiple studies have demonstrated that maintaining adequate spinal cord perfusion reduces the incidence of neurological injury in patients undergoing cervical spinal surgery.[1,2] Autonomic dysfunction is common in patients with cervical myelopathy and increases the likelihood of perioperative hypotension.[3] Heart rate variability (HRV), the physiological variation of the differences between heart beats, has been used to detect autonomic dysfunction.[4] The aim of our study was to determine if changes in HRV could predict hypotension after induction of general anesthesia in patients with cervical myelopathy undergoing spine surgery.
Methods
After REB approval and informed patient consent, adult (18-70years) patients with cervical myelopathy undergoing spine surgery were consented for this prospective observational study. Patients with pre-existing arrhythmias, resting heart rate >100 and those at risk for autonomic neuropathy (diabetes) were excluded. Preoperatively, 5 minutes resting ECG (5 lead) was recorded and HRV was analyzed as a function of frequency domain using a custom software (Lab chart 8)[5]. Total powers and the individual powers of very low frequency (VLF), low frequency (LF) and high frequency (HF) spectra were calculated. All patients had standardized anesthesia induction. Intraoperatively, incidence of hypotension (MAP 5minutes) and the number of interventions (each intervention is 40mcg of phenylephrine or 5mg of ephedrine) required to treat the hypotension during the period from induction to surgical incision were recorded. HRV indices were compared between the hypotension and no hypotension groups. Data were analyzed using Fisher's exact test, Mann-Whitney U test as indicated.
Results
49 patients (28.6% female; mean age 55±10.2 yrs) completed the study. Incidence of post-induction hypotension was 75% (37/49) and required on average 4.75 (range 1-10) interventions to maintain MAP > 80mmHg.Demographics, surgical and anesthesia data were similar between the groups. Among the HRV indices, decreasing HF, increasing LF/HF ratio and in particular LF/HF ratio >2.5 were predictive of hypotension on induction (Table 1). In addition there was a correlation between increasing LF/HF ratio and the numbers of interventions need to maintain MAP > 80mmHg (r = 0.39).
Conclusions;
Our results showed that an LF/HF ratio >2.5 is associated with an increased risk of hypotension on induction in patients with cervical myelopathy. This indicates the imbalance between sympathetic and parasympathetic control in patients with myelopathy. Hence, preoperative HRV analysis can be a useful non-invasive bedside tool to identify patients with myelopathy who are at risk of developing post induction hypotension.

References:

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Table 1

Demographics	Hypotension N = 37	No Hypotension N = 12	Significance (p value)
Age (years)	52 [43-62]	57 [53-63]	0.56
Gender (n) Male: Female	25 : 12	10 : 2	0.46
Preoperative MAP (mmHg)	96.0 [89.8-102.3]	104.3 [93.2-111.4]	0.28
Preoperative HR (Bpm)	70 [62-80]	66 [60-74]	0.45
JAOS Grade (n) 1:2	26:11	12 : 0	0.45
Surgical Approach (n) Anterior : Posterior	24 :13	6 : 6	0.49
Anesthesia			
Fentanyl dose (mcg)	150[125-150]	150[131-150]	0.92
Propofol Dose (mg)	200[130-200]	190[150-237]	0.32
MAC age	0.70[0.6-0.8]	0.70[0.6-0.8]	0.81
HRV INDICES			
Total Power ms^2	14390 [637.9-3130.5]	2191.0 [1229.5-2613.0]	0.27
VLF (%)	684.8 [411.8-1399.5]	705.8 [566.8-1649.0]	0.53
LF (%)	290.2 [143.6-1208.0]	406.5 [236.3-934.7]	0.83
HF (%)	109.7 [64.8-430.8]	350.4 [185.7-634.5]	**0.01**
LF/HF	3.33 [1.93-4.95]	1.22 [0.72-1.86]	**<0.001**

All data were presented as Median [Interquartile range] except *. n= number, MAP- Mean arterial pressure, HR- Heart rate, JAOS- Japanese orthopedic association grading of severity of myelopathy, VLF- very low frequency, LF-low frequency, HF- high frequency.

636599 - COMPLICATIONS ASSOCIATED WITH ANESTHETIC CARE IN OBSTETRICAL PATIENTS: A POPULATION-BASED STUDY IN CANADA

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Introduction: Complications associated with anesthetic care in obstetrics in high-income countries are rare (~1/1000 anesthetic interventions).[1]This rate is too low to be informative for individual practitioners. We provide a population-based summary of the frequency of anesthesia-related complications in obstetrical patients in Canada.

Methods: This ethics approved retrospective population-based study utilized the hospitalization database of the Canadian Institutes of Health Information for all pregnant women (gestation ≥ 20 weeks) in Canada (except Quebec) hospitalized during pregnancy, delivery or the puerperium from Apr 2004 to Mar 2017. Complications were identified by ICD-10-CA codes (O74, O29, O89).[2] Data were summarized with descriptive statistics. We used univariate and multivariate regression to model medical and obstetrical conditions and procedures independently associated with anesthesia-related complications.

Results: 12,318 anesthesia related adverse events occurred among 2,601,034 hospitalizations over 12 year period (Table 1). 11,841 patients had at least one anesthetic related event (0.46%). The most common adverse events were spinal and epidural anesthesia induced headache (56%). The event rate for difficult/failed intubations and pulmonary complications was low (1%). Of the 11,841 women who suffered an event, two died (fatality rate: 16.9/100,000 interventions; 95% CI 4.2-68/100,000). The deaths were unrelated to anesthesia interventions. The frequency of anesthesia related events per year varied from 304 to 513/100,000 interventions ($P < 0.001$). There was significant variation in the incidence among Canadian provinces (206 to 803/100,000 interventions ($P < 0.001$). Women ≤ 25 yrs old were significantly less likely to suffer an anesthetic event (adjusted OR 0.90; 95% CI 0.85 to 0.95). Anesthesia related events were more likely in those who had a cesarean delivery (adjusted OR 1.17; 95% CI 1.12 to 1.23). Use of general anesthesia for an intervention was significantly associated with an anesthetic event (adjusted OR 3.17; 95% CI 2.99 to 3.36). Noteworthy associations between cardiomyopathy (adjusted OR 6.24; 95% CI 2.70 to 14.43), obstructive sleep apnea (adjusted OR 2.31; 95% CI 1.25 to 4.25) and an anesthetic event were found. Postpartum hemorrhage and preeclampsia were the most common conditions associated with an anesthetic event.

Discussion: The incidence of anesthesia related events in obstetric patients in Canada is rare and declining. However, anesthesiologists should be prepared to manage them, especially in women undergoing cesarean delivery under general anesthesia, or having preexisting medical conditions. This information could serve as an audit to evaluate and assess the inherent risks associated with providing anesthetic care during pregnancy through the puerperium.

References:
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Table 1. Frequency of anesthesia related adverse events from nationwide sample of patients during April 2004 and March 2017

Table 1. Frequency of anesthesia related adverse events from nationwide sample of patients during April 2004 and March 2017.

Anesthesia related complications	Pregnancy	Labor and Delivery	Puerperium	Total N (%)
Aspiration pneumonitis due to anesthesia	-	24	-	24 (0.2)
Pulmonary complications of anesthesia	4	98	26	128 (1.03)
Cardiac complications of anesthesia	9	143	19	171(1.4)
Central nervous system complications of anesthesia	5	130	26	161 (1.3)
Toxic reaction to local anesthesia	1	23	4	28 (0.2)
Spinal and epidural anesthesia induced headache	185	3567	3155	6907 (56.1)
Other complications of spinal and epidural anesthesia	182	3441	456	4079 (33.1)
Failed or difficult intubation	8	119	12	139 (1.1)
Other complications of anesthesia	41	496	81	618 (5.01)
Unspecified complications of anesthesia	11	42	10	63 (0.5)
Total	**446**	**8083**	**3789**	**12,318**
Patients with complications				**11,841**

636931 - ARE SHOCK INDEX AND HEMOGLOBIN VARIATION ASSOCIATED WITH BLOOD LOSS AFTER VAGINAL DELIVERIES? A PROSPECTIVE STUDY

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Introduction: Postpartum hemorrhage (PPH) is one of the leading causes of death during childbirth accounting for one maternal death every four minutes globally [1,2]. Substantial variation exists between the onset of clinical signs and PPH [3]. Shock Index (SI) (heart rate/systolic blood pressure [BP]) and continuous non-invasive hemoglobin monitoring (SpHb) (Masimo©, US) have both been proposed for timely diagnosis and management of PPH [4]. The objective of this study was to determine the association of SI and SpHb variation with blood loss after vaginal delivery. We hypothesized that both assessment tools are early indicators of PPH.

Methods: Following institutional REB approval we conducted a prospective observational study in women ≥37 wks gestation undergoing vaginal deliveries. SpHb and heart rate were recorded continuously with non-invasive BP recorded every 10 min for 2 hrs after delivery. Actual blood loss (ABL) was measured at 30, 60 and 120 min postpartum by using calibrated drapes and weighing soiled pads. The primary outcome was the cumulative ABL during the study period. Linear mixed models were used to determine the association of SI and SpHb with ABL. Logistic regression was used to determine the area under the receiver operator curve (AUROC) and the optimal cut off-point for detecting ABL ≥1000mls.

Results: We enrolled 67 women to the study. Both SI and SpHb demonstrated downward trend over time (p=0.04, p<0.01). However, the slope of this trend was not associated with the quantity of blood lost (SI p=0.65; SpHb p=0.32). Mean (SD) SI was higher in women with ABL ≥1000mls compared to those with ABL<1000mls (0.91 [0.17] *vs*. 0.80 [0.14], p = 0.009). Change in SpHb (g/dL) from baseline was not different in women with or without ABL ≥1000mls (-7.08 (8.98) *vs.* -3.83 (7.84), p=0.18). Maximum SI within the first hr of delivery was significantly correlated with ABL (r=0.45, p 0.001) and was a predictor of ABL ≥1000mls (p=0.004, AUROC 0.760) with a value of SI ≥0.9 demonstrating 91% sensitivity and 54% specificity (Fig 1). Maximum change in SpHb from baseline was not correlated with ABL (r=0.23, p=0.057) and was not a predictor of ABL ≥1000mls (p=0.14).

Conclusions: Higher SI values are associated with more blood loss after vaginal delivery and SI ≥ 0.9 within the first hr after delivery may be a clinically useful tool for the early detection of PPH. SpHb variation does not accurately predict blood loss after delivery.

References:

References:

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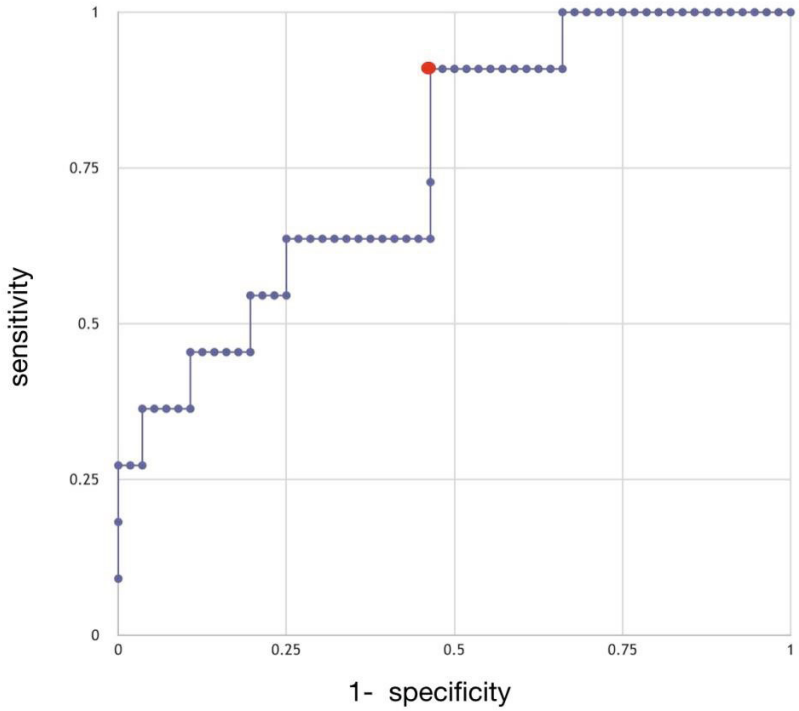
ROC: Max SI vs. Blood loss ≥ 1000mls



Receiver Operator Curve for maximum Shock Index vs. Blood loss ≥ 1000mls

637712 - A NOVEL DIGITAL 3D PRINTED CRICOID PRESSURE DEVICE

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Introduction:

The application of cricoid pressure is a widely adopted, yet controversial component of RSI[1,2]. One major component of the controversy is the inability to apply and maintain the correct force. Too little force is ineffective at preventing gastric regurgitation and too much force may restrict ventilation and worsen views during laryngoscopy[2]. Therefore, the objective was to develop a customizable, 3D printed device capable of applying an accurate and reproducible force.

Methods:

REB approval was not needed as this was a bench study and no participant data was collected or is begin presented. A novel cricoid device was developed that contains a compression/tension micro load cell (model: TAS520-5kg HT Sensor Technology Co. Ltd.) that is incorporated into a 3D printed cricoid pressure application system (Figure 1A). It is designed for testing forces in the range of 0-5 kg (~50 N). The load cell system is calibrated using scientific grade calibration weights. The load cell system is then attached to an Arduino circuit board, HX711 load cell amplification circuit and LCD digital display that are all encased in a 3D printed enclosure. The system can either be directly attached to a computer via USB in order to capture and analyze all of the data or conversely with a 9V battery to give improved portability. In either case, the Force (N) is displayed on the LCD screen to give the user the exact force being applied in real time. Repeat observations were made by study team to assess for their correct application of cricoid pressure. Pre-training cricoid forces were obtained by asking the volunteer to apply cricoid pressure on a tracheal model while blinded to the actual pressure produced. The volunteer was then trained to apply correct pressure employing a 50 cc syringe technique previously published and validated for training[3]. Post-training values were again determined with the subject blinded to the actual applied pressure. Finally, volunteers were asked to use the 3D printed cricoid device. Data expressed as the mean value of 3 separate attempts (Figure 1C).

Results:

Compared to the device (87.2%), only 23.1% of untrained users ($p<0.001$), 33.3% of trained users ($p<0.001$) successfully placed a force of 30 ± 5 N at 10 seconds. Similarly, compared to the device (100%), only 25.6% of untrained users ($p<0.001$), 33.3% after training ($p<0.001$) were successful at 30 seconds and only 28.2% untrained ($p<0.001$), 33.3% after training ($p<0.001$) compared to the device 97.4% at the end of 50 seconds of cricoid pressure. Fisher's exact test (2-sided) was used for categorical outcomes, and $p<0.05$ was considered significant.

Discussion:

We have developed an ideal cricoid pressure device that is capable of reliably producing accurate forces. In addition, it has detachable custom blades that are both disposable and can be printed to fit a variety of patients of various ages and anatomical differences. Further validation studies are needed in order to optimize design and ergonomics.

References:

References

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Figure 1.
Cricoid CAS.tif

Figure 1. A) Cricoid Device B) Individual experiment. Pre-training cricoid forces (red), post-training values (yellow) and using the 3D printed cricoid device (green). Data expressed as the mean value of 3 separate attempts. C) Thirteen volunteers were assessed for their correct application of cricoid pressure on (circle) initial testing, (square) following training and (triangle) using the novel 3D printed cricoid device. Data expressed as mean (SD). * Outlier data of 68.3

638272 - DEXMEDETOMIDINE VS EPINEPHRINE FOR PROLONGING DURATION OF MOTOR SPARING KNEE BLOCK AFTER TOTAL KNEE ARTHROPLASTY

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Introduction – Dexmedetomidine, an alpha 2 agonist, has been approved for providing sedation in intensive care unit. Along with sedative properties, it has got analgesic activity through its highly selective action on alpha 2 receptors. Recent studies have examined the use of dexmedetomidine as an adjuvant to prolong the duration of peripheral nerve blocks (1,2). Studies showing effectiveness of dexmedetomidine for adductor canal block in knee surgery are small(3). Also, its effectiveness has not been compared to Epinephrine which is a strong alpha and beta receptor agonist. In a previous study, we showed that motor sparing knee block significantly increased the duration of analgesia compared with periarticular knee infiltration using local anesthetic mixture containing Epinephrine (4). In this study, we compared local anesthetic mixture containing Dexmedetomidine with Epinephrine for prolongation of motor sparing knee block in primary total knee arthroplasty patients.

Methods – After local ethics board approval and gaining Notice of Compliance (NOC) from Health Canada for use of Dexmedetomidine perineurally, 70 patients between the ages 18 – 95 of ASA class I to III undergoing unilateral primary knee arthroplasty were enrolled. Motor sparing knee block – 1) Adductor canal continuous catheter 2) Single shot Lateral Femoral Cutaneous Nerve block 3) Single shot posterior knee infiltration was performed in all patients using 60 ml mixture of 0.5% Ropivacaine, 10 mg Morphine, 30 mg Ketorolac. Patients randomized into Dexmedetomidine group (D) received in addition to the mixture, 1mcg/kg Dexmedetomidine and Epinephrine (E) group received 200mcg in the mixture. Primary outcome was time to first rescue analgesia as a surrogate for duration of analgesia and secondary outcomes were NRS pain scores up to 24 hours and opioid consumption.

Results – Primary outcome, time to first rescue analgesia was not significantly different between Epinephrine and dexmedetomidine groups, Mean and SD 18.45 ± 12.98 hours vs 16.63 ± 11.80 hours with a mean difference of 1.82 hours (95% CI -4.54 to 8.18 hours) and p value of 0.57. Secondary outcomes, pain scores at 4, 6, 12, 18 and 24 hours were comparable between groups. Mean NRS pain

scores Epinephrine vs Dexmedetomidine groups were 1.03 vs 0.80 at 4 hours, 1.48 vs 3.03 at 6 hours, 3.97 vs 4.93 at 12 hours, 5.31 vs 6.18 and 6.59 v 6.12 at 24 hours. Opioid consumption was also not statistically significant between both groups at 6, 12 18, 24 hours (p values 0.18, 0.88, 0.09, 0.64 respectively).

Discussion – Dexmedetomidine does not prolong the duration of motor knee sparing block when compared to Epinephrine for total knee arthroplasty. Pain scores and opioid consumption was also comparable in both groups. Further studies using higher dose of dexmedetomidine are warranted.

References:
1.Medicine (Baltimore). 2017 Oct;96(43):e7938
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3. Indian J Anaesth. 2017 Nov; 61(11): 903–909.
4. J Bone Joint Surg Am. 2017 Aug 2;99(15):1274-1281.

Duration of Analgesia

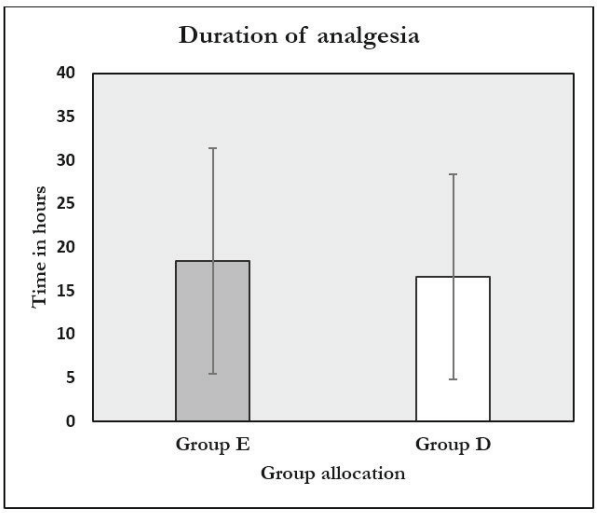

Figure 1 Duration of Analgesia. Bars represent the Mean and the whiskers represent the SD within group