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Perioperative Abstracts

Contents

A multidisciplinary approach for managing a patient with Klippel–Trenaunay–Weber Syndrome for total hip arthroplasty: a case report

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136

AUTHORS

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INTRODUCTION

Klippel–Trenaunay–Weber Syndrome (KTWS) is a rare congenital condition characterized by capillary and venous malformations, varicose veins, and bone and soft tissue overgrowth.[1] Chronic coagulopathy, such as disseminated intravascular coagulopathy, have been documented in these patients, placing them at a significantly higher risk for massive intraoperative blood loss due to vascular malformations and coagulopathy.[2] The severity of vascular abnormalities varies widely among patients, involving both superficial and deep vessels.[3] A multidisciplinary approach is crucial during the perioperative period to manage complications effectively and optimize outcomes.

CASE PRESENTATION

After obtaining consent, we present the case of a 53-yr-old female diagnosed with KTWS, exhibiting chronic hypofibrinogenemia and extensive arteriovenous malformations (AVMs), who required total hip arthroplasty (THA) due to femoral head avascular necrosis. The initial procedure was aborted after encountering severe intraoperative bleeding from subcutaneous AVMs, necessitating massive blood transfusion.

A multidisciplinary team convened to plan a second attempt, which included preoperative embolization and the presence of vascular surgery. Interventional radiology (INR) performed embolization of the internal iliac artery, profunda femoris artery, and circumflex femoral artery. The procedure was conducted in a hybrid operating room under general anesthesia.

Vascular surgery initiated the operation by accessing the common femoral artery and placing a guide wire and balloon catheter under angiographic guidance. The balloon was positioned at the common iliac artery (CIA) level for occlusion as needed. A tourniquet was applied above the knee to be inflated later in the procedure. The orthopedic team commenced THA with reduced pulsatile flow due to the preoperative embolization. During periods of excessive bleeding, the CIA balloon was inflated, and the tourniquet was used to prevent passive venous backflow.

Despite these measures, the patient experienced significant blood loss of approximately 10 L. Resuscitation included the administration of 2 L of autologous blood via cell saver, 12 units of packed red blood cells, 11 units of fresh frozen plasma, 4 units of platelets, and 8 grams of fibrinogen. Postoperatively, the patient was transferred intubated to the intensive care unit and extubated the following day.

CONCLUSION

Anesthesia for KTWS requires careful consideration of coagulopathy, vascular malformation, and the risk of massive bleeding. Potential airway tissue hypertrophy may lead to a difficult airway. Neuraxial anesthesia is generally contraindicated due to the heightened risk of epidural hematoma from vascular malformations in the neuraxial space. This case represents a rare instance of KTWS managed with a multidisciplinary approach for THA. The involvement of INR and vascular surgery significantly minimized intraoperative bleeding, highlighting the importance of comprehensive preoperative planning and teamwork in managing complex cases.

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Analgesic efficacy of preemptive pregabalin in patients undergoing breast surgery: a randomized, placebo-controlled, double-blind clinical trial

Submission ID

16

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INTRODUCTION

Pregabalin is an anticonvulsant drug used to manage neuropathic pain and anxiety disorders. It is classified not as a gamma-aminobutyric acid (GABA) receptor agonist but rather as an agent targeting the alpha-2-delta subunit of voltage-dependent calcium channels.[1] Pregabalin binds to this specific site, modulates calcium influx at the nerve terminals, and inhibits the release of excitatory neurotransmitters, resulting in sedation, anxiolysis, and modulation of pain perception.[1,2] In recent years, pregabalin has increasingly been used perioperatively to improve postoperative pain control and to reduce opioid consumption. However, there is ongoing controversy about the clinical benefits *vs* risks of its perioperative use.[3] This is also true for breast cancer surgery, as a recent review demonstrated conflicting results on the preemptive use of pregabalin in this subset of patients.[4] Therefore, the aim of this study was to investigate the effect of preemptive pregabalin on postoperative pain in patients undergoing breast suregery.

METHODS

Following Institutional Ethical Committee approval the study was conducted and patients were included after providing written informed consent. Eighty female patients scheduled for elective breast surgery (n = 40) were equally randomized to receive either a placebo (maltodextrin) or 300 mg of pregabalin 1–2 hours before surgery. Total intravenous anesthesia with propofol and remifentanil was used to provide general anesthesia. Approximately 20 min before the end of surgery, 1,000 mg of metamizole and 3 mg piritramide were administered for initial postoperative analgesia. After the surgical procedure, patients were transferred to the postanesthesia care unit (PACU) and asked to rank their pain levels according to the numeric rating scale for pain (NRS). If their score was higher than five, another dose of 1,000 mg metamizole and 3 mg piritramide were administered. Subsequently, bolus doses of 3.0–4.5 mg of piritramide were administered if the pain levels were higher than two. After 2 hours, patients were interviewed regarding adverse events such as nausea, dizziness, or visual impairment.

Furthermore, the patients' levels of satisfaction with overall anesthesia care were recorded (4 "very satisfied," 3 "somewhat satisfied," 2 "somewhat dissatisfied," and 1 "not satisfied").

RESULTS

In the PACU, patients in the placebo group reported significantly higher pain scores (3.1 ± 1.8) than patients in the pregabalin group (1.7 ± 1.8) (P = 0.002). Patients in the placebo group (4.5 ± 3.9 mg) received significantly more piritramide than patients in the pregabalin group (2.5. ± 2.6 mg) (P = 0.02). Ten patients in the placebo group and nine patients in the pregabalin group received metamizole in the PACU (P = 0.793), respectively. Three patients in the placebo group and six patients in the pregabalin group reported dizziness, respectively, but that did not reach statistical significance (P = 0.48). In both groups, one patient reported nausea. No other side effects, such as vomiting or visual impairment, were detected. Overall satisfaction with the anesthetic procedure did not differ between groups (placebo group 3.9 ± 0.3, pregabalin group 3.9 ± 0.2).

DISCUSSION

This study demonstrated that preoperative pregabalin reduces postoperative pain and opioid consumption in patients undergoing breast surgery. This pain-modulating effect of pregabalin can be attributed to its mechanisms in experimental models.[1] Pregabalin functions as a calcium channel antagonist, binding with high affinity to the α2δ1 subunit, a specific subunit that mediates hypersensitivity and modulates dorsal horn responses to peripheral pain stimuli.[1] The results of our study are in agreement with investigations reporting similar opioid-sparing effects of pregabalin in other surgical patients.[2,5]

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Anesthetic plan for hysterectomy in a patient with previous “watershed” strokes associated with iron deficiency anemia and a partial occlusion of the left middle cerebral artery

Submission ID

63

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INTRODUCTION

Anemia affects over 1.9 billion people globally, with a disproportional negative impact on women. Anemia is associated with adverse outcomes, including ischemic stroke.[1–3] Iron deficiency is the leading cause of anemia.[1] In women, iron deficiency anemia (IDA) is often inadequately treated due to the misconception that anemia is a “normal” condition and the limited access to effective therapies such as intravenous (iv) iron.[4] This report illustrates the challenges of managing IDA, the clinical consequences of inadequate treatment, and the crucial role of interdisciplinary collaboration in the effective care of these patients. The anesthetic considerations for hysterectomy are reviewed in a patient with a history of two “watershed” strokes linked to reduced cerebral perfusion associated with partial occlusion of the left middle cerebral artery (MCA) and acute anemia due to abnormal uterine bleeding. Emphasis is placed on comprehensive interdisciplinary perioperative planning to optimize patient outcomes.

CASE PRESENTATION

This case involves a 47-yr old woman on oral iron supplementation with persistent IDA secondary to abnormal uterine bleeding. In September 2022, she presented with right-sided numbness and expressive aphasia and was diagnosed with a transient ischemic attack. Magnetic resonance imaging demonstrated a 50% fixed obstruction of the M1 branch of the left MCA. In Feb 2024, she experienced a “watershed” stroke in the left parietal region. Initial management with iv iron was successful in repleting her Hb (129 $g \cdot L^{-1}$). However, uterine bleeding in August 2024 resulted in hospital admission (Hb 71 $g \cdot L^{-1}$), iv iron infusion and red blood cell (RBC)

transfusion followed by hysteroscopic uterine myomectomy under general anesthesia. Following surgery, with Hb 89 $g \cdot L^{-1}$, she experienced similar neurological symptoms and was admitted with radiographic evidence of a second "watershed" ischemic brain lesion in the left posterior centrum semiovale and parietal lobe. Subsequent treatment with iv iron, RBC transfusion, and Lupron therapy ceased uterine bleeding and restored her Hb to 136 $g \cdot L^{-1}$. She is scheduled for a hysterectomy for definitive management. Key anesthetic considerations include:

- Neuraxial anesthesia to avoid impairing autoregulation of cerebral blood flow.
- Open surgical procedure to avoid pneumoperitoneum and central venous congestion.
- Optimize iron status and hemoglobin preoperatively and adopt a liberal transfusion threshold (< 90 $g \cdot L^{-1}$).
- Invasive blood pressure and intraoperative cerebral monitoring (NIRS/EEG) to ensure adequacy of cerebral perfusion.
- Maintain antiplatelet therapy (aspirin) to reduce thrombotic/embolic risk.
- Interoperative TXA therapy for unexplained microangiopathic bleeding.
- Maintain clear interdisciplinary communication.

CONCLUSION

Severe anemia is associated with ischemic stroke,[1–3] while moderate anemia may also elevate the risk of perioperative stroke.[5] In this case, a 50% stenosis of the left M1–MCA likely impaired cerebral blood flow autoregulation, reducing cerebrovascular adaptation to anemia resulting in supply-demand mismatch. This combination rendered the patient susceptible to watershed strokes, which occurred on two separate occasions at relatively high hemoglobin levels (80–90 $g \cdot L^{-1}$). This case outlines the potential risk of anemia and neurovascular disease, highlighting the need for a coordinated interdisciplinary approach to optimize perioperative anemia management and maintain adequate cerebral perfusion.

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Assessment of the effectiveness of an anesthesia clinic care directive for NT-proBNP testing before elective noncardiac surgery

Submission ID

134

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INTRODUCTION

The Canadian Cardiovascular Society (CCS) guidelines[1] recommend cardiac biomarker testing for patients undergoing noncardiac surgery who are at higher risk of perioperative cardiac complications. Brain natriuretic peptides (BNPs) or the N-terminal fragment of proBNP (NT-proBNP) are used to improve perioperative risk estimation and identify patients for postoperative cardiovascular monitoring with electrocardiogram (ECG) and troponin surveillance. Implementation of these guidelines has been described in several centres with various approaches and challenges.[2–4] In January 2022, our Perioperative Anesthesia Clinic implemented a system of nursing care directives to facilitate preoperative NT-proBNP testing before elective surgeries. Instead of testing being initiated by the clinic anesthesiologist, clinic nurses now follow a structured pathway in accordance with the CCS guidelines[1] to automatically trigger NT-proBNP testing, if indicated. This retrospective audit reviews the impact of these changes on the rate of perioperative NT-proBNP testing, postoperative cardiovascular monitoring, and detection of myocardial injury after noncardiac surgery (MINS).

METHODS

Following ethics approval, we conducted a retrospective audit of preoperative NT-proBNP testing in patients undergoing elective noncardiac surgery who were assessed by our Perioperative Anesthesia Clinic. We screened clinic patients who were assessed in September 2021 before the care directive implementation, and a second cohort in September 2022 after the clinic process change. Eighty sequential patients who met the CCS criteria for preoperative NT-proBNP testing were enrolled from each period. Inclusion criteria included patients over 18 yr of age, undergoing elective, noncardiac surgery requiring overnight hospital admission. In addition, in accordance with the CCS guidelines, the patient must be either at least 65 yr of age, score at least 1 point on the Revised Cardiac Risk Index (RCRI), or be between 45 and 64 yr of age with significant cardiovascular disease.[1] The primary outcome was the percentage of eligible patients who had preoperative NT-proBNP ordered in each period. Secondary outcomes for each period included the percentage of positive NT-proBNP tests (> 300 $ng \cdot L^{-1}$), the frequency of proper documentation of the NT-proBNP results, compliance with recommended

postoperative cardiovascular monitoring (ECG and troponins), and the frequency of postoperative MINS events. Proportion data were analysed using the z-test, with a significance level of $P < 0.05$.

RESULTS

A total of 507 clinic patient charts were screened, to enroll a total of 160 patients in whom NT-proBNP testing was indicated. Before the clinic process change, preoperative NT-proBNP was ordered in 13% (10/80) of eligible patients, compared to 79% (63/80) after implementing the automated process ($P < 0.001$). NT-proBNP was positive in 30% (3/10) of tested patients before the changes, and in 27% (17/62) after ($P = 0.87$). NT-proBNP testing results were documented in the anesthesia record in 0% (0/10) of tested patients before the changes, and 13% (8/62) after (p=0.23). Postoperative ECG and troponin testing was done in 33% (1/3) of patients with positive NT-proBNP before the changes, and 24% (4/17) after ($P = 0.36$). Myocardial injury after noncardiac surgery was detected in 6% (5/80) of enrolled patients before the changes, and 10% (8/80) after ($P = 0.38$). In aggregate, MINS were more frequently detected in patients with positive NT-proBNP (25%, 5/20) than patients with negative NT-proBNP (5.8%, 3/52; $P = 0.02$).

DISCUSSION

After implementing a nursing care directive in the Perioperative Anesthesia Clinic, appropriate ordering of NT-proBNP increased more than six-fold to 79% of patients. The rate of positive NT-proBNP tests remained similar. Nonetheless, proper documentation of NT-proBNP test results onto the anesthetic record remained sporadic. This may have negatively impacted upon compliance with recommended postoperative cardiovascular monitoring, and early detection on MINS events. Improving the documentation process of positive NT-proBNP results and collaborating with the surgical team to ensure proper postoperative cardiovascular monitoring are the next steps to improving the quality of perioperative cardiovascular care at our centre.

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N/A

Burnout syndrome amongst perioperative health care providers in Rwanda: a cross-sectional study

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32

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INTRODUCTION

Burnout is defined as a negative emotional and psychological response to the stresses of work. It has been defined as consisting of three factors: emotional exhaustion, depersonalization and reduced feelings of accomplishment.[1,2] Many studies address health care provider burnout in high-income countries; however, there is little data on burnout in low-income countries. Our objectives were 1) to estimate the prevalence of burnout among perioperative health care providers and 2) to explore factors associated with burnout among perioperative health care providers in Rwandan public hospitals.

METHODS

A cross-sectional study using a survey was conducted among perioperative health care providers working in 22 public hospitals across Rwanda. We used a purposive sampling method to represent all regions (4 provinces and the capital Kigali) and types of public hospitals in Rwanda conducting surgery excluding major teaching centers. We used the Maslach Burnout Inventory Human Services Survey (MBI-HSS), a validated 22-item survey including 3 dimensions of burnout: 1) emotional exhaustion (EE), 2) depersonalization (DP), and 3) personal achievement (PA). The primary outcome was the prevalence of burnout while the secondary outcome was factors associated with burnout. Data were analyzed using SAS (version 9.4 for Windows, SAS Institute, Cary, NC, USA).

RESULTS

There were 221 responses from 402 surveys sent with a response rate of 53.7% including nurses 106 (47.9%), general practitioners 36 (16.3%), non-physician anesthetists 33 (14.9%), midwives

25 (11.3%), and specialist surgeons and anesthesiologists 4 (1.8%). Forty-seven (21.3%, 95% confidence interval [CI], 16.1 to 27.3) participants had burnout, 95 (42.9%, 95 CI, 36.6 to 49.6) had high emotional exhaustion, 57 (25.8%, 95 CI, 20.5 to 31.9) had low personal accomplishment, 15 (6.8%, 95 CI, 4.2 to 10.9) had high depersonalization). Three major burnout profiles were identified among participants including the overextended group 84 (38%), the engaged group 83 (37.6%), and the ineffective group 39 (17.6%). Among postulated predictors of burnout, only a lack of having the right equipment was strongly associated with burnout (adj-OR, 3.60; 95 CI, 1.36 to 9.97).

DISCUSSION

One in 5 perioperative health care providers in Rwanda report having burnout, which is consistent with previous data. This suggests that burnout is widespread across the Rwandan health care system, across different perioperative professions. The only factor that was associated with burnout was lack of access to essential equipment, however, other factors that have been identified in the literature which are not statistically significant in this study should not be overlooked. Addressing equipment shortages may promote a resilience workforce in Rwanda in addition to directly impacting the quality of care.

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Does showing up matter? An exploratory analysis of attendance to a multimodal prehabilitation program for cancer patients

Submission ID

89

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INTRODUCTION

Multimodal prehabilitation aims to increase functional capacity and accelerate postoperative recovery through optimizing preoperative physiological and behavioral factors. Its comprehensive nature can require significant effort and lifestyle changes from patients, which can make consistent participation difficult.

Adherence to surgical prehabilitation, often defined as completion of prescribed interventions, has been considered an indicator for success towards prehabilitation efficacy.[1,2] However, measuring adherence is challenging in practice due to dynamic human behaviors associated with the prehabilitation construct. This study focused on 'attendance' of a prehabilitation program, referring to those patients who attended key prehabilitation components and followed through the program until its conclusion, as a more objective measure of adherence, to determine its impact on postoperative outcomes of cancer patients undergoing elective surgery.

METHODS

Research Ethics Board approval was obtained. Two hundred fifty-one surgical cancer patients (thoracic, colorectal, upper GI, gynecological, and others) referred by surgeons to a multimodal prehabilitation clinic at a tertiary care centre, consented to participate in the program between 1 October 2021 and 31 December 2024. This 4–8 week preoperative, personalized, and structured multimodal program included exercise training, nutrition supplementation and coping strategies. The program included an initial baseline visit, follow-up assessments, and a preoperative visit. In addition, exercise sessions, nutrition consultations and coping strategy sessions were recorded. Patients who attended the program until surgery were allocated to "Attended (n = 148)" (Group "A"). Those who dropped out at any point were allocated to "Drop-out (n = 103)" (Group "D"); their reasons for drop-out were documented. Institutional ERAS guidelines were followed. Patients' demographic information, clinical characteristics, and attendance to visits were collected and compared between the two groups. Patients' postoperative outcomes were measured at 30 days after surgery and included incidence of postoperative complications as primary outcome. Secondary outcomes included incidence of

medical and surgical complications, length of hospital stay (LOS), as well as number of emergency department (ED) visits, readmissions, intensive care unit (ICU) stays, and days alive and at home (DAH30) within 30 days after surgery.

RESULTS

After baseline assessment, patients in Group "A" had a mean of 1.52 hospital visits per person, while Group "D" had a mean of 0.92 visits per person ($P < 0.001$; difference in mean 0.60 visits; 95% confidence interval [CI], 0.33 to 0.85).

The two groups were similar in demographics, education, clinical diagnosis, American Society of Anesthesiologists (ASA), comorbidities and Duke Activity Status Index (DASI). Compared to Group "D", the incidence of postoperative complications was significantly lower in Group "A" (30.4% *vs* 44.7%; $P = 0.03$; OR, 0.54; 95% Cl, 0.31 to 0.94); with fewer medical complications (12.4% *vs* 24.8%; $P = 0.04$; OR, 0.49; 95% Cl, 0.25 to 0.97) but no difference in surgical complications between the two groups. Median LOS was 3 days [IQR, 2–6] in Group "A" compared to 5 days [IQR, 2–10] in Group "D" ($P = 0.02$; difference in median −2; 95% CI, − 3 to 0). The number of ED visits, readmission, ICU stay and DAH30 were not different between the two groups.

DISCUSSION

The present study showed that attendance to the prehabilitation program is associated with reduced rates of postoperative complications. This implies that attendance could be considered as a proxy measurement of adherence to core components of the program. Besides baseline screening, assessment, and intervention, ongoing evaluation of a patient's progress is an essential component of achieving preoperative optimization. To enhance efficacy of a prehabilitation program, future efforts should address global and local barriers to adherence and acceptance, to implement changes that encourages greater participation.

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Effect of discontinuing semaglutide prior to surgery on perioperative glycemic control: a pilot study

Submission ID

100

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INTRODUCTION

GLP-1 receptor agonists, such as semaglutide, are extensively utilized for the management of type 2 diabetes mellitus and as an adjunct for weight reduction in non-diabetic individuals.[1] These agents exert their effects by enhancing glucose-dependent insulin secretion, suppressing glucagon release, and significantly delaying gastric emptying. The delay in gastric emptying, a cornerstone mechanism for reducing postprandial hyperglycemia in patients with type 2 diabetes, can however, pose substantial perioperative risks.[2] Prolonged gastric retention may lead to the presence of undigested food and fluids in the stomach despite adherence to standard preoperative fasting protocols, thereby increasing the likelihood of regurgitation and pulmonary aspiration during anesthesia induction.[3] Although GLP-1 receptor agonists are effective in improving glycemic control—demonstrating HbA1c reductions ranging from 0.5% to 2% in clinical studies—their impact on perioperative glycemic stability remains underexplored.[4] This study hypothesizes that discontinuing GLP-1 receptor agonists preoperatively has a negligible effect on glycemic control.

METHODS

This retrospective pilot study analyzed 120 patients with type 1 or type 2 diabetes who were prescribed semaglutide (e.g., Ozempic) and underwent elective surgery between November 2023 and December 2024. Inclusion criteria required patients to have a documented diagnosis of type 1 or type 2 diabetes, be on semaglutide therapy for at least three months before discontinuation and have discontinued the medication at least 21 days prior to surgery in accordance with the hospital directives implemented in October 2023. Patients also required recorded hemoglobin A1c (HbA1c) values within three months prior to their elective surgery and fasting capillary blood glucose measurements taken on the morning of surgery. The primary outcome was the difference between preoperative glycemic control (HbA1c) and fasting blood glucose levels on the day of surgery. Exclusion criteria included semaglutide discontinuation less than 21 days before surgery, lack of HbA1c data, missing fasting blood glucose measurements, and non-diabetic status. Descriptive statistics were used to summarize patient demographics

and medication history. Paired statistical tests were employed to compare fasting glucose levels to expected ranges based on HbA1c measurements. Statistical significance was set at $P < 0.05$.

RESULTS

A paired *t* test was performed to assess differences between preoperative and day of surgery fasting blood glucose measurements. The analysis revealed a statistically significant increase in glucose levels from the preoperative period (8.013 ± 1.617 mmol·L^{-1}) to the day of surgery (8.693 ± 2.488 mmol·L^{-1}), with a t-value of −3.302 and a *P* value of 0.001 (95% CI, −1.091 to −0.272). This increase in glucose levels, though statistically significant, suggests that the discontinuation of semaglutide for at least 21 days prior to surgery has a minimal effect on glycemic control, as the difference in blood glucose levels remained within a clinically acceptable range.

DISCUSSION

This pilot study evaluated the impact of discontinuing semaglutide, a GLP-1 receptor agonist, at least 21 days before surgery on perioperative glycemic control. A statistically significant but modest increase in fasting glucose levels was observed (8.013 ± 1.617 mmol·L^{-1} to 8.693 ± 2.488 mmol·L^{-1}; $P = 0.001$). Despite this, glycemic control remained within clinically acceptable limits. While the small sample size limits generalizability, these findings support current guidelines to discontinue semaglutide preoperatively to reduce aspiration risks. Larger studies are needed to confirm these results, and allow for subgroup analyses conducted by sex, body mass index, anti-hyperglycemic use, and insulin use.

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Effects of position and sensory deprivation on Bispectral Index™ data

Submission ID

110

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INTRODUCTION

Bispectral Index™ (BIS™) is a tool that is used for monitoring depth of anesthesia. It tracks real-time electroencephalography (EEG) data, and is divided into weighted frequency bands which demonstrate distinct patterns of activity for different anesthetic agents.[1] Recently, this tool has been studied for its use outside of the operating room, particularly with respect to use in preoperative assessments.[1,2] Many have postulated a link between reduced preoperative BIS readings and postoperative complications such as delirium or cognitive decline.[2] It is important to understand how various age groups and positions of administration can recorded values in unanesthetized patients. To better understand this, our study proposed to answer the following questions:

1. Does age have a correlation with extra-operative BIS values in healthy and unanesthetized patients?
2. Does position and level of sensory input affect extra-operative BIS values in healthy and unanesthetized patients?
3. Does extra-operative BIS administration require an acclimation period?

METHODS

Ethics approval was received from the local university and 24 healthy participants were recruited from the general population by online posting and word of mouth. Those with a history of diabetes, stroke, or cognitive impairment were excluded from the study, as these conditions may impact BIS values. The BIS apparatus was attached to each participant, and they were recorded for 180 sec in each of six different positions, with combinations of sitting/lying down, headphone, and blindfolds.

Data was tested with Wilcoxon signed-rank tests to determine if the first 30 sec of data collection differed from the rest of the data for each variable in each position. The first 30 sec of data collection was found to significantly differ from the rest of the data for all variables at all positions, except SEF08 at position four ($P = 0.800$). Therefore, the first 30 sec of data collection was removed from analysis. Analysis was performed with SPPS version 28.0.1.0 and SAS version 9.4.

RESULTS

The first 30 sec of data collection significantly differed from the rest of the data for all variables at all positions, except SEF08 at position four ($P = 0.800$). Therefore, the first 30 sec of data collection was removed from analysis. The GLMM show that age group and weight were not significant controls. The mean differences between positions for each pairwise comparison are significant, except for position 3 *vs* position 4 for SEF08 ($P = 0.157$), position 2 *vs* 3 for MEDFRQ08 ($P = 0.011$), position 4 *vs* 6 for MEDFRQ08 ($P = 0.133$), position 2 *vs* 3 for DB13U01 ($P = 0.722$), position 1 *vs* 2 for TOTPOW08 ($P = 0.177$), position 1 *vs* 3 for TOTPOW08 ($P = 0.155$), position 2 *vs* 3 for TOTPOW08 ($P = 0.948$), position 3 *vs* 4 for EMGLOW01 ($P = 0.413$), position 5 *vs* 6 for EMGLOW01 ($P = 0.027$), position 1 *vs* 2 for SQI10 ($P = 0.011$), position 1 *vs* 4 for SQI10 ($P = 0.095$), and position 2 *vs* 4 for SQI10 ($P = 0.391$).

DISCUSSION

Contrary to previous literature about age-based differences in BIS, there were no differences between the 3 age groups that we compared.[3] All 6 positions showed differences from the standardized position of supine with a blindfold and headphones. An acclimation period of 30 sec was found to be necessary, as the data significantly differed between the 2 intervals. Based on these findings, in future extra-operative BIS assessments, consistent positioning and background stimuli are required to ensure homogeneity. In the future, it is imperative to include other predictive elements in a preoperative assessment, like frailty assessments, or mental status assessments.[4]

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Table Generalized linear mixed models for each variable

Model	SEF08	MEDFRQ08	DB13U01	TOTPOW08	EMGLOW01	SQI10
Intercept	22.235*	1.876*	4.531*	4.094*	3.797*	4.362*
Position (reference=1)						
2	0.454*	0.073*	-0.015*	-0.002	0.027*	-0.014*
3	0.732*	0.895*	-0.016*	-0.002	0.039*	0.045*
4	0.636*	0.115*	-0.007*	0.007*	0.037*	-0.009
5	0.962*	0.285*	0.018*	0.020*	0.078*	-0.186*
6	-0.629*	0.125*	0.032*	0.066*	0.083*	-0.368*
Age group (reference=3)						
1	-0.363	-0.209	0.002	-0.028	-0.049	0.155
2	0.517	-0.206	0.026	-0.023	-0.022	0.057
Weight	-0.003	0.001	-0.001	-3.8×10-4	-5.3×10-4	-0.001
Chi-square/DF	8.020	0.080	0.000	0.000	0.010	0.060

*$P < 0.05$

Positions: supine with headphones/blindfold (1), supine with blindfold (2), upright with headphones/blindfold (3), upright with blindfold (4), upright with headphones (5), upright without restrictions (6). Age groups: 18–39 (1), 40–64 (2), > 65 yr old (3).

Feasibilty of a virtual perioperative smoking cessation program utilizing e-mail messages: a pilot randomized controlled trial

Submission ID

83

AUTHORS

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INTRODUCTION

Smoking is one of the most preventable causes of disease and premature death in Canada and is associated with increased risks for cardiovascular, respiratory, wound, and bone healing complications after surgery.[1] Smoking abstinence before surgery can reduce the risk of overall postoperative complications by nearly 56%.[1] The preoperative period can serve as a "teachable moment" to provide smoking cessation counseling and pharmacotherapy. Therefore, this period provides an excellent opportunity to help patients quit and remain abstinent. Providing comprehensive smoking cessation education and counseling can be burdensome for perioperative clinicians with barriers including time constraints and being unable to provide postoperative support. Programs using automated e-mails in nonsurgical individuals have been shown to increase short and long-term (6 months) abstinence but have not been studied in surgical patients.[2] We hypothesize that a virtual perioperative smoking cessation program using automated emails, and an eLearning module will be feasible to increase smoking abstinence.

METHODS

A novel virtual smoking cessation intervention was developed, consisting of an e-learning module and an e-mail messaging program which sent motivational and educational e-mails before and after surgery. Both these intervention components provided information and advice that was tailored to the participant's Fagerstrom Nicotine Dependence score.[3] Participants were randomized to the virtual smoking cessation intervention or control (standard care).

Following institutional ethics approval at the two participating sites, the following feasibility outcomes were observed: 1) initial recruitment and retention of participants in the pre-admission clinic (PAC) compared to the number of patients approached to participate; 2) acceptability of the e-mail messaging program; 3) compliance with reviewing eLearning module; and 4) EPIC patient portal use before/after surgery was surveyed to determine the suitability of delivering this intervention using a patient portal.

Preliminary data on the following outcomes were obtained at 4 timepoints (Recruitment, After Surgery, 7-Day Post-op, and 30-Day Post-op): 1) # of cigarettes smoked; 2) # of quit attempts; 3) change in Fagerstrom Nicotine score; and 4) change in readiness to quit. Participants were also asked to report whether they received any smoking cessation support from a member of their circle of care.

RESULTS

The study recruitment rate was 30.6% (48/157), with a retention rate of 95.8% (46/48). Overall program perception was positive where, on a 5-point Likert scale, the program received average ratings of 4.1 for understanding smoking risks, and 4.3 for understanding the provided information. However, participant feedback indicated a preference to receive text messages rather than e-mails. Before their PAC visit, 69.6% of the patients indicated that they used the patient portal. The average use of the patient portal was 3.3 ± 2.6 days/week (Table). Utilization declined to 54.2% by Day 7 after surgery. By Day 30, utilization further declined to 19.6% with an average usage of 1.0 ± 1.4 days/week. Compliance with reviewing the eLearning module was 79.2% (38/48). Low rates of smoking cessation support were observed with 19.6% (9/46), 28.3% (13/46), 15.2% (7/46), and 21.7% (10/46) of participants reporting discussing smoking cessation with their anesthesiologist, nurse, surgeon, or primary care provider respectively.

DISCUSSION

Our results indicate that a virtual smoking cessation program using automated e-mails, and an eLearning module is feasible in the perioperative setting. Based on participant feedback, text message integration should be considered to improve patient engagement. Due to the low rates of preoperative counseling for smoking cessation from the circle of care, this program may bridge this gap and provide extended support throughout the surgical period. Patient portals may be an effective delivery method so that patients can immediately access relevant smoking cessation information both ahead/after surgery and notify the circle of care whether they would like additional support.

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Table Baseline characteristics and smoking outcomes

Baseline Characteristics	**Total Participants (n=35)**	**Intervention (n=18)**	**Control (n=17)**
Age, mean (SD)	50.42 (12.64)	56.12 (14.28)	48.33 (9.11)
Sex, female n (%)	20 (43.48)	12 (54.55)	8 (33.33)
Body mass index, kg/m^2 (SD)	28.26 (6.31)	25.97 (3.34)	29.57 (7.44)
Surgery Type, n (%)			
In-Patient	19 (41.3)	10 (45.45)	9 (37.5)
Day Surgery	27 (58.7)	12 (54.55)	15 (62.5)
Patient Portal Use, n (%)			
No	14 (30.43)	7 (31.82)	7 (29.17)
Yes	32 (69.57)	15 (68.18)	17 (70.83)
Counseling, n (%)			
Anesthesiologist	9 (19.57)	5 (22.73)	4 (16.67)
Nurse	13 (28.26)	6 (27.27)	7 (29.17)
Surgeon	7 (15.22)	4 (18.18)	3 (12.5)
Primary Care Provider	10 (21.74)	5 (22.73)	5 (20.83)
Readiness to Quit/Stage of Change, n (%)			
Pre-Contemplation	4 (8.7)	2 (9.09)	2 (8.33)
Contemplation	21 (45.65)	10 (45.45)	11 (45.83)
Preparation	16 (34.78)	7 (31.82)	9 (37.5)
Action	5 (10.87)	3 (13.64)	2 (8.33)
Outcome		**Intervention**	**Control**
Number Of Quit Attempts (Mean)			
Baseline	-	0.92±1.24	0.83±1.03
Surgery Day	-	1.08±0.67	0.82±0.4
7 Days	-	2.22±1.92	0.82±0.75
30 Days	-	2.56±2.83	1.55±1.74
Number Of Cigarettes Smoked/Day (Mean)			
Baseline	-	15.5±7.09	13.83±9.24
Surgery Day	-	7.22±5.68	10±3.16
7 Days	-	7.22±5.68	11.90±8.79
30 Days	-	6.11±2.84	8.33±4.26
Fagerstrom Test Of Nicotine Dependence Score (Mean)			
Baseline	-	4.17±2.12	3.41±1.83
Surgery Day	-	2.2±1.75	1.75±1.6
7 Days	-	1.78±1.79	1.75±2.31
30 Days	-	1.11±1.27	0.67±1.32

How wildfires can affect the delivery of anesthetic care

Submission ID

39

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INTRODUCTION

The increasing prevalence of wildfires due to climate change poses significant health challenges, particularly relevant for anesthesiologists during perioperative care. Exposure to wildfire smoke has been linked to respiratory issues, cardiovascular stress, and systemic inflammation.[1] In patients with underlying conditions, such as asthma, chronic obstructive pulmonary disease (COPD), or who are otherwise frail, the effects can be deadly. Both acutely and in the months following, wildfire smoke exposure presents unique challenges, including heightened risks of airway complications, perioperative events, and compromised outcomes. Despite these implications, research into how wildfire exposure influences anesthesia care remains limited.[2] This review explores the perioperative implications of wildfire exposure, emphasizing the challenges of perioperative management and the clinical impact on anesthetic concerns. It aims to provide an understanding of how anesthesiologists can optimize perioperative care for patients affected by wildfire-related health impacts, identify key risk factors, and propose strategies to mitigate risks during wildfire seasons.

METHODS

A systematic literature review was conducted to explore the impact of wildfire exposure on anesthesia care. Electronic databases (Medline, Embase, and all EBM reviews) were searched from inception until October 2024. Keywords included “wildfire” and “anesthesia” along with their variants. Search results were filtered to common pathological or anesthetic complications to retrieve clinically relevant studies. The initial search retrieved 1,935 studies which underwent screening in 2 stages (1. Title and abstract screening, 2. Full text review) in duplicate by 2 independent reviewers. Inclusion criteria focused on studies discussing wildfire exposure’s effects on perioperative outcomes, airway considerations, and investigations into the pathophysiological mechanisms. Exclusion criteria omitted studies unrelated to wildfire exposure, animal studies, those lacking anesthesia-specific insights, and abstracts. Additionally, studies measuring emergency department visits were excluded due to a lack of relevancy. Ultimately, in total 70 studies were included in this analysis which consisted of a mix of retrospective analyses, prospective studies, systematic reviews, and case series. Data extraction was performed using a standardized template in duplicate that investigated both the study

findings and methodological quality. In the screening and data extraction stages, any conflicts were resolved by discussion among the reviewers.

RESULTS

Most included studies investigated North American wildfires and demonstrated a correlation between wildfire smoke exposure and an increase in respiratory and cardiovascular symptoms like asthma exacerbations, COPD exacerbations, out-of-hospital cardiac arrests, and new onset cardiovascular events such as atrial fibrillation. Additionally, some studies found an increase in all-cause mortality due to wildfire exposure. Specifically, a systematic review on the health impacts of wildfire smoke showed that 90% of studies have linked wildfire smoke with a significantly increased risk of respiratory morbidity.[3] Several studies also demonstrated the deleterious effects of wildfire exposure on airway function and inflammation. For instance, a study demonstrated that firefighters post wildfire exposure exhibited a statistically significant decrease in functional vital capacity percent predicted.[4] Of note, a retrospective study found that pediatric patients undergoing general anesthesia had higher incidences of reactive airway disease.[5]

DISCUSSION

Wildfires pose a growing challenge to anesthesiology practice, particularly with the rise of events in Canada. Numerous studies document correlations between wildfire exposure and patient outcomes. For instance, wildfire-exposed patients may have poorer than expected pulmonary function warranting changes in anesthesia care. However, significant knowledge gaps remain, particularly for high-quality studies and the effectiveness of specific interventions during wildfire events. Future research should focus on developing evidence-based protocols for managing wildfire-exposed patients, including integrating air quality data into perioperative risk assessments. Addressing these gaps is critical to improving patient outcomes and safety in the evolving landscape of climate-related health threats.

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Impact of prehabilitation on postoperative outcomes in older adults: a systematic review and meta-analysis

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108

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INTRODUCTION

Prehabilitation is a uni- or multimodal intervention that may consist of exercise, nutritional, cognitive, or psychological components delivered before surgery to improve postoperative outcomes.[1,2] Older adults undergoing major elective surgery face higher rates of postoperative complications, prolonged hospital stays, and functional decline, particularly in the presence of frailty, a multidimensional state of decreased reserves. Although prehabilitation is hypothesized to mitigate these risks,[2,3] its efficacy in older populations remains uncertain.[4] Given the growing older surgical population, and the significant role of frailty in predicting adverse postoperative outcomes, assessing the effect of prehabilitation in this group is a research priority.[5] We conducted a systematic review and meta-analysis to estimate the effect of prehabilitation on patient-prioritized outcomes (complications, length of stay, quality of life, physical recovery, and delirium) in older adults. Secondary objectives included estimating prehabilitation's efficacy in individuals with frailty and identifying whether frailty-associated characteristics or different prehabilitation modalities modify its effects.

METHODS

This was a prespecified study within a larger living systematic review of prehabilitation interventions, conducted following Cochrane best practices; thus, ethical review was not required. We searched MEDLINE, Embase, CINAHL, PsycINFO, Web of Science, and CENTRAL, supplemented by trial registries and reference lists. Eligible randomized controlled trials enrolled older adults (mean age ≥ 65 yr) undergoing elective surgery; compared a prehabilitation program (≥ 7 days) against a non-prehabilitation control; and reported at least one of the following: 30-day postoperative complications, length of stay (LOS), lower limb physical recovery, quality of life (QoL), or postoperative delirium (POD).

Two reviewers independently screened, extracted data, and assessed risk of bias using the Cochrane Risk of Bias tool. Random-effects meta-analysis with Hartung–Knapp adjustment was used to pool estimates and 95% confidence intervals (CIs). Odds ratios (ORs) were pooled for binary outcomes (complications, POD), mean differences (MDs) for LoS, and standardized

mean differences (SMDs) for continuous outcomes (physical recovery, QoL); SMDs were backtransformed to 6-min walk distance (physical recovery) and SF-36 (QoL) for interpretability. Prespecified subgroup analyses explored frailty status, prehabilitation uni/multimodality, and study risk of bias. Frailty-associated characteristics and prehabilitation modalities were investigated as effect moderators. Publication bias was assessed through funnel plots and Egger's test.

RESULTS

From 6,695 screened records, 88 were included (*n* = 7,642). Prehabilitation significantly reduced postoperative complications (OR, 0.63; CI, 0.52 to 0.77; $P < 0.001$; $I^2 = 26\%$) and LOS (MD, −0.74; CI, −1.27 to −0.20; $P = 0.008$; $I^2 = 80\%$). Directionally beneficial, but non-significant effects were observed for QoL (SMD, 0.12; CI, −0.01 to 0.26; $P = 0.07$, reflecting a +1.23-point mean change in SF-36 scores (CI, −0.1 to 2.56). No significant effects were observed for physical recovery (SMD, −0.04; CI, −0.22 to 0.15; $P = 0.69$, reflecting a −4.49-meter mean change in 6MWD (CI, −27.46 to +18.47) and POD (OR, 0.81; CI, 0.45 to 1.44; $P = 0.40$).

An inadequate number of studies reported explicit frailty status, precluding meta-regression. No prehabilitation component types were identified as effect modifiers. Among predefined frailty-associated characteristics, only physical impairment modified effects on physical recovery ($\beta = 0.39$; $P = 0.04$; $R^2 = 14.89\%$) and QoL ($\beta = -0.55$; $P < 0.001$; $R^2 = 76.57\%$). No evidence of publication bias was identified, and risk-of-bias subgroup analyses showed no significant differences, though POD conclusions were limited by study availability.

DISCUSSION

Our findings suggest that in older adults undergoing major elective surgery, prehabilitation reduces postoperative complications and LOS but does not significantly impact physical recovery, QoL, and POD. These findings highlight prehabilitation's potential to enhance short-term surgical outcomes, though benefits for broader functional recovery remain uncertain. High heterogeneity, particularly for LOS and physical recovery, limits interpretability. Insufficient data prevented robust frailty-specific analyses, and overall study quality varied, with a limited number of low risk-of-bias trials. Further high-quality randomized controlled trials that explicitly characterize baseline frailty and functional status are needed, as well as those powered for cognitive outcomes.

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Table Summary of pooled effects of prehabilitation on postoperative outcomes in older surgical adults

Outcome	Total Trials	Total Participants	Pooled effect (95% CI)	I^2	p-value
30-day postoperative complications	53	4324	OR 0.63 (0.52, 0.77)	26%	<0.001
Length of stay*	61	5838	MD −0.74 (−1.27, −0.2)	80%	0.008
Physical recovery*	42	2376	SMD −0.04 (−0.22, 0.15)	72%	0.69
Quality of life*	35	2517	SMD 0.12 (−0.01, −0.26)	55%	0.07
Postoperative delirium	7	762	OR 0.81 (0.45, 1.44)	0%	0.40

*One study measuring length of stay (*n* = 151), two studies measuring physical recovery (*n* = 37), and two studies measuring quality of life (*n* = 81) were exluded from meta-analysis due to missing variance data

Influence of blood transfusions on postoperative pulmonary complications in liver transplant: a single-centre cohort study

Submission ID

92

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INTRODUCTION

Liver transplantation (LT) is the definitive treatment for end-stage liver diseases. Advances in surgery, anesthesia, candidate selection, and postoperative care have improved outcomes.[1] Despite these strides, postoperative pulmonary complications (PPCs), including pulmonary edema, pneumonia, pleural effusions, and atelectasis, affect 35–50% of LT recipients, impairing recovery, reducing graft function, and increasing mortality.[2] Liver transplantation is a high-risk surgery involving substantial bleeding and coagulopathy. Transfusions, though essential, are associated with transfusion-related acute lung injury (TRALI), transfusion-associated circulatory overload (TACO), and transfusion-related immunomodulation (TRIM), which may exacerbate PPCs. The specific impact of TRALI, TACO, and TRIM on PPCs in LT remains unclear, and narrow definitions[3] may underestimate transfusions' effects on postoperative pulmonary health. Our primary objective was to estimate the association between intraoperative transfusions and the incidence of PPCs within the first postoperative week, as well as 1-year graft and recipient survival. Secondary objectives mirrored the primary objective but focused on perioperative transfusions.

METHODS

We conducted a single-centre cohort study of adult LT recipients for end-stage liver disease (2008–2021), excluding retransplantations, combined liver-lung transplants, non-ESLD etiologies, and intraoperative deaths. The primary exposure was intraoperative transfusion of labile blood products, while perioperative transfusions (intraoperative and up to 7 days postoperatively) were analyzed as cumulative, time-varying exposures for secondary objectives. Transfusions were categorized as: 1) binary exposure to any transfusion, 2) binary exposure to red blood cells (RBCs) and hemostatic blood products (HBPs; platelets, fresh frozen plasma,

cryoprecipitates), and 3) cumulative transfused units. The primary outcome was PPC incidence within the first week, including pulmonary edema (non-cardiogenic, cardiogenic, or undefined) and pneumonia. Secondary outcomes included pulmonary edema and pneumonia analyzed separately, and graft and recipient survival at 1 year. Fine and Gray subdistribution hazard models estimated hazard ratios (HR) for intraoperative transfusions and PPCs, while Cox proportional hazards models assessed perioperative transfusions as time-varying exposures. Confounders included age, sex, body mass index, preoperative hematologic profiles, preoperative care setting, baseline central venous pressure, phlebotomy use, piggyback anastomosis, blood loss, intraoperative administration of crystalloids and colloids, and year of transplant. Sensitivity analyses evaluated winsorization and included acute liver failure patients. We reported adjusted hazard ratios (aHR) with 95% confidence intervals (CI).

RESULTS

We included 640 LT recipients, with 388 (60.6%) not transfused intraoperatively and 252 (39.4%) receiving 1,065 transfusions (523 RBCs and 542 HBPs). Including the 7-day postoperative period, 422 patients (66%) were transfused, with 170 receiving transfusions postoperatively. Overall, 1,131 RBCs and 1,794 HBPs were transfused. Transfused patients experienced longer surgeries and higher blood loss. Exposure to any perioperative transfusion significantly increased PPC risk (aHR, 1.77; 95% confidence interval [CI], 1.18 to 2.64), while intraoperative transfusions alone were not significant (aHR, 1.19; 95% CI, 0.78 to 1.82). Perioperative transfusions, but not intraoperative transfusions, were associated with a higher risk of pulmonary edema (aHR, 2.30; 95% CI, 1.38 to 3.82), with no significant association observed for pneumonia. Cumulative perioperative RBC units transfused increased pulmonary edema risk (aHR, 1.12; 95% CI, 1.01 to 1.26). Perioperative HBPs were associated with higher graft loss or death risk at one year (aHR, 1.17; 95% CI, 1.04 to 1.31). Sensitivity analyses confirmed consistent results.

DISCUSSION

Our study identified perioperative transfusions as significant contributors to PPCs, particularly pulmonary edema. Cumulative RBC transfusions during the perioperative period increased pulmonary edema risk, underscoring the additive impact of transfusions on hemodynamic and inflammatory imbalances. Postoperative pulmonary complications should be viewed as part of a broader clinical continuum rather than isolated events defined solely by frameworks like TRALI, TACO, and TRIM, which capture only a subset of the challenges posed by PPCs. Residual confounding and reverse causality cannot be ruled out, particularly for HBP-related risks. Refining perioperative transfusion strategies and mitigating PPCs through targeted interventions are crucial to improving LT outcomes. Randomized controlled trials are warranted.

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Melatonin for preventing postoperative delirium in elderly patients: a multicenter randomized placebo-controlled pilot study

Submission ID

64

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INTRODUCTION

Delirium is an acute and fluctuating state of confusion characterized by alterations in the level of attention and awareness and disturbance of cognition.[1] Postoperative delirium (POD) in older adults is common and is associated with a high risk of morbidity and mortality.[2] With limited treatment options, prevention of POD is essential. Melatonin, a pineal gland hormone, has been suggested to prevent delirium through regulating the sleep-wake cycle and serotonin metabolism, which has been shown to be disrupted in patients with POD.[3,4] Few randomized controlled trials (RCTs) have evaluated melatonin for delirium prevention however with several limitations including variations the dose and duration of treatment and outcome assessment (timing and consistency of delirium assessment).[5] Hence, the evidence regarding the use of melatonin for POD prevention is limited and inconclusive. We conducted a pilot RCT to evaluate the effect of melatonin on POD incidence after noncardiac surgery in patients > 65 yr.

METHODS

This placebo-controlled, two-arm parallel-design multicenter pilot RCT was approved by the local Research Ethics Board and registered on clinicaltrials.gov. We included patients > 65 yr of age, undergoing major elective noncardiac surgery (vascular, thoracic, gynecological, otolaryngeal, general and gastrointestinal) with an expected hospital stay of ≥ 2 days and able to provide informed consent. Exclusion criteria were: 1) refusing to participate; 2) active delirium or dementia; 3) planned postoperative ventilation; 4) previous study participation; 5) allergy to melatonin; 6) hepatic impairment defined as alanine aminotransferase greater than 500 $IU \cdot L^{-1}$; 7) previous liver transplant or liver cirrhosis of Child–Pugh classes B and C; 8) language barrier; or 9) pregnant or breastfeeding women. Patients were randomized, centrally in a 1:1 ratio, using

a computer-generated, permuted, variable block randomization, stratified by site, to treatment (3 mg oral melatonin) or placebo once preoperatively and for 7 days postoperatively. Patients were assessed twice daily for delirium and followed at 3 months postoperatively. Patients, research assistants involved in patient recruitment and follow-up, health care providers, and data analysts were blinded. Feasibility outcomes were recruitment rate, medication adherence, and proportion completing 3-month follow-up. Clinical outcomes were delirium incidence, sleep quality, institutional discharge, and cognitive status at 3 months.

RESULTS

Between September 2021 and June 2023, 85 patients were randomized (~1 patient/week); of these, 92.9% adhered to study medications and 87.1% completed the 3-month follow-up. Due to the COVID-19 pandemic, there were significant interruptions to the study and challenges to patient recruitment. Due to continued challenges in recruitment and need for important changes to the study protocol to establish feasibility (including the need to involve other sites and funding), the study was terminated for futility in June 2023 after recruiting 76% of our target sample size. Baseline and perioperative characteristics (age, sex, comorbidities, medications, history of delirium, surgical diagnosis, cognitive status, sleep quality, and depression) were similar between the groups. Postoperative delirium occurred in 9 patients (10.6%) with no statistical difference between the groups (melatonin group, *n* = 7; placebo group, *n* = 2; adjusted odds ratio: 1.12; 95% confidence interval, 0.006 to 150.1). There were no statistical differences in other clinical outcomes between the two groups (Table).

DISCUSSION

We assessed the feasibility of conducting a large RCT to evaluate the effect of perioperative melatonin on the incidence of POD after noncardiac surgery and explored its effects on clinical outcomes. We showed lower recruitment and retention rates than our prespecified acceptable rates for advancing to the main trial. We did not observe important differences in the incidence of POD or other clinical outcomes. Based on our observations, a large sample size is required for a definitive trial to evaluate the role of melatonin in POD prevention. We highlight considerations to address feasibility challenges and ongoing post-pandemic patient care modifications.

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Table Secondary clinical outcomes

Outcome measure	Melatonin Group (n=43)	Placebo Group (n=42)	Effect Estimate		P-value
			Mean Difference (95% CI)	OR (95% CI)	
RCSQ questionnaire mean scores*; mean (SD)					
Sleep Depth	60.4 (30.59)	56.9 (28.92)	3.52 (-2.79–9.83)	-	0.273
Sleep Latency	66.1 (31.47)	62.0 (31.58)	4.14 (-2.56–10.8)	-	0.225
Awakenings[ε]	56.9 (29.73)	55.6 (29.12)	1.29 (-4.97–7.54)	-	0.686
Returning to Sleep	64.0 (33.02)	63.3 (31.11)	0.76 (-6.05–7.56)	-	0.827
Sleep Quality	58.2 (32.15)	58.0 (28.96)	0.17 (-6.31–6.65)	-	0.959
ICU admission[ɛ]; n (%)	0 (0.0)	2 (4.8)	-	-0.05(-0.14, 0.04)	0.453
Length of hospital stay[Ω]; median (Q1, Q3)	4.0 (3.0, 7.5)	3.0 (3.0, 6.0)	1.0 (0.0–2.0)	-	0.250
Institutional discharge incidence[§]; n (%)	1 (2.3)	1 (2.4)	-	1.05 (0.01, 84.3)	>0.999
MMSE scores*; mean (SD)	24.0 (1.77)	24.5 (1.68)	-0.50 (-1.38–0.37)	-	0.256
Incidence of mortality up to 3 months post-discharge[ɛ]; n(%)	1 (2.3)	0 (0.0)	-	0.02 (-0.05–0.09)	>0.999
Sedation (indicated by POSS score of ≥3, at least once during in hospital follow up)[ɛ]; n (%)	0 (0.0)	0 (0.0)	-	-	

*Based on *t* test across time for each outcome
[Ω]Based on Wilcoxon–Mann–Whitney test
[§]Based on Chi square test
[ɛ]Based on test of proportions due to small/zero counts

CI = confidence interval; ICU = intensive care unit; MMSE = Mini Mental State Examination; OR = odds ratio; POSS = Pasero Opioid-induced Sedation Scale; RCSQ = Richards–Campbell Sleep Questionnaire; SD = standard deviation

Night-time noise levels and patients' sleep experiences in a tertiary care health care facility

Submission ID

126

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INTRODUCTION

Sleep is known to be important for health maintenance and recovery, however 30–60% of patients experience sleep disturbances while hospitalized.[1] Sleep disturbance can be particularly harmful for patients at risk for delirium, which affects up to one-third of older adults.[1,2] Sleep disturbances are known to compromise patient's perceptions about the quality of care they receive and may cause physical and psychological impairment that slows recovery.[3] Current literature emphasizes the importance of sleep enhancement interventions to prevent and mitigate delirium.[1,3,4] We investigated the association between night-time noise levels and patient sleep experience in the hospital setting. Research questions included 1) What are the noise levels in different departments, types of rooms, and the corresponding difference in sleep disturbance? 2) What is the correlation between level of noise and factors that disrupt sleep? 3) What is the relationship between pain and participants rated sleep quality?

METHODS

Ethics approval was obtained to conduct this prospective, observational study aimed to identify night-time noise levels and patient sleep experiences across single, non-single, and observational hospital rooms. Participants (N = 40) had to be: > 18 yr old, speak English, lack dementia, or current confusion. Baseline sleep histories, along with demographic data including American Society of Anesthesiologists classification, surgery, substance use, comorbid conditions, and the use of sleeping aids, were collected. Dosimeters recorded noise levels in each hospital room from 8 PM to 8 AM. Each morning, patients completed questionnaires on sleep comparison (Leeds Sleep Evaluation Questionnaire), sleep quality (Richards–Campbell Sleep Questionnaire), and factors impacting sleep (modified Freedman Scale). Nighttime audits of the general surgery, orthopedic, and internal medicine wards were conducted to identify any measures in place for sleep enhancement related to noise reduction. Overhead announcements were tracked throughout the study duration. Spearman's correlation was employed to determine if the modified Freedman Scale was associated with noise ratings, number of nursing

interventions, patient noise ratings, and overhead announcements. Generalized linear mixed models assessed whether different hospital room types exhibited significant differences in mean noise levels.

RESULTS

Patient-rated noise in general has a weak correlation with nursing interventions (ρ = 0.329; *P* = 0.003), a moderate correlation with overhead announcements (ρ = 0.559; *P* < 0.001), and a strong correlation with noise from other patients (ρ = 0.801; *P* < 0.001) (Table). Pain showed a weak correlation with sleep quality (ρ = 0.365; *P* = 0.001) and a moderate negative correlation with the 5-point RCSQ score (ρ = −0.497; *P* < 0.001). Sleep quality and the RCSQ score had a strong correlation (ρ = 0.765; *P* < 0.001) (Figure). Generalized linear mixed models found no difference in noise levels between departments (*P* = 0.255), but a significant difference was found between room types (*P* < 0.001), with observation rooms being the loudest (LSM = 52.2 dB). There were 80 overhead announcements during quiet hours from 5 June–22 July 2024.

DISCUSSION

While there are many factors impacting patients' sleep, noise is a prominent one which can be mitigated through noise reduction strategies.[1,3,4] Our results support current literature that emphasizes other patients and built environment as key sources of sleep disturbance.[1,4] Therefore, these factors should be considered within the clinical care environment. These results will help inform the development of a noise reduction strategy, which will address patient factors, including how to reduce noise from other patients, and environmental factors such as overhead announcements and noise from charting.

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Prospective preference assessment for the perioperative rectal methadone in spine surgery (PROMISE) trial

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44

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INTRODUCTION

Patients undergoing spine surgery frequently experience chronic pain, with a prevalence of approximately 15%.[1] Traditional analgesics are often contraindicated or unfeasible in spine surgery, leaving immediate-release opioids as the cornerstone of postoperative pain control despite their adverse effects.[2] This highlights a need for innovative, multimodal analgesic strategies tailored to the unique challenges of spine surgery. Evidence suggests that rectal methadone has a promising pharmacokinetic-dynamic profile, which may present a novel perioperative pain management approach.[3,4] We developed the PeRiOperative Rectal Methadone In Spine SurgEry (PROMISE) Trial, comparing rectal methadone to a saline placebo for postoperative pain relief. To optimize enrollment and adherence, we conducted a prospective preference assessment (PPA) prior to trial initiation to: 1) identify patient concerns and motivations regarding participation, 2) refine the trial protocol to improve recruitment and adherence, and 3) identify key differences between patients willing and unwilling to enroll, ensuring the trial's feasibility and success.[5]

METHODS

We developed a PPA to evaluate patient attitudes and identify barriers and motivators for participation in the PROMISE Trial. Patients scheduled for elective spinal fusion surgery were purposively sampled and recruited from the preoperative clinic between July and August 2024. Eligibility criteria included age 18–65, capacity to consent, and proficiency in English. Recruitment targeted a diverse sample (n = 35) to ensure generalizability, with data collection ceasing upon thematic saturation. The PPA comprised four phases: 1) a vignette describing the PROMISE trial, 2) a participant comprehension assessment, 3) a semi-structured interview exploring attitudes and factors influencing enrollment decisions, and 4) a self-administered questionnaire assessing willingness to participate (6-point Likert scale) and demographic/clinical

characteristics. Willingness was dichotomized into 'not willing' (Likert responses 1–3) and 'willing' (Likert responses 4–6). Data were collected in-person and transcribed verbatim. Quantitative analysis included descriptive statistics and group comparisons using *t* tests and Fisher's Exact Tests, stratified by willingness categories. Qualitative data were analyzed using thematic analysis in MAXQDA, involving iterative coding and synthesis by two independent researchers. Emerging themes were refined into a codebook, enabling the identification of motivators and barriers to participation.

RESULTS

Thirty participants were enrolled and categorized into: 'willing to participate' in the PROMISE trial (83%) and 'not willing to participate' (17%). Participants with pain as a major concern regarding their spine surgery were statistically significantly more likely to be willing than not willing to participate (88% *vs* 40%; $P = 0.004$). There were no statistically significant differences with respect to all other variables, including age, sex, education, visible minority status, previous research participation, concomitant medical conditions, previous surgery, regular use of pain medications, previous pain management discussions, pain on most days in the last 3-months, and use of pain medication or alternatives to manage pain for > 1-week within the last month. The main motivating factors for participation were optimizing pain management/pain relief (57%), and perceived benefit of rectal methadone (30%). The common concerns discouraging participation included side effects of methadone (13%) and fear of dependency or addiction (13%) (Table).

DISCUSSION

This study demonstrated strong participant acceptability and feasibility for recruitment, driven by the unmet clinical need for effective postoperative pain relief, underscoring the importance of designing trials aligned with patient priorities. Barriers to participation often coexisted with willingness to participate. Thus, the trial will incorporate modifications informed by participant motivators and concerns, including information on methadone's safety and side effect profile, lower dependency risk with perioperative monitoring, and reassurance of implemented safeguards. Positive receptivity to rectal administration underscores its potential as an innovative pain management approach. These findings highlight the PROMISE trial's role in advancing patient-important outcomes in pain research.

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Table Frequencies of motivating and concerning factors identief from patient interviews influencing willingness to participate in the PPA PROMISE trial

	Total (n = 30), N (%) or mean ± SD	**Not willing to participate (n = 5, 16.7%), N (%) or mean ± SD**	**Willing to participate (n = 25, 83.3%), N (%) or mean ± SD**
Identified Themes: Motivators			
Optimizing pain management/pain relief	17 (57)	1 (20)	16 (64)
Perceived comfort/benefit of rectal route of administration	6 (20)	1 (20)	5 (20)
Perceived benefit of rectal methadone	9 (30)	1 (20)	8 (32)
Curiosity	6 (20)	0 (0)	6 (24)
Familiarity with methadone	2 (7)	0 (0)	2 (8)
Scientific/knowledge advancement	7 (23)	0 (0)	7 (28)
Altruism	8 (27)	0 (0)	8 (32)
Minimizing post-operative opioid use	3 (10)	0 (0)	3 (12)
Ambivalence	1 (3)	0 (0)	1 (4)
No motivating factors	4 (13)	3 (60)	1 (4)
Identified Themes: Concerns			
Concerns about long-term methadone use and effectiveness	1 (3)	0 (0)	1 (4)
Safety of methadone	1 (3)	0 (0)	1 (4)
Side effects of methadone	4 (13)	1 (20)	3 (12)
Opposition to receiving placebo	1 (3)	0 (0)	1 (4)
Stigma around methadone	2 (7)	0 (0)	2 (8)
Influence on perception of pain	1 (3)	0 (0)	1 (4)
Impact on post-surgical pain management	1 (3)	0 (0)	1 (4)
Impact on surgical performance, outcomes and/or timeline	2 (7)	0 (0)	2 (8)
Skepticism/hesitance towards analgesics in general	3 (10)	2 (40)	1 (4)
Fear of potential for dependency or addiction	4 (13)	2 (40)	2 (8)
Blinding to intervention assignment	1 (3)	0 (0)	1 (4)
Novelty of study	2 (7)	0 (0)	2 (8)
Lack of education/knowledge regarding study drugs	3 (10)	1 (20)	2 (8)
Ambivalence	1 (3)	0 (0)	1 (4)
No concerns	14 (47)	1 (20)	13 (52)

Prothrombin complex concentrate use in liver transplant surgery: a survey of attitudes and current practices in perioperative care providers

Submission ID

66

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INTRODUCTION

Prothrombin complex concentrate (PCC) is a fractionated, virally inactivated, human plasma-derived concentrate containing primarily coagulation factors. While licensed for reversal of coagulation factor deficiency related to vitamin K antagonists in emergency settings, it is increasingly used for the treatment of acquired coagulopathy related to surgical bleeding.[1,2] However, in liver transplant surgery, frozen plasma is traditionally used for the treatment of acquired general coagulation factor deficiency, despite an association with adverse events including transfusion associated circulatory overload (TACO).[3] It is essential to better understand individual practice variability and attitudes towards the use of PCC and other hemostatic agents for the treatment of coagulopathy in liver transplant patients. The goal of this survey was to examine existing practices of coagulopathy management in liver transplant surgery among perioperative clinicians, and to describe the attitudes and conventions that inform those practices and related clinical decision-making.

METHODS

All attending anesthesiologists, hepatologists, liver transplant surgeons, and intensivists involved in or specialized in the perioperative care of liver transplant patients at Canadian and International institutions were eligible for inclusion. Institutional ethics approval was obtained. A non-probabilistic method of identifying further research participants (chain sampling) was used to try and capture a breadth of opinions beyond the immediate known network of the

investigators and public knowledge. For each potential respondent, a recruitment e-mail introducing the study and survey link was sent from the study team. The final survey was hosted in RedCap and contained 36 questions targeting demographics, personal practice patterns, and probed opinions. Survey responses were aggregated and counts and percentages reported for quantitative data. SAS OnDemand for Academics was used for all quantitative analyses. Qualitative data analysis was used for free-text responses and comments fields. Free text and comments were tabulated and presented in aggregate for each question. Responses for each question were coded, categorized, and analyzed inductively and deductively by two team members for themes.

RESULTS

The survey was sent to 59 clinicians to fill out and further distribute, with 107 complete survey responses obtained from 30 June 2024 to 21 December 2024. There was wide representation across age categories, with most respondents indicating their specialty as anesthesiologists. The majority of respondents were from Canada (67/107, 63%). The remaining respondents represented 9 other countries. Prothrombin complex concentrate was used by 42%, avoided by 28%, and reserved for rescue treatment by 30%. While frozen plasma (82%) was preferred over PCC (16%) as first-line treatment for general coagulation factor deficiency, 14% preferred to avoid plasma altogether. Intraoperatively, viscoelastic testing (85%) was preferred to guide transfusion management; however, 43% of respondents reported no use of standardized transfusion algorithms at their institution. While clinicians indicated hesitancy to administer PCC to patients with a perceived higher risk of thromboembolism, they also strongly expressed hesitancy to administer plasma to patients with volume overload.

DISCUSSION

This survey demonstrates clear differences in patient selection, timing, concurrent blood product administration, and severity of intraoperative bleeding when providers administer PCC over plasma. The existing observational literature must be considered in the context of this large selection bias and unmeasured confounding. There is high variability in PCC use among clinicians transfusing liver transplant patients perioperatively. Clinicians perceived that PCC was likely beneficial for avoidance of volume overload, but a lack of comparative safety data to plasma was cited as a barrier to use. An adequately powered, high quality randomized trial is required to guide evidence-based practice.

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Figure Respondent responses to questions assessing attitudes and practices in prothrombin complex concentrate *versus* plasma use in liver transplant surgery

Quality gaps and patient outcomes in day-of-surgery glucose management for patients with and without diabetes: a retrospective cohort study

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138

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INTRODUCTION

Perioperative hyperglycemia is associated with adverse patient outcomes in patients with and without diabetes, including twice as many surgical site infections and increased 30-day mortality compared to those without hyperglycemia. Despite these worse outcomes, measurement of glucose and treatment of hyperglycemia are suboptimal in many settings; less than 50% of patients with diabetes had a blood sugar measurement during surgery and less than 20% received insulin for hyperglycemia in studies performed in the USA and the UK.[1,2] The aim of this study was to characterize gaps in day-of-surgery glucose measurement for adult patients in six hospitals and seven surgical services in Alberta, Canada, in preparation for a province-wide quality improvement project (NCT05036655).

METHODS

This multicentre retrospective cohort study used administrative data to describe process, outcomes, and balancing measures related to glucose management on the day of a noncardiac surgery that required hospital admission for adults with and without diabetes.

Colorectal, gynecologic oncology, vascular, urologic, and orthopedic surgeries were included. Preoperative HbA1c was used to stratify participants as having diabetes, prediabetes, no diabetes or unknown diabetes status.

Process measures of interest included glucose measurement before surgery in preoperative holding, during all surgeries and surgeries longer than 120 min, and in the recovery room and administration of insulin for hyperglycemia, defined as more than 10.0 $mmol \cdot L^{-1}$. The primary outcome measure was occurrence of hyperglycemia in preoperative holding areas, during surgery, and in the recovery room, and exploratory outcome measures were length of stay, admission to an intensive care unit (ICU) during the index hospitalization,

and 30-day readmissions. Balancing measures were occurrence of hypoglycemia (defined as a glucose less than 4.0 $mmol \cdot L^{-1}$ and severe hypoglycemia (glucose less than 2.0 $mmol \cdot L^{-1}$).[3]

Process measures are reported as counts and proportions. Logistic, linear, and quantile regression were used to estimate associations between day of surgery hyperglycemia and outcomes of interest, which were adjusted for age, sex, and HbA1C.

RESULTS

There were 12,275 eligible procedures; 3,164 were performed on patients with diabetes (25.8%).

Overall, 85.4% of patients with diabetes had at least one glucose measurement on the day of surgery (*n* = 2,703). Of these, 37.1% had hyperglycemia (*n* = 1,004). About half of patients with diabetes and hyperglycemia received insulin (51.4%, *n* = 516).

In preoperative holding, 71.3% of patients with diabetes had a glucose measurement (*n* = 2,256) and 23.4% had hyperglycemia (*n* = 529). Only half received insulin (48.8%, *n* = 258). Intraoperatively, 40.9% of patients with diabetes had glucose measurement (*n* = 870) and 34.5% had hyperglycemia (*n* = 300). More than half of patients with diabetes received insulin for hyperglycemia (57.0%, *n* = 171). In recovery, only 39.2% of patients with diabetes and hyperglycemia received insulin.

Hyperglycemia was common in recovery in patients with prediabetes (16.3%), no diabetes (15.1%) and unknown diabetes status (17.6%).

Patients with hyperglycemia had longer length of stay, more ICU admissions, and 30-day readmissions, regardless of their underlying diabetes status.

DISCUSSION

Day-of-surgery quality gaps in glucose management were striking; about one-third of patients with diabetes had a glucose measurement during surgery and 40% had a measurement in the recovery room. Hyperglycemia was common. Further, only half of patients with diabetes and hyperglycemia received insulin. Glucose measurement was low in patients with prediabetes, no diabetes, and unknown diabetes status. Despite this, hyperglycemia was found in more than 10% of patients without diabetes on the day of surgery and these patients received insulin infrequently. Day-of-surgery hyperglycemia was associated with worse patient outcomes regardless of diabetes status, though causality cannot be determined by this study.

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Reporting of sex and gender in research on perioperative cardiovascular outcomes: a scoping review

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INTRODUCTION

Sex is a biological variable that applies dichotomously to about 98% of the population, with the remaining 2% exhibiting intersex traits. Gender, a socioeconomic variable, encompasses occupational, educational, and psychological influences, and is less amenable to dichotomization. Although often used interchangeably, sex and gender are distinct constructs. Historically, both variables have been overlooked in medical research, leading to gaps in clinical knowledge and outcomes. To address these disparities, funding and regulatory bodies have introduced guidelines and policies. In 2019, the Canadian Cardiovascular Society endorsed the inclusion of sex and gender considerations in cardiovascular guidelines, acknowledging growing evidence of male-female differences. However, the field of perioperative cardiovascular medicine has been slower to integrate these considerations. This scoping review examines the inclusion of sex and gender in perioperative cardiovascular research since 2010, exploring terminology, inclusivity, and the evolving roles of these variables over time.

METHODS

This scoping review followed the Joanna Briggs Institute (JBI) methodology for scoping reviews as described by Arksey and O'Malley, in stages described by Peters in 2021. The Preferred Reporting Items for Systematic Reviews and Meta-Analysis extension for scoping reviews (PRISMA-ScR) were used to guide reporting. Following development of research question, we selected cardiovascular outcomes validated by Standardized Endpoints in Perioperative Medicine (StEP) initiative. Studies with at least 100 adult participants followed up to 30 days postoperatively were included. Additional inclusion and exclusion criteria can be seen in the Figure, panel 1. A search strategy was developed in EMBASE and Medline, in consultation with a biomedical librarian. Two researchers independently screened and extracted the data using Covidence (Veritas, Melbourne, VIC, Australia). Data was analyzed descriptively in STATA Statistical Software (v18. College Station, TX, USA), and associations were tested using Kruskal–Wallis and Chi square tests (alpha = 0.05).

RESULTS

We screened 1,757 studies and extracted data from 426. Inter-reviewer proportional agreement was 0.89 (κ = 0.72). Majority of studies were observational (88%), with interventional studies representing 11%. The first author was most often anesthesiologist (45%).

The median proportion of female participants was 0.45 [0.3–0.53] and remained consistent over time (*P* = 0.41). None of the studies included non-binary participants, and some excluded participants with missing sex/gender data. No studies referenced guidelines for reporting sex/gender, and only one study specified definitions.

Regarding terminology, 57% of studies used it appropriately (man/woman for gender, male/female for sex), while 42% used the terms interchangeably. Only 15% provided a rationale for including sex/gender, and 15% used these variables solely to describe the study population. Recommended methods for sex-based analysis were used in 11% of studies. While 95% included sex/gender in tables/graphs, only 18% discussed findings, and 5% included them in conclusions.

DISCUSSION

Our review highlights that despite significant biological and sociodemographic differences between sexes and genders, few perioperative cardiovascular studies adhere to current guidelines addressing these factors. Limiting sex/gender to sample description or confounding variables overlooks their impact. Examples include the recently established sex-specific ranges for cardiac biomarkers and association between reproductive history and risk of perioperative myocardial injury in VISION-PREECLAMPSIA study. Systematic inclusion of sex/gender should be encouraged even when not the primary focus. Although fully disaggregated analysis may not always be feasible, omitting such analysis should be justified.

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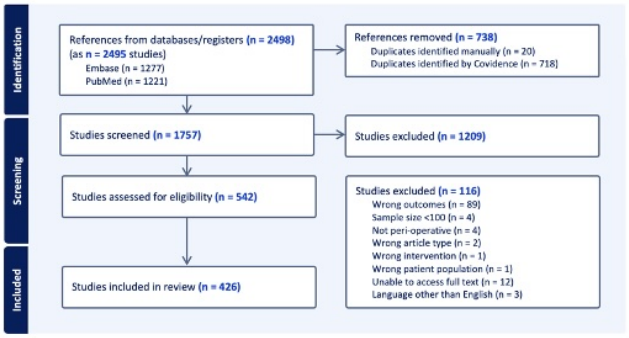
Figure Panel a) Inclusion and exclusion criteria, b) PRISMA-SCr flow diagram, c) Characteristics of included studies, d) Main findings

a.

	Inclusion Criteria	Exclusion Criteria
Publication Dates	January 1, 2010 and more recent	prior to January 1, 2010
Language	English Language	Non-English
Participants/Population	Perioperative adult (within 30 days of non-cardiac surgery)	Perioperative pediatric/neonatal
Setting	All non-cardiac surgeries/procedures	Cardiac surgeries involving cardiopulmonary bypass
Exposure(s)	Surgery, cardiovascular or other comorbidity, biomarker or other exposure	Congenital heart disease
Outcomes(s)	Cardiovascular death, MACE, MI, MINS, CVA/stroke, HF, arrythmia, non-fatal cardiac arrest (on their own or > 1/2 of outcomes in composite).	VTE, PE
Sources	clinical trials and observational studies (cohort, case-controlled, cross-sectional)	Case reports, case series, protocols, systematic reviews, narrative reviews, metanalyses, protocols or other secondary research. Studies with <100 participants.

Table abbreviations: major adverse cardiovascular event (MACE), myocardial infarction (MI), cerebrovascular accident (CVA), heart failure (HF), arrythmia, myocardial injury after non-cardiac surgery (MINS), venous thromboembolism (VTE), pulmonary embolism (PE)

b.



c.

N=426	median	25th-75th %tile
Sample size	1,606	[451 - 15,689]
	N	**%**
Type of study		
Retrospective cohort	235	55
Prospective cohort	137	32
RCT	48	11
Other	6	2
1st Author's specialty		
Anesthesia	192	45
Cardiology	124	29
Internal Medicine	48	11
Other	62	15
Geographic origin		
US	131	31
EU	67	16
International collaboration	53	12
China	47	11
South Korea	27	6
Canada	20	5
Other	81	19
Funding		
Public	195	46
Industry	75	16
Study theme (multiple/study)		
Epidemiology	250	59
Risk prediction	118	28
Prevention	64	15
Exposures and interventions		
Physiologic factors	133	31
Pharmacological	56	13
Anesthetic	51	12
Procedure	29	7

d.

N=426	N median	% 25th-75th %tile
INCLUSIVITY		
Proportion of women/female participants (median, 25-75%tiles)	0.45	[0.36 - 0.52]
Studies reporting non-binary participants	0	0
TERMINOLOGY		
Provided definition of sex or gender	1	0.24
Referenced guidelines for inclusion of sex/gender	0	0
Studies reporting sex	321	75
Studies reporting gender	103	24
Using sex or gender terms appropriately	242	57
Using sex and gender terms interchangeably	178	42
The ROLE of SEX/GENDER in STUDY METHODOLOGY		
Provided rationale for inclusion of sex or gender	64	15
Used sex or gender only to describe the study population	65	15
Subgroup or disaggregated analysis by sex or gender	47	11
Reporting section in the manuscript (multiple/study)		
Abstract	84	20
Methods	244	57
Results	226	53
Discussion	78	18
Conclusion	20	5
Tables and graphs	403	95

Transcatheter tricuspid valve replacement as a bridge to liver transplantation in a patient with severe functional tricuspid regurgitation and cirrhosis

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INTRODUCTION

The prevalence of patients with cirrhosis and severe valvular heart disease is increasing.[1] Functional tricuspid regurgitation (TR) is the most common cause of TR and results from progressive tricuspid annular dilation with a structurally normal valve. Over time, cyclic right ventricular (RV) dilation leads to volume overload and worsening TR.

Primary cardiac disease can precipitate functional TR, causing congestive hepatopathy and cirrhosis. Conversely, patients with cirrhosis may have concurrent primary valvular disease. Moderate to severe TR is associated with increased mortality following liver transplantation.[2] While surgical intervention remains standard of care for TR, patients with advanced cirrhosis often have prohibitive surgical risk. Minimally invasive valve interventions may be useful in this population.[3]

We present a 45-yr-old female with end stage liver disease with concurrent severe functional TR. To our knowledge, this is the first case using transcatheter tricuspid valve replacement (TTVR) as a bridge to liver transplant.

CASE PRESENTATION

A 45 yr old female was admitted with decompensated cirrhosis from metabolic dysfunction associated steatotic liver disease and increased alcohol intake (met-ALD), anasarca and acute on chronic renal failure requiring initiation of dialysis. At admission her sodium model for end-stage liver disease score was 31. A transthoracic echocardiogram was performed as part of the liver transplant assessment. It demonstrated normal biventricular systolic function, severe TR from tricuspid annular dilatation and valvular malcoaptation, with no vegetations confirmed on transesophageal imaging, no intracardiac shunts or mitral regurgitation. Right heart

catheterization revealed a mean pulmonary artery pressure 15 mm Hg, mean right atrial pressure 30 mm Hg, and pulmonary vascular resistance of 0.42 Wood units.

Despite perioperative volume removal using continuous renal replacement therapy, her TR persisted with a large coaptation gap (Figure). A multidisciplinary discussion concluded that proceeding with liver transplantation without valvular intervention could precipitate postoperative congestive hepatopathy and allograft dysfunction. However, due to her advanced cirrhosis, she was not a surgical candidate, and her anatomy was unsuitable for tricuspid transcatheter edge-to-edge repair.

The patient underwent a TTVR, followed by liver transplantation 9 days later. Four months post liver transplantation, her allograft function remains normal, her TTVR demonstrates a normal hemodynamic profile, and she is actively engaged in inpatient rehabilitation.

CONCLUSION

Valvular heart disease may be discovered during evaluation for liver transplant candidacy. While severe valvular heart disease is often a contraindication for liver transplantation, advanced cirrhosis precludes patients from open surgical intervention. In such high-risk cases, minimally invasive valve techniques offer a promising alternative.

The multidisciplinary approach enabled a successful TTVR in a patient with decompensated cirrhosis, facilitating subsequent liver transplantation. This case underscores the utility of minimally invasive TV interventions as a bridge to liver transplantation. Limited data exists identifying which patients may benefit from TV intervention prior to liver transplant, and further research is required

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