
# CAS 2026

## Regional & Acute Pain Abstracts

# Contents

# Hip arthroplasty with low concentration local anesthetic fascia iliaca block: the HALF trial

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156

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## INTRODUCTION

Suprainguinal fascia iliaca block (SIFIB) provides effective analgesia for total hip arthroplasty (THA) but often causes quadriceps weakness. We hypothesized that low concentration local anesthetic (LCLA) SIFIB using 0.075% ropivacaine would offer comparable analgesia to high concentration local anesthetic (HCLA - 0.25% ropivacaine) while better preserving quadriceps strength.

## METHODS

In this double-blind randomized controlled trial, 60 patients undergoing primary THA received either LCLA-SIFIB or HCLA-SIFIB (50 mL ropivacaine + epinephrine 1:200,000) (figure 1). All patients received standard spinal anesthesia (mepivacaine 2% 3.5mL + fentanyl 15mcg + morphine 100 mcg) and multimodal analgesia (standing Tylenol and celecoxib, hydromorphone PRN). Outcomes included pain scores (NRS), opioid consumption (oral morphine equivalents - OME), quadriceps strength (Oxford scale), and hospital length of stay.

## RESULTS

Groups were similar for baseline demographics (table 1). Pain scores and opioid use were similar between groups at all time points ($p > 0.19$). Quadriceps strength at 8 hours after spinal anesthesia was significantly better in the LCLA group (median 4 [3–4]) vs. HCLA (median 2 [2–4], $p = 0.03$). A trend favoring LCLA was also seen in PACU ($p = 0.06$). Strength scores were comparable by POD1 and POD2 (table 2). No differences in adverse events were observed.

## DISCUSSION

LCLA-SIFIB provides comparable analgesia to HCLA-SIFIB after THA, with significantly improved early quadriceps strength. These findings support LCLA-SIFIB as a promising motor-sparing regional technique for enhanced recovery in THA patients.

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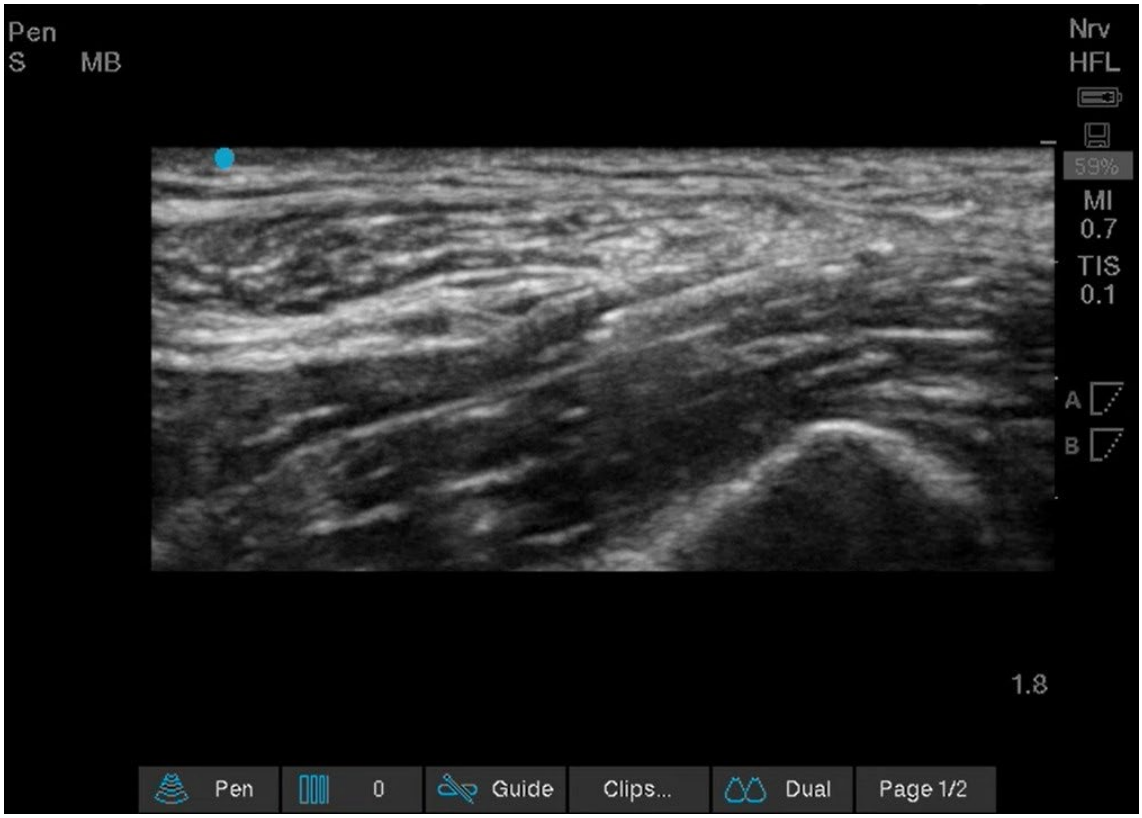


Figure 1

# Novel risk factors for rebound pain following interscalene brachial plexus block with adjunctive dexamethasone: an observational study

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79


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## INTRODUCTION

Peripheral nerve blocks (PNBs) offer substantial benefits in ambulatory surgical populations but *rebound pain*, a dramatic increase in postoperative pain after block resolution, can negatively impact recovery.[1] Secondary analysis of data originally collected for routine follow-up has been used to study rebound pain in large cohorts.[2,3] Younger age, female sex, lack of adjunctive dexamethasone and bone surgery (*versus* soft tissue) consistently emerged as independent risk factors despite heterogeneity in surgical procedures, PNB composition and technique. However, multivariable model predictive capabilities were limited with areas under the receiving operating curve (AUROC) ≤0.65.[2,3]

To elucidate additional modifiable, risk factors, we re-analyzed prospectively collected data from a single-center, randomized controlled trial (RCT) where participants received standardized interscalene block (ISB) with adjunctive dexamethasone for outpatient arthroscopic shoulder surgery. We hypothesized that nocturnal analgesic block resolution[4] and increased anxiety[5] would be associated with increased rebound pain scores and a higher likelihood of severe rebound pain.

## METHODS

Our local research ethics board approved this secondary analysis. The original RCT (conducted 2015-2016), randomized 280 adults to a single-injection ISB with 30mL 0.5% bupivacaine and 4mg or 8mg of either intravenous or perineural dexamethasone. Patients with diabetes or taking regular opioids were excluded.

Predictor variables included data originally obtained by chart review regarding participants' medical history, surgical procedure and anesthetic care. Postoperative telephone interviews

extracted self-reported postoperative anxiety, measured on a numerical rating scale (NRS) of 0 to 10, postoperative analgesic use, and analgesic block duration, the original trial's primary outcome. It was defined as time elapsed from block performance to first postoperative shoulder pain (initial pain). Initial pain occurring between 2300h and 0659h was defined as nocturnal block resolution.

Initial pain NRS was a secondary outcome in the original trial collected at postoperative telephone interview. Rebound pain score,[1,2] the increase in pain from complete analgesia (NRS=0) before block resolution to initial pain NRS at block resolution, was this study's primary outcome. Severe rebound pain, an initial pain NRS ≥7,[2,3] was a secondary outcome. Multivariable analyses included predictor variables reaching significance ($p<0.05$) in univariate analyses or prior literature. Normality of residuals was graphically inspected with QQ plots and histograms.

**RESULTS**

All 280 participants were included for analysis. The only missing data was postoperative analgesic use for 25 participants. The overall mean (standard deviation) rebound pain score was 3.7 (2.3) and severe rebound pain occurred in 38 participants (13.6%). Mean (standard deviation) analgesic block duration was 25.3 (6.7) hours. Dexamethasone route and dose were not significant univariate predictors of either outcome ($p\geq0.79$).

Both nocturnal block resolution and higher self-reported anxiety NRS were independently associated with higher rebound pain scores and increased likelihood of severe rebound pain in multivariable linear and logistic regression models, respectively (Table). The logistic regression model's AUROC was 0.79 (95% confidence interval 0.70 to 0.88).

Postoperative analgesic use from facility discharge to analgesic block resolution was omitted from the original multivariable models out of concern for confounding by indication.[2] When added to the multivariable models in sensitivity analyses, it was not a significant predictor of either outcome.

**DISCUSSION**

We identified postoperative anxiety and nocturnal block resolution as novel, independent risk factors for rebound pain outcomes. Interventions to reduce perioperative anxiety, increase block duration for cases done early in the day and prepare patients for nocturnal analgesic block resolution may reduce the incidence and severity of rebound pain.

This study's severe rebound pain incidence was lower than the approximately 50% incidence observed previously.[2,3] This difference may be due to different surgical populations, variations in the definition of severe rebound pain, this study's universal use of adjunctive dexamethasone5 and the exclusive use of bupivacaine at higher doses in the ISB.

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Table. Multivariable analyses for rebound pain score and severe rebound pain.

| **Predictor** | **Rebound pain score[4] (linear regression) Estimate (95% confidence interval)** | ***p*** | **Severe rebound pain[5] (logistic regression) Odds ratio (95 % confidence interval)** | ***p*** |
|---|---|---|---|---|
| Anxiety (per 1 point on NRS)[1] | 0.16 (0.07 to 0.25) | <0.001 | 1.33 (1.18 to 1.51) | <0.001 |
| Nocturnal analgesic block resolution[2] | 1.1 (0.5 to 1.7) | <0.001 | 2.78 (1.23 to 6.3) | 0.01 |
| Female sex (reference male) | -1.3 (-2.0 to -0.6) | <0.001 | 0.31 (0.10 to 0.97) | 0.04 |
| General anesthetic administered[3] | 1.1 (0.6 to 1.7) | <0.001 | 2.59 (1.11 to 6.0) | 0.03 |
| Height (cm) | 0.05 (0.01 to 0.08) | 0.01 | 1.06 (1.00 to 1.12) | 0.04 |
| Duration of surgery (hours) | 0.48 (0.02 to 0.94) | 0.04 | 2.21 (1.21 to 4.03) | 0.008 |
| Bone surgery (reference soft tissue surgery) | -0.5 (-1.7 to 0.7) | 0.45 | -[6] | |
| Analgesic block duration (hours) | 0.01 (-0.02 to 0.05) | 0.49 | 1.00 (0.94 to 1.05) | 0.9 |
| Age (years) | 0.003 (-0.016 to 0.023) | 0.73 | 1.02 (0.99 to 1.06) | 0.13 |

[1]Postoperative anxiety was measured on a numerical rating scale (NRS) of 0 to 10.
[2]Nocturnal analgesic block resolution was defined as first postoperative shoulder pain in the operative arm occurring between 2300h and 0659h.
[3]General anesthetic was administered at the preference of the surgeon or the discretion of the anesthesiologist.
[4]Rebound pain score is the increase in pain from complete analgesia (pain NRS=0) before block resolution to initial pain NRS at analgesic block resolution.
[5]Severe rebound pain is an initial pain NRS ≥7 at analgesic block resolution.
[6]A zero count of severe rebound pain in soft tissue surgery patients prevented its inclusion in this maximum likelihood multivariable logistic regression analysis. Surgery type was nonsignificant in a Firth penalized likelihood multivariable logistic regression analysis performed as a sensitivity analysis.

# Regional anesthesia for high-risk rib fractures: assessing bleeding risk in coagulopathic patients receiving ESP blocks

**Submission ID**

194


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## INTRODUCTION

Effective analgesia for rib fractures is essential to reduce pulmonary complications and mortality. Thoracic epidural and paravertebral techniques provide excellent pain control but are frequently contraindicated in patients with coagulopathy or therapeutic anticoagulation due to the risk of neuraxial hematoma, as reflected in current regional anesthesia guidelines.[1] The erector spinae plane (ESP) block has emerged as an alternative given its more superficial fascial plane location. Prior studies have demonstrated the safety of ESP blocks in patients with chest wall trauma receiving venous thromboembolism prophylaxis with low rates of bleeding complications.[2,3] Case reports and small series have also described successful ESP block use when neuraxial analgesia is contraindicated by clotting abnormalities.[4,5] However, data specifically evaluating ESP block safety in patients with significant coagulopathy or therapeutic anticoagulation remain limited. This study aimed to evaluate bleeding complications following ESP block placement in this high-risk population and compare outcomes with a non-coagulopathic control group.

## METHODS

We conducted a retrospective cohort of all adult patients with rib fractures who received ESP blocks for analgesia at a tertiary academic centre between January 2021 and December 2024. Patients with coagulopathy (INR >1.5, platelet count <70 $\times 10^9$/L), therapeutic anticoagulation or antiplatelet therapy, or diagnosed bleeding disorders at the time of block placement were included in the coagulopathic group. The control group consisted of patients receiving ESP blocks for the same indication without altered coagulation. Charts were reviewed for bleeding complications, including hematoma formation, neurological deficits, need for anticoagulant reversal, or interruption of anticoagulation. Secondary outcomes included opioid consumption, need for rescue analgesia, mechanical ventilation, and hospital and ICU length of stay.

## RESULTS

Twenty-six patients with altered coagulation and 56 non-coagulopathic patients received ESP blocks during the study period. No clinically significant bleeding complications occurred in either group. Two patients in the coagulopathic group experienced minor superficial bleeding at the catheter insertion site, neither of which required intervention and were not associated with neurological symptoms. No epidural or deep fascial hematomas, local anesthetic systemic toxicity, or block-related infections were identified. No patients required anticoagulant reversal attributable to ESP block placement.

## DISCUSSION

In this retrospective series, ESP blocks were not associated with clinically significant bleeding complications in patients with coagulopathy or therapeutic anticoagulation, with outcomes comparable to a non-coagulopathic cohort. Minor superficial catheter-site bleeding occurred infrequently and without clinical consequence. These findings support the potential safety of ESP blocks as a regional analgesic option for rib fracture management in high-risk patients when neuraxial techniques are contraindicated. Larger prospective studies are warranted to further characterize bleeding risk.

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# Regional anesthesia for scapulothoracic fusion in a patient with facioscapulohumeral muscular dystrophy: a case report

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67

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## INTRODUCTION

Facioscapulohumeral muscular dystrophy (FSHD) has specific anesthetic considerations: patients are more sensitive to inhalational agents, sedatives and opioids, and muscle relaxants, and are therefore at higher risk to develop perioperative complications. Patients with scapular winging may require scapulothoracic fusion, often performed in the prone position and requiring substantial analgesia and muscle relaxation.

Scapular surgery itself is uncommon and the complex innervation of the scapula poses challenges for any singular regional anesthetic technique. Literature reports of regional anesthesia strategies for this procedure in patients with FSHD are scarce. We describe a combined cervical and thoracic regional technique as an adjunct to general anesthesia, demonstrating the "Identify–Select–Combine" framework described by Sonawane et al. regarding regional anesthesia for scapular surgery.

Informed patient consent for submission of case report was obtained and IRB review was not required for a single case report per local institutional policy.

## CASE PRESENTATION

A 57-year-old man with genetically-confirmed FSHD presented with severe right scapular winging and associated functional impairment. His medical history included hypertension and atrial fibrillation. He was scheduled to undergo open scapulothoracic fusion with iliac crest autograft and multiple intercostal fusions (T2/3, T3/4, T4/5, T5/6, T6/7, and T7/8). Thoracic epidural analgesia was discussed in the pre-anesthetic consult but was considered suboptimal given the anticipated short length of stay and surgical site. Preoperatively, the risks and benefits of ultrasound-guided single-shot regional anesthesia was discussed and consent obtained, specifically for the erector spinae plane (ESP) and brachial plexus blocks, as part of a multimodal analgesia strategy. Using 0.5% ropivacaine, a right-sided T3 ESP

block was performed in the sitting position (20mL), followed by superior trunk (10mL) and superficial cervical plexus blocks (5mL) performed supine. In the operating room, general anesthesia was induced with propofol and fentanyl. Rocuronium (0.6mg/kg) was administered only for induction with ongoing quantitative neuromuscular monitoring and later reversed with sugammadex. Anesthesia was maintained with sevoflurane and a phenylephrine infusion. The patient was proned with meticulous padding. Total intraoperative time was 4 hours. Intraoperative analgesia included ketorolac 30mg IV, ketamine 20mg IV, hydromorphone 0.8mg IV, and dexamethasone 8mg IV. He remained normothermic and hemodynamically stable throughout. Postoperatively, he experienced isolated, sharp iliac crest pain managed with hydromorphone 2mg orally every 4 hours as needed. He reported minimal back discomfort (2/10) and block-related analgesia lasted for 10 hours. No pain crisis, respiratory depression, prolonged weakness, nausea or vomiting, or neurologic deficit occurred.

## CONCLUSION

Regional anesthesia techniques can improve patient analgesia and reduce sedative and opioid requirements in FSHD patients scheduled for scapulothoracic fusion. The scapula receives complex innervation; therefore, by utilizing a combination of superior trunk, superficial cervical plexus, and ESP blocks, it is possible to provide coverage that better matches the involved dermatomes, myotomes, and osteotomes. This approach supports the "Identify–Select–Combine" framework, emphasizing combined cervical and thoracic injections to cover both brachial plexus and dorsal rami contributions, with the goals of preserving diaphragmatic function and optimizing perioperative multimodal analgesia being particularly notable in the patient with neuromuscular disease.

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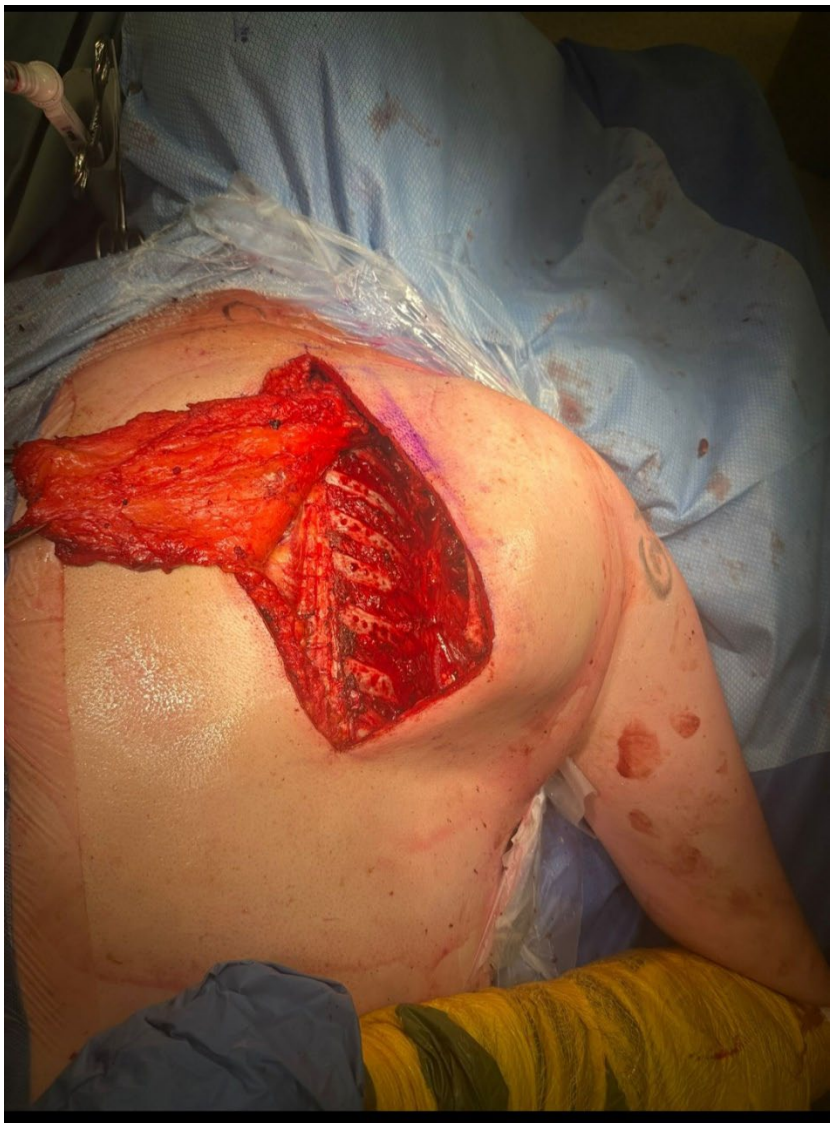

Figure 1

# The impact of continuous serratus plane analgesia on quality of recovery and opioid consumption after video-assisted thoracic surgery. A prospective double-blind, randomized, placebo-controlled trial.

**Submission ID**

174


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## INTRODUCTION

Video assisted thoracic surgery (VATS) has emerged as standard of care for most thoracic surgeries and has revolutionized the surgical treatment of many pulmonary conditions. It is less invasive compared to thoracotomy and it is associated with improved perioperative outcomes like intraoperative cardiopulmonary stability, postoperative pain, postoperative pulmonary complications, and hospital length of stay (LOS) after surgery. Although VATS offers various advantages over open surgery, it remains associated with significant postoperative pain.[1] Various regional anesthesia techniques have been explored, and the serratus anterior plane block (SAPB) has emerged as a promising option to treat postoperative pain.[2-4] Unfortunately, the evidence supporting continuous SAPB infusion and its influence on patient-reported quality of recovery is limited. This study evaluated whether continuous SAPB infusion, as part of standardized multimodal analgesia, improves postoperative quality of recovery following VATS, reduces opioid consumption, as well as has respiratory-protective adjunct.

## METHODS

This prospective, randomized, double blinded, placebo-controlled trial was conducted at a single tertiary academic centre after being approved by the institutional research ethics board. This study included adult patients undergoing elective VATS who were randomized to receive either 0.2% ropivacaine or saline via an ultrasound-guided serratus anterior plane catheter. All patients received standardized intraoperative and postoperative multimodal

analgesia, including infiltration of 20 mL of 0.5% bupivacaine with 1:200,000 epinephrine at the port site by the surgical team as well as patient-controlled analgesia with hydromorphone in post-anesthesia care unit (PACU). The primary outcome was quality of recovery measured using the Quality of Recovery-40 (QoR-40)[5] questionnaire on postoperative day (POD) 1. Secondary outcomes included QoR-40 scores on POD 2–4, postoperative pain scores, opioid consumption, perioperative complications, hospital length of stay, and 30-day readmission. Sample size was calculated to detect a minimal clinically important difference of 6.3 points in QoR-40 with 80% power and $\alpha$=0.05. Analyses were performed on an intention-to-treat basis using parametric or non-parametric tests as appropriate; two-sided p values <0.05 were considered statistically significant.

## RESULTS

A total of 173 patients were included in the analysis (SAPB group n=88; control group n=85). Baseline characteristics were similar between groups. Although median QoR-40 scores on POD 1 were higher in the SAPB group compared with control (176 [IQR 166–184] vs. 172 [159–183], it was not statistically significant (p=0.10). QoR-40 scores were higher in the SAPB group across POD 2–4. Patients in SAPB group had significantly lower opioid consumption in PACU (8.0 ± 7.4 vs. 10.6 ± 9.3 morphine milligram equivalents [MME]; p=0.039) and on POD 1 (12.7 ± 10.8 vs. 16.5 ± 12.2 MME; p=0.035). Hospital LOS was approximately 1 day shorter in the SAPB group, although not statistically significant (2.69 ± 1.76 vs 3.50 ± 4.01, p=0.087). Pain scores were similar between groups at all time points. Rates of postoperative complications, and 30-day readmissions did not differ between groups. No block-related complications were observed.

## DISCUSSION

In this randomized trial, continuous SAPB infusion was associated with improved QoR-40 scores across all postoperative days, although this did not reach statistical significance. Importantly, SAPB resulted in reduced postoperative opioid consumption, particularly in the early postoperative period, supporting its opioid-sparing effect. The shorter hospital stay observed in the SAPB group represents a clinically important outcome given the high cost of inpatient care. Postoperative complications, and 30-day readmissions were similar between groups, with no block-related complications, supporting SAPB continuous infusion as a safe, opioid-sparing multimodal adjunct for VATS.

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| Postoperative Outcomes | SAPB (n=88) | Control (n=85) | P value |
|---|---|---|---|
| **PACU** | | | |
| Total Opioid consumption (MME in mg, mean±SD) | 8.0±7.4 | 10.6±9.3 | 0.0388 |
| Acetaminophen consumption (mg) | 332±459 | 467±537 | 0.0762 |
| Nausea and Vomiting | 15 (16.8%) | 9 (10.3%) | 0.2728 |
| Pruritus | 0 (0%) | 0 (0%) | >0.9999 |
| Urinary Retention | 0 (0%) | 0 (0%) | >0.9999 |
| Headache | 0 (0%) | 0 (0%) | >0.9999 |
| Pain Scores | 5 (3.5, 6) | 5 (3, 7) | 0.4061 |
| **POD 1** | | | |
| Total Opioid consumption (MME in mg, mean±SD) | 12.73±10.75 | 16.45±12.17 | 0.0349 |
| Acetaminophen consumption (mg) | 1967±1151 | 1879±1132 | 0.6113 |
| Nausea and Vomiting | 28 (31.8%) | 29 (34.1%) | 0.8716 |
| Pruritus | 1 (1.14%) | 1 (1.18%) | >0.9999 |
| Urinary Retention | 1 (1.14%) | 1 (1.18%) | >0.9999 |
| Headache | 4 (4.5%) | 1 (1.1%) | 0.3681 |
| Pain Scores | 4 (2, 6) | 4 (2, 6) | 0.5433 |
| QoR-40 | 176 (166, 184) | 172 (159, 183) | 0.1036 |
| **POD 2** | | | |
| Total Opioid consumption (MME in mg, mean±SD) | 5.1±6.4 | 5.4±8.5 | 0.8027 |
| Acetaminophen consumption (mg) | 2118±1235 | 2037±1225 | 0.6663 |
| Nausea and Vomiting | 7 (7.9%) | 10 (11.7%) | 0.4514 |
| Pruritus | 1 (1.14%) | 1 (1.18%) | >0.9999 |
| Urinary Retention | 0 (0%) | 2 (2.3%) | 0.2400 |
| Headache | 3 (3.41%) | 0 (0%) | 0.2459 |
| Pain Scores | 3 (2, 5) | 3 (2, 5) | 0.4982 |
| QoR-40 | 186 (176, 190) | 182 (170, 188) | 0.1062 |
| **POD 3** | | | |
| Total Opioid consumption (MME in mg, mean±SD) | 2.41±4.39 | 3.2±4.9 | 0.2622 |
| Acetaminophen consumption (mg) | 2021±1461 | 1747±1362 | 0.2056 |
| Nausea and Vomiting | 0 (0%) | 2 (2.35%) | 0.2428 |
| Pruritus | 0 (0%) | 0 (0%) | >0.9999 |
| Urinary Retention | 1 (1.14%) | 1 (1.18%) | >0.9999 |
| Headache | 3 (3.41%) | 1 (1.18%) | 0.6208 |
| Pain Scores | 2 (1, 4) | 3 (1, 5) | 0.2287 |
| QoR-40 | 190 (182, 193) | 188 (178, 193) | 0.3540 |
| **POD 4** | | | |
| Total Opioid consumption (MME in mg, mean±SD) | 1.28±2.38 | 1.94±2.71 | 0.0920 |
| Acetaminophen consumption (mg) | 1751±1403 | 1643±1335 | 0.6069 |
| Nausea and Vomiting | 1 (1.14%) | 1 (1.18%) | >0.9999 |
| Pruritus | 0 (0%) | 0 (0%) | >0.9999 |
| Urinary Retention | 1 (1.15%) | 0 (0%) | >0.9999 |
| Headache | 1 (1.15%) | 0 (0%) | >0.9999 |
| Pain Scores | 2 (0,3) | 2 (1, 4) | 0.0804 |
| QoR-40 | 191 (186, 196) | 191 (180, 195) | 0.3126 |
| **Overall** | | | |
| Total Intraoperative Opioid consumption (MME in mg, mean±SD) | 20.04±5.46 | 21.26±7.11 | 0.2028 |
| Length of Hospital stay (days, mean±SD) | 2.69±1.76 | 3.50±4.01 | 0.0872 |
| 30-days readmission n (%) | 3 (3.3%) | 2 (2.2%) | >0.9999 |

Figure 1