

Efficacy of Single-Injection Erector Spinae Blocks in VATS: A Prospective Randomized Control Study

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Introduction

Despite advances in minimally invasive pulmonary resection surgery, the necessary dissection of the lateral thoracic region disrupts spinal nerve tributaries, causing significant postoperative pain.¹ Establishing effective postoperative analgesia enables patient participation in respiratory rehabilitation while reducing opioid use per the Early Recovery After Surgery guidelines.² Current literature highlights the novel application of erector spinae regional blocks with bupivacaine or ropivacaine with bolus infusion therapy to treat this spinal nerve pain effectively in rib fractures, thoroscopic surgeries, and breast surgeries.^{3,4} However, studies evaluating the effectiveness of erector spinae blocks in postoperative pulmonary resection surgery patients demonstrate mixed results, thus warranting further investigation.⁵

Objective

The objective of this prospective, non-blinded, randomized-control study was to explore whether erector spinae blocks with boluses of bupivacaine infusions effectively decrease patients' postsurgical pain and the amount of narcotic pain medication used in adults undergoing video-assisted thoracoscopic (VATS) pulmonary resection surgery.

Methods

This study is a parallel-design, two-arm, randomized, controlled trial for which IRB (NCR 213913) approval was granted. Adult patients aged 18 to 90 years old undergoing VATS pulmonary resection surgery at The George Washington University were randomized into two groups. The control group received standard oral and intravenous pain management including gabapentin, Celebrex, Acetaminophen, and opioids for breakthrough pain. The intervention group received standard care plus a preoperative ultrasound-guided ESB dosed with 30 mL of bupivacaine on the posterior thoracic transverse process correlating with surgical intervention. Pain scores using the numerical Visual Analogue Scale (VAS) and total oral morphine equivalent (OME) consumption were recorded at 6-12-24 hours post-surgery. Secondary outcomes, including length of hospital stay, were collected via chart review. Statistical analyses on collected preliminary data was performed by a statistician who is independent from the study team. Statistical analyses included the Wilcoxon Mann-Whitney U test for

demographic comparisons, and regression tests for subgroup analysis.

Discussion

This analysis and discussion are based on the preliminary results for the first 33 patients that were enrolled out of an expected 70.

- The limited sample size of this preliminary analysis may have prevented us from reaching the power to detect the differences in our outcomes.
- The variability in the duration of and the extent of the procedure and the inconsistency of the intraoperative anesthesia provider may have impacted the internal validity. For instance,
 - Some patients received intraoperative Ketamine, Hydromorphone, and/or Fentanyl to various doses while other patients do not.
 - Some patients received intraoperative dexamethasone which may impact block effectiveness and duration making it difficult to discern their impact on post-operative pain and OME consumption.
- It is imperative that research continues to define appropriate means of regional pain management not only for VATS procedures but other surgeries as well where literature remains scant.

Results

- No differences were found between the control (n=14) and intervention (n=19) groups for 6-12-24 hours postsurgical VAS scores (p=0.868, 0.236, 0.643 respectively), total OME consumption (p=0.77) and length of hospital stay (p=0.887).
- Age was significantly associated with total OME consumption (coefficient -1.28, 95% CI [-2.44 to -0.13], p=0.031) and 12 hours postsurgical VAS pain scores (odds ratio 0.92, 95% CI [0.87 to 0.97], p=0.002).
- With each additional year of age, OME consumption decreased by 1.28 units and the odds of having more pain scores after 12 hours of surgery decreased by 8%.

	Characteristic	Standard of Care (Control, n=14)	P-value	Age	P-value	Sex	P-value
Primary Outcomes	Total Postoperative OME Consumption, coefficient (CI)	12.33 (41.44)	0.394	-1.28 (-0.13)	0.031**	-0.07 (28.23)	0.996
	Postoperative VAS Score at 6-hours, Odds Ratio (CI)	0.79 (3.16)	0.909	0.98 (1.04)	0.513	0.44 (1.52)	0.193
	Postoperative VAS Score at 12-hours, Odds Ratio (CI)	3.37 (12.53)	0.07	0.92 (0.97)	0.002**	1.19 (4.01)	0.781
	Postoperative VAS Score at 24-hours, Odds Ratio (CI)	0.84 (2.96)	0.79	0.96 (1.01)	0.089	0.48 (1.64)	0.241
Secondary Outcome	Length of Postoperative Stay, coefficient (CI)	-0.2397 (0.399)	0.449	0.021 (0.046)	0.101	-0.4456 (0.175)	0.153

Table 1. Regression associations of the primary and secondary study outcomes among the control versus treatment groups after controlling for age and sex.

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