Split-dose Erector Spinae Plane Block with Pectoralis Block to Facilitate Enhanced Recovery in Robotic Thoracotomy: A Case Series

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Introduction

Significant pain, prolonged intubation and extended recovery times are common postoperative outcomes after thoracotomy. To improve patient comfort and satisfaction, opioids are commonly prescribed to these patients. Open and minimally invasive lung resection procedures had the highest incidence of long term-persistent opioid use amongst patients presented for major elective surgeries. A number of anesthetic strategies have been implemented and studied for thoracotomy patients,, including paravertebral blocks, serratus anterior plane blocks, repeated erector spinae blocks, and continuous epidural local anesthetic infusions. The erector spinae block has been described as safe, simple, and effective and its utilization in this patient population continues to be delineated.

This case series presents 3 patients that received split dose erector spinae (ESP) blocks with long acting local anesthetics to facilitate enhanced recovery after elective robotic thoracotomy. The primary outcomes observed were postoperative opioid consumption, and pain scores reported by the patients, measured at 24 hours, 48 hours, and 72 hours.

Methods & Results

All patients in this series received general anesthesia with intraoperative ESPB and PECS 1 and 2 blocks. As part of a multimodal regimen, all patients received preoperative acetaminophen and a gabapentinoid. ESPB were performed prior to induction on the surgical side at the T4 and T10 levels. The ultrasound probe was positioned in a parasagittal orientation to identify the ribs as hyperechoic structures with acoustic shadowing below (Figure 1a, b). The block needle was inserted in a cranial-to-caudal direction using the in-plane technique. When the needle tip was positioned just below the erector spinae muscles, the correct tip position was confirmed by the visualization of linear fluid spreading in the myofascial plane between the transverse process and erector spinae muscles (Figure 1c, d). Twenty milliliters of 0.25% bupivacaine with 10 ml of liposomal bupivacaine was injected in 5 ml aliquots. This procedure was repeated at the second level for a total volume of 60 ml. General anesthesia was induced with propofol, midazolam, rocuronium, 4% LTA spray, and ketamine 0.5 mg/kg and maintained intraoperatively with dexmedetomidine 0.4 mcg/kg/hr, ketamine 0.25 mg/kg/hr and sevoflurane.

Methods & Results (continued)

PECS 1 and 2 blocks were performed after induction on the surgical side with the ultrasound probe positioned below the lateral third of the clavicle. The positions of the axillary artery and vein were confirmed, and the ultrasound probe was moved inferolaterally until the pectoralis major, pectoralis minor, and serratus anterior muscles were identified in one plane at the level between the third and fourth ribs. The block needle was advanced via the in-plane approach in a medial-to-lateral direction until it reached the interfascial plane between the pectoralis minor and serratus anterior muscles (PEC 2 block). After the position of the needle tip was confirmed, 10cc of 0.25% bupivacaine admixed with 5 cc liposomal bupivacaine 1.3% was injected. The needle was subsequently withdrawn until the tip was located in the interfascial plane between the pectoralis major and minor muscles (PEC 1 block), where 5cc of 0.25% bupivacaine admixed with 5 cc liposomal bupivacaine 1.3% was administered. All blocks were performed after chlorhexidine 4% prep with Ultrasound-guidance using a linear array ultrasonography 8-13 Hz probe (HFL38x, M-Turbo; SonoSite, Bothwell, WA) and 50-mm 22-gauge Stimulplex needle (B-Braun, Melsungen, Germany).

All patients received 15 mg ketoralac prior to extubation. After completion of the surgery, all patients were extubated and taken to the postanesthesia care unit (PACU). Post-operative pain was treated with scheduled oral acetaminophen and ketorolac, with opioids as needed for breakthrough pain. The demographic, MME of opioid consumption, and pain scores are listed in the table below:

Subject	Age (y)	Sex	ASA	Opioid Consumption in MME at 24h, 48h, 72h	Pain Scores at 24h, 48h, 72h
1	74	F	3	0, 0, 8	5, 6, 0
2	66	F	3	0, 8, 23	4, 2, 2
3	79	M	3	0, 0, 0	0, 0, 0

Discussion

The main findings of the current case series demonstrate that combined ESP and PEC 1, 2 blocks in patients slated for robotic lung resection are associated with low postoperative opioid requirements, decreased pain scores, and high patient satisfaction. Although formal assessment of hemodynamic stability, time to first rescue analgesia, and length of stay were not performed, our initial results, coupled with the absence of any notable complications, make ESP/PEC1,2 blocks a promising perioperative addition to any cardiac ERAS /opioid-sparing regimen.

It is important to note that other important elements of the anesthetic regimen included preemptive oral analgesic administration, liposomal bupivacaine and intraoperative ketamine. Our findings on efficacy and safety of ESP/PEC 1, 2 blocks for robotic thoracotomy procedures are consistent with other studies of fascial plane blocks. Although other regional anesthetic blocks have been shown to be effective for thoracic surgery, ESP/PEC 1, 2 blocks may provide an unique advantage in terms of ease of performance and reduced risk of complications such as pneumothorax, chest wall hematoma, and local anesthetic toxicity. Further research is warranted.

Acknowledgements & References

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Figures

Fig 1. Staged photograph showing transducer during erector spinae block.

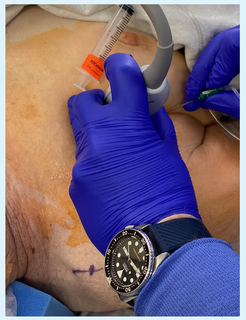


Fig 1. Staged photograph showing transducer during PEC I/II block.

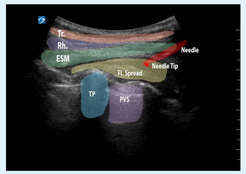
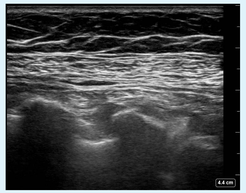
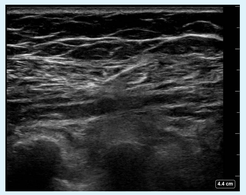


Fig 3a/b/c. Ultrasound imaging showing anatomy prior to ESP block/ Ultrasound imaging showing needle and anesthetic spread/ Ultrasound image showing needle and anesthetic spread with false-color overlay. (Abbreviations: Tr. - Trapezius, RH. = Rhomboid, ESM - Erector Spinae Muscle, TP - Transverse Process, PVS - Paravertebral Space)





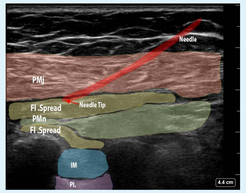


Fig 3a/b/c. Ultrasound imaging showing anatomy prior to PEC block/ Ultrasound imaging showing needle and anesthetic spread/ Ultrasound image showing needle and anesthetic spread with false-color overlay. (Abbreviations: PMj - Pectoralis Major, PMn - Pectoralis Minor, ISM - Intercostal Muscle, Pl. - Pleura)