Case Report

Erector Spinae Plane Block: An Effective Analgesic Technique for Pleurodesis After Senning Operation

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ABSTRACT

Pain emanating from pleurodesis is significantly distressing and presents an important management concern. Despite encouraging evidence on the application of fascial plane blocks for cardiothoracic surgery, the literature on the use of erector spinae block for pleurodesis remains scarce. We describe a case of bilateral recurrent pleural effusion following congenital heart surgery where erector spinae block was employed as an analgesic technique for pleurodesis. Finally, we discuss its regional analgesic effects in comparison to the conventional intravenous/systemic analgesia in a cross over fashion.

Keywords: Acute pain, erector spinae plane block, pleurodesis, regional analgesia, transposition of great arteries

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Submitted: 13-Jul-2019 **Revised:** 29-Oct-2019 **Accepted:** 14-Nov-2019 **Published:** 19-Apr-2021

INTRODUCTION

Pleurodesis is often employed as a treatment modality for recurrent pleural effusions, malignant pleural effusions, and recurrent pneumothorax. Pleurodesis aims to achieve the fusion of visceral and parietal pleura by surgical technique or use of chemical or medicinal agents.[1] Management of post-procedural pain is a key issue in patients undergoing pleurodesis irrespective of the technique employed. Epidural analgesia techniques or systemic analgesics constitute the mainstay of analgesic treatment following pleurodesis.[2] Fascial plane blocks like erector spinae plane block (ESPB) are a novel technique that has evolved as an effective analgesic modality in patients with thoracotomy, rib fractures, and breast surgeries.[3] ESPB is an interfascial plane block which spreads in a cephalocaudal direction deep to the erector spinae muscle in the paraspinal region and potentially spreads toward the paravertebral space through the inter-transverse soft tissue. The visceral and somatic analgesic effects result most likely as a combination of transforaminal and epidural spread.[4] Currently, there is a lack of available literature on the use of ESPB for managing pain following pleurodesis.

We describe a case of bilateral recurrent pleural effusion following congenital heart surgery where systemic analgesics were used during chemical pleurodesis on one side and single-shot ESPB was used as an analgesic technique for pleurodesis on the other side (about a month later) and finally discuss them with regards to their comparative efficacy.

CASE REPORT

A 3-year-old boy weighing 10 kg diagnosed to have congenitally corrected transposition of great arteries with a ventricular septal defect with severe pulmonary stenosis underwent arterial switch operation along with Senning atrial switch at our institute. The hospital stay was prolonged due to recurrent pleural effusion in the postoperative period [Figure 1]. The

Access this article online	
Quick Response Code:	Website: www.annals.in
	DOI: 10.4103/aca.ACA_105_19

How to cite this article: Choudhury A, Sarkar S, Magoon R, Sahoo S. Erector spinae plane block: An effective analgesic technique for pleurodesis after Senning operation. Ann Card Anaesth 2021;24:263-5.

child underwent right-sided chemical pleurodesis with povidone iodine instillation in the intrapleural space almost a month after surgery. The procedure was performed under monitored anesthesia care (MAC) with intravenous midazolam 0.5 mg, intravenous ketamine 0.5 mg/kg, and intravenous fentanyl 1 mcg/kg. Intravenous paracetamol 15 mg/kg 6 h and tramadol 1mg/kg at an interval of 12 h were used for postoperative analgesia. Pain scores were assessed by a modified (F) Face; (L) Legs; (A) Activity; (C) Cry; (C) Consolability (FLACC) scale at 2 h (T_1), 6 h (T_2), 12 h (T_3), and 24 h (T_4) after the procedure in accordance with the institutional protocol [Table 1].[5] The FLACC scores were more than 4 at T_1 and T_3 necessitating an additional dose of 1 μg/kg intravenous fentanyl for rescue analgesia.

The patient was again scheduled for a left-sided chemical pleurodesis at 4 weeks following the previous procedure. In view of the poor analgesic control during the first pleurodesis procedure, ESPB was employed as an analgesic technique for the management of postprocedural pain. The procedure was conducted under MAC with the administration of intravenous midazolam 0.5 mg, ketamine 0.5 mg/kg, and fentanyl 1 mcg/kg.

The block technique

The T_6 spinous process was located in the dorsal midline with the patient in the right lateral decubitus position. Following aseptic precautions, the high-frequency linear array ultrasound probe (Philips ultrasound system, L 11-3 probe, Bothell, WA, USA) was placed longitudinally 2 cm lateral to the T_6 spinous process. After identification of the muscle plane, a 22G needle was inserted craniocaudally in an in-plane approach with the needle tip placed deep to the erector spinae muscle over the T_6 transverse process [Figure 2]. The needle tip location was confirmed by injecting 0.5 mL normal saline and observing the linear fluid spread deep to the muscle. After negative aspiration for blood, 0.375% ropivacaine was injected in a dose of 3 mg/kg adding to a total volume of 10 mL.

Chemical pleurodesis was done by the instillation of povidone iodine in the left interpleural space in this instance. There was no hemodynamic instability or any autonomic signs of pain during instillation of the chemical. Intravenous paracetamol was administered in a dose of 15 mg/kg at an interval of 6 h in the postoperative period. Modified FLACC scores were assessed at similar time points as after the previous pleurodesis [Table 1]. The assessment revealed lower postoperative pain scores in comparison to the scores following right-sided pleurodesis. Moreover, the patient required only a single dose of rescue fentanyl analgesic dose at T_3 with pain scores of less than 4 at other time assessment points.

DISCUSSION

Pain, rightly described as the "fifth vital sign," presents peculiar management concerns to a perioperative physician. The surgical procedures requiring a thoracic incision are one of the most painful procedures. Pleurodesis does not involve any incision, albeit induces severe inflammatory and fibrotic changes in the pleural cavity in order to achieve fusion of the visceral and parietal pleura. The underlying inflammation

Table 1: Comparison of pain scores

Time points of assessment	Total modified FLACC score with use of systemic analgesics	Total modified FLACC score with use of erector spinae block
2 hrs	7	2
6 hrs	5	1
12 hrs	4	2
24 hrs	5	4

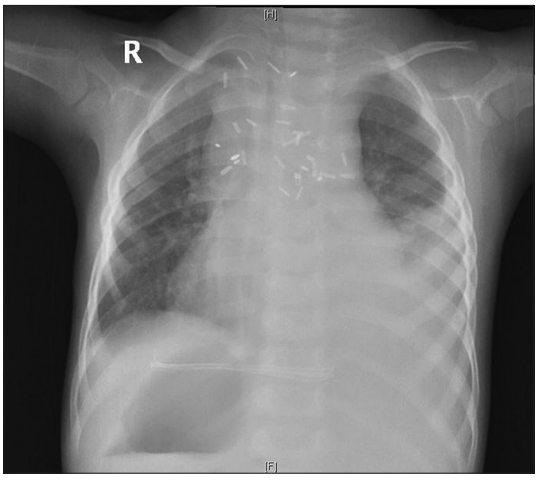

Figure 1: Chest X-ray posteroanterior view showing left-sided recurrent pleural effusion

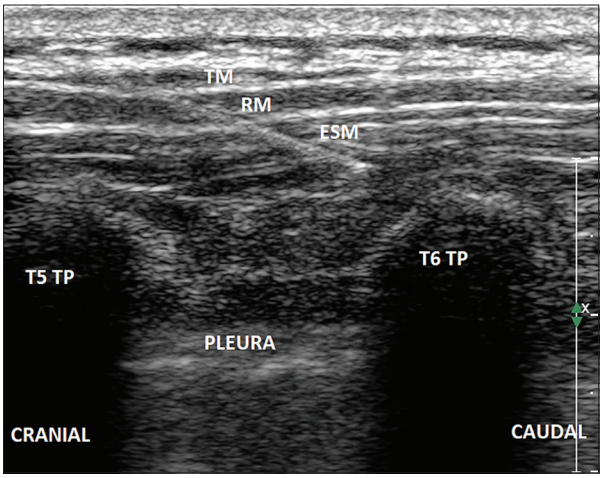

Figure 2: Intraoperative ultrasound image showing needle placement deep to the erector spinae muscle plane. TM—trapezius muscle, RM—rhomboideus major, ESM—erector spinae muscle, TP—transverse process

begets severe pain which is often underestimated. The most common adverse effect reported with pleurodesis being pain bears testimony to the above-mentioned fact.[6]

Traditionally systemic opioid analgesics have been widely used for pain management after pleurodesis. The use of nonsteroidal anti-inflammatory drugs (NSAIDs) for pain control following pleurodesis is debatable owing to its anti-inflammatory action reducing the effectiveness of pleurodesis as demonstrated in some animal studies.[7] However, Ben-Nun *et al*. demonstrated the safety and efficacy of NSAIDs following pleurodesis without any increase in the recurrence rate in a retrospective study involving patients undergoing video-assisted pleurodesis.[2]

Rahman *et al*. concluded that the efficacy of NSAIDs and opioids was similar for analgesia after pleurodesis though the use of NSAIDs was associated with the increased use of rescue analgesics. They also studied the effect of different size thoracostomy tubes on the efficacy of pleurodesis and pain scores and deciphered that smaller size tubes were associated with less pain compared to larger tubes, failing to meet the noninferiority criteria regarding the efficacy of pleurodesis.[8]

The evolution of regional analgesic techniques has resulted in the widespread use of thoracic epidural analgesia and paravertebral blocks following pleurodesis conducted by video-assisted thoracoscopic surgery. High failure rates, hypotension, nausea, urinary retention, pruritus, accidental intrathecal spread, epidural hematoma, and epidural abscess are some of the inherent limitations with the use of neuraxial techniques like epidural analgesia. The paravertebral block has been found to have comparable efficacy to thoracic epidural analgesia and has a lower risk of neuraxial complications. The paravertebral block is associated with the risk of vascular injuries and pneumothorax.[9]

The advent of myofascial plane blocks like ESPB presents a technically simpler analgesic option with comparable analgesic profile and lower risk of complications.[3] ESPB covers multiple dermatomes with a single injection as the muscle plane spans the thoracolumbar region.[10] Several case reports and controlled trials have established the efficacy and safety of ESPB following various thoracic, cardiac, breast, and even abdominal surgeries. However, there is no literature available on the use of ESPB and its effectiveness for the management of post pleurodesis pain.

In our case, we observed an improved analgesic efficacy with ESPB in comparison to the use of systemic analgesics after chemical pleurodesis in a single subject. It was noteworthy that lesser rescue fentanyl doses were required in the immediate postprocedural period following ESPB. However, the patient received intravenous paracetamol following pleurodesis on both occasions.

Considering the advantages of ESPB, it is evolving as an effective technique in the armamentarium of multimodal analgesia adding to the safety profile of the preexisting analgesic regimens. The index report elucidates the clinical utility of ESPB as an alternative analgesic technique to minimize postprocedural pain following pleurodesis aiming to reduce the re-operative morbidity in this patient cohort. The case adds another leaf to the changing paradigm of regional analgesic regimens incorporating novel fascial plane and para-axial techniques in addition to the conventional neuraxial technique in the cardiothoracic surgical arena.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient (s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initial s will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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