

Erector Spinae Plane Block as the Primary Anesthetic Technique for Penetrating Chest Wall Injury: A Case Report

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Abstract

The erector spinae plane block (ESPB) is a simple regional anesthetic technique that is applied in various surgical procedures and has an excellent safety profile. Although primarily used for perioperative pain relief, it has also emerged as a useful opioid-sparing analgesic technique in emergency settings. Nevertheless, its application as the primary anesthetic technique for emergency surgical procedures is limited. We report a case of a penetrating lateral chest wall injury, which was successfully managed with an ultrasound-guided ESPB as the principal anesthetic technique for wound exploration and repair, obviating the need for general anesthesia or systemic opioids. The hemodynamics were stable overall, except for mild hypotension and tachycardia at initial presentation. This case highlights the potential use of ESPB as a safe alternative technique in emergency thoracic trauma surgery where neuraxial techniques or general anesthesia are contraindicated or unsafe.

Keywords: Erector spinae plane block, penetrating chest wall injury, emergency department

Introduction

Penetrating thoracic injuries present unique challenges in overall management; the anesthetic management poses additional challenges for the surgeries in these patients, as they require preserving respiratory function in addition to avoiding anesthetic agents/drugs that may impair ventilation (1). The erector spinae plane block (ESPB) has gained widespread popularity since its introduction a decade ago and has been applied in various surgical procedures. It achieves a reliable spread to the dorsal rami, while spread to the ventral rami is variable. Nevertheless, it has been shown to be an effective technique for pain relief in various surgeries, including breast, thoracic, and abdominal procedures.

ESPB is now increasingly employed in emergency department (ED) settings, especially as an opioid-sparing analgesic technique in various conditions (2). Furthermore, the continuous ESPB technique has demonstrated sustained analgesia in extensive thoracic trauma surgeries (3,4). A recent study observed that the landmark ESPB administered at a prehospital setting was effective

for pain relief in patients with blunt chest trauma (5). Although ESPB has been applied for surgical anesthesia in a few elective surgical procedures (6,7), it is very limited in emergency surgeries. Balaban et al. (7) reported a case of subcostal stab wound repair under ESPB in addition to two elective procedures, in their case series. We report a case of penetrating chest wall injury wherein the ESPB was used as a sole technique for hemostasis and chest wall repair.

Case Report

A 19-year-old male presented to the ED with a penetrating injury to the right posterolateral chest wall following a fall from a height onto a sharp metal rod. On arrival, he was conscious, agitated, and tachypneic (respiratory rate 32/min), with a blood pressure of 94/60 mmHg, a heart rate of 110 beats per minute, and severe pain, with a visual analog scale (VAS) score of 9/10. Active bleeding was partially controlled by external compression. The wound measured 18X14X2 cm in length, breadth, and depth. The wound extended only to the chest wall musculature, with no evidence of injury to the heart, pericardium, lungs, pleura, or other mediastinal structures. Intravenous fluids (1 L) were administered



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for hemodynamic stabilization. The e-FAST performed by the emergency physician on the patient's arrival was unremarkable. Chest X-ray and bedside ultrasonography, performed by the specialist in the radiology department, ruled out pneumothorax or hemothorax. The wound involved intercostal muscles without pleural breach and required urgent exploration and repair in the emergency operating room, as the patient had active bleeding and intractable pain (Figure 1).

After obtaining informed consent (for using the clinical image for research purposes), with patient in the left lateral decubitus position, under conscious sedation with intravenous midazolam 1.5 mg, a single-shot ultrasound-guided ESPB was performed with high frequency linear probe (11 to 13 MHz) at the T5 level using an in-plane approach, by placing the 22 G 3.5-inch needle, between the erector spinae muscle and the TP of vertebrae ensuring longitudinal anesthetic spread. After negative aspiration was confirmed, 20 mL of 0.5% ropivacaine was injected into the plane between the erector spinae muscle and the transverse process. A sensory block (confirmed by pin-prick) from T3 to T8 dermatomes developed within 15 minutes. The procedure was carried out in the block room with continuous monitoring of vital signs and appropriate resuscitation equipment in place. The entire surgery proceeded uneventfully under ESPB and mild sedation, without additional sedation or systemic opioids.



Figure 1. Penetrating chest wall injury with bleeding

The contingency plan was to use general anesthesia with an endotracheal tube and controlled ventilation in case of block failure. The wound was closed after confirming hemostasis (Figure 2). Intraoperative hemodynamics remained stable, and the patient reported minimal pain (VAS 2/10) postoperatively. He recovered uneventfully and was discharged after 48 hours.

Discussion

This case illustrates the expanding role of the ESPB as a valuable anesthetic and analgesic tool in thoracic trauma, as it effectively manages chest wall pain while preserving respiratory function.

The application of the ESPB has increased markedly over the past few years, as it is easy to perform and effective at reducing analgesic requirements, with minimal theoretical complications. A review article observed that ESPB was applied for analgesia in various acute painful conditions presenting in the ED setting, such as acute pancreatitis, burn injuries, herpes zoster, renal colic, and mechanical pain, with rib and spine fractures being the most common (2).

Recently, two case reports demonstrated successful continuous ESPB for sustained perioperative analgesia in extensive thoracic trauma surgeries (3,4). A recent study concluded that ESPB resulted in reductions in pain scores and opioid consumption,

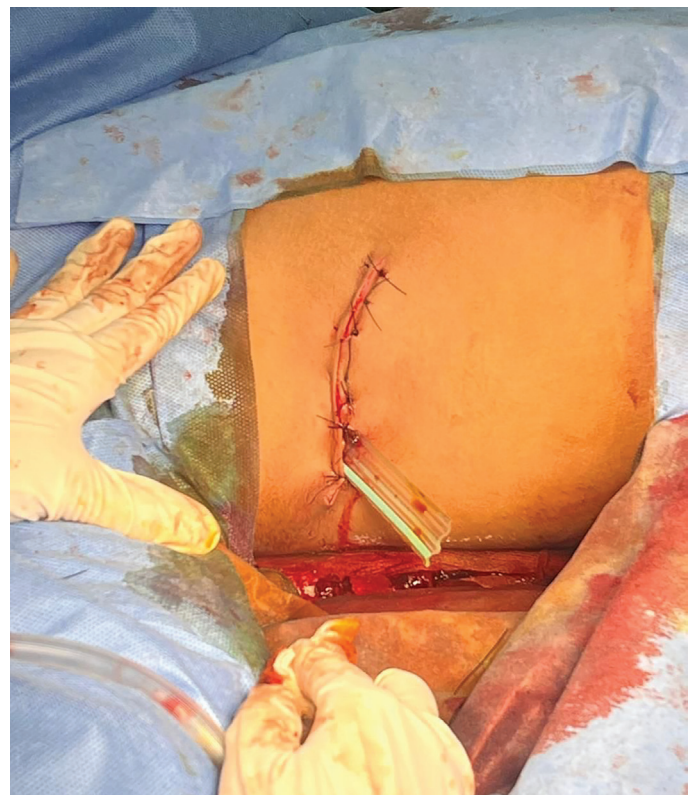


Figure 2. Sutured wound after hemostasis

without adverse effects on hemodynamics, in patients with blunt chest trauma. Notably, the ESPB was applied in a prehospital setting by the landmark technique without ultrasound guidance (5). A few case reports applied ESPB as a sole anesthetic technique in gastrostomy (6), and in minor breast surgeries (7). Balaban et al. (7) used ESPB in a case of subcostal stab wound repair in their case series (7). Thus, we believe that available reports on emergency surgical procedures are very limited.

Compared with neuraxial and paravertebral techniques, the ESPB offers several advantages, including ease of administration, superficial needle placement, and reduced risk of complications such as hypotension, dural puncture, or pneumothorax. Compared with local infiltration, ESPB provides wider, more consistent, and longer-lasting dermatomal coverage. Administration of general anesthesia may be unsafe in some cases because of comorbidities or a full stomach.

In this patient, the ESPB provided both surgical anesthesia and postoperative analgesia without hemodynamic instability or procedural difficulties. While a single-shot block is suitable for minor procedures, a continuous catheter may be preferred for prolonged or extensive chest wall injuries to ensure sustained pain relief (3,4).

Although anesthesiologists were involved in this case, as per our institutional protocol in the emergency operating room, this case report demonstrates that emergency/trauma physicians can also apply this technique, owing to its simplicity and safety in such settings. Furthermore, ESPB is a safe and simple regional anesthetic technique that may reduce opioid use.

Conclusion

A single-shot ESPB may be considered in selected cases as an effective anesthetic technique for chest wall surgical procedures in the emergency setting. It is safe, easy to perform, and offers reliable anesthesia and analgesia with minimal physiological disturbance. However, continuous ESPB, preferably administered with general anesthesia, is required for extensive or major procedures.

Ethic

Informed Consent: The informed consent form was obtained from the patient for this case report.

Footnotes

Author Contributions

Surgical and Medical Practices: S.M., S.N., R.M.S., Concept: S.N., R.M.S., Design: S.M., S.N., R.M.S., Data Collection or Processing: S.N., R.M.S., Analysis or Interpretation: S.M., R.M.S., Literature Search: S.M., R.M.S., Writing: S.M., R.M.S.

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