



## Case Report

# Tramadol as an adjuvant to ropivacaine in ultrasound guided erector spinae plane block for postoperative analgesia after sternotomy

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## ABSTRACT

Ultrasound guided erector spinae plane (ESP) block is effective in thoracoabdominal surgeries for control of postoperative pain. With the increasing use of adjuvants in local anesthetics, the block duration can be prolonged. A 21 year old female patient diagnosed with mediastinal teratoma was planned for resection of tumour through median sternotomy. She was given general anaesthesia with standard drugs. At the end of surgery, patient was given bilateral ultrasound guided ESP block with 10 ml of injection ropivacaine 0.2% with 50 mg tramadol at T5 level on each side. Visual analogue scores (VAS) were in the range of 2-3 for first 24 hours and 1 from 24-48 hours. Patient didn't demand any analgesic in postoperative period for first 48 hours and was completely painfree. Severe postoperative pain of sternotomy can be controlled effectively by giving ultrasound guided ESP block. Moreover, tramadol is a useful adjuvant to prolong the block duration upto 48 hours.

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## 1. Introduction

Median sternotomy is performed for the access of anterior mediastinal structures. Sternotomy incision is associated with severe postoperative pain.<sup>1</sup> Adequate analgesia provides patient comfort, and helps in prevention of respiratory complications such as hypoventilation, retained secretions due to cough suppression and respiratory tract infection. Various modalities have been used for the control of postoperative pain in patients undergoing sternotomy including thoracic epidural, thoracic paravertebral block, erector spinae plane block and patient controlled analgesia (PCA) with intravenous opioids. Regional blocks are preferred over opioids due to absence of significant adverse effects associated with opioid use that include respiratory depression, sedation, nausea and vomiting. Moreover, use of ultrasound in regional blocks have made the procedure simpler, more accurate and safe for the patient as the drug is

being injected under direct visualization.

In ultrasound guided erector spinae plane (ESP) block local anesthetic is deposited in the plane between erector spinae muscle and the transverse processes.<sup>2,3</sup> Bilateral ESP block provides adequate coverage for the midline incision<sup>4</sup> and it is a feasible and attractive analgesic strategy in midline sternotomy. It is associated with minimum side effects because the site of injection is away from the major blood vessels, pleura and neuraxis, and with the application of ultrasound its use may be considered safe even in the presence of coagulopathy.

Various adjuvants have been used with local anaesthetics in different nerve blocks because they prolong the duration of sensory-motor block due to their synergistic effect. In this patient, we used tramadol as an adjuvant to ropivacaine for ESP block.

We report the use of tramadol as an adjuvant to ropivacaine for single shot bilateral ultrasound guided ESP block, to provide effective analgesia in a patient undergoing surgery for resection of anterior mediastinal

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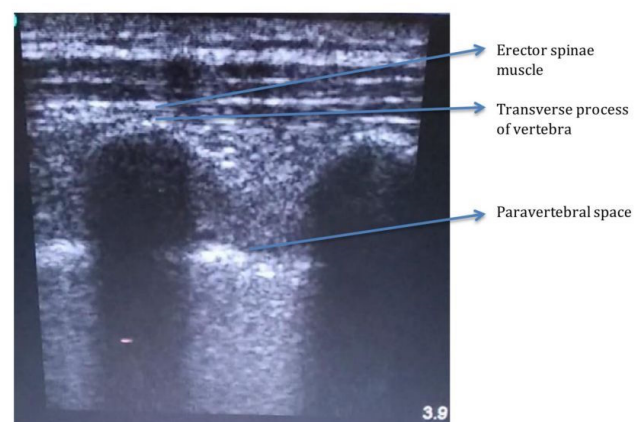
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teratoma through midline sternotomy. To the best of our knowledge this is the first reported case where tramadol has been used as an adjuvant to local anaesthetics in ESP block for midline sternotomy.

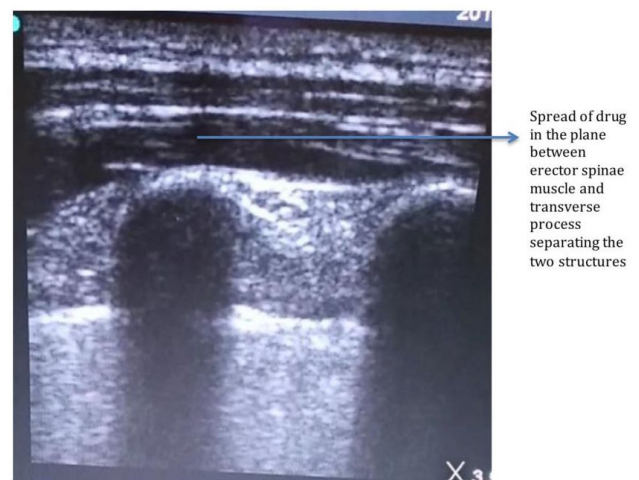
## 2. Case Report

A 21 year old, female patient weighing 36 kg presented to our hospital with the chief complaints of chronic cough and shortness of breath for 3 years. Cough was non productive initially but for last 6 months, it was productive with scanty whitish sputum with increase in frequency on lying down. Patient complained of insidious onset, progressively increasing shortness of breath (NYHA III). There was history of low grade fever on and off with no diurnal variations. Patient had already received two courses of antitubercular treatment (ATT) before presenting to hospital. There was no history of trauma, hemoptysis, chest pain, palpitations, loss of weight or loss of appetite. Patient had no other co morbidities. On examination, heart rate was 90/minute, BP was 102/60 mm Hg and respiratory rate was 20/minute. On auscultation of chest, bilateral vesicular sounds were present with decreased air entry in bilateral upper lobes. Rest of the systems were normal on examination. Blood routine investigations were within normal limits. Chest X-Ray showed right mid-zone opacity. Contrast enhanced CT scan showed a mediastinal mass along right heart border with fat, fluid and calcification, suggestive of likely teratoma. In view of scattered air space opacities and nodules, possibility of co-existing infection was also considered. Carcinoembryonic antigen (CEA) was 3.09 ng/ml (normal value 0.05-2.5 ng/ml) and alfa fetoprotein (aFP) was within normal limits. Patient was planned for resection of teratoma through sternotomy. She was kept nil per orally 6 hours before the surgery and was given premedication with tablet alprazolam 0.25 mg on the night before and morning of surgery. On the day of surgery, patient was taken to the operation theatre and standard monitors were attached. Two 16 G cannula were secured and intravenous drip with normal saline was started. Patient was premedicated with injection midazolam 1mg i.v. and injection morphine 6mg i.v. Induction was done with injection propofol 100 mg and vecuronium 4 mg and patient was intubated with 7.5 mm internal diameter single lumen tube which was fixed at 21 cm. Intraarterial 20 G cannula was inserted in right radial artery and intraoperative invasive blood pressure monitoring was done. Mechanical ventilation was started and anaesthesia was maintained with nitrous oxide and Isoflurane. Intravenous paracetamol 800 mg was given intraoperatively. Patient was hemodynamically stable throughout the surgery. It was planned to give ultrasound guided ESP block postoperatively before extubation. At the end of surgery, patient was turned to left lateral position prior to extubation. Under all aseptic precautions,

a high frequency linear probe was kept in longitudinal orientation and transverse process of T5 vertebra was identified. 23 G spinal needle was introduced in plane under ultrasound guidance between the transverse process and the erector spinae muscle (Figure 1). After confirming the needle placement with hydrodissection, 10 ml of 0.2% ropivacaine with 50 mg tramadol was injected on both sides after negative aspiration and the spread of the drug was observed (Figure 2). Patient was extubated subsequently and shifted to postoperative recovery room. Pain was assessed postoperatively with the visual analogue score (VAS) at 0, 1, 2, 6, 12, 24 and 48 hours. Injection paracetamol was prescribed for postoperative pain if VAS > 4. VAS was 3 at 0, 1, 2 hour and 2 from 6-24 hours and 1 after 24 hours. Patient was comfortable, painfree and didn't demand any analgesic in postoperative period for first 48 hours.



**Fig. 1:** Ultrasound image showing erector spinae muscle, transverse process of vertebra and para vertebral space



**Fig. 2:** Ultrasound image after injection of drug for erector spinae plane block in the plane between vertebra and erector spinae muscle

### 3. Discussion

In this case report we have used tramadol as an adjuvant to ropivacaine in ESP block for postoperative pain control in patient undergoing midline sternotomy. ESP block is an effective modality widely used for postoperative analgesia in midline sternotomy. The needle is directed under ultrasound guidance into a musculofascial plane just superficial to the transverse processes. The needle tip remains a significant distance away from the pleura and the risk of pneumothorax is thus negligible. It is a simpler technique compared to ultrasound-guided paravertebral block as the transverse process is highly visible and more superficial on ultrasound. In addition there is minimum risk of clinically significant hemorrhage or hematoma because this site is more compressible.<sup>5</sup>

Tramadol is a weak opioid agonist. It inhibits pain by two modes of action, an opioid action mediated by  $\mu$  receptor and a non-opioid action mediated by  $\alpha 2$ -adrenergic and serotonergic activity.<sup>6</sup> It has monoaminergic activity which inhibits the descending pain pathways, and suppress the nociceptive transmission at the spinal level. Tramadol blocks K<sup>+</sup> channels and also has local anaesthetic properties.<sup>6</sup> It had been used synergistically to prolong the duration of effect of local anaesthetics in different blocks. Kapral et al. demonstrated prolonged duration of sensory and motor block when tramadol 100 mg was added to mepivacaine 1% for axillary plexus block in comparison to mepivacaine alone.<sup>7</sup> A study by Robaux et al. described that tramadol extends the duration and improves the quality of postoperative analgesia in a dose-dependent fashion when combined with mepivacaine 1.5% for brachial plexus block.<sup>8</sup>

In this case we used tramadol as an adjuvant to local anaesthetics in ESP block for midline sternotomy. The analgesia was adequate and patient was comfortable in postoperative period for 48 hours. Further large randomized control studies are advocated to study its effect in ESP block and to validate the findings of this case report.

### 4. Conclusion

Bilateral ESP block is an easy and safe alternative for postoperative pain management in thoracic surgeries requiring sternotomy. Tramadol used as an adjuvant to ropivacaine in bilateral ESP block provides effective, prolonged postoperative analgesia and patient comfort with

minimal side effects.

### 5. Source of Funding

None.

### 6. Conflict of Interest

None.

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