Case Report

USG-guided continuous erector spinae block as a primary mode of perioperative analgesia in open posterolateral thoracotomy: A report of two cases

ABSTRACT

The postoperative pain management in open thoracotomy is very crucial as the effective analgesia can prevent respiratory and thrombotic complications and lead to early mobilization and discharge. The thoracic epidural analgesia is the gold standard in such surgeries; however, there are few adverse effects such as hypotension, dural puncture, and contralateral block that always warrants safer alternative. Recently, with the advent of ultrasound, the regional anesthetic techniques are getting more popular to avoid such complications. Erector spinae plane (ESP) block is one of the novel techniques that has been described as a safe thoracic paravertebral block. We are reporting here the continuous ESP block as a primary mode of postoperative analgesia which was continued for 48 h. The intraoperative opioid requirement was very less, and the maximum NRS score in postoperative period was 4 at 12 h, which was well managed with multimodal analgesic regimen along with rescue doses of opioid.

Key words: Continuous; erector spinae block; thoracotomy

Introduction

Ultrasound (US)-guided erector spinae plane (ESP) block is a recently described interfascial plane block that has been used for thoracic neuropathic pain, rib fracture, and for perioperative analgesia in video-assisted thoracoscopic surgery (VATS).[1-4] It has also been used for visceral pain relief after abdominal surgery such as ventral hernia repair and bariatric surgery.[5,6] In ESP block, local anesthetic (LA) is deposited either superficial or deep to erector spinae muscle (ESM); however, deeper plane deposition close to the midline at the tip of transverse process favors the spread through costotransverse foramina to both dorsal and ventral rami of the thoracic spinal nerves. It is postulated that, in this location, both cephalad and caudad LA spread is facilitated by the thoracolumbar fascia, which extends across the whole of the posterior thorax and abdomen, and is continuous with the nuchal fascia in the neck.[4] we are reporting two cases of open thoracotomies where we used continuous catheter infusion of LA in the ESP for intraoperative and postoperative analgesia. Written informed consent was taken from both the patients for performing the block as well as for publication without revealing the identity.

Case Reports

Case 1

A 24-year-old male weighing 60 kg, 168 cm, American

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Society of Anesthesiologists (ASA I) patient with a history of cystic neck lump was admitted for excision. Computed tomography scan of the thorax revealed well-defined thick-walled lesion in the right paravertebral region extending from T1 to T3 (thoracic) vertebra and anteriorly in proximity with trachea and superior mediastinum at the same vertebral levels. The patient was planned for a right posterolateral thoracotomy and excision of the mass. As the incision was a standard posterolateral thoracotomy, an ESP block at T5 level was planned. Routine preoperative orders were followed along with informed written consent for the block. In the preanesthesia room, standard ASA monitors attached and intravenous (IV) line secured. IV midazolam 1 mg and fentanyl 30 mcg were administered, followed by oxygen supplementation by face mask at 4 L/min. The patient was positioned sitting and back area was cleaned with betadine solutions. Thoracic spine T4 and T5 were palpated and marked by sterile marker. Another point 3 cm lateral to midline was also marked. A high-frequency linear ultrasound probe (Sonosite M-Turbo, Bothell, WA, USA) was placed longitudinally over the laterally marked point. The three muscle layers were identified from superficial to deep as trapezius, rhomboid major, and ESM. After infiltrating with 2% lignocaine, an 18G Tuohy needle was introduced in caudad to cranial direction in plane to the probe. The needle was advanced till the tip was below the ESM, confirmed by hydrodissection with 2 ml of normal saline. A volume of 25 ml of 1:1 mixture of 2% lignocaine-adrenaline (1:200000) and 0.5% ropivacaine was then deposited, following which a 20G multiport epidural catheter was threaded 4 cm beyond the tip cranially [Figure 1]. After 30 min, sensory mapping of the patient with pinprick was done, which showed a dermatome spread from T2 to T8 in the posterior scapular line extending up to the anterior axillary line. General anesthesia was then induced with IV fentanyl 150 mcg, 120 mg propofol, and 30 mg atracurium. After full relaxation, a 39 Fr left-sided double-lumen tube (DLT) (Mallinckrodt™; Covidien, Tullamore, Ireland) was introduced. The endobronchial position was confirmed by fiber-optic bronchoscopy with endobronchial cuff's edge being just visible at left main bronchus. The patient was placed in the left lateral position and one-lung ventilation was instituted. Anesthesia was maintained with oxygen, air, and isoflurane with minimum alveolar concentration of 0.8%–1%. The surgery lasted 3 h and blood loss was 150 ml. At the end of the surgery, the patient was administered 1 g paracetamol IV. Residual muscle paralysis was reversed with IV neostigmine 50 mcg/kg and glycopyrrolate 10 mcg/kg, and the patient was extubated when fully awake. Total 50 mcg additional fentanyl was used during the surgery in addition to the induction dose making total intraoperative fentanyl consumption

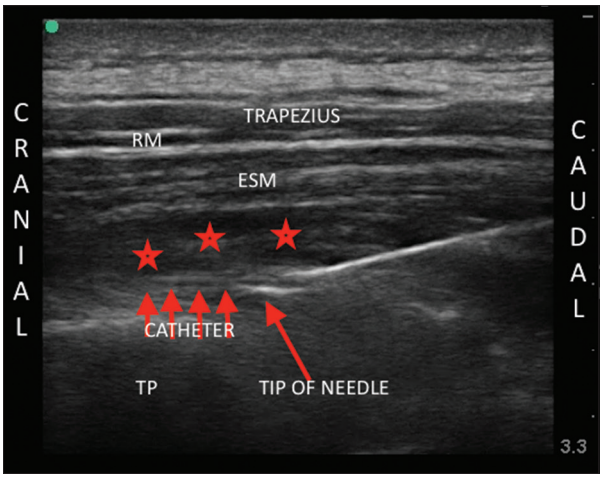

Figure 1: Longitudinal scan at T4–5 transverse process level with arrow mark showing 20 g catheter exiting from Tuohy needle tip. RM: Rhomboid major muscle; ESM: Erector spinae muscle

200 mcg. Postoperatively, the patient was monitored in high dependency unit (HDU) and pain was assessed by Numeric rating scale (NRS 0 being no pain, 10 worst pain). In the immediate postoperative period, NRS was 0/10 at rest and 2/10 on coughing. Postoperative analgesia was maintained with ropivacaine infusion 0.2% at 5 ml/h, and in addition, IV paracetamol 1 g 6 hourly was given as routine. Rescue analgesia was provided when NRS exceeded 4, with IV bolus of 30 μ fentanyl. The patient was followed up at 2, 6, 12, 16, 24, 30, 36, and 48 h after surgery and infusion stopped. Except at 12 h, at no point of time, NRS score was more than 3/10 at rest. At 12 h, he had complained of increasing pain while he initiated ambulation. A volume of 5 ml bolus LA was administered through the catheter; however, the pain persisted and IV fentanyl 30 μg boluses were given two times at an interval of 30 min. The catheter was removed after 48 h, and there were no catheter-related complications. At this time, the patient had a NRS score of 0/10 at rest and 1/10 on coughing. His rest of the hospital stay was uneventful and discharged to home on day 5.

Case 2

A 22-year-old male weighing 60 kg and height of 162 cm, ASA I patient with alleged history of penetrating injury was posted for VATS after 1 week of conservative management as there was persistent pneumothorax. Blood investigations were in normal limits. General anesthesia was induced with IV fentanyl 150 mcg, propofol 120 mg and rocuronium 40 mg. A 39 Fr left-sided DLT was inserted, and the depth of insertion was confirmed with fiber-optic bronchoscope. Anesthesia was maintained with O_2, air, and isoflurane. The patient was positioned right lateral and all the pressure points were well padded. After painting and draping, one-lung ventilation was initiated. Two 10 mm ports and one 5 mm port were put

and surgery started. However, due to suspected iatrogenic injury to the left lower lobe, the surgery was converted to open posterolateral thoracotomy. Further, intraoperative analgesia was maintained with intermittent fentanyl boluses. Thorough adhesiolysis, repair of lacerated lung and pleural toileting were done. Two chest drains were put and chest wall was closed. In view of open thoracotomy, we planned for continuous ESP block for postoperative analgesia. Maintaining the lateral position T2 to T7 area was cleaned and draped. At T3–4 level, a low-frequency (2–5 Hz) probe was placed longitudinally 3 cm away from the midline, and 18 G Tuohy needle was introduced in plane to the probe craniocaudally [Figure 2a]. A volume of 20 ml of 0.375% ropivacaine was deposited, following which the multiport catheter was threaded 4 cm beyond the tip [Figure 2b]. The entry point was then secured by Tegaderm [Figure 2]. The patient was then made supine, reversed of muscle relaxation, and extubated when awake. The NRS on awakening was found to be 2/10 at rest and 3/10 on deep breathing. The patient was then shifted to HDU for further observation. 0.2% ropivacaine continuous infusion was started at 6 ml/h through the catheter for 48 h. IV paracetamol 1 g was administered 6 hourly and IV diclofenac 75 mg was administered 12 hourly. The NRS score was assessed as in the previous case. The maximum NRS score reported was 4 in the first 12 h. Next day in the morning round, the patient had pain during physiotherapy session and specifically at intercostal chest drain insertion site. The NRS score was 4/10 at rest and 6/10 during physiotherapy. A volume of 5 ml bolus of 0.2% ropivacaine was administered through the catheter along with IV fentanyl 30 mcg. Pain was relieved after 15 min and he could complete the session. On day 2, the maximum NRS score was 3/10 during physiotherapy. The catheter was removed, and for rest of the hospital stay, he received tablet paracetamol 1 g orally 8 hourly and tablet diclofenac 75 mg 12 hourly. The patient was discharged home on day 5 and his pain score was 1/10 at rest and 2/10 on coughing at that time.

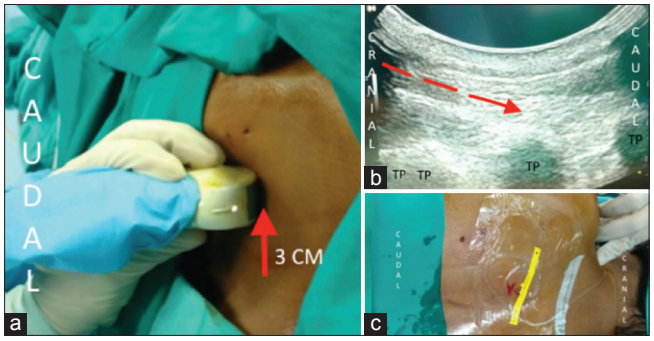

Figure 2: (a) Low-frequency probe (2–5 Hz) placed over T3–4 transverse process level with a patient in the right lateral decubitus position. (b) Tuohy needle introduced craniocaudally with tip just below the erector spinae muscle. (c) Catheter secured with Tegaderm

Discussion

Since long, there has been a paradigm shift toward fascial plane blocks for abdominal surgeries, for example, transverse abdominis plane block and quadratus lumborum block[7] owing to their simplicity over the more commonly practiced epidural and paravertebral blocks. Such fascial blocks were not described for thoracic surgeries, and for long, thoracic epidural and paravertebral techniques were considered standard for all open thoracic procedures.[8] The introduction of the pectoral nerve block and the serratus plane block for breast and anterior chest wall surgeries had led to more and more interest in practice of plane blocks in thoracic dermatomal levels. The recent description of ESP block is an exciting addition to the list.[1] Since its first description, it has been used widely in thoracic pain, and application has been extended in abdominal surgery owing to the unique anatomical location of this fascial plane.

In a case series, Forero *et al*. had utilized the block as rescue analgesia in case of epidural failure and came up with excellent results.[9] The fair performance of this technique in thoracic surgeries as described in literature till date led to our interest in applying the block as primary mode of analgesia for relieving postthoracotomy pain. He had described extensive spread of LA from T2 to T8 with 20 ml when the drug was deposited below the ESM at T5 level. We utilized similar technique and used 25 ml of LA keeping in mind our area of dermatomal involvement including the site of the chest drain placement. Unlike the originally described method, we introduced the needle from caudal to cranial direction, as according to the experience of the concerned anesthesiologist, this technique was easier to perform for a right-handed person with the patient in either sitting or lateral position. In the second patient, we did not perform the block before beginning of surgery as it was initially planned for VATS.

In an editorial, El-Boghdadly and Pawa had argued that lack of control groups, use of nonstandardized additives, and variable doses of LA in the studies published on ESP block should be taken into account while interpreting the fascinating results with this technique.[10] They also noted that dosage of perioperative opioids in some of those patients was not insignificant. However, in our patients, the minimal requirement of perioperative opioids was definitely encouraging. The consistent pain relief in our patients during the duration of continuous infusion of LA through the ESP catheter had made us believe that this technique can be utilized routinely in thoracotomy surgeries for intraoperative and postoperative pain relief. The simplicity of this block

and the satisfactory initial results shall definitely encourage more studies into utilization of this novel technique in such surgeries. Further well-planned randomized trials with more number of patients shall be needed to test the true efficacy and safety of this block.

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All drugs and equipments used in the case series are our hospital resources (All India Institute of Medical Sciences, New Delhi).

Conflicts of interest

There are no conflicts of interest.

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