CASE REPORT

Ultrasound-guided erector spinae plane catheter for postoperative analgesia in a patient undergoing chest wall mass resection and 5th rib costectomy: A case report

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The Erector Spinae Plane (ESP) block is a novel regional anesthetic technique that has been proven to be effective in providing anesthesia for a variety of surgical procedures, postoperative analgesia as well as management of acute and chronic pain. It can be performed either through a single injection technique or catheter placement providing continuous infusion. It has been shown effective for postoperative analgesia after total radical mastectomy and thoracotomy. In this case report, we describe a successful ESP continuous catheter inserted at the fourth thoracic transverse process (T4) level for analgesia after chest wall mass excision and 5th rib costectomy.

Key Words: *Erector spinae plane block; Ultrasound-guided catheter; Chest wall mass; Costectomy*

ABBREVIATION

ESP: Erector Spinae Plane; T4 level: Fourth Thoracic Transverse Process; Ga: Gauge; IV: Intravenous; ECG: Electrocardiogram; FiO_2: Fraction of Inspired Oxygen; US: Ultrasound; SCD: Sequential Compression Device; Fr: French; PCA: Patient Controlled Analgesia; VAS: Verbal Analogue Scale

INTRODUCTION

Perioperative analgesia is an essential but frequently underrated component of medical care [1-3]. As evidenced by an abundance of studies, continuous regional/neuraxial blocks are the most effective approach for relief of severe postoperative pain [3]. Erector Spinae Plane (ESP) block is a new interfascial plane block that was first described for thoracic analgesia in both chronic neuropathic pain as well as acute postsurgical or posttraumatic pain [4]. The most significant advantage of the ESP block is its simplicity and safety with an easily recognizable sonoanatomy, and no structures at risk of needle injury in the immediate vicinity [4]. We hereby report a case of successful ESP block using continuous catheter technique for postoperative pain management of a patient who underwent chest wall mass resection and 5th rib costectomy.

Written consent was obtained from the patient before writhing this case report.

CASE DESCRIPTION

A 52-year-old female patient presenting for left chest wall mass excision and 5th rib costectomy. Her medical history is significant for left breast carcinoma diagnosed in 2018 status post modified radical mastectomy, chemotherapy, radiotherapy and currently on hormonal therapy (Anastrozole), hypothyroidism status post total thyroidectomy on levothyroxine 100 micrograms every morning, osteoporosis on Adromux once every month, vitamin D 10,000 units once every week, caltrate 600 mg twice daily, and May-Thurner syndrome. In the preoperative clinic, ESP catheter was discussed with the patient for postoperative analgesia and consent was obtained.

Preoperatively, patient received her levothyroxine dose. In the induction room, a 20 Gauge (Ga) Intravenous (IV) cannula was inserted in the right upper extremity. Once inside the operating room, a five-lead Electrocardiogram (ECG), noninvasive blood pressure monitoring and pulse oximetry were applied as part of routine monitoring.

After proper positioning in the sitting position and just prior to starting the ESP block, patient received 2 mg of midazolam intravenously. 6 liters of 100% fraction of inspired oxygen (FiO_2) was supplied to the patient *via* a face mask. A high frequency linear array ultrasound transducer (10^{-15} megahertz) was used for initial screening on the left unilateral back side to find the erector spinae muscle group at the fourth thoracic transverse process level and the area was marked. Skin was prepped using chlorhexidine and the ultrasound probe was covered with sterile cover. Sterility was maintained throughout the entire preparation and procedure performance. After erector spinae group of muscles was identified again at the T4 level, the area was infiltrated with 1% lidocaine. A 9.48 cm Arrow© 17 Ga × 3-7/8" TW with cm markings needle was inserted deep into the muscle using an in plane approach and directed cranially to caudally to the target (Figure 1). After confirmation of the proper position with the administration of 0.5^{-1} ml of local anesthesia, 20 ml bolus of 0.25% bupivacaine, 0.3 mcg dexmedetomidine and 5 mcg adrenaline was given. An echogenic 19 Ga single open end hole epidural catheter was then threaded under ultrasound (US) guidance and catheter was tapped at 9 cm.

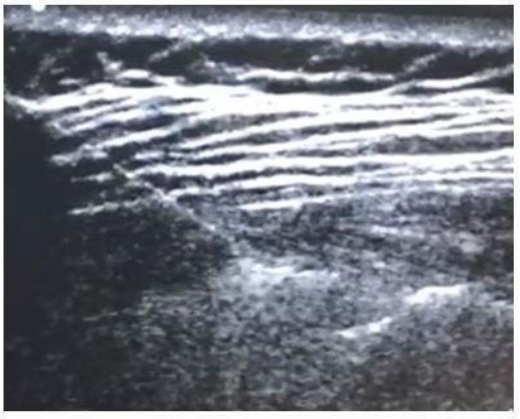

Figure 1) *Sonographic imaging of the ESP block with needle resting over the T4 transverse process, just below the erector spinae muscle sheath*

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Following catheter placement, the patient underwent uneventful general anesthesia with 200 mg of intravenous protocol, 150 mcg of fentanyl, 40 mg rocuronium and endotracheal intubation was performed using video laryngoscope. Right radial arterial line was then inserted under sterile preparation using the Seldinger technique. Another 18 Ga IV line was inserted in the right upper extremity. General anesthesia was maintained with FiO_2 0.4 and sevoflurane (1.4%-1.8%). A lower extremities sequential compression device (SCD) was placed and activated.

An elliptical incision was performed over the scar of the old breast surgery including the nodularity that was felt in the subcutaneous tissue over the 5th rib. Flaps were raised and the whole piece was removed including the rib, old scar and the palpable hard soft tissue. Thoracoplasty was performed by a vascular surgeon and a 28 Fr left chest tube was placed. The surgery lasted 160 minutes and the patient was hemodynamically stable throughout. Immediately before the end of surgery, she received 1 gram paracetamol intravenously and 4 mg ondansetron. No additional analgesics were given intraoperatively. After extubation, patient was transferred to the post-anesthesia care unit for monitoring where she didn't require any analgesics. Patient Controlled Analgesia (PCA) was initiated utilizing 0.125% Bupivacaine and 2 mcg fentanyl *via* the catheter with a basal rate of 8 mL/hour, bolus dose of 8 mL, lock-out period of 45 minutes and 4 hour-limit of 72 ml. She was then transferred to the intensive care unit for 24 hours monitoring.

Pain was assessed using the Verbal Analogue Scale (VAS) while at rest and during active movement at hours 1,2,4,6,12,24 postoperatively and then every 6 hours for the remaining duration the catheter was kept in place. Her VAS was 6/10 at rest 3 hours postoperatively to which she received nefopam 20 mg intravenously and dropped to 3/10 thereafter. VAS was 0/10 at rest and 1/10 during ambulation 48 hours postoperatively and 0/10 for the remaining days.

Patient received 1 g IV paracetamol every 6 hours systematically and nefopam 20 mg IV as needed which she required a total of 3 doses in 4 days. No additional opioid requirement was documented throughout the entire hospitalization and the catheter was withdrawn on the 4th day postoperatively.

DISCUSSION

Most patients who undergo surgical procedures experience acute postoperative pain, but evidence suggests that less than half report adequate postoperative pain relief [5]. According to guidelines published by the American society of pain, it is strongly recommended that clinicians consider surgical site–specific peripheral regional anesthetic techniques for procedures with evidence indicating efficacy [5]. The new ESP block can be used to deliver regional analgesia for a wide variety of surgical procedures in the anterior, posterior, and lateral thoracic and abdominal areas, as well as for management of acute and chronic pain syndromes [6]. Local anesthetic administered during an ESP block can spread caudally and cranially along the thoracolumbar fascia to affect both the dorsal and ventral rami of the spinal nerves [4] as well as into the paravertebral space [7,8].

CONCLUSION

The ESP block is a reliable, simple and safe variant block that has been developed in order to prevent complications such as pneumothorax, epidural injection or intrathecal injection-related neuronal damage, while establishing effective paravertebral block.

Although the effectiveness of an ESP catheter in the postoperative pain management of a patient who underwent surgical fixation of multiple rib fractures has been proven through a case report, this is, to our knowledge, the first case report to show the effectiveness of an ESP catheter in providing continuous local anesthesia for postoperative analgesia after costectomy/thoracoplasty.

FINANCIAL DISCLOSURES

None

CONFLICTS OF INTEREST

None

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