Case Report

the Erector Spinae Plane Block for Postoperative Analgesia in Abdominoplasty - A Case Report

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Abstract

Erector spinae plane block (ESPB) is an ultrasound guided interfascial block. ESPB can provide sensory block of thorax and abdomen through action on thoracic nerves and its branches. An editorial has also highlighted that ESPB is a simple block and has better safety profile than neuraxial analgesia. We reported a case of large ventral hernia repair who received ESPB for postoperative analgesia. ESPB was given preoperatively and catheters were inserted to provide continuous infusion of local anaesthetic and fentanyl mixture for postoperative analgesia. Patient had excellent pain relief. Postoperative analgesia in ventral hernia repair using catheters in ESPB has not been reported earlier in the literature.

Keywords: Erector Spinae Plane Block; Fentanyl; Interfacial Block; Thoracic Spinal Nerves; Postoperative Analgesia; Ropivacaine; Ultrasound Guided Blocks

Introduction

The erector spinae plane block (ESPB) is an interfascial plane block. It has been used successfully to manage severe neuropathic pain arising from ribs [1], laparoscopic ventral hernia repair [2], and thoracic vertebral surgery [3]. The rationale to use ESPB is its likely site of action which is the dorsal and ventral rami of the thoracic spinal nerves. Anatomical and radiological investigations in fresh cadavers have indicated the probability of such mechanism of action [1]. Other regional techniques like epidural, subarachnoid opioids and paravertebral blocks may provide effective postoperative analgesia for abdominal surgery. However, risk benefit ratio make them a poor choice [4]. Recently other truncal blocks like transversus abdominus plane (TAP) block, rectus sheath block and quadratus lumborum block (QLB) are also included as an alternatives in the armamentarium for postoperative analgesia in abdominal surgery. ESPB holds promise as a simple and safe technique for thoracic analgesia in chronic neuropathic pain as well as acute postsurgical or posttraumatic pain [1,2,3,4]. We present a case report where ESPB was used in a multimodal postoperative analgesic regimen in a case of abdominoplasty for large ventral hernia. ESPB with infusion of local anaesthetic through catheter for maintaining postoperative analgesia for such a surgery has not been reported earlier.

Case

A 71 year old female patient weighing 49kg was admitted for abdominoplasty operation due to large ventral hernia (Figure-1 A & B). She had laparotomy and excision of large non-Hodgkin's lymphoma 4 years ago. Patient was cachectic, effort tolerance was poor, rhonchi and occasional coarse crepitation were present on chest auscultation (her medical history included asthma treated by sprayed and oral bronchodilators). Recent computed tomographic scan (CT scan) of abdomen showed residual retroperitoneal lymph nodes, basal atelectasis with tenting of diaphragm and moderate as cites. ECG showed left ventricular hypertrophy with strain pattern. Echo cardiography showed paradoxical movement of interventricular septum, mild regurgitation of mitral and tricuspid valves, calcification of aortic leaflets, mild diastolic dysfunction and left ventricular ejection fraction of 45%. Hemoglobin (Hb%) was 8.4g/dl, total protein was 4.7g/dl, albumin 2.4g/dl, serum creatinine was 0.6mg/dl. She was optimized with blood transfusion and increased protein intake, chest physiotherapy, bronchodilators and antibiotics. Preoperatively Hb% was 10.1g/dl, total proteins.

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were 5.4g/dl, albumin 2.8 g/dl. Anaesthetic plan was to give ESPB to provide postoperative analgesia followed by general anaesthesia with muscle relaxation to avoid excessive abdominal movement during breathing. Informed consent was obtained and patient was shifted to operation room. After securing intravenous access monitors for ECG, SPO2 and non-invasive blood pressure were attached.

In sitting position at the level of T6 linear ultrasound (US) transducer (6-13MZ SonoSite*) was placed vertically 2.5cm lateral to midline. The muscles of the back, transverse process and simmering pleura in between the two transverse processes was identified (Figure-2A). After local infiltration of needle insertion site with 2-3ml of 1% lidocaine through 26G hypodermic needle, 18G Tuohy needle was inserted in cranial-caudal direction towards transverse process (TP) in-plane to the US transducer until needle touched the TP crossing all the muscles. Correct needle placement was confirmed by hydro-dissection with 2-3ml saline (Figure-2B) and then 20ml of 0.375% ropivacaine was injected (Figure-3). A linear spread below the erector spinae lifting the muscle up was noticed. An epidural catheter (18G) was inserted through epidural needle up to 4-5 cm beyond the needle tip. Position and patency of catheter was tested by injection of 1ml saline under ultrasound. The similar procedure was done on other side of back. Both the catheters were fixed at skin through subcutaneous tunnel (Figure-4).

General anaesthesia was induced with 100mg propofol and 50µg fentanyl and after intubation with 6mg vecuronium, maintained with 60% nitrous oxide, oxygen and isoflurane at 1MAC. Surgery lasted for 3hrs; patient was reversed at the end of surgery and trachea was extubated. Patient was awake and comfortable in postoperative ward. Position of catheters were confirmed by injection of 1ml contrast (Omnipaque300*) from each catheter which showed linear spread along the vertebra and also encroachment in paravertebral space (Figure-5).
In the postoperative period, both the catheters were connected to an elastomeric infusion pump through a Y-connection and infusion of ropivacaine 0.12% (300mg diluted to 250ml) with fentanyl 1.2µg/ml (300 µg diluted to 250ml) was started @ 14ml/hr. Pain was monitored during rest as well as during movement on numeric scale of 100 at every 2hrs till 24 hrs then 4hrly for next 48 hrs. Injection paracetamol 1G IV was given when score was 50 or more either on rest or movement. After 30 minutes, in case of persistent pain level above 40/100, an injection of 50mg Tramadol IV was advised. Patient received only one injection of paracetamol during first 24 hrs and one injection paracetamol during next 48 hrs. Pain score remained 0-20/100 during rest, with a maximum up to 50/100 during the morning of the following day, and during change of dressing at day 3.

Catheters were removed when patient reported pain 0-20 even on walking on 4th day. Oral paracetamol was given for next 2days and patient was discharged on 7th day after check dressing.

Transversus abdominal plane (TAP) block also an alternative technique to provide abdominal analgesia for abdominoplasty [7]. However, as it works by blocking the lateral cutaneous branches, the analgesia is only limited to anterior and lateral part. The extent of block is also limited if injection is given at one point therefore, to cover whole abdominal wall, four quadrant has to be blocked separately [8].

Rectus sheath block with catheters have been used for analgesia after abdominal surgery [9]. However, we could not use this technique because the proximity of catheters with the surgical field and infusion of drug near the surgical mesh was not acceptable to our surgeons.

Quadratus lumborum block with use of catheters also an alternative for postoperative analgesia [10]. However, it is more invasive than ESPB and may result in motor weakness which affects early ambulation [11].

Epidural analgesia with local analgesic is the gold standard for postoperative analgesia however; we preferred non-neuraxial regional analgesia technique to provide postoperative pain relief in our patient due to two reasons. First, that our patient was very fragile due to previous disease and poor nutritional status and, neuraxial block could have result in hemodynamic instability [4]. Second, due to chronic lung disease and laxity of abdomen; she had predominantly abdominal breathing which would have compromised the respiration with use of only opioid based analgesia after surgery. TAP block could have been an alternative but it had to be given in the four quadrants [8] which may predispose to local anaesthetic toxicity particularly with low levels of serum protein [12,13].

Figure-5: X-ray after contrast injection through catheters, arrows showing linear contrast spread with paravertebral encroachment

**Discussion**

Nerve supply of abdominal wall comes from thoracic nerve & its branches [5] and intersegmental communicating branches of the thoracic nerves [6] (Figure-6). Erector spinae plane block supposedly works at the origin of the thoracic spinal nerves. This is supported by the cadaveric data as well as by contrast study [1,2]. When dye was injected into the interfascial plane deep to erector spinae muscle, the injectate penetrated anteriorly through the costotransverse foramen and into the vicinity of the origin of the dorsal and ventral rami [1]. Whether the spread of drug affecting visceral nerve supply through paravertebral ganglia is yet to be investigated. We have also noticed the spread of contrast towards paravertebral during confirmation of catheter position in our patient (Figure-5).
Rhomboïd intercostal block (RICB) also works similarly as erector spinae block and may be useful in providing analgesia for both the anterior and posterior hemithorax and part of abdomen [14,15]. But with RICB maximal segmental block occurs between T2 to T9 only which would not be sufficient to provide complete abdominal analgesia. When injection was given between erector spinae and rhomboid major muscle the results were almost similar to RICB (Figure-6) [1].

It has been suggested that for complete abdominal analgesia with ESPB, block should be given at T7 which could result the spread from upper thoracic to lumber L2/L3 level [2]. We also injected first drug at T7 after puncturing the skin at T6. However, we think that inserted catheters must have helped to provide sustained and excellent postoperative analgesia in our case.

The procedure was completed in less than 15 minutes without any discomfort to the patient. No complication was observed and pain relief was well appreciated by patient in comparison to previous two surgeries on abdomen. The use of elastomeric pump further helped to decrease the need for pump care by attending staff.

Limitations

We could not do the sensory mapping due to extensive dressing and have used the quality of pain relief as a surrogate for effective block. We used fentanyl with local anesthetic and thus systemic analgesia effect of fentanyl cannot be ruled out. Moreover, this report only included one case of effective pain relief therefore, more cases or case controlled studies are required before any recommendation to use ESPB.

Conclusion

We conclude that the ultrasound guided ESP block is a promising regional anaesthetic technique for postoperative pain relief in abdominal surgery like ventral hernia repair. Continuous infusion of local anaesthetic with fentanyl provided effective and sustained analgesia without any side effect. The likely advantages of ESPB are the ability to block both the supra-umbilical and infra-umbilical dermatomes with a single-level injection and the simplicity of technique.

References