



# Lumbar Erector Spinae Plane Block at L3 Level for Managing Post-operative Pain in Patients Undergoing Surgery for Proximal Femur Fractures

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## Abstract

Ultrasound guided erector spinae plane block (ESPB) has been widely used at thoracic level. There has been a recent interest in utilising ESPB at lumbar level. Available literature is in the form of case reports. In this series involving 10 cases with proximal femur fractures, we have described unilateral ultrasound guided lumbar ESPB at L3 level for managing postoperative analgesia with continuous local anaesthetic infusion for 48 hours. The visual analogue scale score was always below 4, and there were no adverse effect or complications due to the block.

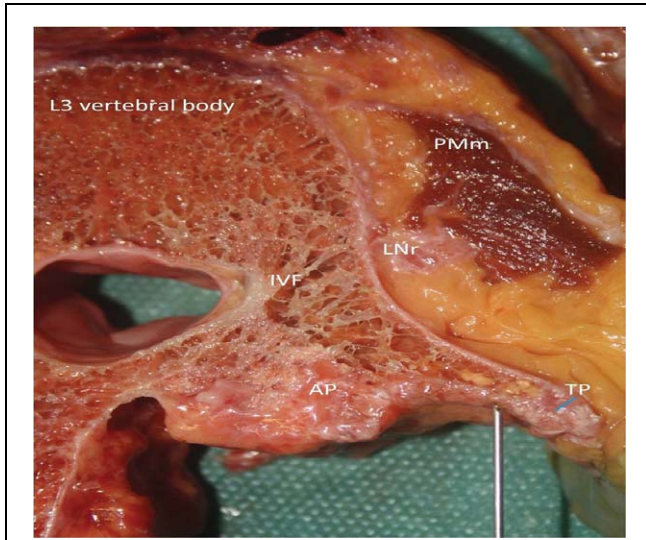
**Keywords:** Erector spinae, fracture, femur, ultrasound, regional anaesthesia

## Introduction

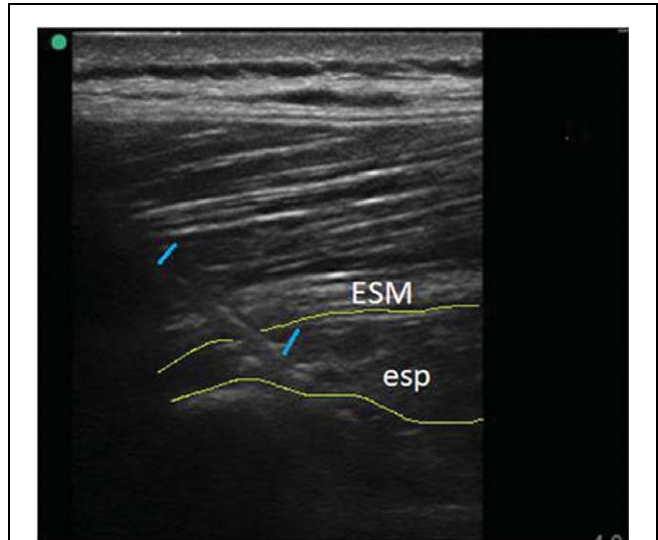
Recently there has been a lot of interest in using lumbar erector spinae plane block (L-ESPB) for managing pain after orthopaedic and spine surgeries. However, there are certain unique differences between thoracic ESPB and L-ESPB.<sup>1</sup> The characteristic structures like ribs, pleura and costo-transverse joint which is encountered and is very important for a thoracic ESPB are not visualised during a L-ESPB. The needle placement in L-ESPB is very medial compared to thoracic ESPB. A low-frequency, curvilinear ultrasound (US) probe (2-5 MHz) is preferred for a L-ESPB compared to a linear array high-frequency US probe (5-10 MHz) which is used for a thoracic ESPB. The local anaesthetic (LA) when injected in L-ESPB spreads tends to spread around the psoas major muscle (PMm) especially to the area where the lumbar plexus enters PMm and subsequently enters to the neural foramina (Figure 1). We performed US guided continuous L-ESPB for managing postoperative pain relief in 10 patients undergoing open reduction and internal fixation of proximal femoral fracture (PFF) to access its efficacy. As a primary anaesthetic, all patients received intrathecal 0.5% bupivacaine 2.5 mL (12.5 mg) for surgical anaesthesia.

## Case Presentation

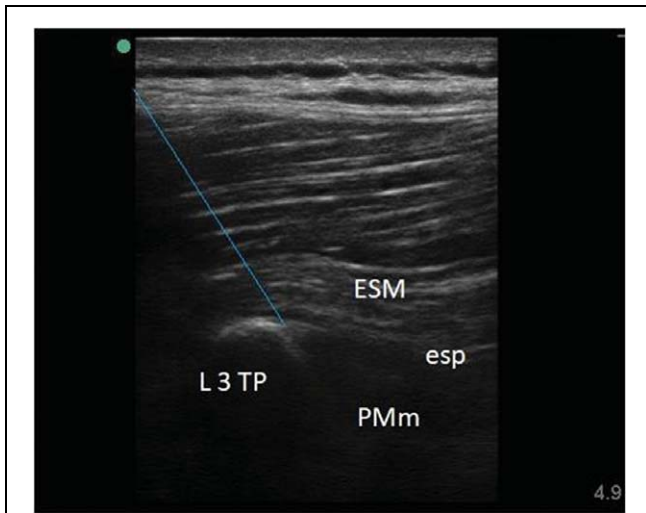
Ten patients (male-six, females-four with a mean age of  $59.7 \pm 8.01$  years) with PFF under American Society of Anesthesiologists' physical status (ASA-PS) II-III were included in this study (8: ASA-PS II, 2: ASA-PS III). Patients with multiple fractures of the lower limb were excluded. Informed consent for continuous unilateral L-ESPB at the L3 level and consent for publication of data related to perioperative pain management without revealing identity was obtained from all patients. A thorough pre-anesthesia check was done for all patients. Relevant investigations like complete blood picture, including platelet count, creatinine, blood group, coagulation profile, viral markers, 12 lead ECG, were advised for all patients and were within normal limits. After confirming nil by mouth status for 6 hours, patients were shifted to operating room. Baseline vital parameters were recorded after attaching necessary monitoring (pulse oximeter probe, non-invasive blood pressure cuff, ECG electrodes). Under due asepsis, all



**Figure 1.** Cadaveric cross section at L3 level-the erector spinae is excised. PMm, Psoas Major; IVF, intervertebral foramina; LNr, lumbar nerve root; AP, articular process; TP, transverse process. *Source:* Departamento de Anestesiología, Hospital Clinic Barcelona, España. Permission obtained to publish.



**Figure 3.** Blue lines-needle placement; ESM, erector spinae muscle; ESP, erector spinae plane; green line, local anesthetic drug distribution.



**Figure 2.** Longitudinal view of ESP at L3. ESM, erector spinae muscle; ESP, erector spinae plane; PMm, psoas major muscle. L3TP, L3 transverse process; blue line, proposed needle placement and target.

patients received intrathecal 0.5% bupivacaine 2.5 mL, i.e., 12.5 mg after skin infiltration with 2% lidocaine using a 27G Whitacre spinal needle. Surgery was performed in the lateral position, with an average duration of 60 to 90 minutes. At the end of surgery, a unilateral continuous L-ESPB at the L3 level was performed under US guidance in a lateral position with operated side non-dependent.

L-ESPB was performed with the patient in the lateral position. A curvilinear array low-frequency probe (Sonosite Inc.)

was used in all patients. The 12th rib was identified in the parasagittal plane, and with probe shifted caudad and medial, the L3 transverse process (TP) was identified. In the parasagittal plane, an 18G Tuohy needle (B-Braun) was inserted from cranial to caudal direction (Figure 2). The needle tip was identified between the L2 and L-3, and 30 mL of 0.2% ropivacaine with 25 µg of dexmedetomidine was injected in ESP (Figure 3). A 20G epidural catheter was inserted to a distance of 3-4 cm in the ESP. The catheter tip was positioned between the L2-4. An infusion of 0.1% ropivacaine was initiated at 6 mL/h thereafter. All patients received IV paracetamol 1 g infusion every 8 hourly and patients. Pain was monitored using visual analogue scale (VAS) in the high dependency unit for 48 hours. IV tramadol 100 mg was ordered as rescue analgesic if VAS was more than 4 (Figure 4). None of the patients required rescue analgesic in first 24 hours and were able to mobilise out of bed next day with support without any motor block.

### Discussion

ESPB was described by Forero et al.<sup>2</sup> for managing thoracic neuropathic pain initially. Due to the ease of performance of the block under US guidance and due to good quality of analgesia offered by it, the block became very popular. ESPB found its application in managing postoperative pain for various abdominal and thoracic surgeries. Subsequently ESPB was tried along lumbar level and is slowly gaining popularity.<sup>3</sup>

Tulgar et al. performed L-ESPB at the level of L4 for post-operative analgesia after a total hip replacement

VAS at hrs	1	2	3	4	5	6	7	8	9	10
0	1	1	1	1	1	1	1	1	1	1
6	1	1	1	1	1	1	1	1	1	1
12	1	1	1	1	2	1	1	1	1	1
18	1	1	1	1	1	1	1	1	1	1
24	2	1	2	1	2	2	2	2	2	2
30	2	2	2	2	2	3	2	2	2	2
36	2	2	3	3	3	2	3	3	3	2
42	3	2	2	2	2	2	3	2	3	3
48	3	3	2	3	2	2	3	3	2	3

Figure 4. Figure showing VAS in all 10 patients over 48 hours.

successfully.<sup>4</sup> Following this, they reported their experience in 12 cases of PFFs.<sup>5</sup> Contrast study performed with 40 mL radio-opaque solution was reported travelling into the lumbar plexus area at L1-2, L3, and L4-5 from the ESP. Singh et al. reported excellent post-operative pain relief in a case of total hip replacement with L-ESPB at L3 level.<sup>6</sup> De Lara González et al.<sup>7</sup> performed bilateral ESPB on fresh cadavers (total 12 blocks) at L4 level and performed CT contrast study. On analysis they found contrast spread from L2 to L5 in a cranio-caudal direction in the ESM, reaching the facet joints medially and the thoracolumbar fascia laterally. Authors concluded that L-ESPB at L4 always acts on the posterior branches of the spinal nerves and infrequently spreads to the paravertebral space to block the spinal nerve. We performed L-ESPB at L3 level which provided good, opioid free postoperative analgesia. We presume that the LA spread might be similar to described by De Lara González et al. in the cadaveric study.

A lumbar epidural catheter and continuous LA infusion for managing post-operative pain provides complementary analgesia to the unaffected side which is not desirable. A lumbar plexus block is an advanced block which requires training and can have serious consequences like local anaesthesia systemic toxicity, haematoma and neuropathy. L-ESPB appears to be a good choice for such patients. In our case series, all 10 patients were pain free with a continuous LA infusion.

### Conclusion

In conclusion, L-ESPB at L3 vertebral level can provide satisfactory analgesia for areas innervated through lumbar plexus. Further studies are warranted to know the optimal volume and concentration of LA used in L-ESPB to provide satisfactory analgesia and facilitate early ambulation and mobilisation.

**Ethics Committee Approval:** The Ethical Committee at Sancheti Hospital, Pune had approved the conduct of this case series.

**Informed Consent:** Verbal informed consent was obtained from all participants who participated in this study.

**Author Contributions:** Concept - S.D.; Design - S.D.; Materials - S.D.; Data Collection and/or Processing - S.D.; Literature Search - A.N.; Writing Manuscript - S.D.; Critical Review - A.N.

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**Conflict of Interest:** The authors have no conflicts of interest to declare.

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