

# Difference Between Erector Spinae Plane Block and Paraspinal Interfascial Plane Block in Analgesia after Posterior Cervical Laminectomy

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## ABSTRACT

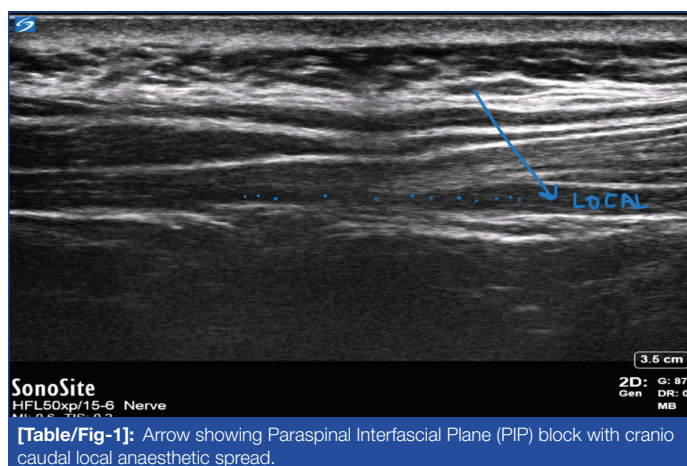
Spine surgeries are associated with severe intraoperative and postoperative pain which need a comprehensive management protocol. It is important to manage postoperative pain in such cases to improve early ambulation and discharge and hence the functional outcomes. A 46-year-old male, weighing 80 kg, was posted for cervical laminectomy with posterior stabilisation. After institution of general anaesthesia before surgical incision, 15 mL of 0.5% bupivacaine on each side at the level of C6 in the erector spinae plane on the left-side and the paraspinal posterior interfascial plane on the right-side was administered. The patient experienced significant postoperative pain relief for 12 hours. However, on clinical examination, there was a mild sensory loss on the left-side from C4 to T1, but no such sensory loss on the right-side. There was a complete recovery of sensory loss the following day. It is proposed that such volume in the erector spine plane can provide excellent analgesia for 12 hours, but with sensory loss. The drug may trickle to nerve roots, whereas it is unlikely to do so in the interfascial plane. It is also suggested that such volumes are needed for effective analgesia. It is also suggested that a technique without definitive sensory deficit is ideal in such cases to detect early surgical complication.

**Keywords:** Analgesia, Nerve block, Pain, Paraspinal posterior interfascial plane, Spine surgeries

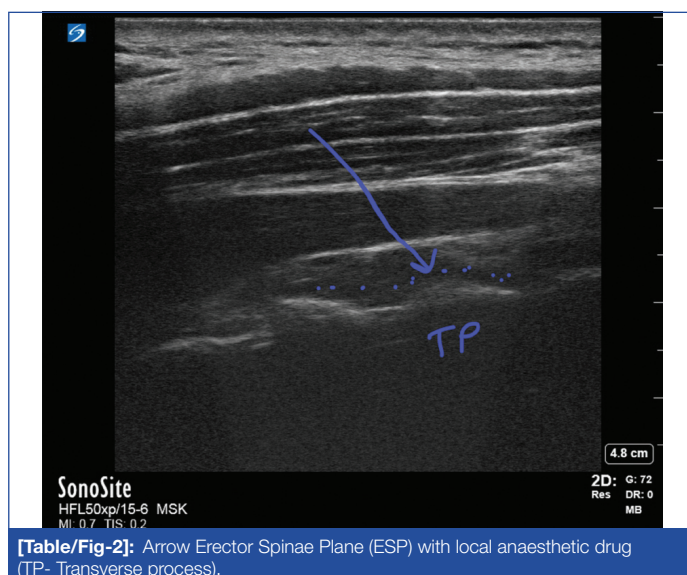
## CASE REPORT

A 46-year-old male, weighing 80 kg, was admitted with complaints of upper limb weakness and pain. Following a thorough examination, the patient was diagnosed with cervical cord compression and scheduled for a laminectomy with posterior cervical vertebral stabilisation. A routine preoperative examination revealed nothing. The upper limb muscles were weak to the tune of 4/5 on the established motor scale. There was severe neuropathic pain, but there was no sensory deficit. There were no co-morbid illnesses, particularly diabetes, which can have an impact on the sensory nervous system.

General anaesthesia was planned for this case, along with an Erector Spinae Plane (ESP) block on one side and a Paraspinal Interfascial Plane (PIP) block on the other side using ultrasound guidance for postoperative analgesia. The patient was given general anaesthesia and was placed in a prone position. Then using the ultrasound guidance erector spinae plane block was given on the left side of the cervical region. A 15 mL of 0.5% bupivacaine was used for the block. The drug was injected deep to the erector spinae muscle and superficial to the transverse process of the cervical vertebra. After injecting, the drug spread was assessed in the craniocaudal direction, with a cranial and caudal spread of local anaesthetics at six levels with single point injection. Following erector spinae plane block, paraspinal interfascial plane block was given on the opposite side. Similar to ESP block, 15 mL of 0.5% bupivacaine was used for PIP block. In PIP block the drug was injected between a fascial plane between the multifidus muscle and semispinalis cervicis muscle [1]. Using ultrasound machine SonoSite X-Porte (United States of America), the individual muscles of erector spinae were identified and the injection of local anaesthetic was given in the plane as described above [Table/Fig-1,2]. Drug spread was similar to the erector spinae plane block which was given in the opposite side, as visualised by immediate follow-up scanning.



[Table/Fig-1]: Arrow showing Paraspinal Interfascial Plane (PIP) block with cranio-caudal local anaesthetic spread.



[Table/Fig-2]: Arrow Erector Spinae Plane (ESP) with local anaesthetic drug (TP- Transverse process).

The surgery started after the procedure of the block was completed. This surgery took approximately 200 minutes in total. The intraoperative period was uneventful, and the haemodynamics remained stable throughout. At the end of the procedure, the patient was extubated and shifted to Postanaesthesia Care Unit (PACU). During the procedure, the patient was given 4.5 mg of morphine and 500 mg of intravenous paracetamol. The postoperative pain was evaluated using a Numeric Rating Scale (NRS) ranging from 0-10, with 0 representing no pain and 10 representing the worst pain imaginable. During the immediate postoperative period, the patient had an NRS score of one. For the first 12 hours after surgery, the patient had no complaints of pain and did not require any additional systemic analgesics. After that, the maximum NRS score was three during the first 48 hours of recovery. The scores were noted every six hours.

During the postoperative period, however, the patient complained of numbness in the left upper extremity. whereas he had no similar complaints on the opposite side where the PIP block was administered. The sensory loss was present from C4-T2 dermatomes went off after 24 hours. There were no other side effects. The breathing pattern was normal.

## DISCUSSION

Innumerable techniques for controlling perioperative pain in cervical spine surgeries have been described in the literature [2]. Following the introduction of ultrasound in pain relief, the administration of nerve blocks has risen prominence [3]. Goyal A et al., used bilateral ESP block for cervical instrumentation and discovered that 15 mL of 0.25% bupivacaine combined with clonidine and dexamethasone was effective [4]. But, in present case, no additives were used. Instead, a higher concentration of 0.5% bupivacaine of a similar volume was preferred. Despite using 0.5% bupivacaine, the authors found no diaphragmatic problems. To emphasise the findings, the authors admit that no diaphragm movement measurements were taken. However, there was no clinical problem in the index case. Tseng V et al., demonstrated that PIP blocks allow for neurophysiological monitoring in laminectomy cases [5]. There was no neurophysiological monitoring in the present case, but a routine pin prick was used to detect sensory loss. Because PIP blocks are fascial plane blocks, an established motor block is unlikely. Motor blockade is uncommon because it does not affect the nerves. This was thought to be advantageous in their studies.

Spivak A and Xu JL, used PIP block in laminectomy successfully and found the technique to be very effective [6]. But a stronger

concentration was used to intensify the block and extend the duration of analgesia. The maximum drug dosage which can be safely used with regard to bupivacaine is 3 mg/kg. The weight of the index patient allowed the same volume and concentration. The authors described a novel technique for keeping the probe vertical during lumbar laminectomy cases. There was numbness on the side where the ESP block was administered. One possible explanation is that there was some drug spread anteriorly to the cervical nerve roots, causing numbness. On the other hand, there was no clinically significant motor blockade on the left-side. When compared to ESP block, the drug injection in intersfacial plane block is farther away from the spinal nerve root, which could explain why there was no conduction blockade of ventral rami neurons. The numbness was very transitory which ruled out a surgical cause. This also is advantageous in cases of laminectomies where an analgesic technique without sensory loss could be more useful in the detection of a surgical complication. The findings must be validated by conducting randomised trials.

## CONCLUSION(S)

In patients undergoing cervical laminectomy, the administration of 15 mL of 0.5% bupivacaine via ESP and PIP planes are effective in establishing satisfactory analgesia. The authors assert that sensory loss is greater in ESP than in PIP block due to the latter's proximity to nerve roots. This could be advantageous to detect a deficit due to a surgical complication, there were no major complications in the present case.

## REFERENCES

- [1] Parthasarathy S, Saravanan B, Ragavan S. A novel method of ultrasound-guided modified thoracolumbar intersfacial plane block for perioperative pain control in lumbar spine fusion surgery: Experience based on two cases. *J Clin of Diagn Res.* 2022;16(3):UM01-02. Available from: <https://www.doi.org/10.7860/JCDR/2022/52207/16112>.
- [2] Bajwa SJ, Haldar R. Pain management following spinal surgeries: An appraisal of the available options. *J Craniovertebr Junction Spine. Res.* 2015;6(3):105-10. Doi: 10.4103/0974-8237.161589.
- [3] Pavithran P, Sudarshan PK. Emerging options for analgesia in posterior cervical spine surgery. *Indian J Anaesth. Res.* 2021;65(9):707-08. Doi: 10.4103/ija.ija\_391\_21.
- [4] Goyal A, Kamath S, Kalgudi P, Krishnakumar M. Perioperative analgesia with erector spinae plane block for cervical spine instrumentation surgery. *Saudi J Anaesth Res.* 2020;14(2):263-64. Doi: 10.4103/sja.SJA\_654\_19.
- [5] Tseng V, Cole C, Schmidt MH, Abramowicz AE, Xu JL. Analgesic efficacy of paraspinous intersfacial plane blocks performed with the use of neurophysiology monitoring for posterior cervical laminectomy surgery: A case series. *J Spine Surg.* 2021;7(1):109-13. Doi: 10.21037/jss-20-644.
- [6] Spivak A, Xu JL. Ultrasound guided paraspinous intersfacial plane blocks for postoperative analgesic on spine surgery. *Journal of Spine Surgery (Hong Kong).* 2019;5(4):601-02. Doi: 10.21037/jss.2019.11.08.

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