Case Report/*Olgu Sunumu*

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Overcoming Anatomical Challenges in Postoperative Erector Spinae Plane Block (ESPB): Advancing Enhanced Recovery after Surgery (ERAS) in Lumbar Spine Fixation-A Case Series

Postoperatif Erector Spinae Plan Bloğu (ESPB) Uygulamasında Anatomik Zorlukların Üstesinden Gelme: Lomber Omurga Fiksasyonunda Cerrahi Sonrası İyileşmeyi Hızlandırma (ERAS) Yaklaşımı - Bir Olgu Serisi

Abhishek Bharadwaj[1], Vikas Kumar Jain[1], Kartik Soni[2], Anisha Jaiswal[1], Nidhi Pathak[1]

[1]Raipur Institute of Medical Sciences, Department of Anesthesiology and Critical Care, Raipur, Chhattisgarh, India
[2]Raipur Institute of Medical Sciences, Department of Orthopedics, Raipur, Chhattisgarh, India

ABSTRACT

Erector spinae plane block (ESPB) is typically performed preoperatively for pain management, but its postoperative application remains less common, especially in patients with altered anatomy after lumbar spine surgery. This case series describes the use of ultrasound-guided ESPB for postoperative analgesia in three patients undergoing lumbar laminectomy and fixation. The unique challenge in each case was identifying anatomical landmarks after surgical alteration, requiring visualization of fixation screws and locating the transverse process accordingly. This series demonstrates the feasibility of performing ESPB postoperatively and its effectiveness in providing pain relief in challenging anatomical contexts.

Keywords: Nerve block, laminectomy, ultrasound-guided block, postoperative analgesia, regional anesthesia, anatomical landmarks

ÖZ

Erektör spina plan bloğu (ESPB), genellikle ağrı yönetimi için preoperatif dönemde uygulanmaktadır, ancak lomber omurga cerrahisi sonrası anatomik değişikliklere sahip hastalarda postoperatif kullanımı daha nadirdir. Bu olgu serisi, lomber laminektomi ve fiksasyon geçiren üç hastada postoperatif analjezi sağlamak amacıyla ultrason eşliğinde ESPB kullanımını açıklamaktadır. Her bir olgudaki benzersiz zorluk, cerrahi değişiklikler sonrası anatomik işaretlerin belirlenmesi olmuş ve bu durum fiksasyon vidalarının görüntülenmesini ve transvers prosesin buna göre bulunmasını gerektirmiştir. Bu seri, ESPB'nin postoperatif dönemde uygulanabilirliğini ve zorlu anatomik bağlamlarda ağrı yönetiminde etkinliğini göstermektedir.

Anahtar sözcükler: Sinir bloğu, laminektomi, ultrason eşliğinde blok, postoperatif analjezi, rejyonal anestezi, anatomik işaretler

INTRODUCTION

Postoperative pain following lumbar spine surgery can be considerable, often impeding early mobilization and delaying recovery efforts (1). While opioids have traditionally been the mainstay for pain control, their use is frequently limited by adverse effects such as sedation, nausea, and respiratory depression. The erector spinae plane block (ESPB), a relatively recent addition to regional anesthesia techniques, offers a promising alternative by delivering effective pain relief with fewer systemic complications (2). This case series explores the application of ESPB in three patients undergoing lumbar laminectomy with instrumentation, where altered anatomy posed challenges in identifying conventional ultrasound landmarks.

CASE SERIES

CASE 1

A 55-year-old female with a history of chronic lower back pain underwent lumbar laminectomy and posterior spinal fixation of the L3 to L5 vertebrae. As part of the intraoperative an-

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***Corresponding author:** Abhishek Bharadwaj • bharadwaj.abhishek@gmail.com
Abhishek Bharadwaj 0000-0002-6283-9691 / Vikas Kumar Jain 0009-0008-7951-1212
Kartik Soni 0000-0001-9020-1006 / Anisha Jaiswal 0009-0007-5217-4618
Nidhi Pathak 0009-0004-1234-1133

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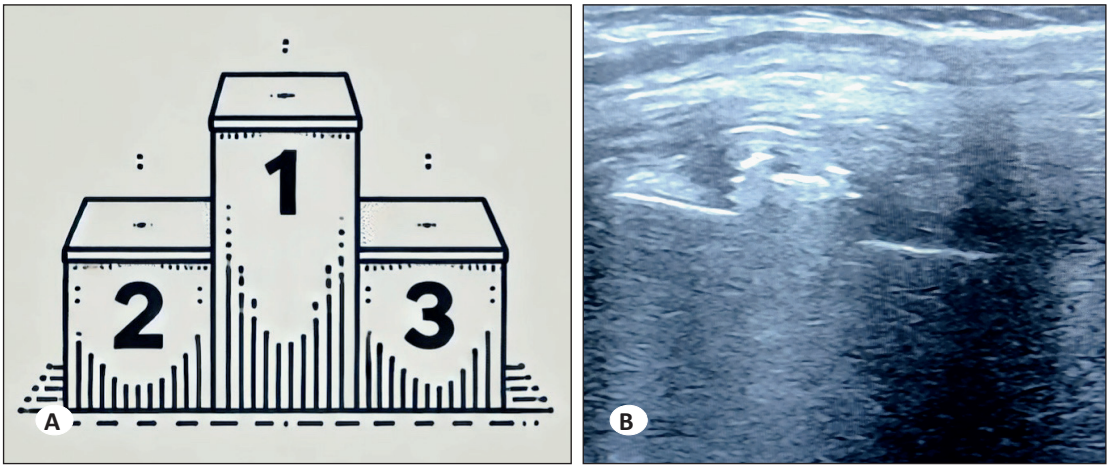

Figure 1. A) A line diagram of an awards podium.
B) Awards Podium appearance of fixation plates and screws.

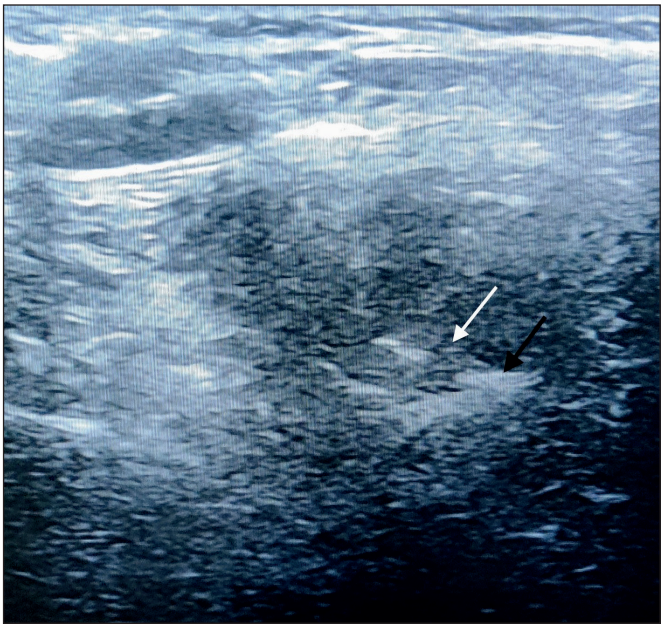

Figure 2. Transverse process with drug deposited in the Erector Spinae Plane. White arrow represents local anesthetic deposited in the Erector Spinae plane whereas the black arrow represents the transverse process.

algesic plan, she received 20 mg of nalbuphine at the time of induction, followed by 1 gram of intravenous paracetamol shortly afterward. During wound closure, 0.25% bupivacaine was infiltrated locally at the surgical site. This perioperative analgesia regimen was uniformly applied to all three patients in this case series. Despite all the above measures, the patient reported significant pain (Visual Analog Scale [VAS] score of 8/10) 2 hours after surgery. To avoid any further use of systemic opioids, it was decided to perform an erector spinae block. After obtaining informed consent, the patient was positioned in the prone position. Under all antiseptic precautions, an ultrasound probe was placed at the L4 level, lateral to the surgical site. Visualization of anatomical landmarks was challenging due to the removal of the spinous processes and lamina, which altered the usual appearance of the transverse processes. To perform the ESPB postoperatively, it was essential to identify the transverse process accurately by using the fixation screws as a landmark. The transverse process was eventually located by visualizing an "awards podium"-shaped hyperechoic structure, corresponding to the fixation plates and screws (Figure 1A, B). The ultrasound probe was moved laterally until the cylindrical fixation plate disappeared, and the transverse process became visible in its typical shape. After local anaesthetic infiltration, a 22-gauge, 100-mm needle was inserted in-plane to the ultrasound probe until the tip contacted the transverse process. After negative aspiration, 20 mL of 0.25% bupivacaine with dexamethasone 4 mg was injected to create the block (Figure 2). The procedure was then repeated on the opposite side; the patient reported a reduction in pain to a VAS score of 2/10 within 20 minutes of block administration. The ESPB effectively provided analgesia for the next 16 hours, reducing the patient's need for additional systemic opioids. The patient was then started on Injectable paracetamol 1 gram to combat rebound pain (3) and eventually shifted to the tablet form of paracetamol. The patient described a smooth postoperative course and recovery.

CASE 2

A 60-year-old male with spinal stenosis underwent lumbar laminectomy and fixation at the L4-L5 level. Postoperatively, he reported severe pain (VAS score 7/10) despite the use of systemic opioids and local infiltration. After informed consent was obtained, the decision to perform the ESPB was made. The ultrasound probe was placed at the L4 level, and the absence of spinous processes and altered anatomy complicated the scanning. The fixation screws and rods were identified as linear, hyperechoic structures. As mentioned in Case 1, the manoeuvre was successfully used in Case 2 to identify the

transverse process in the postoperative period for performing the postoperative ESPB. After local anaesthetic infiltration, a 22-gauge, 100-mm needle was inserted and advanced under real-time visualization to the transverse process using the in-plane technique. After negative aspiration, 20 mL of 0.25% bupivacaine with 4 mg dexamethasone was administered. The procedure was then repeated on the opposite side, resulting in immediate pain relief (VAS score 1/10). Analgesia lasted 14 hours, allowing early mobilization. The patient was subsequently started on intravenous paracetamol (1 gram) to manage rebound pain, which was later transitioned to an oral tablet form. The patient described the postoperative course and recovery as smooth and uneventful.

CASE 3

A 58-year-old male with degenerative disc disease underwent lumbar laminectomy and fixation at the L2-L4 level. Postoperative pain (VAS score 9/10) persisted despite systemic analgesics. After informed consent, the patient was positioned prone, and the ultrasound probe was placed at the L3 level. Given the extensive surgical modification, standard landmarks such as spinous processes were absent. Identifying anatomical landmarks proved challenging due to the removal of the spinous processes and lamina, which altered the typical appearance of the transverse processes. For the postoperative ESPB, accurate identification of the transverse process was crucial and was achieved using the fixation screws as reference points. The transverse process was ultimately located by identifying a hyperechoic structure resembling an "awards podium," corresponding to the fixation plates and screws. The ultrasound probe was then moved laterally until the cylindrical fixation plate disappeared, revealing the transverse process in its characteristic shape. After local anaesthetic infiltration, a 22-gauge, 100-mm needle was inserted in-plane and directed to the plane deep to the erector spinae muscle and superficial to the transverse process. After ensuring correct placement via hydro dissection, 20 mL of 0.25% bupivacaine with 4 mg dexamethasone was injected. The procedure was then repeated on the opposite side. Pain relief was immediate (VAS score reduced to 2/10), lasting 15 hours. The patient was mobilized the following morning, with rebound pain managed using paracetamol. We used the CARE checklist when writing our case series (4).

DISCUSSION

Spinal surgery is commonly performed for conditions such as herniated discs, spinal deformities, and fractures, primarily aiming to alleviate pain, restore functionality, and enhance a patient's quality of life. However, it ranks among the most painful surgical interventions, frequently associated with severe postoperative discomfort resulting from significant tissue trauma, nerve irritation, inflammation, and vascular injury. The rising complexity and frequency of spinal surgeries have correspondingly increased the incidence and severity of postoperative pain, prolonging hospital stays, impeding early rehabilitation, and heightening risks for chronic pain development. Consequently, effective pain management strategies are crucial to optimizing postoperative recovery and patient outcomes (5,6). The ESPB is an interfascial regional anesthesia technique that has gained significant recognition for its effectiveness in providing analgesia. By targeting the plane deep to the erector spinae muscle, ESPB achieves pain relief by blocking both visceral and somatic structures. This is accomplished through the spread of local anesthetic to the dorsal and ventral rami of the spinal nerves and the sympathetic chain via the paravertebral space, thereby offering comprehensive analgesia (7,8). Erector spinae plane block has demonstrated versatility in managing pain associated with thoracic, abdominal, gynecological, post-traumatic, and chronic neuropathic conditions, as well as following oncologic procedures (9,10). Its broad clinical applicability has positioned ESPB as an essential component of multimodal analgesic approaches and aligns well with Enhanced Recovery After Surgery (ERAS) protocols. The ERAS principles emphasize reducing perioperative opioid use, utilizing multimodal pain control, promoting early mobilization, and expediting diet advancement (11). Despite its growing popularity, several aspects of ESPB, including the exact spread of local anesthetic, precise mechanisms of analgesia, and the extent of dermatomal coverage, remain areas of ongoing research (7,10). In our series of patients undergoing lumbar spine surgery with altered anatomy due to prior laminectomy and instrumentation, performing ESPB postoperatively posed certain technical challenges. Specifically, conventional anatomical landmarks were obscured; however, successful needle placement was achieved through careful ultrasound-guided identification of fixation hardware and transverse processes. The postoperative timing of ESPB provided notable clinical benefits. These included prolonged duration of analgesia during early recovery, reduced systemic opioid requirements, and minimized opioid-related adverse effects such as sedation, nausea, respiratory depression, reduced gastric motility, and delayed ambulation (9,12,13). Additionally, administering ESPB after completion of surgery prevented the loss of analgesic efficacy from intraoperative washout of the drug due to irrigation, enhancing analgesic reliability. In this series, aside from the initial challenge of identifying anatomical landmarks of the erector spinae plane and fixation screws, no procedural difficulties were encountered during postoperative ESPB placement. All blocks were performed under strict aseptic conditions, including sterile ultrasound probe covers, sterile gel, and adherence to standard sterile insertion techniques. While it is reasonable to be cautious about the risk of infection when performing ESPB

near fresh surgical wounds and spinal implants, no such complications were observed in our patients. However, larger studies are needed to evaluate potential infection risks and to assess the long-term safety and effectiveness of ESPB in individuals with altered spinal anatomy following surgery. This case series highlights that ESPB can be successfully and safely performed postoperatively in patients with significant anatomical alterations after spinal surgery. Due to the scarcity of literature addressing the use of ESPB in patients with significant anatomical alterations post-spinal surgery, our case series adds meaningful insight into its practical application and effectiveness. Success in administering the block in these cases relied heavily on modifying the ultrasound technique to suit the altered anatomical context—specifically, by identifying surgical implants such as screws and rods as reference points to guide needle placement with precision.

CONCLUSION

Ultrasound-guided ESPB offers a valuable approach to managing postoperative pain following lumbar spine surgery, particularly in patients with distorted anatomical landmarks due to instrumentation. In this case series, the application of ESPB effectively reduced postoperative opioid consumption and facilitated earlier mobilization, contributing to improved recovery. The presence of pedicle screws and rods, typically considered obstacles, were instead utilized as key sonographic landmarks to aid in accurate needle placement. Notably, administering the block immediately after wound closure and prior to extubation may enhance analgesic effectiveness during the early postoperative period. These findings underscore the clinical utility of ESPB in cases with complex spinal anatomy and support the need for future prospective studies to evaluate its broader applicability and long-term benefits.

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AUTHOR CONTRIBUTIONS

Conception or design of the work: AB, VKJ, KS
Data collection: AB, AJ, NP
Data analysis and interpretation: AB, VKJ, KS, AJ, NP
Drafting the article: AB, VKJ, KS, AJ, NP
Critical revision of the article: AB, VKJ, KS, AJ, NP
Other (study supervision, fundings, materials, etc): AB
The author (AB, VKJ, KS, AJ, NP) reviewed the results and approved the final version of the manuscript.

REFERENCES

1. Bharadwaj A, Rekha Nileshbhai S, Thakkar J, Dey S. A randomized controlled study of epidural morphine sulfate-soaked gelfoam and morphine sulfate instillation in the management of postoperative pain following lumbar spinal fixation surgery. Indian J Pain 2024;38(2):128-34.
2. Gonçalves JPF, Duran ML, Barreto ESR, et al. Efficacy of erector spinae plane block for postoperative pain management: A meta-analysis and trial sequential analysis of randomized controlled trials. J Clin Anesth 2025;103:111831.
3. Atar F, Özkan Sipahioğlu F, Karaca Akaslan F, Macit Aydın E, Sezer E, Özkan D. Frequency of rebound pain and related factors in a multimodal regimen including systemic dexamethasone and dexmedetomidine. Anaesthesiologie 2025;74(3):148-55.
4. Gagnier JJ, Kienle G, Altman DG, Moher D, Sox H, Riley D; the CARE Group. The CARE Guidelines: Consensus-based Clinical Case Reporting Guideline Development.
5. Zhang L, Zhou X, Chen L, et al. Impact of erector spinae plane block on postoperative recovery quality in spinal surgery: A systematic review and meta-analysis. Eur Spine J 2025
6. He Y, Liu H, Ma P, Zhang J, He Q. Meta-analysis of the efficacy of the erector spinae plane block after spinal fusion surgery. Peer J 2024;12:e18332
7. Chou WH, Niu WY, Liang PC, et al. Erector spinae plane block spread patterns and its analgesic effects after computed tomography-guided hepatic tumour ablation: A randomized double-blind trial. Ann Med 2025;57(1):2480255.
8. Kannan V, Ullah N, Geddada S, et al. Impact of "Enhanced Recovery After Surgery" (ERAS) protocols vs. traditional perioperative care on patient outcomes after colorectal surgery: A systematic review. Patient Saf Surg 2025;19(1):4.
9. Oostvogels L, Weibel S, Meißner M, et al. Erector spinae plane block for postoperative pain. Cochrane Database Syst Rev 2024;2(2):CD013763.
10. Stewart JW, Dickson D, Van Hal M, et al. Ultrasound-guided erector spinae plane blocks for pain management after open lumbar laminectomy. Eur Spine J 2024;33:949-55.
11. Zhao M, Gao M, Zhang X, et al. Effect of bilateral erector spinae plane block on the gastrointestinal function in patients undergoing traumatic lumbar spine fracture surgery: A retrospective study. J Pain Res 2025;18:1231-9.
12. Yang M, Cao L, Lu T, et al. Ultrasound-guided erector spinae plane block for perioperative analgesia in patients undergoing laparoscopic nephrectomies surgery: A randomized controlled trial. Trials 2024;25(1):10.
13. Loganathan S, Kajal K, Garg K, et al. Efficacy of ultrasound guided erector spinae plane block compared to wound infiltration for postoperative analgesia following laparoscopic living donor nephrectomy: A double-blinded randomized controlled trial. BMC Anesthesiol 2025;25(1):13.