

Anaesthetic Implications Of USG Guided Erector Spinae Block In Spine Surgeries: A Case Series

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Abstract

In recent times, surgeries on the spine and spinal cord have expanded on the horizon. These procedures range from single level decompression to multi-level reconstruction. The anaesthetic management of spine surgeries can prove challenging especially in terms of significant blood loss, prolonged procedure, position-related complications and complex pain management. There is a rapid rise in the number of cases due to the epidemic of chronic lower back pain¹, which makes postoperative analgesia a criteria of utmost importance in such cases. While earlier general anaesthesia with intravenous analgesics was more commonly used, general anaesthesia with regional blocks is preferred at present. The aim is to observe and review beneficial aspects of ultrasound guided erector spinae block in various spine surgeries.

Keywords: Spine, discectomy, laminectomy, analgesia, NRS

Introduction

Surgeries for degenerative spine disease and herniated disks are common in the younger population, while patients over 60 years of age most commonly undergo spine surgery for spinal stenosis.² The surgical procedures can be classified into three groups (Table 1).³

Minor (EBL <100ml)	Major (EBL 100-1000ml)	Complex (EBL 1-10L)
<ul style="list-style-type: none"> ▪ 1-2 level ACDF ▪ ≤ 2 level decompression or microdiscectomy without instrumentation 	<ul style="list-style-type: none"> ▪ 3-4 level ACDF/PCDF ▪ 1-3 level ALIF/XLIF ▪ 1-2 level TLIF ▪ 1-2 level anterior/posterior ▪ Degenerative corpectomy 	<ul style="list-style-type: none"> ▪ 6-18 level instrumentation ▪ ≥3 level anterior/posterior fusion ▪ Pedicle Subtraction Osteotomy (PSO) ▪ Vertebral Column Resection (VCR) ▪ Tumour corpectomy ▪ Tumour debulking

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*EBL= Estimated blood loss

Spine surgeries are mostly performed under general anaesthesia. This is due to the position required during surgery, the preference of the surgeon and/or anaesthesiologist and lack of sufficient literature supporting locoregional anaesthesia. Nevertheless, with respect to spine surgeries more than 80% of the actual literature on erector spinae blocks is dated less than 10 years. This technique is of interest for postoperative analgesia, either with a single bolus injection of local anaesthetics, opioids and adjuvants, alone or in combination.

In the postoperative phase, regional nerve block may cause lower pain scores and/or narcotic requirement with additional benefit in the incidence of PONV^{4,5}. Initiation of a regional anaesthetic technique before the surgical incision may suggest a pre-emptive analgesic effect as well.

The erector spinae plane (ESP) block is a newer regional anaesthetic technique that can be used to provide analgesia for a variety of surgical procedures or to manage acute or chronic pain. The technique is relatively easy to perform on patients under USG guidance. The first report of the successful use of this procedure was in 2016; the block was used to manage thoracic neuropathic pain in a patient with metastatic disease of the ribs and rib fractures.⁶ Since then, the block has been reported to have been used successfully in a multitude of procedures including lumbar fusions.⁷ As this is a relatively novel procedure, ESP block is still in numerous trials with many different types of surgical procedures, and various prospective studies are ongoing.

The ESP block is often performed between the T5-T7 paraspinal levels, but it can be performed at lower levels as well. It is performed using an in-plane

ultrasound-guided technique. It is a paraspinal fascial plane block in which the needle is placed between the erector spinae muscle and the vertebral transverse processes, followed by administration of a local anaesthetic, either using a single-injection technique or via catheter placement for continuous infusion. It causes an analgesic effect on somatic and visceral pain by blocking the dorsal and ventral rami of the thoracic and abdominal spinal nerves.⁸ This blockage includes sympathetic nerve fibers as the local anaesthetic spreads through the paravertebral space.^{8,9} It helps to achieve a multi-dermatomal sensory block of the anterior, posterior, and lateral thoracic and abdominal walls.

There is a hypothesis that the multi-dermatomal sensory block is due to the cranial and caudal spread of the injected local anaesthetic. This spread is aided by the thoracolumbar fascia, which extends across the posterior thoracic wall and abdomen.⁹

Case Series: In our institution, multiple cases of spine surgeries have been performed under general anaesthesia with ultrasound guided erector spinae block. We have listed 4 such cases in this case series. All these cases have been published with informed written consent. All the patients were between the age group of 18-60 years and accepted as ASA I or ASA II.

Case 1

A 31 year old male, 45kgs, came with complaints of chronic lower back pain with tingling sensation in both legs. He was diagnosed with an intradural spinal cord tumour with L5-S1 PIVD, posted for cord tumour excision with discectomy. Patient was a recently diagnosed case of hypertension, normotensive on Tab. Amlodipine 5mg OD.

Preoperative investigations were WNL. Patient was accepted as ASA II.

Preoperative vitals were stable and normal. Cross matched blood was reserved preoperatively. General anaesthesia with erector spinae plane (ESP) block was planned. Patient was premedicated with inj Glycopyrrolate(0.004mg/kg), inj Midazolam(0.05mg/kg) and inj Fentanyl(2mcg/kg). Induction of anaesthesia was done with inj Propofol(2mg/kg) and inj Atracurium(1.0mg/kg). Patient was intubated with ETT no. 8.0 and maintained on O₂/air/Isflurane.

Following induction, patient was made prone. Parts were painted and draped for ESP block. Under USG guidance, L5-S1 were identified as the target transverse processes. 23G Quincke needle was inserted in-plane from a cranial to caudad direction until the needle tip contacted the transverse process. 3 mL of inj Bupivacaine 0.25% (+ 15mcg Dexmedetomidine as adjuvant) was injected to confirm proper injection plane by visualization of a spread deep to the erector spinae muscles and superficial to the transverse process. We completed the nerve block with injection of 15mL of local anaesthetic bilaterally. Patient was hemodynamically stable at the time of skin incision and throughout. 1 unit of packed RBCs was transfused intraoperatively.

After extubation, NRS score was assessed as: 0 at two hours postop ; 3 at six hours postop and 4 at 12 hours postop. Patient did not request for any additional analgesic for 12 hours postoperatively.

Case 2

A 60 year old male, 51kgs, came with the complaint of tingling sensation in bilateral lower limbs with difficulty in ambulation. He was diagnosed with L3-L4, L4-L5 myelopathy and was posted for endoscopic discectomy. Patient had a history of non-Hodgkin's lymphoma 8 years back, for which he underwent 25 cycles of radiotherapy and 6 doses of Tab.Rituximab. He also had a history of ORIF with plating for right distal end radius fracture 3 years back. Preoperative investigations were normal. 2D Echo was within normal limits. Patient was accepted as ASA II.

Preoperative vitals were stable and normal. Cross matched blood was reserved preoperatively. General anaesthesia with erector spinae plane (ESP) block was

planned for endoscopic discectomy. Patient was premedicated with inj Glycopyrrolate(0.004mg/kg), inj Midazolam(0.05mg/kg) and inj Fentanyl(2mcg/kg). Induction of anaesthesia was done with inj Propofol(2mg/kg) and inj Vecuronium(0.1mg/kg). Patient was intubated with ETT no. 8.5 and maintained on O₂/air/Sevoflurane.

After giving prone position parts were painted and draped for ESP block. L3-L4-L5 were identified as the target transverse processes under USG guidance. 23G Quincke needle was inserted in-plane until the needle tip contacted the transverse process. 3mL of inj Bupivacaine 0.25% (+ 15mcg Dexmedetomidine as adjuvant) was injected to confirm proper injection plane visualised by a spread deep to the erector spinae muscles and superficial to the transverse process. The nerve block was completed with injection of 5mL of local anaesthetic bilaterally at the level of L3, L4 and L5 transverse processes. Significant attenuation of hemodynamic response was seen at the time of skin incision. There were no adverse events intraoperatively.

Post extubation, NRS score was assessed as follows: 3 at two hours postop ; 4 at six hours postop and 6 at 12 hours postop. Patient made a request for additional analgesic at 12 hours postoperatively.

Case 3

A 45 year old female, 65kgs, came with the chief complaint of a chronic, dull aching back pain since 5 months, aggravated by spinal motion and coughing. Neurological deficit was present in both lower limbs with power graded as 1/5 and reduced sensory function. CT scan of the spine showed destruction of D9-D10 vertebra and a paravertebral abscess. She also had history of tobacco consumption since 10 years. Patient was diagnosed as D9-D11 Koch's spine and was electively posted for posterior spinal fixation. She was pre-emptively started on AKT-HRZE (300/150/750/800) mg once a day. Preoperative investigations were Hb - 9.3, TLC- 10600, PLT- 3.1, PT INR- 12.4/1.1, Blood group- O+ve. Patient was accepted under ASA II.

Preoperative vitals were BP-130/80mmHg, Pulse rate – 88/min, regular and SpO₂ – 99 % on RA. Cross matched blood was reserved preoperatively. General anaesthesia with erector spinae plane (ESP) block was planned for posterior spinal fixation. Patient was

premedicated with inj Glycopyrrolate(0.004mg/kg), inj Midazolam(0.05mg/kg) and inj Fentanyl(2mcg/kg). Induction of anaesthesia was done with inj Propofol(2mg/kg) and inj Vecuronium(0.1mg/kg). Patient was intubated with ETT no. 7.5 and maintained on O₂/air/Isoflurane

After giving prone position parts were painted and draped for ESP block. D9-D10 transverse processes were under USG guidance and 23G Quincke needle was inserted in-plane until the needle tip contacted the transverse process. 3mL of inj Bupivacaine 0.25% (+ 15mcg Dexmedetomidine as adjuvant) was injected to confirm proper injection plane. The nerve block was completed with injection of 15mL of local anaesthetic bilaterally at the level of D9-D10 transverse processes. Hemodynamic response to skin incision was attenuated. Patient was vitally stable throughout. 1 unit of packed RBCs was transfused intraoperatively.

Following extubation, NRS score was assessed as follows: 1 at two hours postop; 4 at six hours postop and 7 at 12 hours postop. Patient requested additional analgesic at 10 hours postoperatively.

Case 4

A 56 year old female,75kgs, came with the chief complaint of dull, aching back pain and neurological deficit in both lower limbs. Power in both lower limbs was graded 3/5. She was diagnosed with D6-D7 spondylodiscitis and posted for posterior spinal fixation. Preoperative investigations were normal. 2D

Echo was within normal limits. Patient was accepted as ASA I.

Preoperative vitals were as follows: Pulse rate-86/min, BP- 122/86mmHg and SpO₂- 99% on RA. Cross matched blood was reserved preoperatively. General anaesthesia with erector spinae plane (ESP)block was planned for posterior spinal fusion. Patient was premedicated with inj Glycopyrrolate(0.004mg/kg), inj Midazolam(0.05mg/kg) and inj Fentanyl(2mcg/kg). Induction of anaesthesia was done with inj Propofol(2mg/kg) and inj Atracurium(1.0mg/kg). Patient was intubated with ETT no.7.0 and maintained on O₂/air/Isoflurane.

Following induction, prone position was given. Parts were painted and draped for ESP block. Under USG guidance, D6-D7 were identified as the target transverse processes. 23G Quincke needle was inserted in-plane from until the needle tip contacted the transverse process. 3 mL of inj Bupivacaine 0.25% (+ 15mcg Dexmedetomidine as adjuvant) was injected to confirm proper position. The nerve block was completed with injection of 20mL of local anaesthetic bilaterally. Patient was hemodynamic response to skin incision was blunted and patient was vitally stable throughout.

After extubation, NRS score was assessed as: 3 at two hours postop ; 5 at six hours postop and 5 at 12 hours postop. Patient did not request for any additional analgesic for 12 hours postoperatively.



Discussion

All patients had minimal pain on emergence. They transitioned successfully to oral analgesia on the first postoperative day, with no opioid requirements, no side effects, and low pain scores throughout their hospital stay. Bi-lateral bi-level ESP blocks are a simple method of providing pre-emptive regional analgesia in extensive multi-level spine surgery. Integration of ESP blocks into a multimodal regimen that employs other opioid-sparing strategies may have additive, and potentially synergistic, benefits in improving perioperative and postoperative analgesia and reducing opioid requirements.

Conclusion:

Bilateral ultrasound-guided erector spinae plane block was found to be effective for reducing perioperative and postoperative opioid requirement, and better patient satisfaction in comparison to conventional analgesia in lumbar spine surgery.¹⁰ Finally, this study shows and supports increased utilization of regional plane blocks due to the benefits it confers compared to oral/intravenous analgesics.

References:

1. Alboog A., Bae S., Chui J. Anesthetic management of complex spine surgery in adult patients: a review based on outcome evidence. *Curr Opin Anaesthesiol.* 2019 Oct;32(5):600–608.
2. Deyo R.A., Mirza S.K., Martin B.I. Trends, major medical complications, and charges associated with surgery for lumbar spinal stenosis in older adults. *J Am Med Assoc.* 2010;303:1259.
3. Zheng K., Angst M. Guidelines for the intraoperative management of patients undergoing spine surgery - ether - resources for anesthesia research and education - stanford university school of medicine.
4. McLain RF, Tetzlaff JE, Bell GR, Uwe-Lewandrowski K, Yoon HJ, Rana M. Microdiscectomy: spinal anesthesia offers optimal results in general patient population. *J Surg Orthop Adv.* 2007;16:5–11.
5. Demirel CB, Kalayci M, Ozkocak I, Altunkaya H, Ozer Y, Acikgoz B. A prospective randomized study comparing perioperative outcome variables after epidural or general anesthesia for lumbar disc surgery. *J Neurosurg Anesthesiol.* 2003;15:185–192.
6. Forero M, Adhikary SD, Lopez H, Tsui C, Chin KJ. The Erector Spinae Plane Block: A Novel Analgesic Technique in Thoracic Neuropathic Pain. *Reg Anesth Pain Med.* 2016 Sep-Oct;41(5):621-7
7. Chin KJ, Lewis S. Opioid-free Analgesia for Posterior Spinal Fusion Surgery Using Erector Spinae Plane (ESP) Blocks in a Multimodal Anesthetic Regimen. *Spine (Phila Pa 1976).* 2019 Mar 15;44(6):E379-E383.
8. Forero M, Adhikary SD, Lopez H, Tsui C, Chin KJ. The Erector Spinae Plane Block: A Novel Analgesic Technique in Thoracic Neuropathic Pain. *Reg Anesth Pain Med.* 2016 Sep-Oct;41(5):621-7
9. K. J. Chin, L. Malhas, and A. Perlas, “The erector spinae plane block provides visceral abdominal analgesia in bariatric surgery a report of 3 cases.
10. Singh S., Chaudhary N.K. Bilateral ultrasound guided erector Spinae Plane Block for postoperative pain management in lumbar spine surgery: a case series. *J Neurosurg Anesthesiol.* 2019 Jul;31(3):354.