

Ultrasound-guided erector spinae plane block for awake spine surgery: A case report and review of the literature

ABSTRACT

Percutaneous endoscopic lumbar discectomy is increasingly gaining recognition as an alternative to open microdiscectomy for the treatment of intervertebral disk herniation. Apart from the neuraxial blockade, and general anesthesia, there is literature demonstrating the performance of endoscopic lumbar discectomy under sole local anesthesia infiltration. This is particularly advantageous as an awake patient assists the surgeon by verbalizing and preventing any inadvertent nerve root damage. However, marked pain has been reported during key steps such as endoscope port installation and radiculolysis. The erector spinae plane (ESP) block is an interfascial paraspinal block that soaks the spinal nerve roots with epidural spread providing superior analgesia for endoscopic discectomy. The utility of ESP block as a perioperative analgesic technique following spine surgery is well established; there are no reports of successful endoscopic discectomy performed using this block. This article emphasizes the utility of ESP block as the sole anesthetic technique for minimally invasive spine surgery in the awake state.

Key words: Awake spine surgery, erector spinae plane block, interfascial plane block, percutaneous endoscopic lumbar discectomy

Introduction

The treatment of herniated intervertebral disks of the lumbar spine is constantly evolving to minimize perioperative complications. The gold standard surgical treatment is open microdiscectomy; however, lately, percutaneous endoscopic lumbar discectomy is emerging as a successful alternative.^[1] Local anesthesia, neuraxial blockade, and general anesthesia have all been used for this procedure, but without any consensus. The erector spinae plane (ESP) block is an interfascial plane block, which has found utility in a wide variety of procedures including lumbar spine surgery. This case report highlights the role of ultrasound-guided ESP block in minimally invasive spine surgery.

Case Report

A patient in his 50s with a history of fall from the stairs two months ago presented with low backache and sharp shooting pain radiating to the right thigh. On evaluation, he was diagnosed with L₄-L₅ posterior intervertebral disk prolapse and posted for transforaminal percutaneous endoscopic lumbar discectomy. He was a known case of type 2 diabetes mellitus on oral hypoglycemic agents with a well-controlled glycemic profile. He was also overweight (body mass index: 29 kg/m²) with a history of snoring. The rest of his investigations were normal. Pre-emptive analgesia

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in the form of oral acetaminophen and gabapentin was administered.

Inside the operation theater, standard monitoring was instituted. Oxygen was supplemented with a facemask (6l/min), dexmedetomidine infusion ($1 \mu\text{g}\cdot\text{kg}^{-1}$ bolus over 15 minutes followed by $0.5 \mu\text{g}\cdot\text{kg}^{-1}\cdot\text{min}^{-1}$) was started, and the patient was turned prone. An ultrasound transducer (2.5–5 Hz) was positioned 3 cm from the midline in the sagittal plane longitudinally, and the trapezius, rhomboid major, erector spinae muscle, and the T_{12} transverse process were identified. The needle was inserted from the caudal to the cranial direction to reach the interfascial plane between the erector spinae muscle and the T_{12} transverse process [Figure 1a], and the drug was deposited (13 ml of 0.5% bupivacaine and 13 ml of 2% lignocaine with dexamethasone 8 mg). Adequate spread of the drug was noted [Figure 1b]. A single endoscopic port was created, and L_4 – L_5 intervertebral disk was accessed and removed. The vitals were stable throughout, and the patient was in communication with the operating surgeon. The patient reported his general satisfaction using the numerical rating scale with a score of 10. He was discharged the next day with complete relief of pain.

Discussion

With advancements in modern microsurgery, and improved imaging technology, minimally invasive surgery in the form of percutaneous endoscopic lumbar discectomy is gaining popularity. It has many advantages such as a small

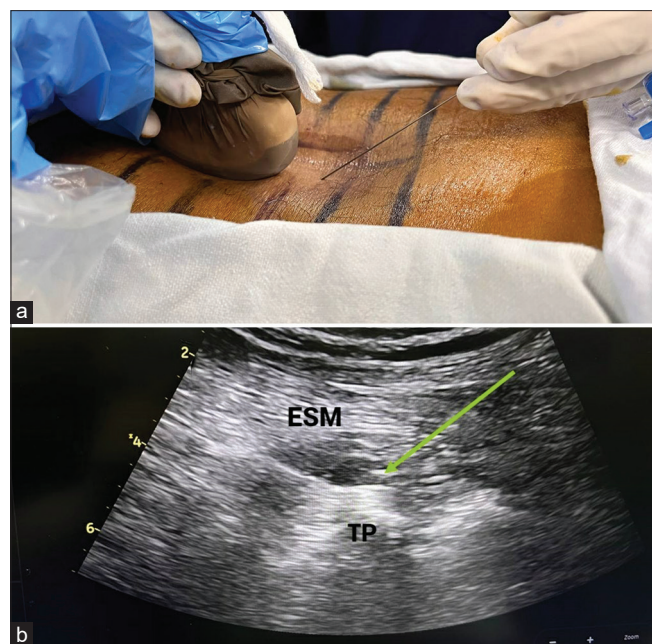


Figure 1: (a) Placement of an ultrasound-guided erector spinae plane block. (b) Spread of the drug between the tip of the transverse process (TP) and erector spinae muscle (ESM)

skin incision (8 mm), less paravertebral muscle, soft tissue trauma, and fewer perioperative complications leading to early recovery.^[1] The major concern during this surgery is the proximity of the endoscope to the spinal cord, nerve roots, and constricted operative space increasing the possibility of irreversible neural injury.^[1]

The performance of endoscopic discectomy under sole local anesthesia infiltration at the surgical site allows the patient to communicate with the surgeon, avoiding nerve root damage. It also avoids polypharmacy, nausea, vomiting, and airway manipulation associated with general anesthesia. It is especially beneficial in the elderly with multiple comorbidities with a reduced margin of safety. However, many patients report marked pain, especially during the endoscope port installation, removal of large sequestered fragments, and radiculolysis, which increases discomfort and may precipitate adverse cardiovascular events.^[1,2] A study ($n = 20$) found that 40% of the patients undergoing endoscopic discectomy under local anesthesia complained of moderate pain intraoperatively.^[3] Analgesia can be supplemented with opioids, which have side effects such as nausea, vomiting, respiratory depression, and constipation. This was corroborated by another study, which reported a 28% incidence of nausea and vomiting when local anesthesia was supplemented with opioids during endoscopic discectomy.^[4]

Epidural anesthesia facilitates a clear consciousness of the patient intraoperatively. A reasonable choice of the anesthetic agent along with control of the sensory domain helps to minimize pain and maintain motor function.^[5] A meta-analysis comparing neuraxial versus general anesthesia for lumbar surgery found lower perioperative heart rate, blood pressure, analgesic requirement, and faster recovery in the neuraxial group.^[2] Neuraxial anesthesia, however, has a limited duration of action, and patients find it difficult to lie still for longer (>90 mins).^[2] It may also lead to hypotension and urinary retention delaying early ambulation, and unintentional motor blockade may mask nerve root injury. Choi *et al.*^[6] reported an 8.6% incidence of nerve root injury in percutaneous endoscopic lumbar discectomy under epidural anesthesia.

Patients who receive general anesthesia cannot perceive nerve injury or pain. A higher incidence of limb numbness (7.4% v/s 6.7%) and motor weakness (4.8% v/s 2.2%) has been reported in patients undergoing endoscopic discectomy under general anesthesia compared with epidural anesthesia.^[7]

The ESP block acts on the dorsal and ventral spinal nerve roots and also has epidural spread producing a paraspinal

block. The thoracolumbar fascia facilitates the craniocaudal drug spread over 3–6 vertebral levels, and the analgesia is reported to last 12 hours postoperatively.^[8] Although it is established that ESP block reduces perioperative opioid consumption and pain scores in lumbar spine surgery, there are no studies on the utility of ESP block as the sole anesthetic technique for percutaneous endoscopic discectomy. Better patient satisfaction and early ambulation have been reported in patients undergoing lumbar spine surgery under general anesthesia supplemented with ESP block.^[9] The ESP block is a sensory nerve block with an increased margin of safety compared with the neuraxial blockade. Several peaks of intraoperative pain have been reported during endoscopic discectomy, that is, during canal formation in the facet joints, endoscope port installation, and nerve root irritation at the time of removal of the disk.^[10] The use of ESP block made it possible to successfully overcome these peaks of pain and thus reduced the need for repeat fluoroscopy and total operative time. Our patient was overweight as well, and we could avoid airway manipulation and polypharmacy and provide opioid-free analgesia facilitating early ambulation. As the search for an effective ideal analgesic technique continues, ESP block emerges as a viable option that can improve patient satisfaction and surgical outcome without compromising on quality and safety.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understands that his name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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