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Epidural Spread of Local Anesthetic Following Lumbar Erector Spinae Block

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Introduction

Erector spinae blocks (ESP) are commonly used analgesic adjuncts for several different surgeries. Much of this rise in popularity stems from anesthesiologists becoming more facile with ultrasound-guided nerve and plane blocks, relatively low complication rates, sparing of motor blockade, and the favorable safety profile in the setting of anticoagulation. At our institution, we routinely perform preoperative, bilateral, single level, single shot ESP blocks for all lumbar spinal fusions, and perform approximately 700 per year. Although the majority occur without issue, we present an example of unanticipated epidural local anesthetic spread resulting in lower extremity weakness and numbness.

Methods and Materials

We performed a retrospective review of one case and performed a brief literature review on the topic. The patient gave consent to be written up. As the case report is devoid of patient identifiable information, it is exempt from IRB review requirements as per Hartford Healthcare policy.

References

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(3) Celik M, Tulgar S, Ahiskalioglu A, et al. Is high volume lumbar erector spinae plane block an alternative to transforaminal epidural injection? Evaluation with MRI. Regional Anesthesia & Pain Medicine 2019;44:906-907.
(4) Tulgar S, Aydin ME, Ahiskalioglu A, De Cassai A, Gurkan Y. Anesthetic Techniques: Focus on Lumbar Erector Spinae Plane Block. Local Reg Anesth. 2020;13:121-133 https://doi.org/10.2147/LRA.S233274

Case Report

A 60-year-old man with a prior L5-S1 fusion 20 years ago, presents with worsening back, buttock, and lower extremity pain. He arrived at the Bone and Joint Institute for a decompression fusion of L3-5 with orthopedic surgery.

His past medical history consisted of depression, Barrett's esophagus, prior transient ischemic attacks, current tobacco abuse, hyperlipidemia, and suspected obstructive sleep apnea. His medications included Divalproex and Quetiapine. This patient received our routine preoperative bilateral lumbar ESP single-shot block under mild sedation. With the patient in the seated position, the needle was advanced under direct in-plane US-guidance using a curvilinear transducer. Thirty mL of 0.25% bupivacaine mixed with 1:400K epinephrine and 5 mg dexamethasone was deposited deep to the erector spinae muscle overlying lumbar transverse process bilaterally for a total of 60mL (Figures 1-2). Vitals signs remained stable and he denied any complaints. Due to a delay in the operating room, the patient remained in the preop area for approximately 1 hour prior to his surgery.

In the OR, he was unable to move his legs when trying to move from the stretcher to the operating table. A detailed neurological exam showed bilateral lower extremity weakness and decreased sensation to cold up to T10. It was suspected that the local anesthetic from the bilateral ESP blocks had spread into the lumbar and thoracic epidural spaces. The patient stated that he had noticed these symptoms following the block but did not notify anyone and that his symptoms had started resolving, with increased ability to move his toes. Given that epidural blockade would interfere with the surgical neuromonitoring, the operation was delayed until the motor and sensory block had worn off.

After another hour, lower extremity motor and sensory exams returned to baseline. The patient returned to the OR and underwent an uneventful L3-4 XLIF, L4-5 TLIF, L3-5 PSF/laminectomy, and L5-S1 exploration of his previous fusion. There were no abnormalities detected with neuromonitoring during the surgery. Post-operatively his pain was well controlled with oral hydromorphone. He worked with physical therapy without any motor or sensory deficits in either lower extremity and was discharged home on post-op day 3.

Figure 1. Needle path of lumbar ESP block, one side

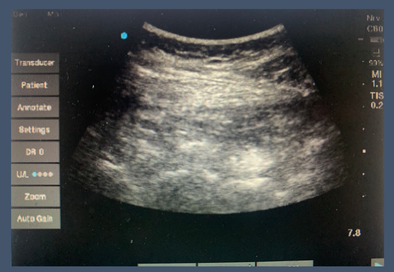


Figure 2. Needle path of lumbar ESP block, one side

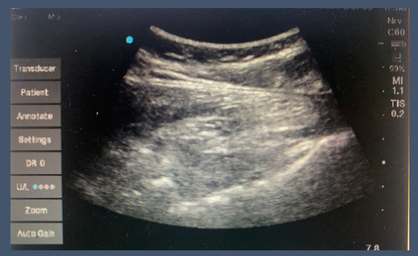
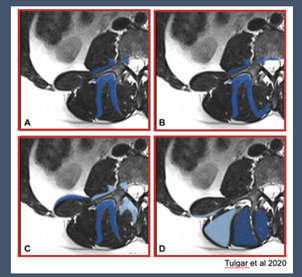


Figure 3. Tulgar et al study of ESP block spread patterns seen on MRI



Discussion

To our knowledge, this is the first known report of a clinically significant, bilateral epidural spread of local anesthetic from a lumbar ESP block. Furthermore, we discovered this complication preoperatively with physical exam because of our normal workflow of performing these blocks in the preop area, prior to inducing general anesthesia. Plane blocks, like TAP, serratus anterior, and ESPs do not involve perineural injection, and do not necessarily require a conversant, awake patient to help detect an intraneuronal injection. Therefore, some perform these blocks on anesthetized patients. However, an unrecognized epidural spread may erroneously affect neurological monitoring that could have a potential negative impact on the patient's surgical outcome. Knowledge of this possible complication could help guide anesthesiologists' future practice.

Due to the limited amount of literature about spread patterns of thoracic and lumbar ESP blocks, there is not wide consensus on the pattern of local spread for this block.(1) A small review article explored the relationship of injectate volume to craniocaudal spread in lumbar and thoracic ESPs.(2) The authors suggested that 5 ml of local anesthetic was needed for appropriate spread at each level lumbar nerve blockade. Few articles describe a variety of lumbar ESP block spread patterns when radiographic evaluation is used. A literature review by Tulgar et al summarized 4 general patterns described in 4 papers that they displayed in the included image (Figure 3). The dark blue areas represent locations of spread with all injections, and the light blue were areas with less frequent spread.(4)

A case report described the spread of a lumbar ESP block used to therapeutically treat chronic lumbar and radicular pain as a substitute to an epidural steroid injection. Due to epidural access previously being described as difficult, the providers performed an ultrasound-guided lumbar ESP with 40 ml of local anesthetic with steroid and contrast agent. The patient's pain greatly improved up to 8 weeks later, with relief of pain and radicular symptoms, but no loss of motor or sensory function. A follow-up MRI at that time showed persistent contrast between L1 and S4 vertebral levels, as well as in the left fascial spina muscle, the surrounding fascia, and the erector spinae muscle. There was also extension of contrast in the neural foramina from L1 to L5 and to the left anterior and posterior epidural space(3), thus providing a possible mechanism for the clinical findings our patient exhibited.

Although these reports suggest potential mechanisms to explain an epidural spread of local anesthetic, it is unclear what was different about this patient or clinical situation that led to ESP to epidural spread, compared to the hundreds of other patients who had this done without incident. The practitioner performing the block was experienced with this technique and there was nothing unusual about the patient's history, anatomy, ultrasound image, or injection pressure. We hope this case serves as a cautionary tale to those performing these blocks under general anesthesia and sparks further studies into patient and/or block risk factors for this complication.