

Epidural Placement Challenges in the Setting of Spinal Fusion



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BACKGROUND

Patients who have anatomical variation or previous spinal surgery present unique challenges to anesthesiologists in providing neuraxial anesthesia. Previous spinal interventions can cause ligamentum flavum hypertrophy, spinal scarring, and narrowing of the epidural space due to obstruction by hardware or osseous changes. Other anatomical variations and changes including spinal stenosis, scoliosis loss of vertebral height can lead to challenges in performing anesthesia. Challenges can include increase the risk of unintentional dural puncture, false loss of resistance, and may lead to an inability to thread an epidural catheter.

Although studies have shown that the success rate of neuraxial following spinal surgery is 85-95%, with only 50-60% analgesic efficacy, particular considerations can optimize an anesthesiologist for success. This case aims to discuss the preoperative management, methods of troubleshooting difficult epidural placement, and alternative labor analgesia strategies, pharmacologic and nonpharmacologic for patients with complex spinal anatomy.

CASE DESCRIPTION

A 28-year-old G1P0 female presented for routine labor analgesia at 39 weeks gestation due to active labor. Patient history was significant for a previous T12 fracture following a motor vehicle accident which required T10-L3 spinal fusion. Prior to epidural placement, labs and imaging were reviewed. MRI showed findings suggestive of scarring around the L3 level.

Patient was consented and prepped for epidural for managing active labor. A 17 gauge epidural Tuohy needle was advanced without difficulty at the L4-5 Level. Loss of resistance to air was obtained, and the catheter was threaded approximately 2-3cm but quickly met resistance. The patient underwent a second attempt of epidural placement at the L5-S1 level and similar resistance was met at 2-3cm of threading the catheter. Despite attempts of expanding the epidural space with sterile saline and maneuvering the Touhy needle, the catheter could not be advanced.

After extensive discussion with the patient, the procedure was aborted. Hours later, patient required an urgent C-section and the patient underwent spinal anesthesia without difficulty.

IMAGES



Image 1: MRI of an alternative patient with L3-4 discopathy



Image 2: X-Ray of an alternative patient with thoracolumbar screw fixation

DISCUSSION

Our patient was found to have significant post-surgical scarring of her lumbar spine, which made threading the epidural catheter challenging. We postulate that manipulation of the dura and surrounding tissues from her previous surgery induced local inflammation and led to formation of scar tissue between the ligamentum flavum and the dura mater. Patients with similar spinal anatomy and variations may present with challenges including inaccurate loss of resistance with subsequent inaccurate placement of neuraxial anesthesia.

Prior to receiving neuraxial anesthesia, patient history, labs and imaging should be reviewed for appropriate planning and risk analysis.

DISCUSSION CONT.

MRI is the most comprehensive modality to evaluate the soft tissue and spinal cord with CT and X-ray can assist in assessing bony structures and hardware. Although imaging records of patients presenting for neuraxial anesthesia may or may not be available, consideration may be given to repeat imaging to allow for better risk assessment and planning. Troubleshooting difficult epidurals includes the use of a spinal needle with confirmatory CSF flow, expansion of the epidural space with saline, and converting to a single shot spinal analgesia when catheter placement is not feasible.

Alternatively, other pain modalities can be considered, including inhaled nitrous oxide or PCA with ketamine, fentanyl or remifentanyl. These pumps can be continuous, or through a bolus depending on patient preference and hospital protocols. Anesthesiologists must consider the risks of fetal exposure when considering systemic IV medications. Pharmacologic modalities also require closer monitoring, due to risks apnea, hypoxia and sedation and may not be appropriate. Additionally, paravertebral lumbar sympathetic block can be considered during the first stage of labor and a pudendal block during second stage of labor, to target the sympathetic innervation of uterine pain during contractions, and to numb the perineal region during delivery. Providers may also consider transcutaneous electric nerve stimulator (TENS) or acupuncture as well as mindfulness and coaching.

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