



Epidural Spread of Lumbar Plexus Block: Anatomical Considerations and Clinical Implications

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49th Annual Regional
Anesthesiology and Acute
Pain Medicine Meeting
March 21-23, 2024 | San Diego, CA

ASRA PAIN MEDICINE



INTRODUCTION

- The lumbar plexus block is considered an advanced regional anesthesia nerve block that has been proven efficacious for many years
- Advantages:
 - Lessen opioid use
 - Increase patient comfort
 - Encourage postoperative ambulation
- Indications:
 - Surgical anesthesia (when combined with a sciatic nerve block)
 - Perioperative analgesia for surgeries involving the lower extremity
- This case report discusses right lower extremity numbness and weakness following an uneventful left lumbar plexus block, likely due to inadvertent epidural spread

BACKGROUND

- L1-L4 nerve roots form the lumbar plexus; in 60% of the population, it includes the T12 nerve root (2)
- Techniques:
 - Landmark (different lumbar levels or distances from midline)
 - Neurostimulation
 - Under neurostimulation, the femoral nerve evokes a motor response in the quadriceps muscle
 - Ultrasound
- Potential complications
 - Epidural or intrathecal injection, renal injury, local anesthetic systemic toxicity, retroperitoneal or psoas muscle hematoma, or peripheral nerve injury (3)
 - Epidural spread has been reported in up to 27% of adults and 92% of children (1)

CASE REPORT

- A 30-year-old male, otherwise healthy, presented for a skin graft over his left below-knee traumatic amputation stump. He preoperatively received a left, single-shot lumbar plexus block with nerve stimulation for pain control.

First block attempt

- The needle was lined up with the iliac crest as an L4 landmark and inserted 5 cm from the midline
- Transverse process was contacted with the needle angled 30-45 degrees medially; the needle was walked off transverse process, but no muscle twitch was elicited

Second block attempt

- The needle was inserted 1 cm medial to the previous insertion site
- Transverse process was contacted perpendicular to the skin, and when the needle was walked off, the left quadriceps twitch was elicited at 1.0 mA and lost at 0.5 mA

- Subsequently, 20 mL of 0.5% ropivacaine was injected in incremental doses
- There was no paresthesia noted on injection or immediately following injection

Postoperative Events

- In PACU, the patient had right leg weakness, which started to resolve after 3 hours
 - He had a T12 sensory level on the right side and an L1 sensory level on the left side
- The Acute Pain team discussed with the patient that his right leg weakness was most likely due to epidural spread of the local anesthetic from the lumbar plexus block
- Patient was contacted the next day and reported his motor and sensory function had returned to baseline

Figure A.

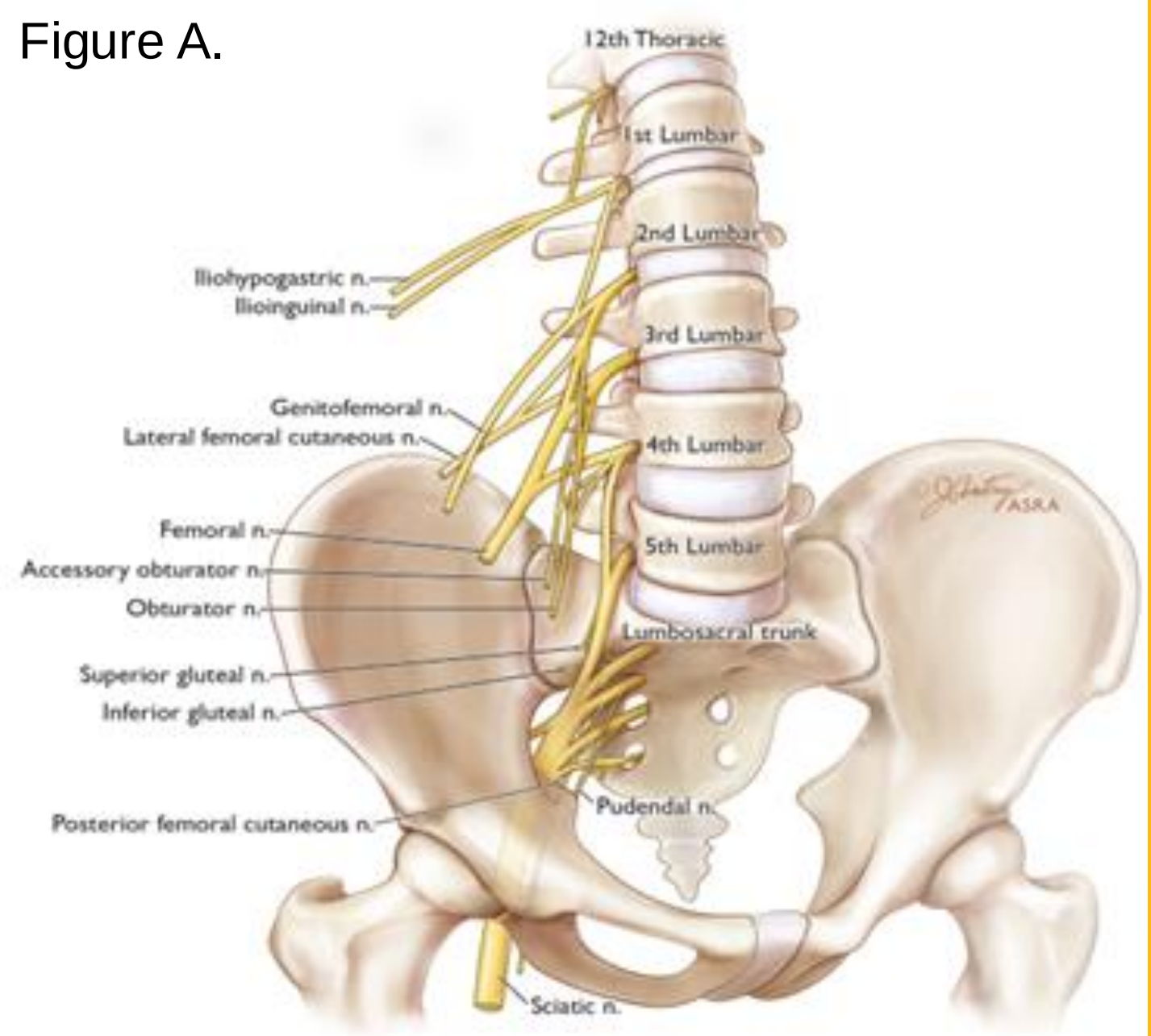


Figure A. Nerve roots of the lumbar plexus

Figure B.

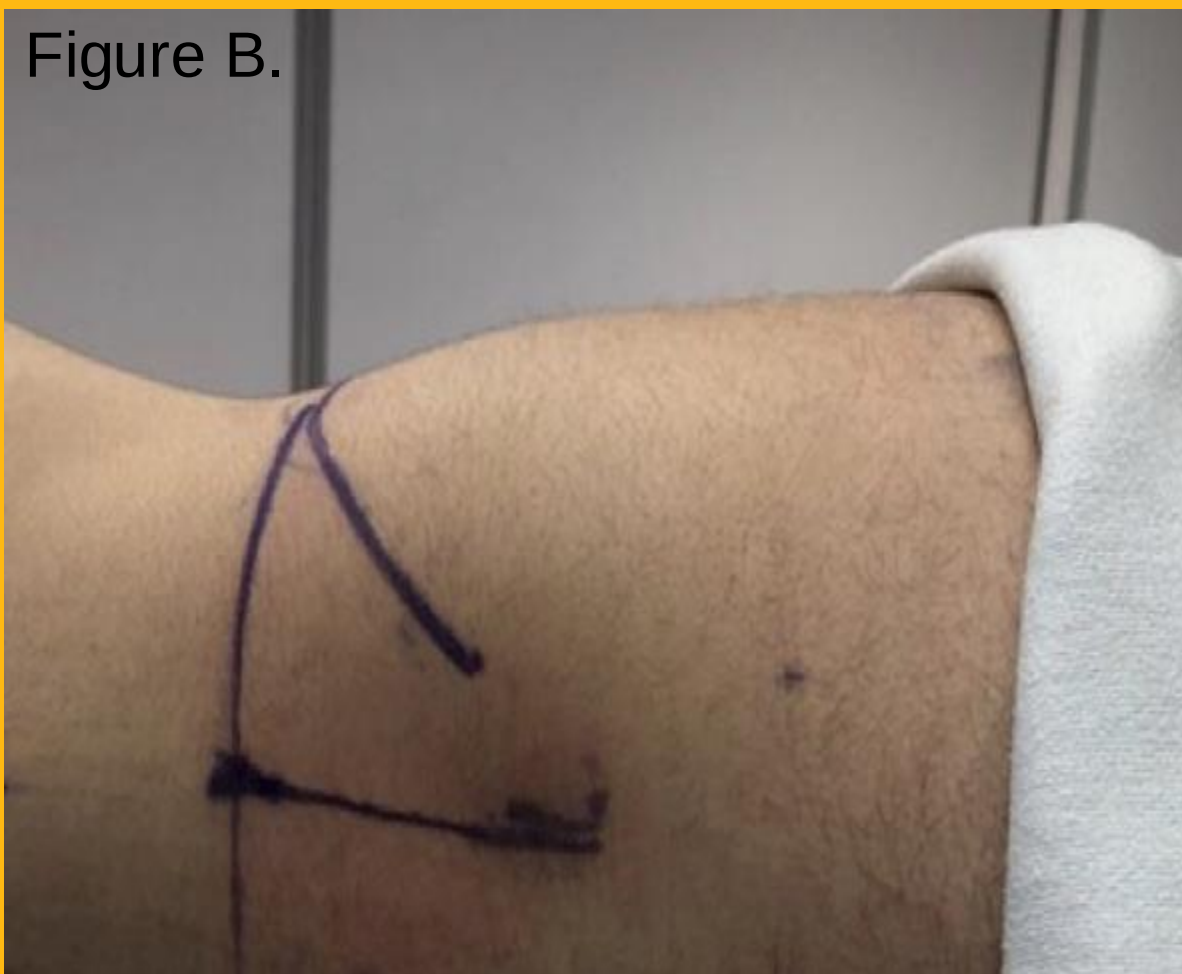


Figure B. Lumbar plexus block landmarks

Figure C.



Figure C. Location of quadriceps motor response with nerve stimulator

DISCUSSION

- Even though epidural spread from a lumbar plexus block is a known complication, techniques and considerations can help prevent it
- High injection pressure (>20 psi) can increase chance of epidural spread (1)
 - Incremental injection can decrease absorption from the deep muscle beds, and prevent unintended intravascular injection as this block area has increased vasculature
- Nerve stimulation current should not be elicited less than 0.5 mA
 - Lower current can suggest needle placement within the dural sheath and cause local anesthetic spread to the epidural or subarachnoid spaces (3)
- Needle insertion with a more medial and cephalic (L3) approach increases the chance of epidural spread (1)
- Following lumbar plexus blocks, patients should be monitored similarly to patients who receive epidural anesthesia since local anesthetic spread to the epidural space can cause significant hypotension due to sympathectomy (3)
 - Reports of cardiac and respiratory arrest following a lumbar plexus block in patients with high dermatomal blocks (1)
- Spinal deformity can impact spread of the local anesthetic (1)
- If a lumbar plexus block catheter is placed, it should be tested for negative aspiration of heme or cerebrospinal fluid before injection
- More studies need to be done to determine if ultrasound guidance will reduce the risk of epidural spread
- Communication with patients is key, they should be made aware of potential epidural spread; provide reassurance that epidural block is typically temporary

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