

Case Report

Acute cauda equina syndrome following orthopedic procedures as a result of epidural anesthesia

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Abstract

Background: Cauda equina syndrome (CES) is a rare complication of spinal or epidural anesthesia. It is attributed to direct mechanical injury to the spinal roots of the cauda equina that may result in saddle anesthesia and paraplegia with bowel and bladder dysfunction.

Case Description: The first patient underwent a hip replacement and received 5 mL of 1% lidocaine epidural anesthesia. Postoperatively, when the patient developed an acute CES, the lumbar magnetic resonance imaging (MRI) scan demonstrated clumping/posterior displacement of nerve roots of the cauda equina consistent with adhesive arachnoiditis attributed to the patient's previous L4-L5 lumbar decompression/fusion. The second patient underwent spinal anesthesia (injection of 10 mg of isobaric bupivacaine for an epidural block) for a total knee replacement. When the patient developed an acute CES following surgery, the lumbar MRI scan showed an abnormal T2 signal in the conus and lower thoracic spinal cord over 4.3 cm.

Conclusions: Acute CES should be considered in patients undergoing spinal or epidural anesthesia for joint replacement surgery. Prompt evaluation with MRI studies may lead to appropriate medical/surgical measures to reverse the deficit.

Key Words: Anesthesia, arachnoiditis, cauda equina syndrome, lumbar spinal stenosis, neurosurgery, spine

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INTRODUCTION

Cauda equina syndrome (CES) is infrequent and may be associated with spinal/epidural anesthesia. Several etiologies have been proposed for CES, including direct or indirect neural trauma, inadvertent dural puncture, infection, and/or increased ischemia to the cord attributed to the lithotomy position.^[4,5]

We present two cases of CES following epidural anesthesia attributed to adhesive arachnoiditis/prior surgical scar and inappropriate needle placement.

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CASE REPORTS

Case report 1

A 59-year-old male [height 6', weight 250 lbs (113.4 kg); body mass index (BMI) 33.91 kg/m²] presented with a 2-year history of groin and left hip pain without radicular symptoms [Table 1]. He had a prior lumbar L4-L5 decompression fusion 3 years earlier.

The patient underwent a left total hip arthroplasty from an anterior approach. Prior to surgery, he received 5 mL 1% lidocaine epidural anesthesia through a catheter while seated. He immediately noted paresthesias in the left leg. The 17 G Tuohy needle was moved to the right, and the catheter was subsequently threaded 5 cm without paresthesia, blood, or CSF return. A 3 mL test dose was given, and there was no paresthesia. The patient was discharged home 6 h postoperatively. Within 24 h of surgery, he returned to the emergency department with urinary retention and a CES [Table 1]. He was subsequently admitted to the hospital 1 week later [Table 1].

A lumbar magnetic resonance imaging (MRI) with and without gadolinium contrast revealed multilevel lumbar spondylosis and clumping/posterior displacement of nerve roots of the cauda equina from L2-3 through L5-S1 compatible with arachnoiditis due to the prior surgery [Figure 1a and b]. The lower extremity electromyography (EMG) demonstrated denervation changes in the left L5 and S1 and right S1 myotome. Ten weeks later, the patient's CES symptoms/signs remained unchanged.

Case report 2

A 61-year-old female [height 5'3", weight 260 lbs (117.9 kg); BMI 46.07 kg/m²] underwent a right total knee arthroplasty utilizing a femoral nerve block (e.g., single-shot epidural block) and general anesthesia [Table 2]. In the right lateral decubitus position, the single-shot 10 mg isobaric bupivacaine epidural block was inserted from the paramedian approach without fluoroscopic assistance reportedly at the L3-4 interspace

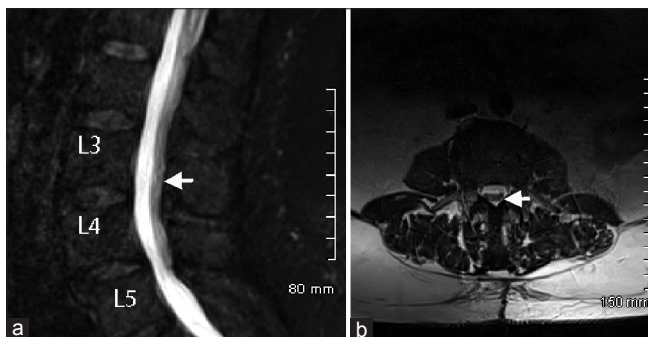


Figure 1: (a) Sagittal and (b) axial views of a lumbar magnetic resonance imaging (MRI) revealed multilevel lumbar spondylosis and evidence of clumping (arrows) and posterior displacement of nerve roots of the cauda equina within the thecal sac suggesting arachnoiditis

level. Right lower extremity paresthesia was noted, and the 22 G Quincke needle was pulled back. CSF was aspirated before and after the injection. Immediately after the knee arthroplasty, she demonstrated a CES [Table 2].

Postoperative thoracic and lumbar MRI scans with and without gadolinium contrast revealed an abnormal T2 signal in the conus and lower thoracic spinal cord

Table 1: Case report #2 of cauda equina syndrome

Preoperative physical examination
Antalgic gait
Positive FABER test on left hip
Postsurgical course
Signs and symptoms within 24 h of surgery
Severe left hip pain
Perineal numbness
Subjective weakness of lower extremities bilaterally
Urinary retention
Cauda equina syndrome
Treatment within 24 h of surgery
Foley catheter placed
Tamsulosin
Signs and symptoms at hospital admission 1 week later
Urinary and bowel retention
Perianal and scrotal numbness
Decreased rectal tone
Saddle anesthesia
Burning pain of feet bilaterally
Treatment at hospital admission 1 week later
Gabapentin
Methylprednisolone
Oxycodone
Physical therapy

Table 2: Case report #2 of cauda equina syndrome

Preoperative physical examination
Antalgic gait
Postsurgical course
Signs and symptoms immediately after surgery
Saddle numbness
Right hip pain
Paresthesia and numbness of right lower extremity
Decreased light touch in right leg in stocking-glove pattern
0/5 strength of right tibialis anterior
0/5 strength of extensor hallucis longus
Unable to bear weight on right leg
Wheelchair bound
Cauda equina syndrome
Treatment immediately after surgery
Gabapentin
Dexamethasone and methylprednisolone
Hydrocodone
Physical therapy

over a 4.3 cm segment along with postoperative changes [Figure 2a and b]. The most likely etiology of her CES was direct damage secondary to the epidural needle puncture. Two months later, the follow-up lumbar MRI scan with gadolinium contrast demonstrated resolution of the conus/cord swelling but residual T12-L1 myelomalacia. An EMG/NCV of the right lower extremity suggested a lumbar radiculopathy involving multiple nerve roots (L2-L5 maximally and S1 mildly) on the right side. Four months later, her CES remained unchanged.

DISCUSSION

Cauda equina syndrome has been reported in the setting of spinal or epidural anesthesia involving a host of local anesthetics, including bupivacaine, lidocaine, ropivacaine, and tetracaine.^[1,2,4,8,9] It has been suggested that limited cephalad extension of the sensory block and maldistribution of anesthetic may result in local anesthetic toxicity.^[1,2]

Few studies have implicated pre-existing lumbar pathology as playing an integral role in the development of CES following spinal or epidural anesthesia.^[3,7,10] Kubina and colleagues reported CES following transurethral resection of a prostate using 3.6 mL bupivacaine with glucose (5 mg/mL) intrathecally.^[3] The MRI scan performed postoperatively showed spinal stenosis at the L2-3 level. Wu and colleagues described a female who received 3 mL of 2% lidocaine epidural anesthesia for uterine cervix conization resulting in CES.^[10] The MRI demonstrated an epidural fluid accumulation around L5 and an incidental herniated intervertebral disc at L4-5. Despite an emergent surgical decompression, she continued to experience voiding abnormalities 5 years later.

Lumbosacral adhesive arachnoiditis resulting in CES may be attributed to the following: agents injected into the subarachnoid space, infection in the subarachnoid space, space occupying lesions such as neurofibroma, subarachnoid hemorrhage, vertebral trauma, or after spinal surgeries.^[6]

Here, CES in our first case was attributed to epidural anesthesia administered in the presence of lumbar

adhesive arachnoiditis in a patient who had a prior L4-5 laminectomy/fusion. Despite treatment with gabapentin, methylprednisolone, oxycodone, and physical therapy, he experienced no improvement of his symptoms. In the second case, the CES was attributed to the anesthesiologist's placing a needle at the L1-2 interspace. Direct injection into the cord/conus likely contributed to this neurological injury.

Physicians should be alert to the rare complication of CES that may arise following spinal or epidural anesthesia. Special attention should focus on patients who have undergone previous lumbar surgical intervention and may have developed adhesive arachnoiditis. Prompt identification of the precise etiology of CES permits timely treatment that may curtail or ameliorate the devastating consequences associated with this condition.

Declaration of patient consent

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

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Conflicts of interest

There are no conflicts of interest.

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Figure 2: (a) Sagittal and (b) axial views of a thoracic magnetic resonance imaging (MRI) scan revealed evidence of abnormal T2 signal in the conus over a 4.3 cm segment (arrows). (c) Sagittal view of a thoracic MRI scan performed 2 months later showed that the enhancement within the conus and the cord swelling had decreased, however, there were mild residual T2 signal changes (arrow)