Case Report

All that glitters is not gold: A spinal epidural empyema following epidural steroid injection

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INTRODUCTION

Spinal epidural empyema (SEE), also called spinal epidural abscesses (SEA), posts a significant risk of neurological morbidity and mortality (e.g., rates of 4–31% worldwide).[16,31] Several risk factors for SEE/SEA include diabetes, intravenous drug abuse, and recent spinal surgery (most frequent cause).[22,30,31,33-35] Fever, spinal tenderness/back pain, and progressive neurological deficits are the triad of symptoms/signs traditionally seen with SEE/SEA.[8,16,17,33,34,39]

Here, we present a patient with an acute cauda equina syndrome due to an MR-documented L4-L5 SEE/SEA following a spinal epidural spinal injection (ESI).
CASE REPORT

A 45-year-old female with a symptomatic lumbar disc herniation had an ESI. Over the next few weeks, she complained constipation with increasing leg pain and the progressive inability to walk; she finally developed in acute urinary retention. On examination, she had a cauda equina syndrome; 3/5 motor function in both lower extremities, with perineal hypoesthesia. Laboratory studies showed a high white blood cell count of 19.79 × 10^3/ml, while the emergent lumbar MRI without gadolinium showed an anterior epidural L4-L5-S1 empyema/abscess (e.g., low signal on T1- and a high signal in T2-weighted images) with marked thecal sac/root compression [Figure 1]. With the diagnosis of a SEE/SEA, an emergent laminectomy/decompression was performed that revealed thick, purulent, grayish fluid compressing the thecal sac anteriorly. Several samples were obtained for culture.

The presumptive initial vancomycin and ceftazidime were changed to clindamycin and gentamicin to address the methicillin-resistant *Staphylococcus aureus* and *Streptococcus parasanguinis*. The 3-day postoperative lumbar MRI documented adequate decompression of the cauda equina [Figure 2], and the remainder of the postoperative course was uneventful; 1 month postoperatively, she had residual 4/5 motor function in the right lower extremity without any residual sphincter dysfunction [Figure 3].

DISCUSSION

Despite the lack of documented safety and efficacy[37,41] and without approval of the Food and Drug Administration, ESIs

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**Figure 1:** Preoperative emergency MRI without gadolinium. In (a), the sagittal T1-weighted image provides suboptimal visualization of epidural abscess. In (b), the sagittal T2-weighted image demonstrates a longitudinally oriented mass-like lesion in the anterior epidural space spreading between the posterior wall of L4 and L5. In (c), the axial T2-weighted image demonstrates right side epidural abscess compressing both the cauda equina and right L5 and S1 emergent nerve roots.

**Figure 2:** Three days postoperative MRI without gadolinium. In (a), the sagittal T1-weighted image, in (b), the sagittal T2-weighted image, in (c), the axial T2-weighted image demonstrate marked reduction of the preoperative empyema mass at L4 and L5 level in the anterior epidural space with consensual reduction of the compression on the adjoining meningeal and neural structures.
### Table 1: Summary of case reports on spinal epidural abscess following spinal epidural steroid injection.

| Author, year | Patient's age, sex | Trauma history | Timing; clinical presentation | Imaging study performed | Imaging findings | Emergency surgery performed | Postop outcome | Microorganism isolated |
|-------------|---------------------|----------------|-------------------------------|-------------------------|----------------|-----------------------------|---------------|------------------------|
| Chan and Leung, et al. (1989) | 56 yo, M | Injection of triamcinolone acetonide for low back pain and right sciatica | Two days after procedure; fever, child and rigor; then increasing back pain, bilateral sciatica, weakness of both lower limbs, and urinary retention | Lumbar spine radiography; CT scan; myelogram | CT inconclusive; complete extradural block at level C3; during myelography | T8–L4 laminectomy, then cervical laminectomy, abscess drainage | Uneventful. Improving muscle power and urinary control | Not specified |
| Goucke and Graziotti, et al. (1990) | 65 yo, F | Three L4–5 injections of bupivacaine and methylprednisolone for resistant low back pain | Weeks later; difficult walk, increasing back pain, and then radiating to the left lower limb, progressively neurological deterioration to urinary retention 72 h later; shaking chills, stiff neck, and fever | Lumbar spine radiography; myelography; CT scan | T12–L5 extensive extradural abscess | T12–L5 laminectomy, abscess drainage | ICU needed for ventilatory failure; still bladder dysfunction, unable to walk; death 2 weeks later | S. aureus |
| Waldman, et al. (1991) | 55 yo, M | Cervical steroid epidural nerve blocks for cervical radiculopathy | Myelography; CT scan | Mass extended to approximately the third cervical vertebral body | C6 laminectomy | Deterioration of neurological status over next hours; a second CT showed a persistent epidural mass; a second laminectomy C4–C5 was performed; a third laminectomy C6–T1 was performed; a third laminectomy T12–L5 was performed; a second drainage | S. aureus |
| Mamourian et al., et al. (1993) | 84 yo, F | Steroid injection for low back pain | MRI | Sharply margimated mass in the dorsal epidural space | L4–S2 pus drainage; laminectomy | Conservative antibiotic treatment | Recovered baseline neurologic function and neck pain status, still left hand hypesthesia and weakness present before sternum injection | S. aureus |
| Knight et al., et al. (1997) | 53 yo, M | Injection of procaine hydrochloride and triamcinolone acetonide for the right buttock pain radiating into posterolateral thigh and calf | MRI; lumbar puncture | Lumbar MRI scan inconclusive; L4–5 lumbar puncture aspiration of frank pus | L4–L5 bilateral foraminal and nerve root canal decompression | Tracheal postop intubation, loss of motor function in legs with absent reflexes, and lax anal sphincter tone. The C3–C4 laminectomy and extradural and subdural pus drainage | S. aureus |
| Huang et al., et al. (2003) | 51 yo, M | Steroid injections for the left posterior shoulder and neck pain | Twenty-two days later; worsening back pain, leg weakness, and urinary incontinence | MRI | C4–C6 epidural abscess | C4–C6 laminectomy, irritation, and debridement | S. aureus |
| Zhang et al., et al. (2017) | 65 yo, F | Two C7–T1 epidural injection of lidocaine, dexamethasone, Vitamin B1 and B6, mecobalamin for neck and shoulder pain with the left arm numbness | Few days later; severe shoulder, neck and head pain, low-grade fever | Chest X-ray; cervicothoracic MRI | Epidural inflammation from C6–T8 and abscess formation | Conservative antibiotic treatment | Epidural abscess was completely absorbed, and the patient discharged from the hospital | S. aureus |
| Our case, 2020 | 45 yo, F | Steroid injection for low back and right leg pain | Few weeks later; constipation, acute urinary retention, increasing leg pain bilaterally, deeper to the right side, and inability to walk | Lumbosacral MRI | Epidural mass between posterior wall of L4–L5 | Right L4 hemilaminectomy and surgical site debridement | Improvement of her neurological status, residual complaint 4/5 strength right lower extremity especially assessing hip flexion, sphincter control recovery | S. aureus |
are still being performed. Nevertheless, as noted here, there are serious complications of ESIs that include spinal epidural and subdural hematomas, brain/cord infarctions (cervical ESI), and spinal epidural/subdural abscesses.

The classical triad of SEE/SEA includes fever, back pain, and neurological deficits which may rapidly progress to quadriplegia/paraplegia. Laboratory studies usually show elevated WBC counts and increased ESR, CRP, and procalcitonin levels. Enhanced MRI remains the study of choice for documenting SEE/SEA that is most frequently found in the thoracic (48%), lumbar (31%), and cervical regions. A definitive diagnosis of the offending organism is critical to choosing appropriate antibiotic therapy. Where inflammatory markers continue to rise, MR studies show worsening, and neurological deficits progress, operative decompression/drainage is warranted in a timely fashion. Notably, the majority of SEE/SEA are due to a S. aureus species.

[Table 1] summarizes reported reviewed cases of extradural abscess following extradural analgesic injection for low back and radiculopathies to our knowledge.

Following spinal ESI, patients generally present within few weeks with back pain, fever, radiculopathies, and/or myelopathy. Enhanced MRI studies are the examinations of choice as they will demonstrate show epidural infections within 2–4 weeks; X-rays and CT studies will take up to 6–10 weeks to show abnormalities.

Here, the patient presented with pain, fever, and a neurological deficit (3/5 motor function of RLE), perineal hypoesthesia, and urinary retention. Once abnormally elevated laboratory inflammatory markers and an MR confirming an anterior L4-S1 epidural empyema were obtained, an emergent decompressive hemilaminectomy was performed that largely resolved the patient’s preoperative deficits. Sample biopsy was crucial to maximize efficacy, tailored antibiotic therapy, and limit resistance.

CONCLUSION

SEE diagnosis should be suspected in a patient presenting with the classic triad of back pain, fever, and a neurological deficit, associated with elevated laboratory inflammatory markers and MRI findings of significant epidural spinal compression. This clinical picture should prompt early neurosurgical intervention/decompression to minimize long-term neurological sequelae.

Declaration of patient consent

Patient's consent not required as patients identity is not disclosed or compromised.

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Conflicts of interest

There are no conflicts of interest.

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