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Case Report

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

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ABSTRACT

Background: Therapeutic epidural spinal injections (ESIs) of steroids are one of the most common nonsurgical management modalities employed for alleviating pain due to chronic persistent lumbar spinal disease. However, it is well documented that they have significant risks and complications without any long-term efficacy. ESI may result in epidural empyema which may be difficult to diagnose with delays resulting in significant permanent neurological sequelae.

Case Description: A 45-year-old female presented with a lumbar spinal epidural empyema after receiving ESI for low back and right leg pain due to a lumbar disc herniation. Laboratory studies showed elevations of multiple inflammatory markers, and the MR documented a significant lumbar epidural empyema contributing to significant thecal sac compression. Clinically, the patient had an acute cauda equina syndrome warranting emergency surgery consisting of a laminectomy for debridement/decompression followed by long-term antibiotic treatment.

Conclusion: Epidural empyema is a major potential complication of lumbar ESI. Multiple markedly elevated inflammatory markers (WBC, ESR, CRP, and procalcitonin) and MRI evidence of an epidural empyema necessitates emergent surgical intervention to limit morbidity, neurological sequelae, and mortality.

Keywords: Lumbar degenerative disease, Pain management, Spinal epidural abscess, Spinal infection, Spinal procedure

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 classically 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].

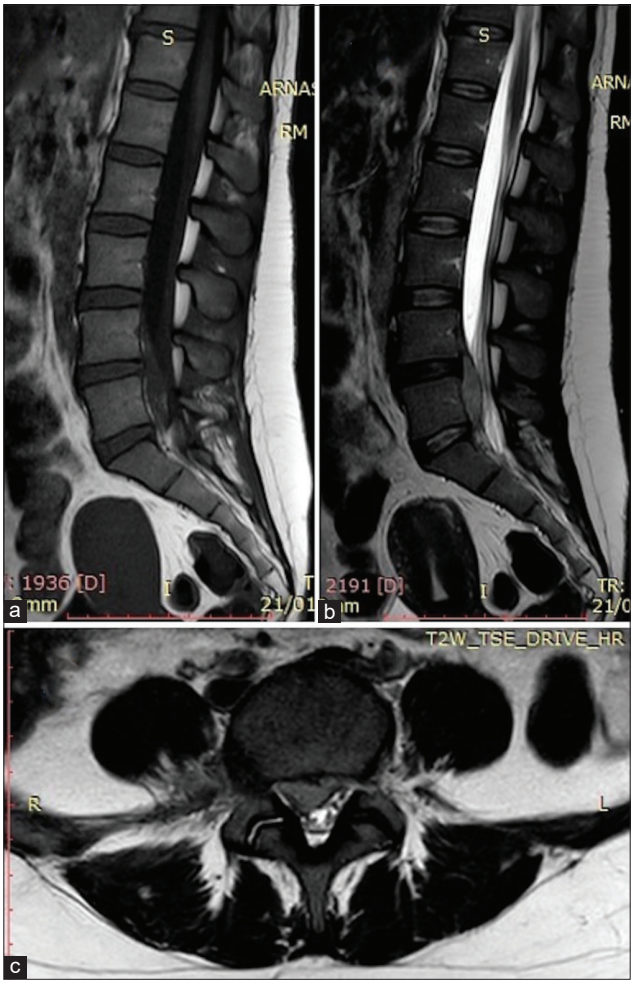

Figure 1: Preoperative emergency MRI without gadolinium. In (a), the sagittal T1-weighted image provides suboptimal visualization of epidural abscess. In (b), the sagittal T2-weighted image demonstrates a longitudinally oriented mass-like lesion in the anterior epidural space spreading between the posterior 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.

DISCUSSION

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

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,[4] 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 C3during myelography	T8-L4 laminectomy, then cervical laminectomy, abscess drainage	Uneventful. Improving muscle power and urinary control	Not specified
Goucke and Graziotti,[15] 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	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,[40] 1991	55 yo, M	Cervical steroid epidural nerve blocks for cervical radiculopathy	72 h later; shaking chills, stiff neck, and fever	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	*S. aureus*
Mamourian *et al.*,[27] 1993	84 yo, F	Steroid injection for low back pain	Two weeks later; worsening back pain, leg weakness, and urinary incontinence	MRI	Sharply marginated mass in the dorsal epidural space	L4–S2 pus drainage; laminectomy	3-degree heart block and ventricular tachycardia; death	*S. aureus*
Knight *et al.*,[23] 1997	53 yo, M	Injection of procaine hydrochloride and triamcinolone acetonide for the right buttock pain radiating into posterolateral thigh and calf	Weeks later; bilateral leg pain and coccygeal pain, absent ankle reflexes, stiff neck and headache, no neurological signs	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.*,[20] 2003	51 yo, M	Steroid injections for the left posterior shoulder and neck pain	Twenty-two days later; the left arm increasing pain, weakness, and paresthesia	MRI	C4-C6 epidural abscess	C4-C6 laminectomy, irrigation, and debridement	Recovered baseline neurologic function and neck pain status, still left hand hypoesthesia and weakness present before steroid injection	*S. aureus*
Zhang *et al.*,[42] 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	
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	

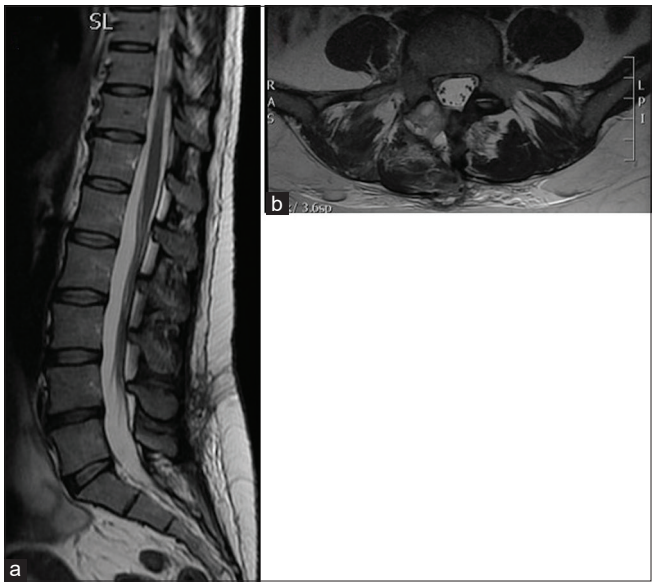

Figure 3: One month postoperative MRI. In (a), the sagittal T2-weighted image and in (b), the axial T2-weighted image demonstrates the complete resolution of the infectious process.

are still being performed.[1,4,5,13,19,29] 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.[3,11,24,37,42]

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.[6,7,9,10,21,25,32,34]

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.[2] 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.[12,18,38] Notably, the majority of SEE/SEA are due to a *S. aureus* species.[15,28,36]

[Table 1] summarizes reported reviewed cases of extradural abscess following extradural analgesic injection for low back and radiculopathies to our knowledge.[4,14,20,23,27,40,42]

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.[26]

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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