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Case Report

Spinal epidural abscess causing cauda equina syndrome after lumbar medial branch radiofrequency ablation

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Abstract

Spinal epidural abscesses after lumbar facet joint injections are rare but can cause rapid neurological deterioration. We describe a man in his 70s who developed severe lower back pain, fever, urinary retention, saddle anesthesia, and worsening paraparesis within two weeks of undergoing lumbar medial branch radiofrequency ablation for facet-mediated pain. Magnetic resonance imaging (MRI) revealed a posterior epidural collection at L4/5–L5/S1 with facet joint effusions and early spondylodiscitis, consistent with a spinal epidural abscess causing cauda equina compression. He received urgent intravenous flucloxacillin and underwent multidisciplinary review. Because of frailty, comorbidity, and early clinical improvement, the patient was managed non-operatively with prolonged antimicrobial therapy and rehabilitation. Follow-up imaging showed marked radiological improvement; however, the patient had persistent bilateral lower limb weakness with imaging features suggestive of probable post-infective arachnoiditis.

Keywords: Spinal epidural abscess, Cauda equina syndrome, Radiofrequency ablation, Lumbar facet joint, Spondylodiscitis, Interventional pain medicine

Introduction

Spinal epidural abscesses are uncommon but potentially devastating complications of spinal interventions. The classic triad of back pain, fever, and neurological deficit is present in only a minority of patients (8–15%); therefore, early diagnosis depends on maintaining a high index of suspicion [1,2]. Infective complications after facet interventions are rare, but septic facet arthritis, spondylodiscitis, paraspinal abscess, and epidural abscess have been reported [3–6]. A recently published case also described spinal epidural abscess after lumbar facet radiofrequency denervation [7]. This case emphasizes the need for urgent reassessment when severe pain after a spinal procedure is accompanied by fever or neurological symptoms.

Case Presentation

History

A man in his 70s with a longstanding history of chronic low back pain developed acute cauda equina syndrome following lumbar medial branch radiofrequency ablation under complete aseptic conditions in a theatre setting. His background included longstanding back pain radiating to the left leg, weakness, and foot drop due to L4/5 disc prolapse and degenerative spondylolisthesis L3/4 with central canal stenosis. Relevant comorbidities included hypertension, previous basal cell carcinoma, previously treated testicular cancer, and pre-diabetic (most recent HbA1c 39 mmol/mol). In late 2022, the patient underwent a successful diagnostic bilateral L2/3, L3/4 and L4/5 medial branch block. Because of persistent facet-mediated pain, the patient underwent repeat lumbar medial branch blocks with radiofrequency ablation at the same levels approximately 2 months later. Within

two weeks after the procedure, he presented to the emergency department with severe worsening of low back pain, fever with rigors, and urinary retention. Clinical examination revealed worsening paraparesis and saddle anesthesia, raising concerns regarding cauda equina syndrome.

Investigations

Blood tests showed a marked elevation of inflammatory markers and leucocytosis (CRP 216 mg/L, white cell count 9.9 $\times 10^9$/L). Urgent MRI revealed extensive posterior epidural collection from L4/L5 to L5/S1, facet joint effusions, and early L4/L5 spondylodiscitis, consistent with spinal epidural abscess causing cauda equina compression. MRI is the key imaging modality when spinal epidural abscess is suspected, particularly when the clinical picture is rapidly evolving. Blood cultures were obtained before commencing antibiotics.

Differential diagnosis

The principal differential diagnoses included recurrent lumbar disc prolapse causing cauda equina syndrome, spinal epidural hematoma after the procedure, and spinal epidural abscess with an associated facet and disc infection. The presence of fever, rigors, leucocytosis, elevated inflammatory markers, facet effusions, and contrast-enhancing epidural collection on MRI makes infection the most likely diagnosis.

Treatment

Empirical intravenous flucloxacillin (2 g, four times daily) was urgently initiated after a multidisciplinary discussion. The microbiology team recommended obtaining tissue or fluid samples for culture; however, because of the urgency of treatment, these were not obtained before commencing antibiotics. A multidisciplinary team review a few days later noted that blood cultures had shown no growth after five days of incubation and recommended broadening antimicrobial cover if there was no clinical improvement; as the patient improved clinically, antibiotics were not broadened and intravenous flucloxacillin was continued. During hospitalization, his back pain gradually improved with intensive analgesia including opioids, buprenorphine patches, and amitriptyline. Given the patient's frailty and evidence of clinical improvement, non-operative management was chosen rather than decompressive surgery. The patient was discharged approximately 3 weeks later with ongoing outpatient parenteral antimicrobial therapy, with a total planned intravenous antibiotic course of 6 weeks.

Outcome and follow-up

Inflammatory markers and the white cell count declined steadily during admission (CRP 28 mg/L and white cell count 6.7 $\times 10^9$/L before discharge), and neurological function improved modestly, with regained bladder function and partial motor recovery. Follow-up MRI about 10 months later showed marked reduction of the abscess, but residual enhancing tissue adjacent to the right S1 nerve root and flecks of enhancement around the cauda equina were suggestive of post-infective arachnoiditis. There was also progression of the residual left-sided L5/S1 disc bulge. Clinically, he had persistent bilateral lower limb weakness, with a Medical Research Council power of 4/5 in hip flexion and 3/5 in ankle dorsiflexion with mild residual sensory loss, consistent with incomplete neurological recovery after severe infection and nerve compression.

Discussion

This case illustrates a rare but not unprecedented infectious complication of spinal intervention involving the lumbar facet. Earlier reports have described epidural abscesses after facet injection, septic facet arthritis after corticosteroid facet injection, spondylodiscitis after facet joint steroid injection, and paraspinal and epidural abscesses after extra-articular facet injection [3–6]. A recently published case also reported a spinal epidural abscess after lumbar facet radiofrequency denervation [7]. This case adds the combination of acute cauda equina syndrome, associated spondylodiscitis, non-operative management due to frailty, and prolonged residual neurological deficits.

It has been suggested that skin flora inoculation during needle placement leads to infection of the adjacent epidural space and the facet joints [1]. Concurrent facet joint effusions and early spondylodiscitis on MRI suggest a spread from the needle track. The offending organism was not isolated in our case as no biopsy was performed, but empirical flucloxacillin covers common organisms, especially methicillin-sensitive Staphylococcus aureus [1].

Lumbar facet radiofrequency procedures are generally regarded as low-risk; in one retrospective series, no infections were identified [8]. Nevertheless, the broader spinal pain literature and recent ASRA Pain Medicine infection-control guidance make it clear that invasive spine procedures can be complicated by serious infection and require meticulous prevention and prompt recognition [9].

The key diagnostic lesson is that severe or escalating back pain after spinal pain procedures should not be dismissed as expected post-procedural discomfort, especially when fever, urinary retention, saddle anesthesia, or new weakness is present. Because the classic triad is often incomplete, an urgent MRI is essential when a spinal epidural abscess is suspected [1,2,10]. Neurological status at presentation remains one of the main determinants of outcome, and blood cultures should ideally be obtained before antibiotics are administered where feasible, although urgent treatment should not be delayed in unstable or neurologically compromised patients [1,2].

Surgical decompression is often favoured when there is neurological deficit and early intervention is recommended to reduce the risk of permanent impairment; however, selected patients may be managed medically when surgical risk is high and close multidisciplinary monitoring is possible [1,2,10]. In this patient, non-surgical management was deemed appropriate, likely due to the underlying comorbidities and improved condition. Follow-up MRI showed improvement but residual inflammation and nerve root involvement, highlighting the severity of the infection and the development of arachnoiditis, a recognized complication of spinal epidural abscesses. This case highlights the potential for long-term sequelae even with timely treatment.

Conclusion

Spinal epidural abscess is a rare but serious complication of lumbar facet radiofrequency ablation that can precipitate cauda equina syndrome. A high index of suspicion, urgent MRI and prompt antimicrobial therapy are essential. Non-operative management may be appropriate in frail patients with early clinical improvement and close multidisciplinary monitoring, but neurological recovery may remain incomplete despite radiological resolution.

Learning Points

- Severe or worsening back pain after lumbar facet intervention should not be assumed to be routine post-procedural pain when fever or neurological symptoms are present.
- A spinal epidural abscess may present without the full classic triad; urinary retention, saddle anesthesia and new weakness should prompt an urgent MRI.
- Infective complications after facet procedures are rare but recognized, including epidural abscess, septic facet arthritis, paraspinal abscess and spondylodiscitis.
- Even when radiological improvement is achieved with non-operative treatment, neurological recovery may remain incomplete.

Declarations

Patient consent for publication

Written informed consent for publication obtained from the patient as per our local policy.

Contributorship statement

Ahmed Elfaioumy collected the clinical data, reviewed the records and drafted the manuscript. Karim Salem contributed to the literature review and drafting the manuscript. Bhavesh Raithatha supervised the report, provided clinical oversight and critically revised the manuscript. All authors reviewed and approved the final manuscript and agreed to be accountable for the work.

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Competing interests

None declared.

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