

Spinal Epidural Abscess Following Spinal Anesthesia in a Bacteremic Patient: A Case Report

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Learning Point of the Article:

Spinal anesthesia in bacteremic patients may increase the risk of spinal epidural abscess, highlighting the importance of careful patient selection and early diagnosis.

Abstract

Introduction: Spinal epidural abscess (SEA) is an uncommon but potentially life-threatening complication that requires prompt recognition to prevent permanent neurological injury. Its occurrence after spinal anesthesia is particularly unusual and presents a diagnostic challenge because the initial symptoms may resemble expected post-operative pain.

Case Report: We describe the case of a 31-year-old woman who developed severe lower back pain and progressive lower limb weakness after undergoing spinal anesthesia for repeated debridement of necrotizing fasciitis in the presence of methicillin-sensitive *Staphylococcus aureus* bacteremia. Advanced spinal imaging demonstrated an extensive lumbar epidural infection associated with vertebral and paravertebral involvement, necessitating urgent surgical decompression. Operative findings confirmed a significant epidural purulent collection with widespread inflammatory tissue, and microbiological cultures were consistent with the bloodstream pathogen.

Conclusion: Following surgery and targeted antimicrobial therapy, the patient experienced marked improvement in pain, neurological function, and mobility. This case highlights the importance of maintaining a high index of suspicion for SEA in patients with persistent back pain and evolving neurological symptoms after neuraxial anesthesia, particularly when bacteremia is present. Early diagnosis and timely intervention are essential for achieving favorable clinical outcomes.

Keywords: Spinal epidural abscess, spinal anesthesia, bacteremia, Methicillin-sensitive *Staphylococcus aureus*, laminectomy, spondylodiscitis, lumbar spine infection.

Introduction

Spinal epidural abscess (SEA) is an uncommon but potentially life-threatening infection characterized by the accumulation of purulent material within the spinal epidural space. Despite advances in diagnostic imaging and antimicrobial therapy, SEA remains a neurosurgical emergency because delayed diagnosis can result in irreversible neurological deficits, paralysis, septic shock, and death. The reported incidence ranges from

approximately 0.2 to 2 cases/10,000 hospital admissions, although recent studies suggest the incidence is increasing due to an ageing population, greater use of spinal instrumentation and neuraxial procedures, improved magnetic resonance imaging (MRI) availability, intravenous drug use, diabetes mellitus, chronic kidney disease, malignancy, and immunosuppressive conditions [1, 2, 3, 4].

Staphylococcus aureus is the predominant pathogen, accounting

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for approximately 60–70% of all SEA cases, with methicillin-sensitive *Staphylococcus aureus* (MSSA) remaining the most frequently isolated organism worldwide [2,5]. Infection usually occurs through hematogenous spread from a distant focus, although direct inoculation following spinal surgery, epidural catheterization, lumbar puncture, or spinal anesthesia has also been reported. Patients with concurrent bacteremia are considered to be at increased risk of developing spinal infections because circulating organisms may seed the epidural space, particularly following disruption of normal tissue barriers during neuraxial procedures [2,6].

Spinal anesthesia is widely regarded as a safe and effective technique with an extremely low incidence of infectious complications. Published literature suggests that SEA following single-shot spinal anesthesia is exceptionally rare, with only isolated case reports and small case series available. Most reported cases have occurred in patients with significant predisposing factors such as diabetes mellitus, prolonged epidural catheterization, immunosuppression, or active systemic infection [6, 7, 8]. Consequently, the decision to perform neuraxial anesthesia in bacteremic patients remains controversial, as current evidence is limited and largely based on observational studies and expert opinion rather than randomized trials.

The diagnosis of SEA is frequently delayed because the classical triad of back pain, fever, and neurological deficit is present in only a minority of patients at initial presentation. MRI with gadolinium contrast remains the gold standard investigation because of its excellent sensitivity for detecting epidural collections, vertebral osteomyelitis, and associated paraspinal abscesses. Early recognition, prompt surgical decompression when indicated and targeted antimicrobial therapy are the cornerstones of management and are associated with significantly improved neurological recovery [1,2,5].

To the best of our knowledge, reports describing extensive lumbar SEA developing after spinal anesthesia in a patient with active MSSA bacteremia secondary to necrotizing fasciitis are exceedingly uncommon, and no similar case has been reported from Fiji. We present this case to highlight the potential risk of neuraxial anesthesia in the presence of bacteremia, the importance of maintaining a high index of suspicion for SEA in patients who develop persistent

back pain and neurological symptoms after spinal anesthesia, and the favorable outcome that can be achieved with timely MRI diagnosis, urgent surgical decompression, and culture-directed antibiotic therapy.

Case Report

A 31-year-old female was admitted to Labasa Hospital, Fiji, with necrotizing fasciitis requiring multiple surgical debridements. Blood cultures obtained during admission demonstrated MSSA bacteremia with Gram-positive cocci in clusters identified on microscopy. She underwent operative management under spinal anesthesia.

After discharge, the patient developed progressively worsening lower back pain associated with lower limb weakness. She presented to Lautoka Hospital this time. The pain became severe and persistent, raising concern for spinal pathology.

Initial contrast-enhanced computed tomography (CT) of the spine demonstrated irregularity of the L5/S1 endplates with adjacent paravertebral soft-tissue thickening suggestive of spondylodiscitis; however, no definite drainable abscess was identified. Due to persistent neurological symptoms and ongoing severe back pain, MRI of the lumbar spine was subsequently performed (Fig. 1).

MRI demonstrated an elongated epidural collection extending from L4 to S1 with post-contrast rim enhancement causing significant thecal sac compression. Associated L5/S1 spondylodiscitis, marrow signal abnormalities, prevertebral and paravertebral soft-tissue enhancement, and left

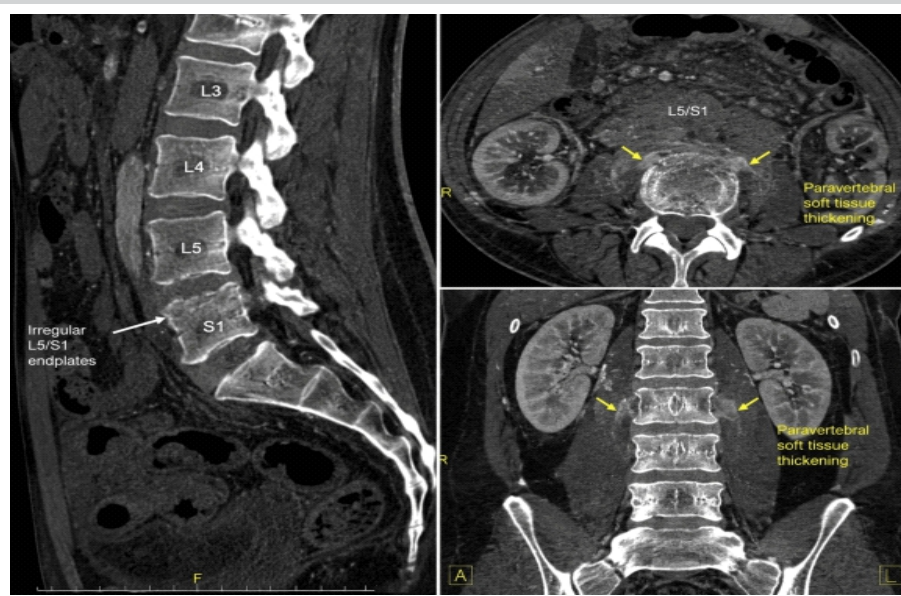


Figure 1: Contrast-enhanced computed tomography of the lumbosacral spine demonstrating irregularity and erosive changes of the L5/S1 vertebral endplates with adjacent paravertebral soft-tissue thickening, consistent with early spondylodiscitis. No definite drainable epidural or paravertebral abscess is identified on computed tomography.



Figure 2: Sagittal magnetic resonance imaging demonstrating extensive lumbar epidural abscess extending from L4 to S1 with associated L5/S1 spondylodiscitis thecal sac compression.

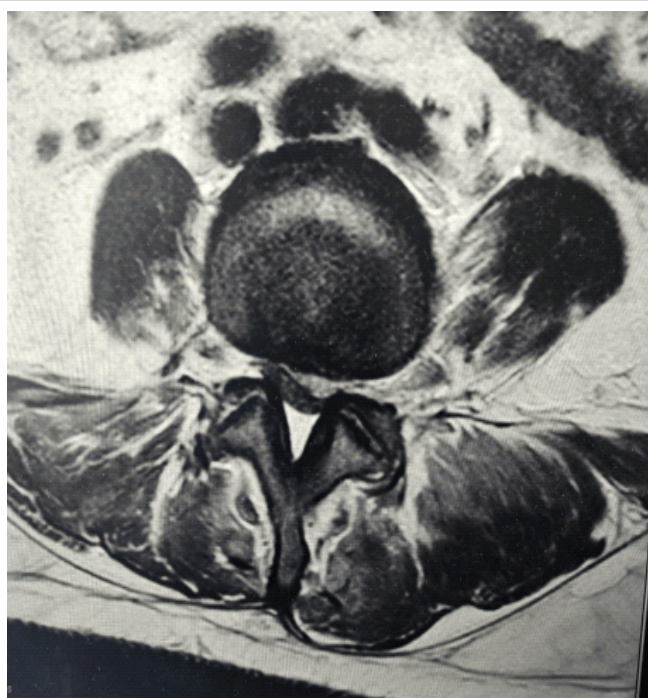


Figure 3: Axial magnetic resonance imaging demonstrating posterior epidural collection causing compression of the thecal sac at the lumbosacral level.

paravertebral as well as erector spinae abscesses were identified (Fig. 2 and 3).

Inflammatory markers were elevated with a C-reactive protein level of 123 mg/L. Microbiological investigations confirmed MSSA sensitive to cloxacillin, erythromycin, and gentamicin.

Given the radiological evidence of epidural abscess with neurological deterioration, urgent surgical decompression was undertaken. The patient underwent lumbar laminectomy and spinal canal decompression under general anesthesia.

Intraoperatively, frank purulent material was identified within the epidural space at S1 with extensive inflammatory pannus and infected tissue extending from L2 to L5. Subperiosteal dissection was performed, followed by laminectomy using Kerrison rongeurs. The ligamentum flavum and inflammatory tissue occupying the epidural space were excised. Extensive irrigation and debridement were performed, and tissue specimens were sent for microbiological analysis (Fig. 4).

Postoperatively, the patient was managed with targeted intravenous antibiotic therapy based on culture sensitivities. Neurological function and pain improved significantly following decompression. The patient regained ambulation and continued recovery with multidisciplinary management and follow-up.

Written informed consent for publication and use of radiological and intraoperative images was obtained from the



Figure 4: Intraoperative image following lumbar laminectomy demonstrating epidural purulent collection and inflammatory tissue within the lumbosacral space.

Study	Study design and population	Main focus	Key findings	Relevance to the present case
Reihsaus et al., 2000 [1]	Meta-analysis of 915 patients	Epidemiology, diagnosis and treatment	Staphylococcus aureus was the predominant pathogen; magnetic resonance imaging was the preferred diagnostic modality; included post-spinal anesthesia cases.	Supports the association between neuraxial procedures and spinal epidural abscess and highlights the importance of early magnetic resonance imaging.
Horlocker & Wedel, 2006 [2]	Literature review	Neuraxial infection risk	Infection after neuraxial block is rare; active bacteremia is an important concern.	Relevant because spinal anesthesia was performed in a patient with methicillin-sensitive Staphylococcus aureus bacteremia.
Curry et al., 2005 [3]	Retrospective series (48 patients)	Management and outcomes	Urgent surgery was associated with improved neurological outcomes in patients with neurological deficits.	Supports emergency decompression in the present case.
Arko et al., 2014 [4]	Systematic review	Medical versus surgical management	Surgery is recommended for patients with neurological deficit or significant neural compression.	Supports operative management in this patient.
Vakili & Crum-Cianflone, 2017 [5]	Retrospective series (101 patients)	Contemporary epidemiology	Back pain was the most common presenting symptom and Staphylococcus aureus remained the predominant organism.	Consistent with the presentation of the present case.
Darouiche, 2006 [6]	Narrative review	Pathogenesis, diagnosis and management	Discussed hematogenous spread, direct inoculation and the importance of early diagnosis.	Explains the likely pathogenesis in this patient with bacteremia.
Sendi et al., 2008 [7]	Clinical review	Risk factors and diagnosis	Recommended early magnetic resonance imaging and microbiological confirmation in suspected spinal epidural abscess.	Supports prompt investigation of postoperative back pain.
Davis et al., 2004 [8]	Retrospective study	Clinical presentation	Diagnostic delay was common and the classic triad was frequently absent.	Highlights the importance of recognising persistent back pain and neurological symptoms early.
Present case	Single case report	Spinal epidural abscess following spinal anesthesia in methicillin-sensitive Staphylococcus aureus bacteremia	Extensive L4-S1 epidural abscess successfully treated with decompression and targeted antibiotics.	Demonstrates successful management with timely surgery and antimicrobial therapy.

TABLE 1: Comparative summary of the principal studies included in the literature review of spinal epidural abscess (SEA). The table compares the study design, primary focus, key findings, and relevance of published studies to the present case of extensive lumbar spinal epidural abscess following spinal anesthesia in a patient with methicillin-sensitive Staphylococcus aureus bacteremia.

patient.

Discussion

SEA is rare globally but carries high morbidity because diagnosis is often delayed. Reviews describe back pain as the most common presenting symptom, while the classical triad of back pain, fever, and neurological deficit is present in only a minority of patients, making early recognition difficult [6, 8]. *S. aureus* remains the leading causative organism, and recognized risk factors include diabetes mellitus, bacteremia, intravenous drug use, spinal procedures, and immunosuppression.

Worldwide, SEA has been reported after neuraxial procedures, although this remains uncommon [2, 8]. A published case report described meningitis and epidural abscess after spinal anesthesia in a bacteremic diabetic patient undergoing amputation for infected gangrene, which is clinically similar to this case because both involved active infection, bacteremia, diabetes, neuraxial anesthesia, and subsequent epidural infection. Reviews on regional anesthesia in infected patients note that available data are limited, but spinal or epidural anesthesia during bacteremia may be a risk factor for central neuraxial infection [2].

SEA is a neurosurgical and orthopedic emergency requiring high clinical suspicion and prompt intervention. The classical

triad of fever, back pain, and neurological deficit is inconsistently present, often contributing to delayed diagnosis [6, 8].

Several risk factors for SEA have been described, including diabetes mellitus, immunosuppression, intravenous drug use, spinal instrumentation, and bacteremia [6, 8]. In this case, active MSSA bacteremia secondary to necrotizing fasciitis likely predisposed the patient to epidural infection following spinal anesthesia.

The role of neuraxial anesthesia in bacteremic patients remains controversial. While transient bacteremia may not absolutely contraindicate spinal anesthesia, active systemic infection increases the risk of hematogenous spread and inoculation into the epidural space [2]. This case highlights the importance of careful risk assessment before performing neuraxial procedures in septic patients.

MRI remains the gold standard imaging modality for diagnosis of SEA due to its superior sensitivity in detecting epidural collections, spinal cord compression, and associated osteodiscitis [6, 8]. In our patient, CT imaging demonstrated only subtle suspicious findings, whereas MRI clearly identified extensive epidural abscess formation and neural compression.

Management of SEA typically involves a combination of surgical decompression and prolonged intravenous antibiotic therapy, particularly in patients presenting with neurological deficits [4]. Early surgical intervention is associated with improved neurological recovery and reduced morbidity [3, 4].

This case reinforces several important clinical lessons. Persistent or worsening back pain following neuraxial anesthesia in patients with active systemic infection should not be considered an expected post-operative symptom. The development of neurological deficits warrants urgent MRI because CT may fail to detect early epidural abscess formation. In patients with MSSA bacteremia, clinicians should maintain a high index of suspicion for SEA, as timely surgical decompression combined with culture-directed antimicrobial therapy can result in excellent neurological recovery (Table 1).

Conclusion

SEA following spinal anesthesia is rare but potentially catastrophic, particularly in bacteremic patients. Persistent or progressive back pain with neurological deficits following neuraxial procedures should prompt urgent MRI evaluation. Early recognition, surgical decompression, and targeted antimicrobial therapy are essential to optimize neurological recovery and reduce morbidity.



Clinical Message

Spinal epidural abscess should be suspected in bacteremic patients who develop persistent or worsening back pain following spinal anesthesia. Early MRI, prompt surgical decompression, and culture-directed antimicrobial therapy are essential to prevent permanent neurological deficits and improve clinical outcomes.

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

Conflict of interest: Nil **Source of support:** None

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