

# Methicillin-Resistant *Staphylococcus aureus* Vertebral Osteomyelitis Following Epidural Catheterization: A Case Report and Literature Review

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## Abstract

Indwelling epidural catheters are frequently used to manage postoperative pain. This report describes a patient who developed methicillin-resistant *Staphylococcus aureus* (MRSA) vertebral osteomyelitis of the lumbar spine following epidural catheterization. To the best of our knowledge, this is the first reported case of MRSA vertebral osteomyelitis secondary to epidural catheter use in the English orthopedic literature. The patient and his family consented to publishing the data.

## Keywords

- ▶ MRSA
- ▶ epidural anesthesia

Epidural analgesia provides excellent pain control following surgery. This reduces the postoperative morbidity and therefore results in better patient compliance for early rehabilitation. Infectious complications following epidural anesthesia are rare in healthy people. Infections such as epidural abscess and meningitis are well documented. The epidural catheter may serve as a nidus for bacteria along its tract from skin to epidural space, so immunocompromised patients and patients with bacteremia are at higher risk of developing infectious complications related to epidural catheter insertion.

## Case Report

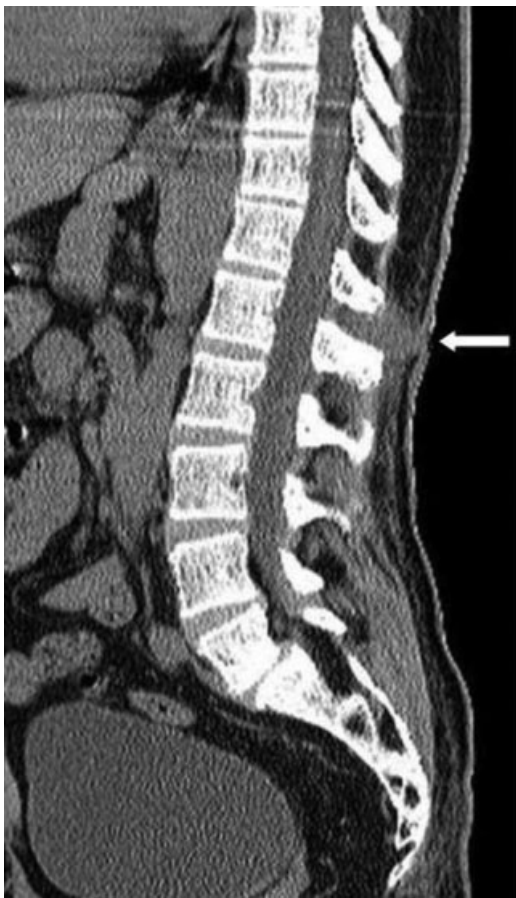
A 63-year-old man underwent open left nephrectomy for a nonfunctional kidney secondary to stricture urethra. He also had bilateral inguinal hernia for which he underwent bilateral inguinal hernia repair with mesh reconstruction. He did not have any comorbid conditions. An epidural catheter was inserted for postoperative analgesia. The catheter was maintained for 4 days after the operation. The postoperative period was uneventful and he was discharged. One month later he developed a fever with low back pain. An abscess developed over the site of previous epidural puncture, which ruptured

and drained pus that same day. Following the rupture of the abscess, he became afebrile. The patient reported to the local hospital 2 days later for persisting drainage and was treated with dry dressings and analgesics. No antibiotics were given, nor were samples sent for bacterial culture. However, the draining sinus in his back persisted for 1.5 months and patient was then referred to our spine unit. Examination of the patient showed erythema around the sinus with tenderness over the L1 spinous process. The neurological examination was normal. His laboratory parameters showed erythrocyte sedimentation rate (ESR) of 55 mm/h and serum C-reactive protein (CRP) level of 79 mg/L. A computed tomography (CT) scan showed a sinus tract reaching up to the spinous process of L1 vertebra (▶ **Fig. 1**). A magnetic resonance imaging (MRI) did not show any evidence of an epidural abscess. He underwent sinus tract excision along with removal of the posterior half of the L1 spinous process. The histopathology of the spinous process was consistent with chronic osteomyelitis (▶ **Fig. 2**). Culture of the tissue from the sinus tract grew methicillin-resistant *Staphylococcus aureus* (MRSA) sensitive to linezolid. He was treated with intravenous linezolid for 6 weeks and the surgical wound healed. At 1-year follow-up, he remained symptom-free.

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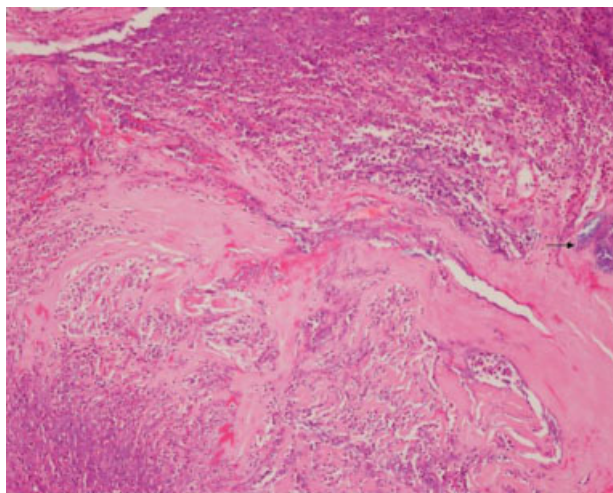
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**Figure 1** Computed tomography scan showing sinus tract from skin to interspinous ligament and L1 spinous process (arrow).

## Discussion

There has been an increasing trend toward epidural anesthesia and analgesia and the placement of catheters in the epidural space for the management of chronic and postoper-



**Figure 2** Photomicrograph showing dense sheets of polymorphs with granulation tissue formation and necrotic bone (black arrow), suggestive of acute or chronic osteomyelitis.

ative pain.<sup>1</sup> Back pain developing after epidural anesthesia is common and its incidence varies from 2 to 31%.<sup>2</sup> The common causes of back pain after regional anesthesia are thought to be due to ligamentous trauma, reflex paraspinal muscle spasm, and ligamentous strain during patient positioning secondary to skeletal muscle relaxation. Symptoms related to back pain are usually mild and respond well to conservative management.<sup>3</sup> Infections following epidural catheter insertion are uncommon; epidural abscess is a well-recognized complication. Vertebral osteomyelitis and discitis after epidural catheterization are extremely rare.<sup>4-8</sup> To the best of our knowledge, MRSA vertebral osteomyelitis secondary to epidural catheter use has not been reported earlier in the English orthopedic literature.

A literature search of published articles in English found only 10 cases of vertebral osteomyelitis as a complication of epidural catheter use. This report analyzes the clinical presentation, laboratory results, therapeutic interventions, and outcome of these patients including the present reported patient (► **Table 1**). There were six women and five men who ranged in age from 34 to 79. The duration of epidural catheter analgesia ranged from 7 hours to 6 days with all patients having back pain (100%). Two of them had draining purulent material (18%). Only one patient developed paraparesis (9%), which completely recovered following treatment. Eight patients had some degree of immune compromise (73%) such as chronic steroid use, ulcerative colitis, chronic alcohol abuse with pancreatitis, diabetes mellitus, and malignancy. The most common organism isolated was *Pseudomonas aeruginosa* (64%; ► **Table 2**).<sup>3-7,9,10</sup> One patient had pneumonia caused by *P. aeruginosa* and subsequently developed a spinal infection with the same organism following epidural use.<sup>3</sup> Two healthy patients were infected with *Propionibacterium acnes*, which is a normal anaerobic and weakly pathogenic saprophyte in the skin, sebaceous glands, and hair follicles.<sup>11,12</sup> Nonoperative management was successful in seven patients (64%) and surgical management in four patients (36%).

Vertebral osteomyelitis and discitis following epidural catheter use could be due to hematogenous spread of organisms from infective foci elsewhere in the body<sup>13</sup> or direct invasion either by skin bacteria through the needle track,<sup>14</sup> contaminated syringes,<sup>15</sup> or contaminated local anesthetics.<sup>16</sup> The diagnosis of vertebral osteomyelitis requires a high index of suspicion. The clinical features include severe back pain, fever, and painful restriction of movements with or without neurological involvement. Early laboratory findings include leukocytosis followed by elevated ESR and CRP levels. Epidural and psoas abscess formation may complicate pyogenic spondylodiscitis.<sup>3,17</sup> Plain radiographs are normal in the early period of infection. MRI is the study of choice, and it is the most sensitive and specific imaging technique for the diagnosis of a spinal infection.<sup>18</sup> However, tissue sampling is often required for characterization of the infecting organism by CT-guided aspiration or by open biopsy.<sup>12</sup>

In the present patient, vertebral osteomyelitis most likely developed through the epidural track itself for several reasons. A nephrectomy was performed for renal dysfunction

**Table 1** Clinical Characteristics of Patients with Vertebral Osteomyelitis following Epidural Catheter Usage Reported in the Literature

Study (Reference No.)	Age, Sex	Epidural Analgesia Indication	Epidural Analgesia Duration (d)	Symptoms	Vertebral Level Involved	Risk Factors	Treatment
3	76, M	Thoracotomy	4	BP	L1	Steroid therapy	IV antibiotics
4	47, M	Radical cystectomy	NS	BP, sensory blunting	L1-3	None	Surgery + IV antibiotics
6	46, F	Total colectomy	10	BP	NS	UC, steroid therapy	Surgery + IV antibiotics
9	67, F	Ovarian cystectomy	4	BP, paraparesis	L2-4	UC	Surgery + IV antibiotics
10	59, M	Total colectomy	NS	BP, sciatica	T12-L4	UC, DM	IV antibiotics
11	51, F	Hysterectomy	4	BP	L5-S1	Nil	IV antibiotics
12	34, F	Labor pain	7	BP, fever	L1-2	Hypothyroidism, beta-thalassemia	IV antibiotics
5	79, F	Bilateral TKR	NS	BP	L2-3	RA, steroid therapy	IV antibiotics
7	42, M	THR	3	BP, fever	T12-L2	Pancreatitis, alcoholism	IV antibiotics
8	66, F	Spondylosis	6	BP, fever, pus discharge	T11-12	DM	IV antibiotics
PR	63, M	Nephrectomy	4	BP, sinus	L1	UTI	Surgery + IV antibiotics

BP, back pain; IV, intravenous; NS, not specified; UC, ulcerative colitis; DM, diabetes mellitus; TKR, total knee replacement; THR, total hip replacement; PR, present report; UTI, urinary tract infection; RA, rheumatoid arthritis.

**Table 2** Cultured Organisms in Patients with Catheter-Related Vertebral Osteomyelitis Described in the Literature

Organism	n (%)
<i>Pseudomonas aeruginosa</i>	7 (64%)
<i>Propionibacterium acnes</i>	2 (18%)
<i>Staphylococcus aureus</i>	1 (9%)
MRSA	1 (9%)

MRSA, methicillin-resistant *Staphylococcus aureus*.

due to chronic obstructive noninfective pathology. The patient did not have any comorbid conditions or other foci of infection. The perusal of anesthesia notes revealed repeated attempts to insert epidural catheter due to bloody tap. At the initial stages of the wound infection, no antibiotics were given by the treating physician and the MRI did not show evidence of epidural abscess.

From the analysis of the published literature, it is evident that immunocompromised patients (8/11) are at a higher risk of developing infective complications following epidural catheter use, and these patients should be closely monitored. Daily inspection and prompt removal of epidural catheter should be done on any suspicion of infection,<sup>19</sup> as even healthy patients can develop infection.<sup>11,12</sup> Therefore, strict aseptic technique of epidural catheter insertion should be practiced, and the anesthesiologist as well as the treating surgeon should be aware of the rare possibility of infection even after uneventful epidural analgesia.

**Authors' Contributions**

Dr. R. Krishnakumar designed the study, collected data, preformed the literature search, and prepared the manu-

script. Dr. J. Renjtkumar analyzed the data, reviewed the manuscript, and edited the manuscript.

**Disclosures**

R. Krishnakumar, None  
J. Renjtkumar, None

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