











Case Report

Citrobacter koseri: A rare cause of an epidural spinal abscess

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ABSTRACT

Background: *Citrobacter koseri*, a Gram-negative organism, rarely causes an epidural spinal abscess.

Case Description: A 50-year-old male presented with mild paraparesis attributed to an magnetic resonance (MR)-documented spinal epidural abscess (SEA) at the T10-level. Following surgical debridement, cultures grew *C. koseri*, a rare Gram-negative organism. The abscess was subsequently managed with a prolonged course of antibiotics resulting in complete symptom and MR-documented radiological resolution.

Conclusion: A 50-year-old male presented with a T10 SEA attributed to a rare Gram-negative organism, *C. koseri*. The abscess was appropriately managed with surgical decompression/debridement, followed by prolonged antibiotic therapy.

Keywords: Antimicrobial treatment, *Citrobacter koseri*, Epidural spinal abscesses, Laminectomy, Spinal infection

INTRODUCTION

A 50-year-old male presented with a mild thoracic paraparesis attributed to an magnetic resonance (MR)-documented T10 epidural abscess. At surgery, the pathology proved to be a rare Gram-negative organism, *Citrobacter koseri*.^[14] Following a decompressive laminectomy with abscess debridement and prolonged postoperative antibiotic therapy, the patients symptoms resolved along with the radiographic findings.

CASE DESCRIPTION

Presentation and first operative course

A 50-year-old male with hypertension and diabetes presented with thoracic pain of 4 months duration, and the acute onset of a T10-level paraparesis. The MR documented epidural cord compression at the T10-T11 (compressing cord to the left) and T11-T12 (compressing the cord to the right) levels [Figures 1a-c]. The T10-T11 laminectomy performed under neurophysiological

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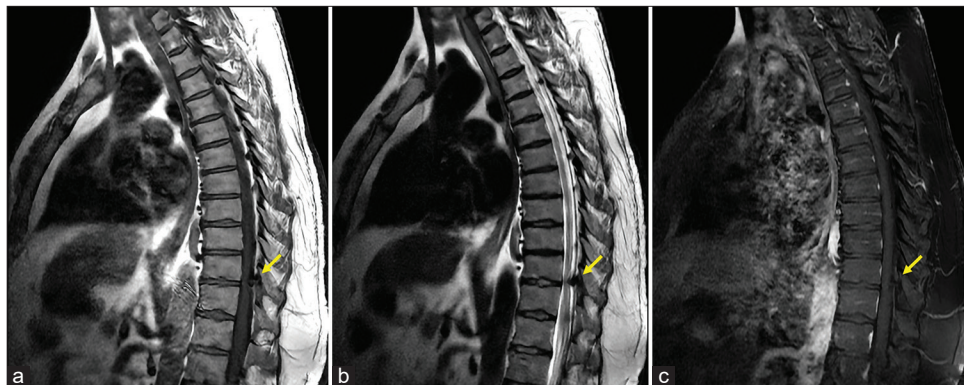


Figure 1: Preoperative studies, sagittal magnetic resonance imaging. (a and b) T1-weighted and T2-weighted show an epidural hypointense image of triangular appearance (arrow) at the anatomical site of the yellow ligaments at the T10 vertebral level that molds to the dura mater and compresses posterior and lateral left cords. (c) T1-weighted post contrast does not enhance with the contrast material; it is introduced to the left intervertebral foramen (arrow).

intraoperative monitoring revealed a partially calcified lesion compressing the cord; intraoperatively, after the cord was decompressed, the somatosensory potentials significantly improved. The intraoperative frozen section revealed leucocyte infiltration and calcification of the lesion, but initial postoperative cultures were negative. Therefore, the patient was routinely discharged without a diagnosis of infection.

Return 7 days later with infection diagnosed as *C. koseri*

The patient returned 7 days later with a wound infection; once reopened, a brown discharge was cultured. Broad-spectrum antibiotics (AB) (i.e., Ertapenem and Vancomycin) were immediately started; 5 days after the second surgery, cultures from both the first and second surgeries were documented in a rare Gram-negative organism, *C. koseri*. Within 8 postoperative days, the peripheral white blood cell count and acute phase reactants normalized; then continued, Ciprofloxacin for an additional 2 weeks, along with 4 days of Ertapenem. Six months later, the thoracic magnetic resonance imaging showed complete resolution of the epidural abscess/wound infection, and the patient fully recovered [Figure 2].

DISCUSSION

Risk factors for spinal epidural abscesses (SEAs) due to *C. koseri*

Citrobacter is a nonsporulating, facultatively anaerobic, and Gram-negative bacteria of the Enterobacteriaceae family that was first isolated in 1932 by Werkman and Gillen.^[5,15] It is frequently found in mammals' water, soil, food, and intestines.^[13] These infections can occur in the urinary tract (39%), gastrointestinal system (27%), wound/decubitus ulcers (10%), pulmonary, or other sites (11%). Although they typically occur in patients with diabetes mellitus, intravenous

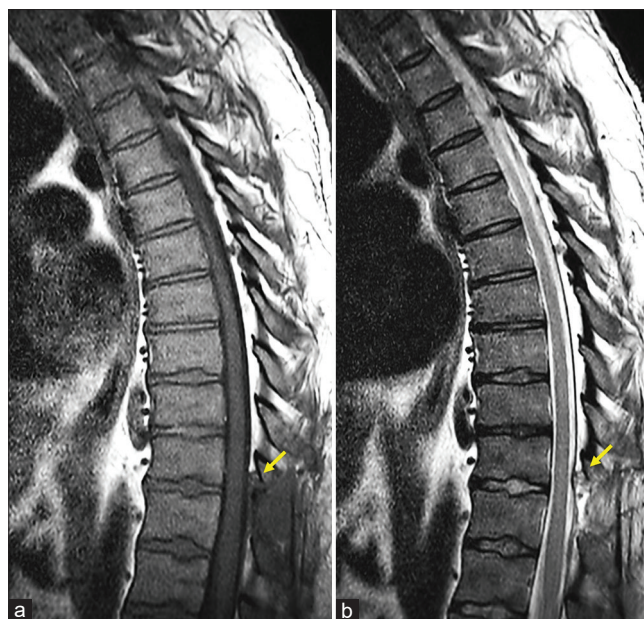


Figure 2: Post-operative studies, sagittal magnetic resonance imaging. (a and b) T1-weighted and T2-weighted show a left laminotomy with hemostatic material to the surgical site injected slightly into the dura mater (arrow). The medullary cord recovers its caliber, currently without mass effect.

drug use, or compromised hosts (i.e., patients over >60 years of age and neonates), other cases have been reported in younger patients without clear risk factors.^[2,6,7,9,12,14]

Treatment of choice for SEA due to *C. koseri*

The treatment of choice for epidural spinal abscesses in patients with significant neurological deficits is often operative decompression (i.e., laminectomy)/aggressive operative debridement, followed by 4–16 weeks of

Table 1: Published cases spinal infections by *Citrobacter koseri*.

S. No.	Authors	Year	Age/Sex	Comorbidities	Location	Clinical presentation	Probable cause	Treatment	AB/Time	Complications	Follow-up
1.	Müller and Keller ^[9]	1992	68/M	SHA, DM	Lumbar	Pneumonia	Hematogenic dissemination	Surgery and chemotherapy	None	None	1 yrs
2.	Sotto et al. ^[1,2]	1994	74/M	SHA	C3-C4 and C6-C7	Acute cervicalgia	Genitourinary instrumentation	AB	Imipenem and amikacin/3 weeks Imipenem/8 weeks	Bone reconstruction	6 Mo
3.	Hayati et al. ^[6]	2012	75/F	No one	L2-L3+large paravertebral abscess	Recurrent fever and persistent lower back pain	Unknown	AB	Drainage and cefuroxime/8 weeks	None	1 yrs
4.	Ramachandran et al. ^[10]	2022	27/M	No one	L4-L5	Back pain and fever	Unknown	AB	Cefoperazone, sulbactam and ciprofloxacin/2 weeks Ciprofloxacin/6 weeks	None	1 yrs
5.	Present case	2023	50/M	SHA, DM	T10-T11	Radicular syndrome	Unknown	AB	Ertapenem and vancomycin/4 days Ciprofloxacin/2 weeks	None	6 Mo

M: Masculine; F: Feminine; SHA: Systemic hypertension artery; DM: Diabetes Mellitus; Yrs: years; Mo: Months

Table 2: Summary of antibiotic therapy for *C. koseri*.

Antibiotic sensitivity to <i>C. koseri</i>	Antibiotics
Sensitive	a. Ciprofloxacin ^[4,8] b. Imipenem ^[4,8] c. Amikacin ^[8]
Moderately resistant	d. Azithromycin ^[8] e. Cefuroxime ^[11] f. Aztreonam ^[3,8]
Markedly resistant	g. Ampicillin ^[3,4,8] h. Amoxicillin ^[1,4] i. Ceftazidime ^[3]
<i>C. koseri</i> : <i>Citrobacter koseri</i>	

postoperative intravenous AB.^[7,14] While some infections may resolve by the 4th postoperative week, others will require total treatment durations of six or more weeks [Table 1].^[6,9,10,12] Notably, symptoms and inflammatory markers can help guide the efficacy and duration of antibiotic therapy.^[11]

Antibiotic sensitivity of *C. koseri*

C. koseri is typically sensitive to ciprofloxacin, carbapenems, third-generation cephalosporins, piperacillin-tazobactam, aminoglycosides, and trimethoprim-sulfamethoxazole, but are typically markedly or moderately resistant to multiple other AB [Table 2].^[1,3,4,8]

CONCLUSION

SEA caused by *C. koseri* is very rare. However, once recognized in conjunction with significant neurological deficits, they typically require surgical decompression/aggressive debridement and prolonged postoperative antibiotic therapy.

Declaration of patient consent

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

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Conflicts of interest

There are no conflicts of interest.

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