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Case Report

Cervicothoracic Spinal Epidural Empyema Causing Tetraparesis: Case Report and Literature Review

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ABSTRACT

Introduction: Spinal Epidural Empyema (SEE) is a rare and severe central nervous system infection characterized by pus in the epidural space of the spine, often caused by bacteria such as *Staphylococcus aureus*. Although its incidence has increased in recent decades, diagnosis remains challenging. Risk factors include advanced age, invasive surgeries, injectable drug use, and central venous catheters. The clinical presentation typically includes spinal pain, fever, and focal neurological deficits. Diagnosis is confirmed by contrast-enhanced magnetic resonance imaging (MRI).

Case Presentation: This report describes a 41-year-old female with a history of urinary tract infection who developed tetraparesis, cervicalgia, and fever. MRI revealed an extensive fluid collection in the epidural space from C5 to T6, with spinal cord compression. Urgent surgical intervention was required for decompression and purulent drainage, with *Staphylococcus aureus* identified as the causative pathogen. Following two weeks of intravenous antibiotics, the patient showed significant recovery of strength in both upper and lower limbs.

Conclusion: Early intervention with surgical decompression and appropriate antibiotics is crucial to prevent severe neurological sequelae. Raising awareness and achieving a prompt diagnosis are key to improving patient outcomes and quality of life.

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INTRODUCTION

Spinal Epidural Empyema (SEE) is a rare and severe infection of the central nervous system, characterized by the presence of pus in the spinal epidural space, resulting from a bacterial infection. Although the incidence of SEE has increased over the past 20 years, reaching a rate of 1:10,000 cases, its clinical manifestation and diagnosis remain challenging [1,2]. Risk factors include aging, invasive surgeries, injectable drug use, and the presence of central venous catheters [3,4].

The average age of patients diagnosed with SEE is around 50 years, with a male predominance, possibly due to greater exposure to risk factors associated with comorbidities and lifestyle habits [5]. The main clinical suspicion arises in patients with spinal pain, fever, and focal neurological deficits, often associated with radiculopathy. Although the most common location for SEE is the lumbar region, due to the higher amount of adipose tissue that favors infection, only 6.9% of cases involve the cervicothoracic region [6,7].

The diagnosis is confirmed by imaging, with contrast-enhanced magnetic resonance imaging (MRI)

being the preferred exam as it allows precise identification of the location, extent of the epidural abscess, and presence of spinal cord compression [6]. Treatment typically involves decompression and surgical drainage, combined with systemic antibiotic therapy, especially in cases with acute or progressive neurological deficits [8].

CASE PRESENTATION

A 41-year-old female patient presented with a clinical picture of paresis in the lower limbs and multiple falls. She had a recent history of urinary tract infection and had sought medical attention on several occasions without a definitive diagnosis. Two weeks later, the patient developed tetraparesis, cervicalgia, perineal anesthesia, and fever.

Cervical and thoracic MRI showed extensive liquid consolidation in the epidural space from C5 to T6, measuring 16 cm in length, occupying the posterior lateral space with peripheral enhancement after contrast administration (Fig.1).

Laboratory tests indicated increased white blood cell count and elevated inflammatory proteins, suggesting an active infectious process. Urgent surgical intervention was indicated for spinal decompression, and a laminotomy at the C7 level was performed with drainage of purulent secretion (Fig.2).

Microbiological diagnosis revealed *Staphylococcus aureus* (methicillin-sensitive). After two weeks of intravenous antibiotic therapy, the patient showed clinical improvement, with recovery of strength in both the upper and lower limbs, and progressive improvement in neurological deficits. The patient was discharged to continue oral antibiotics and physical rehabilitation.

DISCUSSION

SEE is a rare but extremely severe condition with a high risk of neurological complications, including irreversible paralysis. Early diagnosis and appropriate treatment are crucial for improving clinical outcomes. The infection is often caused by bacteria, with *Staphylococcus aureus* being identified in up to 60% of microbiological cultures [9,10]. In addition to *S. aureus*, other pathogens such as *Escherichia coli* and *Streptococcus pneumoniae* can also be isolated, depending on the primary infectious focus [11,12].

The infection can occur in various ways, with hematogenous spread being the most common, followed by direct contamination after surgical interventions or trauma [13,14]. In a study by Reihsaus et al., it was observed that most SEE cases originate from infections in distant organs, such as the urinary tract infections, skin, or bones. This hematogenous form of infection, often associated with comorbidities like diabetes and immunosuppression, also increases the severity and extent of the infection, as seen in the presented case. [6,15].

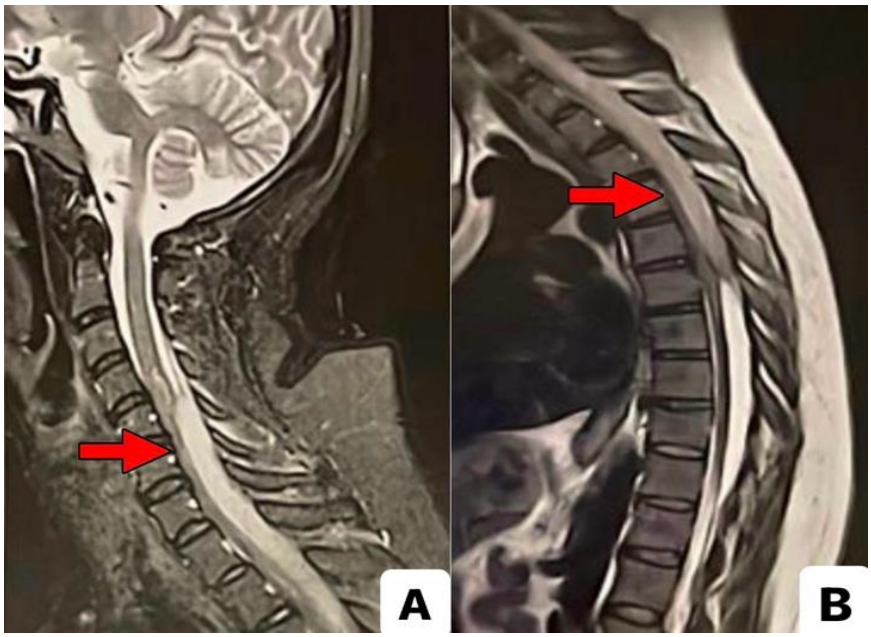


Fig.1. A – Cervical MRI, sagittal view, showing posterior epidural collection (red arrow), intrathecal, with spinal cord compression, starting from the fifth cervical vertebra and extending into the thoracic region. B – Thoracic MRI, sagittal view, showing posterior epidural collection (red arrow), intrathecal, with spinal cord compression, extending to the sixth thoracic vertebra.

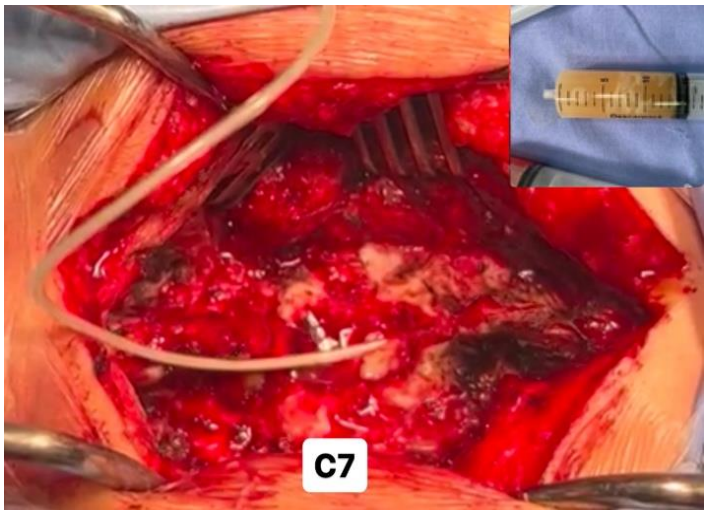


Fig. 2. Intraoperative image showing, on the left, the cranial portion during laminotomy at the seventh cervical vertebra, with the release of a large amount of purulent secretion, aspirated with a probe and a sterile syringe.

The diagnosis of SEE is challenging, as its symptoms can be confused with other neurological conditions, such as radiculopathy, myelitis, or spinal cord compression syndrome [16]. Contrast-enhanced MRI is the diagnostic exam of choice as it provides detailed information about the extent and location of the epidural abscess, and allows for visualization of inflammatory changes in the subarachnoid space. [17,18].

In patients with severe or progressive neurological deficits, such as the one reported here, surgical intervention is indicated. Immediate surgical decompression, often performed via laminotomy or laminectomy, has shown favorable results by relieving pressure on the spinal cord and facilitating drainage of purulent secretion [19,20]. The choice of antibiotic should be based on the resistance profile of the isolated pathogen and the clinical condition of the patient, with therapeutic adjustments according to the response to treatment [21].

Additionally, functional recovery depends on how quickly the diagnosis is made and treatment is started. In our patient, early intervention led to significant recovery, highlighting the importance of rapid diagnosis and treatment of the infection [22]. Subsequent physical rehabilitation also plays a crucial role in functional recovery and the prevention of permanent sequelae [23].

CONCLUSION

SEE is a rare but clinically significant infection due to its potential to cause severe neurological deficits. Early diagnosis, based on a well-founded clinical suspicion and confirmed by imaging, is essential to prevent complications. Appropriate treatment, involving surgical decompression and antibiotic therapy, can significantly improve patient prognosis. Awareness of this condition is crucial so that healthcare professionals can act promptly, minimizing the risk of permanent sequelae and improving the quality of life for affected patients.

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CONFLICT OF INTEREST

The authors declare there is no conflict of interest.

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