



Complex Management of Spinal Tuberculosis in an 8-Year-Old Child: A Case Report

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Abstract

A previously healthy 8-year-old girl presented at our hospital with cervical pain and walking difficulty. Initial evaluation was unremarkable, but magnetic-resonance-imaging revealed extensive vertebral involvement. Surgery confirmed *Mycobacterium tuberculosis* infection and a nine-month antitubercular regimen was started. Early diagnosis, multi-drug therapy and surgery led to a favorable outcome, emphasizing the importance of a multidisciplinary approach in managing pediatric spinal tuberculosis.

Keywords: Spinal Tuberculosis; Pott Disease; *Mycobacterium Tuberculosis*; Child.

INTRODUCTION

Tuberculosis (TB) of the spine, also known as Pott disease, continues to be a critical concern in pediatric infectious diseases due to its significant morbidity and complex treatment requirements. This extrapulmonary form of tuberculosis, caused by *Mycobacterium tuberculosis*, predominantly arises from the spread of bacilli through the bloodstream from a primary pulmonary or extrapulmonary focus [1,2]. Notably, spinal tuberculosis often affects the intervertebral discs due to the shared segmental arterial supply, leading to progressive vertebral body destruction, neurological deficits, and severe spinal deformities [3]. Children typically present with more severe forms compared to adults. This is due to a higher cartilage content in their vertebral bodies, making them more vulnerable to infectious damage [4].

The diagnosis of spinal TB requires a multidisciplinary approach, integrating clinical assessment, radiographic evaluation, microbiological testing, and histopathological examination [5-7]. Despite advances in anti-tuberculosis treatment, the rise of Multidrug-Resistant (MDR) and Extensively Drug-Resistant (XDR) TB strains presents formidable challenges in the effective management of this condition [8]. Optimal treatment strategies for Pott disease involve prolonged multi-drug antitubercular therapy, with surgical intervention reserved for cases with pronounced kyphosis or neurological compromise [9]. Surgical management focuses on debridement, spinal fusion, and deformity correction [10]. Early diagnosis and a comprehensive treatment regimen are paramount to achieving favorable clinical outcomes in pediatric patients afflicted with spinal TB.

CASE PRESENTATION

A previously healthy 8-year-old girl from El Salvador, who had been living in Italy for two years, was admitted to our emergency department with cervical pain, difficulty walking, and trouble maintaining an upright

posture. Her symptoms had started the day before admission. Upon reviewing her medical history, it was noted that the patient had visited our emergency department approximately two weeks earlier with a complaint of torticollis. Initial blood tests, including a complete blood count with differential, C-Reactive Protein (CRP), and liver and kidney function tests, performed in the emergency department, were within normal limits. A neurological consultation revealed weakness in the lower limbs, particularly in hip and knee flexion, with the Mingazzini Test II sustained for only a few seconds. Deep tendon reflexes were preserved, and the patient displayed a paraparetic gait. Suspected central nervous system involvement led to a cranial Computed Tomography (CT) scan and a lumbar puncture.

The cranial CT scan was unremarkable. The lumbar puncture revealed clear Cerebrospinal Fluid (CSF) with the following results: white blood cells 10 cells/ μ L, glucose 55 mg/dL (normal range 40-70 mg/dL), protein 194 mg/dL (normal range 10-45 mg/dL), lactate 1.4 mmol/L (normal range 1.1-2.8 mmol/L), and no red blood cells. The patient was subsequently admitted to the pediatric ward, where a spinal Magnetic Resonance Imaging (MRI) with contrast revealed osseous involvement suggestive of a proliferative lesion affecting the D2-D3 vertebrae, the right ninth rib, the D9 vertebral body, and the left sacral ala at S2, with dorsal dural sac compression from D2 to D4 (Figure 1). Further evaluation with a spinal CT scan confirmed the osteolytic nature of the lesion.

The patient underwent D3 and D4 laminectomy and posterior arthrodesis with transpedicular screws in D4 and sublaminar bands in D2, connected by titanium rods. During surgery, samples were collected for microbiological and histopathological examinations. Blood tests for alpha-fetoprotein, beta-hCG, and neuron-specific enolase were within normal limits. Polymerase Chain Reaction (PCR) testing of the biopsy material was positive for *Mycobacterium tuberculosis*. Both the Mantoux test and the Quantiferon-TB Gold test were also positive. Gastric aspirates for *Mycobacterium tuberculosis*, performed because the patient was unable to produce sputum, were negative. Histopathological examination of the biopsy material demonstrated necrotizing epithelioid and giant cell granulomatous inflammation. Acid-fast bacilli and fungal elements were not detected with Ziehl-Neelsen and PAS staining.

A thoracic CT scan was normal, while an abdominal CT scan revealed some liquefied lymph nodes in the gastrohepatic ligament and splenic hilum. Based on these findings, a four-drug antitubercular therapy regimen consisting of isoniazid (12 mg/kg/die), rifampin (15 mg/kg/die), pyrazinamide (35mg/kg/die), and ethambutol (20 mg/kg/die) was initiated. Following this, a more detailed medical history revealed that the child's grandmother, with whom she had lived, had passed away two years earlier from pulmonary tuberculosis.

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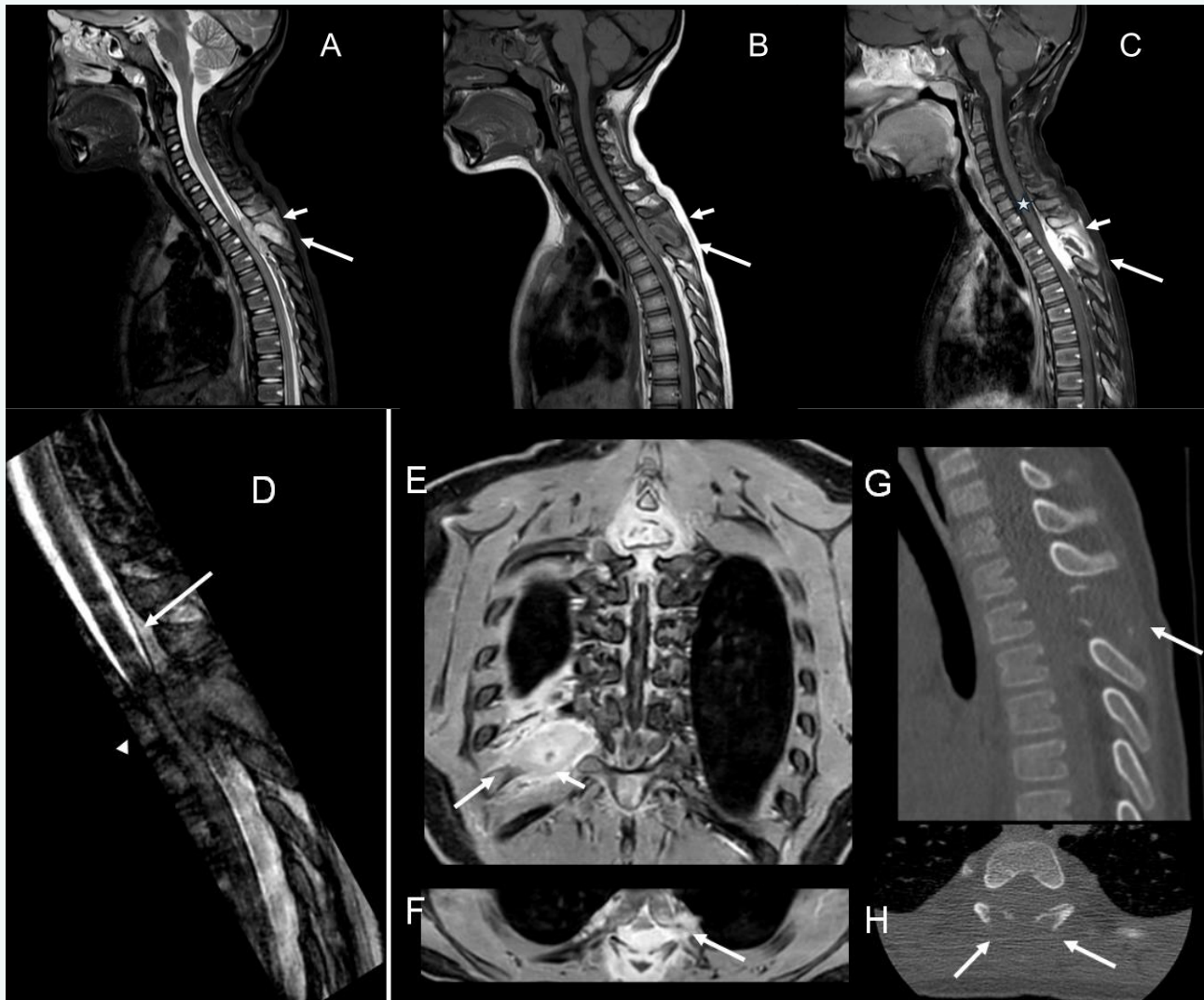


Figure 1: A show a sagittal T2 TSE image and B a sagittal T1 TSE demonstrating dishomogeneous T2 hyperintensity of the lesion and T1 hypointensity with conspicuous contrast enhancement (C; T1 Fat Sat). Involvement of interspinous soft tissue (arrow head) and spinous process (arrow) of D3 is noted, with a central component characterized by lack of contrast enhancement, representing possible necrotic tissue. Subtle dural thickening is noted (star). No frank associated myelopathy is noted. D show a sagittal reformat of an heavily T2 weighted high resolution images show the presence of an intracanalicular roughly ovoid expansile lesion with an extradural epicenter, demonstrated by the dural dislocation (arrow). The lesion extend from C7 to D5. Cord compression is noted (arrowhead). In E a coronal T1 Fat Sat image with contrast demonstrate a second lesions involving the VIII right rib (arrow) with a necrotic center (arrowhead). F show the canal involvement of the lesion with extension to the foramina (arrow) on a post contrast T1 Fat sat image. CT imaging demonstrate erosion of the spinous process (arrow in G) and of the lamina (arrows in H) of the vertebral body of D3.

After two weeks of antitubercular therapy, the child was discharged in excellent general condition with complete resolution of neurological symptoms. She was instructed to continue the four-drug regimen for two months, followed by dual therapy with isoniazid and rifampicin for seven months, completing a total of nine months. A follow-up plan was established, including a neuroradiological assessment with a spinal cord MRI six months post-discharge, a neurosurgical evaluation with a spinal X-ray one month after discharge, and monthly infectious disease assessments with blood chemistry tests to monitor therapy adherence and potential side effects.

DISCUSSION

The diagnosis of spinal tuberculosis in pediatric patients can

be challenging due to its nonspecific symptoms and rarity. When evaluating a child with spinal involvement and neurological symptoms, several differential diagnoses must be considered. Tumors, including primary spinal tumors or metastatic lesions, can present with vertebral involvement and neurological deficits similar to spinal tuberculosis. Differentiating these conditions from infectious causes typically requires advanced imaging studies and, in some cases, a biopsy. Spondylodiscitis, which involves infection of the vertebral bodies and intervertebral discs, can also mimic tuberculosis. However, it may be caused by various pathogens, and distinguishing it often relies on specific microbiological testing and imaging features.

Multiple Sclerosis (MS) should also be considered, as it can present



with spinal cord symptoms and motor and sensory deficits. MS is characterized by disseminated lesions throughout the central nervous system on MRI, which differ from the localized vertebral lesions seen in tuberculosis. Acute Disseminated Encephalomyelitis (ADEM) is another potential diagnosis. ADEM is an inflammatory demyelinating condition often following a viral infection, presenting with widespread central nervous system lesions on MRI, in contrast to the focal lesions typical of spinal tuberculosis.

Finally, myelitis, which involves inflammation of the spinal cord, can present with similar symptoms. It is usually associated with viral infections or autoimmune disorders. Accurate differentiation from tuberculosis requires assessing Cerebrospinal Fluid (CSF) findings and ruling out infectious causes through comprehensive microbiological testing. In this case, the integration of imaging studies, microbiological testing, and histopathological examination was crucial in confirming spinal tuberculosis and distinguishing it from these other potential conditions. Early and precise diagnosis, supported by a thorough diagnostic workup, is essential for achieving favorable outcomes and avoiding misdiagnosis.

CONCLUSION

This case highlights the importance of considering spinal tuberculosis in the differential diagnosis of pediatric patients with spinal involvement and neurological symptoms. Early diagnosis and appropriate therapy are critical for preventing severe complications and ensuring favorable outcomes.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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