



CASE REPORT: A 31-YEAR-OLD FEMALE WITH INFERIOR PARAPARESIS UPPER MOTOR NEURON TYPE DUE TO DESTRUCTION OF THORACIC 6-7 VERTEBRAE DUE TO TUBERCULOUS SPONDYLITIS

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ABSTRACT

Background: Tuberculous (TB) Spondylitis results from the hematogenous spread of Mycobacterium tuberculosis bacteria to the spinal blood vessels. The incidence of extrapulmonary tuberculosis in the world is 3%, of which 10% of cases are bone. **Purpose:** This paper will describe the case of a patient with Inferior paraparesis upper motor neuron type due to the destruction of thoracic 6-7 vertebrae resulting in tuberculous spondylitis at Dr. Moewardi General Hospital, Surakarta, Indonesia. This case can provide vital insights to health services, marking a significant step forward in advancing the discussion on tuberculous spondylitis. It underscores the importance of early detection and effective treatment in improving patient outcomes and guiding future research efforts. **Case Presentation:** A Female, 31 years old, presented with complaints of lower limb weakness felt four months before admission and associated with back pain. The patient's consciousness was compos mentis. There was tenderness in the back midline and neurological deficits. There was a decrease in muscle strength in the lower extremities, both left and right, and also a decrease in physiological reflexes in all four extremities. There was positive Babinski on the right side and positive clonus on both sides. Thoracolumbar MRI results showed destruction of the corpus of Thoracic 6&7 Vertebrae with gibbus deformity and kyphosis with a picture of soft tissue abscess. **Conclusion:** The patient was diagnosed with paraparesis inferior upper motor neuron type due to destruction of thoracic 6-7 vertebrae due to tuberculous spondylitis. Then she was treated and planned for laminectomy, PSF, debridement, and corpectomy.

INTRODUCTION

Tuberculosis is one of the oldest known infectious diseases and remains a major source of morbidity and mortality worldwide.¹ Tuberculosis, as a disease, has been recognized since ancient times. It has been described from 1000 to 600 BC as "Yakshama" in ancient Indian medical literature, as well as the Sushruta Samhita and Charaka Samhita.² Percival Pott, in 1779, was the first physician who found classically described features with a type of lower limb paralysis often accompanied by curvature of the spine.^{3,4} Tuberculosis is well-controlled, and large-scale

transmission is prevented in Southeast Asian countries, including Indonesia. However, some vulnerable populations, such as the elderly and those with multiple comorbidities, may still be infected with Mycobacterium tuberculosis complex (MTC) without being diagnosed.

Spinal TB is usually secondary hematogenous and spreads from the primary site of infection (most commonly the lungs). Paradiscal blood vessels usually supply the subchondral bone on either side of the disc space and therefore, the most common site of vertebral involvement is paradiscal. Other patterns of involvement include central (with predominant



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vertebral body involvement), posterior (mainly involving posterior structures), and non-osseous involvement (presenting with abscesses). Progressive vertebral damage leads to deformity and kyphotic instability of the spine.⁵ The clinical presentation of spinal tuberculosis is variable. The manifestations depend on the duration of the disease, the severity of the disease, the location of the lesion, and the presence of associated complications including deformity and neurological deficits. In uncomplicated disease, patients usually present with back pain whereas the presentation associated with complicated tuberculous spinal disease involves deformity, instability, and neurological deficits.

Back pain in tuberculosis can be related to the active disease itself (secondary to inflammation), bone destruction, and instability. Pain at rest is pathognomonic, and rarely, radicular pain can be the primary symptom. Constitutional symptoms, including weight or appetite loss, fever, and malaise/fatigue, are less commonly associated with extrapulmonary tuberculosis than with pulmonary disease.⁶

In such cases, if these individuals have spinal compression fractures, it is imperative to consider tuberculous spondylitis (Pott's disease) as part of the differential diagnosis, as the treatment approach is fundamentally different from the treatment approach for simple osteoporotic compression fractures.⁷ Tuberculosis is the leading cause of death worldwide, with ten million new cases each year, and was responsible for 1.8 million deaths in 2018 alone.⁸⁻¹⁰ Tuberculous spondylitis is a common chronic infectious disease and constitutes 50-75% of extrapulmonary tuberculosis and 4% of all cases.¹¹

Tuberculosis is still one of the most important health problems in the world. In developed countries, the proportion of extrapulmonary tuberculosis cases is increasing. Indonesia is the country with the third-highest prevalence of TB in the world, after China and India. Tuberculous spondylitis is a rare case and its management involves multidisciplinary approaches. In this case, after receiving proper treatment, the patient regained limited mobility and resumed daily activity, even using a wheelchair.

CASE REPORT

A female, 31 years old, came to the emergency room with a complaint of lower limb weakness that she had felt since four months before admission. In the early stages of symptoms appearing about four months before admission, the patient complained of back pain that felt increasingly aggravated when waking up with a scale according to the Visual Analog Scale (VAS) was 6. The pain felt did not decrease with a change in position and improved when the patient took medication. The pain was increasing over time. 2 Weeks before admission, the patient complained that the lower limbs felt numb and increasingly aggravated, which made it difficult to walk and caused the patient to be assisted with a cane or assisted by family members when walking. The numbness was initially felt only in the legs and then rose to the upper abdomen. Until one day before admission, the patient was unable to walk and could only shift his limbs. The patient also complained of difficulty defecating since three days before admission. Previously, the patient did not have a history of complaints similar to the present, nor did she have a history of trauma, and the patient could walk without having difficulty or using assistive devices. The patient also denied similar complaints in the family members and history.

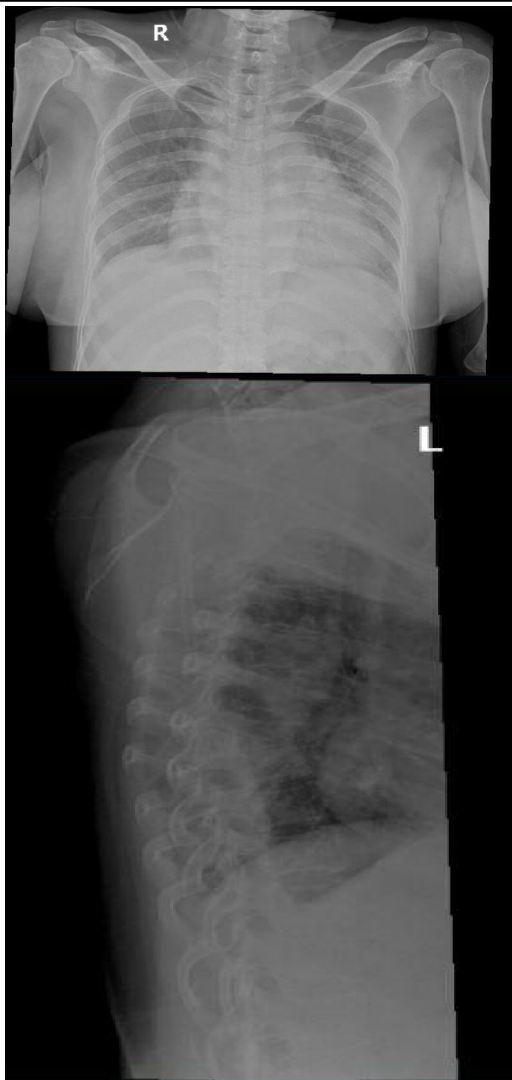


Figure 1. Thorax and Thoracic X-ray. There is an inhomogeneous opacity with well-defined regular borders in the paratracheal region at the level of the corpus of Thoracic 3-10 Vertebrae and destruction at the corpus of Thoracic 6 Vertebrae with kyphosis at the level 6-7 of Discuss Inter Vertebrae.

A physical examination was performed on the patient. The patient appeared moderately ill with *compos mentis* consciousness, blood pressure was 142/90 mmHg, heart rate was 91 times/minute, respiratory rate was 22 times/minute, body temperature was 36.6° C, and oxygen saturation was 99% with room air. From the localized status examination of the spinal region, the skin appeared intact, with no swelling or lesions. There was Midline tenderness, no step-off, and there were neurological deficits. From the motor and reflex examination, muscle tone was not found to be weak, there was a decrease in muscle strength in the lower extremities both left and right. There was also a decrease in physiological reflexes in all four extremities. On pathological reflex examination, positive Babinski was found on the right side and positive clonus on both sides.

Then, the patient underwent additional examinations such as Thorax X-ray, Thoracic X-ray, and Thoracolumbar MRI with contrast. From the results of the Thorax X-ray and Thoracic X-ray, it was found that there was a destruction of the corpus of Thoracic 6 Vertebrae accompanied by kyphosis at the DIV of level 6-7 with suspicious tuberculous spondylitis. From the results of Thoracolumbar MRI with contrast, it was found that there was the destruction of the corpus of Thoracic 6 & 7 Vertebrae accompanied by changes in bone marrow intensity, narrowing of DIV at level T6-7 with gibbus and kyphotic deformities and a picture of soft tissue abscesses at level T5-9 which narrowed the *canalis centralis*, pressing the spinal cord at the level of T6-7, extending to the anterior and posterior longitudinal ligaments at T5-9, M. Erector Spinae bilaterally at T5-9, facet joints, lamina, processus transversus at T5-9 leading to a picture of TB spondylitis. Then, the patient was diagnosed with inferior paraparesis upper motor neuron type due to destruction of thoracic 6-7 vertebrae due to TB spondylitis. Moreover, The patient was treated and planned for laminectomy, Posterior Spinal Fusion, debridement, corpectomy, culture and histopathological analysis. After that, although there was no change in muscle strength and sensory perception before and after the surgery, the patient underwent training in movement and physiotherapy, including general exercises, range of motion exercises, turning and positioning exercises, and gradual mobilization. This enabled her to resume normal activities despite using a wheelchair.

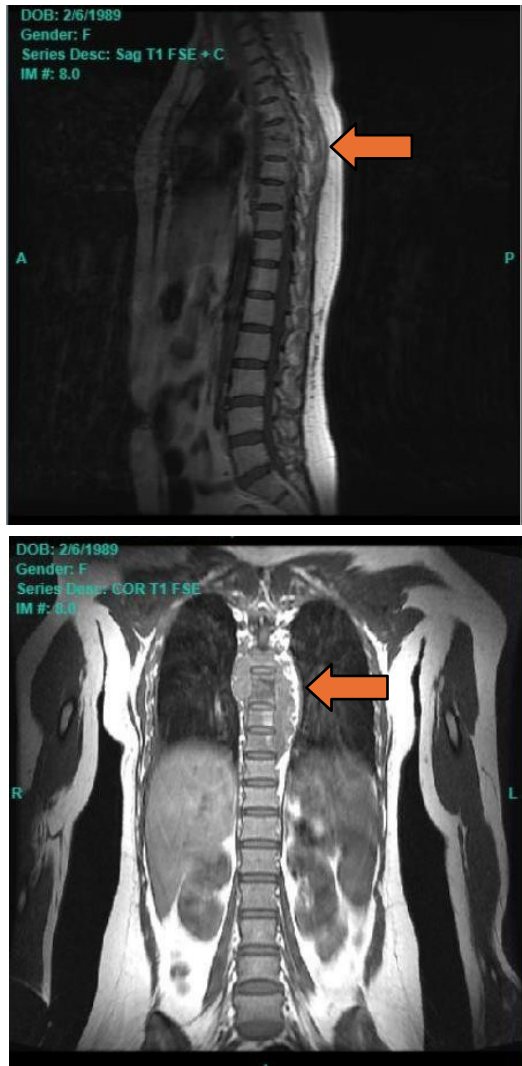


Figure 2. The contrast-enhanced Thoracolumbar MRI shows the destruction of the corpus of thoracic 6 and 7 vertebrae accompanied by gibbus and kyphotic deformities and soft tissue images of abscesses extending into the surrounding tissues.

DISCUSSION

Tuberculosis (TB) is an infection caused by *Mycobacterium tuberculosis* (MTB). TB generally affects the lungs but can also affect organs or areas outside the lungs, known as extrapulmonary TB. Extrapulmonary tuberculosis accounts for 10 to 15 percent of TB, and the musculoskeletal system is the second most commonly infected site after the lymph nodes.^{5,2,13} TB spondylitis or Pott's disease is a tuberculosis infection that affects the spine. The spine is reported to be the most commonly affected site of tuberculosis infection in the musculoskeletal system, accounting for almost 50 percent of cases. The lumbar spine is the most common predilection of TB spondylitis (60 percent), followed by the thoracic (40 percent) and cervical (10 percent) vertebrae. *Mycobacterium tuberculosis* enters the body through the lungs by way of droplet infection or through the gut, very rarely infecting through the skin. The disease causes a granulomatous reaction leading to tissue necrosis and caseous.¹²

The first symptom of TB spondylitis is usually a lump on the spine accompanied by pain. Destruction of the subchondral bone results in complaints of deformity of the spine or kyphosis, which is a back that bends and forms an angle, occurring in 80 percent of cases. Myelopathy that occurs in TB spondylitis is usually caused by pressure on the collapsed anterior vertebral column due to spinal instability, as well as compression on the spinal cord due to granulation tissue. If prolonged, it may be accompanied by paraplegia or without paraplegia. Kyphotic deformity and neurological deficits are the worst complications of TB spondylitis. Spasticity, increased tendon reflexes, and the presence of Babinski reflexes are symptoms of UMN lesions.¹³ Neurological deficits in the form of pain and paraplegia are present in more than 10-47 percent of patients with TB spondylitis. Kyphotic deformity with or without neurological complications can occur if the disease is not diagnosed and treated properly. The mildest degree of kyphosis deformity is fingernail-shaped, and the most severe degree is angular or rounded. TB spondylitis of the spine affects the intervertebral discs, leading to bony deformities. Other symptoms still found in patients who have been treated surgically include chronic pain, postural abnormalities, and permanent neurological injury.¹⁴⁻¹⁶

The presence of *M. Tuberculosis* in cultured tissue specimens was initially considered the gold standard for the diagnosis of TB spondylitis, but sensitivity is



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poor. Histopathological studies (classic granuloma appearance) and acid-fast bacilli staining are standard references. GeneXpert MTB/RIF takes only 90 minutes and has relatively high sensitivity and specificity. It can detect rifampicin resistance.¹⁰ If specimens are not examined, caseous infection may extend to the surrounding soft tissues and cause cold abscesses. These abscesses may rupture, forming tuberculous sinuses or ulcers.

Thoracic radiographs are helpful in showing pulmonary involvement and paraspinal abscesses. X-ray examination will reveal soft tissue edema and periarticular osteoporosis. The endplate looks 'washed out' and the articular space is narrowed. In children, the epiphysis may be enlarged, probably due to long-standing hyperemia. There is erosion of the subarticular bone characteristically seen on both sides of the joint, a sign that an inflammatory process has started within the synovium. Cystic lesions may appear at the ends of adjacent bones but there is little or no periosteal reaction. In the vertebrae, the typical appearance is bony erosion and collapse around the intervertebral disc space. Soft tissue shadows can determine the presence of a paravertebral abscess.¹²

MRI is the imaging modality of choice as it allows clear views of bone and soft tissue. MRI findings in TB spondylitis may be indistinguishable from pyogenic infection, but there are some differences that are characteristic of TB and reflect the different pathological types described earlier. The intervertebral discs may have normal height and normal signal on MRI, reflecting the resistance of the disc to TB infection. The diagnosis of TB spondylitis can be made by the involvement of the anterior aspect of several adjacent vertebral corpus or the involvement of posterior elements. Paraspinal masses tend to be longer in TB spondylitis than in pyogenic infections and can be well-imaged with plain or gadolinium-enhanced MRI. Contrast enhancement can differentiate abscess from granulation tissue. MRI findings are not entirely typical. Therefore, a biopsy is required in all cases. The central segment of TB is very similar to neoplasms.

The primary treatment of TB is long-term antibiotic therapy for at least 1 year, with a minimum of 6 months in certain cases. Multidrug antituberculosis treatment (ATT) is the primary treatment for complicated and uncomplicated TB.

Multidrug ATT may reduce the incidence of drug resistance. The duration of therapy for spinal TB has long been debated, and the WHO recommends 9 months of treatment with 4 drugs: isoniazid, rifampicin, pyrazinamide, ethambutol, or streptomycin given in the initiation phase for 2 months, followed by isoniazid and rifampicin for 7 months in the continuation phase. There is a controversy regarding the superiority of daily dosing regimens over intermittent regimens.¹⁷

Indications for surgery include unknown pathogen, neurological deficit, nerve compression due to epidural abscess, and refractory back pain.¹⁸ Indications for surgery in active TB are for debridement of lesions and to address vertebral instability and neurological deficits, while surgery in cured disease is for progressive deformity, late-onset neurological deficits, bothersome pain, and vertebral instability.¹⁵ Surgical therapy also has risk factors for the onset of pain and causing impaired neurological function.^{14,15} Patients who develop tuberculous spondylitis after kyphoplasty are often elderly and immunocompromised. The risk of perioperative complications is high when attempting complete removal of cement after cement removal but still achieving good infection control.¹⁹ In the active phase, especially in the early stages with minimal collapse and flexible deformity, posterior vertebral stabilization along with transpedicular decompression without anterior reconstruction is sufficient. In cases requiring minimal debridement, vertebral cleaning to achieve bone-to-bone contact can be performed to avoid anterior reconstruction. Spinal TB has a favorable prognosis, especially with earlier diagnosis and treatment.²⁰ In patients with more extensive bony involvement, facet and intercostal nerve removal and complete debridement with anterior reconstruction and implant or titanium cage may be performed.¹⁵

In this patient, Laminectomy of T6-T7, Posterior Spinal Fusion of T4-T8, Transpedicle Debridement of T6-T7, Debridement Costotransversectomy of T6, Corpectomy of T6, culture, and histopathological analysis were performed. The culture and histopathological analysis were conducted post-surgery, with sample collection performed during the surgery. The result was consistent with tuberculous characteristics. After the surgery, although there was no change in muscle strength and sensory perception before and after the surgery, the patient underwent training in movement and physiotherapy, including general exercises, range of motion exercises, turning



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and positioning exercises, and gradual mobilization. This enabled her to resume normal activities despite using a wheelchair.

The prognosis and recovery are influenced by the patient's age, severity of kyphosis deformity, lesion site, number of vertebrae involved, and health status, including nutritional status. They are also associated with the initiation of treatment and stage of disease development. In this case, the prognosis of this patient was possibly poor because there was neurological deficit and deformity.

CONCLUSION

Tuberculosis infection of the musculoskeletal system most commonly occurs in the spine. The symptoms complained of are lumps on the spine accompanied by pain. Destruction of the subchondral bone results in complaints of deformity of the spine (kyphosis), which is a back that bends and forms an angle. Kyphosis deformity and neurological deficits are the worst complications of TB spondylitis. Symptoms of neurological deficits in the form of pain and paraplegia appear in more than 10-47 percent of cases of TB spondylitis patients. The lumbar vertebrae are the most common predilection for TB spondylitis infection.

Thoracic radiographs are helpful in showing pulmonary involvement and paraspinal abscesses. X-ray examination will reveal soft tissue edema and periarticular osteoporosis. In the vertebrae, the typical appearance is bony erosion and collapse around the intervertebral disc space. Soft tissue shadows can determine the presence of a paravertebral abscess. MRI findings in TB spondylitis may be indistinguishable from pyogenic infection, but there are some differences that are characteristic of TB and reflect the different pathological types previously described. The intervertebral discs may have normal height and normal signal on MRI, reflecting the resistance of the disc to TB infection. The diagnosis of TB spondylitis can be made by the involvement of the anterior aspect of several adjacent vertebral corpus or the involvement of posterior elements. Contrast administration can differentiate abscess from granulation tissue. MRI findings are not entirely typical. Therefore, a biopsy is required in all cases.

The management of tuberculous spondylitis and pyogenic spondylitis after kyphoplasty will be similar. Spondylitis due to nonspecific infection can

have clinical features of tumor metastases and the exact diagnosis can only be made after performing a tissue biopsy. Anatomical pathology examination can help in establishing the diagnosis of non-infectious diseases such as tumours. The biopsy method may use a needle (fine needle biopsy) or involve a skin incision to collect a tissue sample (open biopsy). Anti-tubercular therapy (ATT) is the primary treatment for complicated and uncomplicated TB. WHO recommends 9 months of treatment with 4 drugs: isoniazid, rifampicin, pyrazinamide, ethambutol, or streptomycin given in the initiation phase for 2 months, followed by isoniazid and rifampicin for 7 months in the continuation phase. Indications Surgery in active disease is performed for lesion debridement and to address vertebral instability and neurological deficits, while surgery in resolved disease is for progressive deformity, late-onset neurological deficits, both some pain, and vertebral instability.

PATIENT CONSENT

The patient has agreed and signed a written consent regarding the publication of this clinical case in an academic journal without disclosing the patient's identity.

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CONFLICT OF INTEREST DISCLOSURE

The authors declare that there are no conflicts of interest related to the material, methods, and findings in this study.

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AUTHORS CONTRIBUTION

The authors are responsible for conceptualization, intellectual content, literature search, clinical studies, data acquisition, manuscript preparation, manuscript editing, as well as manuscript review, and also serve as guarantors of the article.

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