A tuberculosis spondylitis patient with paraplegic manifestations

Nugra Akzatama, Lita Diah Rahmawati

INTRODUCTION

Two-thirds of adults will experience back pain at some point in their lives. Abnormalities can cause back pain in the spine’s sensory nerve components, such as ligaments, facet joints, vertebral bodies, annulus fibrosus, fascia, paravertebral muscles, and blood vessels and nerves. Spondylitis is a type of back pain that can be caused by tuberculosis (TB). TB primarily affects the lungs and the disease is still a main problem in Indonesia and this health issue getting complicated during COVID-19 pandemic. Apart from infecting lungs, in 3% of TB cases, it can also affect organs other than the lungs (extrapulmonary TB). Skeletal TB is found in 10% of extrapulmonary TB cases, with tuberculous spondylitis (TB spondylitis) accounting for half of the cases.

TB spondylitis is a chronic granulomatous inflammatory disease of the spine caused by Mycobacterium tuberculosis. Up to 50% of TB spondylitis patients have spinal lesions, and 10-45% have neurological deficits. TB spondylitis, also known as Pott’s disease, was first described in 1779 by Sir Percival Pott with a clinical presentation of paraplegia in the European population with kyphotic deformity.

TB spondylitis is the most dangerous of TB cases that attack bones and joints because it can cause complications such as vertebral body destruction, spinal deformity and/or paraplegia, and pulmonary insufficiency due to thoracic deformity. A dangerous complication in the form of paraplegia, also known as Pott’s paraplegia, occurs in 4-38% of TB spondylitis patients.

Pott’s paraplegia is typically treated in two ways: medically and surgically. Medical therapy in the form of antituberculosis drugs is preferred, whereas surgical therapy is tailored to each patient’s unique circumstances. In this case report we present a rare case of 28 years-old TB spondylitis patient with paraplegia.

CASE PRESENTATION

A female patient, 28 years old, Javanese, Muslim, a Surabaya resident was admitted to Dr. Soetomo General Academic Hospital Surabaya with the primary complaint of back pain. Two months before admission to the hospital, the patient experienced back pain radiating to the stomach and bending when walking. Patients experience back pain, particularly in the area of the bent/hunched back, and the pain was felt both at rest and during activities, becoming worse over time. The patient had been unable to move the left legs for 11 days before admission and the patient had previously complained of being unable to move and feeling stiff in both legs (Figure 1A). The patient complained of a thickening sensation in both legs, becoming worse over time. The patient could walk perfectly 8.5 months after the initial treatment.

BACKGROUND

Mycobacterium tuberculosis is the primary causative agent of tuberculous spondylitis (TB spondylitis), a chronic granulomatous inflammatory disease of the spine. Patients with TB spondylitis may have spinal lesions in up to 50% of cases, and 10-45% may also have neurological deficits. We reported a case of severe paraplegia manifesting TB spondylitis in a young adult patient.

Case Presentation: A 28-year-old female Javanese Muslim was admitted to Dr. Soetomo General Academic Hospital in Surabaya, Indonesia with back pain, inability to move, and feeling stiff in both legs. During previous therapy, the patient was thought to have spondyloarthropathy. X-ray examination demonstrated T9 to T10 retrolisthesis and T10 corpus lipping. Thoracolumbosacral MRI with contrast revealed that the patient had TB spondylitis. A debridement and hemilaminectomy of T7-8 for fusion with bone segments at T7-8 were performed on the patient. The patient was treated with oral antituberculosis drugs for 10 months and could walk perfectly 8.5 months after the initial treatment.

Conclusion: This case demonstrates the complexities of diagnosing TB spondylitis, which necessitates the use of multiple disciplines. Because the clinical manifestations of TB spondylitis differ, various methods, including thoracolumbosacral X-ray and MRI with contrast, are required to confirm the disease. As a result, an interdisciplinary collaborative team is required to achieve optimal patient outcomes and to prevent long-term sequelae.
The patient had a history of back pain and was admitted to Dr. Soetomo General Academic Hospital Surabaya one month before with suspected spondyloarthropathy. The patient had no history of hypertension, diabetes, or malignancy. The patient also had no prior surgical history. None of the patient’s family members had similar complaints. There was no family history of cancer, hypertension, or diabetes mellitus.

On physical examination, the general condition was poor but compost mentis with GCS 456. The blood pressure 104/70 mmHg, pulse 88x/min, respiratory rate 20 x/min, SpO2 98% with free air, axillary temperature 37.4°C, and a Wong-Baker pain scale of 4. Anemic conjunctiva, icteric sclera, cyanosis, dyspnea, increased jugular venous pressure, and enlarged neck lymph nodes were absent during the head and neck examination. Thoracic examination revealed symmetrical movement with no substernal, intercostal, or suprasternal retractions. Regular single S1S2 heart sound with no murmurs, gallops, or pericardial rubs. No additional breath sounds such as crackles, wheezing, or pleural rub. There were no enlarged lymph nodes in the axilla. The abdomen appeared flat on examination, with normal bowel sounds, a smooth touch, no tenderness, and tympanic percussion in all abdominal regions. The liver and spleen were not palpable. Warm, dry, and red acral was discovered during an examination of the extremities, with a capillary refill time of less than 2 s. There was no edema in both leg, no enlargement of lymph nodes in either inguinal and no pathological lesions on the patient’s skin. Motor strength was 0/0 on examination of both lower extremities, with increased tendon reflexes in the form of knee pess reflex (KPR) of +3 and Achilles pess reflex (APR) of +3 as the Babinski reflex.

Laboratory examination showed Hb 13.5 g/dL, leukocytes 9880 /µL, neutrophils 80.1%, lymphocytes 13.5%, platelets 309,000 /µL, PTT 12/11.2 seconds, APTT 27.1/21.7 seconds. Blood glucose 104 mg/dL, blood urea nitrogen (BUN) 19 mg/dL, serum creatinine 0.71 mg/dL, SGOT 47 U/L, SGPT 36 U/L, albumin 3.89 g/dL, sodium 136 mmol/L, potassium 2.6 mmol/L, chloride 85 mmol/L, C-reactive protein (CRP) 55.86 mg/L, HbsAg negative and HIV rapid test negative.

The electrocardiogram revealed a normal sinus rhythm of 89x/min with no pathological features. An X-ray of the chest reveals a normal heart and lungs (Figure 1B). The corpus, pedicle, and intervertebral space were all in good shape on the BOF and left lateral decubitus (LLD) radiograph (Figure 1C). AP/lateral thoracolumbosacral X-ray demonstrating T9 to T10 vertebrae retrolisthesis and T10 corpus lipping (Figure 1D and 1E).

The patient was diagnosed with paraplegia inferior type upper motor neuron (UMN) and hypokalemia based on clinical manifestations, laboratory and radiological findings. The patient was treated with bed rest and high-calorie high protein diet therapy of 1900 kkal/day, WIDA KN2 infusion 1000 mL every 24 h. Ranitidine injection 50 mg, mecobalamin injection 500 mcg, and fursultiamine injection 2.5 mg IV bolus every 12 h. Potassium slow release 600 mg orally every 8 h, paracetamol 500 mg and codeine 10 mg orally every 6 h if there was pain.

A perspiration test or thermoregulatory sweat test (TST) was scheduled for the patient to determine the target area of thoracolumbosacral magnetic resonance imaging (MRI).

On the 2nd day of treatment, the patient still had a fever, nausea, and was unable to move both legs on the second day of treatment, but the back pain have subsided. On physical examination, the patient’s blood pressure 100/70 mmHg, pulse rate 88x/min, respiratory rate 20x/ min, axillary temperature 37.6°C, the Wong-Baker pain scale was 2, and motor strength in both extremities was 0/0. The TST was performed on the patient to determine the thoracolumbosacral MRI focus.

On the 5th day of treatment, the patient complained of being unable to move both legs but no longer felt fever, nausea and back pain. Laboratory results showed Hb 11.5 g/dL, leukocytes 10,890/µL, platelets 416,000 /µL, sodium 136 mmol/L, potassium 3.8 mmol/L, and chloride 93 mmol/L. TST showed hypohidrosis at the level of 9-10 thoracic myelum
Spondylodiskitis is the most common type of vertebral infection, which occurs in the discs and is more common in children. Whereas discitis affects the intervertebral end plates and is more common in adults, Spondylitis affects the corpus or vertebral body and can cause destruction extending posteriorly, pushing on the spinal canal, creating a picture of spondylitis tuberculosis (Figure 2). The patient was diagnosed with TB spondylitis. The patient was referred to a Pulmonary Department and was given oral anti-TB drugs (rifampicin 600 mg, isoniazid 300 mg, pyrazinamide 1250 mg, and ethambutol 1000 mg). On the 22nd day of treatment, the patient was mobilized with a thoracolumbosacral orthosis (TLSO) corset to help for sit actively.

The patient was still unable to move both legs on the 34th day of treatment. Physical examination of a Wong-Baker pain scale was 0. The neurosurgeon from Department of Surgery did a surgery procedure that included debridement, hemilaminectomy T7-T8 for fusion with bone segments at T7-T8, fixation with rods, locking nuts, and corporeal screw insertion at T6-T10 (Figure 3). After surgery, the patient’s AP/lateral of thoracolumbosacral X-ray revealed T8 collapse with internal fixation on T7 and T9, as well as good bone apposition. The GeneXpert MTB/RIF assay was used to analyze pus samples from a T6-T9 corpus paravertebral abscess.

On the 36th day of treatment, the patient complained of nausea, vomiting, back pain, particularly in the area of the recent surgery, and inability to move both legs. A Wong-Baker pain scale was 5 and motor strength in both legs was 0/0. GeneXpert MTB/RIF examination of pus samples from T6-T9 corpus paravertebral abscesses showed M. tuberculosis and no rifampicin resistance was detected. The patient was given a high-calorie high protein refined porridge diet (1900 kcal/day), KCl premix infusion of 50 meq 500 ml in 24 h and started on treatment using anti-TB drugs (rifampicin 600 mg, isoniazid 300 mg, pyrazinamide 1250 mg, and ethambutol 1000 mg). On the 44th day of treatment, the patient did not complain of nausea, vomiting, or back pain even though the patient could not move the legs. During the physical examination, the Wong-Baker pain scale was 0 and both motor strength disorders were 0/0. All routine laboratory results within normal limits. The patient was discharged from the hospital by continuing the previous OAT.

The patient maintained routine control at the Neurosurgery Polyclinic and the Medical Rehabilitation Polyclinic at Dr. Soetomo General Academic Hospital Surabaya while undergoing intensive anti-TB therapy at the Tembok Dukuh Health Center. The patient was able to walk perfectly 8.5 months later. Anti-TB drugs were finally discontinued 10.5 months later.

**DISCUSSION**

Our patient had back pain for two months, accompanied by fever with a new onset, notably 5 days before entering the hospital, and had a history of previous use of intravenous drugs because there was a history of being hospitalized at Dr. Soetomo General Academic Hospital one month earlier. Back pain in the patient was more indicative of a vertebral infection, a serious spine disorder that necessitates immediate diagnostic imaging. Vertebral infection is classified into several diseases based on its location and characteristics. Spondylitis affects the corpus or vertebral end plates and is more common in adults, whereas discitis affects the intervertebral discs and is more common in children. Spondylodiskitis is the most common type of vertebral infection, which occurs in the disc and adjacent vertebral bodies. Septic facet joints are affected by hematogenous spread, whereas epidural abscesses are affected by contiguous spread (directly into adjacent structures) to the medullary canal.12
The American College of Physicians and the American Pain Society guidelines both recommend specific imaging for any abnormality in the spine. In cases of suspected vertebral infection, cauda equina syndrome, severe neurologic deficits, and new-onset low back pain with a cancer history, MRI is the first choice. Plain lumbosacral radiographs are the first choice in suspected vertebral compression fractures, cancer over the age of 50, and cancer with unexplained weight loss. Plain pelvic radiographs are advised when ankylosing spondylitis is suspected.\(^{11}\)

A thoracolumbosacral MRI with contrast is required to diagnose a suspected vertebral infection with severe neurologic deficits in the form of paraplegia. The MRI of the patient showed the collapse of the T8 corpus was accompanied by a 16-degree gibbus formation with a surrounding soft tissue mass and intraosseous and paravertebral abscesses as high as the T4-11 corpus, which extended posteriorly, pressing the spinal canal and causing cord edema. All of these suggested a TB spondylitis feature. TB spondylitis spreads hematogenously from the primary focus of the lung or Batson's paravertebral venous plexus and spinal canal above the level of kyphosis are the three main causes of Pott's paraplegia.\(^{8}\)

The anamnesis of the patient revealed that both limbs had been immobile and stiff for one week before admission to the hospital. For two months, the patient complained of back pain radiating to the stomach and bending when walking. The patient experienced back pain both at rest and during activity, which worsened over time. The patient also complained of a fluctuating fever for 5 days before admission to the hospital. The physical examination revealed a Wong-Baker pain scale of 4, motor strength in both legs of +3, and Babinski reflex in both legs. Due to a suspicion of TB spondylitis, the patient was diagnosed with upper motor neuron (UMN) type paraplegia.

The presence of \textit{M. tuberculosis} in cultured tissue specimens was initially considered the gold standard for the diagnosis of TB spondylitis, but the sensitivity was poor. BACTEC media culture requires 2–4 weeks of incubation. Histopathological studies (classical granuloma appearance) and acid-fast bacilli staining are standard references. GeneXpert MTB/RIF only takes 90 minutes with a relatively high sensitivity and specificity and can detect the rifampicin resistance.\(^{5,17}\)

Imaging could assist with the diagnosis of TB spondylitis. The chest X-ray only detects defects in late-stage kyphosis. Bone destruction, regional stability, posterior column involvement, and joints are all identified using computed tomography (CT). MRI can distinguish TB from other causes of spondylitis, detect soft tissue involvement, spread of abscesses, nerve compression, and assess response to therapy. MRI is the gold standard for imaging TB spondylitis, with a sensitivity up to 100% and 80% specificity.\(^{3}\) Destruction and edema of two or more vertebral bodies, relatively good vertebral discs, infection extension under the anterior longitudinal ligament, and thin-walled prevertebral/paravertebral/epidural/intraosseous abscesses are MRI features of TB spondylitis.\(^{14}\) The thoracic and thoracolumbar segments are commonly affected by TB spondylitis. 70% and 65% of cases had paravertebral and epidural abscesses, respectively.\(^{18}\)

The diagnosis of TB spondylitis was made based on MRI findings and confirmed by GeneXpert PCR/sensitivity culture/histopathological evidence.\(^{3}\)

This case report patient's laboratory results revealed an elevated CRP level of 55.86 mg/L. T9 retrolisthesis to T10 and T10 corpus lipping as seen on an AP/lateral thoracolumbosacral X-ray. Thoracolumbosacral MRI findings suggest TB spondylitis, and GeneXpert MTB/RIF pus from aT 6-9 corpus paravertebral abscess revealed \textit{M. tuberculosis} but no rifampicin resistance.

The patient was diagnosed with TB spondylitis. Antituberculosis drugs are the primary treatment option for TB spondylitis. Due to the difficulty of assessing therapeutic response, the WHO and American Thoracic Society (ATS) recommend rifampicin-sensitive TB spondylitis therapy in the form of two-month intensive phase drugs (isoniazid, rifampicin, ethambutol, pyrazinamide) and seven-month follow-up phase drugs (isoniazid, rifampicin).\(^{16,19}\) In spinal lesions, ethambutol and pyrazinamide concentrations are adequate. Ethambutol has a high ability to penetrate synovial fluid and cold skeletal abscesses.\(^{20}\)

Operative therapy is indicated in certain cases of TB spondylitis. Oguz et al. developed the Gulhane Askeri Tip Akademis (GATA) classification system for TB spondylitis based on seven clinical and radiological criteria (abscess formation, disc degeneration, vertebral collapse, kyphosis, sagittal index, instability, and neurological problems). This classification aims to select the appropriate specific management and techniques for each type of TB spondylitis.\(^{21}\)

Spinal instrumentation in shape of internal fixation, such as rods, interbody spacers, screws, or Hartshill rectangles, has been developed for all vertebrae (cervical to sacral). Internal fixation in TB spondylitis surgery aims to allow spinal fusion within 4-5 months of surgery to prevent...
pseudarthrosis. Pseudarthrosis is the appearance of joint-like movements in areas where the bones have failed to heal and unite completely. 

The patient was given anti-TB drugs (600 mg rifampicin, 300 mg isoniazid, 1250 mg pyrazinamide, and 1000 mg ethambutol every 24 h for two months followed by 450 mg rifampicin and 450 mg isoniazid three times a week for seven months). The patient was fitted with a TLSO corset to stabilize the spine in the thoracic, lumbar, and sacral regions. According to the GATA classification, the patient has type II TB spondylitis because there was a collapse of the T8 corpus, gibbus formation with a sagittal index of 16 degrees, kyphosis, and deformity accompanied by neurological deficits in the form of paraplegia, so debridement is performed, T7-8 hemilaminectomy for fusion with bone segments at T7 -8. Internal fixation with rods, locking nuts, and corporeal screw insertion is performed on patients at T6-10 to allow spinal fusion and corporeal screw insertion is performed on patients at T6-10 to allow spinal fusion at 4-5 months postoperatively and prevent pseudarthrosis.

The prognosis for TB spondylitis is fairly positive, with antituberculosis therapy relieving pain and improving neurological deficits and kyphotic deformity in 82-95% of cases. Recovery time for TB spondylitis varies depending on the prognostic stage.

The patient has a good prognosis with a healing time of about 8 months, from the first time received anti-TB until the patient was able to walk perfectly. This is consistent with the patient's prognostic stage, namely stage III in the form of a collapse of one vertebra (T8 corpus) accompanied by gibbus formation with an angle of 16 degrees therefore that the estimated healing time is around 3-9 months.

CONCLUSION

We reported a patient with TB spondylitis GATA type II. The patient received anti-TB drugs for two months intensive phase and seven months in the continuation phase, as well as corset fitting (TLSO) and surgical procedures (debridement, hemilaminectomy for fusion, and internal fixation). The patient had a good prognosis and can walk normally after eight months of therapy. This case highlights how accurate diagnosis and management could prevent the patient's deformity.

PATIENT CONSENT

The patient had agreed and signed written informed consent regarding publishing this clinical case in an academic journal without exposing the patient's identity.

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AUTHOR CONTRIBUTION

NA was responsible for the conceptualization, intellectual content, literature search, clinical studies, data acquisition, manuscript preparation, manuscript editing, and review of the manuscript. DR was responsible for the conceptualization, intellectual content, clinical studies, manuscript editing and as the guarantor of the article.

REFERENCES