

Musculoskeletal Tuberculosis Involving Ribs, Spine and Pelvis in a 17-year-old Girl: A Case Report

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Abstract

Background: We present a case of progressive back pain associated with weight loss and low-grade fever in a 17-year-old patient previously diagnosed with spinal tuberculosis (TB) also known as tuberculous spondylitis or Pott's disease.

Case presentation: Upon the patient's presentation to the clinic, a differential diagnosis including infectious and non-infectious causes such as extra-pulmonary tuberculosis, septic arthritis, malignancy, rheumatologic diseases, and physical abuse was made. Her preliminary workup was suggestive of granulomatous disease. A positive tuberculin skin test (TST), and a polymerase chain reaction (PCR) test of the tissue with mycobacterium tuberculosis deoxyribonucleic acid (MTB DNA), confirmed the diagnosis of musculoskeletal TB.

Conclusion: The patient was treated with anti-TB regimen and Pyridoxine to avoid peripheral neuropathy associated with isoniazid use. Her clinical follow-up showed improvement with a proper response to treatment and no sequelae.

Keywords: Musculoskeletal tuberculosis, Potts disease, Back pain, Tuberculous spondylitis, Gibbus deformity

Introduction

Musculoskeletal TB consists of around ten percent of extra-pulmonary TB, with spinal TB accounting for up to 50% of these cases [1]. Pathogenesis of spinal TB is explained by bacterial hematogenous spread through vertebral arteries, affecting two or more contiguous vertebrae [2]. Diagnostic delays of spinal TB are associated with a permanent bone defect, mainly kyphotic, and neurological sequelae [3]. Based on the literature review, the diagnostic approach suggested for similar cases includes a detailed history and physical exam, TST, erythrocyte sedimentation rate (ESR), and imaging in addition to the valuable confirmation by a biopsy of the lesions, with DNA amplification techniques or PCR. Culture should be always considered to determine the exact organism even though it can come back negative [4-5]. Spinal TB is rare in children, usually insidious with delayed diagnosis. In this case report, we present a 17-year-old female with multifocal non-contiguous musculoskeletal TB involving her ribs, spine, and pelvis. Therapy is decided based on neurological involvement. Medical therapy is usually enough for patients without neurological complications, while patients with neurological complications need a combination of medical and surgical treatment to improve outcomes [4-5].

Case Presentation

A 17-year-old adolescent single female presented to our institution with a six months history of progressively worsening back pain, night sweats, low-grade fever, and fatigue. Her fever occurred once or twice per 24 hours, mostly at night, reaching 39°C (102.2 F), and associated with night sweats. During the day, fever was usually low grade and responsive to antipyretics. Her back pain was diffuse, mostly mid-thoracic and lumbosacral, that improved at rest and worsened with activity. The pain was intermittent but gradually progressed, restricting her daily activities and causing her

sleeping difficulties. The pain was accompanied by heaviness, burning sensation, and numbness in the lower limbs. She had generalized fatigue and a six kilograms weight loss over three months. Parents did not receive BCG vaccination. Past medical and surgical history was negative for tuberculosis, rheumatologic diseases, and malignancy as well as family history. The patient has three healthy siblings. The patient denied exposure to sick contacts, but she reported traveling with her family every summer to Belgium. In the clinic, she looked pale and undernourished. Her vital signs were normal, and no signs of adenopathy were perceived. There was mild tenderness along the spinal vertebrae and palpable spine deformity, 5-centimeters swelling causing angulation of the T7 vertebrae (Gibbus deformity). Otherwise, she had normal motor strength and sensation in all extremities, no focal neurological signs with normal distal tendon reflexes, and a normal gait.

Our differential diagnosis included infectious and non-infectious causes including septic arthritis, pyogenic or fungal osteomyelitis, malignancy, rheumatologic disease, and tuberculosis. Because the patient was stable with no need for hospital admission, our diagnostic approach was progressive. We started by ordering general tests such as complete blood cells count, C reactive protein, TST, and Chest X-ray. We did not order any tumor markers because the diagnosis was revealed before their turn. Her initial laboratory workup included normal complete blood cells count and liver function test but elevated C reactive protein at 97 mg/L (Normal: <5 mg/L) and positive tuberculin skin test (TST) with 20 mm induration.

A chest X-ray was done and had normal findings. However, a chest computed tomography (CT) scan was significant for localized right pleural effusion. Abdominal CT scan showed T7 endplate lytic lesion, iliac and sacrum bone appear heterogeneous. A spine magnetic resonance imaging (MRI) showed innumerable lesions with abnormal signals

and enhancement involving multiple vertebrae including the body and posterior elements, ribs, and bones of the pelvis (Figure 1). In addition, it also showed the irregularity of the endplates and anterior aspects of the vertebral bodies at the T7-T8 level with associated disc desiccation and irregularity and mild narrowing of the disc space (Figure 2). Small right pleural effusion with the necrotic component, left pleural thickening, and enhancement were also present (Figure 3). Scapular involvement was also noted (Figure 4).

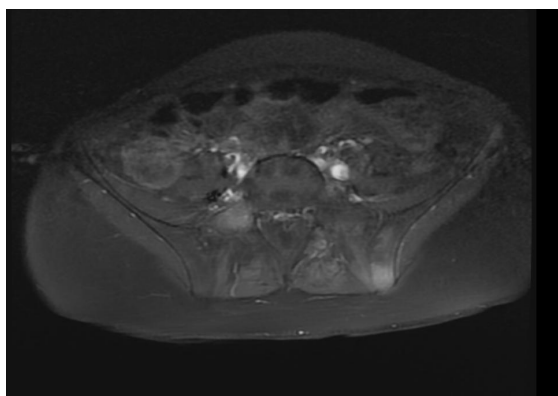


Figure 1: high STIR and low T1 signal with enhancement post contrast in left iliac bone



Figure 2: At T7-T8, cortical irregularities at the level of the end plates and anterior aspects of the vertebral bodies, with associated disc desiccation with irregularity and mild narrowing of the disc space

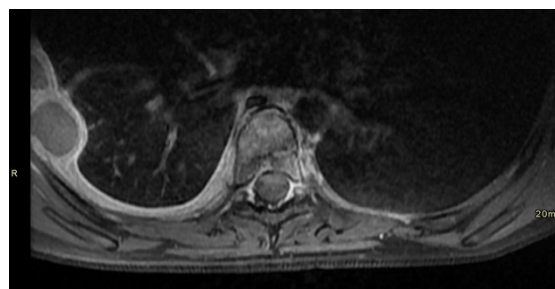


Figure 3: small multiloculated right pleural effusion with necrotic components

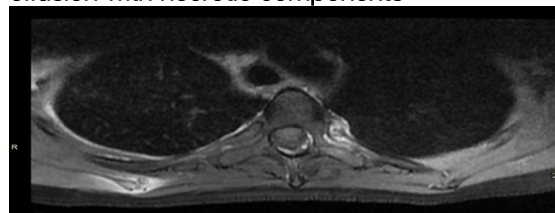


Figure 4: Scapular involvement showing high STIR and low T1 signal with enhancement post contrast and periosteal edema.

These investigations lead to an open thoracotomy and pleural biopsy that revealed epithelioid and giganto-cellular granulomatous inflammation without caseating necrosis and suppurative necrosis, consistent with sarcoidosis. The polymerase chain reaction (PCR) test of the tissue was positive for mycobacterium tuberculosis deoxyribonucleic acid (MTB DNA) confirming the diagnosis of musculoskeletal TB. Because the patient was clinically stable and managed as an outpatient, we did not order any other tests, especially tumor markers.

The patient was initially started on intensive treatment with four drugs anti-TB regimen, including Isoniazid 300 mg once daily, Rifampin 600 mg once daily, Ethambutol 1,200 mg once daily, and Pyrazinamide 1,500 mg once daily. All medications were taken orally for two months. The patient was also started on Pyridoxine 50 mg once daily to avoid peripheral neuropathy associated with isoniazid use. She was educated on keeping a nutritious diet and avoiding strenuous activity. After that, the patient was switched to the continuation phase of therapy with only Isoniazid 300 mg once daily and Rifampin 600 mg daily for four months. The patient was asked to come

back to the clinic for assessment after three months of treatment and to repeat imaging. The neurosurgery team recommended a brace for better pain control and requested a repeat imaging after three months for follow-up.

Four weeks after therapy initiation, the patient reported improvement in her activity, back pain, and fatigue with complete resolution of her fever.

Discussion

We described a case of musculoskeletal TB with a clinical presentation mimicking malignancy, and a pathology indicating sarcoidosis. Musculoskeletal involvement of chronic inflammatory diseases can present with a similar clinical picture and the clinician should look meticulously to find specific signs to orient the search for the final diagnosis.

In 2017, extrapulmonary TB consisted 14% of all cases reported, with 24% of them in the Eastern Mediterranean Region [6]. Lymphatic and pleural diseases were the most common extrapulmonary manifestations, followed by bone and joint involvement [7]. Spinal TB was found to be the most common manifestation of skeletal TB. While this disease is still endemic in developing countries, the incidence in developed countries has been gradually increasing in association with the increased incidence of human immunodeficiency virus and increased migration from low-income countries.

A delay in the diagnosis and treatment of spinal TB is noted in children especially since clinical manifestation is often insidious in this population [8]. The clinical presentation depends on the site and the extent of disease involvement. In most cases, progressive back pain consists of the earliest symptom of spinal TB. Patients may also complain of associated constitutional symptoms including fever and weight loss [9]. Motor, sensory, and bowel or bladder dysfunction may also arise due to spinal

cord involvement [9]. In our case, the patient had six months of ongoing back pain with constitutional symptoms before medical advice was sought and the diagnosis was made. In areas endemic to tuberculosis, spinal TB should be part of the differential diagnosis in patients with chronic back pain. Laboratory workup including positive TST and elevated erythrocyte sedimentation rate confirm the presence of tuberculosis. Spinal TB can further be diagnosed with positive acid-fast bacilli and PCR from bone tissue obtained by CT-guided needle biopsy or surgical biopsy. Caseating necrosis on histology further confirms the diagnosis [10]. X-ray changes associated with spinal TB can present relatively late including but not limited to vertebral body collapse, anterior vertebral body lytic destruction, and anterior vertebral wedging. CT scan aids in better diagnosis through demonstrating bony sclerosis and destruction, especially in posterior elements, but it is still inferior to MRI which is the gold standard for evaluating spinal TB. MRI allows detection of soft tissue masses and possible neural cord compression [9].

The differential diagnosis for patients presenting with back pain and constitutional symptoms include spinal abscess, spinal tumor, metastatic tumor of unknown origin, septic arthritis, or infectious processes such as brucellosis, candidiasis, and histoplasmosis, given the right clinical setting and risk factors.

In our case, the histology showed non-caseating granuloma indicating the possibility of sarcoidosis or other granulomatous diseases. But the positive TST, as well as the positive pleural PCR, confirmed the diagnosis of TB. MRI findings also confirmed the presence of a non-contiguous spread of TB, which is a rare finding in the pediatric population. Few cases of multi-level tuberculous spondylitis or TB affecting multiple vertebrae have been reported in the literature, with most cases affecting 1 or 2 levels. Few reports over the last several years suggest that these multi-level and non-contiguous lesions may be

more common than previously reported. However, TB mimicking bone metastasis with diffuse involvement of the spine and ribs or other skeletal sites has rarely been reported [11]. Reports of multifocal skeletal TB typically describe older patients. One report described a 19-year-old male with chronic back pain and hip pain for 6 months, similar to our patient. He was diagnosed with TB based on granulomas on biopsy. Lesions involved the vertebra, iliac joint, and sternum [12].

Spinal tuberculosis with no complications can be managed medically, and surgery is reserved for complicated or resistant cases. The preferred regimen for skeletal TB treatment includes daily dosing of rifampin, ethambutol, pyrazinamide, and isoniazid for two months followed by four months of isoniazid and rifampin [13]. Studies have shown that treating skeletal tuberculosis with regimens containing rifampin for 6-9 months was as successful as 18-months courses that do not include rifampin [15]. In the case of the presence of orthopedic hardware, some physicians tend to continue therapy over 12 months to ensure adequate treatment [15].

Concerning surgical management, surgery is indicated in case of poor response to medical therapy in the setting of active tuberculosis infection or worsening clinical condition. Surgery is also indicated for spinal cord decompression in case of neurologic deficits or spine instability [16]. The surgical intervention also deals with stabilizing the spine with hardware when needed, draining spinal abscesses to limit infection and debridement of infected tissue [17-18].

The efficacy of therapy is determined by clinical factors. Improvement of pain, decrease in constitutional symptoms, improvement of mobility, and resolution of neurologic signs and symptoms all indicate response to treatment. Typically, clinical and radiographic improvement in therapy is relatively slow and may take several months. Inflammatory markers play a limited role in monitoring response to therapy [19].

Conclusion

We report a patient who had progressive back pain and daily fever, with imaging showing multiple lesions in the spine, ribs, and pelvis, mimicking spinal cord or metastatic tumor and pathology showing noncaseating granulomas. Further investigation showed positive TB PCR and TST, and treatment with an anti-tuberculosis regimen was initiated promptly to avoid neurological sequelae with good response. What makes our case important is the rarity of the occurrence of spinal tuberculosis in children and young adults. Reporting these cases continues to shed a light on these rare conditions and helps the medical community to stay vigilant when a similar presentation happens. Providers caring for children and adolescents in TB endemic areas should keep TB in the differential diagnosis of any chronic back pain and the differential diagnosis of multifocal skeletal lesions.

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