Disseminated Tuberculosis in an Immunocompetent Adult: A Rare Clinical Presentation and Diagnostic Challenge

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ABSTRACT
Disseminated tuberculosis (TB) is a rare and life-threatening form of TB, particularly when it occurs in immunocompetent individuals. A 52-year-old diabetic male presented with tachypnea, tachycardia, and chronic low back pain. Comprehensive imaging revealed pulmonary involvement, lumbosacral vertebral destruction (L5-S1), genitourinary TB, hepatitis, and psoas abscesses. Ultrasound-guided drainage and CB-NAAT analysis confirmed Mycobacterium tuberculosis. Given the patient's deranged liver function tests, a modified antitubercular therapy regimen, including levofloxacin, amikacin, and ethambutol, was administered. The patient demonstrated significant clinical improvement, with resolution of symptoms and normalization of liver function on follow-up. This case underscores the diagnostic complexity of disseminated TB in immunocompetent patients, highlighting the importance of early detection and individualized treatment. Further research is needed to develop standardized treatment protocols, particularly for cases involving multi-organ involvement and liver dysfunction.

1. Introduction

Tuberculosis (TB) remains a significant global health concern, with an estimated one-quarter of the world's population carrying a latent infection. Despite efforts to control the spread of TB, countries like India continue to bear a substantial burden of the disease. Disseminated tuberculosis, a severe form of the condition, occurs when the infection spreads hematogenously to involve two or more non-contiguous organs. This form of TB is particularly challenging due to its varied clinical presentation and diagnostic difficulties. Miliary TB, a subset of disseminated TB characterized by the widespread distribution of tiny lesions across multiple organs, accounts for a small percentage of total TB cases but represents a significant portion of extrapulmonary TB cases, with mortality rates remaining high despite advances in treatment. The clinical manifestations of disseminated TB can be insidious, often mimicking other conditions, which can delay diagnosis and appropriate treatment. Early detection and prompt initiation of antitubercular therapy (ATT) are crucial to improving outcomes, especially in cases where multiple organs are involved, and in patients with comorbidities such as diabetes. In this case, we present an immunocompetent individual with disseminated TB affecting the lungs, lumbosacral spine, genitourinary system, and liver, complicated by a psoas abscess. This case underscores the complexity of diagnosing disseminated TB, particularly in the absence of classical risk factors such as immunosuppression, and highlights the importance of a tailored therapeutic approach in managing this multifaceted disease.

2. Case Presentation

A 52-year-old male farmer with a history of poorly controlled diabetes mellitus presented with complaints of progressively worsening lower back pain over the past two months. The pain was accompanied by intermittent low-grade fever, significant loss of appetite, and weight loss over the preceding three months. The patient had been previously admitted to another hospital a month earlier for similar symptoms, where an MRI of the spine revealed extensive paradiscal destruction involving the L5-S1 vertebrae, suggestive of Pott’s spine. A biopsy guided by C-arm fluoroscopy was performed at that time, but both CB-NAAT (cartridge-based nucleic acid amplification test) and acid-fast bacilli (AFB) smears were negative. He was subsequently diagnosed with pyogenic spondylitis and treated with intravenous antibiotics (Cefoperazone + Sulbactam) with temporary symptom resolution upon discharge.

Upon re-presentation at our facility, the patient was tachypneic (respiratory rate 38/min) and tachycardic (pulse rate 112/min), with an oxygen saturation of 82% on room air, improving to 94% with supplemental oxygen. He

was hypotensive with a blood pressure of 80/60 mmHg, but there were no signs of cervical lymphadenopathy. Auscultation revealed bilateral crepitations in the infrascapular, infra-axillary, and interscapular regions. Laboratory investigations demonstrated normal leukocyte counts (6650 cells/cumm), but liver function tests were deranged, with elevated total bilirubin (2.52 mg/dl), direct bilirubin (1.81 mg/dl), and significantly raised alkaline phosphatase levels (524 IU/L), indicating hepatobiliary involvement. Serum albumin was notably low at 2.7 g/dl.

Further imaging confirmed the suspicion of disseminated tuberculosis. A chest X-ray revealed multifocal miliary nodules scattered throughout the lung fields. A computed tomography (CT) scan of the chest showed similar findings of military TB, while an abdominal CT revealed a hypodense collection in the right iliacus muscle extending into the iliopsoas, raising suspicion of a psoas abscess. Additionally, there was evidence of genitourinary TB, as indicated by periureteric fat stranding, ureteric wall thickening, and a small, irregular bladder. Magnetic resonance imaging (MRI) of the spine confirmed the presence of paradiscal destruction in the L5-S1 vertebrae, with pre- and paravertebral soft tissue thickening consistent with Pott's spine.

The definitive diagnosis was established following ultrasound-guided aspiration and drainage of the psoas abscess. The aspirate was sent for CB-NAAT analysis, which confirmed the presence of Mycobacterium tuberculosis. Cytology of the fluid also revealed acid-fast bacilli (AFB) on Ziehl-Neelsen staining, further corroborating the diagnosis of disseminated TB involving the lungs, spine, genitourinary system, and liver. Given the deranged liver function tests, a modified antitubercular therapy (ATT) regimen was initiated, consisting of levofloxacin (750 mg once daily intravenously), amikacin (500 mg once daily intravenously), and ethambutol (800 mg orally once daily). Within a week of starting the modified regimen, the patient’s oxygen saturation improved, and by the third week, his liver function tests had normalized. He was subsequently transitioned to a standard four-drug ATT regimen, with hepatotoxic drugs reintroduced individually. Concurrent management of his diabetes was achieved with a combination of oral hypoglycemic agents and insulin. The patient’s symptoms gradually improved, and follow-up imaging showed a reduction in the size of the psoas abscess. He was discharged on oral ATT and remained clinically stable during subsequent follow-ups.

This case highlights the complexity of diagnosing and treating disseminated TB in an immunocompetent individual, particularly in the presence of multi-organ involvement and coexisting diabetes.

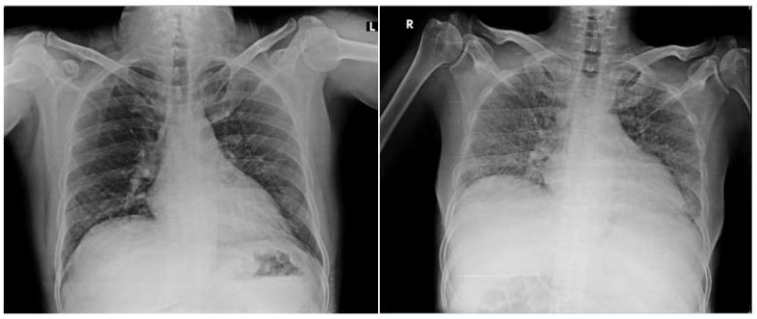

Figure 1: Chest X-ray showing disseminated TB
The X-ray demonstrates diffuse, bilateral miliary nodules throughout the lung fields, indicative of miliary tuberculosis. These small nodules represent hematogenous dissemination of Mycobacterium tuberculosis.

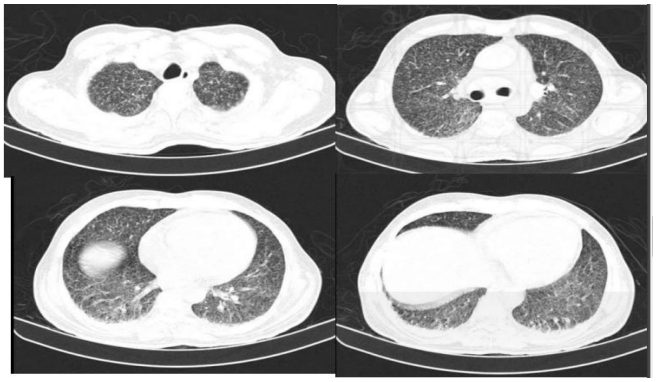

Figure 2: CT Thorax showing military deposits

A computed tomography scan of the thorax reveals numerous small, randomly distributed nodules in both lungs, characteristic of military TB, confirming widespread pulmonary involvement.

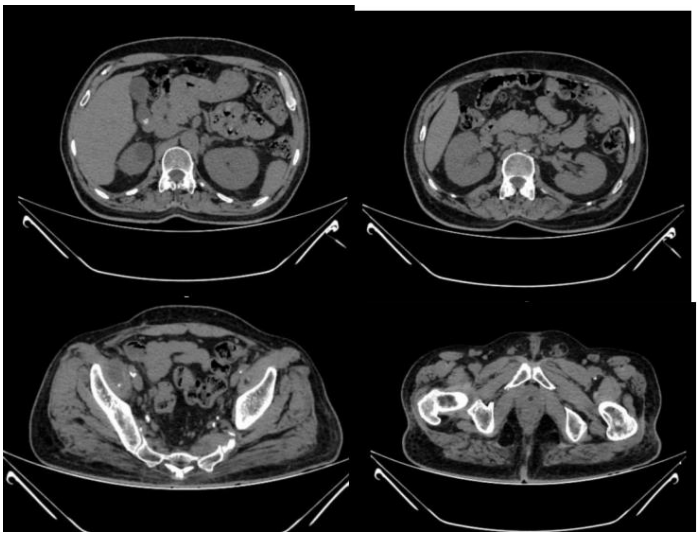

Figure 3: CT Abdomen findings
The abdominal CT scan shows a well-defined hypodense collection in the right iliacus muscle extending into the iliopsoas, suggestive of a chronic psoas abscess associated with disseminated tuberculosis.

Figure 4: MRI Spine with features of Pott's Spine
The MRI of the lumbosacral spine reveals extensive paradiscal destruction at the L5-S1 vertebral bodies, along with pre-paravertebral soft tissue thickening, consistent with spinal tuberculosis, commonly known as Pott's spine.

3. Discussion

Disseminated tuberculosis (TB) represents a severe and rare form of tuberculosis that occurs when the infection spreads hematogenously, involving multiple non-contiguous organs. This condition is most commonly associated with immunocompromised individuals, particularly those with HIV/AIDS, yet it can occasionally present in immunocompetent individuals, as demonstrated in this case. Kashyap et al. (2013) note that India remains one of the countries with the highest burden of TB, making such cases particularly relevant in regions with endemic TB. The diagnosis of disseminated TB is often delayed due to its nonspecific clinical presentation, which can mimic a variety of other systemic conditions. This highlights the importance of maintaining a high index of suspicion, particularly in endemic regions or in patients with known risk factors such as diabetes mellitus, which compromises the immune response (Khan et al., 2019).

In this case, the patient presented with classic symptoms of TB, including fever, weight loss, and lower back pain. However, the initial workup did not confirm the diagnosis of tuberculosis due to negative results from the cartridge-based nucleic acid amplification test (CB-NAAT) and acid-fast bacilli (AFB) smear. This is not uncommon, as diagnostic tests for TB can sometimes yield false-negative results, especially in the case of extrapulmonary or disseminated TB where the bacterial load may be lower. Furthermore, the presence of a psoas abscess and genitourinary involvement further complicated the clinical picture, emphasizing the varied and often multisystem presentation of disseminated TB (Sharma et al., 2016).

The diagnosis was eventually confirmed through imaging and ultrasound-guided drainage of the psoas abscess, with subsequent CB-NAAT and AFB staining confirming the presence of Mycobacterium tuberculosis. Khan et al. (2019) emphasize the value of combining clinical suspicion with imaging modalities such as CT and MRI, which provide critical clues in identifying the spread of tuberculosis to multiple organ systems. The findings of military nodules on chest CT, combined with the destruction of the L5-S1 vertebrae and the presence of a psoas abscess, were key in confirming the diagnosis.

Treatment of disseminated TB is often complicated by the involvement of multiple organs, as well as comorbid conditions. In this case, the patient's liver dysfunction necessitated a modification of the standard antitubercular therapy (ATT) regimen. The use of levofloxacin, amikacin, and ethambutol allowed for effective treatment while minimizing hepatotoxicity. Once liver function stabilized, the patient was transitioned to the standard four-drug regimen. This highlights the need for a flexible and patient-tailored approach to managing disseminated TB, particularly in patients with comorbidities that limit the use of certain drugs (Sharma et al., 2016; Wang et al., 2007).

The prognosis for disseminated TB can be poor if not promptly diagnosed and treated. Mortality rates range from 25% to 30%, as noted by Schübel et al. (2006), particularly in those with delayed initiation of therapy or extensive multi-organ involvement. Early identification and tailored therapeutic interventions, as demonstrated in this case, can significantly improve patient outcomes. Nevertheless, disseminated TB remains a diagnostic and therapeutic challenge, and further research is needed to standardize treatment protocols, especially in cases involving immunocompetent individuals or those with organ dysfunction.

In conclusion, this case of disseminated TB in an immunocompetent individual underscores the complexity of diagnosing and managing this condition. It highlights the importance of considering disseminated TB in the differential diagnosis of patients with multi-system involvement, particularly in endemic areas or in patients with risk factors such as diabetes. Early diagnosis, prompt initiation of a modified ATT regimen, and close monitoring of the patient's response were critical to achieving a positive outcome in this case.

4. Conclusion

Disseminated tuberculosis is a rare yet serious manifestation of Mycobacterium tuberculosis infection, particularly challenging to diagnose and treat in immunocompetent individuals. This case of a 52-year-old diabetic male, with pulmonary, spinal, genitourinary involvement, and a psoas abscess, highlights the diverse clinical presentation of disseminated TB and underscores the importance of thorough diagnostic workups, especially in endemic areas. Despite initial negative results from standard TB tests, the use of comprehensive imaging techniques and guided drainage procedures led to a confirmed diagnosis.

Treatment in cases of multi-organ involvement, particularly when complicated by comorbid conditions such as liver dysfunction, requires a tailored approach. The successful use of a modified antitubercular regimen in this case resulted in clinical improvement and resolution of symptoms. This case further emphasizes the need for awareness of disseminated TB among clinicians and the importance of individualized treatment plans, especially in patients with comorbidities that complicate standard treatment protocols.

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