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DISSEMINATED TUBERCULOSIS IN AN IMMUNOCOMPETENT ADULT: AN UNUSUAL CLINICAL MANIFESTATION AND A DIAGNOSTIC CHALLENGE

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Abstract
Disseminated tuberculosis (TB) constitutes a rare and potentially fatal manifestation of Mycobacterium tuberculosis infection, particularly notable when occurring in immunocompetent individuals. A 52-year-old male with diabetes mellitus presented with a clinical constellation of tachypnea, tachycardia, and chronic lumbar pain. Comprehensive diagnostic imaging revealed pulmonary involvement, destructive changes of the lumbosacral vertebrae (L5-S1), genitourinary tuberculosis, hepatic dysfunction, and bilateral psoas abscesses. Ultrasound-guided aspiration of the abscess, followed by Cartridge-Based Nucleic Acid Amplification Test (CB-NAAT) analysis, confirmed the etiological agent as Mycobacterium tuberculosis. In light of the patient's compromised hepatic function, a modified antitubercular therapy (ATT) regimen was initiated, comprising levofloxacin, amikacin, and ethambutol. The patient exhibited a substantial clinical response, characterized by symptom resolution and normalization of hepatic function during follow-up. This case delineates the diagnostic complexity of disseminated TB in immunocompetent patients, underscoring the criticality of prompt diagnosis and tailored therapeutic strategies. Further investigation is warranted to establish standardized treatment protocols, especially for cases characterized by multi-organ involvement and concomitant hepatic dysfunction.

Keywords: Disseminated tuberculosis, Miliary TB, Immunocompetent, Psoas abscess, Lumbosacral spine.

1. INTRODUCTION

Tuberculosis (TB) remains a prominent global health challenge, with an estimated latent infection in approximately one-quarter of the global population. Notwithstanding concerted global control efforts, a substantial disease burden persists in endemic nations, such as India. Disseminated tuberculosis, a severe manifestation resulting from the hematogenous dissemination of the pathogen to two or more non-contiguous organ systems, presents considerable diagnostic challenges attributable to its protean clinical manifestations. Miliary tuberculosis, a specific subtype of disseminated TB characterized by the widespread distribution of minute lesions across multiple organs, constitutes a minor fraction of total TB cases but comprises a substantial proportion of extrapulmonary TB presentations; its associated mortality rates remain elevated despite therapeutic advancements. The clinical manifestations of disseminated TB can be insidious, frequently emulating other pathologies, thereby postponing accurate diagnosis and appropriate therapeutic intervention. Prompt diagnosis and the timely initiation of antitubercular therapy (ATT) are pivotal for optimizing clinical outcomes, particularly in cases involving multiple organ systems and in patients with comorbidities such as diabetes mellitus. This report details the case of an immunocompetent individual with disseminated TB affecting the pulmonary, lumbosacral, genitourinary, and hepatic systems, complicated by a psoas abscess. This case illustrates the diagnostic complexity of disseminated TB, particularly in the absence of classical immunosuppressive risk factors, and emphasizes the necessity for a customized therapeutic approach in the management of this multifaceted disease.

2. CASE PRESENTATION

A 52-year-old male agricultural worker with a documented history of inadequately controlled diabetes mellitus presented with a chief complaint of progressively intensifying lumbar back pain of two months' duration. This was associated with intermittent low-grade pyrexia, pronounced anorexia, and significant cachexia manifesting over the preceding three months. The patient had a prior admission to an external facility one month earlier for analogous symptomatology, where magnetic resonance imaging (MRI) of the spine demonstrated extensive paradiscal

destruction at the L5-S1 vertebral level, indicative of tuberculous spondylitis (Pott's spine). A C-arm fluoroscopy-guided biopsy was procured at that time; however, both the cartridge-based nucleic acid amplification test (CB-NAAT) and acid-fast bacilli (AFB) microscopy yielded negative results. A diagnosis of pyogenic spondylodiscitis was rendered, and the patient was administered intravenous antibiotics (Cefoperazone-Sulbactam), which resulted in transient symptomatic relief post-discharge.

Upon presentation to our institution, the patient exhibited tachypnea (respiratory rate: 38 breaths/min) and tachycardia (heart rate: 112 beats/min). His peripheral oxygen saturation was 82% on ambient air, which improved to 94% with oxygen supplementation. He was hypotensive (blood pressure: 80/60 mmHg). Physical examination revealed no evidence of cervical lymphadenopathy. Pulmonary auscultation identified bilateral crepitations across the infrascapular, infra-axillary, and interscapular regions. Hematological analysis revealed a leukocyte count within the normal range (6,650 cells/mm³). Conversely, hepatic function assays were significantly deranged, evidenced by elevated total bilirubin (2.52 mg/dL), direct bilirubin (1.81 mg/dL), and markedly increased alkaline phosphatase (524 IU/L), suggesting hepatobiliary pathology. A state of hypoalbuminemia was present, with a serum albumin level of 2.7 g/dL.

Subsequent radiological evaluations substantiated the suspicion of disseminated tuberculosis. A chest radiograph revealed diffuse, multifocal miliary nodules distributed throughout both lung fields. Thoracic computed tomography (CT) corroborated these findings, while abdominopelvic CT identified a hypodense fluid collection within the right iliacus muscle extending into the iliopsoas, suggestive of a psoas abscess. Features consistent with genitourinary tuberculosis were also observed, including periureteric fat stranding, ureteral wall thickening, and a contracted, irregularly contoured urinary bladder. Spinal MRI re-demonstrated the paradiscal destruction at L5-S1, with pre- and paravertebral soft tissue thickening consistent with Pott's spine.

A definitive etiological diagnosis was established via ultrasound-guided aspiration and drainage of the psoas abscess. The aspirate was subjected to CB-NAAT analysis, which returned a positive result for *Mycobacterium tuberculosis*. Furthermore, cytological examination of the fluid using Ziehl-Neelsen staining demonstrated acid-fast bacilli (AFB), providing additional confirmation for the diagnosis of disseminated TB involving the pulmonary, spinal, genitourinary, and hepatic systems. In consideration of the compromised hepatic function, a modified antitubercular therapy (ATT) regimen was initiated, consisting of levofloxacin (750 mg once daily, intravenous), amikacin (500 mg once daily, intravenous), and ethambutol (800 mg once daily, oral).

Within one week of initiating this regimen, the patient’s oxygen saturation improved, and hepatic function parameters normalized by the third week of treatment. He was subsequently transitioned to a standard four-drug ATT protocol, with the cautious, sequential reintroduction of hepatotoxic agents. His diabetes mellitus was concomitantly managed using a combination of oral hypoglycemic agents and insulin. The patient experienced a gradual amelioration of symptoms, and subsequent imaging demonstrated a decrease in the dimensions of the psoas abscess. He was discharged on an oral ATT regimen and maintained clinical stability at subsequent outpatient follow-up appointments. This case report illustrates the diagnostic and therapeutic complexities associated with disseminated tuberculosis in an immunocompetent patient with multi-organ involvement and comorbid diabetes mellitus.

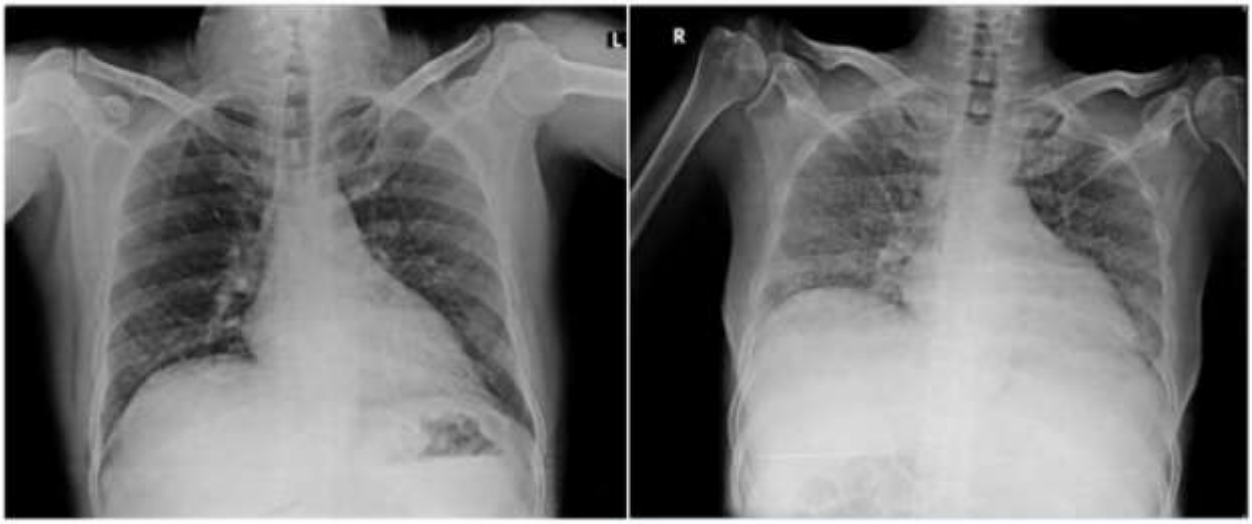

Figure 1: Chest X-ray demonstrating disseminated tuberculosis

The chest radiograph demonstrates diffuse, bilateral, miliary nodules throughout the pulmonary fields, consistent with miliary tuberculosis. These nodules represent hematogenous dissemination of *Mycobacterium tuberculosis*.

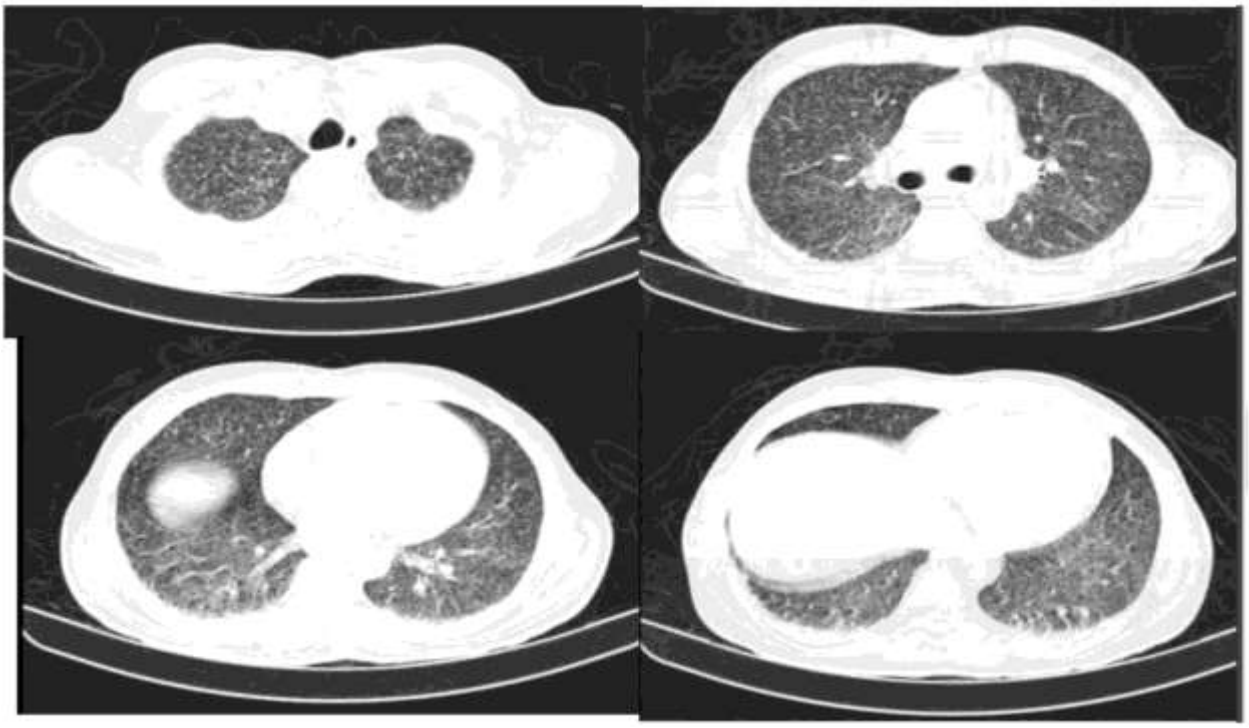

Figure 2: CT thorax demonstrating miliary deposits

Computed tomography of the thorax reveals multiple small, randomly distributed nodules in both lungs, characteristic of miliary tuberculosis, thereby confirming widespread pulmonary involvement.

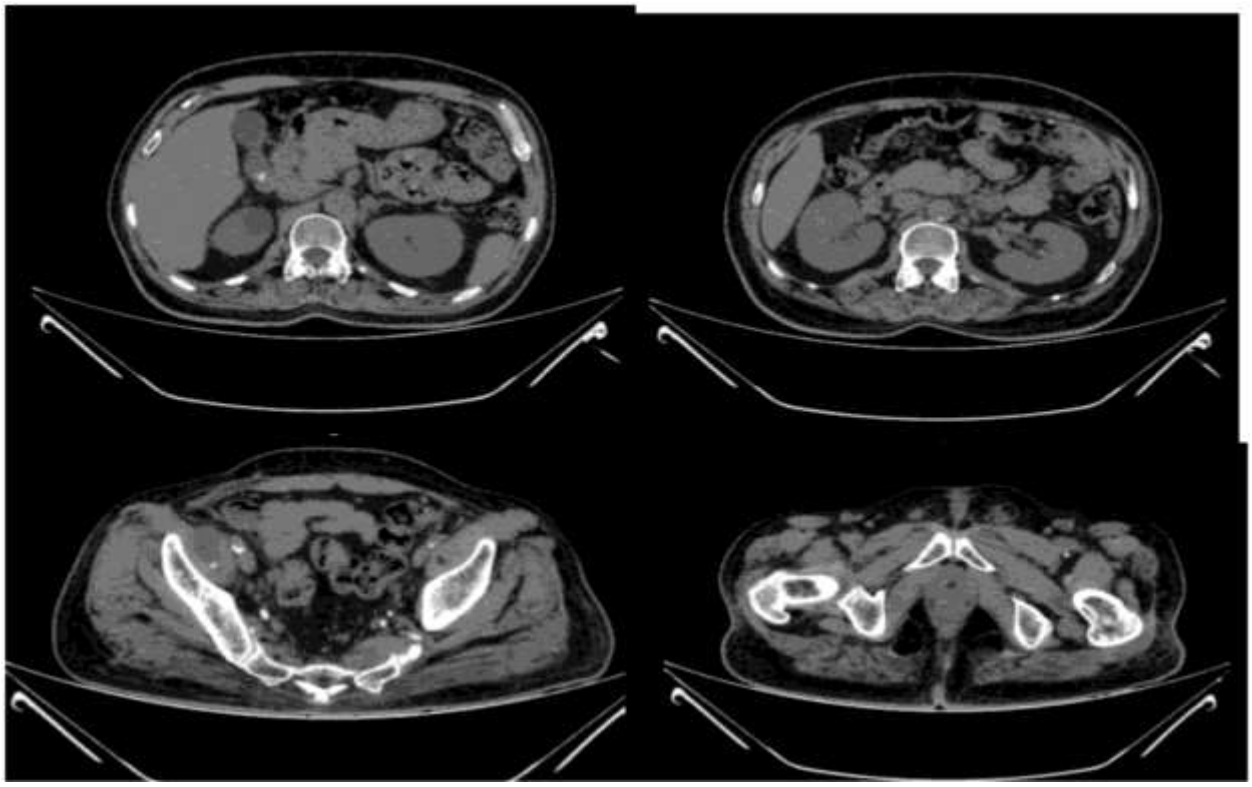

Figure 3: CT abdomen findings

Abdominal computed tomography demonstrates a well-defined hypodense collection within the right iliacus muscle extending into the iliopsoas, suggestive of a chronic psoas abscess associated with disseminated tuberculosis.

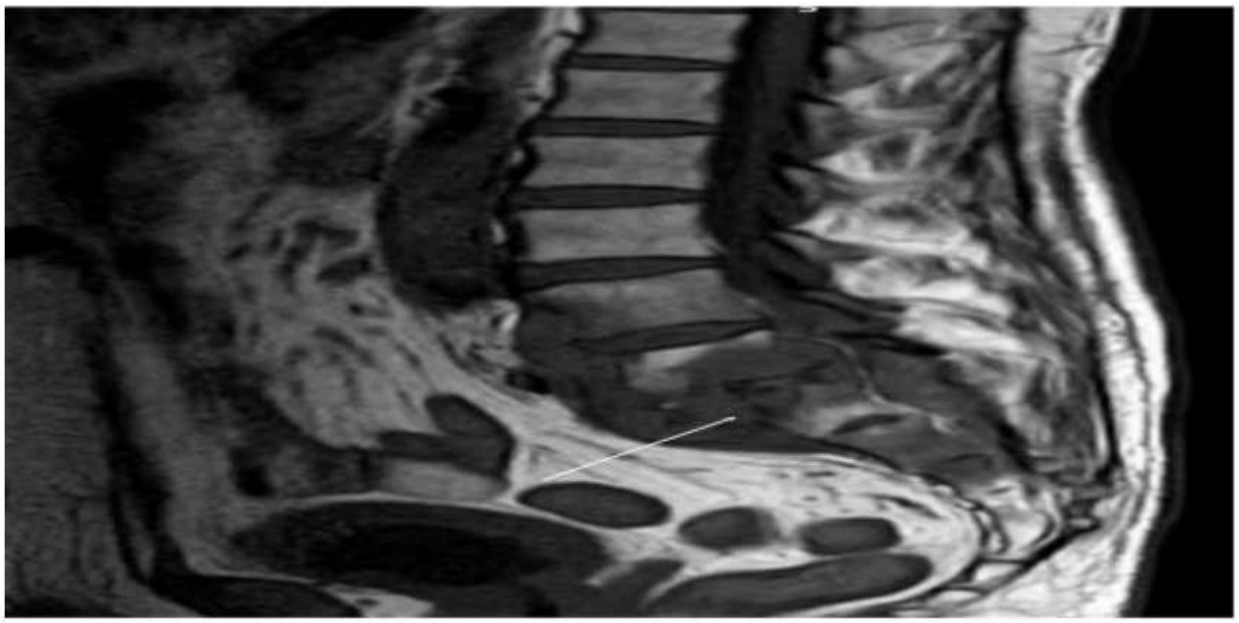

Figure 4: MRI spine with features of Pott's disease

Magnetic resonance imaging of the lumbosacral spine demonstrates extensive paradiscal destruction involving the L5–S1 vertebral bodies, accompanied by pre-paravertebral soft tissue thickening, findings consistent with spinal tuberculosis (Pott's disease).

3. DISCUSSION

Disseminated tuberculosis (TB) constitutes a severe, albeit uncommon, manifestation of tuberculosis resulting from the hematogenous dissemination of the pathogen to multiple, non-contiguous organs. This condition is predominantly observed in immunocompromised populations, particularly individuals with HIV/AIDS; however, it can sporadically manifest in immunocompetent individuals, as exemplified by the present case. Kashyap et al. (2013) reported that India is a nation with one of the highest global burdens of TB, rendering such presentations highly pertinent in endemic regions. The diagnosis of disseminated TB is frequently protracted owing to its nonspecific clinical manifestations, which can emulate a spectrum of other systemic pathologies. This fact underscores the necessity of maintaining a high index of clinical suspicion, particularly within endemic locales or in patients with established risk factors like diabetes mellitus, which is known to impair the immune response (Khan et al., 2019).

In this instance, the patient exhibited symptomatology characteristic of TB, including pyrexia, cachexia, and lumbar pain. Nevertheless, the initial diagnostic investigations failed to establish a diagnosis of tuberculosis, given the negative results from the CB-NAAT and AFB smear. This phenomenon is not atypical, as diagnostic assays for TB may yield false-negative outcomes, particularly in the context of extrapulmonary or disseminated disease where the bacillary load can be low. Moreover, the presence of a psoas abscess and genitourinary pathology further contributed to the complexity of the clinical presentation, highlighting the varied and frequently multisystemic nature of disseminated TB (Sharma et al., 2016).

The diagnosis was ultimately established through radiological 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) underscore the utility of integrating clinical suspicion with advanced imaging modalities such as CT and MRI, which offer crucial diagnostic information regarding the extent of tuberculous dissemination to multiple organ systems. The findings of miliary nodules on thoracic CT, in conjunction with the L5-S1 vertebral destruction and the psoas abscess, were instrumental in establishing the diagnosis.

The management of disseminated TB is frequently complicated by the involvement of multiple organs and the presence of comorbid conditions. In this case, the patient's hepatic dysfunction necessitated a deviation from the standard ATT protocol. The administration of levofloxacin, amikacin, and ethambutol enabled efficacious therapy while mitigating the risk of iatrogenic hepatotoxicity. Upon stabilization of hepatic function, the patient was transitioned to the standard four-drug regimen. This underscores the imperative for a flexible, individualized therapeutic strategy for managing disseminated TB, particularly in patients with comorbidities that contraindicate the use of specific agents (Sharma et al., 2016; Wang et al., 2007).

The prognosis for disseminated TB can be unfavorable in the absence of prompt diagnosis and treatment. Reported mortality rates range from 25% to 30% (Schübel et al., 2006), particularly among patients with delayed therapy initiation or extensive multi-organ pathology. Prompt identification and customized therapeutic interventions, as

demonstrated in this case, are critical for improving clinical outcomes. Nonetheless, disseminated TB continues to pose significant diagnostic and therapeutic challenges, and additional research is warranted to establish standardized management protocols, especially for cases involving immunocompetent hosts or those with organ dysfunction.

In summation, this case of disseminated TB in an immunocompetent individual illustrates the complex nature of diagnosing and managing this condition. It reinforces the necessity of including disseminated TB in the differential diagnosis for patients presenting with multi-systemic disease, particularly in endemic areas or in the presence of risk factors such as diabetes. A timely diagnosis, the prompt initiation of a modified ATT regimen, and vigilant monitoring of the patient's clinical response were critical to achieving a favorable outcome in this case.

4. CONCLUSION

Disseminated tuberculosis is an infrequent yet grave manifestation of Mycobacterium tuberculosis infection, presenting considerable diagnostic and therapeutic challenges in immunocompetent individuals. This case of a 52-year-old diabetic male with pulmonary, spinal, and genitourinary involvement, complicated by a psoas abscess, exemplifies the diverse clinical spectrum of disseminated TB and emphasizes the importance of comprehensive diagnostic evaluations, particularly in endemic regions. Despite initial negative findings from standard microbiological tests, the application of comprehensive imaging techniques and interventional procedures such as guided aspiration were pivotal in confirming the diagnosis.

The therapeutic management of cases with multi-organ involvement, especially when complicated by comorbid conditions like hepatic dysfunction, mandates an individualized approach. The effective implementation of a modified antitubercular regimen in this patient culminated in a favorable clinical response and symptom resolution. This case further serves to heighten clinical awareness of disseminated TB and underscores the critical importance of formulating individualized treatment strategies, particularly for patients whose comorbidities complicate standard therapeutic protocols.

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