Case Report

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Disseminated Tuberculosis Complicated with Disseminated Intravascular Coagulation (DIC) in an Immigrant Patient

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ABSTRACT

Disseminated tuberculosis (TB) is rare, can affect any organ system, and predominantly presents in immunocompromised populations. While pulmonary tuberculosis (TB) is prevalent in developing countries, it is an uncommon cause of disseminated TB. In pediatric populations, particularly in the first and second decades of life, disseminated TB is often secondary to lung infections. However, there have been few reports of disseminated TB complicated by disseminated intravascular coagulation (DIC). Disseminated TB is defined as the involvement of two or more noncontiguous sites due to the lymphohematogenous spread of Mycobacterium tuberculosis. Extrapulmonary involvement occurs in one-fifth of all TB cases and may present without histological or radiological evidence of pulmonary infection.

An eleven-year-old girl presented to the emergency department (ED) with complaints of weight loss and abdominal pain. She had no history of immunodeficiency but had been in contact with TB patients. On admission, she exhibited refractory coagulopathy, necessitating transfer to the pediatric intensive care unit (PICU). In the PICU, intravenous vitamin K, fresh frozen plasma (FFP), and packed red blood cells (PRBCs) were administered on the 14th day of admission, following the initiation of antibiotics and a combination of standard anti-tuberculous drugs.

It can be speculated that many pediatric cases of TB-induced pneumonia leading to acute respiratory distress syndrome (ARDS) remain unreported in the literature. More robust data on the epidemiology of childhood TB are necessary to better understand its contribution to ARDS and to develop pediatric-specific therapeutic strategies. Some risk factors for disseminated TB include young age, recent measles infection, immunodeficiency, malnutrition, and malignancies. Children, especially infants and immunocompromised patients, are at higher risk of developing miliary and disseminated TB. However, none of these contributing factors were identified in this child.

In the present case, the patient had no HIV infection or immunodeficiency but was an immigrant from an endemic country and had a history of contact with TB patients. The onset of her symptoms closely resembled those of inflammatory bowel disease (IBD), and she later developed coagulation disorders and DIC. We successfully treated disseminated TB complicated by DIC using antibiotics, FFP, PC, vitamin K, and anti-tuberculous therapy. The follow-up indicated an improvement in her condition and the resolution of symptoms.

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Introduction

Disseminated tuberculosis (TB) is rare, can affect any organ system, and predominantly presents in immunocompromised populations. In pediatric populations, especially during the second decade of life, disseminated TB is often secondary to lung infections. However, there have been few reports of disseminated TB complicated by disseminated intravascular coagulation (DIC) caused by TB [1].

Tuberculosis (TB) remains a significant public health concern in developing countries. In Iran, despite substantial efforts to address TB and its associated risk factors, the number of cases remains high. Disseminated TB has gained increased recognition in children recently, owing to the growing prevalence of immune suppression secondary to AIDS, immunosuppressive therapies for various medical disorders, and greater awareness. Children experience high mortality rates related to tuberculosis (TB), yet the causes of death among those presumed to have TB are poorly documented [2, 9].

Disseminated tuberculosis (TB) is defined as the involvement of two or more noncontiguous sites resulting from the lymphohematogenous dissemination of *Mycobacterium tuberculosis*. Extrapulmonary involvement occurs in one-fifth of all TB cases and may present even in the absence of histological evidence. Tuberculosis is one of the leading causes of infectious diseases in the chest and is associated with significant morbidity and mortality in pediatric populations, particularly in low- and middle-income countries. Due to the challenges in obtaining microbiological confirmation of pulmonary TB in children, the diagnosis often relies on a combination of clinical and radiological findings.

The traditional clinical staging for tuberculous meningitis (TBM), developed by Lincoln et al. in 1960, has been widely utilized to predict long-term neurologic sequelae (NS) [5, 7]. Another study reports a case of miliary tuberculosis in a 3-month-old boy who had a fever and was breathless for a month. The patient appeared cyanotic, experienced a seizure, and became comatose [8, 4]. Early diagnosis of central nervous system (CNS) TB is challenging, as presumptive diagnoses often rely heavily on imaging. Brain infections can present either as diffuse exudative basal leptomeningitis or as localized disease, such as tuberculomas, abscesses, or cerebritis [4].

Spinal (TB) may present as radiculomyelitis, spinal tuberculoma, abscess, or epidural phlegmon [3]. Musculoskeletal manifestations account for 10% of extrapulmonary presentations but are often overlooked due to their insidious clinical course and non-specific imaging findings. Common musculoskeletal manifestations of TB include spondylitis, arthritis, and osteomyelitis, while tenosynovitis and bursitis are less common.

Abdominal TB typically presents with a triad of symptoms: pain, fever, and weight loss. It may occur in various forms, such as tuberculous lymphadenopathy or peritoneal, gastrointestinal, or visceral TB. Chest radiographs should be performed, as approximately 15% to 25% of children with abdominal TB also have concomitant pulmonary infections. Urogenital TB is rare in children.

We report the case of an immigrant who presented to the ED with severe fever, weight loss, abdominal pain, and distention caused by disseminated TB complicated by DIC, which was successfully treated.

Case Presentation

An eleven-year-old Afghan immigrant female presented with evening fever, weight loss, loss of appetite, weakness, and night sweats. Two and a half months before admission to our hospital, she developed abdominal pain and distention, which had worsened over the past two weeks. She had immigrated to Iran a year ago. Although she had no history of immunodeficiency, she had been in contact with individuals suffering from TB.

On physical examination at admission, she was a prepubescent girl weighing 27 kg and measuring 141 cm in height. Her vital signs included a body temperature of 37 °C, blood pressure of 100/60 mmHg, and a heart rate of 110 beats per minute. Her mother reported that the child's clothes had become loose. Abdominal examination revealed tenderness and general distention, while pitting edema was observed in both lower limbs.

After admission, imaging studies were performed, including chest X-ray (CXR) (Figure.1), abdominal X-ray (Figure.2), and abdominal sonography, which revealed the following findings: free fluid in the interloop region and several mesenteric hypoechoic lymph nodes with no clear nidus, some of which appeared conglomerate in the mesentery.

Abdominal and lung computed tomography (CT) scans with intravenous and oral contrast (Figs. 3 and 4)

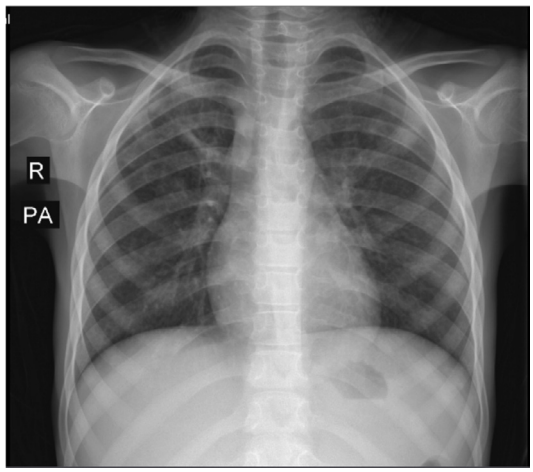

Fig. 1. CXR

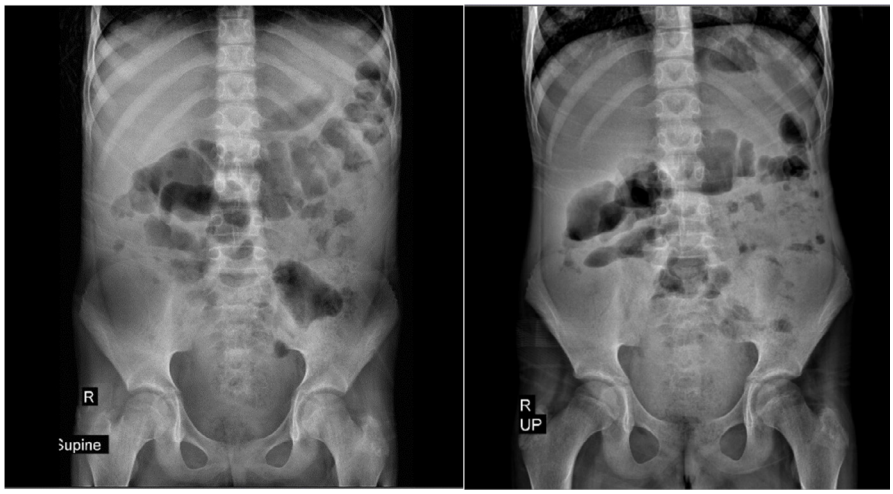

Fig. 2. Abdomen supine and upright x ray

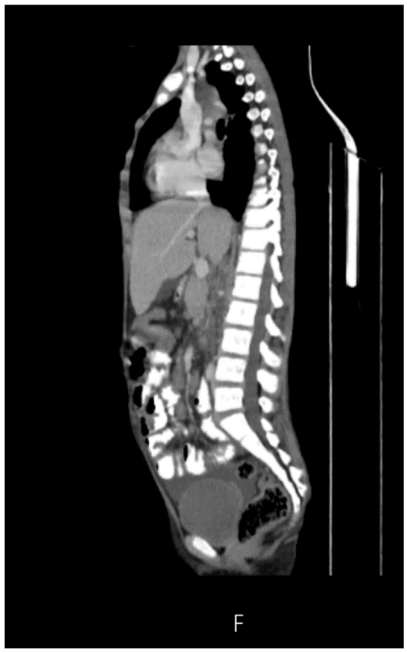

Fig. 3. Lung and abdominal CT

were performed. The report indicated the presence of several mesenteric lymph nodes, some of which had a conglomerate shape in the mesentery. The cecum, ascending colon, and ileum exhibited circumferential increased wall thickness. Regular jejunal fold thickening and moderate free fluid were noted in the pelvis and abdomen.

The lung CT with contrast revealed the following findings: a pericarinal mediastinal lymph node with a maximum size of 9 mm; a right hilar lymph node measuring 16 × 16 mm; a basal pleural node with a diameter of 7 mm in the lower lobe of the right lung; consolidation in the posterior region of the right upper lobe; disturbed patchy consolidations in both lungs, predominantly in the right lung; focal air trapping in the superior segment of the lung; and centrilobular nodes with a tree-in-bud appearance in the superior lobe, favoring the right side.

We requested three sputum cultures for tuberculosis (TB) and tested for COVID-19 IgM-IgG, Widal, right 2ME, and PPD.

We initiated antibiotic therapy and requested gastrointestinal consultations for inflammatory bowel disease (IBD) and celiac disease. Laboratory findings were as follows: white blood cell (WBC) count, 9,100 cells/µl; red blood cell (RBC) count, 364 × 10^3 cells/µl; platelet (PLT) count, 202 × 10^3 cells/µl; aspartate aminotransferase (AST), 54 U/L; alanine aminotransferase (ALT), 60 U/L; blood urea nitrogen (BUN), 11.3 mg/dL; creatinine (Cre), 0.46 mg/dL; C-reactive protein (CRP), 77 mg/dL; prothrombin time (PT), 13 seconds; partial thromboplastin time (PTT), 32 seconds; and international normalized ratio (INR), 1.

Wright and 2ME tests were negative. Stool occult blood (OB) was negative, and stool culture revealed normal flora. The Widal test was negative, and blood culture (BC) showed no bacterial growth. Additional laboratory results included: total protein, 5.4 g/dL; albumin, 2.3 g/dL; calcium (Ca), 8 mg/dL; sodium (Na), 125 mmol/L; potassium (K), 4.47 mmol/L; lactate dehydrogenase (LDH), 1,010 U/L; creatine phosphokinase (CPK), 189 U/L; and total bilirubin, 0.5 mg/dL.

On the fourth day of hospitalization, the patient developed rectorrhagy, which worsened as prothrombin time (PT) increased to 16.5 seconds, partial thromboplastin time (PTT) to 58 seconds, and international normalized ratio (INR) to 1.5, while platelet (PLT) count decreased to 100 × 10^3 cells/µl. These changes indicated a progression to disseminated intravascular coagulation (DIC) [6]. Treatment was initiated with intravenous vitamin K, fresh frozen plasma (FFP), and packed red blood cells (PC). Additionally, the antimicrobial regimen was adjusted to include meropenem and vancomycin. The patient was transferred to the pediatric intensive care unit (PICU), where her condition gradually improved.

Bone marrow aspiration was performed and revealed normal findings, with no band cells present. The results of a rapid influenza test were negative, and testing for anti-HIV antibodies was also negative. A repeat bone marrow aspiration confirmed normal findings.

After obtaining a positive sputum culture from the gastric lavage sample, we initiated a combination of standard anti-tuberculous drugs: rifampicin (15 mg/kg/day), isoniazid (10 mg/kg/day), pyrazinamide (30 mg/kg/day), and ethambutol (20 mg/kg/day). Consequently, the patient was transferred from the PICU to the infectious disease department. The DIC was successfully treated, and she was discharged from the hospital on the 14th day after admission..

Discussion

TB continues to be a significant cause of disease and death among children worldwide, particularly in developing countries with poor public health infrastructure. While TB-associated acute respiratory distress syndrome (ARDS) has been documented in adult patients, surveillance data for estimating the contribution of TB to pediatric ARDS remains limited. It is likely that many pediatric cases of TB-induced pneumonia leading to ARDS have not been reported in the literature. More comprehensive data on the epidemiology of childhood TB are necessary to better understand its contribution to ARDS and to develop pediatric-specific therapeutic strategies [1].

Some risk factors for miliary and disseminated TB include young age, recent measles infection in children, immunodeficiency, malnutrition, and malignancies. Children, particularly infants and immunocompromised patients, are at a higher risk of developing these forms of TB. However, none of these contributing factors were identified in this patient [3, 4].

In the study by Jann-Yuan Wang et al., conducted from January 2002 to December 2003, all culture-proven tuberculosis patients who developed DIC before starting anti-tuberculosis treatments were selected. Patients with other clinical conditions or infections by pathogens that could have contributed to their DIC were excluded. Survival analysis was performed for each variable with potential prognostic significance.

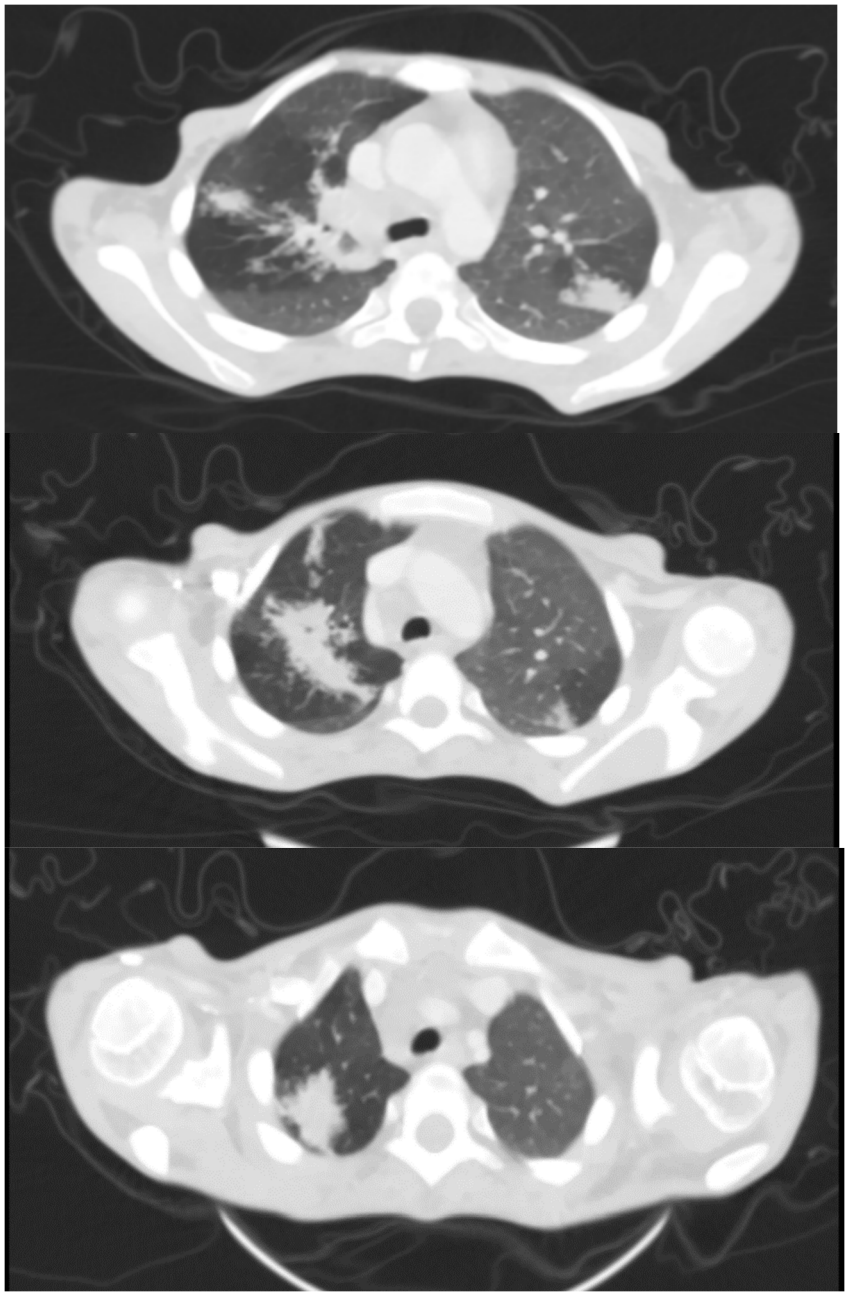

Fig. 4. lung CT

The results indicated that 27 (3.2%) out of 833 patients with culture-proven TB developed tuberculosis-induced DIC, with a mortality rate of 63.0%. The most common clinical manifestations were fever (63.0%) and multiple patches of pulmonary consolidation (59.3%). Seven (25.9%) patients had disseminated TB, 12 (44.4%) developed acute respiratory distress syndrome (ARDS), and three (11.1%) were associated with hemophagocytosis. Additionally, 24 (88.9%) patients exhibited findings unusual for acute bacterial infection, including positive acid-fast smear, miliary pulmonary lesions, lymphocytotic exudative pleural effusion, and mediastinal lymphadenopathy. Early initiation of anti-tuberculosis treatment significantly improved survival [11].

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In conclusion, TB can cause DIC. Patients with non-miliary, non-disseminated TB may also develop this rare clinical manifestation. Since the prognosis is extremely poor in patients not treated at an early stage, a high index of suspicion is essential, particularly in those with clinical findings suggestive of TB [6, 12].

In this case, emergency practitioners (EPs) should be aware of the predisposing factors for disseminated TB in patients presenting with prolonged abdominal pain and rectorrhagy, which could mimic symptoms of IBD. These predisposing factors include impaired cell-mediated immunity, as seen in patients with HIV/acquired immune deficiency syndrome (AIDS); increased use of immunosuppressive drugs; diminished ability of the liver to clear bacteria from the bloodstream, as observed in advanced liver disease; and recent immigration from regions with high rates of TB.

In the present case, the patient had no HIV infection or immunodeficiency. Gastroenterology consultation did not diagnose any specific disease, and the workup for IBD and celiac disease was ruled out. Bone marrow aspiration was performed, and the results showed no band cells and were reported as normal. The patient was an immigrant from an endemic country and had been in contact with tuberculosis patients. However, the onset of her symptoms was suspiciously similar to those of IBD, later progressing to a coagulation disorder and DIC.

Disseminated TB is uncommon beyond infancy, particularly in the absence of immune deficiency. Moreover, the complication of disseminated TB with DIC has been reported in only a few cases and is not recognized as a common clinical pattern of the disease.

Administration of antibiotics and high-dose IVIG therapy was initiated to control inflammation. However, the patient's condition deteriorated, leading to the development of DIC-related complications. Anti-DIC therapy, including FFP, PC, and vitamin K, was administered. Following a positive sputum culture from the gastric lavage sample, standard anti-tuberculosis (anti-TB) treatment was initiated.

After a two-day stay in the PICU, the progression of DIC was successfully halted, and the patient was transferred to the infectious disease department. On the 14th day of hospitalization, the patient was discharged in good general condition, with no fever or abdominal pain. During follow-up, the patient demonstrated appropriate tolerance to the therapy and achieved proper growth over the six-month period of anti-TB drug treatment.

Conclusions

In conclusion, we have documented the successful treatment of disseminated TB complicated by DIC using antibiotics, FFP, PC, vitamin K, and standard anti-tuberculous therapy. Follow-up indicated significant improvement in the patient's condition and the resolution of symptoms.

Ethical Considerations

Compliance with ethical guidelines

There were no ethical considerations to be considered in this article.

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Conflict of Interests

The authors have no conflict of interest to declare.

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