

Multifocal Disseminated Tuberculosis Involving the Lung, Hilar Lymph Node, Femur, and Thigh in an Immunocompetent 14-Month-Old Child

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Abstract

Tuberculosis remains a major infectious disease burden in many endemic countries. Disseminated tuberculosis is a severe form of the disease. Despite the high burden of tuberculosis in endemic settings, disseminated disease involving multiple organs simultaneously, particularly in young children, remains relatively poorly documented. We report a case of disseminated tuberculosis involving the lungs, hilar lymph node, femur, and thigh in a 14-month-old Indian girl. Diagnosis was challenging because of the child's young age, non-specific clinical presentation, and involvement of multiple non-contiguous sites. However, a comprehensive diagnostic evaluation facilitated recognition of the disease and initiation of antituberculous therapy.

Categories: Pain Management, Orthopedics, Infectious Disease

Keywords: cartridge-based nucleic acid amplification test (cbnaat), disseminated tuberculosis, mycobacterium tuberculosis (mtb), tb, tb osteomyelitis

Introduction

Mycobacterium tuberculosis causes tuberculosis (TB), a major infectious disease that continues to pose a substantial public health burden, particularly in endemic countries [1]. Although extrapulmonary TB accounts for 20%-24% of cases, the lungs remain the most commonly affected site [2]. TB continues to contribute substantially to morbidity and mortality worldwide, particularly in regions with a high disease burden [3].

Disseminated TB refers to disease involving two or more non-contiguous anatomical sites or the dissemination of *M. tuberculosis* through the bloodstream or into the bone marrow [4]. It is an uncommon form of TB, accounting for approximately 1%-2% of all cases [5]. Among immunocompetent individuals, disseminated disease is estimated to occur in fewer than 2% of TB cases and accounts for approximately 20% of extrapulmonary TB cases [6]. Despite advances in diagnostic techniques and treatment, disseminated TB remains associated with considerable mortality, with reported mortality rates ranging from 25% to 30% [7].

Childhood TB remains a major public health concern, particularly in children younger than five years, who are more susceptible to rapid progression from infection to active disease and to severe forms of TB, including disseminated TB and tuberculous meningitis. Globally, children younger than 15 years account for approximately 11% of all TB cases, and nearly half of affected children are younger than five years. Close household contact with an individual with infectious pulmonary TB is a major risk factor for infection in young children. Because symptoms may be non-specific and microbiological confirmation can be challenging, diagnosis may be delayed until the disease has progressed [8]. The risk of severe disease is particularly high in infants and young children, underscoring the importance of early recognition, systematic contact evaluation, and timely treatment. The World Health Organization recommends TB preventive treatment for household contacts younger than five years after active TB disease has been excluded [9]. Therefore, identifying potential exposure to an infectious household member is an essential component of evaluating young children with suspected TB, including those presenting with disseminated disease.

We report a rare case of disseminated TB involving the lungs, hilar lymph node, femur, and thigh abscess in a 14-month-old Indian child. The diagnosis was challenging because of the patient's very young age, lack of a known history of contact with a person with TB, and the atypical pattern of multisite involvement. This case highlights the importance of maintaining a high index of suspicion for disseminated TB in young children, even when the initial clinical presentation does not suggest widespread disease.

Case Presentation

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In 2021, a 14-month-old girl was brought to the outpatient department by her father as a referral from a pediatric hospital with a 15-day history of swelling over the right thigh. There was no history of fever, cough, loss of appetite, night sweats, trauma, or known contact with TB within the family. The family had a history of migration, belonged to a low-income socioeconomic background, and had been living in a slum for approximately six years. She was fully vaccinated for her age.

On general examination, the child weighed 7.3 kg and measured 71 cm in length. She appeared ill, with poor general condition and pallor. Local examination of the right lower limb revealed an ill-defined, firm swelling measuring approximately 10 × 5 cm over the upper medial aspect of the right thigh. The swelling was non-tender and immobile, with no overlying skin discoloration or other visible skin changes. Systemic examination was otherwise unremarkable. A comprehensive diagnostic work-up was subsequently performed, and the findings are summarized in Table 1.

Investigation	Results	Reference range
HGB	8.5	11.5-16.0 g/dL
MCH	18.7	27-33 pcg
MCHC	28.1	31-36 g/dL
MCV	67.0	85-100 fL
PCV	39.0	38.3%-48.6%
RDW	20.0	0%-14%
RBC	4.5	4.7-6.1 million cells/mcL
WBC	11.7	4.5-12.0 K/ μ L
DLC		
Neutrophils	66	55%-70%
Lymphocytes	39	20%-40%
Monocytes	6	2%-8%
Eosinophils	3	1%-4%
Basophils	2	0%-1%
ESR	53.0	0-22 mm/hr
Serum sodium	136.0	135-145 mmol/L
Serum potassium	4.6	3.5-5.1 mmol/L
Serum calcium	8.6	8.5-10.5 mmol/L
Serum chloride	99.0	98-107 mmol/L
Blood culture	Sterile	Sterile
Serum bilirubin (total)	0.35	0.2-1.0 mg/dL
Serum bilirubin (direct)	0.21	0.2-1.0 mg/dL
Serum bilirubin (indirect)	0.14	0.2-1.0 mg/dL
ALK PHOS	111.0	30-115 U/L
Albumin	4.6	3.5-5 g/dL
Serum creatinine	0.5	0.51-0.95 mg/dL
AST	43.0	0-40 U/L
ALT	28.0	0-40 U/L
Serum uric acid	6.6	2.4-5.7 mg/dL
Lactate dehydrogenase	335	35-225 U/L

Anti-HCV antibodies	Non-reactive	Reactive-non-reactive
HIV (I and II)	Non-reactive	Reactive-non-reactive
Fasting blood sugar	94.0	70-99 mg/dL
Activated partial thromboplastin time	34	25-35 s
Serum angiotensin-converting enzyme levels	31	<40 nmol/mL/min
C-reactive proteins	0.3	0.3-1.0 mg/dL
Bone marrow biopsy	Unremarkable	Unremarkable-remarkable
Mantoux test	Negative	0-15 mm
USG-whole abdomen	Unremarkable	Unremarkable-remarkable

TABLE 1: Diagnostic workup of the patient.

HGB: hemoglobin; MCH: mean corpuscular hemoglobin; MCHC: mean corpuscular hemoglobin concentration; MCV: mean corpuscular volume; PCV: packed cell volume; RDW: red cell distribution width; RBC: red blood cell; WBC: white blood cell; DLC: differential leukocyte count; ESR: erythrocyte sedimentation rate; ALK PHOS: alkaline phosphatase; AST: aspartate aminotransferase; ALT: alanine aminotransferase; HCV: hepatitis C virus; USG: ultrasonography

Plain radiography of the right lower limb revealed a large, well-defined soft-tissue mass in the proximal thigh and hip region, containing extensive cloud-like calcification and heterotopic ossification. The adjacent proximal femoral shaft demonstrated a well-defined lytic lesion underlying the soft-tissue mass (Figure 1).

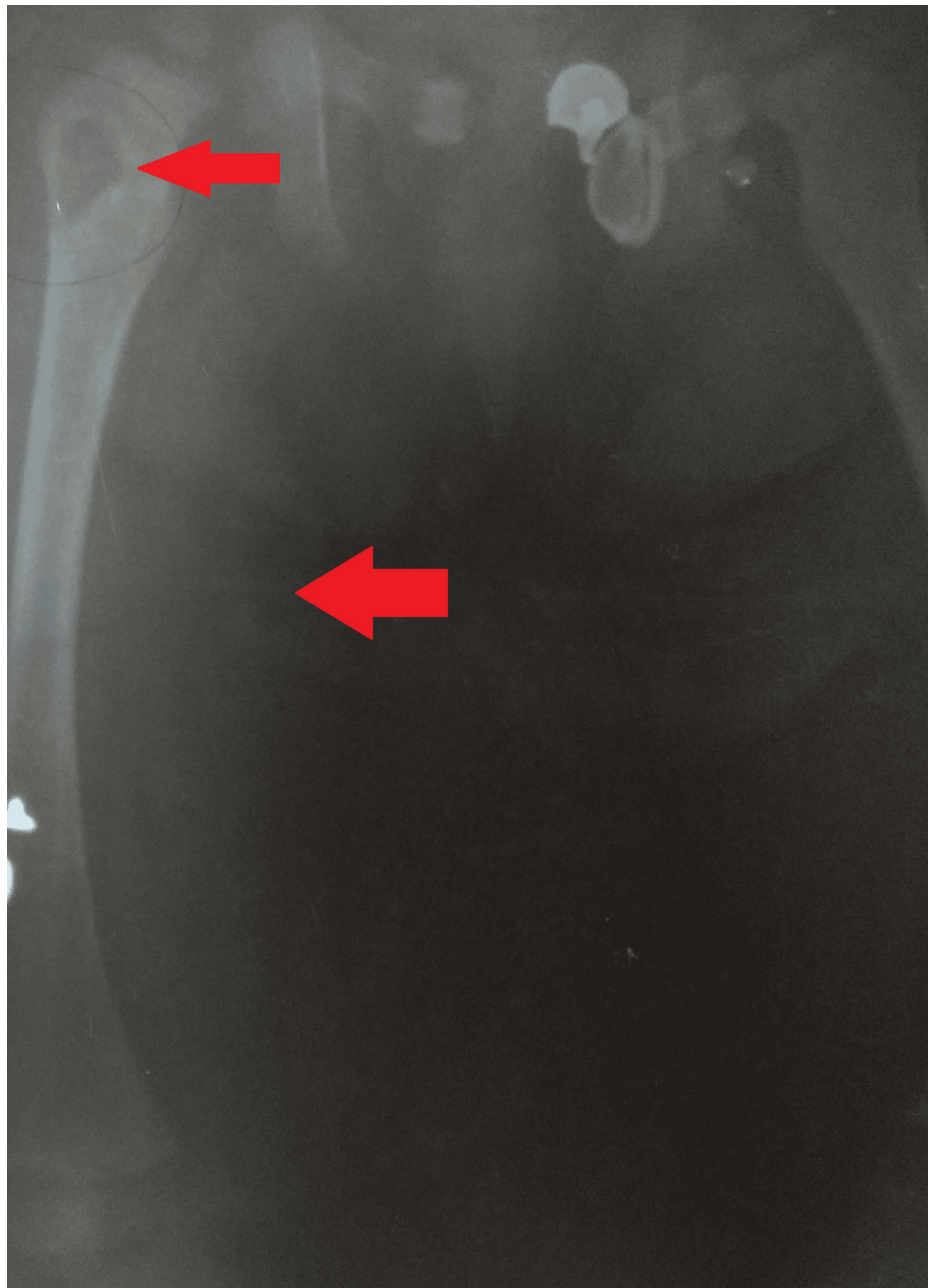


FIGURE 1: Plain radiograph of the right lower limb showing a large soft-tissue swelling in the proximal thigh with an underlying lytic lesion involving the proximal femur.

Chest radiography revealed multiple bilateral ill-defined opacities along with hilar lymphadenopathy (Figure 2).

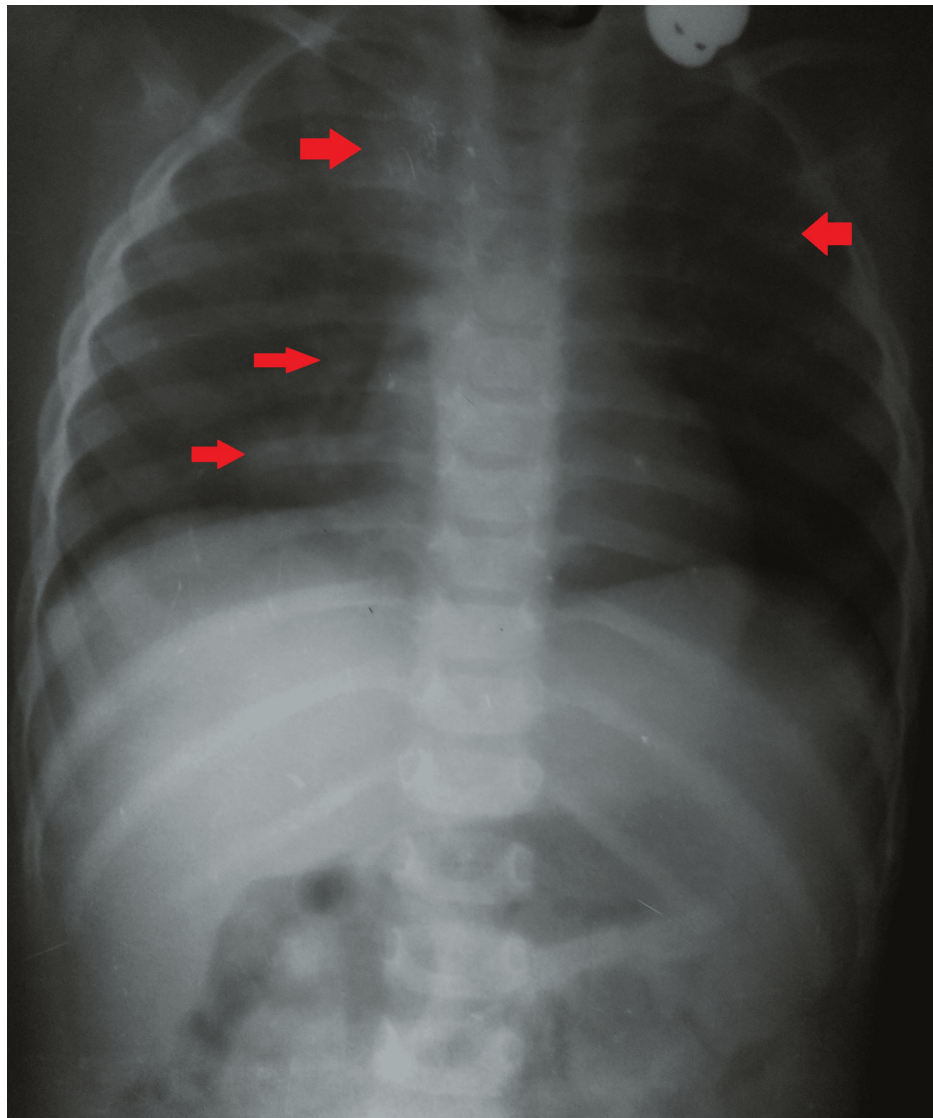


FIGURE 2: Chest radiograph showing multiple bilateral ill-defined opacities along with hilar lymphadenopathy.

Ultrasonography of the right thigh demonstrated an anechoic lesion within the intermuscular plane containing internal echoes and septations. Ultrasound-guided fine-needle aspiration cytology was suggestive of a tuberculous abscess, with acid-fast bacilli identified on Ziehl-Neelsen staining. Cartridge-based nucleic acid amplification testing (CBNAAT) detected *M. tuberculosis* at a very low level, with no evidence of rifampicin resistance. Pus culture, line-probe assay, and CBNAAT performed on gastric aspirate were negative.

A final diagnosis of disseminated TB involving the lungs, hilar lymph node, femur, and thigh was established in the 14-month-old child, and antituberculous therapy with four drugs, i.e., rifampicin (15 mg/kg/day), isoniazid (10 mg/kg/day), pyrazinamide (35 mg/kg/day), and ethambutol (20 mg/kg/day), was initiated. The orthopedician advised hip spica immobilization for six weeks, and therapeutic iron supplementation was also prescribed. The child responded well to treatment, with no major drug-related adverse effects. Follow-up radiography of the pelvis and right hip demonstrated an ill-defined hypodense lesion involving the neck of the right femur and extending into the greater and lesser trochanteric regions, with multiple areas of osseous erosion (Figure 3).

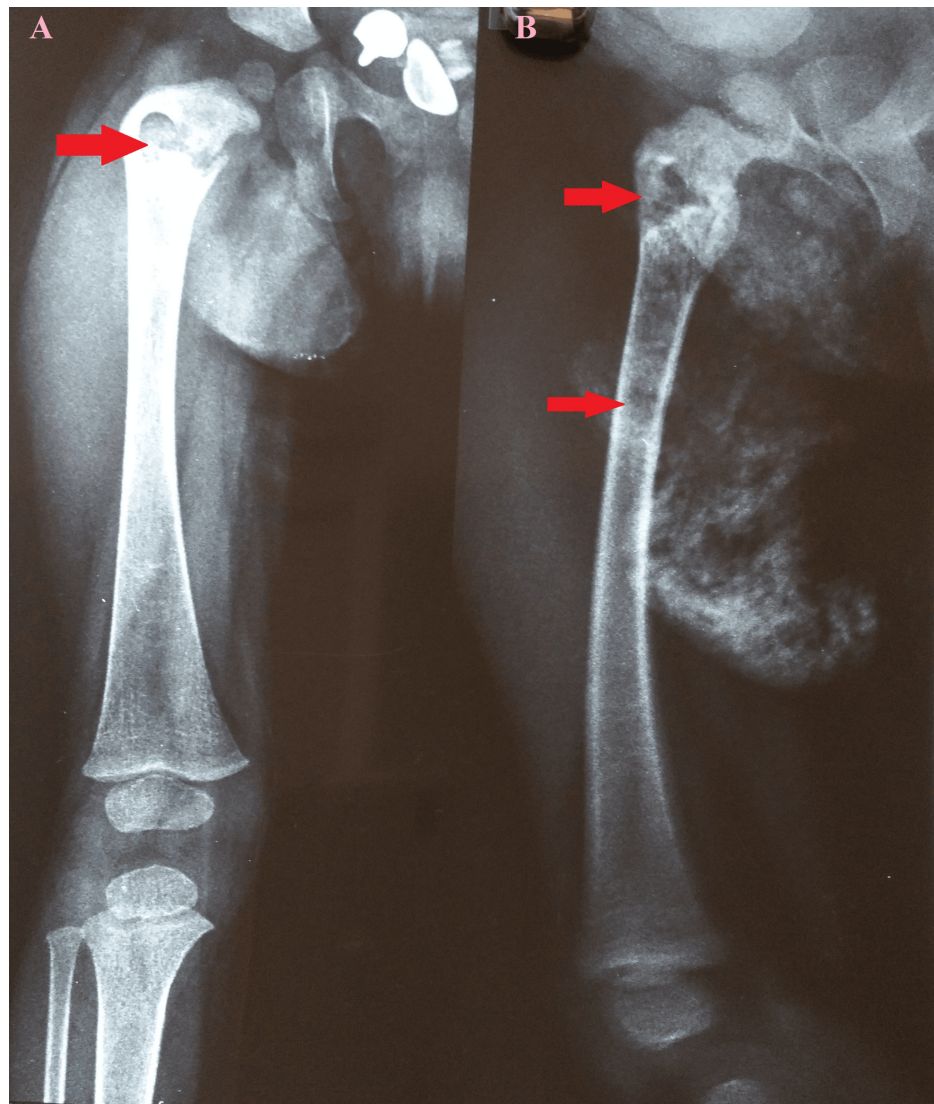


FIGURE 3: Follow-up radiograph of the pelvis and right hip showing an ill-defined osteolytic lesion involving the neck of the right femur and extending into the greater and lesser trochanteric regions, with multiple areas of osseous erosion.

(A) Anteroposterior view; (B) lateral view

At the parents' request, the child was subsequently transferred to another district, with advice to continue follow-up in the pediatric and orthopedic outpatient departments. However, she was lost to follow-up after completing four months of antituberculous therapy.

Discussion

Disseminated TB can be life-threatening, particularly when diagnosis and treatment are delayed. Its recognition remains challenging because the clinical manifestations are often subtle, non-specific, and variable. Conventional diagnostic methods also have important limitations. Acid-fast bacilli smear microscopy has limited sensitivity, mycobacterial cultures require prolonged incubation, and chest radiography may fail to identify early or subtle miliary changes [7]. Khan et al. reported a delay of approximately one month in seeking medical care among patients with disseminated TB, largely attributable to its non-specific clinical presentation [10].

Musculoskeletal involvement accounts for approximately 3% of TB cases [11]. Within this spectrum, tuberculous myositis is an exceptionally rare manifestation, representing an estimated 0.015%-2% of extrapulmonary TB cases [12]. Contiguous extension is the most commonly reported route of tuberculous muscle involvement, accounting for approximately 63% of cases, followed by hematogenous dissemination

(29%) and direct inoculation (8%). TB of the thigh muscles is uncommon and generally involves a single muscle, most frequently the quadriceps femoris. When a tuberculous focus is present at another site, hematogenous dissemination may contribute to muscular involvement [11]. In the present case, the thigh abscess may have resulted from contiguous extension from the underlying femoral lesion or hematogenous dissemination. However, the precise route of spread could not be established.

Microbiological confirmation by culture of *M. tuberculosis* from specimens obtained from the affected site remains an important diagnostic reference standard. However, the time required for culture confirmation may delay definitive diagnosis and the initiation or modification of therapy, potentially affecting clinical outcomes. Therefore, diagnosis should be based on an integrated assessment of the clinical presentation, radiological findings, microbiological results, and histopathological features, particularly when rapid microbiological confirmation is unavailable or inconclusive.

The optimal duration of treatment for disseminated TB remains uncertain, particularly when multiple organs are involved [7]. Treatment is primarily medical and consists of antituberculous therapy. The duration should be individualized according to the sites involved, clinical response, and drug susceptibility profile. The national guideline cited here recommends a 12-month treatment course for skeletal TB [13]. Surgical intervention may be required in selected patients, particularly those with large, symptomatic, or poorly resolving abscesses. In such cases, procedures such as incision and drainage may provide source control and symptomatic relief, as was done in the present case.

In a 10-year retrospective study of 3,058 culture-confirmed TB cases, Wang et al. identified disseminated TB in 164 patients (5.4%), with a substantial mortality rate of 31.1% [14]. A separate three-decade retrospective study from India reported extensive multisystem involvement. The lungs were the most frequently affected site (90.1%), followed by the brain (73.3%), liver (72.0%), spleen (44.0%), kidneys (37.0%), bone marrow (17.0%), adrenal glands (12.2%), intestines (11.4%), pancreas (8.5%), and reproductive organs (6.9%). Notably, TB had not been clinically suspected before death in approximately one-third of cases, highlighting the diagnostic difficulty and often clinically occult nature of disseminated disease [15].

Conclusions

We report a rare case of disseminated TB involving four non-contiguous sites in an Indian child. Such multisite presentations are uncommon and remain insufficiently characterized, particularly in young children from TB-endemic regions. This case emphasizes the importance of maintaining a high index of suspicion for disseminated TB when clinical manifestations are non-specific or the pattern of organ involvement is unusual. Reporting similar atypical presentations may improve clinical recognition and facilitate timely diagnosis and treatment. However, as this report represents a single case, larger studies are needed to better define the clinical spectrum of disseminated TB and determine whether existing diagnostic and management strategies require further refinement.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

Concept and design: Sankalp Yadav, Amruta Nadar, Madhan Jeyaraman, Gautam Rawal

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Disclosures

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