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Access Microbiology

# TIBIAL OSTEITIS CAUSED BY MYCOBACTERIUM TUBERCULOSIS A CASE REPORT

--Manuscript Draft--

# TIBIAL OSTEITIS CAUSED BY MYCOBACTERIUM TUBERCULOSIS: A CASE REPORT

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## ABSTRACT

Tuberculosis is a major scourge, posing a serious public health problem in countries where it is endemic. Osteoarticular involvement accounts for 3 to 5% of all tuberculosis cases and 10 to 15% of extrapulmonary tuberculosis cases. We report a case of tibial osteitis caused by *Mycobacterium tuberculosis* in a 52-year-old female patient who presented to the trauma department at the Mohammed V Military Teaching Hospital with a painful swelling of the lower part of her left leg. Standard X-rays and computed tomography (CT) scans revealed bone involvement, specifically in the tibia. In an endemic context, any persistent and atypical bone lesion should raise suspicion of osteoarticular tuberculosis to enable rapid diagnosis and appropriate therapeutic management. In the absence of other suggestive pulmonary or extrapulmonary lesions, the diagnosis also relies on the exclusion of other pathologies, such as malignant tumors, which may present with similar clinical and radiological features.

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## DATA SUMMARY

No data were reused or generated in this study.

## INTRODUCTION

Tuberculosis is a significant public health issue, particularly in countries where it is endemic. Although pulmonary tuberculosis is the most well-known form, osteoarticular tuberculosis represents a considerable portion of the disease. It is a relatively common form, accounting for approximately 3 to 5% of all tuberculosis cases and 35 to 50% of extrapulmonary tuberculosis cases worldwide (1). It is characterized by an infection that may affect various bones, joints, the synovium, and the spine. This is a serious condition that can lead to bone destruction. The presentation is often atypical, sometimes mimicking severe conditions such as malignant tumors (2).

Tibial tuberculous osteitis is a specific infection of the tibia caused by the Koch bacillus (Mycobacterium tuberculosis), which is characterized by persistent pain in the tibia, often insidious and progressive, localized swelling, and systemic symptoms such as fever, weight loss, and fatigue, although these may be absent in chronic cases. Medical imaging reveals characteristic bone lesions, such as cavities or bone sequestra, and bone biopsy confirms the diagnosis by identifying, through molecular biology techniques, the presence of tuberculous bacilli in the bone tissue (3).

We report here the case of a 52-year-old woman with tuberculosis of the lower part of her left leg, presenting as a bone tumor, an atypical manifestation rarely seen in the literature.

## CASE REPORT

This case involves a 52-year-old woman with no significant medical history and no known tuberculosis contact, admitted due to the presence of a mass on her left leg that had been progressing for a year, with no history of trauma. The initial symptoms included a tingling pain, worsening at night and exacerbated by movement of the affected leg. The pain was initially

relieved by analgesics, leading her to consult a rheumatologist, where she received treatment without success. Due to the persistence of symptoms, the patient was referred to the trauma department for further management.

On questioning, the patient appeared to be in good general condition. She reported no general symptoms of infection and no specific signs of tuberculosis such as fatigue, fever, or night sweats.

During clinical examination, the patient was afebrile, with normocolored conjunctivae, and no signs of systemic infection were noted. A hard, painful swelling was noted on the distal part of the left leg, localized over the tibia, along with swelling of the ankle without inflammatory signs. Given the presentation, the differential diagnoses included neoplastic pathology and other non-specific infections. However, the absence of typical malignant features on imaging and the identification of characteristic lesions helped narrow the diagnosis to osteoarticular tuberculosis.

Respiratory examination revealed clear pleuropulmonary sounds, with an oxygen saturation of 94%. There were no signs of respiratory distress or paradoxical breathing.

Cardiovascular examination showed that the patient was hemodynamically stable (120/50 mmHg) with no signs of hypoperfusion, a regular and strong pulse, and a heart rate of 74 bpm. Cardiac auscultation revealed normal heart sounds (B1 and B2).

Neurologically, the patient was conscious (Glasgow Coma Score 15/15), well-oriented in time and space, and exhibited no sensory or motor deficits. Pupils were equal and reactive.

Blood tests showed no abnormalities. Activated partial thromboplastin time (aPTT) was normal at 1.0, and the prothrombin rate (PT) was 63% (normal range: 70-100%). Kidney function tests were normal, with a urea level of 0.17 g/L (normal: 0.15-0.38 g/L), and creatinine was slightly low at 5 mg/L, equivalent to 44.25 µmol/L (normal: 53-115 µmol/L). The elevated C-reactive protein (CRP) level of 24.2 mg/L suggests an inflammatory process, consistent with

the clinical and radiological findings. There were no electrolyte imbalances on the blood chemistry panel, and liver function was normal with aspartate aminotransferase (AST) at 34 IU/L and alanine aminotransferase (ALT) at 17 IU/L. Serological tests for HBV, HCV, and HIV were negative. Rheumatoid factor and antinuclear antibodies were also negative.

Radiologically, standard X-rays of the left leg (anteroposterior and lateral views) revealed an osteolytic or osteosclerotic lesion in the lower diaphyseal-metaphyseal-epiphyseal region of the tibia, with associated periosteal reaction in a "flame" pattern, and minor osteosclerosis of the distal phalanx of the great toe, without cortical bone rupture (Figure 1).

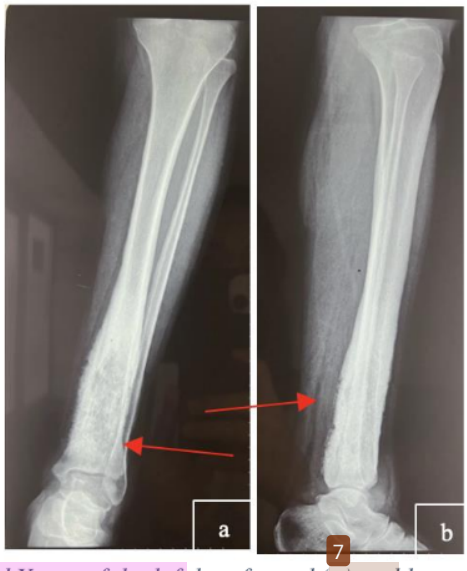


*Figure 1: Standard X-ray of the left leg, frontal (a) and lateral (b) views showing a marked osteosclerosis (indicated by the red arrow) in the distal tibial region.*

Computed tomography (CT) and magnetic resonance imaging (MRI) of the left leg revealed an effusion in the talocrural joint with diffuse synovial thickening enhanced by contrast injection (Figure 2) (Figure 3).

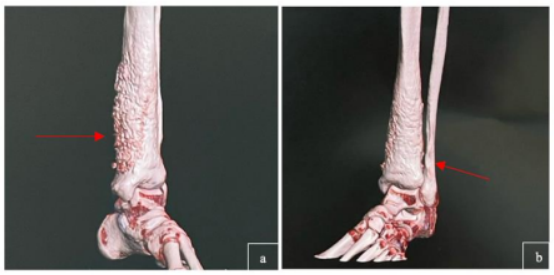


*Figure 2: Volumetric reconstruction on CT scan of the left leg showing the synovial thickening (red arrows))*

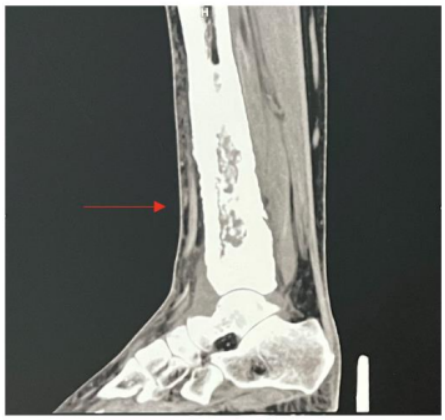

*Figure 3: Volumetric reconstructions on CT scan of the left leg with synovial thichening (red arrow).*

A frontal chest X-ray showed a consolidation focus in the upper third of the right lung field.

A thoracoabdominal-pelvic CT scan was also performed to investigate the primary lesion and revealed a superinfected bronchiectasis focus and splenic lesions suggestive of secondary involvement.

A biopsy was performed by the trauma department to obtain a tissue sample. This procedure aimed to allow histological and microbiological analysis to confirm the diagnosis, determine the nature of the lesion, and identify the presence of bacteria such as Mycobacterium tuberculosis. The biopsy results will guide appropriate treatment and help assess the severity of the condition.

**RESULTS**

Bacteriological examination of the bone biopsy revealed acid-fast bacilli (AFB) on direct Ziehl-Neelsen staining (1 to 10 AFB per 100 fields), confirming the presence of Mycobacterium tuberculosis (Figure 4). The culture on Löwenstein-Jensen solid medium and in liquid MGIT medium became positive on days 21 and 14, respectively, further supporting the diagnosis. Real-time PCR (GeneXpert MTB/RIF®, Cepheid) detected the Mycobacterium tuberculosis complex at a low level. Importantly, the test did not detect rifampicin resistance, providing crucial information for treatment planning.

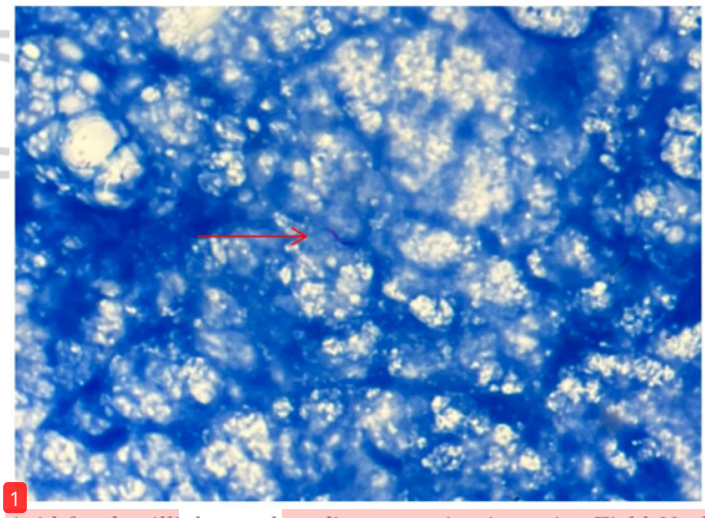

*Figure 4: Acid-fast bacilli detected on direct examination using Ziehl-Neelsen staining (red arrow).*

Histopathological examination revealed caseating granulomas, which are characteristic of Mycobacterium tuberculosis infection. These granulomas were surrounded by a

granulomatous inflammatory reaction with prominent lymphocytic and macrophagic infiltrates, indicating a strong immune response consistent with a tuberculous infection.

The diagnosis of tibial tuberculous osteitis was established based on clinical, radiological, microbiological, and histopathological findings, ruling out other causes of osteitis and bone infection.

After the detection of the Mycobacterium tuberculosis complex, the patient was started on a therapeutic regimen similar to that used for pulmonary tuberculosis, but adapted with an extended duration due to bone involvement. For the first two months, a daily four-drug regimen was administered, including Isoniazid (INH) at 5 mg/kg/day, Rifampicin (RIF) at 10 mg/kg/day, Pyrazinamide (PZA) at 25 mg/kg/day, and Ethambutol (EMB) at 15-25 mg/kg/day. After this initial phase, the treatment continued with a two-drug regimen of Isoniazid and Rifampicin for an additional 7 months, bringing the total treatment duration to 9 months. This extended duration is necessary to ensure the complete eradication of the bone infection. The diagnosis of tibial tuberculous osteitis was confirmed based on the integration of clinical, radiological, microbiological, and histopathological findings. With the confirmation of Mycobacterium tuberculosis, the patient was promptly initiated on a tailored treatment regimen, ensuring comprehensive management of the bone infection.

## DISCUSSION

Tuberculosis remains a major public health issue, particularly in developing countries where it is endemic, such as Morocco (4)(5). Among the extrapulmonary forms, tuberculous osteitis is a relatively common manifestation, often complicating other forms of tuberculosis such as Pott's disease or tuberculous arthritis (3). It is usually chronic, with a long diagnostic delay, and manifests as slowly worsening pain and/or swelling (6).

Tuberculous osteitis is often diagnosed late due to its slow progression and nonspecific symptoms, which can resemble other conditions. In countries with high TB endemicity, such as ours, the lack of awareness of bone tuberculosis may contribute to delays in diagnosis (7).

Standard radiography may be normal in the early stages or reveal nonspecific images such as osteolysis, periosteal reaction, soft tissue opacity, or pathological fracture (8). In 1920, Jungling described a finely rimmed lacunar image of osteocondensation, referring to it as pseudocystic multiple tuberculous osteitis (9). The presence of bone sequestra, forming a "rattle" image, may cause diagnostic confusion with bone tumors (3).

Computed tomography (CT) is an excellent tool for delineating bone involvement and soft tissue abscess extension. MRI is likely more sensitive for detecting early bone marrow edema and soft tissue involvement.

Polymerase chain reaction (PCR) offers 100% specificity for detecting mycobacterial DNA, making it an invaluable tool for rapid diagnosis. However, direct Ziehl-Neelsen staining can often yield negative results due to the paucibacillary nature of the lesions, which makes PCR even more crucial for confirming the diagnosis (10). In our case, direct examination after Ziehl-Neelsen staining revealed positive results.

Diagnosing tuberculous osteitis is challenging in the absence of suggestive pulmonary or extrapulmonary lesions, particularly since other diseases, such as malignant tumors, can present with similar clinical and radiological features (11). Therefore, a bone biopsy is generally indicated to establish a histological diagnosis by identifying epithelioid giant-cell granulomas with caseous necrosis.

The treatment for tuberculous osteitis involves a combined medical and surgical approach. The standard regimen consists of rifampicin, isoniazid, pyrazinamide, and ethambutol for the first two months, followed by a maintenance regimen with rifampicin and isoniazid for an additional seven months. This extended treatment is critical to eradicate the

infection completely, particularly in bone lesions, which require prolonged therapy for effective healing. Surgical intervention is generally conservative and reserved for complications such as soft tissue abscesses, fistula tracts, or the need for bone debridement in cases of extensive infection. Orthopedic management, such as immobilization, is used to manage pain and prevent deformities (12). With appropriate treatment, the prognosis for tuberculous osteitis is generally favorable. However, early diagnosis and prompt initiation of therapy are crucial to prevent bone destruction and long-term complications, ensuring better outcomes for patients (13).

## CONCLUSION

In conclusion, osteoarticular tuberculosis presents significant diagnostic and therapeutic challenges, particularly in developing countries like Morocco, where it remains endemic. The often nonspecific presentation of this disease necessitates increased vigilance and a rigorous diagnostic approach, including radiological, bacteriological, and histopathological examinations. Early and accurate diagnosis, combined with appropriate management, which includes both medical treatment and selective surgical interventions, is crucial for improving clinical outcomes. Multidisciplinary coordination, particularly among microbiologists, radiologists, and clinicians, is essential for the timely and effective management of this complex pathology.


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## Author contributions

M.B. contributed to the initial drafting of the manuscript, while B.E. and B.Y. revised it critically for important intellectual content. M.C. provided final approval for the version to be published.

## Conflicts of interest

The authors declare no competing interests.

**Consent to publish**

Written informed consent was obtained from the patient to publish this report in accordance with the journal's patient consent policy. The patient agreed to the publication of her personal and medical details, including her name and other identifying information, in this article.

**Institutional Review Board Statement**

The study was conducted in accordance with the Declaration of Helsinki and was approved by the Ethics Committee of Mohammed V Military Teaching Hospital/Faculty of Medicine and Pharmacy (protocol code 3596; approval date: 24 June 2024)

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Figure 1

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