Osteoarticular Tuberculosis of the Foot and Ankle: Diagnosis and Treatment Based on Our Experience. Case Report

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ABSTRACT

Osteoarticular tuberculosis (TB) is the third most common form of extrapulmonary tuberculosis after pleural and lymph node involvement. It accounts for 1% of all tuberculosis cases, and only 3-12% of osteoarticular cases involve the foot and/or ankle. The objectives of this article are to present a clinical case and its treatment, compare it with similar cases reported in the literature, and raise awareness of this uncommon presentation. We report the case of a 50-year-old man with pulmonary tuberculosis who presented with pain in the malleolar region of the left ankle. Physical examination revealed a well-circumscribed soft-tissue mass without skin discoloration or increased local temperature, which subsequently progressed to ulceration. Radiographs and computed tomography scans showed cavitary osteolytic lesions with internal content and cortical disruption. A specimen was obtained for culture, which tested positive for *Mycobacterium tuberculosis*. The patient received antituberculous therapy for 9 months, and partial weight-bearing was initiated after 5 months. The outcome was favorable. **Conclusion:** Early diagnosis and appropriate multidisciplinary management are essential to prevent complications.

Keywords: Osteoarticular tuberculosis; foot and ankle; extrapulmonary tuberculosis; antibiotics; osteolytic lesions.

Level of Evidence: IV

Tuberculosis ósea en el pie y el tobillo. Diagnóstico y tratamiento basados en nuestra experiencia. Reporte de caso

RESUMEN

La tuberculosis osteoarticular es la tercera forma de afectación extrapulmonar luego de la pleural y la ganglionar. El 1% de los enfermos con tuberculosis tiene este cuadro. Solo el 3-12% compromete el pie o el tobillo. Los objetivos de este artículo son comunicar un caso clínico y su tratamiento, compararlo con casos similares publicados y advertir sobre esta presentación infrecuente. Se trata de un hombre de 50 años con tuberculosis pulmonar que refiere dolor en la región maleolar del tobillo izquierdo. Tiene una tumoración blanda circunscrita, sin cambio de coloración ni aumento de la temperatura que evoluciona a una úlcera. La radiografía y la tomografía computarizada muestran imágenes osteolíticas cavitadas con contenido y disrupción cortical. Se toma una muestra para cultivo que resulta positiva para *Mycobacterium tuberculosis*. El paciente recibió un tratamiento antibiótico contra la tuberculosis durante 9 meses y continuó con carga parcial a los 5 meses; los resultados fueron favorables. **Conclusión:** Se deberá realizar un diagnóstico precoz e indicar un tratamiento multidisciplinario adecuado para evitar complicaciones.

Palabra clave: Tuberculosis osteoarticular; pie y tobillo; tuberculosis extrapulmonar; antibióticos; imágenes osteolíticas.

Nivel de Evidencia: IV

INTRODUCTION

Tuberculosis is an infectious disease caused by *Mycobacterium tuberculosis*. It is transmitted through airborne droplets from a person with active tuberculosis to a susceptible individual and most commonly affects the lungs.[1] It is the second leading cause of death from infectious diseases after human immunodeficiency virus (HIV) infection, with 95% of cases and deaths occurring in developing countries.[2]

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Only 1% of patients with tuberculosis develop osteoarticular involvement. Approximately half of these cases affect the spine, whereas involvement of the foot and ankle accounts for 3%-12% of cases. Because of its nonspecific presentation and the difficulty of establishing an early diagnosis, this condition should always be considered, as delayed diagnosis may lead to extensive joint destruction, involvement of adjacent structures of the foot, and severe deformities.[2–4] Diagnosis is based on clinical suspicion, imaging studies, and microbiological confirmation.

Clinical manifestations often begin with pain in the affected region, functional impairment, and difficulty bearing weight. Patients may also present with fever, tachycardia, anorexia, weight loss, asthenia, and apathy, as well as swelling without erythema or increased local temperature, tenderness on palpation, and purulent discharge.[3]

Microbiological evaluation is essential. In addition to demonstrating the presence of bacilli, isolation of the causative organism allows *in vitro* susceptibility testing to antituberculous drugs.[4]

Early radiographic findings include increased bone density, soft-tissue swelling, and lamellar periosteal reaction, which may appear approximately 10 days after symptom onset. Characteristic findings are osteolytic lesions, while bone sequestra typically become evident during the second or third week.

Tuberculosis of the foot has four radiographic presentations. The most common is the periarticular granulomatous form, followed by the central granulomatous form, isolated hematogenous synovitis, and, finally, tuberculous tenosynovitis or bursitis.[5] Magnetic resonance imaging (MRI) allows early diagnosis and demonstrates early osseous and soft-tissue changes, including bone edema, trabecular fractures, synovial abnormalities, joint effusion, fluid collections, tenosynovitis, and inflammatory infectious changes. Bone scintigraphy has a sensitivity comparable to that of MRI. Definitive diagnosis is confirmed by biopsy or aspiration of the bone lesion.[6]

The objectives of this article are to present a clinical case, including its presentation, diagnosis, and treatment; to compare it with similar cases reported in the literature; to analyze the differences; and to discuss our experience.

CLINICAL CASE

The patient was a 50-year-old man with a history of cutaneous pemphigus diagnosed in 2019, which had completely resolved, and pulmonary tuberculosis diagnosed in 2023. He was receiving treatment with rifampicin, isoniazid, and pyrazinamide. He reported a three-month history of sharp pain over the dorsum of the foot and the anterior aspect of the left ankle. He was taking corticosteroids, which worsened his symptoms. He presented in a wheelchair. Physical examination revealed a soft, fluctuant, well-circumscribed mass with well-defined borders, without skin discoloration or increased local temperature (Figure 1).

Figure 1. Medial malleolar region showing a soft, fluctuant, well-circumscribed mass with well-defined borders.

During subsequent follow-up, the lesion progressed to a sinus tract with abundant purulent discharge and, a few days later, to an ulcer in the medial malleolar region. The ulcer was approximately 4 cm in diameter, circular in shape, with elevated necrotic margins and a wound bed containing devitalized tissue and purulent discharge.

Anteroposterior and lateral radiographs of the foot and ankle obtained at presentation demonstrated multiple osteolytic lesions involving the talus, calcaneus, cuboid, medial and lateral malleoli, the lateral cuneiform, and the bases of the third, fourth, and fifth metatarsals, associated with cortical thinning (Figures 2-4).

Figure 2. Oblique radiograph of the foot. Multiple osteolytic lesions involving the talus, calcaneus, cuboid bone, and tibial and fibular malleoli.

Figure 3. Lateral radiograph of the foot and ankle. Multiple osteolytic lesions involving the talus and calcaneus.

Figure 4. Anteroposterior radiograph of the ankle. Multiple osteolytic lesions involving the talus and the tibial and fibular malleoli.

Computed tomography of the foot and ankle revealed generalized osteopenia, particularly in sections through the hindfoot involving the talar head and the anterior portion of the calcaneus (Figure 5).

This osteopenia resulted in marked cortical thinning and cortical disruption along the medial aspect of the calcaneus (Figure 6).

These findings were considered consistent with an inflammatory osseous process (osteomyelitis) associated with sequestrum and involucrum formation. Magnetic resonance imaging revealed marrow edema within the fifth metatarsal shaft, diffuse bone edema with trabecular fractures involving the talus and calcaneus, joint effusion within the anterior and posterior talar recesses and the sinus tarsi, synovial proliferation, and an approximately 35-mm fluid collection adjacent to the posterior tibial tendon. Additional findings included infectious-inflammatory changes and tenosynovitis of the flexor hallucis longus tendon. The joints otherwise appeared preserved. (Figures 7 and 8).

Samples were obtained for acid-fast bacilli culture, which yielded positive results.

The patient continued antituberculous therapy with pyrazinamide, isoniazid, and rifampicin for a total of 9 months. Progressive wound healing was observed. Partial weight-bearing was allowed after 3 months, progressing to full weight-bearing at 6 months (Figure 9).

The patient provided written informed consent for publication of the case and accompanying images.

Figure 5. Computed tomography of the foot, axial image. Generalized osteopenia involving the talar head and the anterior portion of the calcaneus.

Figure 6. Computed tomography of the foot and ankle, sagittal image. Infectious involvement of the talus and calcaneus with sequestrum and involucrum formation.

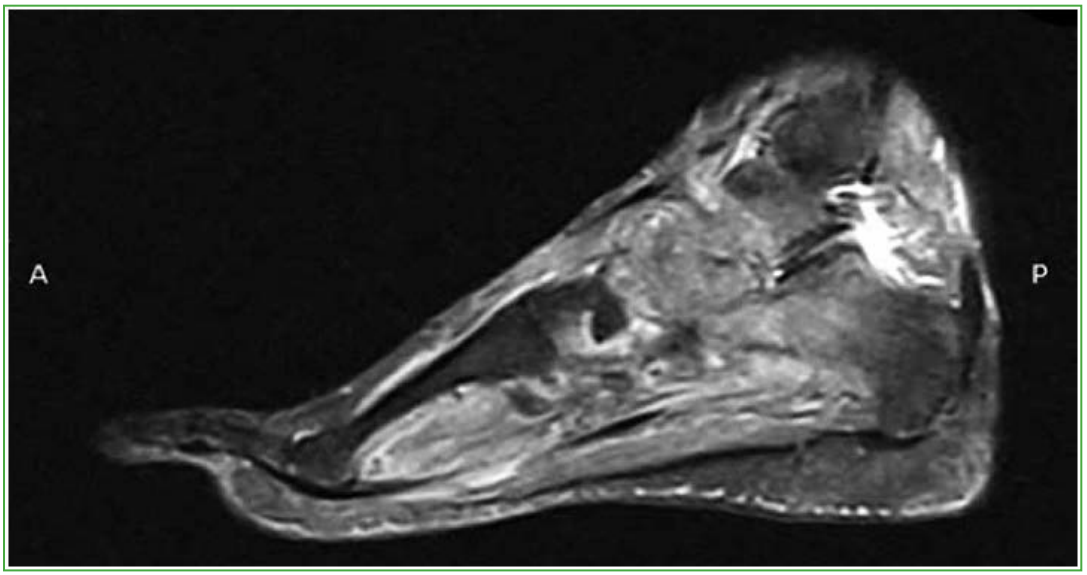

Figure 7. Magnetic resonance imaging of the foot and ankle, sagittal image. Trabecular fractures of the talus and calcaneus, an approximately 35-mm fluid collection adjacent to the posterior tibial tendon, and infectious-inflammatory changes are observed.

Figure 8. Magnetic resonance imaging of the foot and ankle, coronal image. Trabecular fractures of the talus and calcaneus and joint effusion within the anterior talar recess are observed.

Figure 9. Clinical improvement of the wound, with no drainage or fluctuance.

DISCUSSION

The World Health Organization reported that 1.3 million people died from tuberculosis in 2022. During that year, an estimated 10.6 million people developed tuberculosis worldwide, including 5.8 million men, 3.5 million women, and 1.3 million children. Tuberculosis is present in all countries and affects all age groups.[1]

Isolated skeletal involvement is uncommon. The variable clinical and radiological manifestations may mimic osteomyelitis, bone tumors, or other inflammatory and neoplastic conditions.[7]

Studies by Lasalle Vignolo and by Navarrete et al. reported that osteoarticular tuberculosis accounts for only 1%-3% and 5%-10% of cases, respectively. Both authors emphasized that delays in diagnosis and treatment contribute substantially to disease progression.[8,9]

Conventional radiography remains the cornerstone of diagnosis, although radiographic changes may be absent during the early stages of the disease. For this reason, computed tomography and magnetic resonance imaging play an important role in the detection of calcifications and soft-tissue abnormalities, respectively.[2]

A high index of suspicion is essential in patients presenting with persistent pain, swelling, and chronic drainage. Delayed diagnosis results in more advanced disease and may also lead to financial burden and psychological distress. Biopsy of deep tissue specimens should be performed. Early diagnosis and antituberculous treatment for 9–18 months are essential to prevent joint involvement and other complications.[10]

It should be emphasized that diagnosis must be based on a combination of imaging findings and histopathological and microbiological analysis of biopsy specimens, as no single diagnostic gold standard has been established according to the literature reviewed.[11-13]

Casuriaga et al. stated that biopsy is the only method capable of definitively confirming the diagnosis. The absence of pathognomonic imaging findings further complicates diagnosis.[13]

The calcaneus is the most frequently affected bone in foot tuberculosis, possibly because it is the largest bone in the region and is particularly vulnerable to direct trauma. This finding is consistent with our case, although our patient also exhibited involvement of several other bones of the foot.[5,12,14]

Bains et al. reported an unusual case of a large cold abscess secondary to sternal tuberculosis. The patient was a 23-year-old immunocompetent Asian woman who presented with a painless, gradually enlarging swelling of the anterior chest wall that had been present for 5 months. The lesion measured 12.5 cm in diameter and was soft, non-tender, fluctuant, and without local warmth.[15]

The differential diagnosis includes rheumatoid arthritis, pyogenic osteomyelitis, tumors, sarcomas, and fungal osteomyelitis. Following imaging studies, we recommend confirmation of the diagnosis by bone biopsy, followed by appropriate treatment.[16] Tulli emphasized gradual ambulation with an appropriate orthosis beginning 3 months after initiation of treatment, with progressive discontinuation of the orthosis after 2 years.[17] Conde and Carvallo proposed surgical treatment consisting of debridement and placement of gentamicin-loaded cement because of the chronic nature of the disease. They also highlighted the lack of consensus regarding the treatment of calcaneal osteomyelitis.[18]

In our case, osseous tuberculosis did not present with the typical isolated calcaneal involvement commonly described in the foot, as multiple bones were affected. Considering the patient's clinical history and presenting manifestations, we obtained ankle and foot radiographs, computed tomography, and magnetic resonance imaging to exclude other possible diagnoses.

CONCLUSIONS

Because tuberculosis of the foot and ankle is an uncommon condition, early diagnosis and prompt initiation of appropriate treatment are essential to prevent complications. Delayed diagnosis may result in joint involvement and unfavorable outcomes. Furthermore, the complexity of this disease requires a multidisciplinary approach.

Conflicts of interest: The authors declare no conflicts of interest.

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