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(CASE REPORT)

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Diagnostic pitfalls in the imaging of talar aseptic osteonecrosis in children: Osteoarticular tuberculosis mimicking avascular necrosis of the talus: A case report

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Abstract

Background: Osteonecrosis-like radiological images of the talus are uncommon in children. When encountered, they should prompt a systematic search for an underlying aetiology, including osteoarticular tuberculosis (OAT), which remains the leading cause of talar osteolytic lesions in high-prevalence regions.

Case Presentation: We report the case of a 12-year-old girl with no significant past medical history who presented with a two-year history of antalgic gait and progressive right ankle swelling, associated with constitutional symptoms (low-grade fever and night sweats). Plain radiography revealed an osteolytic geode-like lesion of the talus without periosteal reaction; CT scan confirmed mirror-image osteolytic lesions of the talus and the distal tibia. Surgical exploration disclosed pus, caseous material and a destructive lesion at the talar neck. Histopathological analysis of bone biopsy specimens confirmed necrotising tuberculoid granulomatous inflammation. The patient completed nine months of standard anti-tuberculous therapy (RHZE/RH) with satisfactory clinical and radiological outcome.

Conclusion: Isolated talar tuberculosis is a rare but important differential diagnosis to consider in children presenting with chronic ankle pain and swelling in endemic settings. Awareness of its imaging similarities to avascular necrosis is essential to avoid delayed diagnosis and unnecessary procedures. Histopathological confirmation remains the gold standard for diagnosis, and early anti-tuberculous treatment leads to favourable functional outcomes.

Keywords: Talus; Osteoarticular Tuberculosis; Avascular Necrosis; Osteolytic Lesion; Paediatric; Case Report; Diagnostic Pitfalls

1. Introduction

Imaging features suggestive of aseptic osteonecrosis of the talus are uncommon in the paediatric population. When such an appearance is encountered, the clinician must systematically consider alternative aetiologies. In endemic countries, osteoarticular tuberculosis (OAT) caused by Mycobacterium tuberculosis — the Koch bacillus (BK) — represents the most frequent underlying cause of talar osteolytic lesions [1].

OAT accounts for approximately 3–5% of all tuberculosis cases and roughly 10–15% of extrapulmonary tuberculosis presentations, following genitourinary, lymph-node and pleural forms [2,3]. Although largely controlled in industrialised nations, OAT remains a significant public health burden in developing countries, where it occurs endemically [4].

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The insidious onset and non-specific clinical presentation of OAT frequently result in a diagnostic delay exceeding one year [5]. Isolated tuberculosis of the talus is particularly rare and its radiological mimicry of avascular necrosis (AVN), bone tumours or pyogenic osteomyelitis often impedes timely diagnosis [6,7].

We present a paediatric case of isolated talar OAT initially suspected to represent aseptic osteonecrosis, highlighting the diagnostic pitfalls and the critical role of surgical biopsy with histopathological analysis.

2. Case Presentation

A 12-year-old girl with no relevant past medical history was referred to our orthopaedic department for evaluation of a two-year history of progressive antalgic gait and swelling of the right ankle. The symptoms had evolved insidiously and were associated with low-grade fever and night sweats, suggesting a systemic inflammatory process.

On clinical examination, a painful swelling of the right ankle was noted, with overlying inflammatory signs and significant restriction of ankle range of motion. No lymphadenopathy or pulmonary signs were identified.

2.1. Imaging

Plain radiography of the right ankle revealed a geode-like osteolytic lesion of the talus without periosteal reaction — an appearance classically associated with aseptic osteonecrosis (Figure 1). Computed tomography (CT) confirmed the osteolytic lesion of the talus and additionally demonstrated a mirror-image osteolytic lesion involving the distal tibia (Figure 2), a finding highly suggestive of an infectious aetiology with transarticular spread.

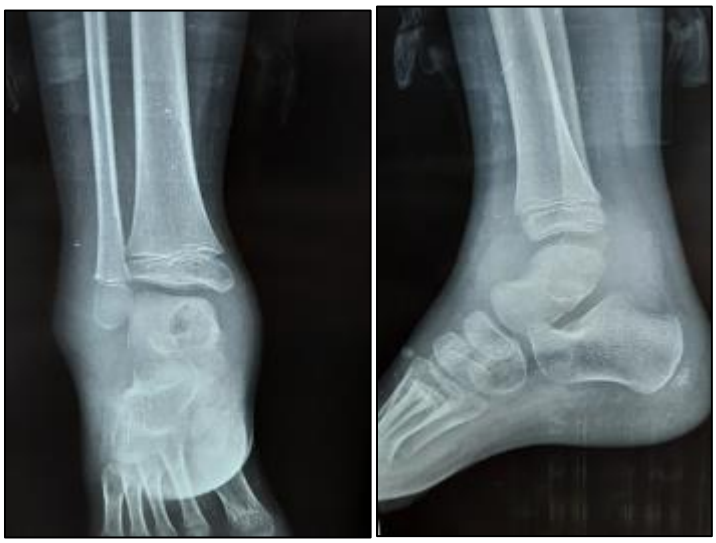

Figure 1 Plain anteroposterior and lateral radiographs of the right ankle demonstrating a geode-like osteolytic lesion of the talus without periosteal reaction, mimicking the appearance of aseptic osteonecrosis

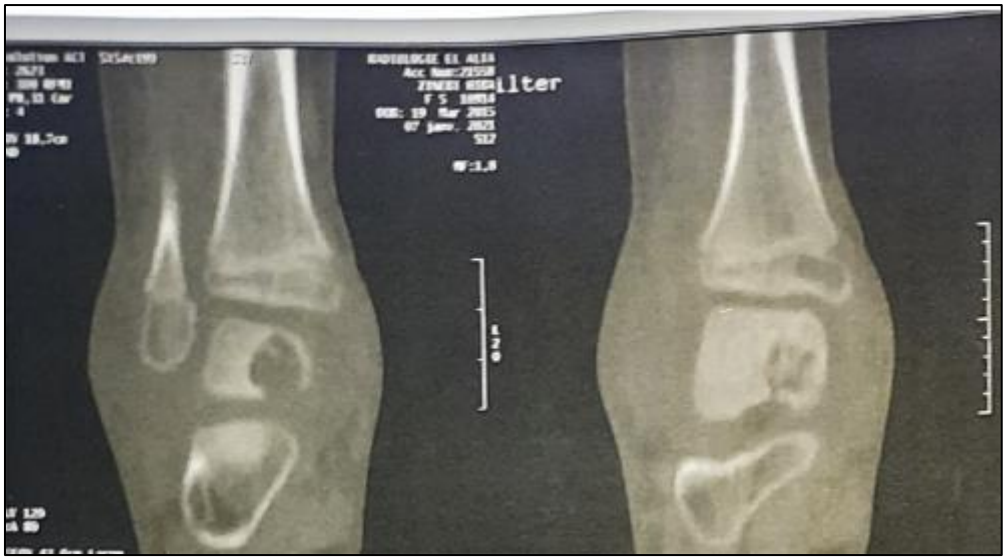

Figure 2 Computed tomography of the right ankle showing mirror-image osteolytic lesions involving the talus and the distal tibia, consistent with transarticular spread of infection

2.2. Surgical Exploration

Given the clinical and radiological findings, surgical exploration via an anterior approach was performed. Intraoperatively, the arthrotomy of the ankle joint revealed pus and caseous material alongside an osteolytic lesion at the neck of the talus. Bacteriological swabs and osseous biopsy specimens were obtained from the lesion and the joint capsule.

Postoperatively, the patient was managed with antibiotic coverage and immobilisation using a posterior splint. The postoperative course was uneventful.

2.3. Pathological Findings

Histopathological examination of the bone biopsy specimens demonstrated necrotising tuberculoid granulomatous inflammation, confirming the diagnosis of skeletal tuberculosis (Figure 3).

2.4. Treatment and Outcome

The patient was initiated on standard anti-tuberculous therapy with the four-drug regimen (Rifampicin–Isoniazid–Pyrazinamide–Ethambutol / RHZE) for two months, followed by a continuation phase (Rifampicin–Isoniazid / RH) for seven months, totalling nine months of treatment in accordance with national guidelines. Clinical resolution and progressive radiological improvement were documented at follow-up.

3. Discussion

Osteoarticular tuberculosis is defined by the pathological involvement of the skeletal and articular structures of the locomotor system by BK [1]. It represents a major diagnostic challenge owing to its protean clinical presentation, non-specific laboratory findings and imaging features that closely mimic other conditions, including AVN, bone tumours and pyogenic osteomyelitis [8,13].

Isolated involvement of the talus is exceedingly rare; talar tuberculosis constitutes a minor fraction of all OAT cases, and very few paediatric series have been published [6,9]. The predominant presenting features — antalgic gait, ankle swelling, low-grade fever and night sweats — are common to many infectious and inflammatory conditions, contributing to a mean diagnostic delay that frequently exceeds twelve months [5].

3.1. Imaging Features and Diagnostic Pitfalls

Plain radiography remains the first-line investigation for osseous and articular pathology. In tuberculous arthritis, the classic Phemister triad — comprising juxta-articular osteoporosis, peripheral osseous erosions and progressive narrowing of the joint space — is the hallmark radiological pattern [10,11]. However, at early stages, the radiograph

may only show epiphyseal hypertransparency or a soft-tissue shadow, and osteolytic lesions with ill-defined geode formation may closely resemble AVN, as observed in our patient [12].

CT provides superior bone detail, allowing characterisation of osteolysis, sclerosis, periostitis and sequestra, and crucially may reveal soft-tissue abscesses with calcifications — a feature highly evocative of a tuberculous aetiology [11]. The bilateral mirror-image osteolytic pattern identified in our patient on CT was an important clue pointing towards a transarticular infectious process rather than AVN.

MRI is the most sensitive modality for early OAT, demonstrating intraosseous extension, cortical integrity and extraosseous spread. Tuberculous osteomyelitis characteristically shows T1 hypointense and T2 hyperintense marrow oedema with gadolinium enhancement [12]. Technetium-99m bone scintigraphy may occasionally demonstrate a photopenic (cold) lesion corresponding to extensive osteolysis with caseous necrosis, rather than the expected hot spot [12,13].

3.2. Laboratory Investigations

Routine biological parameters have limited diagnostic value in OAT. Elevated erythrocyte sedimentation rate (ESR) is present in most cases, but is normal in 10–20% of patients [5]. C-reactive protein has been insufficiently studied, and a mild normocytic anaemia may be present. Synovial fluid analysis typically reveals a hypercellular exudate, with cell counts frequently exceeding 5000 cells/mm^3 [14].

Definitive diagnosis requires either bacteriological confirmation (culture of BK from biopsy or abscess aspirate) or histopathological evidence of caseating granulomatous inflammation. In published series, bacteriological confirmation is achieved in approximately 23–50% of cases, while histopathology remains positive in up to 77% [1,14].

3.3. Treatment

Standard first-line anti-tuberculous therapy in Morocco and most endemic countries comprises four drugs — Isoniazid (H), Rifampicin (R), Pyrazinamide (Z) and Ethambutol (E), with or without Streptomycin (S). The RHZE combination is administered for two months, followed by a seven-month RH maintenance phase, for a total duration of nine months for OAT [15].

Surgical intervention is reserved for cases with diagnostic uncertainty, cold abscess formation requiring drainage, neurological compromise, structural instability or failure of conservative management. In the present case, surgery served a dual diagnostic and therapeutic purpose, permitting direct tissue sampling and debridement [15].

Reported cure rates for correctly treated OAT exceed 90%, with recurrence rates of approximately 3% [16]. Functional sequelae, particularly articular stiffness, are noted in up to 68% of cases following tuberculous arthritis, and are significantly reduced when treatment is initiated at an early stage [16].

3.4. Prognosis

The prognosis of talar OAT in children is generally favourable when diagnosis is made promptly and appropriate chemotherapy is instituted. Growth disturbances, deformity and articular ankylosis represent the principal complications associated with diagnostic delay. Predisposing factors for relapse include malnutrition, diabetes mellitus, immunodeficiency, local trauma and surgical manipulation [5].

4. Conclusion

Talar osteolytic lesions in children may mimic aseptic osteonecrosis and constitute a diagnostic trap, particularly in tuberculosis-endemic regions. The present case illustrates the importance of maintaining a high index of suspicion for OAT when faced with a chronic monoarticular ankle presentation associated with constitutional symptoms, even in the absence of pulmonary involvement. CT imaging findings of mirror-image transarticular osteolysis should alert the clinician to an infectious process. Surgical biopsy with histopathological analysis remains the cornerstone of diagnosis, and early initiation of standard anti-tuberculous therapy is associated with satisfactory clinical and functional outcomes.

Compliance with ethical standards

Disclosure of conflict of interest

The authors declare no conflicts of interest.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

Statement of ethical approval

Ethical approval was not required for this case report in accordance with institutional guidelines.

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