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Chronic Osteomyelitis Mimicking Osteosarcoma in a Young Adult: The Role of Imaging

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Abstract | **Case Report**

We report the case of a 19-year-old patient admitted to the trauma department with an inflammatory swelling of the right knee that had been evolving for three months. The clinical context and the aggressive appearance of the bone lesion initially suggested an osteosarcoma. However, imaging studies — ultrasound, CT, and MRI — revealed features suggestive of chronic osteomyelitis. Blood work showed signs of inflammation. Cytobacteriological analysis of the aspirated pus was sterile but showed a hemopurulent aspect rich in neutrophils. The definitive diagnosis of active chronic osteomyelitis was confirmed by bone biopsy. The patient was treated medically with a favorable outcome. This case highlights the importance of an integrated clinical and radiological approach to distinguish bone infections from malignant tumors, thereby avoiding inappropriate treatment.

Keywords: Osteomyelitis, Ultrasound, CT, MRI, Bone Tumors, Osteosarcoma.

INTRODUCTION

Osteomyelitis (OM) is defined as an infection of the bone marrow and adjacent osseous structures, potentially extending into the surrounding soft tissues [1].

Chronic osteomyelitis presents with various imaging features and can, in some cases, mimic a malignant bone tumor, particularly osteosarcoma, both clinically and radiologically. The differential diagnosis can be challenging and requires a multimodal approach. We present an illustrative case in a young adult, with a complete imaging workup.

CLINICAL CASE

A 19-year-old male patient, with no significant medical history, originating from a rural area with chronic exposure to wood smoke, poultry, and livestock, presented to the trauma department with a painful swelling of the right knee that had been evolving for three months, without any history of trauma. Clinical examination revealed a mass on the anterior aspect of the leg, red, warm, and painful, without any cutaneous fistula.

Initial blood tests showed moderate leukocytosis at 11,000/mm³ and a markedly elevated C-reactive protein (CRP) level at 100 mg/L, indicating a biological inflammatory syndrome.

On the standard radiograph (Fig1), a lytic lesion with a moth-eaten appearance and poorly defined borders was observed in the metaphysis and proximal diaphysis of the tibia, associated with areas of heterogeneous density. An irregular periosteal thickening was also present adjacent to the lesion, along with soft tissue densifications in the surrounding area. These radiographic signs are characteristic but non-specific, making it difficult to differentiate between osteomyelitis and osteosarcoma. Due to this uncertainty, additional imaging studies were performed to refine the diagnosis and guide the management plan.

Figure 1: Standard radiograph of the lateral view of the tibia: lytic lesion with a moth-eaten appearance and poorly defined borders in the metaphysis and proximal diaphysis.

Ultrasound of the soft tissues of the right leg revealed a relatively well-defined, anechoic collection containing fine internal echoes, with no vascularization on color Doppler. It was located on the anterior aspect of the junction between the upper and middle third of the right leg, suggesting a localized suppurative process.

Bone CT scan (fig 2) showed a moth-eaten osteolytic process involving the epiphysis, metaphysis, and proximal diaphysis of the right tibia. This process extended into the bone marrow and contained multiple fat globules. Cortical remodeling with cortical breaches was noted, along with dense intralesional bone fragments corresponding to bone sequestra. A discontinuous, lamellar periosteal reaction was also observed, with early centromedullary ossification.

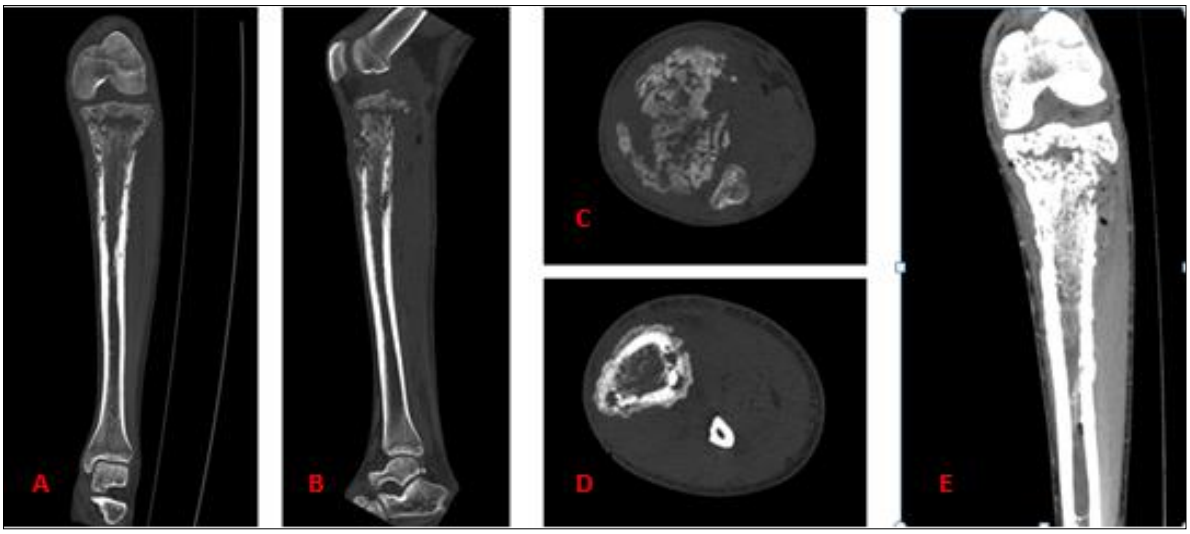

Figure 2: CT scan of the right leg in coronal (A), sagittal (B), and axial (C and D) slices using bone window, and coronal slice (E) using soft tissue window, demonstrating a moth-eaten osteolytic process involving the epiphysis, metaphysis, and proximal diaphysis of the right tibia. The lesion extends into the bone marrow and contains multiple fat globules. Cortical remodeling with breaches is noted, along with dense intralesional bone fragments corresponding to bone sequestra

MRI (Fig 3) revealed a centromedullary lesion involving the epiphyseal, metaphyseal, and proximal diaphyseal regions of the right tibia. The lesion appeared heterogeneously hypointense on T1-weighted sequences, and heterogeneously hyperintense on T2 and STIR sequences, with heterogeneous enhancement after gadolinium injection. There was also infiltration of the adjacent soft tissues, containing fat globules, which oriented the diagnosis toward chronic osteomyelitis, although the overall appearance could initially suggest a malignant tumor.

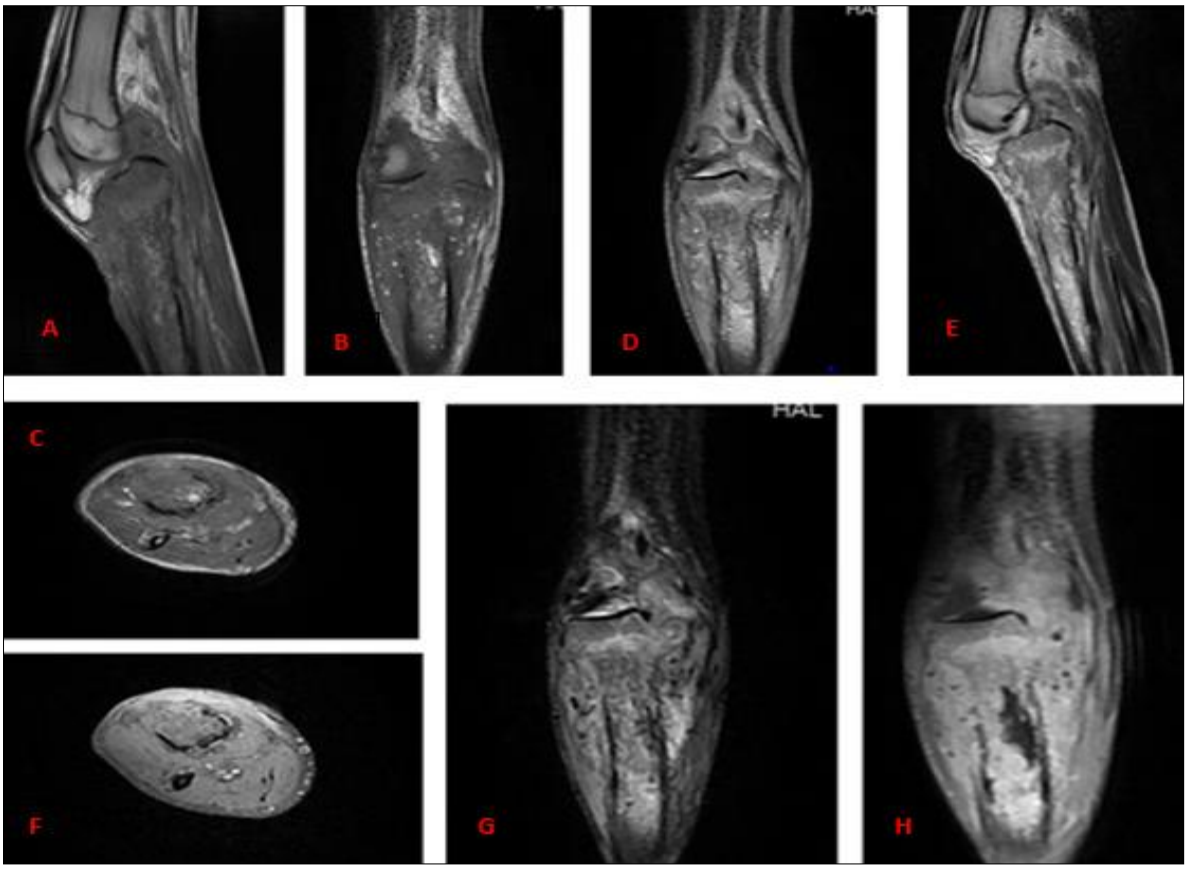

Figure 3: MRI of the right leg — sagittal (A), coronal (B), and axial (C) slices on T1-weighted sequence; coronal (D) and sagittal (E) slices on T2-weighted sequence; axial T1 FAT SAT (F); coronal STIR (G); and post-contrast T1 (H). These images demonstrate a centromedullary lesion involving the epiphyseal, metaphyseal, and proximal diaphyseal regions of the right tibia, appearing heterogeneously hypointense on T1-weighted sequences, heterogeneously hyperintense on T2 and STIR sequences, with heterogeneous enhancement after gadolinium administration

Cytobacteriological analysis of a pus sample revealed a hemopurulent fluid rich in neutrophils, with a culture that remained sterile.

Finally, a bone biopsy confirmed the diagnosis of active chronic osteomyelitis.

The patient was started on oral antibiotic therapy with ciprofloxacin 500 mg (1 tablet/day) for a duration of 3 months. The clinical course was favorable, with progressive regression of pain and swelling, and good functional recovery.

DISCUSSION

Osteomyelitis is an inflammatory infection of bone tissue that may involve the bone marrow, cortical bone, and surrounding soft tissues. It can be classified as acute or chronic depending on the duration and response to treatment. In adolescents and young adults, hematogenous osteomyelitis is the most common form, typically affecting long bones, particularly the metaphyseal regions due to their rich vascular supply [1-13]. *Staphylococcus aureus* is the most frequently implicated pathogen, although other organisms such as *Streptococcus spp.*, Gram-negative bacilli, or anaerobes may be involved, especially in post-traumatic or post-surgical cases [8-14].

Clinically, chronic osteomyelitis may present with persistent bone pain, localized swelling, and sometimes redness or warmth, with or without systemic symptoms. Fever is often absent in indolent forms. The lack of overt infectious signs and the aggressive imaging appearance may mimic malignant bone tumors such as osteosarcoma, complicating the diagnosis [7-13].

It is important to note that inflammatory biomarkers such as elevated CRP and leukocytosis, while indicative of an infectious etiology, cannot solely exclude a malignant tumor. In our case, the sterile culture of pus could be explained by the presence of fastidious organisms or prior antibiotic administration [14].

Chronic osteomyelitis and some malignant bone tumor, such as osteosarcoma can have similar clinical and radiological features. As a result, the differential diagnosis is often challenging, especially in adolescents and young adults. In our case, the clinical presentation initially suggested osteosarcoma. However, the radiological findings were more indicative of chronic osteomyelitis.

Radiologically, several elements are characteristic of chronic osteomyelitis:

- Sequestra: Necrotic fragments of devitalized bone that appear as dense areas on radiographs and hypointense on all MRI sequences. Their presence is a distinctive sign in favor of chronic osteomyelitis [7-12].
- Involucrum: Formation of new periosteal bone surrounding the sequestrum, visible as cortical thickening on CT scans and conventional radiographs [3-5].
- Cloaca: A cortical breach allowing pus drainage into the soft tissues, visible on MRI as a cortical interruption associated with hyperintense signal on fluid-sensitive sequences [4, 5].
- Lamellar periosteal reaction: Although common in malignant tumors such as osteosarcoma, it is also observed in chronic infections. However, in this context, it is often more irregular and discontinuous [2-9].

MRI is the imaging modality of choice for assessing the extent of the infection, detecting intraosseous abscesses, fistulous tracts, and differentiating infectious lesions from tumor lesions. The "penumbra sign," which refers to a thin layer of granulation tissue surrounding an abscess cavity, is particularly suggestive of subacute osteomyelitis and constitutes a relevant differential criterion against bone tumors [2-10].

Bone biopsy remains the gold standard for diagnosis. It allows for in-depth histological and microbiological analysis, essential in cases of doubt, to avoid inappropriate treatment, such as unnecessary chemotherapy in the case of misdiagnosis as bone neoplasia [8-15].

The treatment of chronic osteomyelitis typically involves a combination of targeted antibiotic therapy, ideally initiated after microbiological identification, and in some cases, surgical intervention to debride necrotic tissue or remove sequestra [8-14]. Antibiotics may be administered orally or intravenously for a prolonged duration, generally ranging from 6 weeks to several months, depending on the severity and clinical response [13].

The prognosis is favorable in most cases when diagnosis is timely and management is appropriate. However, delayed or inadequate treatment can lead to complications such as sequestrum formation, chronic fistulas, recurrence, or permanent joint damage [8-15]. In our case, the response to medical treatment alone was favorable, illustrating that an accurate diagnosis based on imaging and confirmed by biopsy can prevent unnecessary invasive procedures or inappropriate treatments such as chemotherapy in cases misdiagnosed as bone tumors.

CONCLUSION

Chronic osteomyelitis can mimic a malignant bone tumor, particularly osteosarcoma, both clinically and radiologically. This similarity can lead to a diagnostic delay and inappropriate management if certain suggestive radiological signs, such as sequestra, intralesional fat globules, and discontinuous periosteal reaction, are not considered [7-12].

Close correlation between imaging data, clinical context, and biological results is crucial for guiding the diagnosis. Bone biopsy remains the key element for establishing the definitive diagnosis and initiating appropriate therapy. A better understanding of these atypical presentations can help avoid unnecessary treatments, especially in younger population [8-16].

BIBLIOGRAPHY

1. Julie D, Magdalena P, Filip M.V. The many faces of osteomyelitis: A pictorial review. Journal of the Belgian Society of Radiology, 2017; 10.5334/jbr-btr.1300
2. Marti-Bonmati L, Aparici-Robles F. The “penumbra sign” on T1-weighted MR imaging in subacute osteomyelitis: frequency, diagnostic specificity and differential diagnosis. Eur Radiol. 1998;8(5):796–800.
3. Pineda C, Espinosa R, Pena A. Radiographic imaging in osteomyelitis: the role of plain radiography, computed tomography, ultrasonography, magnetic resonance imaging, and scintigraphy. Semin Plast Surg. 2009;23(2):80–9.
4. Cloaca (osteomyelitis) | Radiopaedia.org. https://radiopaedia.org/articles/cloaca-osteomyelitis-1
5. Involucrum | Radiopaedia.org. https://radiopaedia.org/articles/involucrum
6. Kamath S, Kattapuram SV. MR imaging of musculoskeletal infections. Radiol Clin North Am. 2001;39(2):277–300.
7. Wouters C, De Maeseneer M, Vanhoenacker F, De Mey J, Parizel PM. The many faces of osteomyelitis: a pictorial review. J Belg Soc Radiol. 2017;101(Suppl 2):1–18.
8. Lew DP, Waldvogel FA. Osteomyelitis. Lancet. 2004;364(9431):369–79.
9. Osteomyelitis | Radiopaedia.org. https://radiopaedia.org/articles/osteomyelitis
10. Lee YJ, Sadigh S, Mankad K, Kapse N, Rajeswaran G. The imaging of osteomyelitis. Br J Radiol. 2016;89(1061):20150902.
11. Greenspan A, Norman A, Swischuk LE, et al. Bacterial osteomyelitis: findings on plain radiography, CT, MR, and scintigraphy. AJR Am J Roentgenol. 1991;157(2):365–70.
12. Chronic osteomyelitis | Radiopaedia.org. https://radiopaedia.org/articles/chronic-osteomyelitis-1

13. Dormans JP, Drummond DS. Pediatric hematogenous osteomyelitis: new trends in presentation, diagnosis, and treatment. J Am Acad Orthop Surg. 1994;2(6):333–41.
14. Osteomyelitis - Adult - Trauma - Orthobullets. https://www.orthobullets.com/trauma/1057/osteomyelitis--adult
15. Pineda C, Vargas A, Rodríguez AV. Imaging of osteomyelitis: current concepts. Infect Dis Clin North Am. 2006;20(4):789–825.
16. Chronic Osteomyelitis | Radiology | University of Utah. https://medicine.utah.edu/radiology/education/msk-ref/osteomyelitis/chronic