

Acute Osteomyelitis with Subperiosteal Abscess

Osteomielite Aguda com Abscesso Subperiosteal

Ana Sofia Alves^{1*}, Sandra Sousa²

***Autor Correspondente/Corresponding Author:**

Ana Sofia Alves [sofiafalves92@gmail.com]

Hospital de São José, Centro Hospitalar Lisboa Central

R. José António Serrano, 1150-199 Lisbon, Portugal

ORCID ID: <https://orcid.org/0000-0001-6213-9540>

doi: 10.48687/ljsj.135

Keywords: Abscess; Child; Osteomyelitis/diagnosis imaging; Periosteum; Streptococcal Infections

Palavras-chave: Abscesso; Criança; Infecções Estreptocócicas; Osteomielite/diagnóstico por imagem; Periosteó

A 15-year-old boy presented to the emergency department with a two-day history of progressive right knee pain, fever, and chills. The pain was localized in the popliteal fossa and distal third of the thigh, impairing the gait due to its severity. There was no history of trauma or arthritis. Physical examination revealed a tender right knee, and there was pain with range of motion. There was no erythema or rash. The auricular temperature was 38.3°C.

His blood tests revealed elevated white blood cell count ($16.79 \times 10^9 / L$; normal range 3.90 - 9.90) with neutrophilia and high levels of C-reactive protein (21.23 mg/dL; normal < 0.50).

The initial lateral radiograph of the right knee showed no abnormalities (Fig. 1).

Blood cultures grew *Staphylococcus aureus*.

A magnetic resonance imaging (MRI) of the right knee and thigh revealed diffuse bone marrow signal changes in the distal femoral shaft, with several irregular foci of serpiginous contour with peripheral enhancement, likely related to acute osteomyelitis. There was also a large heterogeneous subperiosteal fluid collection around the distal end of the femoral

diaphysis, more evident in the posterior aspect, measuring 75 x 37 x 17 mm with fat-fluid levels (Figs. 2 and 3). After contrast administration, a peripheral enhancement was detected, compatible with a subperiosteal abscess (Fig. 4). There was marked surrounding soft tissue swelling and enhancement, consistent with cellulitis. There was also a small amount of intra-articular fluid with linear enhancement, compatible with mild synovitis, thought to be reactive to the infectious process. No changes in the distal epiphyseal region or the proximal two-thirds of the femur were observed.

The patient was successfully treated with surgical drainage of the purulent collection and antibiotic therapy based on the antibiogram result.

Hematogenous osteomyelitis is the most common type of osteomyelitis in children, usually caused by *Staphylococcus aureus*.¹ This usually affects the fastest-growing bones that have highly vascularized metaphyses such as the distal femur, proximal tibia, and proximal humerus.² An infection can spread into the subperiosteal space through the porous metaphyseal cortex. In children, the periosteum is loosely attached and can be separated easily from the underlying bone by pus, allowing a subperiosteal abscess to develop.^{1,3} The spread of a

1. Radiology Department, Centro Hospitalar Universitário de Lisboa Central, Lisbon, Portugal. **2.** Radiology Department, Hospital Lusíadas Lisboa, Lisbon, Portugal.

Recebido/Received: 16/11/2022 – **Aceite/Accepted:** 17/11/2022 – **Publicado online/Published online:** 30/12/2022 – **Publicado/Published:** 30/12/2022

© Author(s) (or their employer(s)) and Lusíadas Scientific Journal 2022. Re-use permitted under CC BY-NC. No commercial re-use.

© Autor (es) (ou seu (s) empregador (es)) e Lusíadas Scientific Journal 2022. Reutilização permitida de acordo com CC BY-NC. Nenhuma reutilização comercial. huma reutilização comercial.

subperiosteal abscess is contained by the perichondrium at the periphery of the physis, where the fibrous periosteum and the bone cortex meet in a tight junction to form a "V" at the vertex (Figs. 2 and 4).³ As a first-line modality, the plain radiograph is useful for excluding other differential diagnoses; however, its sensibility to detect early osteomyelitis is low.^{3,4} MRI can accurately detect and depict the extent of the disease as well as associated complications. On MRI, infected bone marrow is characterized by high signal intensity on fluid-sensitive sequences, and low signal intensity on T1W images, sometimes with interspersed foci of preserved marrow fat. Gadolinium can help to improve the diagnosis of an abscess, in order to plan the approach to its aspiration and drainage.^{1,4}



Figure 1. Lateral radiograph of the right knee demonstrates no effusion and no focal osseous abnormalities.

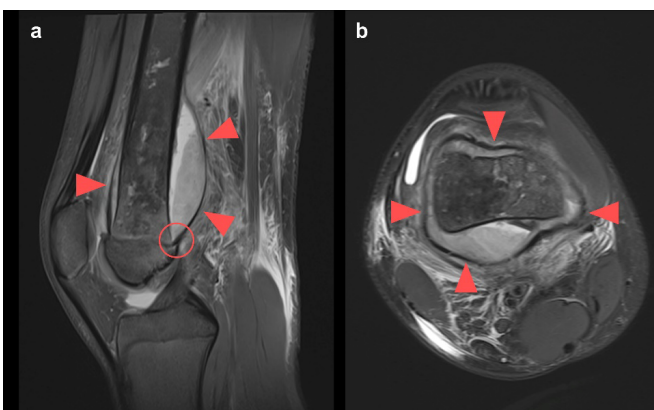


Figure 2. MRI of the right knee - sagittal (a) and axial (b) T2-weighted images with fat suppression. There is increased serpiginous signal intensity in the distal femoral marrow primarily involving the metaphysis. The periosteum is separated from the bone by a subperiosteal abscess (orange arrowheads). This abscess extends to the perichondrium, where the elevated periosteum and underlying bone meet, resulting in a "V" configuration (orange circle). There is associated edema of the surrounding tissues.

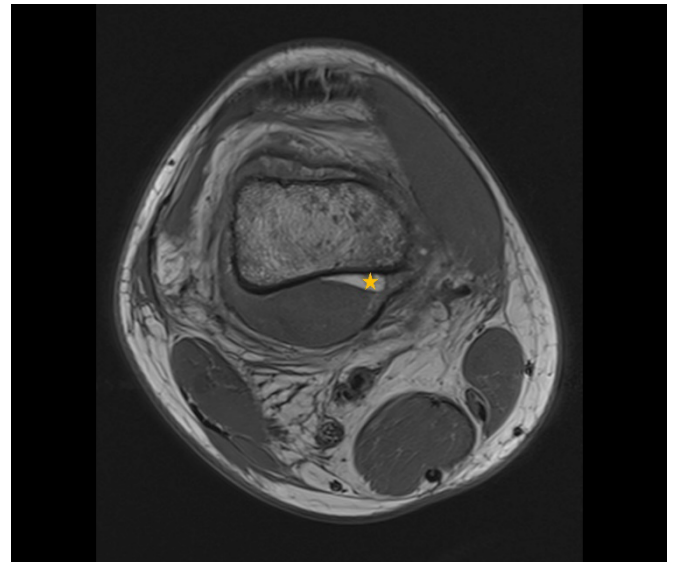


Figure 3. MRI of the right knee - axial T1-weighted images without fat suppression. The subperiosteal fluid collection shows a fat-fluid level. The anterior fatty component (yellow star) has high signal intensity, equal to subcutaneous fat.

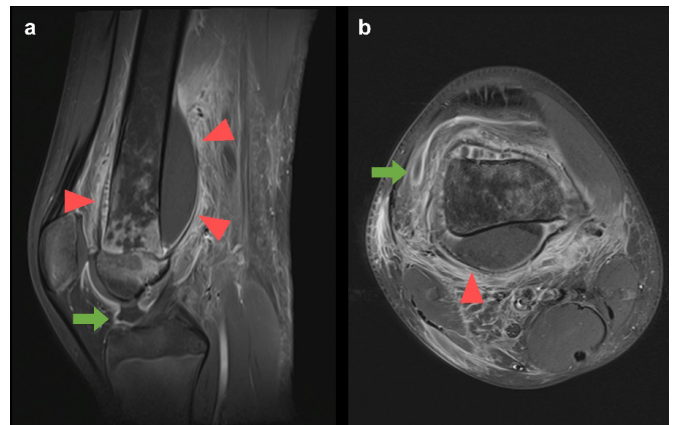


Figure 4. MRI of the right knee - sagittal (a) and axial (b) T1-weighted fat-suppressed images post gadolinium. There is heterogeneous bone marrow enhancement throughout the femur and a rim-enhancing subperiosteal abscess (orange arrowheads), more expressive posteriorly, without central enhancement. Also, high signal intensity in the surrounding soft tissues is present, related to cellulitis. There is also a small effusion with mild synovitis, reactive to the infectious process (green arrow).

Responsabilidades Éticas

Conflitos de Interesse: Os autores declaram a inexistência de conflitos de interesse na realização do presente trabalho.

Fontes de Financiamento: Não existiram fontes externas de financiamento para a realização deste artigo.

Confidencialidade dos Dados: Os autores declaram ter seguido os protocolos da sua instituição acerca da publicação dos dados de doentes.

Consentimento: Consentimento do doente para publicação obtido.

Proveniência e Revisão por Pares: Não comissionado; revisão externa por pares.

Ethical Disclosures

Conflicts of Interest: The authors have no conflicts of interest to declare.

Financing Support: This work has not received any contribution, grant or scholarship.

Confidentiality of Data: The authors declare that they have followed the protocols of their work center on the publication of data from patients.

Patient Consent: Consent for publication was obtained.

Provenance and Peer Review: Not commissioned; externally peer reviewed.

Declaração de Contribuição

AA: Revisão da literatura e elaboração do manuscrito

SS: Autoria dos exames de imagem e revisão crítica do manuscrito

Contributorship Statement

AA: Literature review and manuscript preparation

SS: Authorship of imaging exams and critical review of the manuscript

References

1. Jaramillo D. Infection: musculoskeletal. *Pediatr Radiol.* 2011;41 Suppl 1:S127-S134. doi:10.1007/s00247-011-2001-y
2. Pugmire BS, Shailam R, Gee MS. Role of MRI in the diagnosis and treatment of osteomyelitis in pediatric patients. *World J Radiol.* 2014;6:530-7. doi:10.4329/wjr.v6.i8.530
3. Jaramillo D, Dormans JP, Delgado J, Laor T, St Geme JW 3rd. Hematogenous osteomyelitis in infants and children: imaging of a changing disease. *Radiology.* 2017;283:629-43. doi:10.1148/radiol.2017151929
4. Weaver JS, Omar IM, Mar WA, Klauser AS, Winegar BA, Mlady GW, et al. Magnetic resonance imaging of musculoskeletal infections. *Pol J Radiol.* 2022;87:e141-e162. doi: 10.5114/pjr.2022.113825.