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SCIENTIFIC ARTICLE - CASE REPORT

OSTEOMYELITIS OF THE DISTAL FIBULA IN A NINE-YEAR-OLD CHILD: A CASE REPORT

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ABSTRACT

Osteoarticular infections, such as acute hematogenous osteomyelitis, are among the diseases in Pediatric Orthopedics that needs faster diagnostic responses and immediate treatment. Acute hematogenous osteomyelitis is a severe, invasive bone infection that can cause reckless harm to the patient if not promptly treated. This study aimed to report the case of a child with acute hematogenous osteomyelitis in an unusual place, in the left distal fibula, addressing diagnostic flow, effective treatment, and appropriate cynical support. This study highlights the need for clinical suspicion for a quick and accurate diagnosis by the pediatrician, and the correct surgical therapy performed by the orthopedist, in order to avoid sequelae, being a relevant topic in medical education.

Keywords: Acute haematogenous osteomyelitis, Bone infection, Bone fistula, Devitalized bone tissue, Orthopaedics, Paediatrics

INTRODUCTION

Orthopedics has had a close relationship with Pediatrics since its inception. In the mid-18th century, the French physician Nicolas Andry defined it as “the art of correcting bodily deformities in children,” with the term’s etymology deriving from the Greek orthós (straight) + paidós (child) + the suffix -ia[1]. It was only at the end of the 19th century that this term was extended to encompass the study and treatment of musculoskeletal diseases at all ages.[1]

Among the various diseases in Pediatric Orthopedics, osteoarticular infections are among those that require the fastest diagnostic response and immediate, precise treatment.[2] In this context, acute hematogenous osteomyelitis stands out. Its annual incidence ranges from 1:5,000 to 1:10,000 children, affecting those between 3 and 14 years old. It is more prevalent among Black individuals and economically disadvantaged populations, occurring approximately three times more frequently in boys than in girls[3]. Patients with some form of immunosuppression or sickle cell disease are more prone to developing osteomyelitis, with the latter group being particularly susceptible due to vascular obstruction, leading to infarction and bone necrosis.[4]

Acute hematogenous osteomyelitis is defined as a severe, invasive bone infection, usually bacterial, that occurs after the pathogen spreads through the bloodstream. If not promptly treated, it can cause serious and permanent damage to the patient.[5] The disease's pathophysiology involves bacterial invasion of the bone, triggering a local inflammatory response, bone destruction, and abscess formation, which compromises vascularization and hinders antimicrobial access to the infection site.[5] In some cases, distant infectious foci are detected. However, in many instances, no apparent sources of contamination are identified that could lead to acute hematogenous osteomyelitis. The most commonly affected sites are the distal metaphysis of the femur and the proximal tibia, adjacent to the knee joint. Less frequently affected bones include those of the feet, hands, radius, clavicle, and fibula.[6]

The duration of disease progression is not the most important factor in classifying osteomyelitis as acute, subacute, or chronic; rather, its pathophysiology is fundamental to defining the condition.[2] Acute osteomyelitis is primarily characterized by the presence of systemic symptoms. Subacute osteomyelitis occurs when there is a balance in the parasite-host relationship, with minimal or absent clinical manifestations. Chronic osteomyelitis develops when there is bone necrosis (sequestrum formation), and its hallmark clinical feature is a cutaneous bone fistula.[2] Laboratory tests only show findings consistent with an infectious process in cases of acute osteomyelitis.[2]

The information in this study was obtained through a review of the medical record, an interview with the patient, photographic documentation of clinical progression, and a literature review.

The literature review was conducted in March and April 2024 through searches in the Medical Literature Analysis and Retrieval System Online (MEDLINE via PubMed®) and consultations of the following theoretical books: Sizínio Hebert – Ortopedia e Traumatologia: Princípios e Prática, 5th edition, Artmed, 2017; and Tachdjian's Pediatric Orthopaedics: From the Texas Scottish Rite Hospital for Children, 6th edition, Elsevier, 2021.

OBJECTIVE

To report the case of a child with acute hematogenous osteomyelitis in an uncommon location—the distal left fibula—focusing on the diagnostic process, effective treatment, and appropriate clinical support.

CASE REPORT

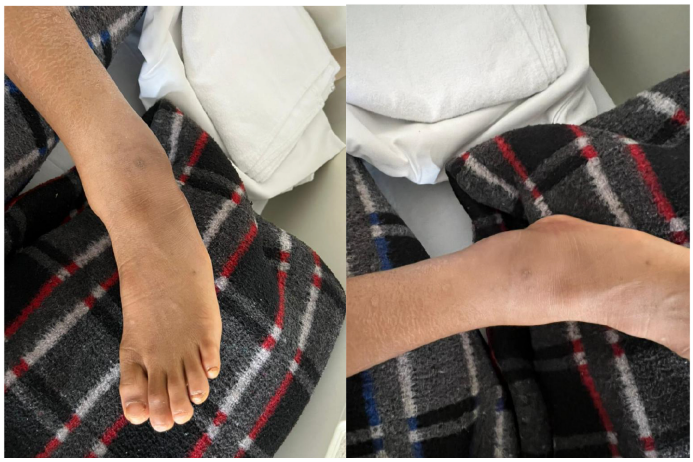
Endometriosis LRS, a 9-year-old male, was admitted to the Hospital das Clínicas at the Federal University of Goiás (HC-UFG) with a history of a left ankle sprain 20 days prior, for which he had been using an immobilizing splint since then. Fifteen days before admission, he developed a fever that partially improved with the use of simple analgesics, with daily fever spikes, significant pain in the left ankle, local edema and erythema, as well as poor appetite and fatigue. He had used amoxicillin for 3 days and cephalexin for 4 days without clinical improvement. Urination and bowel movements were present and normal, with no other signs or symptoms in the clinical history.

Initially, the diagnosis of infectious cellulitis was assumed. However, on the fourth day of hospitalization (and the fourth day of antibiotic treatment with oxacillin), the child developed a rupture of a blister on the left lateral malleolus, with drainage of serosanguineous and purulent secretion, worsening of edema in the left foot and ankle, as well as a significant deterioration in general condition, including limping and the inability to place the left foot on the ground.

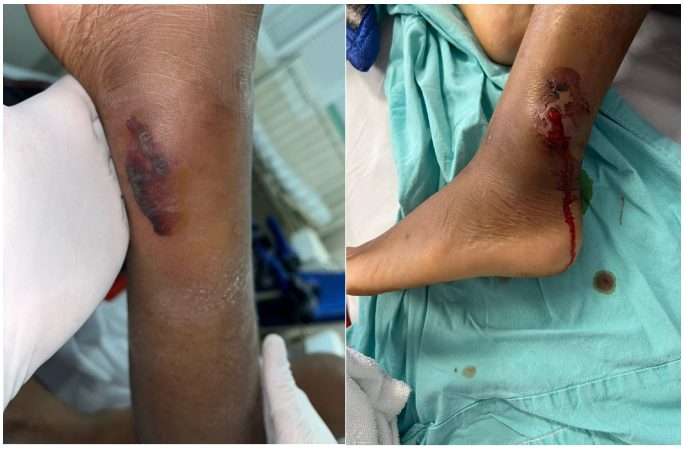
On physical examination, the child was in fair general condition, pale, hydrated, acyanotic,

febrile, and breathing normally in ambient air. Cardiac and pulmonary auscultation showed no abnormalities, and the abdominal and neurological exams were unremarkable. The left lower limb presented with edema, erythema, and a ruptured blister in the area of the left lateral malleolus.

PROGRESSION ON PHYSICAL EXAMINATION:

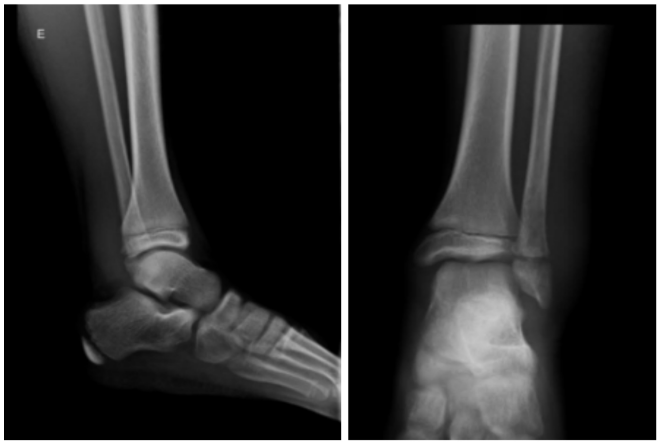


Figures 1 and 2: Appearance of the left ankle on the first day of hospitalization, with local edema and erythema.

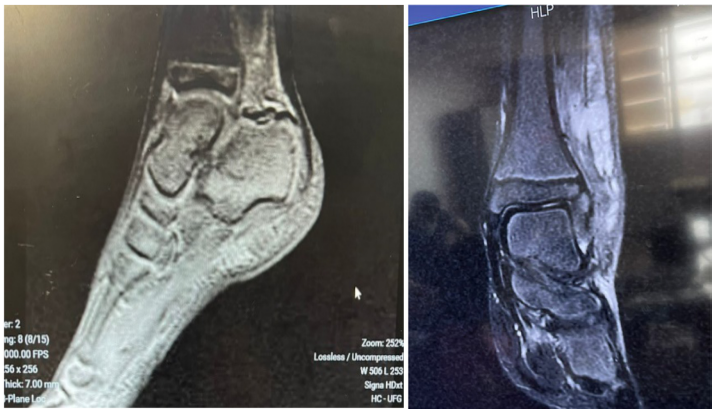


Figures 3 and 4: Appearance of the left ankle on the fourth day of hospitalization, showing a blister on the left lateral malleolus with drainage of serosanguineous and purulent secretion; and worsening of edema in the foot and ankle.

X-rays and magnetic resonance imaging (MRI) of the left foot and ankle were requested and performed, as shown in the following figures.



Figures 4 and 5: X-ray of the tibio-tarsal joint on the first day of hospitalization.



Figures 6 and 7: Magnetic resonance imaging (MRI) of the left lower limb, showing nonspecific signs

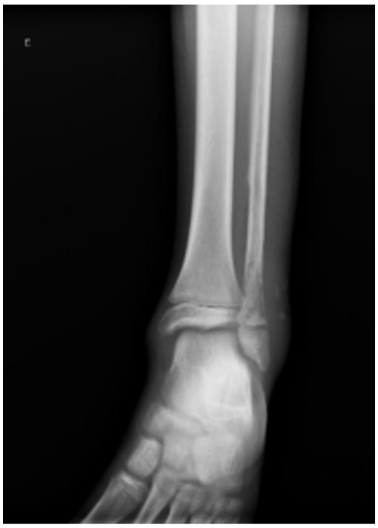
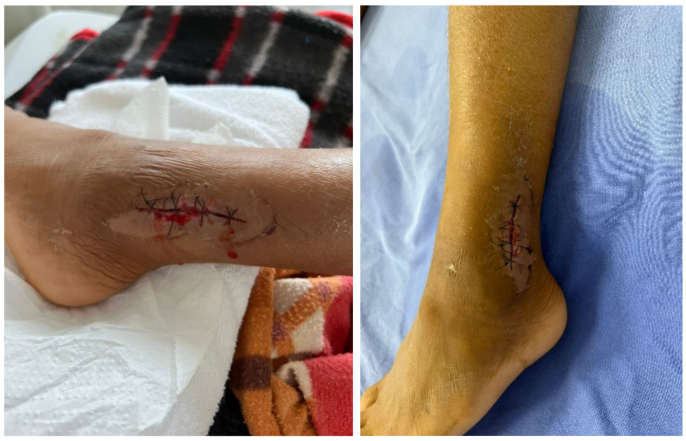


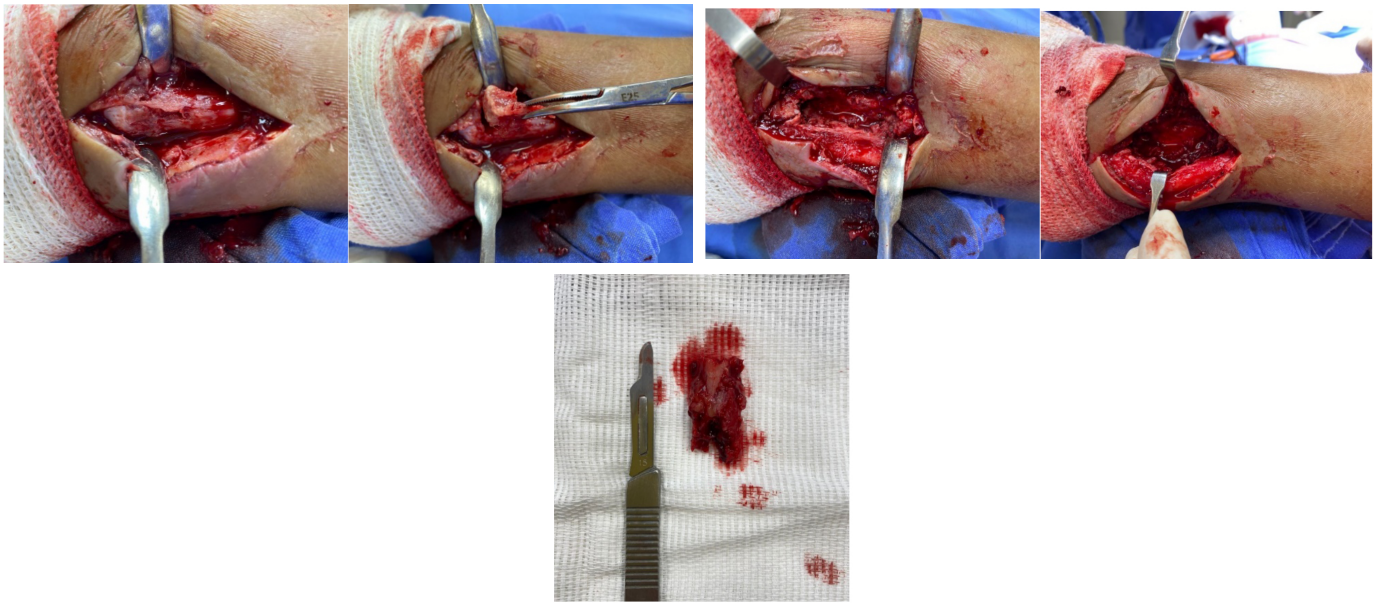
Figure 8: X-ray of the left ankle after twenty days of clinical progression, already showing signs of bone rarefaction in the left fibula.

The patient underwent initial surgical intervention, with the removal of a bone fragment for culture, which yielded the following results: Acid-fast bacilli (AFB) negative; fungal culture negative; bacterioscopy: Gram-positive cocci in pairs with a positive culture for Staphylococcus aureus resistant to penicillin and sensitive to oxacillin. Intravenous antibiotic therapy was continued. However, the patient continued to experience significant pain in the left ankle, daily fever, and secretion from the surgical wound, showing no considerable clinical improvement.



Figures 9 and 10: Appearance of the surgical wound after the first surgical procedure.

Three days later, the child was taken back to the operating room, now with a diagnosis of acute osteomyelitis. This time, the child underwent sequestrum removal, diaphysectomy, and extensive lavage with saline solution, presenting a clinical picture compatible with Chronic Osteomyelitis Cyerny Mader 4A.



Figures 11, 12, 13, 14, and 15: Intraoperative photos (second surgical procedure) showing the removal of the necrotic bone fragment.

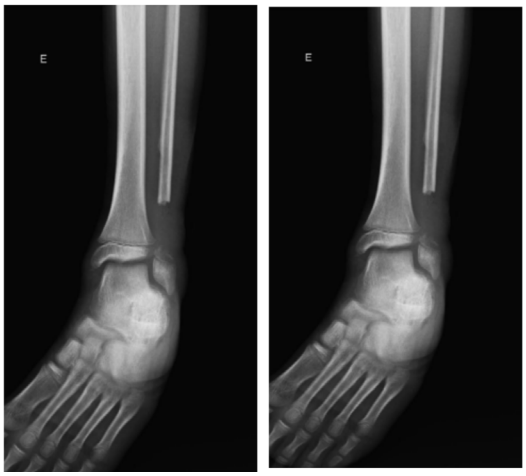


Figure 16: Immediate postoperative X-ray (second surgical procedure) of the left tibio-tarsal joint showing bone defect due to the removal of the necrotic bone fragment.

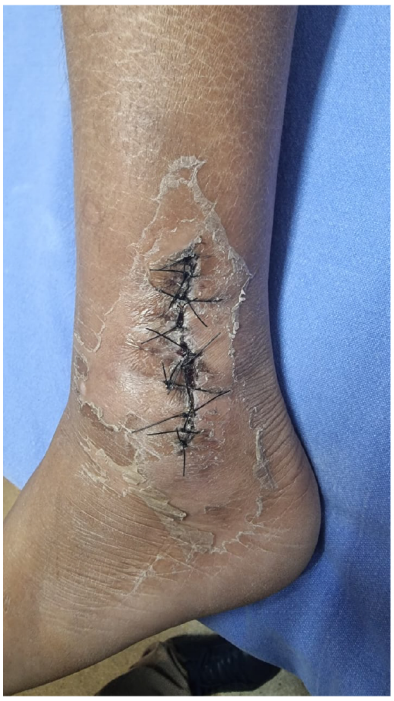


Figure 17: Appearance of the surgical wound after the second surgical procedure.

After the second surgical intervention, which involved extensive lavage, sequestrum removal, and diaphysectomy of the left fibula, the patient showed significant clinical improvement. The fever subsided, there was no further drainage of purulent secretion, and the local pain resolved. The patient was discharged on the second postoperative day, with a prescription for oral cephalexin for seven days and a referral for an outpatient follow-up appointment in seven days for medical

reevaluation. During hospitalization, the patient received twelve days of intravenous antibiotic therapy with oxacillin and continued with oral cephalexin for an additional seven days at home, totaling nineteen days of antibiotic treatment.

The child continued with outpatient clinical follow-up at HC-UFG. One month after the second surgical procedure, radiographic imaging showed bone growth at the site of the bone defect in the left fibula, resulting from the second surgical procedure.

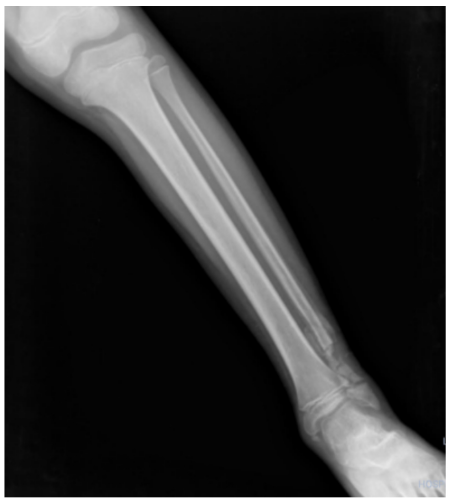


Figure 18: X-ray of the left fibula 30 days postoperatively (second surgical procedure), showing new bone formation at the site of the previous defect.

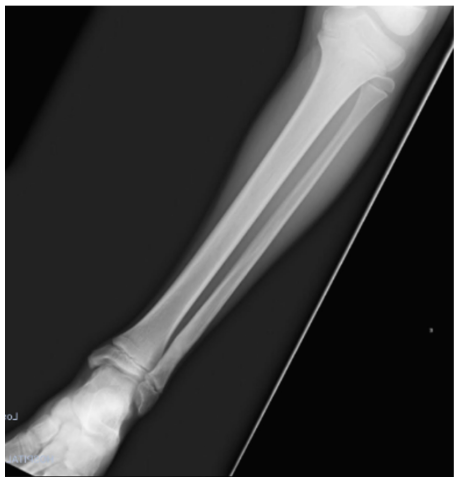


Figure 19: X-ray of the left fibula one year postoperatively (second surgical procedure), showing complete filling of the previous defect with new bone tissue.

DISCUSSION

Acute hematogenous osteomyelitis is an infection that primarily affects the bone metaphysis, a region that contains a growth zone and is therefore more vascularized2. When the aggressor pathogen settles in the metaphysis, it triggers local inflammation, with the formation of exudate and interstitial

infiltration, increasing local pressure and causing ischemia, followed by bone necrosis. The pus infiltrates the periosteum, and without surgical drainage, it separates the periosteum, causing further tissue necrosis, which can lead to an external fistula and result in a necrotic bone fragment, known as a sequestrum.[2]

Most osteomyelitis cases are caused by Staphylococcus aureus (the etiological agent in 90% of acute hematogenous osteomyelitis cases), followed by group B streptococci, enterococci, pneumococci, gonococci, salmonella, pseudomonas, and more recently, Kingella kingae.[2] The diagnosis is primarily clinical. The patient presents with significant and progressive pain, functional limitation, edema, erythema, and local hyperthermia.[6] The "one finger point" sign, which refers to intense pain upon palpation of the bone metaphysis during a physical examination, is crucial. When positive, it indicates the need for bone aspiration in a surgical center. The presence of pus during the aspiration confirms the diagnosis and requires the surgical removal of all necrotic bone material and vigorous lavage with physiological saline solution.[6]

In the reported case, the patient's diagnosis was delayed due to the request for imaging exams, such as MRI, which is not a routine or necessary diagnostic test. A simple X-ray, a low-cost and quick examination that is easier to perform, initially reveals only nonspecific signs and takes about ten to fourteen days to show early osteomyelitis changes, such as bone rarefaction in the metaphyseal region2. It is known that acute hematogenous osteomyelitis is among the diagnoses that require rapid and immediate treatment initiation.[2] Therefore, whenever there is suspicion of this disease, the patient should be hospitalized, undergo bone aspiration and surgical removal of necrotic tissues, along with culture and histopathological analysis of the removed material, intravenous antibiotic therapy, and clinical and nutritional support with a pediatrician.[2]

The positive culture of the bone fragment plays an important role in clinical management, as it is relevant for defining the appropriate antibiotic therapy to be used. The histopathological examination should be performed to rule out the differential diagnosis of Ewing's tumor. It is a primary bone tumor with high lethality, and children and adolescents of the male sex are the most likely population to develop it.[7] Therefore, in the presence of bone pain, local swelling, hyperemia, and radiological images revealing subperiosteal bone reaction, it is essential to rule out the possibility of Ewing's tumor with a biopsy.

With delayed appropriate treatment, recurrence or reactivation of the infectious process may occur, potentially leading to bacteremia and even death.[2] Typically, after the surgical removal of the affected bone fragment, antibiotic therapy is maintained for four to six weeks. If the child shows good clinical progress, oral antibiotic therapy should be initiated, with outpatient follow-up.[2]

Patients with delayed treatment may also develop sequelae resulting from injuries to the growth plate.[6] Damage to the growth plate can lead to angular deformities such as varus, valgus, antecurvatum, and recurvatum. It can also result in bone shortening and subsequent limb length discrepancy.[6] In the clinical case presented in this study, the patient had some delay in the initial diagnosis, presented a picture compatible with Chronic Osteomyelitis Cyerny Mader 4A, but had an excellent clinical evolution without sequelae.

Hematogenous acute osteomyelitis is, therefore, a disease of childhood, and often children with osteomyelitis symptoms present to the pediatric emergency department for their first consultation. This highlights the great importance of pediatricians mastering the clinical presentation, pathophysiology, diagnostic flow, and treatment of this condition.

CONCLUSION

The reported case and the publications cited in this work highlight the discussion on the necessity of clinical suspicion for a quick and accurate diagnosis by the pediatrician, as well as the proper surgical therapy carried out by the orthopedic surgeon. It is the pediatrician who often receives the child, raises the diagnostic suspicion, requests joint follow-up with the orthopedic team, and provides the necessary clinical support for the patient. The goal is to prevent acute hematogenous osteomyelitis from progressing to chronic osteomyelitis, leaving physical sequelae and compromising the child's or adolescent's academic, social, and athletic life due to a long-term chronic infection. Preventing this outcome is a joint effort of pediatrics and orthopedics, and it needs to be widely disseminated and studied during medical training.

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