



## Case report

## Subacute osteomyelitis of the tibial diaphysis associated with Brodie's abscess: A rare case report of a four-year-old child

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## ARTICLE INFO

## Keywords:

Subacute osteomyelitis

Pediatric

Brodie's abscess

Tibial diaphyseal osteomyelitis

## ABSTRACT

**Introduction:** Septic osteomyelitis is a hematogenous bacterial bone infection. The acute presentation is the most common; the subacute one is less frequent. The aim of our case report is to put forward the features of this uncommon presentation and to propose a therapeutic management.

**Presentation of case:** We report a rare case of subacute osteomyelitis associated with Brodie's abscess of the tibial diaphysis in a four-year-old child. The chief complaint was a pain in the left tibia evolving for five weeks. The radiological findings and the unusual location of this pathology suggested a malignant bone tumor. Thanks to imaging assessment and bone biopsy the diagnosis of subacute osteomyelitis associated with Brodie's abscess was made. Therefore, the child had antibiotic therapy and plaster immobilization to avoid pathological fracture. Pain relief and radiological improvement was obtained after 3 months of antibiotic treatment. At a two-year follow-up, the X-ray was normal.

**Discussion:** We report an uncommon case of subacute osteomyelitis which evolved to Brodie's abscess with diaphyseal location. The mainstream treatment is surgery combined with antibiotics. However, medical treatment alone can lead to recovery without sequelae.

**Conclusion:** Because of the atypical location and presentation of subacute osteomyelitis, the other differential diagnoses, especially malignant bone tumors have to be eliminated. In some cases, treatment may be based on antibiotics therapy alone.

### 1. Introduction

Subacute osteomyelitis may have deceptive features which can delay the diagnosis. Whereas metaphyseal localization is the most frequent, the involvement of diaphysis is still rare. Moreover, the association between Brodie's abscess and subacute osteomyelitis is seldom. The aim of this case report is to highlight the radiological aspect of this presentation and its therapeutic management.

This topic has been reported online with the SCARE criteria and the following paper:

Agha RA, Franchi T, Sohrabi C, Mathew G, Kerwan A; SCARE Group. The SCARE 2020 Guideline: Updating Consensus Surgical CAse REport (SCARE) Guidelines Int J Surg. 2020;84:226-230 [1].

### 2. Case report

We report the case of a four-year-old child who was presented to the pediatric orthopedic emergency department for inflammatory pain of

the left leg middle third. This symptomatology has been evolving for five weeks and there was no history of trauma. The child has no medical nor surgical history, nor trauma nor open fracture nor an infectious episode nor sickle cell disease. The patient had a good overall health but (38.1 °C) with slight inflammatory signs of the skin and a transfixing bone pain at palpation of the middle third of the tibial diaphysis. The homolateral knee and hip had normal full painless range of motion and there was no evidence of infectious disease. The spine assessment was strictly normal. At the vascular examination, distal pulses were present, and there were no trophic skin abnormalities. The white blood-cell count = 8400 elements/ml, the erythrocyte sedimentation rate = 40 mm at the 1st hour and the C-reactive protein = 8.5 mg/dl. The X-ray of the leg (Fig. 1) showed rounded, regular, and intramedullary bone lysis with cortical condensation obstructing the medulla. Ultrasound showed edematous infiltration of the soft tissue without periosteal abscess. Bone T<sup>99</sup> scintigraphy showed an intense hyper fixation of the middle third of the tibial diaphysis at the tissue time. At bone time, it showed an intense early and late tibial hyper fixation without other secondary localization.

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<https://doi.org/10.1016/j.ijscr.2021.106453>

Received 29 August 2021; Received in revised form 22 September 2021; Accepted 24 September 2021

Available online 28 September 2021

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**Fig. 1.** X-ray showing osteocondensation (arrows) and regular bone lysis (asterisk) of the middle third of tibial diaphysis.

MRI revealed an intramedullary collection with a pluri-lamellar periosteal reaction and soft tissue infiltration (Fig. 2). A surgical bone biopsy of the tibia confirmed the diagnosis of subacute osteomyelitis. Pathologists have reported chronic inflammation rich in plasma cells and lymphocytes as well as neutrophils. The Culture of the biopsy product was negative. The patient had enteral antibiotics Amoxicillin-Clavulanic Acid 3 g per day for three months and immobilization of the limb in a cast for 6 weeks. The clinical evolution was good with a pain relief one week after the treatment onset. At a two-year follow-up, the X-ray showed no abnormalities, disappearance of the bone lesion with permeabilization of the medullary canal (Fig. 3).

### 3. Discussion

Subacute osteomyelitis is an infectious bone disease which origin is almost exclusively bacterial [2]. It affects children and adolescents through hematogenous contamination [3]. Its prevalence is higher in low- and middle-income countries [4]. It is accepted that a well-active immune system can identify the bone source of infection and transform acute osteomyelitis into subacute. Subacute osteomyelitis is characterized by a diagnostic delay which can reach two months because the clinical [5,6], laboratory and radiological signs are nonspecific and can be normal without modification during the first week [5,7]. The constant sign is bone pain. Typically, nocturnal inflammatory type, but it

can have all aspects. The fever is inconstant, it doesn't exceed 38.8 °C. The skin inflammatory signs have late onset. Diaphyseal localization is rare, and this fact constitutes another element favoring the delay in diagnosis. All accessible bones should be palpated, and a complete clinical examination performed to not miss another location. Biology remains normal for a long time or at the limit of normal. Only erythrocyte sedimentation rate is accelerated at first, and then comes C-reactive protein and white blood-cell count. A normal X-ray should bring the physician to suspect the diagnosis of subacute osteomyelitis. The blood culture is seldom positive. The scintigraphy makes it possible to objectify the bone fixation and to determine the number of foci. It is sensitive but not specific. MRI is the mainstream further examination. It shows early important findings before the appearance of radiological signs, sometimes with 100% certainty, to objectify an intraosseous collection called the Brodie's abscess and eliminate a malignant tumor [8,9]. Subacute diaphyseal osteomyelitis has received less attention in the literature than the other forms [10]. In subacute osteomyelitis, a Brodie's abscess may develop, which is an intra-osseous abscess that is typically seen in young adults [11]. If there is still a doubt, a bone biopsy is necessary to confirm the diagnosis. In diaphyseal lesions with a periosteal reaction a core of bone should be taken which includes periosteum, cortex and medullary contents [10]. The histological features of chronic pyogenic infection characterized by inflammatory cells, plasma cells and polymorphonuclear leukocytes were seen in all specimens [10,12]. It is necessary to eliminate differential diagnoses such as osteosarcoma and Ewing's sarcoma, the most common primary malignant bone tumors in children and adolescents. The other differential diagnoses are bone infarction, vaso-occlusive crises in sickle cell disease, benign bone cysts, tuberculosis [9], osteoid osteoma and eosinophilic granuloma [13]. The bacteriological investigation is often negative [14]. Blood cultures, culture of the biopsy sample and the removal of fluid from Brodie's abscess do not isolate a germ [14].

The treatment consists of two important fields: one medical and the other orthopedic. The medical treatment consists of empiric antibiotic therapy adjusted to the antibiogram [4]. It depends on the dominant bacterial spectrum in each country. Concerning the diaphysis location, antibiotics duration varies from 3 to 12 months. Orthopedic treatment consists in immobilizing the limb for 6 weeks to avoid pathological fractures in a bone weakened by the infection [4,10,15,16].

### 4. Conclusion

We presented an unusual case of subacute osteomyelitis with Brodie's abscess of the tibial diaphysis due to diagnostic delay. These results deserve to be taken into consideration by attending clinicians and radiologists for the management of atypical bone pain in children and adolescents.

### Ethical approval

N/a

### Sources of funding

None.

### CRediT authorship contribution statement

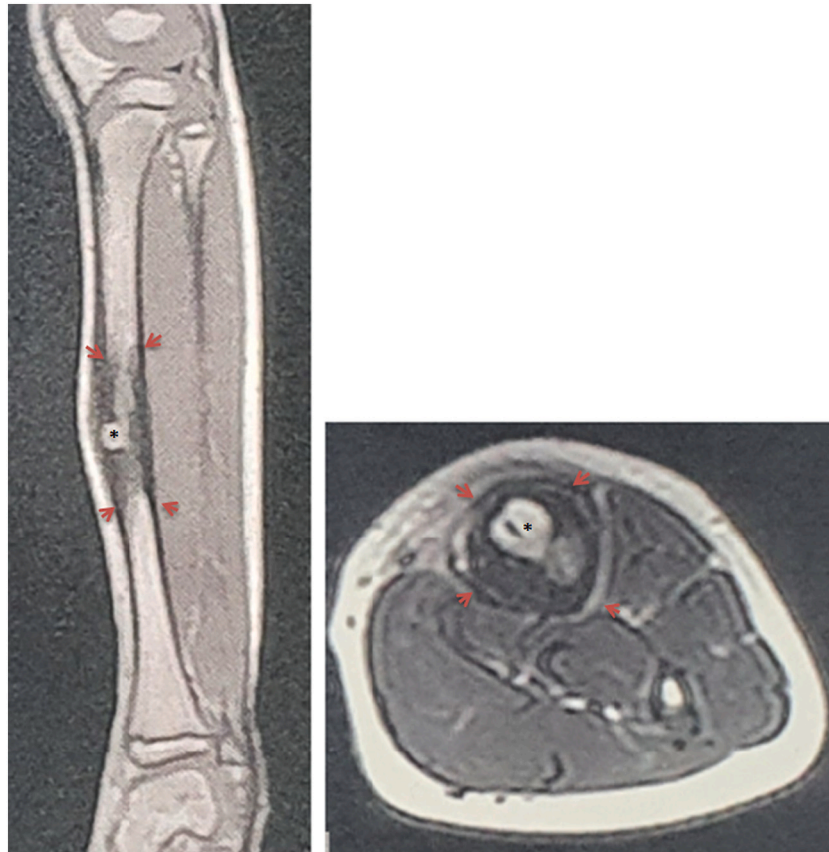
\* Mohamed Zairi: Writing drafting the article, Conception and Design

\* Rim Boussetta: Revising it critically for important intellectual content

\* Ahmed Msakni: Revising it critically for important intellectual content

\* Ahmed Amin Mohseni: Supervision

\* Mohamed Nabil Nessib: Final approval of the version to be



**Fig. 2.** Brodie's abscess on MRI: Heterogeneous signal from the medulla of the middle third of the tibial shaft accompanied by thickening of the cortex and infiltration of soft tissues (arrows). Intramedullary oval formation enhancing after injection of Gadolinium (asterisk).



**Fig. 3.** X-ray showing disappearance of bone lesions with repermeabilization of the tibial canal.

published

#### Guarantor

Mohamed Zairi

#### Research registration (for case reports detailing a new surgical technique or new equipment/technology)

N/a

#### Data availability

All data is available to readers.

#### Provenance and peer review

Not commissioned, externally peer-reviewed.

#### Consent

Written informed consent was obtained from the patient's parent for publication of this case report and accompanying images.

#### Declaration of competing interest

None.

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