Brodie's Abscess in a 14-Year-old Boy. A Case Report

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Abstract

We describe an adolescent boy who presented with insidious complaints of pain and swelling of the ankle and was subsequently diagnosed with Brodie's abscess of the distal tibia. From the literature we describe the prevalence, aetiology and management of this type of subacute osteomyelitis presenting as a bone abscess. The usual presentation is pain and swelling without fever and an insidious onset with elevation of C-reactive protein and other serum markers of inflammation in only a minority of patients. We aim to raise awareness of this subtle presentation, which is often associated with a significant delay in diagnosis.

Introduction

Brodie's abscess was first described by Sir Benjamin Collins Brodie in 1832 as a specific and rare form of subacute osteomyelitis, that presents as a collection of pus, usually affecting the metaphysis of long bones, most commonly the tibia (48.6%) followed by the femur (31.1%) (1, 2). It is more common in children and young adults and presents in an insidious manner (2-4). Pain is the most commonly reported presenting symptom (98%), followed by swelling (53%). Fever was reported in only 16% of the cases and serum markers of inflammation were mostly normal or slightly elevated (2-4). Staphylococcus aureus is by far the most common pathogen found (65%), however in 25% of the cases cultures remained negative (2). A systematic review showed an average time to diagnosis of 12 weeks (2). In the literature, possible aetiologies are often either not described or unclear, yet a history of minor trauma has been described in 25 out of 56 cases (2). Haematogenous spread appears to be the main cause of infection but is often difficult to prove due to the long delay in diagnosis (2). The diagnosis of Brodie abscess is confirmed by radiological imaging with X-ray, computed tomography (CT) or magnetic resonance imaging (MRI) and perioperative cultures (2-4). Surgery remains the cornerstone of the treatment and is usually followed by a prolonged course of antibiotics.. The outcome is usually favourable but is poorly documented in the literature.

Case report

A 14-year-old boy presented to the emergency department with a 1-week history of right ankle pain and swelling. There was no clear history of trauma, no local wounds or systemic symptoms.

Initial biochemistry revealed a mildly elevated C-reactive protein (CRP) of 32 mg/L [N≤5.0 mg/L]. Ultrasound showed extensive periarticular inflammation around the right ankle with a limited amount of intra-articular fluid. Treatment with systemic non-steroidal anti-inflammatory drugs (NSAIDs) was started for 2 weeks with a presumptive diagnosis of arthritis. During follow-up the patient had a maximum temperature of 38.0°C and a complete resolution of his symptoms was observed under the initiated therapy.

Figure 1: FMRI scan of the Brodie abscess in the right distal tibia with surrounding oedema and penetration of the growth plate.

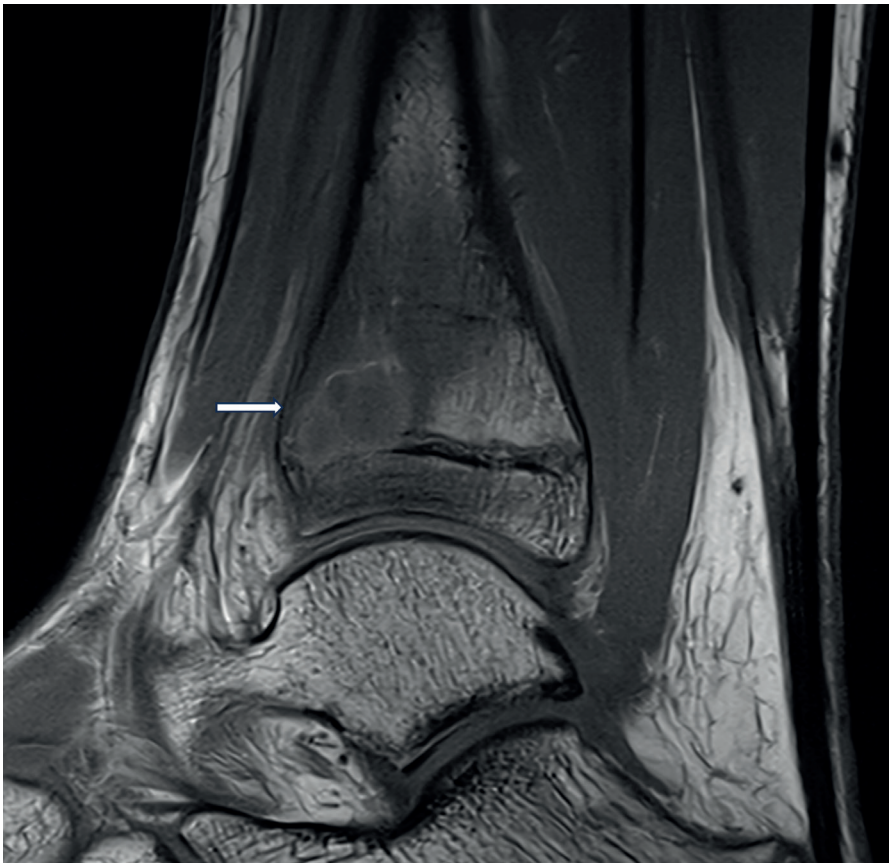
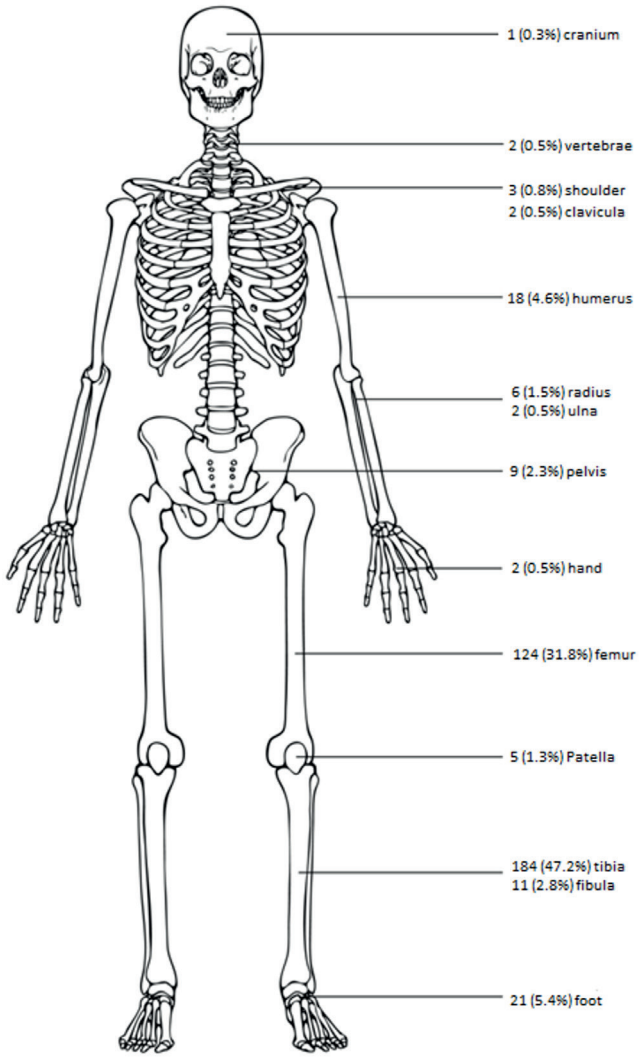


Figure 2: Brodie's abscess localisation reported in literature.



However, after discontinuation of the treatment, his symptoms rapidly returned. Following reassessment by the general practitioner, an MRI of the ankle was ordered. This confirmed the presence of a bone abscess in the right distal tibia with surrounding bone oedema, with extension into the growth plate and oedematous infiltration of the surrounding soft tissues (Figure 1). This confirmed the diagnosis of a Brodie abscess, for which elective surgical debridement was planned. After obtaining cultures, empirical antibiotic treatment was started with intravenous flucloxacillin. Perioperative cultures became positive for *S. aureus.* After 72 hours, treatment was switched to oral flucloxacillin and continued for 4 weeks. Given the patient's age, current height and the location in the distal tibia, the chances of a significant leg length difference were expected to be minimal.

Discussion

Epidemiology

Van der Naald et al. found that a Brodie abscess is more common in males (male: female ratio 2.1:1) with a median age of presentation of 17 years (2).

Aetiology

Brodie's abscess is usually defined as a collection of pus in bone after suspected haematogenous spread of bacteria, without a history of open trauma or surgery (2). As mentioned above, case reports have described recent minor trauma, leading to the hypothesis that bruising may increase the susceptibility of the affected bone to infection (2).

Diagnosis

As mentioned above, Brodie's abscess can be easily misdiagnosed due to its insidious onset with absent or mild systemic symptoms. Therefore, in the setting of atraumatic limb pain in children, clinicians should maintain a high index of suspicion. Rapid and accurate imaging is needed to avoid a major delay in diagnosis, with its possible complications (2, 3, 5). Therefore, in the setting of atraumatic limb pain in children, clinicians should maintain a high index of suspicion. Conventional radiography remains the most commonly used examination due to its high and easy availability (2). The lesion typically presents as a well-demarcated radiolucent lesion predominantly in the metaphysis of a long bone (Figure 2) (5). However, one has to be aware that it can take 10 to 21 days for an osseous lesion to become visible on conventional radiography, making it a poor diagnostic tool in the early stages of infection (5). In the case of an atypical presentation, diagnosis in the early stages or in difficult anatomical locations, CT-scans and/or MRI are required. MRI remains the most sensitive technique to evaluate Brodie's abscess, especially to differentiate this pathology from bone tumours (2, 5). T1-weighted images show a lower signal intensity than fatty bone marrow. CT scan is superior to conventional radiography and MR imaging for the detection of sequestra (5).

Treatment

The cornerstone of Brodie abscess treatment is surgical intervention (2, 6). The primary objective of debridement is to remove all infected and necrotic tissue, which is crucial for effective infection control and bone healing. Current practice recommends thorough surgical exploration and debridement before starting antibiotic therapy, so that cultures can be obtained for subsequent targeted antibiotic treatment.

Although there are reports for surgical treatment alone, the administration of antibiotics is often critical to the management of the bacterial infection (2). Empirical antibiotic therapy should be initiated based on the most frequently associated pathogens: *S. aureus*, methicillin-resistant *S. aureus* (MRSA), *Salmonella* spp., *Kingella kingae* and *Pseudomonas* spp. After obtaining cultures and antimicrobial susceptibility, antibiotic therapy should be tailored to the specific pathogen. However, in 25.6% of the cases no pathogen can be identified (Figure 3) (2). In these cases, PCR detection of *K. Kingae* cab be an additional diagnostic tool. Slinger et al. have already demonstrated its effectiveness in cases of septic arthritis with negative cultures (7).

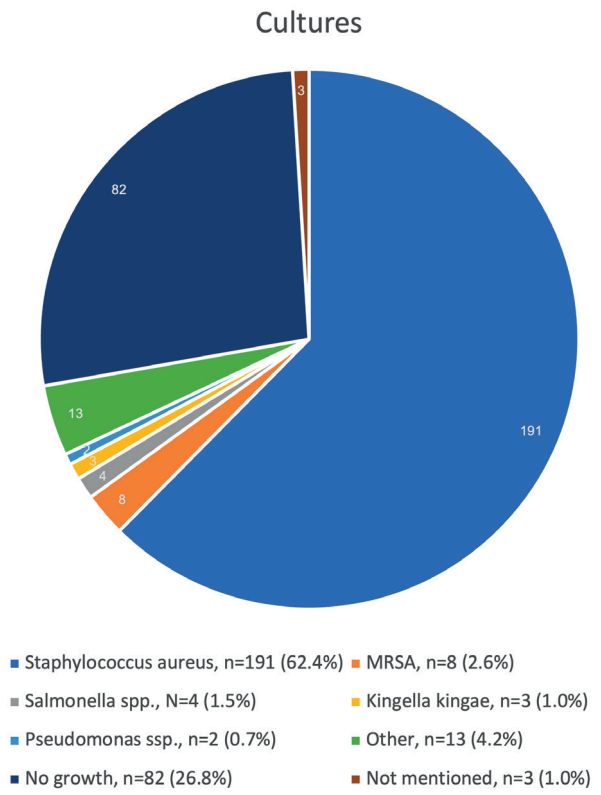
The optimal duration of antibiotic therapy for chronic osteomyelitis is poorly studied (2, 8). The available literature shows a wide range of duration of therapy, usually between 4 and 6 weeks, but one study even described a patient treated with antibiotics for over 2 years (6, 9). Intravenous versus oral antibiotic treatment of bone infections also remains a matter of debate. The duration of intravenous treatment for bone infections has shortened significantly over the years, and this does not seem to affect the rate of disease remission in case of susceptible pathogens (8). Further research is needed, yet for now, a personalised approach guided by clinical response and ongoing assessment is essential to optimize antibiotic therapy.

Follow up and prognosis

Follow-up visits are usually scheduled every few weeks to assess the healing process and any persistent symptoms, such as pain or swelling (2, 3). Conventional x-rays can be used for regular follow-up to assess the decreasing size of the bone lesion. CT or MRI scans can be used if indicated (5).

Overall a Brodie abscess has a very good prognosis but it can lead to several complications if not managed effectively.. These may include

Figure 3: Microbiological results of cultures from Brodie's abscess reported in literature.



chronic pain and mobility issues as the abscess can damage surrounding bone and soft tissue, or in some cases limb length discrepancy due to growth plate lesions (2).

Conclusion

In this case, the diagnosis of a Brodie abscess was made within 3.5 weeks of initial presentation, despite mild symptoms, through a rapid MRI analysis. The patient had an excellent recovery with no residual symptoms after surgery and tailored antibiotic treatment.

Take home message: as paediatricians we are familiar with the presentation of acute arthritis and osteomyelitis. However, this case highlights the need to consider the possibility of Brodie's abscess or subacute osteomyelitis in a child/adolescent presenting with atraumatic limb pain and subtle clinical symptoms, as a high index of suspicion is needed for diagnosis. Further research is needed, particularly regarding the optimal antibiotic treatment options.

The authors have no conflict of interest to declare.

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