

Subacute Haematogenous Osteomyelitis of the Calcaneus in a Child: A Case Report and Review of the Literature

W Talbot

Citation

W Talbot. *Subacute Haematogenous Osteomyelitis of the Calcaneus in a Child: A Case Report and Review of the Literature*. The Internet Journal of Orthopedic Surgery. 2012 Volume 19 Number 3.

Abstract

Osteomyelitis is an inflammation of bone caused by a pyogenic organism. Osteomyelitis of the calcaneus in children is an uncommon diagnosis, particularly when haematogenous in nature and not caused by direct inoculation.⁹ Historically haematogenous osteomyelitis has been characterized as acute, subacute or chronic with each type based on the time of disease onset.⁷ Subacute haematogenous osteomyelitis is characterized by mild localized bony pain and tenderness usually of more than two weeks duration, mild or no systemic manifestations, noncontributory lab data, negative blood cultures, and positive radiological findings.⁵ Prior reports and studies have found that children with calcaneal osteomyelitis can be a diagnostic challenge because of the unimpressive signs and symptoms and often marginal lab results.⁶ This is made even more difficult when subacute in presentation and associated with a traumatic injury. Therefore we present a case of subacute haematogenous osteomyelitis of the calcaneus with an associated minor traumatic injury, and a review of the literature

INTRODUCTION

Osteomyelitis is an inflammation of bone caused by a pyogenic organism. Osteomyelitis of the calcaneus in children is an uncommon diagnosis, particularly when haematogenous in nature and not caused by direct inoculation.⁹ Historically haematogenous osteomyelitis has been characterized as acute, subacute or chronic with each type based on the time of disease onset.⁷ Subacute haematogenous osteomyelitis is characterized by mild localized bony pain and tenderness usually of more than two weeks duration, mild or no systemic manifestations, noncontributory lab data, negative blood cultures, and positive radiological findings.⁵ Prior reports and studies have found that children with calcaneal osteomyelitis can be a diagnostic challenge because of the unimpressive signs and symptoms and often marginal lab results.⁶ This is made even more difficult when subacute in presentation and associated with a traumatic injury. Therefore we present a case of subacute haematogenous osteomyelitis of the calcaneus with an associated minor traumatic injury, and a review of the literature.

CASE REPORT

A 10 year old male presented to the emergency department with a painful right ankle one week after sustaining an injury whilst playing sport. The child had been reluctant to weight

bear due to pain and had a decreased range of motion of his ankle. The diagnosis of ankle sprain was made and the child was discharged from the emergency department with crutches and advised to rest and ice the ankle. Four days later the child represented with increasing pain and ongoing inability to weight bear. Radiology showed no evidence of fracture and all observations were normal. However given the child's ongoing symptoms he was put into a cast and referred to the Orthopaedic fracture clinic.

Figure 1

Figure 1. Plain lateral radiograph 10/10/09



Figure 2

Figure 2. Plain lateral radiograph 12/11/09



One week after this presentation and two weeks after his initial injury the boy was seen in the Orthopaedic fracture clinic. Again repeat xrays were performed and no evidence of fracture was identified (Figure 1). Given the child's ongoing ankle swelling and pain he was put into a walking cast and to weight bear as tolerated. One week later he was again reviewed (three weeks post injury) and found to have significant swelling and pain unchanged from previous presentations. He was painful over the entire calcaneus to palpation which was a new symptom from his previous visits. Radiography on this occasion showed marked osteopenic changes from previous radiographs but nil other changes (Figure 2.). The symptoms were concerning given the presumed diagnosis of simple ankle sprain and that it was now three weeks post injury. Radiology reports suggested possible complex regional pain syndrome changes and this fitted with the clinical symptoms. An urgent magnetic resonance image was requested at this stage that resulted in a possible diagnosis of osteomyelitis, complex regional pain syndrome or tumour (Figure 3 and 4).

Figure 3

Figure 3. T2 Weighted MRI Image 13/11/09



Figure 4

Figure 4. T1 weighted magnetic resonance image 13/11/09



Given the clinical presentation and the radiology investigations obtained it was elected to admit the patient to hospital for blood tests and observations. A full blood count was all normal with a C-reactive protein of seven. It was elected to therefore take the child to theatre to surgically gain samples from the calcaneus. The samples were obtained through drill decompression of the calcaneus from the medial aspect and grew *Staph. aureus* sensitive to flucloxacillin. With the advice of the paediatric and infectious diseases teams in the hospital the child was treated with IV flucloxacillin for six weeks and made an

unremarkable recovery.

DISCUSSION

Osteomyelitis can result from haematogenous seeding or direct inoculation, as seen in puncture wounds, open fractures or extensions of pressure ulcers.¹¹ Subacute osteomyelitis of the calcaneus is a haematogenous infection of bone characterized by an insidious course (longer than two weeks).

The incidence of haematogenous calcaneal osteomyelitis has been reported as 3-10% in adults and 7-8% in children.^{6,8,}

⁹The mean age of presentation is 6.5-7.5 yrs in children.⁸ An association with trauma has been reported in <35% of patients with subacute haematogenous osteomyelitis in general. In spite of this reported association, only a small percentage of cases of calcaneal osteomyelitis have been reported after blunt trauma.⁶

The pathogenesis of subacute haematogenous osteomyelitis is believed to be the result of an altered host pathogen relation in which there is an increased host resistance and decreased bacterial virulence.⁵

Haematogenous calcaneal osteomyelitis distinguishes itself from long bone haematogenous osteomyelitis, by usually presenting clinically with less dramatic signs and symptoms of infection. An accurate history and thorough physical examination should provide important information for obtaining a correct diagnosis.⁶

Clinically almost all patients or patients' parents report pain, toe walking, inability to weight bear, or refusal to walk on the affected heel.⁸ Local signs of infection including tenderness and erythema are typically present but usually mild.⁹ Fever and systemic symptoms are rarely seen.

In subacute haematogenous osteomyelitis abnormal white cell counts occur in less than 20% of cases with the C-Reactive Protein within normal limits in more than 80% of occurrences. Radiographic changes can be of assistance in making a diagnosis but may not be present for some 1-3 weeks after initial seeding.⁶ Radionuclide scintigraphic studies, including bone and gallium scans, are useful, but they may be equivocal and may not distinguish bone infection from septic arthritis, overlying cellulitis or bone infarcts.⁷

Evidence from the literature states that the average time to diagnosis of haematogenous calcaneal osteomyelitis is 13.1 days.⁶ The reasons for a delay in diagnosis are due to a

lengthy differential diagnosis of heel pain in children combined with the high incidence of such complaints and the less dramatic presentation when compared with that of osteomyelitis of the long bones. Other common childhood afflictions which can present with similar clinical and laboratory findings are calcaneal stress fracture, calcaneal apophysitis and Achilles enthesopathy.⁹

Computerised tomography is particularly useful in the detection of sequestra; however it may be insensitive for metaphyseal medullary changes.⁷ Magnetic resonance imaging has a high sensitivity in the detection of pathologic changes in bone, bone marrow, and soft tissue, without radiation concerns. In osteomyelitis, magnetic resonance imaging shows replacement of the normal fat in the bone marrow with inflammatory exudates (figure 3). It provides images in any plane, which enables better planning of surgical or percutaneous drainage of an abscess. The specificity of magnetic resonance imaging is increased by clinical, plain radiographic and scintigraphic correlation and knowledge of potential diagnostic pitfalls. Direct tissue or pus culture has been found to be positive on 73% of cases.⁸ Staph. Aureus accounts for 48% of cases while Strep. pyogenes 11% of haematogenous calcaneal osteomyelitis.⁸

The prognosis of haematogenous subacute osteomyelitis depends on a variety of factors, including baseline health, the type and virulence of the infecting organism, rapidity of the diagnosis, and the beginning, duration and type of antibiotic treatment.⁷ The majority of published reports and textbooks in paediatric orthopaedics suggest surgical debridement over conservative treatment for subacute osteomyelitis.⁵ However there is no convincing evidence that this is in fact a better form of treatment than no surgical debridement at all.

Some strongly believe from a therapeutic point of view, cases of subacute osteomyelitis can be treated effectively with intravenous antibiotics only, and that surgical debridement should be reserved for those cases that do not respond to a conservative trial.⁵

With regards to the need for an open biopsy to obtain tissue diagnosis, a review of the literature revealed that most authors – the same who recommended surgical debridement – did indeed prefer and recommend such an approach.⁵ The primary and most important reason that these authors recommended such management is because they believed that it is very difficult to differentiate many of these lesions

from tumours and other tumour like conditions, and that only a histologic specimen could provide the final diagnosis.

Complications of calcaneal osteomyelitis can include chronic infection, growth disturbance, and spread to adjacent joints. All reports have concluded that today, appropriate treatment leads to a satisfactory outcome in most cases.⁸

CONCLUSION

In summary, the calcaneus is an uncommon site of osteomyelitis in the child. A high index of suspicion is necessary to diagnose the problem early, as the clinical and laboratory findings are typically blunted in comparison with those of long bone osteomyelitis.¹⁰ With appropriate treatment, a good outcome is likely to result.

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Author Information

William Talbot, B.Sc, MBBS

Orthopaedic Registrar, Townsville Hospital