PRIMARY SUBACUTE HAEMATOGENOUS OSTEOMYELITIS OF THE TARSAL BONES IN CHILDREN

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Primary subacute haematogenous osteomyelitis (PSHO) of the small bones of the foot is a rare and infrequently considered cause of a limp in children. We describe 11 patients with PSHO, of whom nine were under three years of age, who had a limp with few symptoms. The talus was involved in 36%. Bone scans were positive in all patients and led to localisation of the lesion in two. The radiological features included soft-tissue swelling, an osteolytic lesion in the talus and the calcaneus and a sclerotic appearance of the cuboid and the navicular bones. All patients except one were cured with antibiotics.

Received 9 May 1997; Accepted after revision 3 July 1997

A limp in a child may be due to many causes. One lesion that has received little attention is primary subacute haematogenous osteomyelitis (PSHO) of the small bones of the foot. This is difficult to diagnose because the typical signs and symptoms of acute osteomyelitis are absent and no specific laboratory tests are available. Cases of subacute osteomyelitis may be initially misdiagnosed and proper treatment delayed. Management is also controversial. Some reports have shown an increasing incidence of this form of osteomyelitis and a higher prevalence in certain countries.

Roberts et al1 in a review of 55 patients with osteomyelitis described PSHO in only 18 in none of whom was the foot involved. In the 212 cases of acute osteomyelitis reported by White and Denison11 only five had involvement of the tarsal bones. Grattan-Smith et al, Skevis, Robert-son,13 and Antoniou and Conner14 all draw attention to this disorder to facilitate early diagnosis and conservative treatment without the need for surgery.

Most authors prefer a surgical approach for these lesions in order to exclude tumours and tumour-like conditions and to evacuate the cavity. There is, however, some evidence that surgery has no advantage over conservative treatment.

We have diagnosed and treated 41 children with PSHO in 11 of whom the disease was confined to one of the tarsal bones of the foot. We present our results of conservative treatment using antibiotics.

PATIENTS AND METHODS

Between 1985 and 1995 we diagnosed and treated 41 children with PSHO in 11 of whom it was confined to the foot. The talus was involved in four patients, the cuboid in three, the calcaneus in two and the navicular and cuneiform in one each.

Clinical and laboratory features. There were nine boys and two girls. The average age at presentation was three years six months (1 to 13). Nine children were under three years of age. Symptoms had been present for an average of four weeks (2 to 12) from onset to the diagnosis. The clinical features were a painful limp, refusal to bear weight, and some local pain and tenderness. Slight swelling over the ankle or the foot was found in seven. In those with talar involvement there was swelling and painful restricted ankle movements.

No child had any systemic illness and the temperature was higher than 38°C in only two. The ESR was over 30 mm in two patients and the C-reactive protein level was within the normal range in all except one. Leucocytosis was found in two. All blood cultures, at least two per patient, were negative. There was no history of trauma or recent infection within the month before the onset of symptoms.

Radiological findings. Plain radiographs at the time of diagnosis showed a well-circumscribed subchondral lytic lesion in the talar and calcaneal areas which was circular or oval with a fine sclerotic or a well-defined margin of normal trabecular bone. There were no margins around those parts of the lesion adjacent to the articular surface.
lesion. The talar lesions were eccentric and had eroded the subchondral bone (Fig. 1a). A calcaneal lytic lesion in the posterior part of the bone adjacent to the growth plate extended across the plate. In three children there was sclerosis of the proximal half of the cuboid with a small subchondral lytic lesion in one child. In two patients with involvement of the calcaneus and cuneiform plain radiographs showed no obvious changes when compared with the contralateral side.

**Bone scan:** We performed $^{99m}$Tc bone scanning on all patients (Fig. 2). Increased uptake was seen in all and led to localisation of the lesion in two. In the patients with lytic lesions CT was used to evaluate the extent of the lesion and the involvement of the adjacent joint and surrounding soft tissues. When compared with the plain radiographs CT did not add any useful information except for the demonstration of soft-tissue oedema.

**Treatment protocol.** Antistaphylococcal antibiotics were given intravenously for a mean of ten days (7 to 14). Once improvement in either pain and/or the limp had been noted, they were then administered orally. The overall duration of treatment was three to four weeks.

**Assessment.** The response to treatment was evaluated initially and after 4, 6 and 12 weeks and follow-up continued until bone healing had occurred. All children were again reviewed by plain radiography between one and six years after presentation. The average length of follow-up was 30 months.

**RESULTS**

All the patients except one responded within a few days from the start of treatment with resolution of the limp, local tenderness and swelling. The radiological response was much slower, however, and healing was evident within three to 12 months (Fig. 1b). One patient with a lytic...
calcaneal lesion was readmitted to hospital because of a recurrent limp and no clear radiological improvement. Complete cure was obtained after curettage and a second course of intravenous antibiotics. Coagulase-positive Staphylococcus aureus was cultured from the tissue obtained at surgery. Histological examination showed granulation tissue with granulocytic and lymphocytic infiltration. At the last outpatient visit she had no signs or symptoms and the clinical and radiological appearance of both calcanei was identical.

All patients showed complete clinical and radiological healing with no recurrences and normal growth at the end of the follow-up period.

DISCUSSION

Both acute and subacute osteomyelitis affect the tubular bones in the metaphysical region. Involvement of the flat and small bones is less common, but is seen often in the subacute form. The pathogenesis is the same since the small bones have vascular anatomical subdivisions comparable with the metaphysis of long bones. These are close to the articular cartilage and apophyseal growth plates. The subchondral site of all the bony lesions in our series, i.e., either near the articular cartilage of the talus or on the border of the apophyseal of the calcaneus, supports this theory.

The main reason for the delay in diagnosis and initiation of appropriate treatment is the lack of signs and symptoms, and of a specific non-invasive laboratory test. In our series diagnosis was based on a history of a painful limp for at least two weeks. A positive bone scan and characteristic radiological findings help to make the correct diagnosis. We did not perform a diagnostic biopsy, but a needle biopsy, depending on the anatomical site, may give confirmation of the diagnosis.

The wide variety of radiological presentations of subacute osteomyelitis was summarised and discussed by Gledhill and later modified by Roberts et al. We have adopted their classification, but we believe that another presentation should be added, i.e., sclerosis of flat bones without an erosive or destructive process.

Treatment remains controversial. Some authors agree that antibiotic therapy is preferable in most cases administered parentally at first and then orally for at least four to six weeks, but others recommend surgery when a bony lesion develops.

In our series the average delay in diagnosis was three weeks four days and in nine patients a bony lesion had already developed. Nevertheless all our patients except one completely recovered after treatment with antibiotics. Most recurrences occur within six months. For this reason our follow-up period was made longer to allow bone growth to be assessed.

Our cure rate of 90% is comparable to that reported by others. In the one patient treated surgically, we found granulation tissue but no pus which was compatible with other reports. We could find only six studies in the literature in which conservative therapy had been recommended. Most published reports and all others, such as the standard English textbooks in paediatric orthopaedics refer to surgery when a bony lesion is suspected. In the foot in which malignant tumours are rare, diagnostic experience and awareness of the condition have reduced the indications for surgery from a ‘biopsy-all-lesions approach’, to biopsy of selected cases which do not respond to conservative treatment or show radiological progression of the lesion.

No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article.

REFERENCES