PRIMARY EPIPHYSEAL OSTEOMYELITIS IN CHILDREN

REPORT OF THREE CASES AND REVIEW OF THE LITERATURE

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In the literature 21 children have been reported with haematogenous osteomyelitis involving only the epiphyses of long bones; in 20 the epiphyses of the knee were involved and the radiographs showed a lytic lesion. Most patients gave a history of pain, limp or refusal to walk for weeks or months without general illness. The erythrocyte sedimentation rate and white cell count were of little diagnostic value, but a bone scan was usually positive. All the patients were cured by antibiotics alone or in combination with curettage.

In children aged more than one or two years haematogenous osteomyelitis characteristically affects the metaphysis of long bones. Primary epiphyseal osteomyelitis in children is very rare and only 21 cases have been reported in the literature (Robertson 1967; King and Mayo 1969; Green, Beauchamp and Griffin 1981; Lindenbaum and Alexander 1984; Rosenbaum and Blumhagen 1985). We describe three additional cases and review the literature.

CASE REPORTS

Case 1. A four-year-old boy developed swelling of his left knee and walked with the knee flexed. His temperature rose to 39°C, but only for one or two days. A radiograph taken a week later showed a lytic lesion in the distal femoral epiphysis and his doctor started treatment with erythromycin. Three weeks after the onset of symptoms he was taken to hospital. By now his symptoms had diminished and on examination the knee had only a small effusion with no tenderness and with normal painless movement; his white cell count (WBC) was 14,000 and his ESR 35 mm/hr. A radiograph showed progression of the lytic lesion (Fig. 1), and this was explored. Pus was found and grew *Staphylococcus aureus*; no bacteria were found in the joint effusion. The treatment was curettage and irrigation lavage for six days and antibiotic therapy (cephalexin) for five months.

He was discharged from hospital with a knee brace and his recovery was uneventful. The lesion in the epiphysis gradually disappeared during the following three years. **Case 2.** A boy aged two years four months was admitted with a three-week history of a left sided limp but no general symptoms. Fourteen days after the onset of his limp a radiograph had shown a lytic lesion in the left proximal tibial epiphysis. On admission the left knee felt warm, it had an effusion, movements were painful and he refused to walk. His WBC was 14,200 and his ESR 62 mm/hr. Radiographically the lytic lesion now occupied approximately half the calcified tibial epiphysis

Fig. 1

Case 1. Radiograph of left knee taken just before operation and three weeks after the onset of symptoms.

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Fig. 2

Fig. 3

Figure 2 - Case 2. Radiograph of left knee taken just before operation and three weeks after the onset of symptoms. Figure 3 - The same patient nine years after operation. Partial epiphysiodesis is seen in the proximal tibial epiphysis, but no clinical evidence of growth disturbance was found.

Fig. 4

Case 3. Radiograph of right knee taken before operation, four weeks after the onset of symptoms.

(Fig. 2). The lesion was curetted and grafted. There was no bacterial growth on culture, but histological examination showed micro-abscesses and marked infiltration with neutrocytes. He was allowed to go home in a plaster cast which he wore for one month; no antibiotics were given. One month after the operation a radiograph showed involvement of the epiphyseal plate and the metaphysis. Whether this was caused by surgery or

represented progression of the infection was unclear. However, the patient had no symptoms and his clinical recovery was uneventful. He was followed up for a further nine years; a partial epiphysiodesis developed (Fig. 3) but no clinical evidence of growth disturbance was seen.

Case 3. A 20-month-old boy was admitted with a four-week history of walking with a stiff right knee but no general symptoms. A radiograph taken after 14 days had shown a lytic lesion in the proximal tibial epiphysis. When first seen the WBC was 9,200 and the ESR was 11 mm/hr. Physical examination revealed no effusion, soft tissue swelling or tenderness and the range of movement was normal. A bone scan showed slightly increased activity in the proximal tibia. A further radiograph showed progression of the lytic lesion (Fig. 4). He was treated by curettage and bone grafting. Granulation tissue was removed from the lesion; culture was negative but microscopic examination showed infiltration with neutrocytes. On the third day after the operation antibiotics (flucloxacillin and ampicillin) were started because of a slight rise in temperature, but they were discontinued after 10 days because of a skin rash. He was allowed home with a plaster cast which he wore for one month. His recovery was uneventful and nine months later the radiograph showed healing.

DISCUSSION

In the literature we have found reports of 21 cases of haematogenous osteomyelitis in children involving only the epiphyses of long bones. All had osteolytic lesions on radiography and the diagnosis was confirmed by culture, histological examination or the response to antibiotic therapy. The three additional patients presented in this paper seem to be typical of this uncommon variety of haematogenous osteomyelitis. The following conclusions are based on all 24 cases.

The patients commonly (in 17 of the cases) presented with a history of pain, limp, or refusal to walk for a period of two weeks to three months without any general symptoms or signs. This clinical course was called subacute by Green, Beauchamp and Griffin (1981). However, an acute course with high fever and a short history of one or only a few days does occur (Rosenbaum and Blumhagen 1985).

Seventeen of the patients have been boys and seven girls (this includes the two cases of Rosenbaum and Blumhagen who also had metaphyseal involvement, but not the two cases of King and Mayo (1969) since their sex was not reported). The age of the patients ranged from 20 months to nine years; more than half were below five years.

The distal femur has been involved in 16 cases, and the proximal tibia in five; one patient, reported by Rosenbaum and Blumhagen (1985), had both epiphyses of the same knee involved. One case has been in the

proximal humerus, one in the proximal femur, one in the distal tibia and one in the distal fibula.

The ESR has varied from normal in at least nine patients to 110 mm/hour, and the WBC has been either normal or slightly elevated. A technetium bone scan has been performed in 11 patients and was positive in all but one. In four patients the bone scan was positive between five and 12 days before the lesions were visible on radiographs.

Material from the lesion was cultured in 17 cases and bacteria were detected in eight (staphylococci in four, streptococci in two, *Haemophilus influenzae* in one and *Kingella kingae* in one).

In 17 cases curettage was performed, followed in all but one patient by antibiotics, usually for five or six weeks. Seven patients were treated with antibiotics alone. Weight bearing was avoided for some time. The follow-up period was specified for 15 of the patients and ranged from nine months to nine years; 13 were followed up for two years or more. No recurrences or sequelae have been reported.

The false impression that haematogenous bone infections in children does not primarily affect the

epiphyses of long bones may account for the diagnostic problems in many of the reported cases, including ours. The pre-operative diagnoses have, apart from infection, been chondroblastoma, ostoid osteoma and avascular necrosis. It should, however, be recognised that epiphyses of long bones can be involved in haematogenous osteomyelitis; Rosenbaum and Blumhagen (1985) found this site affected in 4% of cases of haematogenous osteomyelitis in children older than 18 months.

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