PHYSEAL WIDENING IN CHILDREN WITH MYELOMENINGOCELE

J. A. ROBERTS, G. C. BENNET, J. R. MACKENZIE

From the Royal Hospital for Sick Children, Glasgow

We report five examples of physeal widening in four children with myelomeningocele. In all cases there was rapid clinical resolution with the use of the patients' normal orthoses and minor limitation of activity, and there was no evidence of early epiphyseal closure or growth disturbance. We suggest that recognition of the pathological process before fracture occurred may explain the rapid return to normal.

Pathological fractures are a well recognised complication in children with neurological disorders (Sharrard 1979; Rang 1983) and are due to osteoporosis associated with sensory impairment. Of patients with myelomeningocele 10 to 30% will sustain fractures, of which over half will be around the knee (Quilis 1974), and about 10% will involve the physis (Matejczyk and Rang 1983). Fractures which do not involve the physis usually heal rapidly, often with abundant callus formation, which may be due to impaired pain perception allowing repeated trauma, or to loss of neural regulation of bone formation. Previous studies of physeal injuries have suggested that they behave differently, in that they take longer than usual to unite, require prolonged non-weight-bearing immobilisation, and have an increased risk of premature epiphyseal closure (Edvardsen 1972; Quilis 1974; Wenger, Jeffcoat and Herring 1980; Kumar, Cowell and Townsend 1984).

We present five physeal lesions with characteristic radiological features, seen in four children with myelomeningocele. None had a history of significant trauma or showed definite displacement or angulation. All settled rapidly with minimal immobilisation and there were no long-term sequelae.

MATERIALS AND METHODS

Each of the four children presented with a warm, swollen limb at the level of the affected physis, and only two had any history of trauma, in both cases minor. The case histories are summarised in Table I. On clinical examination there was no abnormal angulation or mobility on stressing.

In each case radiographs showed physeal widening, with some metaphyseal irregularity and sclerosis but no significant displacement or angulation (Figs 1, 2 and 3). In Case 4 a radiograph of the contralateral asymptomatic and clinically normal limb was taken for comparative purposes; this showed the same radiological abnormalities of the physis. In all cases, the correct diagnosis was made and no patient was admitted. Bone scans in two patients showed increased blood flow and increased uptake at three hours.

Three patients (four affected physis) were treated as outpatients, being instructed to continue with normal activities in their usual orthotic appliances, but to avoid physiotherapy and excessive exertion. In these four physis there was rapid resolution to a clinically normal state by one month, though the radiographic changes persisted for longer. One patient, treated at another hospital, had a plaster cast for two weeks, then a Robert Jones bandage for a further two weeks. At one month the lesion had resolved clinically, but the abnormal radiological appearances led to the use of a protective splint for a further two months.

RESULTS

Patients were reviewed clinically and radiologically at an average of 33 months (range 26 to 41 months) from initial presentation. No patient had any complaint with respect to the affected physis and all were clinically normal. The radiographs taken at review show satisfactory resolution of the abnormalities. In Case 1 (Fig. 4), an 11-year-old child, the epiphysis had not fused, and there is no growth disturbance. In Case 2 (Fig. 5) the epiphysis is closing centrally. This may represent a minor growth disturbance, but the child was 13 years old at the time of

J. A. Roberts, FRCS, Senior Registrar in Orthopaedic Surgery
G. C. Bennet, FRCS, Consultant Orthopaedic Surgeon
J. R. MacKenzie, FRCR, Consultant Radiologist
Royal Hospital for Sick Children, Yorkhill, Glasgow G3 8SJ, Scotland.
Correspondence should be sent to Mr J. A. Roberts.

© 1989 British Editorial Society of Bone and Joint Surgery
0301–620X/89/1185 $2.00

THE JOURNAL OF BONE AND JOINT SURGERY
Radiographs showing the involved physes in Cases 1, 2 and 3 respectively.

Figure 4 - Case 1, 41 months after injury, showing uneventful resolution with no evidence of growth disturbance or premature fusion.
Figure 5 - Case 2, 34 months after injury, showing resolution of the lesion with possible partial phyeal closure.
Figure 6 - Case 3, 30 months after injury, showing possible early phyeal closure but no growth disturbance. There is moderate involvement of the proximal tibia physe, which was asymptomatic and clinically normal.
the radiograph, and fusion might normally be expected at about this age. In Case 3 (Fig. 6) the physis is seen to be closing, but the child is 14 years old. The proximal tibial physis shows a moderate degree of physeal widening and metaphyseal sclerosis, although clinical findings were normal. No treatment was instituted.

**DISCUSSION**

The five lesions form a homogeneous group of cases showing physeal widening. The absence of significant trauma was confirmed by the lack of periosteal stripping and new bone formation, a common feature of fractures in myelomeningocele. All were undisplaced with no angulation and thus were probably stable. Some previous reports have not been so specific. The cases illustrated in the paper of Wenger et al. (1980) showed angulation and thus were unstable. This may account for the delay in healing and early epiphyseal closure. Kumar et al. (1984) included four physeal injuries similar to those reported in this paper and drew similar conclusions regarding the speed of healing.

As regards cause, we suggest that repeated minor trauma in a limb with no sensation may produce micromovement in the zone of cartilage transformation, arrest the normal process of calcification and lead to widening of the proximal uncalcified part of the physeal plate. In addition, secondary hyperaemia may cause increased growth in the zone of cartilage proliferation, resulting in further widening. In all our cases minimal protection of the physis from repeated trauma resulted in rapid clinical resolution. The phenomenon is best regarded as a pre-fracture state, with physeal widening making the growth plate weaker and thus more susceptible to fracture. It may be that when fracture does occur the complications of delayed union and growth disturbance then follow.

We suggest that treatment of these lesions by long periods of immobilisation in a cast, with its attendant effects on insensitive skin and the production of increased osteoporosis, is unnecessary. Such patients should continue to use their normal orthoses, but avoid excessive use and physiotherapy until there is clinical normality, usually after four weeks. To await radiological resolution of the lesion would seem to prolong the treatment unnecessarily.

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**


