Hajdu-Cheney syndrome

M A R O'Reilly, D G Shaw

Department of Radiology,
Hospital for Sick Children,
Great Ormond Street,
London WC1,
United Kingdom
M A R O'Reilly
D G Shaw

*Department of Diagnostic Imaging,
The Robert Jones and Agnes Hunt
Orthopaedic Hospital,
Oswestry,
Shropshire SY10 7AG,
United Kingdom.

Correspondence to:
Dr Marian O'Reilly,
Department of Radiology,
St George's Hospital,
Blackshaw Road,
London SW17,
United Kingdom.

Clinical history

The patient, a female child, was born at 37 week gestation by a spontaneous vaginal delivery following an uneventful pregnancy. The parents were not consanguineous. Two older siblings were alive and well. Respiratory difficulties with cyanotic episodes occurred during the first few months of life.

Multiple congenital deformities were noted. The face was dysmorphic with a prominent premaxilla. There was hypertelorism and the eyes sloped downwards with narrow palpebral fissures. The jaw was small with a thin upper lip. The palate was high and arched and the uvula appeared rotated forwards and fixed to the palate. There was excess skin around the neck and back. The arms were short, with flexion deformity at the wrist and radial

deviation. The hands appeared short and stubby and the fingers were clubbed.

As the child grew older, generalised joint laxity and hyperextensibility developed. Height and weight remained on the third percentile for age but head circumference was above the 98th percentile, with an enlarged pituitary fossa on skull radiographs. Motor development was delayed but normal intelligence was apparent. Kyphoscoliosis was treated with a brace and eventually spinal fusion. The chest deformity led to a restrictive ventilatory defect and recurrent chest infections.

The permanent teeth were all lost soon after eruption. At the age of 15 years, delayed puberty was apparent with prepubertal serum levels of LH, FSH and oestradiol and a bone age of only 12 years.

Radiological findings

Skull radiographs showed basilar impression, multiple wormian bones and an enlarged elongated pituitary fossa (fig 1). The calvarium was thickened and the cranial sutures were widely separated.

There was discrepancy in the length of the paired long bones, resulting in valgus at the knees and bowing of the fibulae (fig 2). The ulnae were bowed, resulting in a non-united fracture of the proximal shaft of the ulna on the right (fig 3). Both radial heads were dislocated. There was generalised osteopenia.

Radiographs of the spine revealed a severe kyphoscoliosis (fig 4). The lumbar vertebrae were tall with narrow disc spaces and there was slight anterior wedging of the vertebral bodies at T9 to T11 (fig 5). The neural foramina in the lumbar region were enlarged (fig 5).

The most characteristic features, however, were seen in the hands (fig 6). Osteolysis of the terminal phalanges with overlying soft tissue swelling developed in late childhood. The toes were only partially affected (fig 7).

Differential diagnosis

Acro-osteolysis refers to the dissolution of bone at the phalanges. It is commonly associated with other diseases such as scleroderma, sarcoidosis, neuropathic disorders, and rheumatoid or psoriatic syndromes. It can be associated with nephropathy in childhood. The pathogenesis may be vascular, neurovascular, traumatic (due to burns and frostbite), toxic (due to PVC or ergot poisoning), metabolic or infective. It may also be idiopathic.

Figure 1 Lateral view of the neck and skull base shows basilar invagination. The pituitary fossa (open arrowheads) is enlarged and elongated, and the clivus is steep (large arrowhead). Multiple wormian bones (closed arrowheads) are present.

Figure 2 Both tibiae and fibulae. There is valgus at the knees. Both fibulae are bowed distally (arrows) and the appearances suggest early pseudarthroses.

The additional radiographic findings in this patient make a congenital syndrome more likely. The major ones to consider are progeria, pyknodysostosis and the Hajdu-Cheney syndrome. This patient does not display the characteristic facies, skin changes and premature ageing seen in progeria. Pyknodysostosis includes many of the features described here but there are two major differences between this and the Hajdu-Cheney syndrome: in pyknodysostosis the bones are dense and the mandibular angle is almost 180 degrees.

The most likely diagnosis is that of the Hajdu-Cheney syndrome.

Discussion

In acro-osteolysis, resorption of bone may occur at the phalangeal tufts, in the

mid-portion of the phalanges or at the peri-articular surfaces (table 1). Most of the rheumatological diseases cause erosions at the distal tufts and surrounding juxta-articular areas. Neuropathic disorders, such as diabetes mellitus and leprosy, may cause sclerosis and pencilling or pointing of the phalanges. The primary osteolysis syndromes of Hajdu-Cheney and Rothmund may cause a band-like area of lucency in the distal phalangeal shaft which is more sharply defined than that seen in occupational or traumatically induced acro-osteolysis.

The Hajdu-Cheney syndrome (familial idiopathic acro-osteolysis) was first described in 1948 by Hajdu and Kauntze,¹ and more extensively reported by Cheney.²

Most cases are sporadic but inheritance is likely to be autosomal dominant. Although this is a congenital disorder, the correct diagnosis is rarely made until later childhood, when the characteristic hand changes occur.

Figure 3 Right forearm. Mesomelic shortening of the forearm bones. The radial head is dislocated (arrow). The ulna is bowed and there is a non-united fracture of the proximal shaft (open arrow). There is acro-osteolysis of the terminal phalanx of the thumb (curved arrow). Diffuse osteopenic change.

Figure 4 Thoraco-lumbar spine—frontal view. Severe kyphoscoliosis. The lumbar vertebral bodies are enlarged with narrowed disc spaces.

Table 1 Causes of acro-osteolysis related to the radiological appearances of the phalanges

Resorption of the phalangeal tuft
Scleroderma
Raynaud's disease
Sarcoidosis
Psoriatic arthropathy
Neuropathic disease
Thromboangitis obliterans
Thermal injuries and trauma
Hyperparathyroidism
Epidermolysis bullosa
Porphyria
Progeria
Pachydermoperiostosis
Resorption of the mid-portion of the phalanges
Polyvinyl chloride tank cleaners
Hyperparathyroidism
Hajdu-Cheney syndrome
Rothmund's syndrome
Periarticular resorption
Psoriatic arthropathy
Hyperparathyroidism
Scleroderma
Multicentre reticulohistiocytosis
Erosive osteoarthritis
Thermal injuries

The affected child has a distinctive facial appearance, short stature and retarded puberty. Intelligence is normal. The eyes slope downwards and there is telecanthus and synophrys. Optic atrophy can develop. The philtrum is long and the nostrils are anteverted. The mandible is small, the palate highly arched and the occiput prominent. The neck is short and the ears are low-set.

Multiple wormian bones occur in the skull (fig 1). These are intrasutural bones occurring most frequently along the lambdoidal sutures. The presence of a few wormian bones is normal up to the age of six months and only when multiple are they considered significant (table 2).

Table 2 Causes of multiple wormian bones

Cleidocranial dysostosis
Osteogenesis imperfecta
Congenital hypothyroidism
Hypophosphatasia
Pyknodysostosis
Progeria
Pachydermoperiostosis
Hajdu-Cheney syndrome
Down's syndrome
Idiopathic

Figure 5 Thoraco-lumbar spine—lateral view, taken with the patient wearing a brace. Kyphoscoliosis. The lumbar vertebrae are tall with reduced disc heights. Posterior scalloping of the vertebral bodies (arrows) and enlarged neural foramina. Diffuse osteopenia.

Figure 6 Left hand. Soft tissue swelling about the terminal phalanges and distal interphalangeal joints, with severe osteolysis of the terminal phalanges (arrows). The fourth and fifth metacarpals are hypoplastic.

Other characteristic radiological features in the skull in the Hajdu-Cheney syndrome are the elongated pituitary fossa, thickened skull vault, and prominent occiput. Progressive basilar invagination develops and a serious complication of the disease can be foramen magnum impaction. The spine is kyphotic. The lumbar vertebral bodies are tall and the disc spaces are narrowed. Schmorl's nodes and vertebral collapse may develop. Other features are the absence of the frontal sinuses and early loss of teeth.

The upper limbs are mesomelic. There is discrepancy in the length of the paired long bones, resulting in valgus at the knees and dislocation of the radial heads. The fibulae are long and bowed and they project proximally. The bones may be osteopenic and there is a high incidence of fractures. Joint laxity is also a feature.

The classic acro-osteolysis develops in late childhood. The terminal phalanges tend to be small and triangular in appearance with an increase in the amount of surrounding soft tissue. Sometimes the acro-osteolysis takes the form of transverse lytic defects across the shafts of the phalanges. The feet are less severely affected. Pain is a frequent manifestation, especially in the hands.

Treatment of the disorder can only be symptomatic. The prognosis can be serious, depending on the degree of ventilatory restriction caused by the chest deformity and the severity of neurological impairment caused by basilar invagination.

- 1 Hajdu N, Kauntze R. Cranio-skeletal dysplasia. *Br J Radiol* 1948; 21: 42.
- 2 Cheney W D. Acro-osteolysis. *Amer J Roentgenol* 1965; 94: 595.

Figure 7 Both feet. Acro-osteolysis of the terminal phalanges (arrows) is less severe than in the hands. There is bilateral hallux valgus and the fourth and fifth metatarsals on the left are hypoplastic.