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Genochondromatosis

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Abstract

We report a new disorder that we have called genochondromatosis. Four patients from the same family with the characteristic localisation of chondromatosis (clavicle, upper end of humerus, and lower end of femur) were investigated. The favourable course, the dominant transmission, and previous publication of similar cases confirm the uniqueness of this new entity. The chondrodysplasias with disorganised development of cartilage are far from being completely understood. Recently, several disorders within this group have been well defined, including metachondromatosis and spondyloenchondroplasia, but there still remain numerous clinical subgroups that are very difficult to classify.

We report four cases from one family with a specific disorder that clearly differs from all the others currently described. The characteristic localisation and evolution and the dominant transmission, together with previous publication of similar cases, confirm that this disorder is a separate clinical entity. We propose the name of 'genochondromatosis' because it is genetically determined.

Case reports

CASE 1

A 9 year old girl was referred to our clinic for an 'osseous defect' detected on radiographs one month after an episode of knee pain that disappeared after a few weeks. The clinical examination was almost normal (height 131 cm, weight 29·8 kg). The morphology of the trunk and the lower limbs was not altered. Apart from a slight cubitus valgus, the only abnormality was visible hypertrophy of the medial extremity of the clavicles, confirmed by palpation (fig 1). However, there was no abnormal swelling of the long bones, the hands, or the ribs. Radiographic examination of the skeleton showed small defects of the lower femoral metaphyses. These defects were circular with a fine sclerotic margin. Some of them were located in the cortex forming a protrusion, particularly marked on the lower medial third of the bone (fig 2). In the upper tibial metaphyses there were bands parallel to the longitudinal axis of the bone surrounding more radiolucent zones. Major defects were visible on the proximal humeral metaphyses that caused broadening (fig 3). However, the most important lesions were found on the medial extremity of the clavicles (fig 4). These were enlarged and deformed with deep cavities that had an irregular structure and margins. All these defects were perfectly symmetrical. The other parts of the skeleton were normal, in particular the bones of the hands, feet, pelvis, and hip. The family history indicated that the patient had two brothers without any functional disorder. However, radiographic examination showed

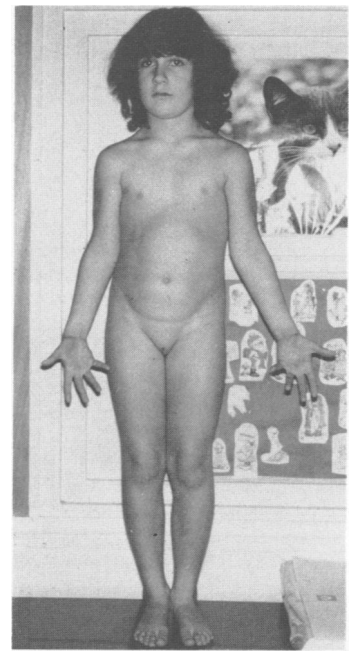

Figure 1 Case 1 aged 9 years. Notice the hypertrophy of the clavicle.

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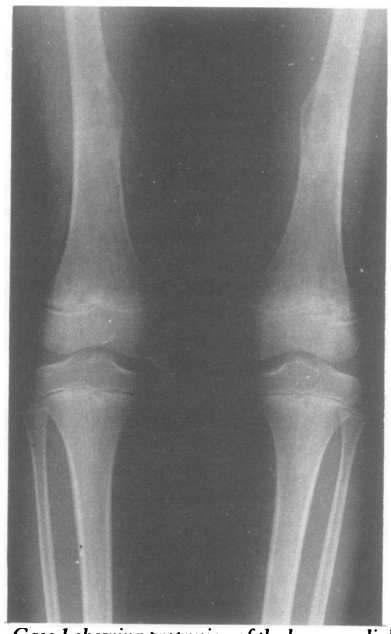

Figure 2 Case 1 showing protrusion of the lower medial third of the femur.

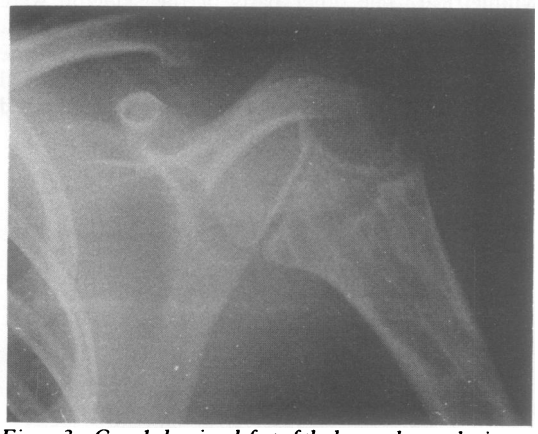

Figure 3 Case 1 showing defect of the humeral metaphysis.

the same features as in their sister. Their mother had suffered a fracture of the left humerus at the age of 13 leading initially to the diagnosis of fibrous dysplasia.

CASE 2

A 15 year old boy, the older brother of the first patient, did not complain of any disorder except for a vague pain in the knee after sports sessions. His height was 161 cm and weight 52·3 kg. Clinical examination was normal. Apart from a mild kyphotic posture the only notable sign was slightly prominent extremities of the clavicles. *X* rays of the lower limbs showed multiple round defects with a fine sclerotic margin in the metaphyses of the lower femur and the upper tibia, in the latter associated with streaky images. These defects were remarkably symmetrical and were also found in the proximal humeral metaphyses (fig 5). The medial extremity of the clavicles was large and irregular, whereas the other parts of the skeleton were normal.

CASE 3

A 21 month old boy, the younger brother of case 1, had a height of 84 cm and weight of 12·8 kg. He was clinically normal. There were already small radiologically detectable defects in the lower femoral metaphyses (fig 6). They could hardly be seen in the tibia and they were not visible at all in the humerus. However, the extremities of the clavicles were already enlarged.

CASE 4

The mother of these patients was 38 years old and showed no clinical abnormality. At the age of 13 she had had a pathological fracture of the left humerus requiring intramedullary nail fixation. Radiographs on that occasion showed the presence of osseous

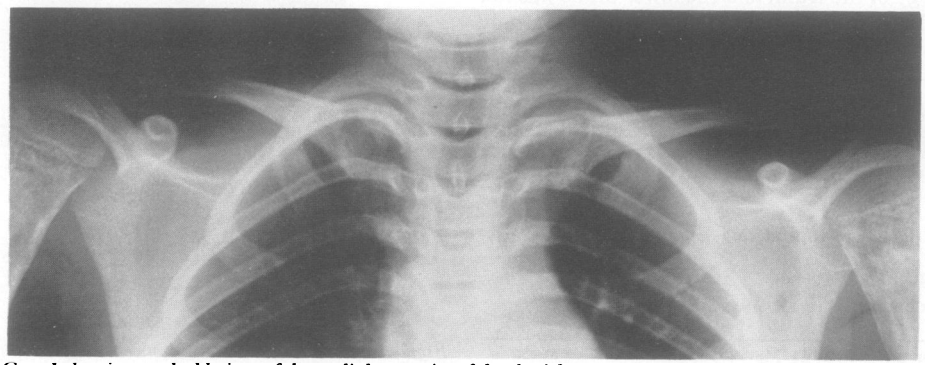

Figure 4 Case 1 showing marked lesions of the medial extremity of the clavicle.

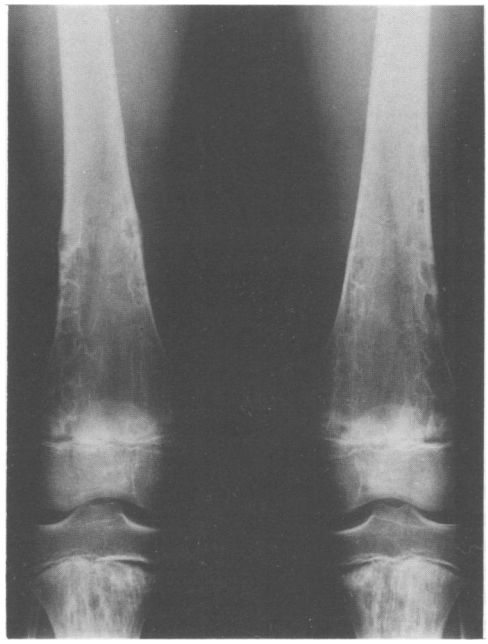

Figure 5 Case 2 showing round defects with sclerotic margin of the metaphyses of the femur and tibia.

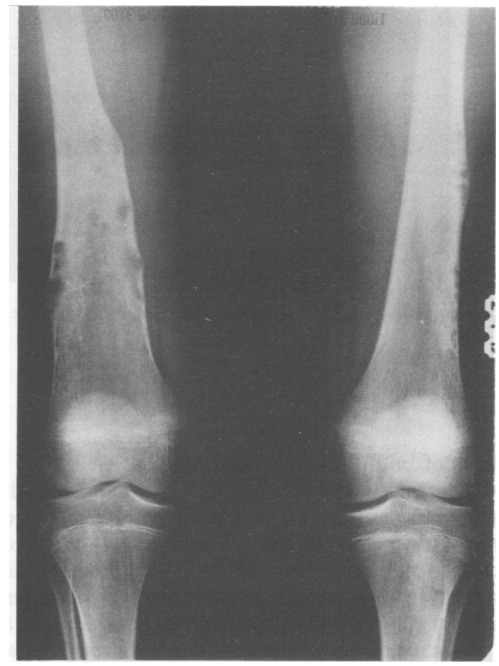

Figure 7 Case 4 aged 13 years showing osseous defects of both metaphyses.

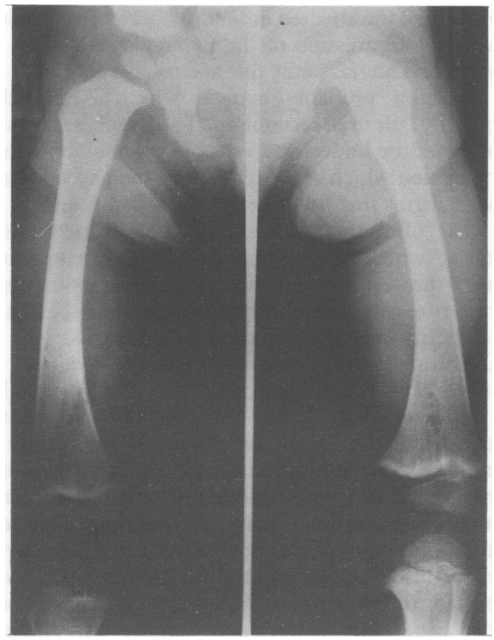

Figure 6 Case 3 showing small defects of the lower femoral metaphyses.

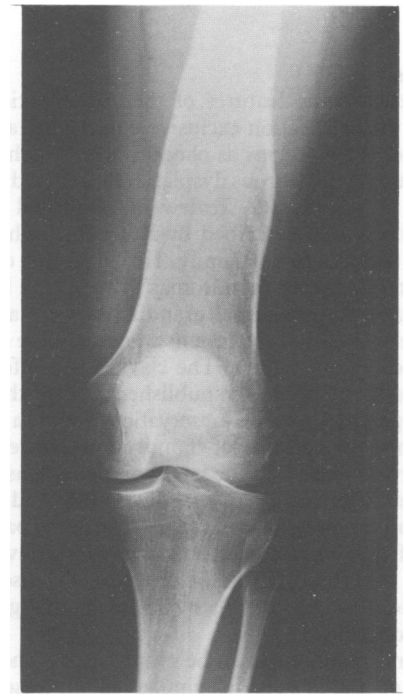

Figure 8 Case 4. X ray at 38 years of age: persistence of irregularly shaped femur.

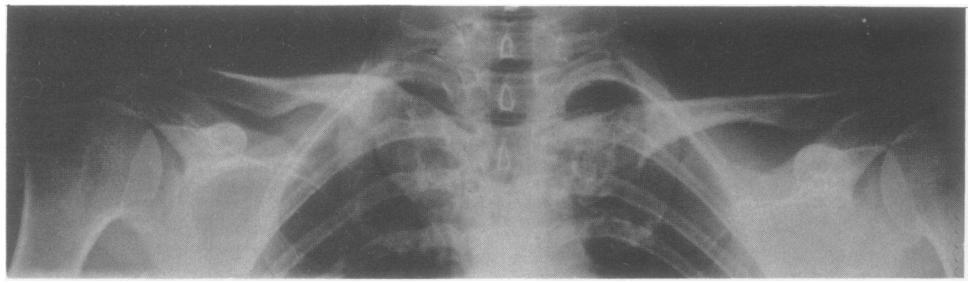

Figure 9 Case 4 showing irregular and enlarged extremities of the clavicles.

defects of both humeral metaphyses as well as of the lower extremities of the femora (fig 7) and a slightly streaky image of the upper tibial metaphyses. A bone biopsy taken next to the fracture line showed only necrosis of the bone without any characteristic pattern. *X* rays at the age of 38 showed the persistence of an irregular shape of both humeri and femora (fig 8). The extremities of the clavicles were irregular and enlarged (fig 9). We were able to obtain several *x* rays of the maternal grandparents, but only the grandfather had a small, bony defect on the upper humeral extremity and it was difficult to confirm the pathological character of this image.

Discussion

The radiographic features of these four patients, as well as the localisation exclusively in the metaphyses, identifies these lesions as chondromas, which cannot be confused with fibrous dysplasia, the initial diagnosis in the fourth case. A review of published reports showed a family described by Rossberg,[1] which had similar features to our family. He called this disorder 'hereditary osseous chondromas'; two sibs, a boy and a girl, and their paternal grandfather were affected. The localisations of the lesions were the same as those described in our family. The clavicle was affected in the girls. In addition, the published *x* ray of the knees is comparable to our observations, and a biopsy confirmed the presence of chondromas. However, the brother had defects in the trochanteric regions, which were not seen in our cases. Our family and that of Rossberg[1] seem to have the same disorder, a particular form of dominant chondromatosis with a favourable course. It is important to be aware of this disorder to avoid confusion with other entities in this group of chondrodysplasias.

Several points need to be emphasised. The localisation of the lesions is similar in all cases. The localisation in the lower femoral metaphyses and, to a lesser extent, in the upper tibial metaphyses and the upper humeral metaphyses seems to be a constant feature. However, the most characteristic finding seems to be the presence of chondromas on the medial extremity of the clavicle sometimes leading to a visible swelling, as in our patients. It should be pointed out that the lesions are small and numerous in the lower femur resulting in a protrusion of the cortex, whereas the lesions in the clavicle are more voluminous causing a metaphyseal deformity. A further typical sign is the symmetry of the chondromas. They are identical on both sides of the body, but they vary in size and morphology depending on the metaphysis affected. These lesions do not cause any modification of bone growth, in contrast to enchondromas and exostoses that frequently lead to shortening or deformity of the affected bone. Furthermore there is a tendency to regression of the radiographic defects in adult life. This fact and the normal development of the skeleton probably explain why this disorder frequently fails to be recognised. The last characteristic that should be underlined is the autosomal dominant transmission which seems proven in the two families. This confirms that the disorder is a separate entity. In the case of multiple exostoses[2] and metachondromatosis,[3] which have a similar mode of transmission, there is no fear of confusion because in both these disorders exostoses are always present and they have never been observed in genochondromatosis.

Confusion with multiple chondromatosis is possible,[4] but the diagnostic criteria of this disorder are different. The hands and feet are frequently involved and the lesions are always asymmetrical or even unilateral. Inhibition of limb growth is quite common and can pose serious orthopaedic problems in the lower limbs. Finally, in multiple chondromatosis the lesions do not regress and can even calcify during their evolution. However, the most important difference is probably that chondromatosis is not genetically determined; among our patients with multiple chondromatosis we have observed identical twins where one child was affected and the

other strictly normal. Thus, the disorder in the family reported here can be distinguished from the other forms of chondromatosis by the favourable course and the autosomal dominant transmission. We could find no other similar condition in published reports including the description of three cases of Ollier disease by Lamy *et al.*[5] More widespread knowledge of this condition would probably prevent confusion and might show that this disorder is not as rare as the small number of reports suggests. However, without radiographic examination many cases will probably remain unidentified owing to the absence of clinical manifestations.

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5 Lamy M, Aussannaire M, Jammet ML, Nezelof C. Trois cas de maladie d'Ollier dans une fratrie. *Bull Mem Soc Med Hop Paris* 1954;**3**:62.