CALCIFYING ENCHONDROMA OF LONG BONES

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In examining radiographs of long bones, from time to time one comes across a film showing a sharply defined granular or flocculent deposit of dense calcium in the medulla in, or adjacent to, the metaphysis. Normal cancellous bone surrounds the calcium deposit. There is no change in size or shape of the bone nor is there any periosteal reaction. This is the appearance produced by a calcifying enchondroma.

In recent years a number of such calcified enchondromata have been identified at the Royal Sussex County Hospital. One was explored. Microscopic examination revealed bone and cartilage embedded in blood clot. The bone trabeculae were in general well preserved. Only small areas of cartilage appeared normal; the rest showed degenerative changes of varying degree, and small areas of calcification. No evidence of malignancy or inflammation was seen. A review of this and other similar cases was made to ascertain whether there were any special features that would enable the condition to be more readily recognised.

CASE REPORTS

Case 1—A woman aged sixty complained of pain in the left knee of three months duration. There was no history of injury. She walked with a slight limp. On examination there were tenderness and swelling over the lower end of the femur. The range of knee movements was normal. There was no increased heat and no effusion. Radiographs showed a flocculent granular deposit in the lower end of the femur (Fig. 1). The deposit was more dense round the periphery than at the centre. *Operation*—The lower end of the femur was explored from the lateral aspect. The periosteum was normal. A piece of the lateral cortex was removed to expose a thick grumous mass rather like inspissated tuberculous pus intermingled with blood clot. The histological appearance of the specimen has already been described in the opening paragraph. *Progress*—The post-operative progress was uneventful. Within two months the patient was free from pain. It was believed that relief was brought about by excision of the abnormal tissue.

Case 2—A woman aged fifty-five complained of intermittent pain in the neck and right shoulder for one year. The pain was not very severe but now tended to be more constant than ever before. There was no history of injury. *On examination* the predominant clinical sign was limited movement of the cervical spine. There was no swelling in the region of the neck or shoulder and no wasting in the muscles of either upper extremity. Movements at the right shoulder joint were full and painless. A radiograph of the cervical spine showed a narrow disc space at C.6-7 and osteoarthritic changes. Radiographs of the right shoulder showed a calcified mass in the upper part of the humeral shaft (Fig. 2). The cervical spine was treated with radiant heat and massage with complete disappearance of the pain and a return of normal mobility to the neck. It seems therefore that the mass in the humerus was in no way related to the signs and symptoms.

Case 3—A man aged sixty-four fell on his right arm and sustained a fracture of the upper end of the humerus. Radiographs showed, in addition to the fracture, a calcified mass in the upper part of the humeral shaft extending from the surgical neck downwards for three inches (Fig. 3). This had presumably been present for some time but the patient could not remember having had any previous symptoms in the arm. There was nothing in the radiograph to suggest that the calcified area had predisposed to the fracture; the fracture united satisfactorily.

Case 4—A man aged sixty-three complained of constant, but not severe, pain in his left knee for three months. There was no history of injury and on examination there was a small effusion in the knee and slight wasting of the quadriceps. Radiographs revealed a calcified mass in the lower end of the femur (Fig. 4). He was treated by quadriceps exercises and the symptoms subsided completely.

FIG. 1

FIG. 2

Figure 1—Case 1. Calcifying enchondroma. Localised granular deposit in the femoral metaphysis. Normal bone appearance elsewhere. Figure 2—Case 2. Normal shoulder joint but localised dense opaque deposit (calcifying enchondroma) in the humeral metaphysis. Normal surrounding bone.

FIG. 3

FIG. 4

Figure 3—Case 3. Flocculent opaque deposits (calcifying enchondroma) in the uppermost third of the humeral shaft. Normal texture of surrounding bone. Comminuted fracture at upper end of humeral shaft. Figure 4—Case 4. Heavy granular deposit (calcifying enchondroma) adjacent to the femoral metaphysis. No other bone changes.

Case 5—A man aged sixty-three slipped, twisting his left foot and knee. There was no history of his ankle giving way and on examination there was no clinical evidence of fracture but there was tenderness over the lateral ligament of the ankle. There was also slight tenderness over the medial ligament of the knee. A radiograph showed a calcified deposit, more dense at its centre than at the periphery, in the lower end of the femur (Fig. 5). The symptoms subsided without treatment.

DIFFERENTIAL DIAGNOSIS

The condition must be distinguished from 1) endosteal sarcoma, 2) Brodie's abscess, and 3) benign chondroblastoma of bone.

In *endosteal sarcoma* (Fig. 6) the involved area of bone may be greater than that affected by calcified enchondroma. Areas of bone destruction as well as of calcification are present but the density of the calcification is less intense. Usually some point can be seen where the bone surface is broken through. Periosteal reaction and local soft-tissue swelling are seen

FIG. 5

Case 5—Localised granular deposit in femoral metaphysis. Very similar to the calcifying enchondroma shown in Figure 1.

if the growth is in an advanced stage. If there is any doubt a biopsy should be performed to establish the diagnosis.

Brodie's abscess (Fig. 7)—The usual radiographic appearance is a sharply defined oval translucent area bounded by a thin sclerotic zone. Occasionally, however, it may be observed as a less well defined lesion and occupy a rather larger area, when the appearance might be confused with that of a calcifying enchondroma. Nevertheless in a Brodie's abscess of this type (Fig. 7) some areas of translucency can usually be identified; these are never seen in a calcified enchondroma. Moreover there is usually some, although slight, increase in the width of the bone.

Benign chondroblastoma of bone (France 1952)—This tumour, unlike an enchondroma, originates in the epiphysis though occasionally it may enter the metaphysis. It gives rise to a train of symptoms referable to the adjacent joint and there are muscle wasting, spasm and limitation of movement. Radiographically it is shown as an area of rarefaction throughout

FIG. 6

Endosteal sarcoma of femur showing as an ill defined dense mass arising centrally but reaching the bone surface posteriorly. Amidst the dense tissue there are rarefied areas due to bone destruction.

FIG. 7

Atypical Brodie's abscess. A collection of closely approximated well defined rarefied areas each bounded by a thin zone of sclerosis. Slight enlargement of the bone in a postero-medial direction.

which there are scattered areas of increased density. Biopsy shows characteristic giant cells and cartilage cells. A calcifying enchondroma produces no significant signs or symptoms and, radiographically, no rarefied bone is seen.

DISCUSSION

Stabler (1942) described two cases of degenerative enchondroma. Both were symptomless but biopsy was done in one and the report (by Dr W. W. Woods) stated: "Portions of spongy bone. The eosinophilous trabeculae are normal lamellar bone, and between some of them there is normal fatty marrow. But replacing the fatty marrow in most of the bone there are areas of solid haematoxophil tissue which are areas of chondroma. The matrix of the chondroma is in places hyaline, but much of it is fibrillar, having undergone mucoid change. The granular haematoxophil areas in the chondroma are areas of calcification." In all our cases except one the calcified mass in the bone presented as a non-clinical entity. The patients were all over fifty and gave no history of previous abnormality in the areas involved.

The first description of the radiographic appearances in calcified enchondroma was by Salinger (1928), who described five cases and stated: "The shadows appear in the long hollow bones. They are finely mottled, irregular, spongy, and in one case also an homogeneous shadow, and they are of such density that they stand out clearly in normal bones. It is noteworthy that the bone does not show any signs of destruction. Chalk content of the surrounding cancellous bone and cortex are normal. Even the outline of the bone is unaffected."

The condition was recognised by Virchow (1864) who at first termed them enostotic growths and indeed later called the enostosis a calcified enchondroma. Brailsford (1935) wrote: "In the lower third of the medulla of the shaft of the femur it is not unusual to see collections of calcium. These are indications of healed inflammatory foci, probably tuberculous in origin." In our cases it was noted in every instance that there was no interference with the architecture of the bone, nor was there destruction of bone or new bone formation. The argument against Brailsford's supposition is to be found in Stabler's and our own pathological findings.

Since most of these appearances have been found by accident in patients past middle age it is reasonable to infer that they have been present for a long time. It is also reasonable to suggest that in Case I, in which there were symptoms referable to the site of the lesion in the lower end of the femur, the condition had not reached its final quiescent state.

SUMMARY

1. Five cases of calcified enchondroma are described. In all except one the condition was symptomless and was discovered accidentally.
2. The radiographic features are described and the differential diagnosis is discussed.
3. It is emphasised that when the diagnosis is in doubt biopsy should be undertaken.

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