BENIGN CHONDROBLASTOMA OF BONE
REPORT OF A CASE
JAMES A. ROSS and EDITH K. DAWSON, EDINBURGH, SCOTLAND

From the Royal College of Surgeons, Edinburgh

A benign chondroblastoma of bone is reported. It was unusual because it occurred in an old lady, in a toe, and it was not painful and radiologically resembled a chondroma. The coarsely lobulated tumour showed a varied microscopic appearance, but it consisted chiefly of closely packed sheets of small, round polygonal or fusiform cells. There was some calcification present. The literature is reviewed.

CASE REPORT

A woman aged eighty-two years complained of a painless swelling at the end of the fifth toe of the right foot, present for three years. It had not interfered with walking, though there was now an ulcer on its under surface; the big toe of the same foot was deformed. There was no swelling of the ankle and no loss of weight or other suspicious development. She attributed a large soft swelling on the lateral aspect of the thorax to a fall many years previously.

Examination showed a globular, slightly lobulated tumour deforming the end of the right fifth toe, approximately 4 centimetres in diameter, rounded and firm, with a few hard areas. On the plantar aspect there was a defined granulating ulcer 2 centimetres in diameter with no surrounding inflammation. The thoracic lesion was diagnosed as a large lipoma.

Radiographs showed a rounded soft-tissue tumour which had replaced the tip of the fifth toe (Fig. 1). It appeared to contain some calcified or bony fragments. It

The radiograph before operation. Note the calcified opacity.

A photograph of the bisected tumour, showing coarse lobulation. (× 1·2.)

James A. Ross, M.D., P.R.C.S. Edinburgh, Royal College of Surgeons, Edinburgh EH8 9DW, Scotland.
Small-cell undifferentiated chondroblasts with lobulation by fibrous bands (Haematoxylin and eosin, × 100.)

Undifferentiated chondroblasts with an early maturing focus. (Haematoxylin and eosin, × 100.)

Fully differentiated cartilage with calcific necrosis. (Haematoxylin and eosin, × 450.)

Extensive calcification with regressive cartilage cells in the chondroid matrix. (Haematoxylin and eosin, × 200.)

Benign chondroblastoma is a rare tumour and its comparatively late recognition with various synonyms suggests a fibroma or a chondroma. The lung fields were clear.

Operation—The toe was amputated through the metatarso-phalangeal joint. Healing was uneventful and weight-bearing subsequently good. Three years later, in January 1973, she was well with no further trouble.

Pathology—The transected tumour showed a well defined coarsely-lobulated appearance (Fig. 2) with a few areas of calcification which were small and scattered. Sections were stained with haematoxylin and eosin, phosphotungstic-acid haematoxylin and by Masson's trichrome and Van Gieson's methods. Microscopically the tumour showed a varied structure. Much of the tissue consisted of closely-packed sheets of small round, polygonal and fusiform cells with strands of fibrous tissue forming lobules (Fig. 3). Scattered irregularly in this undifferentiated tissue were more or less defined areas of early differentiating cartilage in a developing chondroid matrix (Fig. 4). High magnification showed other irregular foci of fully differentiated cartilage cells (Fig. 5) with progressive destruction by pericellular calcific deposit. Some areas showed a more regressive picture, with extensive calcification and degenerated cartilage cells embedded in abundant chondroid matrix (Fig. 6). A few multinucleated giant-cells were scattered singly or in small clumps in the small-cell areas (Fig. 7), but no mitotic activity, excessive vascularity or bone formation was observed.

INCIDENCE

Benign chondroblastoma is a rare tumour and its comparatively late recognition with various synonyms suggests
that earlier cases were misinterpreted. Small series were reported or reviewed by Codman (1931); Jaffe and Lichtenstein (1942); Coley and Santoro (1947); Valls, Ottolenghi and Schajowicz (1951); Sundaram (1966); Gravanis and Giansanti (1971) and others. Dahlin (1957) found only seventeen cases in 1,176 primary bone tumours at the Mayo Clinic, an incidence of less than 1 per cent. Jaffe (1958) had examined about thirty cases and Neviaser and Wilson (1972) found 109 reported up till then. It may occur in animals: Campbell (1969) described and illustrated a tumour in a young chicken at a costochondral junction "which may be analogous to the benign chondroblastoma of man".

**CLINICAL FEATURES**

**Site**—Benign chondroblastomas were recognised initially in the epiphysial areas of the long bones, especially the humerus, femur and tibia. Many unusual sites have since been reported, including the thoracic spine (Buraczewski, Lysakowska and Rudowski 1957); patella (Cohen and Cahen 1963); scapula (Wellmann 1969); ischium (Gravanis and Giansanti 1971) and rib (Assor 1973). Ackerman and Spjut (1962) mentioned, among 100 recorded cases, examples in the radius, fibula, talus, sacro-iliac region and temporal bones. It is rare in the small bones of the hands (Neviaser and Wilson 1972) or of the feet, as in the case described here.

**Age**—The tumour occurs mainly in adolescence or in early adult life. Jaffe’s thirty cases ranged from ten to seventeen years, Codman’s from twelve to twenty-four years. Pre-adolescent cases are very rare though Hatcher and Campbell (1951) found two examples at eight and eleven and a half years. Cases at older ages, even to sixty years (Coley and Santoro 1947), are only very occasionally found and no report of a tumour in a patient approaching the age of the one described here has been found in the literature.

**Sex**—Male cases predominate, as in the two to one ratio in sixty cases in the literature noted by Dahlin (1957) and four males in six cases studied by Sundaram (1966), but some reports show no sex predilection (Codman 1931).

**DISCUSSION**

The clinical recognition of a benign chondroblastoma may be difficult. The tumour has been considered a chondroma, chondrosarcoma, fibroma, fibrous dysplasia, fibrosarcoma, calcifying giant-cell tumour and, if haemorrhagic, an aneurysmal bone cyst. Tuberculosis was the initial clinical diagnosis in four out of six cases studied by Sundaram (1966). Ossification is rare (Codman 1931; Jaffe and Lichtenstein 1942) but osteoid and bone were found in a few cases reported by Gravanis and Giansanti (1971); this may suggest an osteosarcoma. The intact tumour is rarely available for gross examination and, though the defined mottled radiographic appearance is typical (Fig. 8), it may not be recognised because of the rarity of the tumour. The most likely misinterpretation is a giant-cell tumour of bone, a tumour which may rarely become malignant (Dyke 1931; Orr 1931).

**TREATMENT**

Amputation of the toe was satisfactory in the present case but this rarely applies in the more usual sites encountered, where curettage is the recognised treatment. Histological examination of adequate material is therefore essential in all cases to avoid misdiagnosis and unnecessary mutilation. Heavy irradiation alone or with curettage as a form of treatment is inadvisable because of possible damage to active epiphysial tissue in young patients, leading to
disturbance of growth with possible deformity. The prognosis is good and long-term survival the rule, even to thirty years (E. S. J. King's (1931) case of a boy of nineteen years, with a later note by T. King (1959)). No proven spontaneous malignant development has been found in the literature. A suspected recurrence of a tumour of the tibia treated by curettage and irradiation proved to be a sarcoma in the previously normal fibula within the irradiated field and not in the primary benign tibial growth (Hatcher 1945). It is now established that irradiation of bone may possibly cause later development of sarcoma.

It is difficult to understand why this tumour became clinically apparent at such an advanced age and with a histological structure of proliferating epiphysial tissue characteristic of the predominantly adolescent cases. Had a focus of undifferentiated cartilage, possibly ectopic, remained dormant for so long? Dedifferentiation is not an acceptable explanation in so mature a tissue as bone, if indeed it is ever a possibility in any tissue.

The tumour is a specimen in the museum of the Royal College of Surgeons, Edinburgh. We are grateful to Dr Henry L. Jaffe, New York, for permission to use the radiograph in Figure 8.

REFERENCES


Kolodny, A. (1927) Bone sarcoma. The primary malignant tumours of bone and the giant cell tumor. Surgery, Gynecology and Obstetrics, supplement 1, p. 44.


