MULTIPLE GIANT-CELL TUMOUR OF BONE
Report of a Case

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The occurrence of more than one giant-cell tumour of bone in the same person (that is, the appearance of the tumour otherwise than as a solitary lesion) is so unusual that one accepts only with great hesitation an apparent instance of this; such a case must be carefully scrutinised to eliminate hyperparathyroidism. Jaffe (1958) observed a case of giant-cell tumour involving the lower end of an ulna, the fifth metacarpal bone, the proximal phalanx of the ring finger and, perhaps, the upper end of the humerus. He found two other patients mentioned in the literature, one with two independent giant-cell tumours in a talus and in the adjacent navicular bone, the other, reported by Coley, in which lesions developed in both femora.

Coley (1949) concluded that rare reports of multiple lesions are probably instances of osteitis fibrosa cystica generalisata with tissue resembling giant-cell tumour. He found one case in which both femora were involved, already mentioned by Jaffe, and observed that on several occasions the condition extended across a joint to involve the other bone, for instance tibia to fibula and femur to acetabulum.

In their series of patients with giant-cell tumour of bone, Spjut, Dorfman, Fechner and Ackerman (1971) did not report any case with a tumour in more than one place. It was the same in the review by Mnaymneh, Dudley and Mnaymneh (1964) and by Erens (1971) who studied the series of the Netherlands Committee on Bone Tumours.

Goldenberg, Campbell and Bonfiglio (1970) reviewed 299 giant-cell tumours of which 218 fulfilled the criteria for full analysis. They found 222 lesions in 218 patients. This confirms the conclusion of the other authors, that multiple localisation of the tumour is extremely rare.

This paper reports a patient in whom multiple giant-cell tumours of bone developed, each at a different time.

CASE REPORT

In October 1966 a farmer’s wife, aged fifty-three, came to hospital complaining of pain in her left knee of six months’ duration. The pain was worse on walking and was relieved by rest. Examination showed some swelling and 20 degrees loss of flexion and extension of the left knee. Radiographs showed a radiolucent non-trabeculated area 5 centimetres in diameter in the lower end of the left femur. The bone cortex was thin and partly destroyed dorsally (Fig. 1). Radiographs of the thorax showed no evidence of tumour.

Investigations—Haemoglobin was 13·8 grammes, sedimentation 6 millimetres in the first hour, alkaline phosphatase 2·7 units (Bessey), serum calcium 9·2 milligrams per cent and inorganic phosphate 3·3 milligrams per cent.

Microscopic examination of a biopsy specimen (Figs. 2 and 3) showed multiple small pieces of rather cellular tissue in which there were scattered areas of necrosis. The stromal part of the tumour was composed of elongated cells and spindle cells with fusiform or oval nuclei. Some cells had a more or less epitheloid appearance and there were groups of foam cells. There was a moderate degree of polymorphism and the number of mitoses was conspicuous, up to two per high power field (×400). Scattered through the tumour tissue there were many rather small multinuclear giant cells with rounded nuclei, some of which showed pyknosis. Some small areas of osteoid with or without calcification were found. In tissue taken from the peripheral part of the lesion tumour cells were found between bony

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trabeculae. No decision could be made whether the tumour actually penetrated the cortical bone or not. A diagnosis was made of giant-cell tumour probably with some degree of malignancy. The Dutch Commission on Bone Tumours confirmed the diagnosis of giant-cell tumour, but classified it as grade II: not frankly malignant.

**Treatment and progress**—Treatment consisted in excision of 12 centimetres of the lower end of the femur and reimplantation of the bone after autoclaving for twenty minutes. The knee was then arthrodesed by removal of the articular cartilage, fixation with an intramedullary nail and supplementary grafting from the tibia of the same leg.

Pieces of the tumour taken during operation showed essentially the same microscopic picture as did the biopsy material. Local bone formation was distinct in the tumour (Fig. 4). In some areas giant cells were very numerous (Fig. 5).

The arthrodesed knee healed and the patient remained free of recurrence for eighteen months.

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**The second lesion**—In March 1968 the patient felt increasing pain in the right hip and could not take her full weight on that leg. Radiographs showed a radiolucent area in the right trochanteric region with a diameter of 5 centimetres (Fig. 6). Investigations showed: haemoglobin 12.8 grammes, sedimentation 9 millimetres in the first hour, alkaline phosphatase 2.2 units (Bessey) and calcium 9.4 milligrams per cent.

The biopsy material from this second tumour consisted of several small pieces of brownish coloured tissue. The microscopic picture was identical with that of the first tumour (Figs. 7 and 8). The stromal cells were of the same type, varying from spindle cells to cells with an epitheloid character. The nuclei were somewhat swollen and some showed distinct nucleoli. Again there were many mitoses—up to two per field of magnification ×400. Giant cells were quite numerous, rather large and contained many nuclei. In some areas there was slight fibrosis while locally some bone formation could be observed (Fig. 9). This time also the tumour was considered to be a giant-cell tumour with some degree of malignancy. The Commission on Bone Tumours graded it II to III.
Figure 2—The appearance is of a giant-cell tumour. There is a cellular stroma with moderate polymorphism and mitoses and giant cells are present. (Haematoxylin and eosin, ×470.) Figure 3—The same tumour as in Figure 1 to show the cellular stroma and the areas of foam cells. (Haematoxylin and eosin, ×470.) Figure 4—An area of bone formation in the tumour. (Haematoxylin and eosin, ×75.) Figure 5—A part of the tumour showing many multinuclear giant cells. (Haematoxylin and eosin, ×123.)
Treatment and progress—The upper end of the femur containing the tumour was resected to 2 centimetres below the lesser trochanter and the femoral shaft arthrodesed to the acetabulum. Fixation being obtained with a McLaughlin nail and plate.

The resected piece of bone was 11 centimetres long containing both trochanters and surrounding soft tissues with a diameter of about 8 centimetres. Longitudinal section showed a greyish-red tumour measuring 3-5 centimetres, and, at the site of the fracture the tumour looked as if it was invading the surrounding soft tissues. However, microscopically this was not confirmed and the tumour again had the same characteristics as in the biopsy material, but also there was haemorrhage and necrosis (Fig. 9).

![Fig. 6](image)

The second tumour, which occurred eighteen months after the first, was found in the upper end of the right femur. Characteristically transradiant, it has almost destroyed the calcar femorals. The hole in the greater trochanter was made at the time of biopsy.

The third lesion—A third tumour was discovered radiologically in September 1968; it was small, 3 centimetres in diameter, in the upper end of the shaft of the left femur (Fig. 10). Because of the short time between the appearance of the second and the third tumour, the patient was treated by radiotherapy, a tumour dose of 6,000 r being given.

Progress—In 1969 no further manifestations of the tumour had been found but, in April 1970, the patient developed sudden pain in the left hip and was unable to bear weight because of a pathological fracture through the tumour. The radiograph of the lung fields was normal.

Pain and the poor healing of the fracture necessitated a third resection. This was done in May 1970, when 6 centimetres of the proximal shaft of the left femur were resected and the bone reconstructed with a condylar plate.

Examination of the specimen showed that at the fracture the bone was widened and filled with greyish-brown tissue that was partly haemorrhagic. The cortex in places was very thin.

Histologically the appearance was the same as before, with spindle cells and other more swollen cells and a moderate degree of polymorphism in the stroma. There were numerous giant cells, and part of the tumour appeared viable. The fracture had caused extensive haemorrhage. There were several areas with hyalin connective tissue and irregularly calcified and deformed bone trabeculae. Mitoses were scarce, probably because of the radiotherapy. There was no tumour infiltration outside the cortex.

Further progress—Union of the shortened femur to the upper fragment was slow and in February 1971 the plate broke and, because of pain, had to be replaced with a nail and plate.
Figure 7—The second giant-cell tumour showing the cellular stroma with many multinucleate giant cells. (Haematoxylin and eosin, ×123.) Figure 8—The same tumour showing moderate polymorphism and typical giant cells. (Haematoxylin and eosin, ×468.) Figure 9—The third giant-cell tumour is identical to the other two. On the left is an area with haemorrhage and necrosis. (Haematoxylin and eosin, ×125.)
Fig. 10
A radiograph of the left upper femur almost two years after the appearance of the first tumour in the lower end of the same femur. The transradiant lesion is not trabeculated and there is thinning of the cortex.

Fig. 11
A radiograph of the pelvis five years after the onset of symptoms. Neither fracture shows radiological union but they were stable, painless and the patient was able to walk with crutches.
Present condition—The patient, despite several extensive operations, is in good general condition and is able to walk with crutches. There are no signs of further recurrence and the appearance of the hips is shown in Figure 11.

COMMENT

In this report of giant-cell tumour of bone involving three separate sites none of the tumours could be described as frankly malignant, although slightly atypical histologically. Whether there was one primary tumour which metastasised or three tumours of multifocal origin is difficult to answer with certainty; the presence of more than one giant-cell tumour in different bones in the same individual is most unusual. The first site was the lower end of the left femur and the second tumour was found just below the right great trochanter. It does not seem likely that the tumour should metastasise from the first site to the second, particularly as it was not obviously malignant, but this cannot be excluded. It is easier to consider that the third tumour could have metastasised from the first because it was situated in the same bone, in the upper end of the shaft of the left femur. The first tumour was radically removed and four years have now passed since the appearance of the other two lesions. It is still not possible to decide if the tumour was multifocal or had metastasised.

SUMMARY

1. A case is described of three giant-cell tumours, the first in 1966 in the lower left femur, the second in 1968 in the upper right femur, the third later in 1968 in the upper left femur.
2. None of the tumours could be described as frankly malignant.
3. Despite a lapse of four years it is still not possible to decide whether the first tumour had metastasised or whether all three arose independently by multifocal origin.

REFERENCES