FIBROUS CORTICAL DEFECT AND NON-OSSIFYING FIBROMA

PETER G. BULLOUGH, M.B., Ch.B.

JON WALLIY, F.R.C.S.

*Nuffield Department of Orthopaedic Surgery,
University of Oxford,
and
Department of Orthopaedics, War Memorial Hospital,
High Wycombe.*

THE FIBROUS cortical defect and the non-ossifying fibroma are benign fibrous tumours occurring, in the cortex of the metaphysis, in the long bones of children and young adolescents. The fibrous cortical defect occurs in children usually under ten years of age; occasionally it develops into the more extensive lesion found in young adolescents and known as a non-ossifying fibroma. Despite the superficial dissimilarities the one most probably gives rise to the other.

Because of their clinical rarity these tumours still cause misgivings in the minds of pediatricians, orthopaedic surgeons and pathologists. Their real incidence is probably many times greater than their clinical frequency would suggest since most of them are only discovered accidentally, when the patient is X-rayed for some trauma or other to the affected area, or, as we have seen, even in a control X-ray. Unless there is a pathologic fracture through the tumour it is unlikely that there will be any symptoms. In this presentation we review seven cases referred to us.

Case Reports

Case No. 1.

A six-year-old boy bumped his left knee. An X-ray revealed the lesion shown in Fig. 1. Curettage was performed and histological examination revealed only dense fibrous tissue. The diagnosis of fibrous cortical defect was made.

Case No. 2.

An eight-year-old boy was admitted to the pediatric wards with a six-months' history of pain in several joints including the left hip, knee and ankle and both hands. On examination he was tall for his age, 4 ft. 10 ins., and was rather gangly with a tendency to scoliosis. Initially he was thought to be a case of rheumatoid arthritis but whilst in hospital his ESR never rose above 15 mm/hr nor did he have any pyrexia. An X-ray revealed eccentric radiolucent lesions at both the lower end of the femur and the upper end of the tibia. Biopsy revealed the typical histology of fibrous cortical defects.

Case No. 3.

A twelve-year-old girl fractured the left clavicle in a fall and the X-ray incidentally revealed a trabeculated eccentric lytic lesion in the upper end of the humerus (Fig. 2).

FIG. 1.—A fibrous cortical defect of the femur in a six-year-old boy (Case 1).

Case No. 4.

A healthy youth of twelve was first seen in December 1963 with an inversion strain of his right ankle. On clinical and radiographic examination no fracture was seen. However, the X-ray showed a trabeculated lytic area in the lower third of the tibia. At operation there was normal periosteum and cortical bone which was removed to reveal a sclerotic walled reddish-brown fleshy tumour. Histological examination (Fig. 3) showed densely whorled fibrous tissue with an admixture of giant cells and foam cells typical of a non-ossifying fibroma. The wound healed uneventfully. On review to 1964 he has maintained full activity and is pain-free.

FIG. 2.—A non-ossifying fibroma of the humerus in a 12-year-old girl (Case 3).

Case No. 5.

A thirteen-year-old boy was seen after having bumped his right tibia. X-rays of the right leg were taken for possible evidence of injury and for comparison control X-rays of the left leg. The lesion (Fig. 4) was found on the control side. There had been no symptoms. It was decided to curette the lesion and histologic examination of the tissue proved it to be a non-ossifying fibroma.

Case No. 6.

A healthy youth of sixteen was seen following a torsion strain of the right ankle on 5th March 1962. There was tenderness and slight swelling over the lower third of the tibia. Radiographs revealed an oblique pathological fracture through a trabeculated lytic area which showed sclerosis of the margins (Fig. 5). A plaster cast was applied and maintained for twelve weeks when there was clinical evidence of firm union. Partial weight-bearing and later full weight-bearing was instituted with a rapid return to full activity including normal games. No biopsy was performed. Several radiographs and review to 1964 show a steady obliteration of the greater part of the lesion (Fig. 6).

Case No. 7.

A healthy girl of seventeen was first seen in May 1960 following a torsion strain of the right ankle. Radiographs showed a dubious fracture of the medial

FIG. 3.—A photomicrograph of the tissue curetted from a lesion in a 12-year-old boy (Case 4). Note the whorled bundles of fibroblasts and the admixed foam cells and giant cells.

malleolus. In the lower third of the tibia was an eccentric trabeculated lytic area which had sclerotic margins. Follow-up showed a slow slight increase in size and expansion of the lateral cortex (Fig. 7). At operation there was normal periosteum with a thin layer of bone overlying a tumour composed of reddish-brown fleshy material. Histological examination of the curetted material revealed cellular whorled fibrous tissue and numerous small giant cells. Haemosiderin, scanty foam cells with a few spicules of bone were present. The appearances were compatible with that of a non-ossifying fibroma. Wound healing was uneventful. The girl returned to normal athletic activities. After three years follow-up there has been little material clinical or radiographic change though the lesion can be seen to have progressed up the tibia shaft.

Discussion

These lesions, which are also referred to as metaphyseal fibrous defects (Hatcher, 1945) and non-osteogenic fibromas (Jaffe and Lichtenstein, 1942) are quite benign, and are probably self-limiting and self-healing. Unless they are large and liable to lead to fracture they need no treatment. If they require treatment, then simple curettage and packing of the cavity with bone chips is sufficient.

FIG. 4.—Almost the whole thickness of the lower end of the tibia is involved in a 13-year-old boy (Case 5).

In keeping with cases reported here most of the tumours occur in the ends of the long bones of the lower limb.

The fibrous cortical defect occurs in young children and is seen as a small lucent defect in the metaphyseal cortex close to the growth plate (Fig. 1).

On the other hand the non-ossifying fibroma is seen in older children (not usually before

FIG. 5.—A pathological fracture through a non-ossifying fibroma in a 16-year-old boy, X-ray dated March, 1962. (Case 6).

ten) and young adolescents. It is still a lucent defect but is much larger and often shows a trabeculated appearance. It is also further away from the growth plate.

It is a common mistake in the interpretation of X-ray pictures to refer to radiolucent lesions of the bone as cystic lesions but obviously the defect may be filled by solid but radiolucent tissue. Similarly, sometimes a radiolucent lesion has a trabeculated appearance. This is due to expansion of the cortex of the bone by the tumour leading to irregular thinning. On the X-ray picture this gives rise to alternate opaque and lucent zones; it does not imply

FIG. 6.—Another X-ray dated July 1963 shows obliteration of most of the lesion (Case 6).

loculation and yet how often we talk of a loculated cystic lesion when we mean a trabeculated lytic lesion.

The histologic appearances of the fibrous cortical defect and the non-ossifying fibroma are similar and it is generally believed that whereas most fibrous cortical defects heal, some do not and instead grow and are seen in an older age group when they are called non-ossifying fibromas (Jaffe, 1958). The non-ossify-

FIG. 7.—A non-ossifying fibroma in a girl aged 17 years (Case 7).

ing fibroma may become very large and extend across almost the full thickness of the bone and it is these lesions which tend to fracture and be clinically discovered. The fracture necessarily leads to haemorrhage and maybe callus formation, and thus there is an overlay of new bone formation, vascularization, haemorrhage and granulation tissue over the existing fibrous tissue and this may give some difficulty in histological interpretation.

The tumour represents a fibrous proliferation arising from the periosteum and is probably based upon a developmental defect (Caffey, 1955; Hatcher, 1945). In addition to intertwining bundles of fibrous tissue one sees giant cells and sometimes areas of foamy cholesterol-filled cells and even small haemorrhages, and these latter are most probably degenerative changes in the lesion. In association with the foci of haemorrhage there are haemosiderin containing cells and it is these which impart the brown-orange colour to the lesion grossly.

The large non-ossifying fibroma is still most frequently mistaken for a giant-cell tumour (osteoclastoma) both radiologically and micro-

scopically. In fact the classical radiological description of the giant cell tumour as a soap-bubble-like lesion is much more applicable to the non-ossifying fibroma.

However there are considerable differences both clinically and pathologically between the two lesions. The giant-cell tumour is rarely seen in patients under twenty and tends to involve the epiphysis in addition to the metaphysis; radiologically it does not show the sclerotic edge which is usual with non-ossifying fibromas.

Histologically it is important to realise that giant cells in a bone tumour are not pathognomonic of a giant-cell tumour, but in fact occur in significant numbers in several types of bone tumour.

Summary

The clinical, radiological and pathological characteristics of fibrous cortical defect and non-ossifying fibromas are discussed, and illustrated by seven cases recently referred to the authors.

We are grateful to Dr. Emilio Guicciardi, Lecco, Italy, for referring Case 3 to us.

REFERENCES

- CAFFEY, J. (1955): On Fibrous Defects in Cortical Walls of Growing Tubular Bones. *Advanc. Pediat.*, **7**, 13.
- HATCHER, C. H. (1945): The Pathogenesis of Localized Fibrous Lesions in the Metaphyses of Long Bones, *Ann. Surg.*, **122**, 1016.
- JAFFE, H. L. (1958): Tumours and Tumourous Conditions of the Bones and Joints. Philadelphia: Lea and Febinger.
- JAFFE, H. L. and LICHTENSTEIN, L. (1942): Non-osteogenic Fibroma of Bone. *Amer. J. Path.*, **18**, 205.
- MORTON, K. S. (1964): Bone Production in Non-Osteogenic Fibroma. *J. Bone Jt. Surg.*, **46-B**, 233.
- PURCELL, W. M. and MULCAHY, F. (1960): Non-osteogenic Fibroma of Bone. *Clin. Radiol.*, **11**, 51.
- SCHWARZ, G. S. (1960): Late Appearance and Evaluation of a Cortical Defect in a Boy with Delayed Puberty, *J. Bone Jt. Surg.*, **42.A**, 173.
- SELBY, S. (1961): Metaphyseal Cortical Defects in the Tubular Bones of Growing Children, *J. Bone Jt. Surg.*, **43.A**, 395.