MALIGNANT CHANGE IN FIBROUS DYSPLASIA

Report of a Case

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Since Coley and Stewart (1945) recorded two cases of sarcomatous change in polyostotic fibrous dysplasia, there have been a further twelve reported cases of malignant change occurring in patients with fibrous dysplasia (Table I). Eight of these occurred in patients with polyostotic fibrous dysplasia and, of these, three were in patients with Albright's syndrome. Of the other six patients, in five the malignant change occurred in a single bone affected by fibrous dysplasia, and in one I have been unable to obtain full details (Gyri 1951).

Although Elmslie distinguished clearly between "diffuse fibrosis of bone" and what we now know as hyperparathyroidism as early as 1914, the term fibrocystic disease continued to be applied to a number of bone conditions having similar appearances but different causes until Lichtenstein (1938) coined the title fibrous dysplasia. Consequently it is difficult to trace instances of malignant change in fibrous dysplasia before 1938, but it does seem that a patient reported by Elmslie in 1914 (referred to as Lawford Knaggs's case) was in fact a true instance of sarcomatous change in polyostotic fibrous dysplasia.

A further two patients, in whom malignant change occurred in large bone cysts, were reported by Platt (1947). Although from the text of his article he considered that these were similar to the cases reported by Stewart and Coley, no details of the original histology were given and it is impossible to be sure that these were cases of monostotic fibrous dysplasia.

In view of the rarity of this complication, it was considered justifiable to report another patient in whom sarcomatous change occurred.
TABLE 1
PREVIOUSLY REPORTED CASES OF MALIGNANT CHANGE IN FIBROUS DYSPLASIA

<table>
<thead>
<tr>
<th>Author</th>
<th>Type of dysplasia</th>
<th>Site</th>
<th>Tumour</th>
<th>Treatment and result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elmslie (1914)</td>
<td>Polyostotic</td>
<td>Femur</td>
<td>Giant-celled sarcoma</td>
<td>Amputation. Died 7 months later</td>
</tr>
<tr>
<td>Coley and Stewart (1945)</td>
<td>Albright's syndrome</td>
<td>Scapula</td>
<td>Giant- and spindle-celled sarcoma</td>
<td>Irradiation. Died 12 years later</td>
</tr>
<tr>
<td>Coley and Stewart (1945)</td>
<td>Polyostotic</td>
<td>Femur</td>
<td>Spindle-celled sarcoma</td>
<td>Irradiation. Died 4 years later</td>
</tr>
<tr>
<td>Dustin and Ley (1950)</td>
<td>Albright's syndrome</td>
<td>Pelvis</td>
<td>Polymorphic bone-forming sarcoma</td>
<td>Died before treatment</td>
</tr>
<tr>
<td>Sutro (1951)</td>
<td>Polyostotic</td>
<td>Tibia</td>
<td>Osteogenic sarcoma</td>
<td>Amputation. Alive and well after 3 months</td>
</tr>
<tr>
<td>Gyri (1951)</td>
<td>Monostotic</td>
<td>No other details</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perkinson and Higginbotham (1955)</td>
<td>Polyostotic</td>
<td>Femur and tibia</td>
<td>Osteogenic sarcoma</td>
<td>Disarticulation at the hip. Died 1 year later</td>
</tr>
<tr>
<td>Sabanas, Dahlin, Childs and Ivins (1956)</td>
<td>Monostotic</td>
<td>Maxilla</td>
<td>Osteogenic sarcoma. Post irradiation</td>
<td>No treatment. Died after 4 months</td>
</tr>
<tr>
<td>De Marchi (1956)</td>
<td>Monostotic</td>
<td>Mandible</td>
<td>Osteogenic sarcoma</td>
<td>Local excision. Alive, time unknown</td>
</tr>
<tr>
<td>Trubnikov and Skoblin (1956)</td>
<td>Monostotic</td>
<td>Femur</td>
<td>Osteogenic sarcoma</td>
<td>Unknown</td>
</tr>
<tr>
<td>Jaffe (1958)</td>
<td>Monostotic</td>
<td>Femur</td>
<td>Chondrosarcoma</td>
<td>Local excision. Alive and well after 5 years</td>
</tr>
<tr>
<td>Vakhurkina (1958)</td>
<td>Polyostotic</td>
<td>Tibia</td>
<td>Osteoblastoclastoma</td>
<td>Died. Treatment unknown</td>
</tr>
<tr>
<td>Jäger (1962)</td>
<td>Albright's syndrome</td>
<td>Maxilla</td>
<td>Osteogenic sarcoma</td>
<td>Died. No treatment</td>
</tr>
<tr>
<td>Sethi, Clinie and Tuttle (1962)</td>
<td>Monostotic</td>
<td>Fifth rib</td>
<td>Osteogenic sarcoma</td>
<td>Excision and irradiation. Died 6 months later</td>
</tr>
<tr>
<td>van Horn, Johnson and Dahlin (1963)</td>
<td>Polyostotic</td>
<td>Femur</td>
<td>Osteogenic sarcoma. Post irradiation</td>
<td>Hindquarter amputation. Alive after 17 months with pulmonary metastases</td>
</tr>
</tbody>
</table>

CASE REPORT

The patient was first seen at the London Hospital in 1930 when he was a boy of twelve. He was complaining of progressive bowing of his right thigh and of a lump at the back of the head. The serum calcium and phosphorus levels were normal and a diagnosis of osteitis fibrosa was made. Osteotomy of the right femur was performed. The parathyroids were explored; three were found to be normal but the left superior gland was not seen.

After this he remained well until 1951 when he fractured his left radius: this united without incident. He had no further trouble until 1957 when he fractured the left humerus. He was treated initially at another hospital, but because of the unusual radiological appearances he was admitted to the London Hospital for full investigation.

On examination he was found to have pigmented areas on the small of the back and the nape of the neck (Fig. 1). There was a prominence of the left parieto-occipital area. Deformities of the left arm, right leg and both hands were obvious and a skeletal survey was carried out, the bones involved being illustrated in Figure 2.

The results of the biochemical investigations confirmed the diagnosis of polyostotic fibrous dysplasia. The plasma calcium was 10.5 milligrams per cent, the inorganic phosphorus 2.2 milligrams per cent, alkaline phosphatase 36 units, blood urea 25 milligrams per cent, plasma
chloride 104 milliequivalents, plasma sodium 131 milliequivalents, plasma potassium 3.95 milliequivalents and the plasma bicarbonate 25 milliequivalents. The calcium balance was normal apart from a high urinary phosphorus.

In January 1963 he complained of pain in the right knee (Fig. 3). Two weeks later he slipped getting out of a chair, took all his weight on the right leg, and sustained a fracture of the right femur. He was treated by skin traction on a Thomas’s splint but a radiograph three weeks later showed obvious malignant change (Fig. 4).

Biopsy was performed; the sections showed a pleomorphic spindle and giant-cell sarcoma with a high mitosis rate in an area of fibrous dysplasia. There was slight differentiation to cartilage and osteoid (Fig. 5).

The tumour was irradiated with Cobalt 60 (10,000r in ten doses using wedged fields and given over a period of two weeks). Five days after the course was completed the right leg was amputated just below the greater trochanter. The wound healed by first intention and he was discharged home. He has remained well ever since without any clinical or radiological evidence of metastases.
**Histology of the specimen**—Examination of the specimen (Fig. 6) showed a fusiform, yellowish, partly necrotic sarcoma with cysts in its upper and lower parts replacing the lower shaft of the femur and forming a mass 14 centimetres by 13 centimetres that had completely destroyed the bone about 5 centimetres above the knee joint. It reached the intercondylar fossa and the back of the anterior articular cartilage; 3 centimetres of the medial condyle and 1 centimetre of the lateral condyle were not involved. No bone was being formed in it, but a little around it. The tumour was well encapsulated by periosteum except in front where it extended into muscle. There was no extension into the veins or into the subcutaneous plane at the biopsy site. Grey, uniform, gritty fibrous dysplasia of the shaft of the femur extended above the growth right up to the line of transection, with erosion of the cortex but no involvement of the soft tissues. Similar tissue was present in the whole of the S-shaped fibula, the upper half of the tibia and the anterior two-thirds of the talus; deposits replaced much of the calcaneus, the navicular and cuneiform bones, and all except the proximal fifth of the metatarsal bones and proximal phalanges. There was sharp demarcation between all of this tissue and the thinned cortex and the normal cancellous fatty bone which tended to break away from it.

Microscopically there was severe degenerative change in the nuclei of the sarcoma after irradiation: there were large smudgy nuclei, eosinophilic cytoplasm without collagen or bone, and extensive areas of complete necrosis. There was still a little sarcoma present at the upper edge of the main necrotic cavity, fading out very soon into the fibrous tissue that filled the
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marrow cavities in the greater part of the bones of the limb. The total width of this zone was about 2 millimetres; it was marked by a very conspicuous band of large osteoclastoma-like giant cells. Mitoses though still present were few and there was a lot of osteoid and collagen formation. No other foci of sarcoma were located in a series of large sections taken from the fibrous dysplasia that reached the articular cartilage in the lower femur, upper tibia and talus; it was sharply demarcated from the normal fatty marrow when it did not fill the medullary cavity completely, often by a narrow strut of normal lamellar bone. Foam cell areas were numerous but osteoclastic activity, apart from the zone mentioned above, was scarce (Fig. 7). There was no extensive haemorrhage or iron deposited from old haemorrhages; two cysts in the upper tibia were the only ones visible and there were no fractures.

SUMMARY

A brief review of the literature on malignant change occurring in fibrous dysplasia is given and a further case of a sarcoma arising in a patient with polyostotic fibrous dysplasia is reported.

I wish to thank Dr A. Stuart Mason for allowing me to report this case. I am indebted to Dr J. W. Landells for the histological studies and to Mr R. F. Ruddick and Miss P. Burgess for the illustrations.

REFERENCES


