

SOLITARY EOSINOPHILIC GRANULOMA IN BONE

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Solitary eosinophilic granuloma has been described in almost every bone of the body. It is commoner in children than in adults, and in its radiographic appearance it may simulate other conditions.

This report reviews the background of eosinophilic granuloma, discusses its relationship to histiocytosis X and suggests that some of these lesions may progress to a more complex form of the disease. The clinical features, laboratory findings and radiographs in forty patients seen at the Hospital for Sick Children, Toronto, during the last forty-one years are presented.

PREVIOUS REPORTS

The disease has been variously described among the xanthomatoses and osteomyelitides, but Lichtenstein and Jaffe (1940) defined it as a separate entity, and suggested the name eosinophilic granuloma. Otani and Ehrlich (1940) named it solitary granuloma of bone. Farber (1941) suggested a pathological gradation to include eosinophilic granuloma, Hand-Schüller-Christian disease and Letterer-Siwe disease. For these the title histiocytosis X was coined by Lichtenstein (1953). He suggested that eosinophilic granuloma is the localised form, and Letterer-Siwe's disease and Hand-Schüller-Christian disease are the acute and chronic disseminated forms.

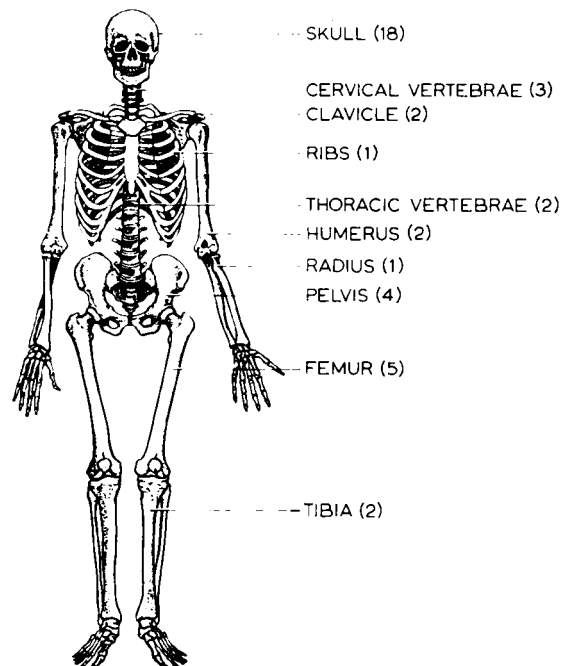


FIG. 1

Sites involved by solitary eosinophilic granuloma in forty children. No epiphyses were affected.

CLINICAL MATERIAL

Since 1926, 107 patients with histiocytosis X have been seen at the Hospital for Sick Children, Toronto. Of these, forty had a single bone lesion. Skeletal surveys done in twenty-nine of this group were uniformly negative. The presumptive diagnosis of a solitary lesion in the remaining eleven patients can be made with reasonable certainty in view of the careful follow-up ranging from one to thirty-five years, with an average of five and a half years. The diagnosis was proven by biopsy in all cases.

The sex distribution was equal, and the age incidence was evenly distributed from seven months to fourteen years.

CLINICAL FEATURES

More than half the children came with a history of localised pain. Swelling was a prominent symptom only when a

superficial bone was involved—the skull and clavicle in this series. In fifteen children local trauma brought the disease to attention.

The skull was the site of nearly half the lesions and the pelvis and femur were involved in another quarter (Fig. 1).

INVESTIGATIONS

The erythrocyte sedimentation rate was between 16 and 59 millimetres in the first hour in eleven of the twenty-four children in whom the test was done.

A peripheral smear was done in twenty-six of forty patients. Only four showed an eosinophilia of from 6 to 8 per cent.

In sixteen patients biopsy material from the lesion was cultured. In two staphylococcus albus was cultured, in one a non-pyogenic staphylococcus, and in another streptococcus viridans. In the remainder cultures were sterile. Five guinea-pig inoculations for tuberculosis were done and all were negative. Two virological examinations were also negative.



FIG. 2

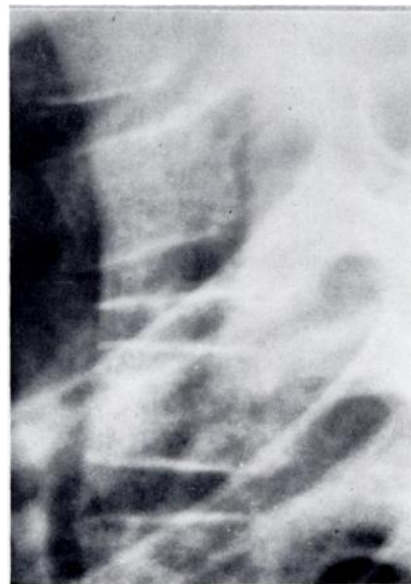


FIG. 3

Figure 2—Lateral radiograph of skull showing an osteolytic, scalloped defect of the frontal bone with no bone reaction. Figure 3—Radiograph showing vertebra plana caused by a solitary eosinophilic granuloma.

RADIOGRAPHIC FEATURES

Initial and subsequent radiographs of twenty-six patients were reviewed. The affected bone showed localised rarefaction with added features specific to the region. For example, a lesion in the skull had a lytic area involving both tables, with no marginal sclerosis or periosteal reaction. The outline was scalloped (Fig. 2). In the lumbar and thoracic regions of the spine the vertebra plana of Calvé, with its classic "coin-on-edge" appearance, may be caused by eosinophilic granuloma involving the vertebral body (Compere, Johnson and Coventry 1954) (Fig. 3). The height of the body is reduced without horizontal expansion, and consequently its radiological density is increased. The disc spaces apparently remain normal. Kyphosis develops at the site of vertebral collapse. Spontaneous interbody fusion does not occur.

In the long bones the lesion usually begins in the medullary cavity of the diaphysis and spreads by osteolysis. The edges of the tumour may be ill-defined, the cortex eroded from

within and expanded, varying amounts of laminated, subperiosteal new bone being laid down in a fusiform manner. This pattern is particularly marked in the femoral shaft (Fig. 4). If the lesion is high in the shaft of the femur, reactive new bone formation may extend for a considerable distance distally but does not appear along the femoral neck (Fig. 5). An inexplicable feature is the rapidity with which a lesion may develop (Figs. 6 and 7).

Radiologically, the lesion may mimic Ewing's sarcoma, with medullary destruction, cortical erosion, expansion and perforation, invasion of soft tissue and layered periosteal new bone formation. Among other lesions to be differentiated are osteolytic osteogenic sarcoma, metastatic tumour, particularly a neuroblastoma, and Brodie's abscess. The diagnosis of eosinophilic granuloma can be confirmed only by biopsy.



FIG. 4



FIG. 5

FIGS. 4 AND 5

Figure 4—Radiograph of a lesion of the femoral shaft with endosteal erosion and subperiosteal deposition. Figure 5—Radiograph of a subtrochanteric lesion with marked periosteal reaction distally, but none proximally.

HISTOLOGY

Microscopically, the delicate connective-tissue framework of the lesion is moderately vascular and cellular, containing histiocytes, plasma cells, small lymphocytes, neutrophils, giant cells, and foam cells, and especially eosinophilic leucocytes (Fig. 8). In two cases a diagnosis of Ewing's sarcoma made before 1940 has been revised to that of eosinophilic granuloma. Both patients were alive and well more than twelve years later. In the same period three other lesions were misdiagnosed as lymphosarcoma, reticulum-cell tumour and giant-cell tumour.

TREATMENT

Treatment is shown in Table I. Of the forty patients in the series, six had a biopsy only and received no treatment. In three others the tumour site was irradiated after biopsy. In

two patients biopsy was followed by curettage, and in a further nineteen patients the lesion was curetted only. Ten others had curettage, two combined with a bone graft, the remainder followed by irradiation.

COMPLICATIONS

Complications occur only because of the site of the lesion, or the treatment. Of our patients, one boy with a lesion in the body of the fourth thoracic vertebra developed a transient

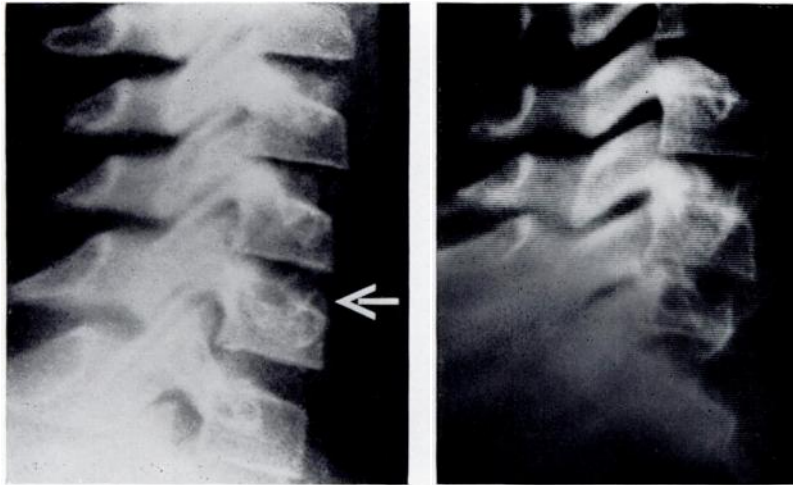


FIG. 6

FIG. 7

Figure 6—Initial lateral radiograph of the cervical spine showing a small area of bone destruction at the upper margin of the sixth cervical vertebra. The patient complained of pain following a trivial injury. Figure 7—The same case ten days later showing almost complete destruction of the body.

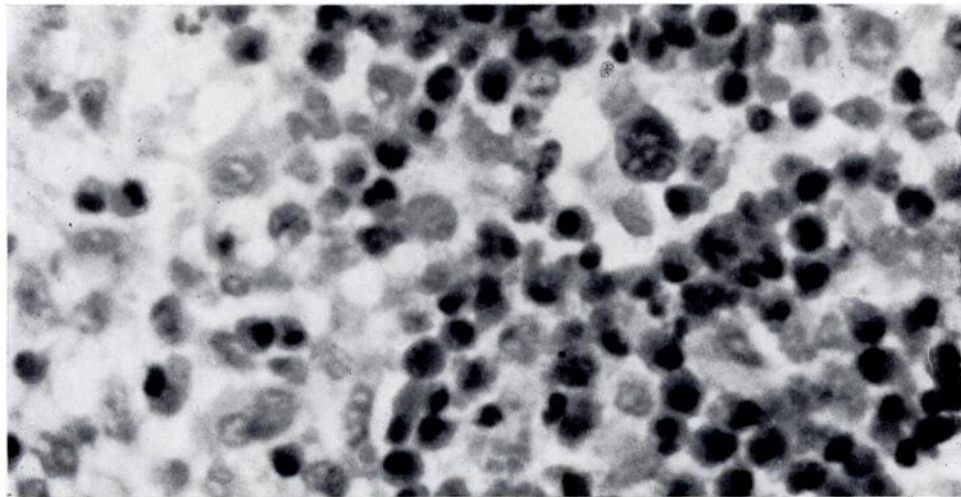


FIG. 8

Photomicrograph of material from a solitary lesion showing a preponderance of eosinophilic leucocytes. (Haematoxylin and eosin, $\times 300$.)

drop foot, two children with cranial lesions involving the orbit developed proptosis, and five had pathological fractures, four before treatment and one after curettage.

One patient, aged three years, had several courses of irradiation to her face after a lesion, diagnosed histologically as a lymphosarcoma and since reclassified as eosinophilic granuloma,

had been removed from the temporal region. Five years later she had bilateral cataracts, and twenty-five years after that she developed a mixed salivary tumour of the tongue, a rodent ulcer on the forehead and a microfollicular adenoma of the thyroid.

DISCUSSION

Ochsner (1966), reviewing the literature and the experience of his own clinic, was able to find a report of only one patient with a solitary eosinophilic granuloma of bone who later developed further lesions. He questioned the histopathological similarity of the histiocytosis X. However, Lichtenstein (1964) reported three cases in which the lesion appeared later in local lymph glands.

Among the 107 patients seen in the Hospital for Sick Children with histiocytosis X, forty had a solitary lesion in bone and are the subjects of this paper. Of the remaining sixty-seven patients four were originally considered, on the evidence of skeletal survey and biopsy, to

TABLE I
METHODS OF TREATMENT FOR SOLITARY EOSINOPHILIC GRANULOMA OF BONE IN FORTY CHILDREN

Bone affected	Biopsy alone	Biopsy and irradiation	Biopsy followed by curettage	Curettage alone	Curettage with bone graft	Curettage and irradiation	Total
Skull . . .	2	2	2	9	—	3	18
Cervical spine .	1	—	—	1	1	—	3
Thoracic spine .	—	1	—	1	—	—	2
Rib . . .	—	—	—	—	—	1	1
Pelvis . . .	—	—	—	2	—	2	4
Clavicle . . .	1	—	—	—	—	1	2
Humerus . . .	—	—	—	1	—	1	2
Radius . . .	—	—	—	1	—	—	1
Femur . . .	—	—	—	4	1	—	5
Tibia . . .	2	—	—	—	—	—	2

have solitary eosinophilic granuloma, but later showed more widespread forms of the disease. In one a lesion appeared in the ilium two years after the initial skull lesion, and was followed by multiple bony involvement and diabetes insipidus, a common feature of the chronic disseminated form of histiocytosis X. A second patient, whose initial lesion was in the femur, developed the first of many other bony lesions eleven months later. A third patient presented with a second lesion in the skull eight months after the first, and a fourth patient developed a lesion in the skull one and a half years after curettage of the original femoral lesion.

In two of these four patients the initial lesion continued to expand after biopsy and irradiation. This is contrary to our experience with true solitary eosinophilic granuloma; it suggests that the disease may become widespread, thus altering the prognosis and treatment.

Irradiation has its hazards. The tumours which developed years after irradiation in the patient originally treated for lymphosarcoma, later reclassified as eosinophilic granuloma, may have been iatrogenic.

All the patients with true solitary eosinophilic granuloma in this series showed clinical and radiographic improvement regardless of the treatment they received. The lesion recurred

in none during the follow-up period. This supports the concept that solitary eosinophilic granuloma in bone is a benign self-limiting process and that irradiation is not necessary for its treatment.

SUMMARY

1. Forty patients with solitary eosinophilic granuloma of bone from the Hospital for Sick Children, Toronto, have been reviewed. They had clinical and laboratory findings similar to those reported by others except for the erythrocyte sedimentation rate, which was raised in nearly half the patients tested.
2. Radiographs in all cases showed the lesion to be osteolytic. In the skull and cervical spine there was no bony reaction; in the thoracic and lumbar spine the typical picture of Calvé's disease was produced; in long bones the cortex commonly showed endosteal erosion and periosteal reaction.
3. In one patient the lesion progressed so rapidly that the body of a cervical vertebra was destroyed within ten days.
4. The differential diagnosis includes sarcoma. Biopsy is essential.
5. All the patients improved regardless of the treatment they received. Complications were due either to the site of the lesion or to its treatment.
6. Expansion of the lesion after biopsy indicates a more widespread manifestation of histiocytosis X.

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