OSTEOID OSTEOMA

A CLINICOPATHOLOGIC STUDY OF 20 CASES*

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FROM THE SECTIONS ON SURGICAL PATHOLOGY AND ORTHOPEDIC SURGERY OF THE MAYO CLINIC, AND THE MAYO FOUNDATION, ROCHESTER.

IN 1935, JAFFE[30] described, under the title of "osteoid osteoma" a peculiar lesion of bone which previously had not been recognized as a distinct entity. Clinically the lesions behaved like atypical osteomyelitis and roentgenologically they exhibited many of the features of sclerosing osteomyelitis of Garré. Microscopically the lesions lacked the features of inflammation and presented instead many of the elements of a benign neoplastic condition. Typically there was a soft, brownish, ridiculously small centrally located nidus consisting of osteoblasts and osteoid tissue in a fibrovascular matrix, and about this there was usually a disproportionately extensive zone of osteosclerotic bone. Since the original contribution by Jaffe[30] some 36 groups of investigators have reported single cases or series of cases of the condition and the current total of cases reported approaches 150.[2-4, 12-15, 18, 21-24, 29-34, 36-38, 40, 42, 43, 45, 46, 49-51, 53-55, 57-59, 61]

Two questions arose: (1) Is osteoid osteoma an entity? (2) Is the lesion inflammatory, degenerative or neoplastic? The first of these has been settled by an affirmative answer and a mad scramble to add examples to the growing list of case reports. The latter remains to be proved conclusively; however the majority of the authorities[2-4, 12-15, 20-22, 28, 29, 36, 37, 40, 43, 46, 49-51, 53-55, 57-59] side with Jaffe and Lichtenstein[33] and classify the condition as a type of osteoma.

At this time certain high lights in the historical evaluation of osteoid osteoma as illustrated by the excellent contributions of the literature will be listed briefly. These are as follows:

1. Osteoid osteoma has been reported in almost every bone in the body with the exception of the skull and mandible. It is most commonly found in the shafts of the long bones in the lower extremities.

2. Pain is a most outstanding and constant clinical feature; it often precedes by months the development of positive roentgenologic signs. It usually increases in intensity in spite of all forms of treatment short of surgical extirpation of the lesion including the central nidus.

3. The early roentgenographic appearance of the central nidus is that of a zone of relative radiolucency; this appearance may change later as a result of deposition of calcium within the matrix of osteoid tissue.

4. The widespread osteosclerosis around the central nidus has not been accounted for. This sclerosis is approached in degree only by the osteoma formation seen over certain intracranial meningiomas.

5. The central nidus or the actual osteoid osteoma is constantly small. Its dimensions are usually measured in milli-

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TABLE I.—*Data in 20 Cases of Proved Osteoid Osteoma.*

Case and Age of Patient	Complaint	Examination	Roentgenograms	Treatment and Result
1 17 yr.	Pain in L. tibia for 9 mo.	Thickening and tenderness medial aspect of L. tibia	Cortical radiolucency of L. tibia surrounded by osteosclerosis	Excision of diseased bone; no symptoms 2 yr. later
2 13 yr.	Pain in L. elbow for 9 mo.	Indurated fixed enlargement of L. ulna with limitation of movement and local temperature	Small area of translucency in upper third of L. ulna surrounded by osteosclerosis	Excision; no symptoms 4 yr. later
3 14 yr.	Pain in R. hip for 5 yr.; began during pertussis	Limp; limited flexion and extension of hip, atrophy of muscles of R. leg	Osteosclerosis 3 cm. in diameter in R. femoral neck; bulging periosteum and central zone of osteoporosis	Excision; no symptoms 6 mo. later
4 16 yr.	Swelling and pain of R. forearm for 6 mo.	Fixed tender mass 7.6 x 10 cm. in upper third of R. ulna; local warmth	Dense sclerosis of cortex of R. ulna with bulging periosteum; central nidus with translucent halo	Excision of diseased cortex en bloc; no symptoms 3 yr. later
5 5 yr.	Painful swelling of R. arm	Enlarged, firm tender R. arm; anemia	Sclerosis in midportion of R. humerus surrounded by thickening of periosteum; central zone of radiolucency	Saucerization of sclerotic bone after removal of central nidus; no symptoms 6 mo. later
6 15 yr.	1938: pain in L. ankle. 1946: pain in L. ankle for 1 yr.	1946: bilaterally prominent malleoli; tender swelling over lower third of L. tibia	1938: no abnormality. 1946: radiolucent zone in cortex of lower third of L. tibia surrounded by sclerosis	1938: conservative treatment. 1946: bone drilled and diseased region saucerized; 3 yr. later slight pain but no treatment needed
7 12 yr.	Pain in R. thigh for 5 wk.	Indurated thickening of lower third of R. thigh with local heat. Sedimentation rate 32 mm. in 1 hr.	Fusiform thickening of lower third of R. femur with onion peel appearance of periosteum and subperiosteal translucent zone in sclerotic cortex	Nidus excised; no symptoms 10 mo. later; satisfactory healing.
8 15 yr.	Intermittent pain and swelling of L. leg for 1 yr.	Nontender swelling over lower third of L. tibia and slight muscular atrophy	Cortical sclerosis of lower third of L. tibia with poorly defined central translucent zone	Block of sclerotic bone removed with relief for 6 mo. only. At second operation diseased bone and nidus removed. No symptoms 9 mo. later
9 30 yr.	Pain and swelling of L. shin for 1 yr.	Swelling over R. tibia	Poorly defined translucent zone in lower third L. tibia surrounded by sclerosis and bulging of periosteum; 2nd examination after recurrence: nidus beneath periosteum	Overgrowth chiseled away, no nidus removed; recurrence in 3 wk. At second operation wide resection of diseased bone; no symptoms 2 yr. later
10 20 yr	Pain in L. thigh 18 mo.	Operative scar on L. thigh with fusiform swelling; motion of knee limited	Zone of osteosclerosis in middle third of L. femur with central radiolucent nidus	Wide block excision of diseased bone; heal [illegible]; no follow-up
11 15 yr.	Pain, worse at night, and swelling of R. leg for 9 mo. Limp, infectious mononucleosis with fever	Axillary and inguinal nodes enlarged; fixed indurated tender mass in middle of R. tibia; local heat, edema and atrophy of leg muscles	Radiolucent zone in cortex of midst of R. tibia surrounded by sclerotic area with periosteum thickened in onion peel manner	Wide excision, nidus identified and removed; no symptoms 1 yr. later; bony defect filled
12 19 yr.	Pain and swelling of L. ankle for 1 yr.	Thickening of middle third of L. tibia	Radiolucent zone surrounded by sclerosis in L. tibia	Chisel excision of diseased bone; no symptoms in 19 yr. follow-up

TABLE I.—(*Continued*).

13 19 yr.	Boring pain in R. hip	Slight limitation of flexion and rotation of R. hip	Radiolucent cortical spot middle third of R. femoral neck; minimal surrounding sclerosis	No improvement following trial of roentgen treatment. Excision of nidus; no symptoms 2 mo. after operation
14 33 yr.	Backache for 6 yr. after auto accident; relief from belt. Recurrence for 18 mo.	Tenderness in lumbar region	Pedicle of L-3 not visualized on right; osteosclerosis of transverse process	Removal of spine and right pedicle of L-3; no symptoms 8 yr. later
15 23 yr.	Increasingly severe pain in back for 3 yr. becoming constant and extending to L. thigh and leg	Muscles of L. thigh atrophied; straight leg raising test positive on left	Translucent zone midshaft of L. femur surrounded by sclerosis	Removal en bloc; no symptoms 2½ yr. later
16 23 yr.	Intermittent cramping pain in R. arm for 3½ yr.; localized to R. shoulder for last 3 mo.	Weakness and limitation of motion of R. shoulder	Irregularity of R. scapular margin below glenoid fossa with surrounding proliferation of bone	Diseased bone rongeured away; small nidus removed; well 1 yr. later
17 34 yr.	More or less constant pain in L. thigh for 1 yr.	Atrophy of muscles of R. thigh; limp	Small radiolucent zone in region of lesser trochanter on R. with thickening of overlying cortex	Removal of diseased bone; pain decreased for 2 yr. Some bony sclerosis visible. Therafter symptomatic relief
18 20 yr.	Severe pain in L. leg for 4½ yr.	Enlarged inguinal nodes and fusiform enlargement of L. tibia	Large radiolucent zone in middle third of L. tibia surrounded by bony sclerosis and bulging of the periosteum	Wide resection of L. tibia; defect filled with bone from L ilium. Later sequestrectomy for draining sinus and other operations; wound broke down
19 23 yr.	Pain in L. thigh for 5 mo. Some days constant; some days intermittent	Atrophy of L thigh for 3.8 cm.; tenderness over lateral aspect	Cortical thickening on anterolateral aspect of L. femur	Excision of most prominent area which contained a small osteoid osteoma; no symptoms after operation
20 10 yr.	Pain in L. thigh and knee for 2 yr.; increasing severity with occasional fever	Limp; temperature of 99.2° F.; tenderness in L. popliteal space; sedimentation rate 29 mm. in 1 hr.; tuberculin test negative	Small zone of rarefaction surrounded by bony sclerosis in upper third of L. femur	Radiolucent zone removed; no symptoms after operation

meters rather than centimeters or inches. The central nidus remains central and does not tend to erupt and invade the soft tissues as the central nidus in a giant cell tumor occasionally does.

6. Occasionally an overlying prolifer ative periosteal reaction is noted which may produce the "onion peel" appearance typical of Ewing's tumor of bone.

7. There is never observed any production of marrow by the mesenchymal cells.

MATERIALS AND METHODS

In order to obtain material for the present study, records of cases bearing the diagnosis "sclerosing osteitis," "Brodie's abscess," "solitary cortical abscess," "localized osteitis fibrosa," "osteofibroma," "osteoma," and "osteoid osteoma" were drawn from the file of the Mayo Clinic. As a preliminary we excluded all cases in which frank pus was encountered at the time of operation, those in which large sequestra were present, those in which multiple bony defects were found and finally all cases in which microscopic material was not available for study.

This screening process left us with about 150 cases for further analysis. The surgical specimens available in each instance were secured and reviewed. Notes

were made on the weight of tissue removed and the general characteristics. Careful search was made for soft tissue fragments which might represent the nidi of osteoid osteoma. An average of six blocks was selected from each specimen and these were placed in decalcifying solution preparatory to sectioning which was done both by the freezing and the paraffin methods. Staining with hematoxylin and eosin was employed routinely.

Roentgenograms, when available, were secured and scrutinized for radiolucent and radiosclerotic areas. An attempt was made to make a diagnosis from the roentgenogram in each case in an effort to evaluate the importance of this method as a single diagnostic test for osteoid osteoma. A review and summary of the clinical symptoms and signs were next made objectively in an effort to evaluate the importance of the clinical study in the diagnosis. In the resulting 48 cases the typical clinical and roentgenographic features of osteoid osteoma were present. In 20 of these microscopic examination of tissue confirmed the diagnosis.

TABLE II.—*Ages of Patients Affected.*

Age, Years	Patients
0–5	1
6–10	1
11–15	6
16–20	6
21–25	3
26–30	1
31–35	2
Total	20

TABLE III.—*Bones Involved*

Bone Involved	Cases
Femur	8
Tibia	7
Ulna	2
Humerus	1
Scapula	1
Vertebra	1
Total	20

SUMMARY OF CLINICAL AND PATHOLOGIC FEACURES IN 20 CASES IN WHICH DIAGNOSIS WAS TONFIRMED BY MICROSCOPIC EXAMINATION (TABLE I)

Age.—Thirteen of the 20 patients were from ten to 20 years of age. One patient was less than ten years of age and the remainder were more than 20 years old (Table II).

Sex.—Sixteen were males and four were females.

Bones Involved. — The femur was involved in eight cases and the tibia in seven. The ulna accounted for two lesions while the humerus, vertebra and scapula were each the seat of osteoid osteoma in one instance (Table III).

Symptoms and Physical Findings.—Pain, usually of a boring character, was present in all cases and it was a leading symptom in 18. In nine it was localized to the site of the osteoma and in 11 there was extension, often to the neighboring joints. It was nearly always intermittent, but gradually progressive in severity. In 12 cases it was worse at night. Analgesics afforded relief in only two of the 20 cases. Only two of seven patients who had been treated with light, heat, massage and so forth had noted improvement. Plaster immobilization in one case gave no better results. Penicillin and roentgen therapy were not efficacious and operations at the clinic and elsewhere in which the central nidus was not eradicated gave little in the way of symptomatic relief.

Eleven of the patients had observed local swelling over the part and several remarked on the appearance of redness or local heat. Yet only three patients had generalized reactions with fever and in one of these the elevation of temperature was on the basis of infectious mononucleosis. Two patients had lost weight. In another patient the condition began while he had active pertussis. Although eight patients mentioned trauma as a possible background, only one of these reported that the symptoms began at the time of the injury.

Physical findings were for the most part

localized to the site of the lesion. Thirteen of the patients exhibited tenderness of the affected region. A palpable mass was noted in 12 cases but not always in the same cases that localized tenderness was noted. Four patients showed increased local heat but redness of the skin was not observed in mildly elevated blood sedimentation rates. Furthermore, bacteriologic studies carried out from smears and cultures taken from the lesions at the time of operation revealed absence of causative micro-organisms.

Figures 1 to 9 show the roentgenologic and pathologic aspects in selected cases.

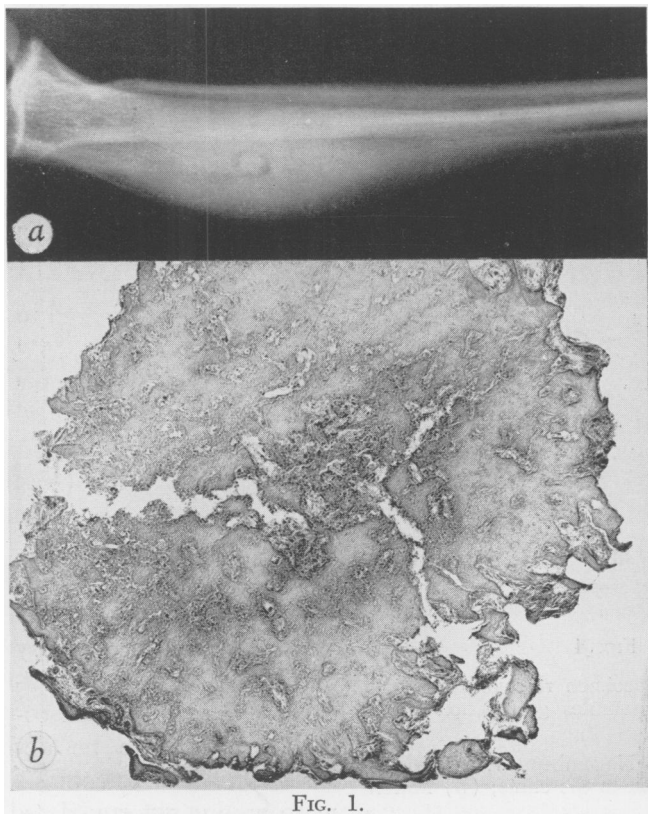

FIG. 1.

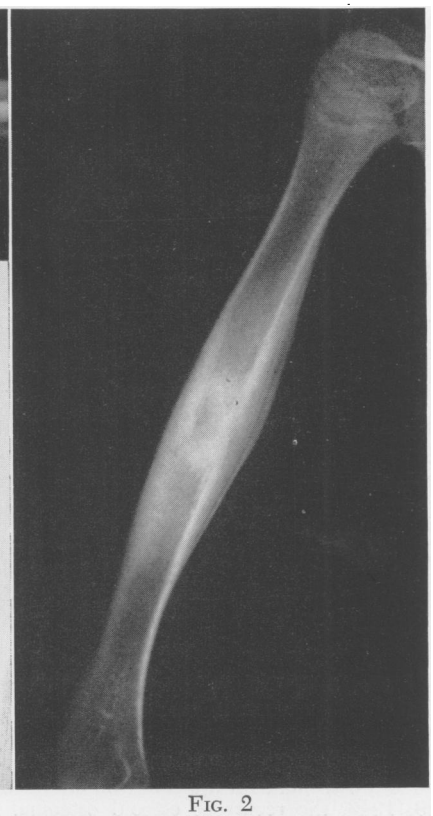

FIG. 2

FIG. 1.—(Case 4) a. A centrally located calcified nidus in the ulna. Nidus is surrounded by a radiolucent zone and dense sclerotic bone. There is marked bulging of the periosteum posteriorly. b. The actively proliferating nidus is sharply demarcated from the surrounding dense bone (hematoxylin and eosin ×14).

FIG. 2.—(Case 5). A poorly defined radiolucent nidus in the middle third of the shaft of the humerus with marked sclerotic bone around the periphery. The periosteum is laid down in layers (onion peeling) as is sometimes seen in Ewing's tumor of bone.

a single instance. Six of 15 patients with osteoid osteomas of the lower extremities had a limp; nine had detectable atrophy of muscle groups related to the site of the lesion.

Laboratory Data.—Routine blood and urinary studies were done on all patients with inconsequential findings. Possible exceptions were the two patients who had

Roentgenographic Data. — Roentgenograms of the affected bones sometimes revealed nothing abnormal in the presence of typical clinical symptoms. Later, however, all the affected bones showed evidence of periosteal proliferation. In these later roentgenograms, in 19 of the 20 cases typical radiolucent zones measured from 3 mm. to 2 cm. (Figs. 1 to 4). In five the translucent

zones contained irregular foci of calcification. In the case in which the transverse process of a vertebra was involved the entire bony structure had been destroyed and there was no surrounding bony sclerosis. In the other 19 cases relatively extensive osteosclerosis was observed around the aforementioned radiolucent nidus. The degree and the extent of the sclerosis bore no apparent fixed relation to the age of the lesion as measured in terms of clinical symptoms and signs. Calcification within the central nidus similarly was seen early and late in the clinical story (Table IV).

FIG. 3

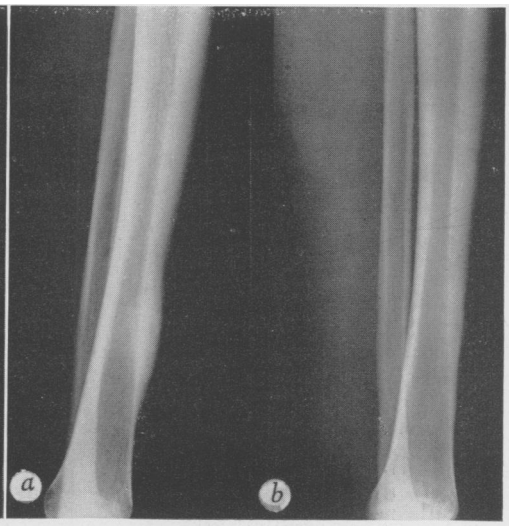

FIG. 4

FIG. 3.—(Case 7). Section through specimen removed, showing the nidus as a small, soft area which resembles granulation tissue within the bone.

FIG. 4.—(Case 9). The tibia; (a) November 17, 1945, the osteoid osteoma as it appeared on admission to the clinic; (b) March 29, 1946, the recurrent osteoid osteoma.

Pathologic Features.—Grossly, our specimens exhibited nothing new in the diagnosis of osteoid osteoma. Centrally, or more usually eccentrically located, a small pocket of reddish gray soft tissue resembling granulation tissue was always found (Figs. 1b and 5). The focus was never large and sometimes so small that it could be missed readily when the bone was removed by shaving with a chisel. On two occasions it was necessary to make roentgenograms of the removed bone in order to locate the nidus which we had missed by routine methods of examination. In another instance the osteoid osteoma dropped out of its bed while it was being sectioned following decalcification. These points are mentioned in passing to emphasize how easy it becomes to miss the main lesion and label the removed tissue "osteosclerosis" as had been done in several of our cases. The surrounding bone was always relatively large in amount and of extreme density when cut with a saw. It appeared to be relatively avascular.

The basic microscopic appearance of the central nidus was fairly constant throughout the series (Fig. 5). The tissue appeared cellular and vascular (Fig. 6). Large numbers of young mesenchymal cells were scattered irregularly and from these, transitions to fibroblasts and osteoblasts were to be observed. The osteoblasts were producing osteoid tissue in abundance and this appeared as a pale pink ground substance. Primitive trabeculae were very abundant, closely packed, narrow and interlacing one with another. Around many of them there was a palisading of osteoblasts. The interstices were filled with fibroblasts, mesenchymal cells and small blood vessels, and these last-named elements were particularly numerous about the periphery of the lesion. Osteoclasts were never abundant but were found in all specimens. Cartilaginous cells were not observed and the formation of the nidus was

suggestive of formation of bone from membrane. In many of the lesions bluish black granules of calcium appeared in the osteoid tissue and in some areas trabeculae appeared like fairly mature osseous tissue. No inflammatory elements were noted in any of the sections studied.

The surrounding bone was densely sclerotic in the 20 tumors studied. The intertrabecular spaces were few in number and appeared to be filled with proliferating fibrous tissue rather than marrow. Although these spaces contained fair-sized blood vessels, the osseous part of the tissue was relatively avascular. No areas of necrosis were seen.

TABLE IV.—*Physical Signs and Roentgenologic Findings.*

	Cases	Per Cent of 20 Cases
Physical signs and laboratory findings		
Local tenderness	13	65
Palpable mass	12	60
Muscle atrophy	9	45
Limitation of motion of local joint	6	30
Fever	6	30
Limp*	6	30
Palpable regional nodes	5	25
Increased local temperature	4	20
Leukocytosis†	2	10
Elevated sedimentation rate‡	2	10
Low basal metabolic rate§	1	5
Roentgenologic finding		
Radiolucent area	19	95
Surrounding bony sclerosis	19	95
Calcified nidus	5	25
Early roentgenograms normal	5	25
Destruction of bone	1	5

* Lesions of the lower extremities in 15 cases.
† More than 10,000 per cubic millimeter of blood.
‡ More than 30 mm. in one hour.
§ Less than −10 per cent.

The periosteal reaction was typified by a concentric fibrous thickening, but otherwise was not remarkable.

DIFFERENTIAL DIAGNOSIS

In the differential diagnosis from the pathologic standpoint the following three categories must be considered:

Inflammatory Lesions. — These include solitary abscess,[10, 17] (Fig. 10a) the sterile abscess of Brodie,[9, 16, 26] sclerosing nonsuppurative osteomyelitis,[8, 20, 25, 27, 35, 39, 44, 47, 48, 52, 60] syphilitic osteomyelitis and tuberculous osteitis (Fig. 10b). The two last mentioned have specific microscopic features and should not be confused.[5] In all of the others nests of inflammatory cells are to be found within the central cavity and in the interstices of the surrounding zone of osteosclerosis (Fig. 11a). Such inflammatory foci are absent from the lesions of osteoid osteoma.

A case, reported by Horwitz,[28] of multiple abscesses in a cuboid bone which had been removed surgically showed these abscesses to be going through many stages of healing. Some were relatively early abscesses and showed polymorphonuclear leukocytes and lymphocytes in small clusters with little or no fibrosis. The older abscesses were undergoing replacement by fibrous tissue but there was still some evidence of inflammation as lymphocytes and plasma cells were seen. In none of these abscesses was there evidence of repair by the formation of osteoid or atypical bony trabeculae. We reviewed the sections in this case as a part of our study.

Metabolic Diseases.—Metabolic diseases, such as polyostotic fibrous dysplasia,[1, 7, 41] eosinophilic granuloma of bone, Paget's disease and hyperparathyroidism, all may produce osteoporotic lesions of bone. These, however, are usually multiple and large. Microscopically, too, the lesions rarely exhibit osteoid formation to any degree and they do not reproduce the closely woven pattern of osteoid trabeculae. Peripheral sclerosis is rare except in eosinophilic granuloma but there the presence of eosinophils and foam cells facilitates differentiation.

Other Conditions.—Other types of osteoma, ossifying fibroma[6, 19, 20, 56] of bone and certain intracranial meningiomas may be associated with considerable sclerosis but the central nidus is lacking and the

tumor has a more or less specific picture. An ossifying fibroma in the immature stage may resemble an osteoid osteoma but this lesion does not have the same distribution, clinical history, roentgenologic aspect and is not easily confused with the tumors under discussion (Fig. 11b).

provided that the nidus is removed at the time of operation.

Whether spontaneous healing or regression of this lesion may occur seems to us a problem which can hardly be solved in the light of our present knowledge. Because of the fact that the diagnosis can be made only

FIG. 5

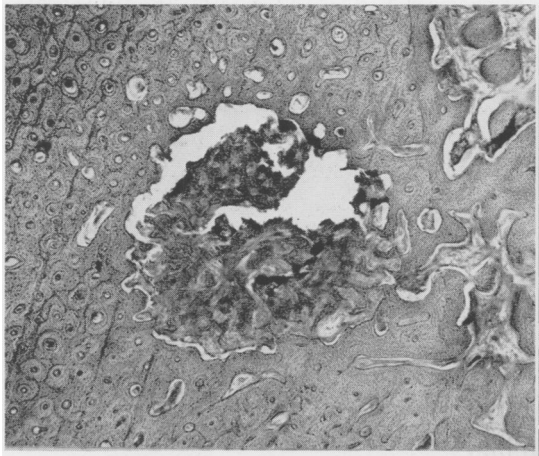

FIG. 5.—(Case 9). The nidus is clearly demarcated from the surrounding dense bone (hematoxylin and eosin ×12).

FIG. 6

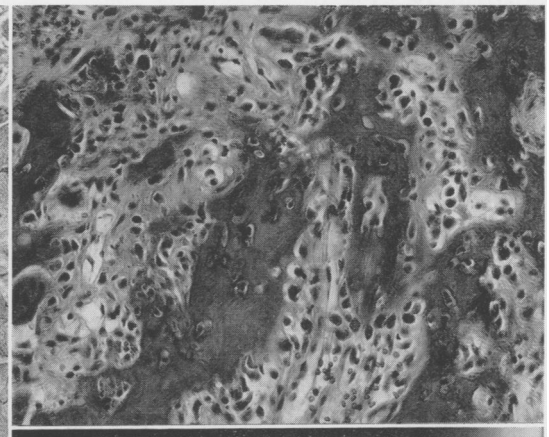

FIG. 7

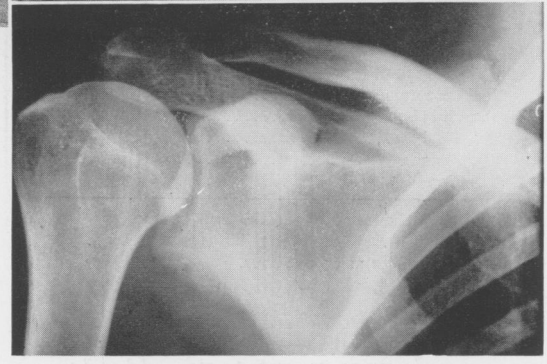

FIG. 6.—(Case 11). Atypical trabeculae of bone with osteoblasts lined on their surfaces and an occasional osteoclast within Howship's lacunae. The intertrabecular spaces are filled with a highly vascular, fibroblastic matrix which contains both calcified and uncalcified osteoid (hematoxylin and eosin, ×125).

FIG. 7.—(Case 16). The scapula showing a very small osteoid osteoma just beneath the glenoid fossa. An osteoid osteoma has not been reported in the scapula previously.

TREATMENT

All evidence, both from our cases and from the literature to date, points to the fact that surgical excision is the treatment of choice in these cases and that excellent results are obtained from surgical excision by microscopic examination of the tissue and the discovery of a typical nidus, it would seem that if spontaneous healing occurred in any case a diagnosis of osteoid osteoma could never be made unless this occurs in a recurrent lesion in which the diagnosis has definitely been established.

It might be well worth-while for some of these recurrent lesions to be followed for longer periods of time in order to determine this.

COMMENT

In an article by Brown and one of us[11] (Ghormley) it was implied that the lesion of osteoid osteoma did not exist. We are glad to be able to correct this viewpoint and add our support to the large group of investigators who have recognized the lesion and reported on it in the literature. We are, however, as yet unable to prove whether the lesion is inflammatory or neoplastic.

A recent review of all of the cases in the group which one of us (Ghormley) previously reported as "solitary cortical abscesses" revealed that from the standpoint of history, clinical findings and roentgenograms, these cases could not be distinguished from our cases of osteoid osteoma. Ten of the patients in that group were not operated on, and therefore, no tissue examination was made. It is possible, of course, that some, or even all, of the patients who were not operated on actually may have had osteoid osteomas. The pathologic findings in those cases in which operation made tissue available indicate that they were not cases of osteoid osteoma.

Are osteoid osteomas and solitary cortical abscesses then two phases of an essentially similar process? Are they variants of a single process, or actually two different lesions with similar clinical and roentgenographic pictures? In one instance, Case 18, an atypical picture of osteoid osteoma has developed in what seemed to be an

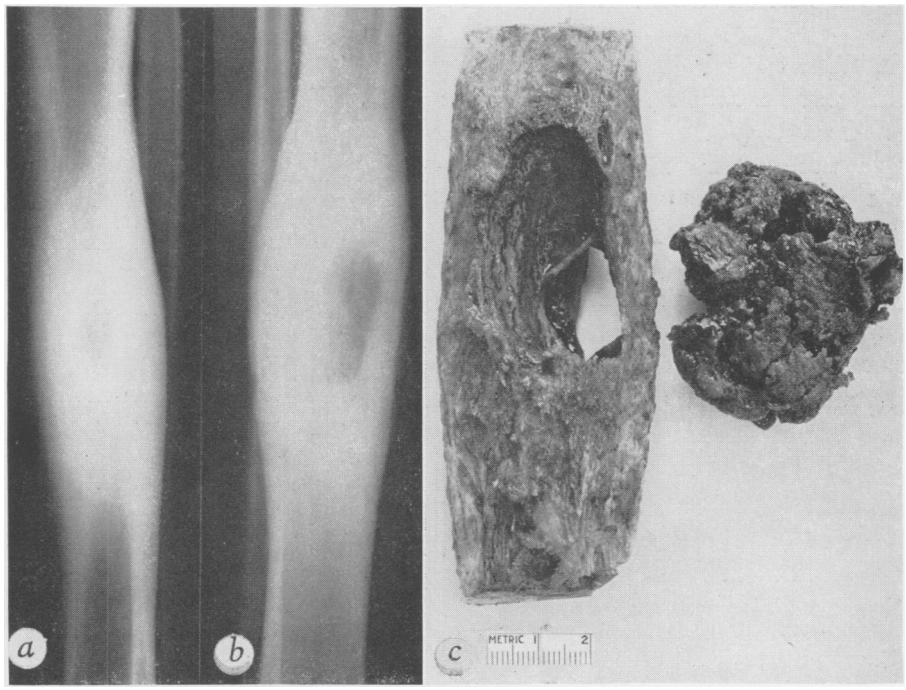

FIG. 8.—(Case 18). The left tibia; (a) On September 1, 1943, showing a poorly defined radiolucent area surrounded by dense sclerotic bone. This roentgenogram was made prior to any surgical procedure. (b) January 24, 1946; a very large osteoid osteoma of the tibia with characteristics more closely resembling a neoplasm of bone. This roentgenogram showed the appearance of the lesion on admission to the clinic. (c) The specimen removed. Note the large cystic hemorrhagic cavity containing some tissue resembling granulation tissue.

osteoid osteoma from the clinical, roentgenographic and pathologic picture. This is the only case in which we might say a true neoplastic type of change has been observed.

On the other hand, we know of one case in which the clinical and roentgenologic characteristics of osteoid osteoma were observed by us several years ago, but operation was not performed and therefore the diagnosis was never proved. Recent follow-up reports in this case, together with roentgenograms, indicate that the lesion has disappeared.

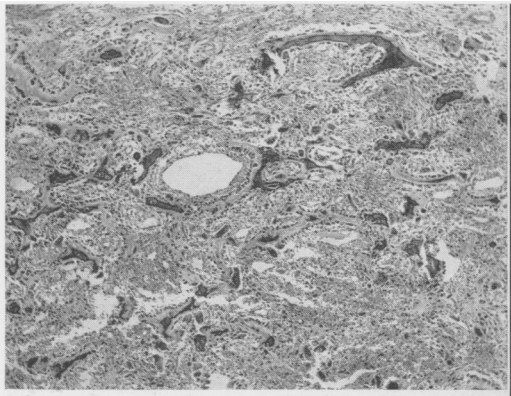

FIG. 9

FIG. 9.—(Case 18). A typical area of the nidus which consists of atypical bony trabeculae with some osteoid in the interstices. A small fragment of surrounding dense bone may be seen in the periphery (hematoxylin and eosin ×35).

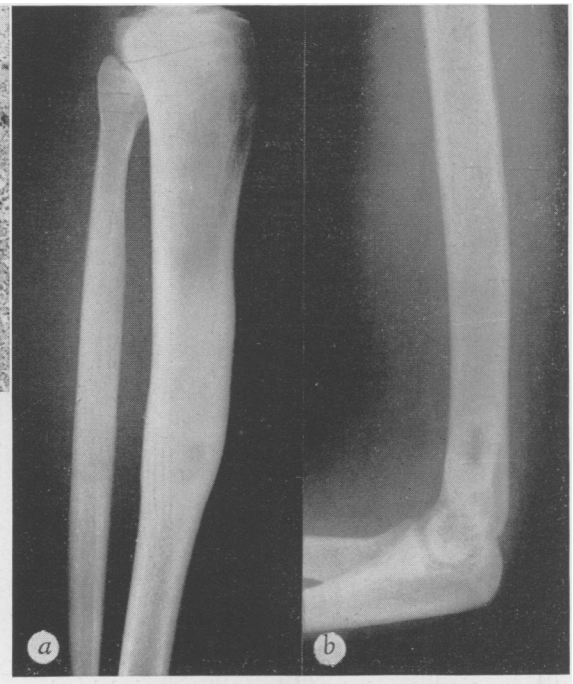

FIG. 10

FIG. 10.—(a) A solitary eccentric cortical abscess of the tibia, proved microscopically. This lesion might be confused with osteoid osteoma from the roentgenogram. (b) Proved tuberculous abscess of humerus showing roentgenographic characteristics of osteoid osteoma.

The patient, a girl, age 7 years, was admitted to the clinic on October 9, 1941. For 4 months her mother had noticed that she was limping, although the child did not complain of pain. Roentgentograms of the left lower extremity had revealed nothing abnormal but rest in bed was advised to await further developments. While the child was in bed she had a low-grade fever (up to 99.5° F.) and lost one pound (0.5 Kg.) per month in weight. She occasionally awoke at night and wanted her left knee massaged.

General examination revealed a temperature of 99.2° F. with a pulse rate of 104 beats per minute. There was some limitation of external rotation of the left hip and atrophy of the left thigh. Urinalysis showed albumin grade 2+ on a grading basis of 1 to 4. Results of routine blood tests were normal. A skin test was positive for Brucella but an agglutination test for Brucella gave negative results. Roentgenograms showed a small translucent area within the neck of the left femur (Fig. 12a).

We advised a program of limitation of activity with more or less constant rest in bed and sulfathiazole tablets for periods for 2 to 3 weeks at intervals. Her parents were asked to bring the child back every 6 weeks to 2 months for re-examination. Roentgenograms were again reviewed in December, 1941, and little change in the previously described lesion was noted. The same program of treatment was advised for another 3 months. In February, 1942, she was walking with only a slight limp and began to attend school for 2

FIG. 11

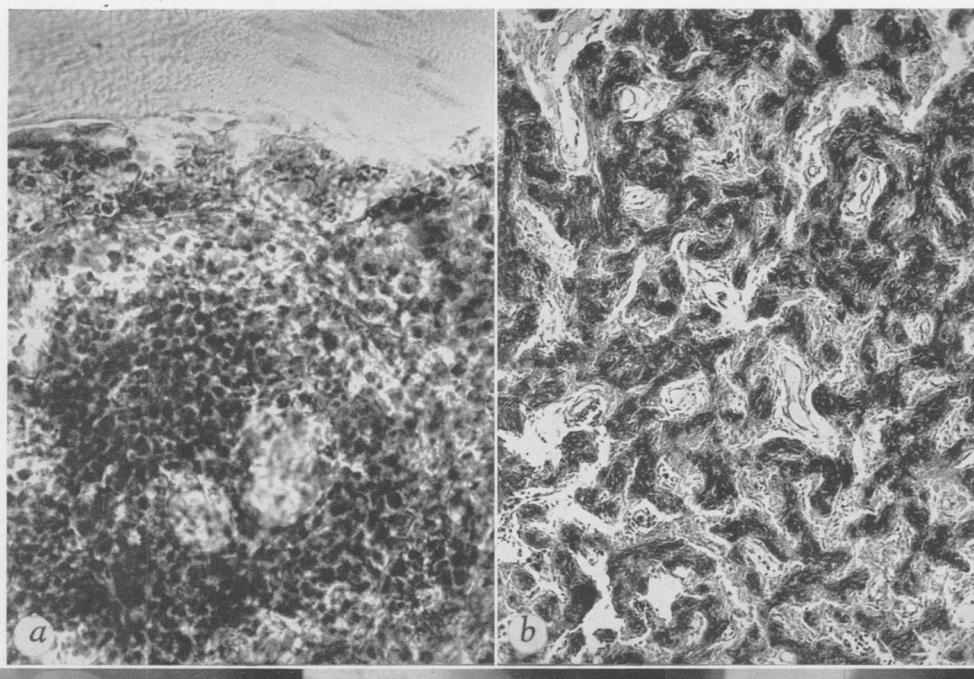

FIG. 12

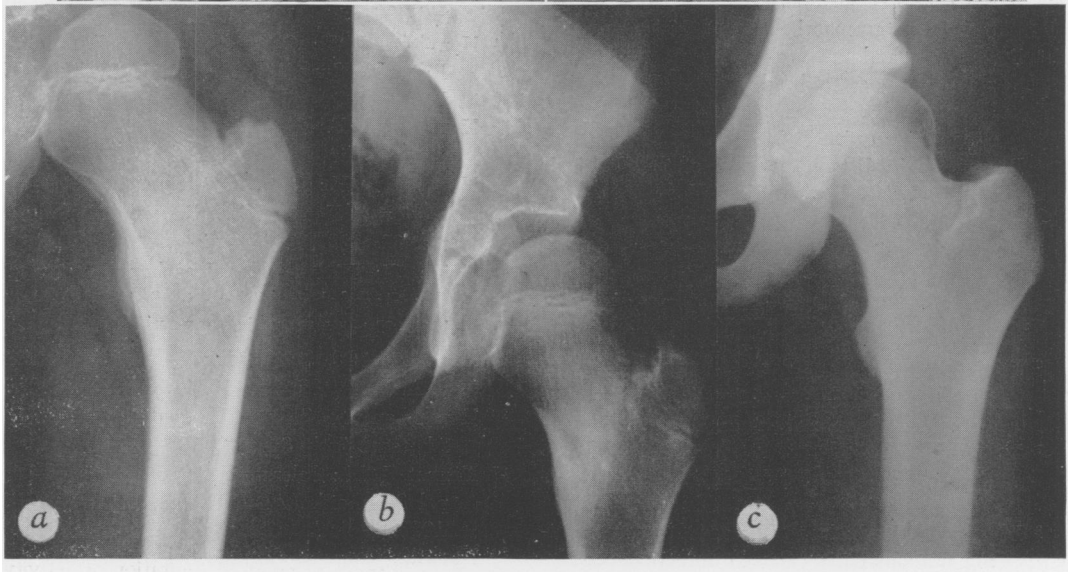

FIG. 11.—(a) Section from a bone abscess showing nests of inflammatory cells surrounded by dense bone. There is no active bone proliferation and there is no osteoid (hematoxylin and eosin ×20); (b) section taken from an ossifying fibroma of the right antrum showing highly calcified osteoid with vascular fibroblastic interstitial tissue that might be confused with osteoid osteoma microscopically (hematoxylin and eosin, ×75).

FIG. 12.—(Case 21). The upper part of the femur; (a) October 10, 1941, a small radiolucent zone surrounded by moderate sclerosis of bone may be noted in the medial aspect of the base of the neck; (b) August 19, 1942, ten months after conservative treatment was begun the radiolucent zone in the neck of the femur is gone; (c) about seven years after "a." The bone is completely normal roentgenologically.

to 3 hours a day. Roentgenograms revealed some tendency toward healing with more surrounding sclerosis and a less clearly defined translucent area within the neck of the femur.

In May, 1942, the child was gaining weight, walking with less of a limp and attending school on a half-time basis. Roentgenograms in August, 1942, showed a progression of the healing process (Fig. 12b). She was followed regularly at about 2 month intervals until April, 1948, at which time she was completely asymptomatic with roentgenograms of the left femur entirely negative (Fig. 12c).

Such observations lead us to believe that we are dealing with a lesion which may at times develop one type of pathologic picture and at other times a different picture.

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