CONVENTIONAL RADIOGRAPHY ANALYSIS OF 70 CASES OF PROVED APPENDICULAR-SKELETAL-RELATED OSTEOSARCOMA IN RAMATHIBODI HOSPITAL

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ABSTRACT

A retrospective analysis of conventional radiographic appearance of the appendicular skeletal related osteosarcoma patients, who came for pre-operative chemoembolization was presented in 70 cases. The most common age range was 16-20 years old. Male to female ratio was 1.3 to 1.

The presenting symptoms were pain and soft tissue mass. Central osteosarcoma occupied 90% of cases and the rest was its variant-telangiectatic type. Around knee involvement was the most common area. Long bones predominated with rare flat bones involvement.

Every region of the bone may be involved, but 85% included metaphyseal region. There was no isolated epiphyseal involvement. Usually the radiographic pattern was mixed lytic and blastic and purely lytic lesion. There was no good correlation between the roentgen appearance and the histologic type. The osteoid matrix represented 74%, chondroid matrix 14% and unclassified 13%. 81% had associated mass, and more than half of them were larger than 5 cms. The sunburst or sunray, the Codman's triangle or combined pattern represented 66%, the rest was spiculated pattern and combined spiculated and Codman's triangle. The finding were not different from those reported by previous authors, except epiphyseal plates were involved mainly in young children whose growth plates were not closed.

INTRODUCTION

Osteosarcoma or osteogenic sarcoma is second in frequency only to plasma cell myeloma as a primary malignant neoplasm of the bone (1). It is characterized histologically by proliferating tumor cells that, in most instances, produce osteoid or immature bone. Infrequently, such cells remain so immature that osteoid or bone is not elaborated, leading to difficulties in tumor classification and to considerable interest in identifying diagnostic methods not dependent on routine microscopy. Extensive modifications in the classification scheme of osteosarcoma have appeared in recent years. Traditional systems using the designations of conventional and parosteal tumors have been replaced owing to the identification of many clinical, radiologic, and histologic varieties of osteosarcoma, although no single method of classification is accepted uniformly. Available systems (2, 3, 4) employ such features as the precise location of the tumor within the bone (intramedullary or central, intracortical, surface, periosteal, or parosteal); the degree of cellular differentiation (high grade or low grade) ; the histologic composition (osteoblastic, chondroblastic, fibroblastic, fibrohistiocytic, telangiectatic, small cell); the number of foci of involvement (single or multicentric); and the status of the underlying bone (normal or the site of disease such as Paget's disease, of injury as occurs with a vascular insult or following irradiation, or of another neoplasm, such as an osteochondroma, chondroma, or osteoblastoma).

This study was a retrospective analysis of the roentgenographic imaging of the proved cases of osteosarcoma in 70 patients who came to receive the chemoembolization of the tumors during the year 1987 and 1993, in Ramathibodi Hospital.

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PATIENTS AND METHODS

Plain films of the involved bones of 70 patients were reviewed. The information concerned were the sites of involvement, the radiographic patterns, the associated soft tissue mass, the types of the periosteal reaction and the types of the matrix. The presenting symptoms were studied from the hospital data. The types of histology were correlated with the radiographic patterns.

RESULTS

There were 39 males and 31 females ostesarcomatous patients. The age ranged from 5 to 48 years old, the most common range was between 16-20 years old. The males to females ratio was 1.3 : 1. Table 1 showed the frequency of the presenting symptoms. Pain was the most common presenting symptom and some patients were thought to have myalgia or tendinitis at first. The duration of the symptoms before the diagnosis was 4 weeks to 1 year, average time was 1-4 months. Conventional osteosarcoma was the most common type (63/70 or 90%). Its correlated histology was shown in table 2. The osteoblastic type was the most common one, followed by chondroblastic, mixed form and fibroblastic types. The unusual variants named telangiectatic type was seen in 10%.

The knee was the most common location to be involved by the tumor, representing 48/70 (69%) ; the distal femur was twice as common as the proximal tibia. The proximal humerus was the third most common site.

Metaphyses of long bones were the most common location, appeared in 93% of cases. The epiphyseal involvement alone was not present. Epiphyseal growth plate extension occurred in 5/70 cases (7%) and involved mainly the young children whose growth plates were not closed. The frequency of the involved bones and their sites were presented in table 3 and 4.

More than half of the patients had mixed osteolytic and osteoblastic radiographic appearance. The purely osteolytic destruction pattern showed permeative and/or moth eaten destruction. Some patients had geographic destruction, causing difficulty in differentiating from other primary bone tumors, such as giant cell tumor, aneurysmal bone cysts, fibrosarcoma or metastatic lesion. The correlation of the radiographic pattern and the histology of osteosarcoma was performed and illustrated in the table 6. It seemed to show no definite correlation.

The osteoid tumor matrix, appearing as cloudlike density was the most common associated matrix. The frequency of types of the matrix was shown in the table 7.

The frequency of the mass and periosteal reactions appeared in the table 8 and 9. The sun-ray , the Codman's and the combination of both types were among the majority. Usually, the tumor penetrated the cortex into the surrounding soft tissue, causing palpable mass and/or pathological fracture. We found 14/70(20%) of the patients had pathologic fracture at the presentation. The central osteosarcoma showed fracture 10/63 cases (16%) and the telangiectatic type 4/7 (57%).

The mixed osteolytic and osteoblastic osteosarcoma with osteoid matrix, sunray periosteal reaction and associated mass was shown in Fig. 1. The osteolytic type with Codman's periosteal reaction was shown in Fig. 2. The osteoblastic type with spiculated periosteal reaction was demonstrated in Fig. 3. The epiphyseal location with chondroblastic matrix and soft tissue mass was in Fig. 4. The expanding lesion simulated Giant cell tumor was in Fig. 5. The osteoblastic type at the right clavicle with spiculated periosteal reaction was in Fig. 6. The spiculated osteoblastic osteosarcoma of the calcaneum was shown in Fig. 7. The involvement of the growth plate was seen in the case of Fig. 8. The pathological fracture in the osteolytic type of the tumor was shown in Fig. 9.

DISCUSSION

The larger series of roentgenologic analysis of the osteosarcoma in Thailand was presented by Kaewjinda(5), in 1988. One hundred and twenty five cases were studied, including bones of the extremities, extremities-related bones, rib, skull, spine, mandible and maxilla. However, there was no histologic correlation as in this study.

Conventional osteosarcoma generally is seen in the second and third decades of life (6-8), although the neoplasm has been identified in patients of all ages, including infants and very young children (9,10) and the elderly (11,12). Clinical manifestations include pain and swelling, restriction of motion, warmth and pyrexia (6,7).

Most of the cases develop in the osseous structures about the knee; it is the distal portion of the femur and the proximal portions of the tibia and

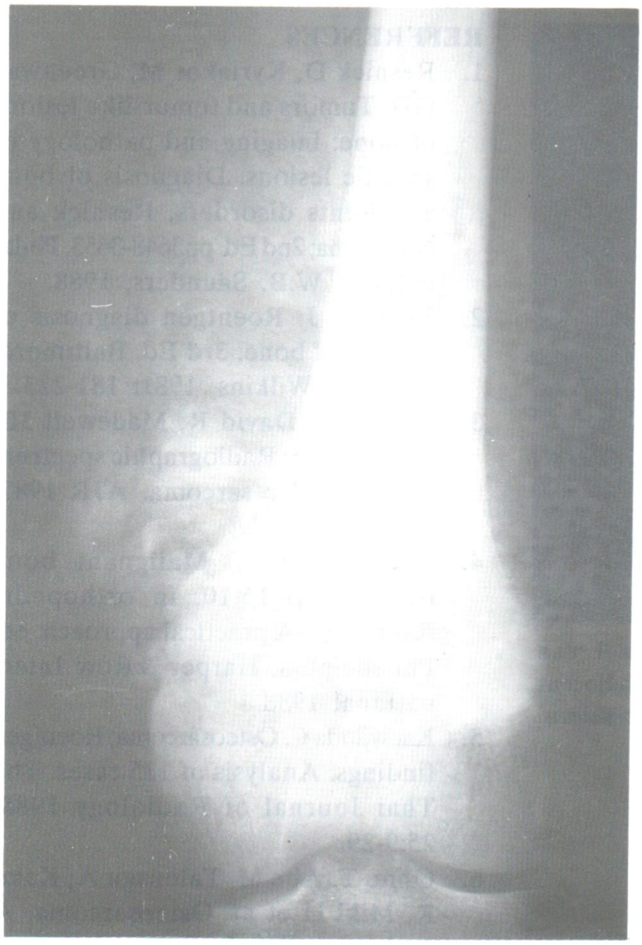

Fig 1. Mixed lytic and blastic osteosarcoma arising in meta-diaphysis of distal femur shows dense cloud like osteoid tumor matrix, classical sunray periosteal reaction and large soft tissue mass.

Fig. 2 . Lytic type osteosarcoma in meta-epiphysis of proximal tibia with large area of bony destruction, soft tissue extension and characteristic codman periosteal reaction were shown.

humerus that represent the areas involved most frequently (6,13-16). With regard to the long tubular bones, metaphyseal location predominates. Initial involvement of the diaphysis occur in 2 to 11 percent of cases (17-21). Although osteosarcoma may extend into the epiphysis (22), especially when the physis is closed (23, 24), a primary epiphyseal origin is quite rare (25,26).

The roentgenographic findings usually are obvious at the time of the initial examination of the patient. A mixed pattern consisting of both osteolysis and osteosclerosis is most typical, with purely osteolytic or osteosclerotic lesions being encountered less frequency (27). Osteolysis is especially characteristic of the telangiectatic variety. With regard to the tubular bones of the appendicular skeleton, conventional osteosarcoma usually is evident as an ill-defined, intramedullary, metaphyseal lesion that has extended through the cortex and produced a sizable soft tissue mass (28). Periosteal reaction in the form of Codman's triangle or with a " sunray " appearance (29, 30) and uncommonly, a pathologic fracture (6) are additional radiographic features.

Five to 10 percent of osteosarcoma involve the flat bones and may be more frequent in older patients (12). Our results were similar to those reports by other authors, except that the epiphyseal plates involvement occurred in the children whose growth plates were not closed.

Resnick (1) emphasized that the "gold standard "in the specific diagnosis of this tumor remains the conventional radiograph and that those other techniques (bone scintigraphy, arteriography, computed tomography and magnetic resonance) are more useful in defining the extent of the neoplasm and its relationship to surrounding neurovascular structures and in evaluating the response of the tumor to therapy.

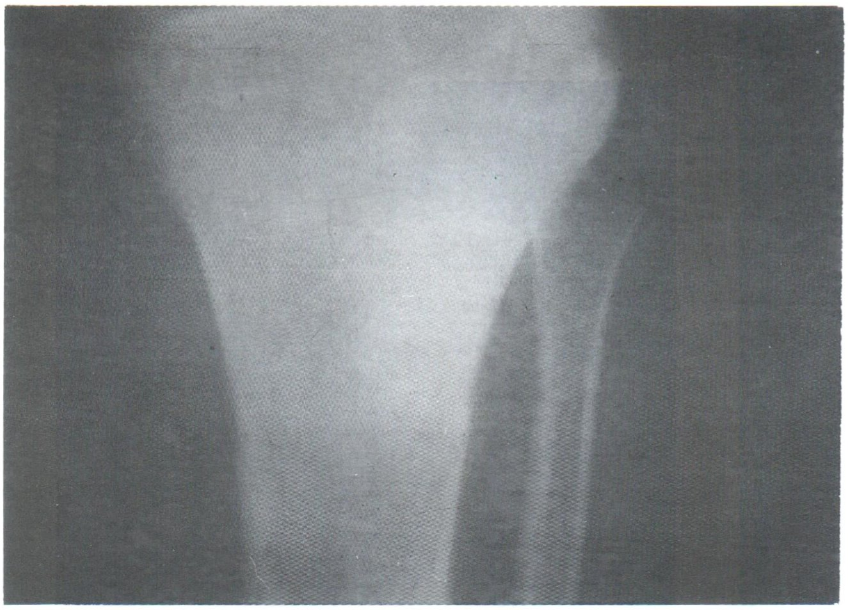

Fig. 3 Purely blastic type osteosarcoma in metaphysis of proximal tibia with cloud like tumor matrix at the lesion extending into the adjacent soft tissue was noted. Spiculated periosteal reaction was shown.

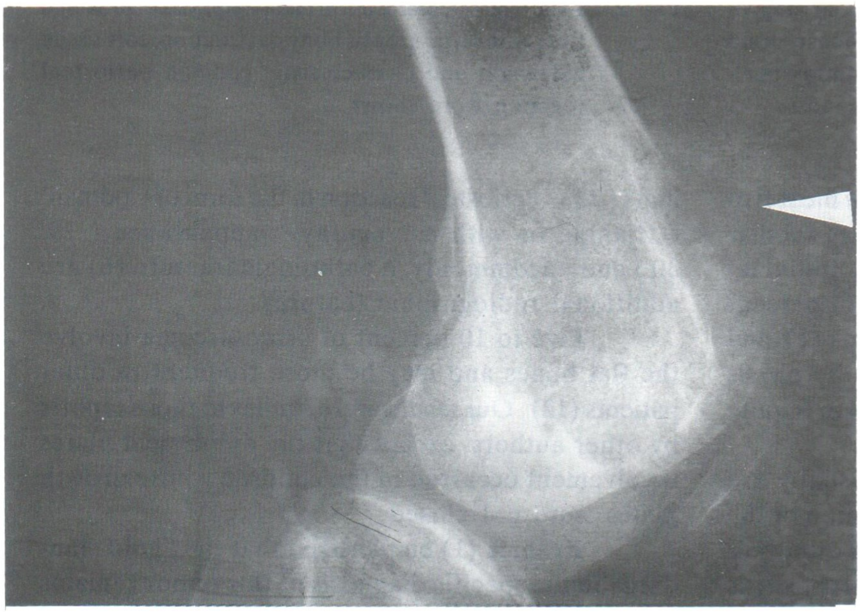

Fig. 4 Epiphyseal location of mixed largely lytic and few blastic osteosarcoma arising in distal femur was demonstrated. There is cortical destruction at anterior aspect of the lesion with extension of tumor containing chondroblastic type tumor matrix into the adjacent soft tissue.

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Fig. 5 Lytic expanding type osteosarcoma involving metaphysis and epiphysis of distal femur, simulated Giant cell tumor. Note the focal increased density of cloud like tumor matrix at proximal part of the lesion, suggested bone forming tumor of osteosarcoma.

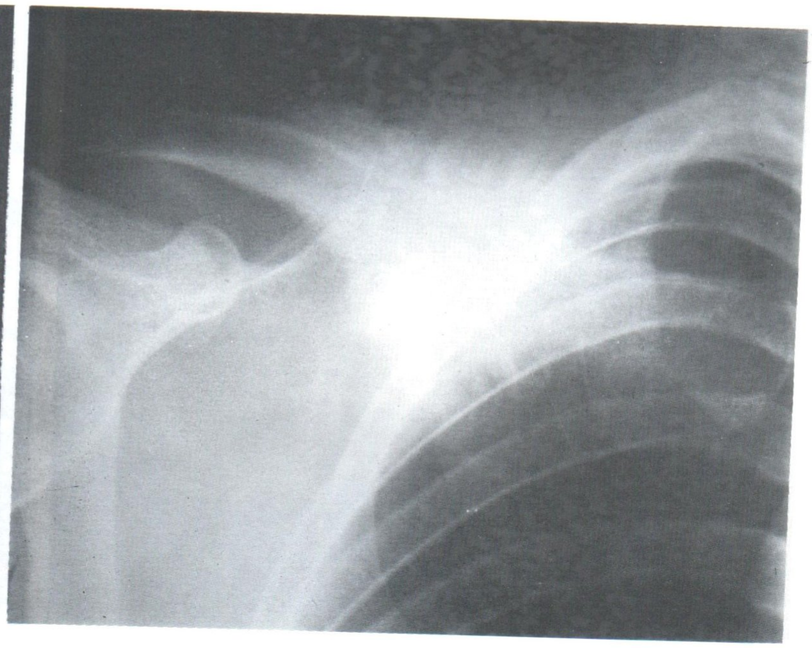

Fig . 6 Blastic osteosarcoma in right clavicle with soft tissue mass, and dense spiculated periosteal reaction were demonstrated.

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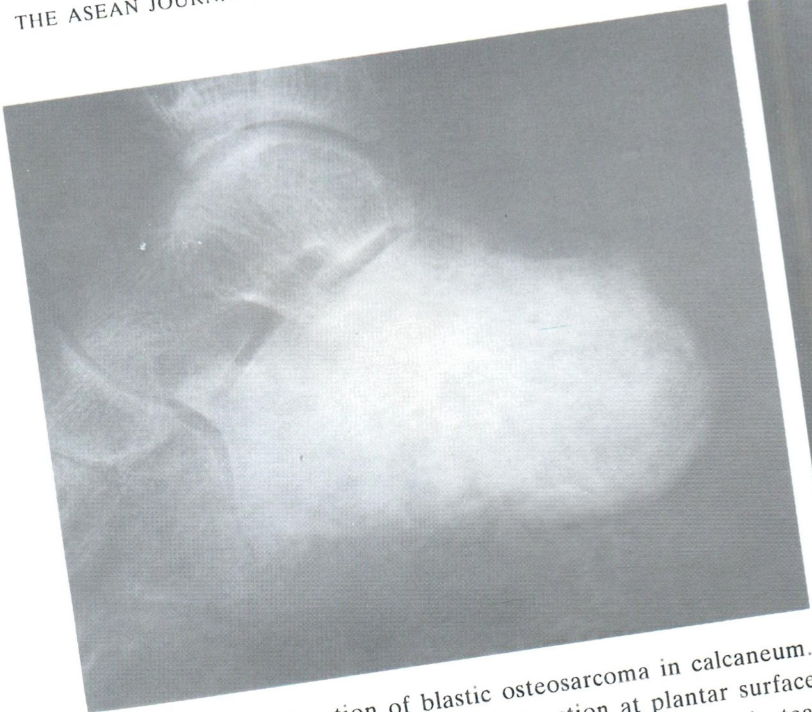

Fig. 7 Unusual location of blastic osteosarcoma in calcaneum. The lesion shows cortical destruction at plantar surface with soft tissue extension and faint spiculated periosteal reaction.

Fig. 8 Epiphyseal extension of the severe blastic osteosarcoma in proximal metaphysis of tibia. The growth plate is involved definitely. Dense cloud like tumor matrix, associated soft tissue mass and combination of sunray and spiculated periosteal reaction were shown.

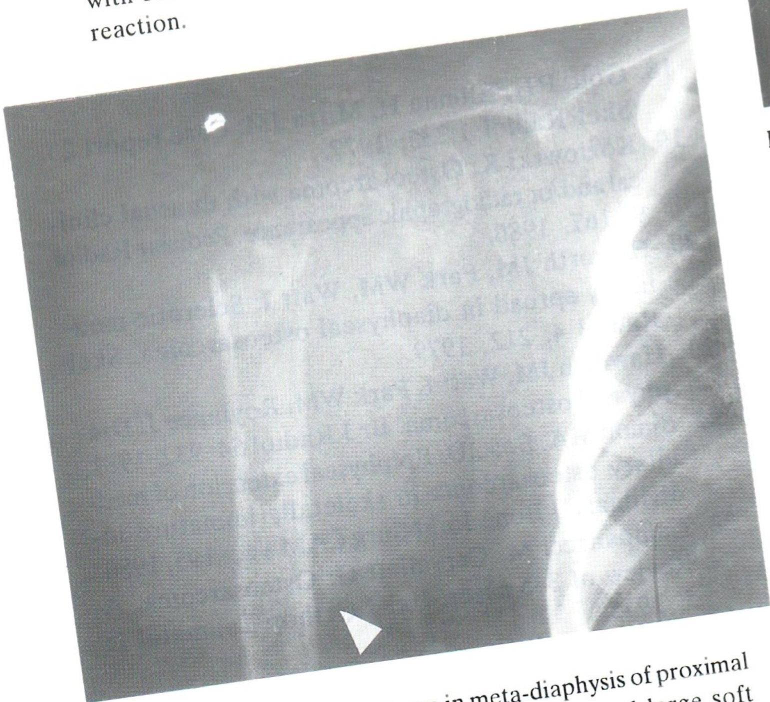

Fig. 9 Lytic type osteosarcoma in meta-diaphysis of proximal humerus shows pathologic fracture and large soft tissue mass. Codman's triangle periosteal reaction is noted at proximal diaphyseal area.

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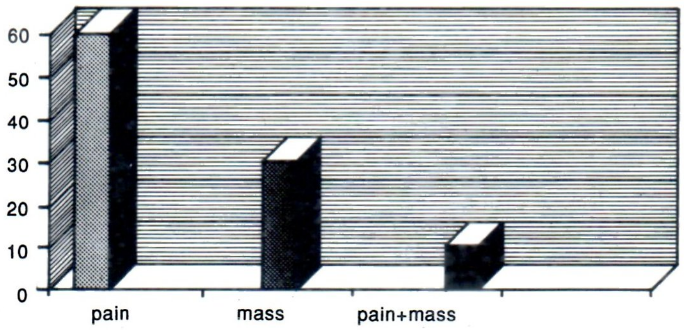
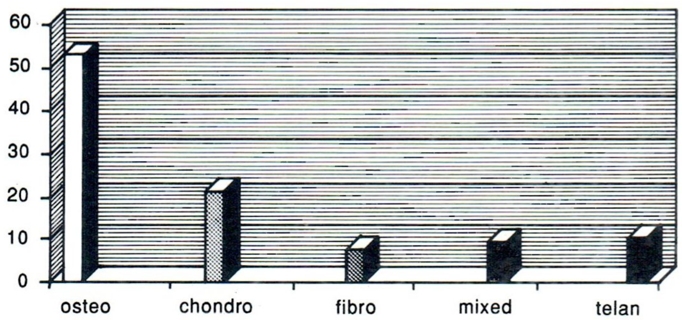


PAIN	42 CASES (60%)
MASS	21 CASES (30%)
PAIN & MASS	7 CASES (10%)

Table 1 : Frequency of the presenting symptoms



OSTEOBLASTIC	37 CASES (53%)
CHONDROBLASTIC	15 CASES (21%)
FIBROBLASTIC	5 CASES (7%)
MIXED	6 CASES (9%)
TELANGIECTATIC	7 CASES (10%)

Table 2 : Frequency of the histologic type of tumor

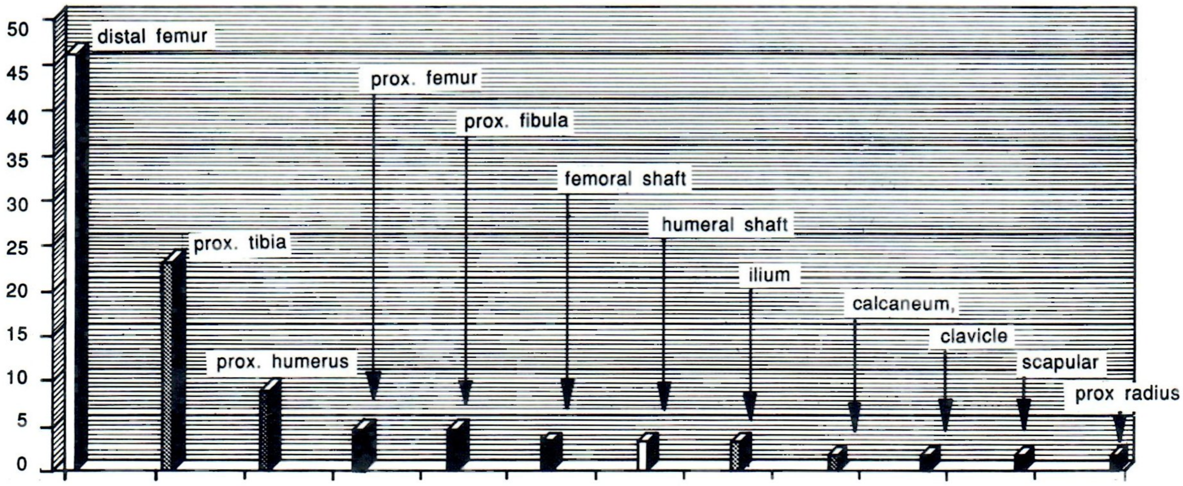


Table 3: Frequency of the sites of involvement

□ DISTAL FEMUR	32	(46%)
PROXIMAL TIBIA	16	(23%)
PROXIMAL HUMERUS	6	(9%)
PROXIMAL FEMUR	3	(4.5%)
PROXIMAL FIBULA	3	(4.5%)
FEMORAL SHAFT	2	(3%)
□ HUMERAL SHAFT	2	(3%)
ILIUM	2	(3%)
CALCANEUM	1	(1.5%)
CLAVICLE	1	(1.5%)
SCAPULA	1	(1.5%)
PROXIMAL RADIUS	1	(1.5%)

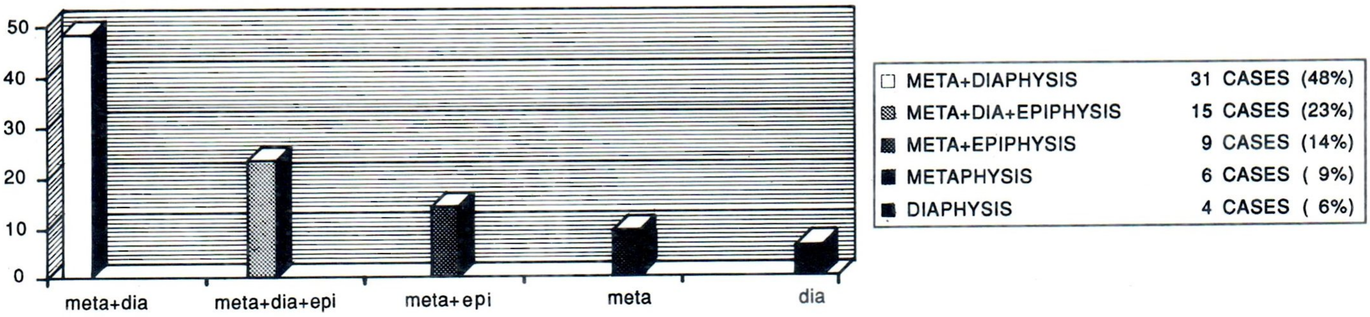


Table 4 : Frequency of involved location in the bones

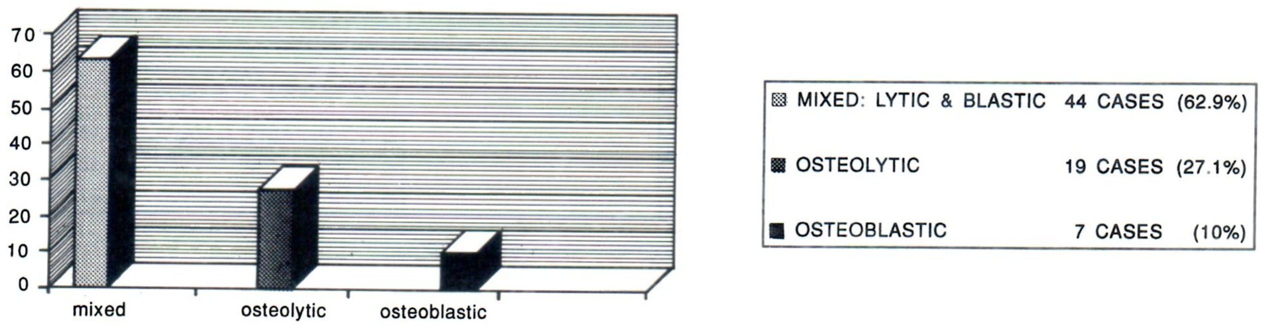


Table 5: Frequency of the radiographic patterns

PATHOLOGY

FINDING	OSTEOBLASTIC	CHONDROBLASTIC	TELANGIECTATIC	FIBROBLASTIC	MIXED
MIXED	22	12	2	3	4
LYTIC	11	2	5	2	-
BLASTIC	3	2	-	-	2

Table 6: Correlation of the radiographic finding and pathology

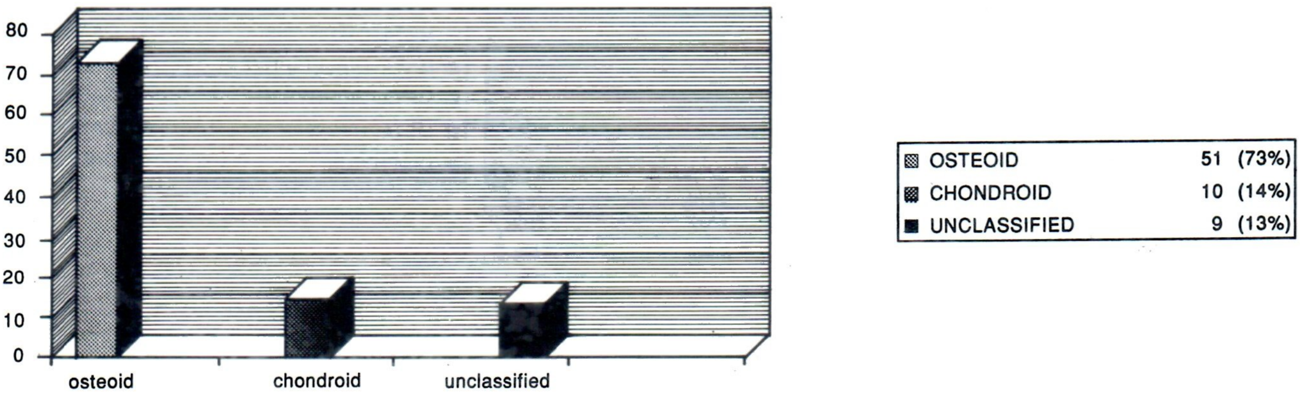


Table 7: Frequency of types of matrix

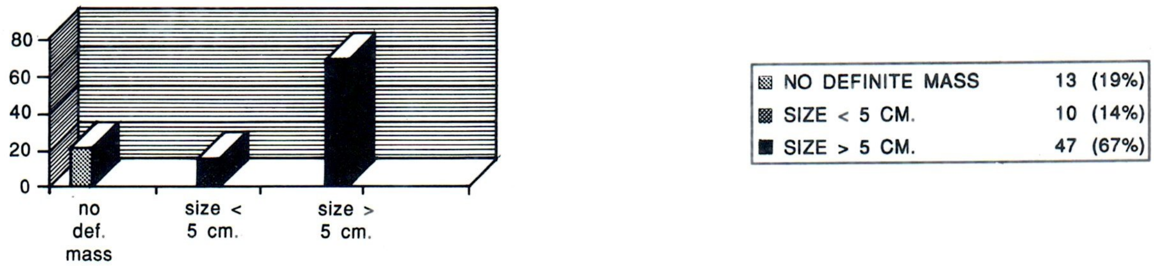


Table 8: Frequency of the associated mass

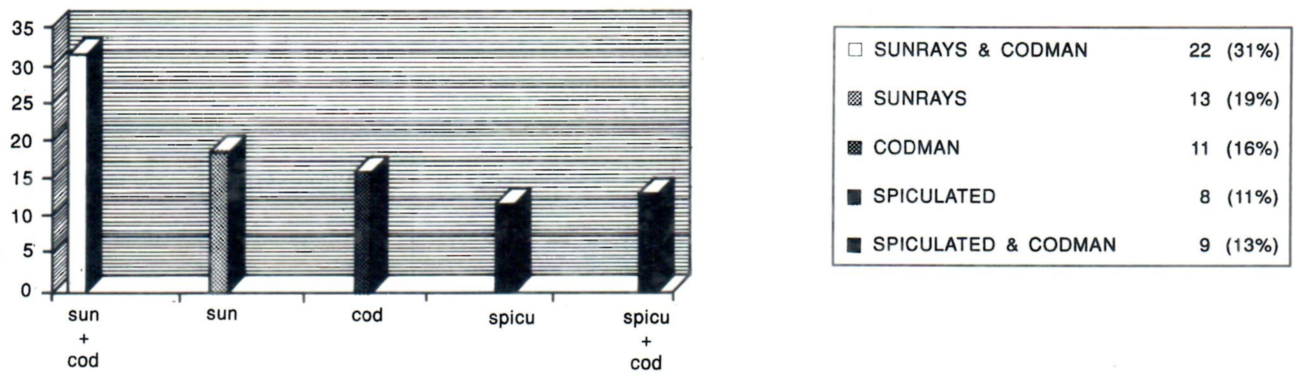


Table 9: Frequency of the periosteal reaction