RADIOLOGICAL MANIFESTATIONS OF PRIMARY MALIGNANT BONE TUMOURS

THESIS

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BY

ALIA ABDALLAH EL FIKY

SUPERVISED BY

Prof. Dr. ZEINAB ABDALLAH

Prof. of Radio-Diagnosis

Ain Shams University

FACULTY OF MEDICINE

AIN SHAMS UNIVERSITY

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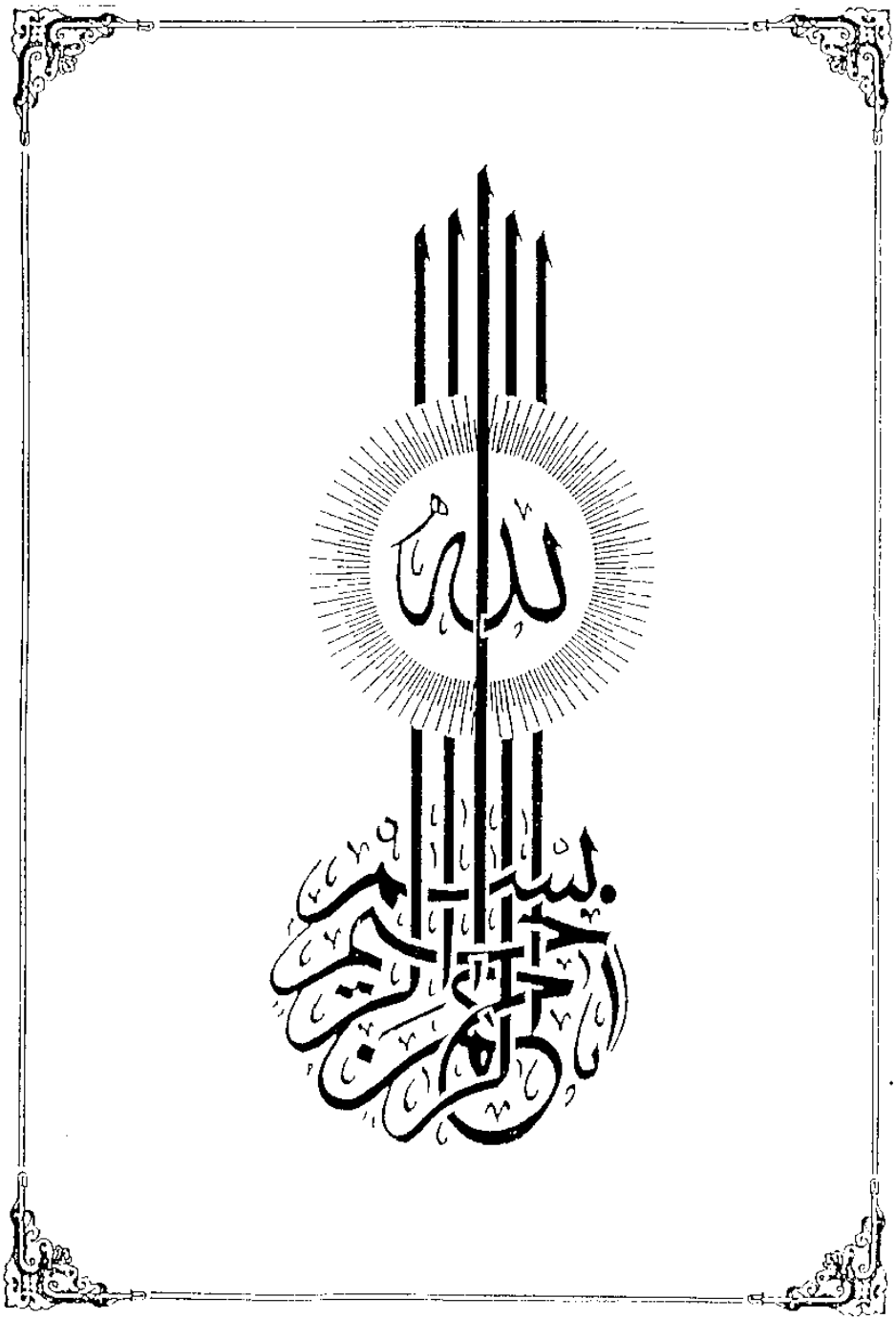

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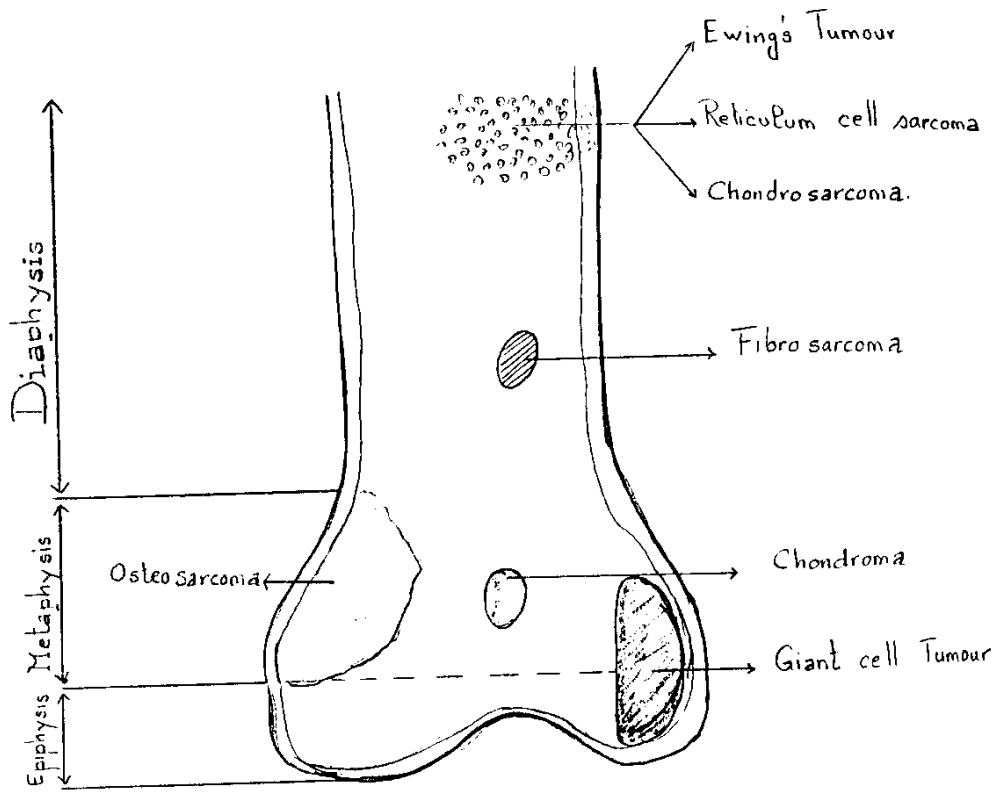
Bome tumours present a most interesting and complicated roentgenographic appearance. The subject is confused by the disagreements in nomenclature, arguments as to whether certain tumours are benign or malignant, and even the actual existence of certain bone tumours. In these regards, not only experienced radiologists differ, but also pathologist differ too. Often the final diagnosis rests neither with the pathologist nor the radiologist, but on the eventual outcome of the case, whether the patient lives or dies. A good example of the latter is gaint cell tumours which only in retrospect may be classified as a bengin or malignant. Stated differently, often the clinical course of the disease alone determines the true nature of the lession (Edeiken and Hodes, 1967).

Correlation of the clinical data, radiological findings is of utmost importance from the diagnostic point of view. The aim of this work is to study the radiological manifestations of the primary malignant bone tumours and to clarify that radiology is still the main diagnostic tool for diagnosis of primary malignant bone tumours.

PATHOLOGY OF PRIMARY MALIGNANT BONE TUMOURS

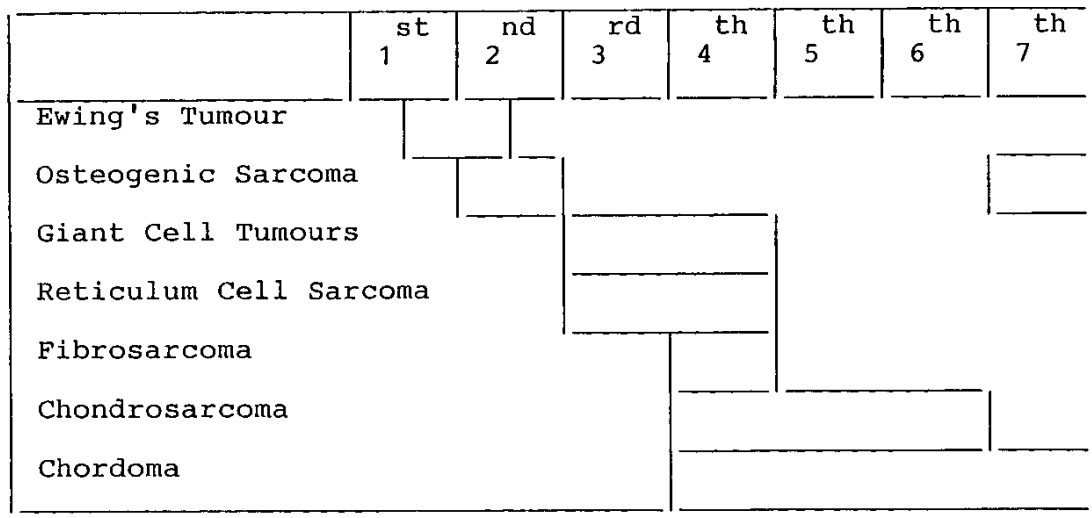
Sites Of Origin Of Primary Malignant Bone Tumours

(A composite diagram modified from Madewell et al, 1980)



Peak Age Incidence Of Primary Malignant Bone Tumours.

(Chapman and Nakielny, 1984)



CLASSIFICATION OF PRIMARY MALIGNANT BONE TUMOURS

(Sutton, 1980)

A- Tumours persumed to arise from Skeletal Connective Tissue.

Tumours forming bone	osteosarcoma
Tumours forming cartilage	chondrosarcoma
Tumours forming fibrous tissue	Fibrosarcoma
Tumours forming osteoclastic tissue	Osteoclastoma (Giant Cell Tumours)

B- Tumours of unknown histogenesis.

Ewing's Tumour

C- Tumour persumed to arise from Skeletal Components.

Blood vessels	Angiosarcoma
Nerves	Neurosarcoma
Fat	Liposarcoma
Notochord	Chordoma (locally malignant but may metastasize)
Lymphoid and haemopoietic tissues described under reticulosis	Reticulum Cell Sarcoma

PRIMARY MALIGNANT BONE TUMOURS

1- OSTEOSARCOMA

Osteosarcoma is defined as those sarcomata whose malignant cells must produce osteoid substance even if in only small foci.

When sampled throughout predominence of osteoid tissue, chondroid, or fibromatoid differentiation. It is the commonest primary malignant bone tumour arising from cells of primitive bone forming mesenschyme, (Dahlin, 1978).

Sex and Age incidence :

Osteosarcoma occurs more frequently in males than females in the ratio 2:1, (Anderson, 1980).

In females the incidence is higher in the younger age group, (Price, 1955).

Age incidence is in the second decade. In patients over 40 years the tumour is associated with Paget's disease, (Anderson, 1980).

Sites of occurence :

The commonest sites of osteosarcoma is in the spongiosa of metaphysis of long bones; about half the cases occur around the knee joint. To a less extent diaphysis of the shaft of

long bones may be affected.

The distal end of the humerus, small bones of the hand, and toes are rarely affected. Nevertheless any bone may be affected, (Murray and Jacobson, 1977).

Multiple osteogenic sarcomata which were discovered simultaneously have been reported in a few cases.

The origin may be multicentric or there was a primary tumour with metastasis, (Finalyson, 1953).

Examination :

A short history of increasingly severe pain of a mass in the affected region.

Over lying engorged viens & oedema distal to the lesion.

Physical examination may be more contributary in some of the tumours that are covered by thick layer of tissues.

Pathological fracture is uncommon.

Movement may exagerate pain. With the osteolytic variety, vascularization is rich, and pulsations of the tumour mass can be felt, (Dahlin & Coventry, 1967).

Elevation of Serum alkaline phosphatase level in about half of the patients is a reflection of the osteoblastic activity, (Dahlin, 1978).

Predisposing Factors :

Paget's disease, Multiple enchondromatosis (King, 1967), bone infarct fibromatosis (Johnsom et al, 1962), solitary bone eyst, carcinogens (Jaffe, 1958), bone treated with radiation (Johnson et al, 1962), multiple exostosis (Mekenna, 1966), myositis ossifficans (Lichtenstein, 1955), polyostotic fibrous dysplasia, Tuberculosis, and trauma.

Macroscopic appearance :

A fan shaped tumour commonly originates in the medullary cavity. It then errodes the cortex & grows peripherally to extend throughout the periosteum invading the surrounding soft tissues, muscles, and into the epiphysis without involving the joint. Osteosarcoma does not involve the epiphysis until ossification of the epiphyseal line has occured, (Anderson, 1980).

Those which progress most rapidly tend to be (osteolytic) in type giving soft,friable,vascular destructive lesion with areas of haemorrhage & necrosis these lesions are reffered to as telengiectatic osteosarcoma, (Matsuna et al, 1976).

Others may contain much more tumour bone (osteosclerotic) specially in the central areas, they are dense & of turnip like consistance in their softer parts.

The amount of tumour bone formation is not related to the

age of the tumour nor does it appear to affect the prognosis, (Anderson, 1980).

Microscopic appearance :

It is variable from area to area.

The malignant bone & or osteoid is accompanied by a malignant stroma. A mixture of malignant bone, cartilage and stroma is often seen and one of them is usually dominant.This has lead to subclassification to osteoblastic, chondroblastic and fibroblastic varieties, (Del Regato and Spjut, 1977).

Metastatic spread :

Metastatic spread occurs early & by a haematogenous route so that these tumours commonly affect the lungs, (Dahlin, 1978).

Metastasis to other bones has been reported.

Lymph nodes are rarely affected, (Anderson, 1980).

Special Types of osteosarcoma :

- Osteosarcoma with Paget's disease.
- Osteosarcoma after previous irradiatiom.
- Diaphyseal osteosarcoma.
- Parosteal osteosarcoma.

- Multiple osteosarcomas of bone, (Sutton, 1980).

SARCOMA IN PAGET'S DISEASE

Most osteosarcomata occuring after the age of 50 arise as a complication of Paget's disease which is established as a precancerous disease.

The skull, pelvis & long bones specially the femur & humerus are the sites of predilection. In 20% of cases the lesion is multifocal, (Sutton, 1980).

Sex :

Men are more commonly affected by Paget's disease than females.

Examination :

Paget's disease is usually asymptomatic except at late stages. In alteration in the character of bone pain with increase of severity & more precise localization, invasion to soft tissue or pathological fracture should arouse suspicion of malignancy. This is supported if a mass is felt and a further rise in the alkaline phosphatase level is observed.

These neoplasms are more osteolytic than osteoblastic,