

Neoplasm of bone

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- primary bone tumor : rare
- metastatic : more common

Classification

- Ewing 1939
- Mayo clinic
- WHO Classification
 - Bone-forming : osteoid osteoma, osteosarcoma
 - Cartilage-forming : chondroma, chondrosarcoma
 - Giant cell tumor
 - Marrow tumor (round-cell) : Ewing's sarcoma, lymphoma, myeloma
 - Vascular tumor
 - Other connective tissue tumor : fibrous histiocytoma, fibrosarcoma
 - Other tumor : neurilemoma, adamantinoma, chordoma
 - Tumor-like lesion : simple bone cyst, aneurismal bone cyst, fibrous dysplasia
- Diagnosis : age, gender → important role
- Sign & symptom
 - Pain
 - Pathologic fracture
 - Mass
 - Deformity
 - Incidental finding
 - Other
- Physical exam :
 - Mass
 - Function
 - General exam
- Laboratory : less useful
 - CBC
 - ESR
 - Alkaline phosphatase
 - Acid phosphatase, PSA
 - Serum electrophoresis
- Imaging study
- Plain x-ray
 - Pattern of bone destruction
 - Geographic
 - Moth-eaten
 - Permeative
 - Size : >6 cm → malignant
 - Margin : sclerotic, sharp, poorly defined
 - Periosteal reaction
 - Single
 - Multiple
 - Solid
 - Codman triangle
 - Speculated

- Staging (surgical staging of Enneking)
 - Histology → G (Grade)
 - G0
 - G1
 - G2
 - T (Site)
 - T0
 - T1
 - T2
 - M (Metastasis) : M0, M1
 - Benign : latent, active, aggressive
 - Malignant
- Other imaging
 - Bone scan
 - Ultrasound
 - CT Scan
 - MRI
 - Angiogram
- Biopsy : needle, incisional, excisional
- Treatment
 - Surgery
 - Radiotherapy
 - Chemotherapy
 - Other

Common bone tumor

- Osteoid osteoma
 - 5-24 years
 - small size
 - pain → night pain
 - x-ray finding : nidus
- Osteosarcoma
 - 10 – 20 years
 - distal femur, proximal tibia, proximal humerus
 - x-ray finding : mixed lytic & blastic, periosteal reaction
 - treatment : adjuvant chemotherapy → surgery
- Osteochondroma
 - Most common benign bone tumor
 - 1% secondary malignant change
- Chondrosarcoma
 - 30 – 60 years
 - male > female
 - pelvis, proximal femur
- Giant cell tumor
 - 20 – 40 years
 - local aggressive
 - 10% local recurrence
- Ewing's sarcoma
 - Small round cell tumor
 - 5 – 15 years
 - diaphysis

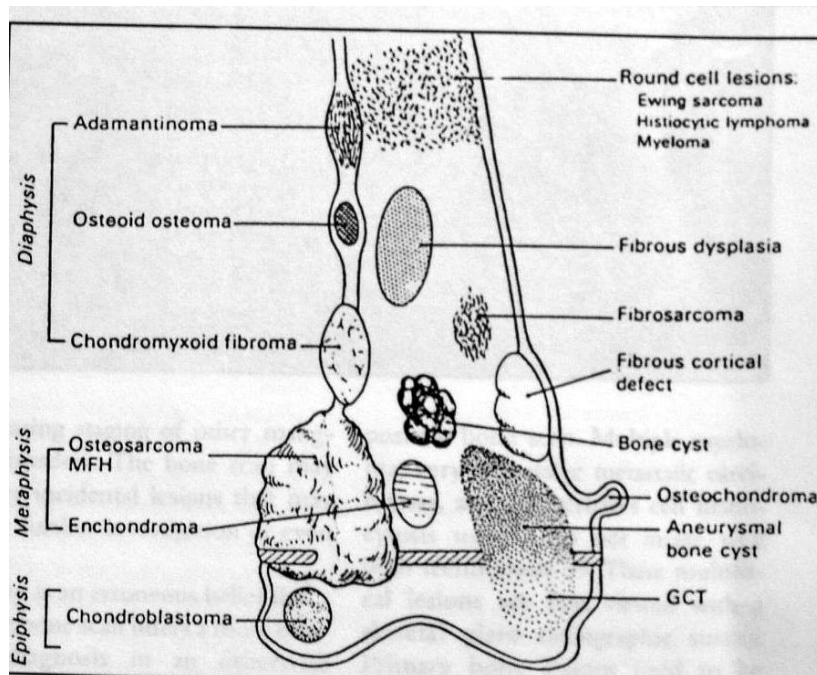
- Multiple myeloma
 - o More than 40 years
 - o Bone pain, anemia
 - Aneurysmal bone cyst
 - o Expansile lytic lesion
 - o Blood fill, fluid level
 - Solitary bone cyst (Unicameral bone cyst)
 - Fibrous dysplasia
 - o Developmental anomaly
 - o X-ray finding : ground glass appearance, Shepherd's crook deformity
 - Metastatic bone tumor
 - o More common in age > 50 years
 - o Breast
 - o Prostate
 - o Kidney
 - o Lung
 - o Thyroid
 - o Bladder
 - o G-I
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Classification – Mayo clinic

	Benign	Malignant
Hematopoietic		Myeloma, Lymphoma
Chondrogenic	Osteochondroma, Chondroma Chondroblastoma, Chondromyxoidfibroma	Chondrosarcoma
Osteogenic	Osteoid Osteoma, Osteoblastoma	Osteosarcoma
Unknown	Giant cell tumor	Ewing's sarcoma, Adamantinoma
Histologic	Fibrous Histiocytoma	MFH
Fibrogenic	Hematoma	Desmoplastic fibroma, Fibrosarcoma
Notochordal		Chordoma
Vascular	Hemangioma	Hemangioendothelioma
Lipogenic	Lipoma	Liposarcoma
Neurogenic	Neurilemmoma	

TABLE 83-2. Tumors and Tumor-Like Lesions: Typical Ages of Patients

Tumor	Age (Years)								
	0	10	20	30	40	50	60	70	80
Malignant									
Osteosarcoma									
Parosteal osteosarcoma									
Chondrosarcoma									
Fibrosarcoma									
Fibrous histiocytoma									
Malignant giant cell tumor									
Ewing's Sarcoma									
Adamantinoma									
Hemangioendothelioma									
Histiocytic lymphoma									
Chordoma									
Plasma cell myeloma									
Skeletal metastasis									
Benign									
Osteoma									
Osteochondroma									
Enchondroma									
Chondroblastoma									
Chondromyxoid fibroma									
Osteoid osteoma									
Osteoblastoma									
Nonossifying fibroma									
Desmoplastic fibroma									
Lipoma									
Hemangioma									
Giant cell tumor									
Neurilemoma									
Simple bone cyst									
Aneurysmal bone cyst									



Benign

Stage 1 (G0T0M0)

Latent : inactive asymptomatic

Stage 2 (G0T0M0)

Active : growing lesion

Stage 3 (G0T1-2M0-1)

Aggressive

Malignancy

Stage	Grade	Site	Metastasis
IA	G1	T1	M0
IB	G1	T2	M0
IIA	G2	T1	M0
IIB	G2	T2	M0
III	G1-G2	T1-T2	M1

Diagnosis Strategy for bone tumors

