

## BONE TUMORS:

### CLASSIFICATION:

- Osteogenic tumors
- Cartilaginous tumors
- Fibrogenic tumor
- Ewing's sarcoma
- Giant cell tumor
- Vascular tumor
- Lipogenic tumor
- Neurogenic tumor.

- 1) OSTEOGENIC TUMOR: Production of bone by neoplastic cell
- MCQ →
- 1. Osteoma (usually solitary) - Multiple seen
  - 2. Osteoid osteoma
  - 3. Osteoblastoma
  - 4. Osteosarcoma
- Benign
- Malignant.

VO-6/4

### OSTEOSARCOMA:

- malignant mesenchymal tumor in which the carcinoma cell produce bone matrix. (hall mark)

- most frequent primary malignant bone tumor

- C.S → metaphysis of long bone

- Bimodal Age distribution M:F (1.6:1)

Lower end of femur (30%)

upper end of tibia

Proximal humerus.

## RISK FACTORS:

- Acquired Paget's disease, Radiation, chemotherapy

- genetic - TP53, RB gene

Overexpression of MDM2 and CDK4 gene

## CLASSIFICATION

- site of origin (clavical, medullary, extra medullary)
- Histological features
  - Osteoblastic OS
  - Chondroblastic OS
  - Fibroblastic OS

Degree of differentiation - High and low OS.

1<sup>o</sup>

## PATHOGENESIS

Occurs mostly in the growth plate of rapidly growing bone

→ Mutation of RB gene

→ TP53 Inactivation

→ Inactivation of CDKN2A

→ Overexpression of MDM2 and CDK4

## 2<sup>o</sup> Primary OS

- Paget's disease

- Radiation exposure

- Pre-existing bone lesions.



## MORPHOLOGY:

### GROSS:

- Site → Humerus upper
- Big bulky tumor, intramedullary mass.
- Areas of hemorrhage and cystic degeneration.

### HISTO

- High grade hypercellular tumor
- Anaplasia, pleomorphic neoplastic cell
- Bizarre tumor giant cell
- High NC Ratio.
- Formation of bone / osteoid by tumor cell

### RADIOLOGICAL FEATURES:

Codman triangle: infiltrates and breaks through the cortex.

- The tumor lifts the periosteum from the bone produce a space b/w the cortex and end of periosteum.

Shows a  $\Delta$  shadow.

may also seen in

- Ewing, osteomyelitis, bone cyst.

→ Codman  $\Delta$ .

Sunburst Appearance → when tumor extends into soft tissue || lines of mineral deposition in periosteal Region.

C/F → Pain, Progressive enlarging mass

Serum Alkaline Phosphate is raised.

t/t → Chemotherapy surgery

## CARTILAGINEOUS TUMOR:

Osteochondroma  
chondroma } Benign.  
chondroblastoma  
chondrosarcoma - Malignant.

Osteochondroma -> Most common benign tumor.

M > F

Arises from the bone surface

-> Associated with hereditary osteochondritis syndrome

EXT1 or EXT2 gene

Mushroom shaped bony projection

GROSS:

site - metaphysis near the growth plate

- Bony stalk with underlying cortical and cancellous bone covered by a cartilage cap may be sessile / pedunculated.

composed of

benign hyaline cartilage

MICRO:

Cartilage cap -> hyaline cartilage

Bone -> cortical lamellae bone

Chondrosarcoma -> poor calcification, Ring like ossification



EWING SARCOMA: boys > girls.

Aggressive, small, uniform, Round cell without obvious differentiation  
- 2nd most common in children.

### PATHOGENESIS:

- 1) gene fusion of one member of the FET And other of ETS
- 2) EWING FL11 fusion gene is formed.

ERG.

FL11 gene on 11q, 24 & ~~EWING~~ on 2q, 22

⇒ t(11, 22) (q24, p12)

⇒ t(21, 22) (q22, 12)

↓

(p12) This fusion Activate the C-myc promoter  
leading to Abnormal cell proliferation And survival.

### MORPHOLOGY

site → diaphysis And diaphysis metaphyseal region.

→ may infiltrate the Medullary space, penetrate periosteum.

→ Soft, grayish, white Appearance.

MICRO → Uniform, S, R, cell.

Tumor cell size → twice the size of lymphocyte

Cytoplasm Appearance → Rich in glycogen.

### HOMER-WRIGHT ROSETTE:

→ tumor cell arranged in a circle About a central



(B) C

fibrillary space (Round cell clusters with a central fibrillary core)

Indicative of neural differentiation.

Eg Other sarcoma showing this:

→ Ewing's sarcoma, neuroblastoma, medulloblastoma.

### IMMUNOHISTOCHEMISTRY:

ENS cell express Antigen FLI1, CD99

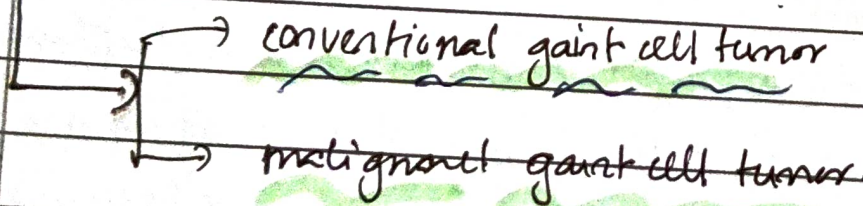
Radio → - disorganized layers of jumbled new bone formation produce → onion skin pattern

Osteosarcoma  
(osteoclastoma)

29 TYPES

GIANT CELL TUMOR: - Rarely metastasizes. (GCT)

neoplastic mononuclear stromal cell, uniformly distributed  
multinucleate osteoclast-like giant cell



### PATHOGENESIS:

The majority are nonneoplastic osteoclasts

They are primitive osteoblast precursor  
express high level of RANKL

→ lead to development to osteoclasts

Absence of normal Regulate feedback b/w osteoblast and osteoclasts:



## MORPHOLOGY:

site: epiphysis but extend into metaphysis  
knee joint, lower end of Radius.

GROSS → cystic change

(at surface → soft, dark brown haemorrhagic appearance)

## MICRO

↳ two main type of cell

mononuclear

large osteoclast like cells

1) Mononuclear (stromal cell) - 2 type

① ⇒ Neoplastic mononuclear cells - uniform, oval & plump  
scanty cytoplasm.

→ diagnosis depend on its morphology

② Nonneoplastic macrophage

2) large multinucleated → Giant cell

- numerous large osteoclast - type giant cell.

→ neovascular & mitotic figures.

RADIO → lytic lesion, destroy overlying cortex

soft tissue mass surrounded by a thin shell of

Reactive bone → soap bubble

speed CS → lung

C.F. → Pathological fracture