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BONE TUMORS

CLASSIFICATION:

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

1) OSETOGENIC TUMOR: Production of bone by neoplastic cell

MCQ → 1. osteoma (usually solitary) } Benign - Multiple seen in Gardner syndrome
2. osteoid osteoma }
3. osteoblastoma }
VQ 4. Osteosarcoma } Malignant.

VQ-6/4 OSTEOSARCOMA:

- malignant mesenchymal tumor in which the cancerous 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.

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RISK FACTORS:
- Acquired Paget's disease, Radiation, chemotherapy
- genetic - TP53, RB gene
  Overexpression of MDM2 & CDK4 gene

CLASSIFICATION
- Site of origin (classical, medullary, ultra medullary)
- Histological feature → Osteoblastic OS
  → Chondroblastic OS
  → Fibroblastic OS.
- Degree of differentiation — High & low OS.

1° PATHOGENESIS
Occurs mostly in the growth plate of Rapidly growing bone

→ Mutation of RB gene
→ TP53 DnActivation
→ DnActivation of CDKN2A
→ Overexpression of MDM2 And CDK4

2° day OS
- Paget disease
- Radiation exposure
- Pre-existing bone lesions.

↳ Fracture of hereditary Retinoblastoma

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MORPHOLOGY:

GROSS:

Site → Metaphysis

Big bulky tumor, intramedullary mass.

- Areas of hemorrhage And cystic degeneration.

MICRO

- 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 break through the cortex.

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

Show a △ shadow.

→ Codman △.

May Also seen in

- Ewing, osteomyelitis, bone cyst.

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

C/F → Pain, Progressive enlarging mass

Serum Alkaline Phosphatase is raised.

t/t → Chemotherapy surgery

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CARTILAGE TUMOR:

Osteochondroma
Chondroma
Chondroblastoma
} Benign.

Chondrosarcoma - Malignant.

Osteochondroma → Most common benign tumor.
M > F
Arises from the bone surface
→ Associated with hereditary exostosis 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 lamellar bone

HOC

Chondrosarcoma → popcorn calcification, Ring like ossification

EWS R > Ft

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EWING SARCOMA: boys > girls.

Aggressive, small, uniform, Round cell without obvious differ to

- 2nd most common in children.

PATHOGENESIS:

gene fusion of one member of the FET And other of ETS

EWSR1 FLI1 fusion gene is formed.

~~EWSR~~ ERG.

FLI1 gene on 11q24 of EWSR on 22q24

⇒ t(11,22) (q24 p12)

⇒ t(21,22) (q22,12)

Thus fusion Activate the Cmyc promoter leading to Abnormal cell proliferation And survival

MORPHOLOGY

site → diaphysis And diaphysis metaphyseal portion.

→ 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 Appear clear → Rich in glycogen.

HOMER-WRIGHT ROSETTE:

→ tumor cell arranged in a circle About a center

(B) C

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

↓

Indicative of neural differentiation.

Eg Other sarcoma showing this:

→ Ewings Sarcoma, neuroblastoma, medulloblastoma.

IMMUNOHISTOCHEMISTRY:

ENS cell express Antigen FLI1, CD99

Radio → - discontinuous layers of perforated new bone formation produces → onion skin pattern

Osteosarcoma (Osteoclastoma)

GIANT CELL TUMOR: - Rarely metastasis. (GCT)

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

2 TYPES

→ conventional giant cell tumor

→ ~~malignant giant cell tumor~~.

PATHOGENESIS:

The majority are non neoplastic osteoclasts

They are primitive osteoblast precursor

express high level of RANK L

↳ lead to development to osteoclasts

Absence of normal Regular feedback b/w osteoblast And osteoclasts.

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MORPHOLOGY:

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

GROSS → cystic change
cut surface → soft, dark brown hemorrhagic Appearance

MICRO
↳ two main type of cell

mononuclear | large osteoclast like cells.

1) Mononuclear (stromal cell) - 2 type

ⓐ → Neoplastic mononuclear cells - uniform, oval & plump
scanty cytoplasm.
→ diagnosis depend on its morphology

ⓑ Non neoplastic macrophage

2) large Multinucleated : → Giant cell
- numerous large osteoclast - type giant cell.
→ nexous, mitotic figures.

RADIO → lytic lesion, destroy overlying cortex
soft tissue mass surrounded by a thin shell of
Reactive bone → (soap bubble)

spread CS → lung

C.F → Pathological fracture.