LAQ. - 1) Classify bone tumours. Describe morphology of cartilage forming bone tumours.

Answer:- BONE + CARTILAGE TUMOURS → together called as Bone tumours

(A) Classification of bone tumours

Histologic Derivation	Benign	Malignant
A) Osseous tumours		
1) Bone forming (osteogenic / osteoblastic)	• Osteoma • Osteoid osteoma • Osteoblastoma	• Classic osteosarcoma • Surface osteosarcoma
2) Cartilage-forming (chondrogenic)	• Enchondroma • Osteochondroma (osteocartilaginous exostosis) • Chondroblastoma • Chondromyxoid fibroma	• Chondrosarcoma
3) Haematopoeitic (marrow) tumours	—	• myeloma • Lymphoplasmacytic lymphoma
4) Unknown	• Giant-cell tumour (osteoclastoma)	• Malignant giant cell tumour • Ewings sarcoma • Adamantinoma of long bones.
5) Notochordal tumours	—	• Chordoma

(2) B) NON-OSSEOUS TUMOURS.

1) Vascular tumours	Haemangioma	Haemangioendothelioma Hemangiopericytoma Angiosarcoma	
2) Fibrogenic tumours	Non-ossifying fibroma	Fibrosarcoma.	
3) Neurogenic tumours	Neurilemomma & Neurofibroma	Neurofibrosarcoma	
4) Lipogenic tumours	Lipoma	Liposarcoma.	
5) Histiocytic tumours	Fibrous Histiocytoma	Malignant fibrous Histiocytoma	

(B) Morphology of cartilage forming bone tumours

(I) Benign :-

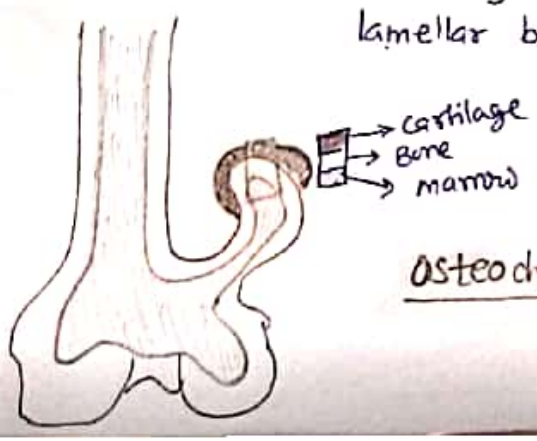
(1) Osteocartilaginous Exostoses (osteochondromas) :-

- Commonest of benign cartilage-forming lesions.
- Exostoses = arise from metaphyses of long bones
  - ✓ 'MC' Lower femur + upper tibia.

Morphology :-

Gross :- → Broad & narrow base (sessile/ pedunculated)
→ Protrude expphytically as mushroom-shaped, cartilage capped lesions enclosing well formed cortical bone & marrow.

Microscopically → Composed of outer cap composed of mature cartilage resembling epiphyseal cartilage and the inner mature lamellar bone & bone marrow.



Osteochondroma

(2) Enchondroma :→

- Grossly → Lobulated, bluish-grey, translucent, cartilaginous mass lying within the medullary cavity
- Microscopically → Characteristic lobulated Appearance
  → Lobules are composed of normal adult hyaline cartilage seperated by vascularised fibrous stroma.
  → foci of calcification may be evident within tumour

Enchondroma is distinguished from chondrosarcoma by the absence of invasion into surrounding tissues & lack of cellular features of malignancy.

(3) Chondroblastoma :→

- Gross → well defined mass, upto 5 cm in diameter, lying in the epiphysis.
  → Tumour is surrounded by thin capsule of dense sclerotic bone.
  → Cut surfaces :- reveal a soft chondroid tumour ε foci of hemorrhages, necrosis, calcification.
- Histologically → → Highly cellular
  → small, round to polygonal mononuclear cells resembling chondroblasts & has multinucleate osteoclast-like giant cells.
  → small areas of cartilagenous intercellular matrix & focal calcification.

(4) Chondromyxoid fibroma :→

- Gross → sharply demarcated, grey-white lobulated mass, not exceeding 5 cm in diameter, lying in the metaphysis.
  → surrounded by a layer of dense sclerotic bone.
  → C/S → soft to firm & lobulated but calcification in the tumour is not as common as ε other cartilage forming tumours.

(II) Malignant

(1) Chondrosarcoma →

Gross → Varies in size
→ Few cms to large and lobulated masses of firm consistency
→ Cut surface of tumour → translucent, bluish white, gelatinous/myxoid appearance with foci of ossification

Histologically → → Invasive character
→ Formation of lobules of anaplastic cartilage cells
→ Tumour cells show hyperchromatism, pleomorphism two/more cells in lacunae & tumour giant cells.

Short notes :- Assignment ①

② D/D's of Giant-cell-lesions of bone.

Answer :-

(A) Reactive :-

→ Brown tumour
→ Giant cell reparative granuloma
→ pseudomalignant myositis ossificans
→ Tubercular osteomyelitis

(B) Benign :-

→ GC tumour
→ Aneurysmal Bone cyst
→ Chondroblastoma
→ chondromyxoid fibroma
→ Non-ossifying fibroma
→ Langerhan's cell histiocytosis
→ Benign fibrous histiocytoma of bone

(C) Malignant :-

→ osteosarcoma
→ clear cell chondrosarcoma
→ metastatic carcinoma

Assignment → (1) (6)

Q (3) Pathogenesis and diagnosis of metabolic diseases of bone?

Ans:- A large number of metabolic & endocrine disorders produce generalized skeletal disorders:→

(A)

(1) Osteoporosis :- Resulting from quantitative reduction in (N) bone.

(2) Osteomalacia & Rickets :- Qualitative abnormality in the form of impaired bone mineralisation due to deficiency of vit D in adults & children respectively.

(3) Scurvy :- deficiency of vit.C → subperiosteal hemorrhages.

(4) Hyperparathyroidism :→ Leading to osteitis fibrosa cystica.

(5) Pituitary dysfunctions :→ Hyperpituitarism causing gigantism & acromegaly & Hypopituitarism causing dwarfism.

(6) Thyroid dysfunctions :- Hyperthyroidism → osteoporosis
Hypothyroidism → cretinism.

(7) Renal osteodystrophy :- CRF

(8) Skeletal fluorosis → ↑ NaF content in soil & water.

3) (1) Osteoporosis :- Diagnosis :- Levels of Sr. Ca^{2+}, inorganic phosphates, & alkaline phosphatase = in (N) Limits.

→ Bone mass estimation :- DEXA & SEXA

→ CT / USG.

pathogenesis → (1) primary osteoporosis → results from osteopenia occurring an underlying disease or medication.

(a) Idiopathic (b) Involutional

(2) secondary osteoporosis → results from immobilisation, chronic anaemia, acromegaly hepatic disease (or) as an effect of medication

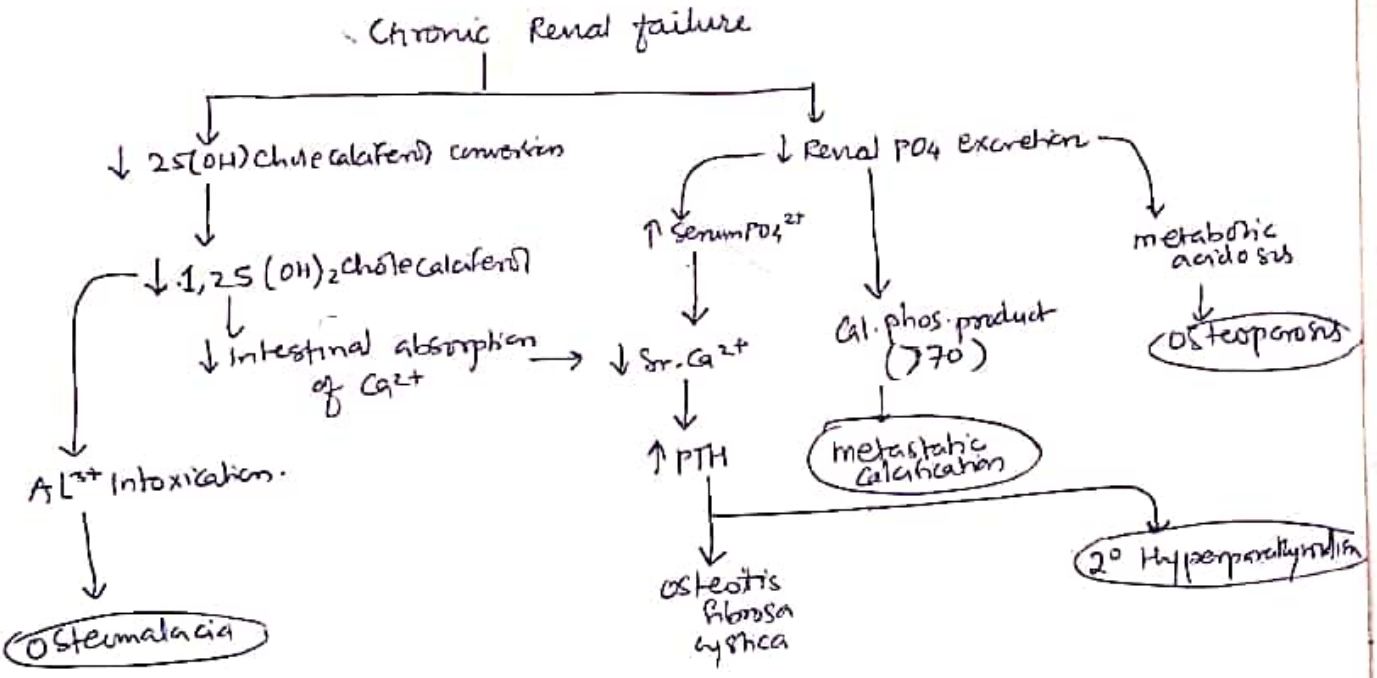
Heparin, Anti-convulsants, Hypercortisonism

(2) **Osteitis fibrosa cystica** :- Hyperparathyroidism of $\left\langle \begin{matrix} 1^{\circ} \\ 2^{\circ} \end{matrix} \right\}$ type leads to ↑se in osteoclastic resorption of bone due to oversecretion of parathormone.

△ Diagnosis → ✓ ↑ PTH
✓ ↑ Sr. Ca^{2+}
✓ ↓ Sr. PO_4^{2-}
✓ ↑ Ca^{2+} in urine

(3) **Renal osteodystrophy** :- metabolic bone disease
(Renal Rickets)

pathogenesis



(4) **Skeletal fluorosis** :-

pathogenesis → fluoride replaces Ca^{2+} as the mineral in the bone & gets deposited in bone

↓

Thicker & heavier bones

↓

But weak & deformed (just like in osteopetrosis)

↓

+ Deposits of fluoride in soft tissues.
(as nodules in interosseous membrane)

(5) Paget's disease of bone (osteitis deformans) :-

- Slow viral infection by paramyxovirus (RSV, measles) in osteoclasts
- Autosomal dominant inheritance & genetic susceptibility

(6) Scurvy → Manifestations caused d/t defective collagen synthesis → ↓ vit C. & hemorrhagic diathesis.

Clinical Features :-

- → Anaemia
- → Gingival swelling
- → Skin Rash
- → Scorbutic rosary
- → Delayed wound healing
- → Ecchymoses
- → Subperiosteal haematoma
- → Haemarthrosis.
- → Bow legs.