Metabolic & Endocrine disorders of bone:

Ø Osteoporosis:

- Bone apposition < bone resorption

- **Risk factors:**
  - Postmenopausal women
  - Hyperthyroidism
  - Hyperparathyroidism
  - Cushing’s syndrome

- **↓ bone quantity:** thin cortex & trabeculae & ↑ marrow

- **Dental aspects:** denture, surgery, sinus

Ø Hyperparathyroidism:

∇ **Primary:**

- Adenoma, Ca, Hyperplasia
- Postmenopausal women
- Hypercalcaemia → metastatic calcification
- **Bone disease:**
  - ↑ Osteoclastic activity
  - Brown tumours
Rx:

- Osteoporosis
- Mottled areas of radcy & thinning of cortical plates
- Jaws: loss of trabecular pattern, LD, brown tumours

Biochemistry:

- ↑ Ca, ↓ PO4, ↑ PTH, ↑ ALKP, ↑ urinary Ca & PO4

Secondary:

- RF → low Ca
- Rickets & Osteomalacia:

Rickets & Osteomalacia:

- ↓ Vit D or resistance to its action
- RF, malabsorption of Ca
- Failure of mineralization of Osteoid & cartilage
- Weak bones, bending
- Biochemistry: n/↓ Ca, ↓ PO4, ↑ ALKP
**Dental aspects:**

- E hypoplasia
- Dentine hypocalcification
- Delayed eruption
- Condyle

**Acromegaly:**

- Prognathism
- Macroglossia
- Lips & nose
- Hands & feet

**Paget’s disease:**

- Uncoordinated ↑ in Osteoclastic & osteoblastic activity of bone Cs
- Primary dysfunction of osteoclasts
- Viral inclusions
- **Abs:** measles & RCV
- **Aetiology:** slow viral infection + genetic factors
Three phases: osteolytic, mixed & osteoblastic

Clinically:
- M>F, >40y
- Geographical variation
- Monostotic or polyostotic
- Axial skeleton then skull & femur
- Max > Mand
- Deformity of spine & legs
- Fracture
- Enlargement of skull & facial bones
- Bone pain & joint disease
- Skull base; cranial nerves & spinal cord
- Symmetrical & gross enlargement of alveolar process, flat palate
- Spaces between teeth, malocclusion, incompetent lips
- Hypercementosis & ankylosis, root resorption
- Haemorrhage
- Infection

Rx:
- Diffuse radcy
- Patchy Osteosclerosis “cotton wool” appearance
- Thick cortical plates of skull
- Enlarged maxilla & mandible
- Loss of LD, hypercementosis & ankylosis
Hist:

- Rapid bone resorption & replacement
  - Initially: ↑ Osteoclastic activity → vascular fibrous marrow
  - Then: Osteoclastic & osteoblastic activity, mosaic pattern
  - Finally: Osteoblasts predominate → dense lamellar bone

- Jaws: masses of cementum-like tissue, cementum (mosaic)

Biochemistry:

- ↑ ALKP:
  - Normal Ca & PO4

Complications:

- ↑ A-V shunt → ↑-output HF
- Osteosarcoma

Central Giant cell granuloma:

- Giant cell lesions
- Less aggressive & destructive than in other bones

Clinically:

- Less common than PGCG
- Majority: 10-30 ys, F>M
▶ Mand > Max, Anterior
▶ 75% in Mand & crossing midline
▶ Expansion
▶ ± Perforation & root resorption

○ Rx:
▶ Cyst-like radcy w expansion
▶ “Soap-bubble” appearance
▶ Displacement & occasional resorption of roots

○ Hist:
▶ Giant Cs, mononuclear Cs, FV stroma
▶ Hemosiderin, extravasated RBCs
▶ Strands of collagen w Osteoid or bone
▶ Aggressive lesions

○ Aetiology?

<header>Torus/exostosis:</header>

- Nodular, non-neoplastic growth of bone
- Developmental, some AD

- Torus palatinus:
  ▶ Develops after puberty in susceptible pts
  ▶ Grows slowly over enter life
• Rounded, symmetrical, can become large & pedunculated
• Thin mucosa
• **Denture, speech, O.H**

**Torus mandibularis:**

• Less common
• Lingual to premolar
• Frequently bilateral
• Usually multiple-lobed
• Tongue movement, denture, O.H

• **Hist:** cortical bone ± cancellous bone

• Buccal alveolus of Max in molar region

**Bone tumours:**

• **Classification:**

  • **Bone-forming tumours:**
    
    ➢ **Benign:** osteoma & osteoblastoma
    
    ➢ **Malignant:** osteosarcoma

  • **Cartilage forming tumours:**
    
    ➢ **Benign:** chondroma
    
    ➢ **Malignant:** chondrosarcoma

  • **Marrow tumours:** myeloma

  • **Fibrous tumours:**
    
    ➢ **Benign:** cemento-ossifying fibroma
- **Tumour-like lesions in bone**: Langerhans cell histiocytosis, haemangioma
- **Metastatic tumours**

  ➡️ **Osteoma:**
  
  - Benign & slow growing
  - Mand> Max
  - Single or multiple
  - Superficial or intraosseous

  ![Osteoma Image](image)

  ➡️ **Gardner Syndrome:**
  
  - AD
  - Intestinal polyps
  - Unerupted normal & supernumerary teeth
  - Fibromas of skin
  - Epidermal/sebaceous cysts

  ![Gardner Syndrome Image](image)

  ➡️ **Hist:**
  
  - Compact vs. cancellous

  ![Hist Image](image)
**Osteoblastoma:**

- Rare
- Swelling & pain
- Rx: rounded, w-d w central radcy or speckling
- **Hist:** osteoblasts, MNGC, Osteoid & FV stroma

**Osteosarcoma:**

- Most common bone sarcoma
- Long bones, 7% H & N
- Mand > Max, 10 ys later
  - Bony-hard swelling
  - W or without pain
  - Loosening of teeth, paraesthesia
  - Trismus
  - Nasal obstruction & eye symptoms
- **Rx:**
  - Variable
  - **Osteolytic tumours:** irregular radcy
  - **Sclerotic type:** irregular radio-opacity
  - “Sun-ray” appearance
  - PL
- **Hist:**
  - Osteoid
  - Fibroblastic type, chondroblastic type
- **Prognosis:** osteoblastic, less metastasis in jaws
**Chondroma & Chondrosarcoma:**

- Ant Max & post Mand, symphysis, condyle, coronoid
- **Hist:**
  - Chondroma: mature cartilages
  - Chondrosarcoma:
  - Calcifications
- **Clinically:** malignant → pain, loosening of teeth

**Giant-cell tumour:**

- Ends of long bones
- Aggressive & locally invasive W \( \uparrow \) LRR \( \pm \) metastasis
- **Hist** = CGCG
  - Uniform distribution of giant Cs
  - No Osteoid or bone
- Older age group

**Myeloma:**

- Differentiated B lymphocytes or plasma Cs win bone marrow
  - **Solitary plasmacytoma**
  - Jaw or oral soft tissues
  - 50-70 yrs
  - Large amounts of a single homogenous type of Igs
  - **Bence-Jones proteins**
    - Multiple foci of bone destruction, bone pain, anaemia, thrombocytopenia
  - Infection
  - Hypercalcaemia
  - Proteinurea
  - Bones w red marrow
- **Jaw lesions:** Mand > Max, S&S
- **Macroglossia**

- **Rx:** w-d, round/oval punched-out radices

- **Hist:** sheets of plasma Cs, Immunohistochemistry
**Langerhans cell histiocytosis:**

- Langerhans cells
- **3 forms:**

  1. **Unifocal eosinophilic granuloma (Chronic focal LCH):**
     - < 20 yrs, M > F
     - Cranium, jaws, ribs & long bones, Mand>Max
     - **Jaws:** localized bone destruction w swelling & often pain
     - **Rx:** “floating in air”
     - Spontaneous regression, curettage, excision or Rx’d
     - → Multifocal lesion

  2. **Multifocal eosinophilic granuloma (chronic disseminated LCH):**
     - Several bones & often other organs
     - Skull
     - Jaws
     - ± Liver, spleen, LNs
     - **Hand-Schuller-Christian syndrome**

  3. **Progressive (acute) disseminated histiocytosis:**
     - Letterer-Siwe disease
     - Aggressive
• Infants & young children

• Disseminated → skin, viscera, bones

• **Clinically:** fever, malaise, ↑ LNs, ↑ liver & spleen, pancytopenia

• **Rx:**
  - Osteolytic lesions
  - **Jaws:** diffuse bone destruction, floating, loosening of teeth

• **Hist:**
  - Histiocytes w pale, lobulated nuclei & eosinophilic cytoplasm
  - Eosinophils, neutrophils, lymphocytes
  - He, necrosis, fibrosis, giant Cs

![Haemangioma of bone:](image)

• **Mand>Max**

• **Clinically:**
  - Progressive painless swelling
  - Pulsatile
  - Loosening, bleeding
  - Hge
• **Rx:** osteolytic defect, multilocular

• **Hist:** usually cavernous

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**Metastatic tumours:**

- Breast, bronchus & kidney
- Bone & soft tissue
- Mand>Max
- S & S
- Osteoblastic tumours