ORTHOPAEDICS REVISION 1

Active space

Basics of Bone

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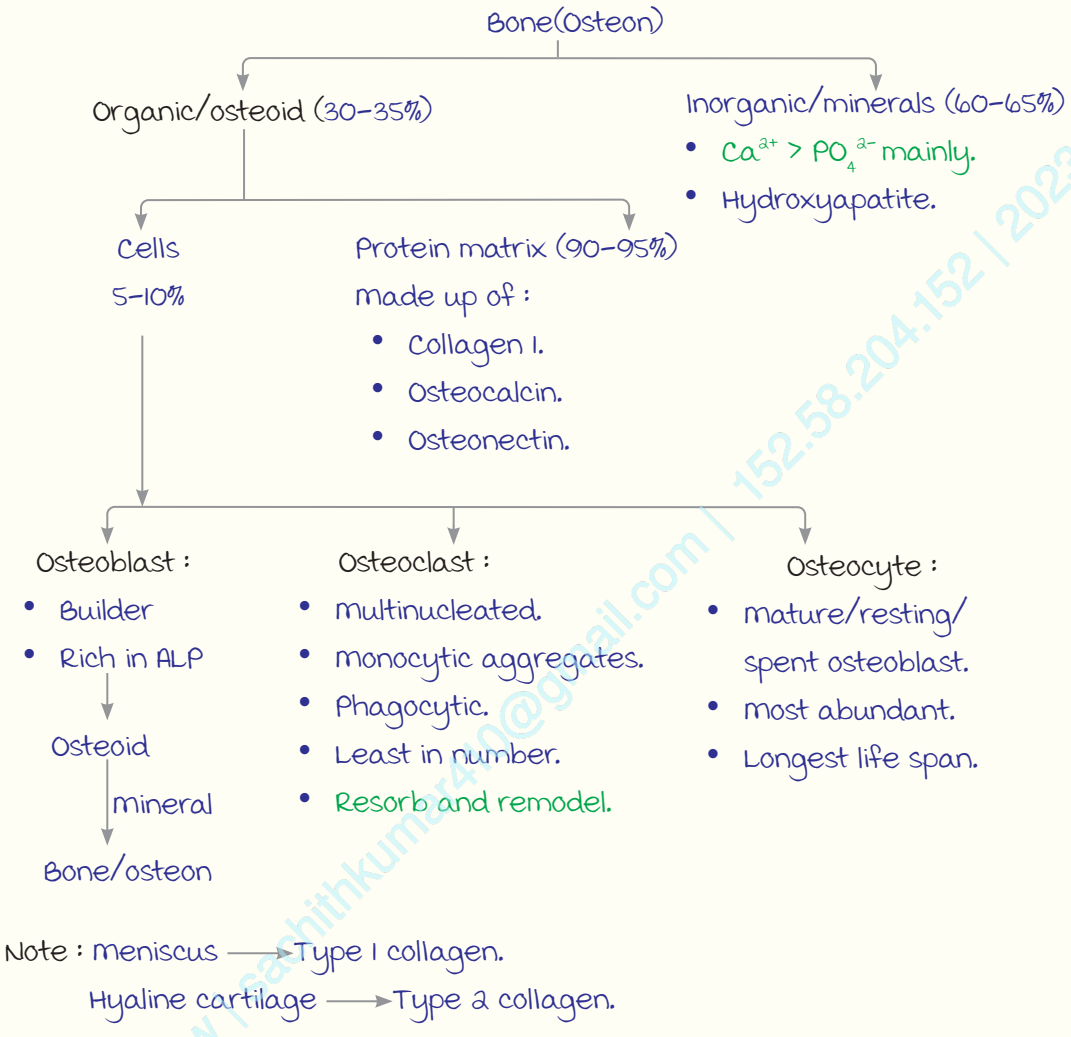


Note : Meniscus → Type I collagen.
Hyaline cartilage → Type 2 collagen.

Bone markers :

Formation markers	Breakdown markers
• Procollagen I. • Osteocalcin. • Osteonectin. • ALP (Alkaline phosphatase).	• Hydroxy proline. • Hydroxy lysine. • N & C telopeptide. • TRAP (Tartrate resistant acid phosphatase).

----- Active space -----

Layers of growth plate (Physis) :

Growth occurs from epiphysis to metaphysis.

- Germinal layer (most important).
- Proliferative layer.
- Hypertrophic layer (weakest layer).
- Calcification layer.
- Ossification layer.

Fracture

00:05:09

Breach or a break in the continuity of the cortex of bone.

Dx :

- Clinically : Abnormal bone movement.
- Radiologically : Discontinuity on X-ray.

Fracture without significant trauma

- In abnormal bone → Pathological fractures
  - Localized Causes
    - Infection.
    - Ischemia.
    - Lesions.
    - Cysts.
    - Radiation.
  - Generalized causes
    - Osteoporosis (m/c).
    - metastasis (2nd m/c).
    - Rickets.
    - Osteomalacia.
    - Osteogenesis imperfecta.
    - Osteopetrosis.
    - Paget's disease.
    - Scruvy.
- In Normal bone d/t repetitive loading → Stress fractures

Pathological fracture :

C/f : Pain before fracture.

- m/C cause of osteoporosis.
- m/c bone to fracture in osteoporosis : Spine > Hip > Colle's.
- m/C cause in young age : Metastasis (m/c proximal femur > Spine).

Mirel's criteria ≥ 8 : Requires prophylactic fixation of fracture.

Banana type of pathological fracture

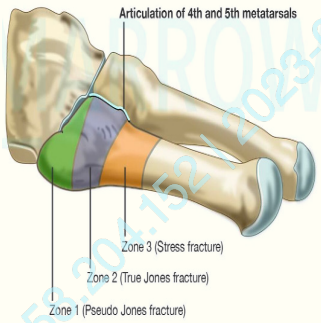
Active space

Stress fracture :

D/t repetitive abnormal loading.

C/f :

- Pain after activity & point tenderness.
- LL > UL.
- ↑ Intensity and frequency of activity.
- m/c bone for stress fracture : Tibia.
- m/c bone in foot is metatarsal (2nd > 3rd meta -tarsal neck > Shaft #/march #).
- IOC : MRI (X-ray +ve only after 2-3 weeks).
- IOC for multiple stress # : Bone scan.
- Rx : Immobilization with rest.



Robert Jones fracture
Base of 5th metatarsal #

Fracture healing

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Primary healing	Secondary healing
Direct healing.	Indirect healing.
No callus seen.	Callus d/t micromovement at fracture site.
Result of absolute stability	Result of relative stability.

Stages of healing :

Stages	Features
1. Hematoma (2-3 days)	Bleeding at # site : Fibroblast aggregation by chemotactic factors.
2. Granulation (2-3 wks)	Fibroblasts matures into osteoblast.
3. Callus (2-3 months)	Osteoid with less Ca^{2+}.
4. Consolidation (2-3 yrs)	Woven bone : Rigid callus with irregular collagen.
5. Remodeling (> 3yrs)	Lamellar bone replaces woven bone.

Callus

First radiologically visible stage of fracture healing : Callus (at 3 wks).

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Non-union :

m/c cause : Improper immobilization.

Types :

Hypertrophic non union	Atrophic non union
Biology is good	Abnormal biology i.e. infections, ischemia.
D/t improper immobilization	Immobilization may be good.
Exuberant callus present.	No callus.
Rx : Immobilize 	Rx : Autologous bone grafting (m/c site of harvesting : Iliac crest) 

Malunion :

healed in anatomically abnormal position.

Rx : Osteotomy.

Gun stock deformity (Supracondylar # malunion)

Abnormal outcomes of fracture :

Malunion	Non union
• Clavicle (m/c). • Supracondylar Humerus. • Colle's. • Intertrochanteric (Extra capsular) femur	• Lower 1/3rd Tibia (m/c). • Lateral condyle humerus. • Scaphoid. • Neck of femur (Intracapsular). • Neck of Talus.

Avascular necrosis

00:19:26

Active space

AVN
- Traumatic
- Non-Traumatic

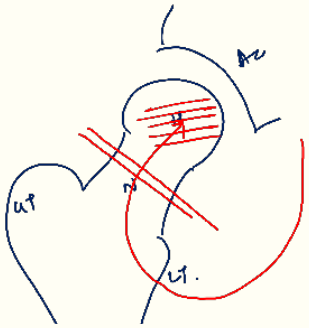
m/c cause : Idiopathic (non-traumatic).

m/c association : Steroid administration.

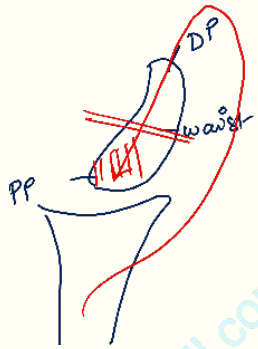
m/c Site : Head of femur (m/c) > Proximal pole of scaphoid > Body of Talus.

Other causes : Alcohol abuse, Perthes disease, sickle cell disease, Gaucher's , Caisson disease.

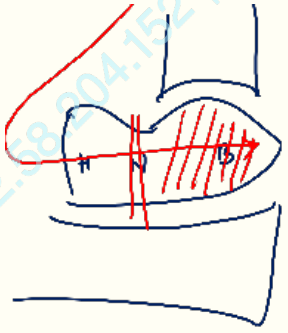
IOC : MRI.



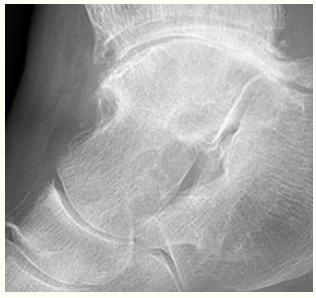
Neck of femur # : Head of femur AVN



Waist of Scaphoid # : Proximal pole of scaphoid AVN



Neck of Talus # : Body of talus AVN



Fracture management

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Displacement : Described in relation to distal fragment.

Fracture
- Intra articular #
  - OR + IF with plates & screws
- Extra articular #
  - CR + POP
  - Definitive treatment
    - If upper limb
    - If Lower limb
      - CR + IF with intramedullary interlocking nails and rods.