

FRACTURE HEALING. (short note)

A fracture is defined as loss of bone integrity due to mechanical injury and/or diminished bone strength.

break in continuity of bone.

Similar to the healing of soft tissue.

- Types
 - Traumatic
 - Pathological.

Simple fracture.
Comminuted fracture. } types of traumatic fracture.
Open fracture.

- Types → transverse, open, oblique, oblique displaced, comminuted, segmental, avulsed, spiral, greenstick (in children)

Impacted → one end of bone is driven up into other.

Depressed → usually in skull.

Events in healing of fractures

- Primary union of fractures.
- Secondary union of fractures.

Primary union

→ Ends of fracture approximated surgically by application of compression clamps or metal plates.

→ Bony union takes place with formation of medullary callus w/o periodical callus formation.

→ Early ambulation

→ More extensive bone resection and slow healing.

Secondary

More common

Immobilization by plaster casts

Steps

- (i) Procallus formation
- (ii) Osseous callus formation
- (iii) Remodelling

Procallus formation

- 0 - 2 weeks.
- Tissue destruction and hematoma formation.
- Torn blood vessels hemorrhage
- mass of clotted blood formed at fracture site
- site becomes swollen, painful, and inflamed.

fibroblasts.

- Inflammation and cellular proliferation
- Exudation of fibrin, polymorphs, macrophages

- Ingrowth of granulation tissue.
- Neovascularisation.

- Soft tissue callus
- (1). proliferation of mesenchymal cells from periosteum and endosteum

• Formation of soft tissue callus
or procallus.

provides anchorage
osteoblasts at osteoblastic activity
↳ deposit subperiosteal
calcification. uncalcified
cartilaginous matrix.

① Ossous callus formation
→ 2-3 weeks.

→ after 2 weeks, osteogenic cells start depositing subperiosteal trabeculae of woven bone in the medullary cavity.

Endochondral ossification.

By end of 3rd week → lamellar bone.

contiguous network of woven formation in medulla and periosteum.
progressive mineralization → strength

Remodelling.

Early stages → 2-3 weeks
resorptions as callus matures.
resorptions are of healing bone and resorptions lamellar bone.

3 weeks → months (1-2 years)
Resorption of medullary activity.

Factors affecting fracture healing

Factors related to injury

① Open fractures : Impurity

or preceding for
- delay in formation of
- risk of infection.

② of the alignment & congruity of joint surface & not restored
- delayed healing or non union
- joint stiffness.

③ Soft tissue interposition.

④ Damage to the blood supply.

Enhancing.

Early immobilisation
Bone fragments contact
adequate blood supply
Proper nutrition
Adequate hormones
(GH, thyroxine, calcitonin)

Delays.

→ advanced age.
→ excessive soft tissue trauma
→ Bone loss
→ inadequate immobilisation
→ Infection
→ Vascular neurosis

Complications.

→ May not unite (Non union)
→ delayed.
→ Fibrous union may result instead of osseous union - Immobilisation of fractured bone is not done
→ formation of false joint or pseudoarthrosis. → malformed callus.

→ Malunion - due to inaccurate reduction, ineffective immobilisation.
→ Vascular neurosis (scaphoid)