Principles Of Fractures(1)

Dr. FAWZI ALJASSIR,MD, MSc, FRCSC

Associate Professor & Consultant Orthopedic Surgery

Chairman, Department of Orthopedics
Director, Orthopaedic Surgery Research Chair
Chairman of Education & Training Commission of SASMA

Master In Surgical Research (McGill University).

Introduction.

- Defintions.
- Mechanisms.
- Diagnosis.
- Classification.
- Fracture healing.

Fracture:-

Break in the continuity of bone

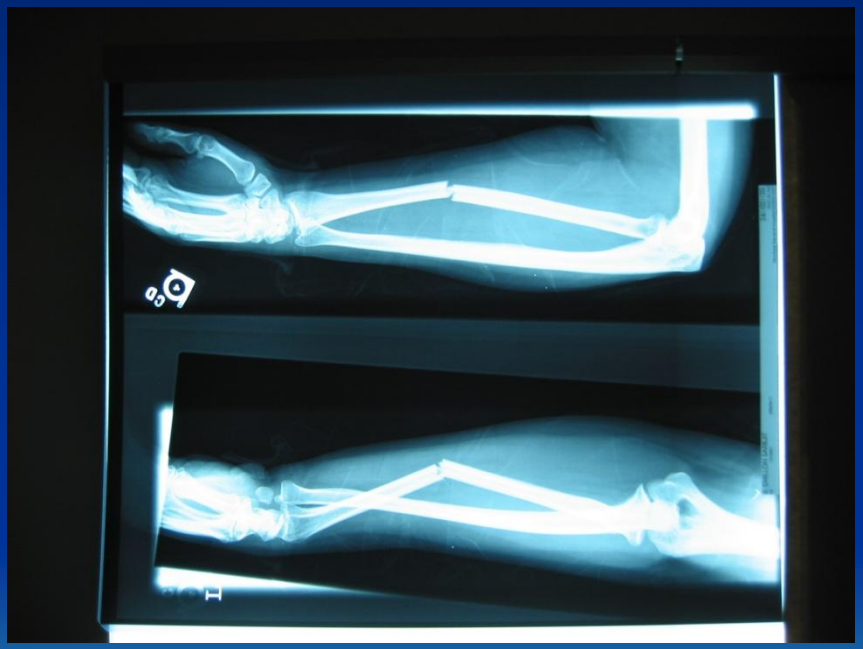
Fig. 1 Complete fracture

Fig. 2 Incomplete fracture

Defintions.

Incomplete

Complete



Defintions.

- Closed fracture (simple).
- Open fracture (compound).
- Complicated fracture.

Defintions.

- **Closed Fracture (simple):-**

  Does NOT communicate with external environment

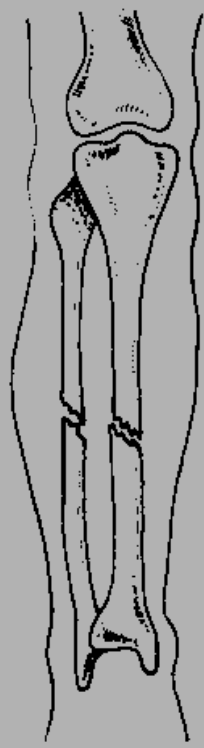


Fig 3. closed fracture tibia

Defintions.

- **Open Fracture (compound):-**

Communicate
with external environment

Infection !!

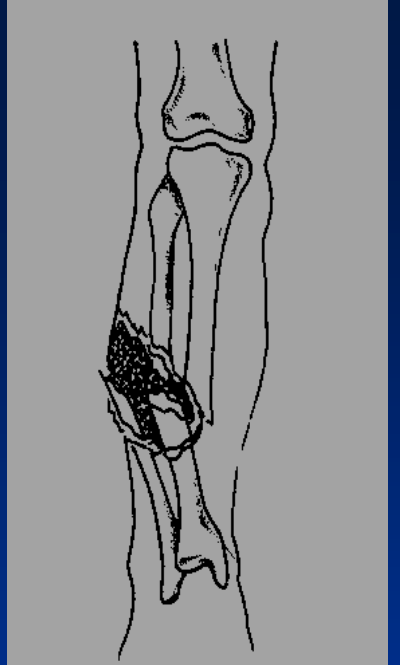
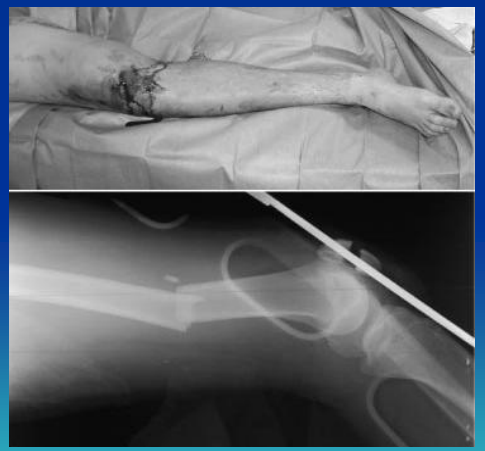


Fig. 4 Open fracture tibia



Defintions.

- **Complicated Fracture:-**

  Associated with damage to nerves, vessels or internal organs

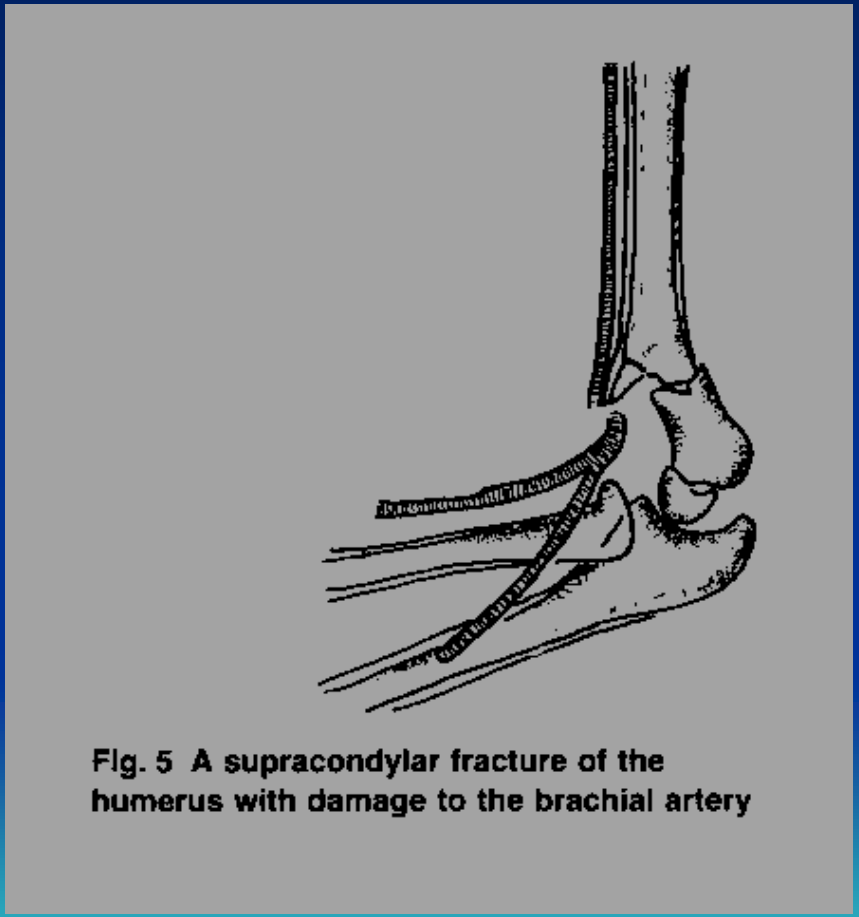
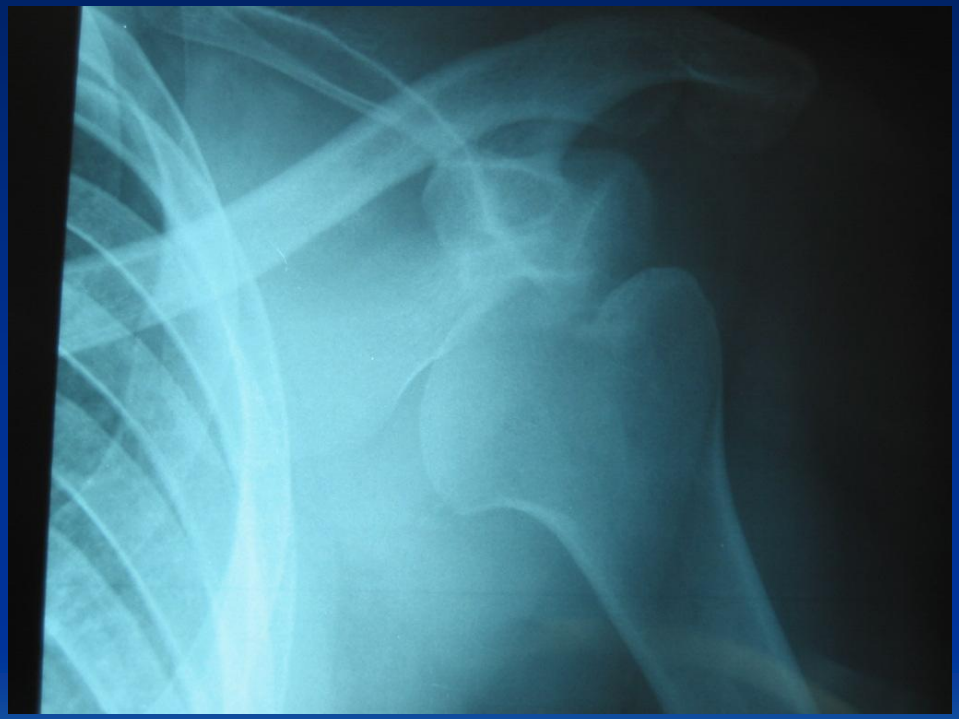


Fig. 5 A supracondylar fracture of the humerus with damage to the brachial artery

Defintions.

- Dislocation.
- Subluxation.
- Fracture disloction.



Defintions.

- **Dislocation:-**

  Complete separation of the articular surface.

  Distal to proximal fragment

  Anterior, Posterior, Inferior, Superior

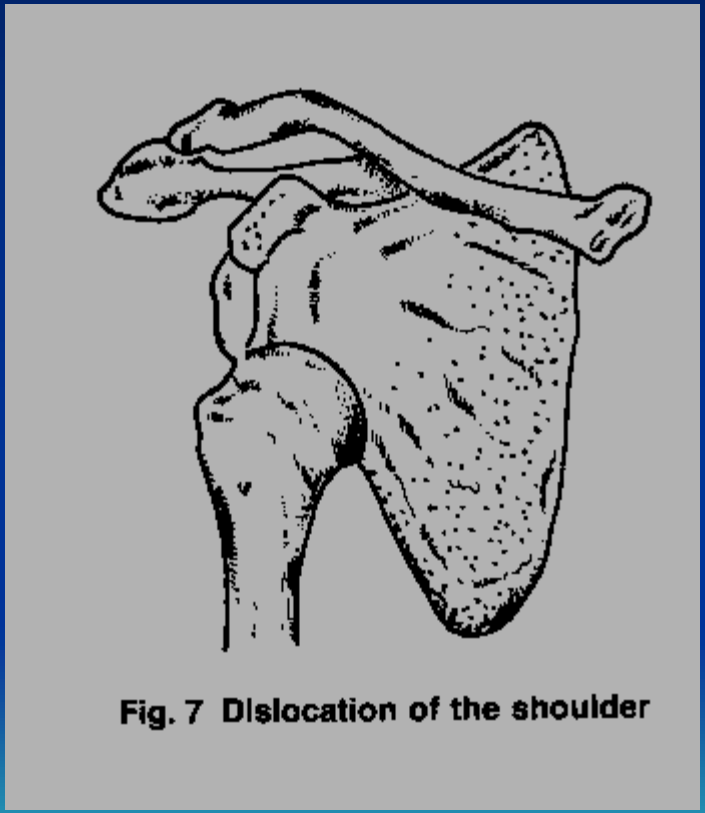


Fig. 7 Dislocation of the shoulder

Defintions.

- **Subluxation:-**

Incomplete separation

Joint Function in Anatomical position Only

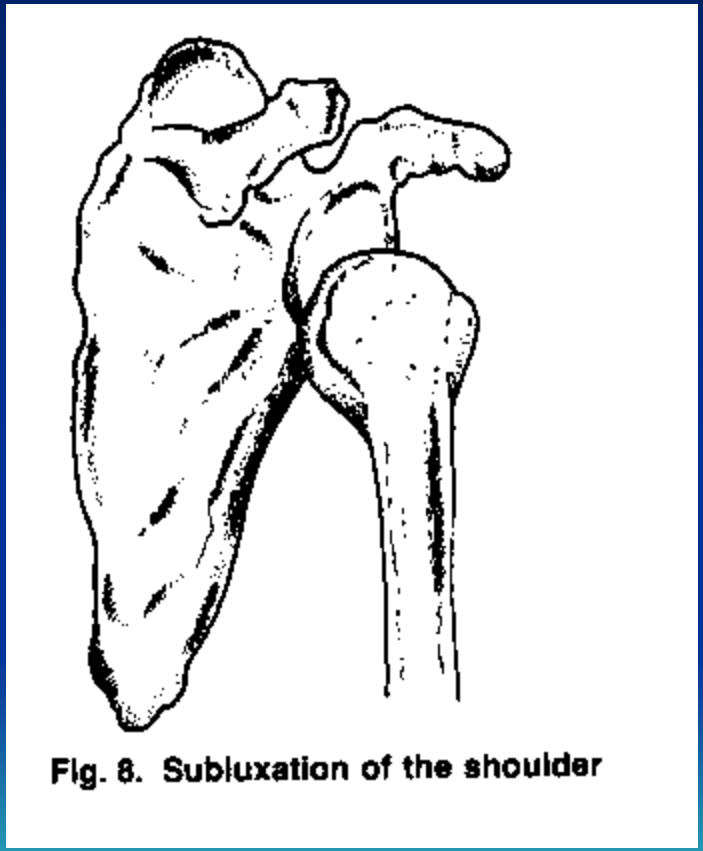


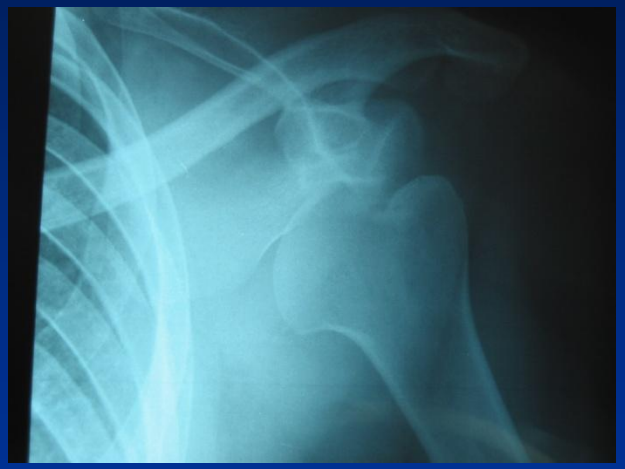
Fig. 8. Subluxation of the shoulder

Defintions.

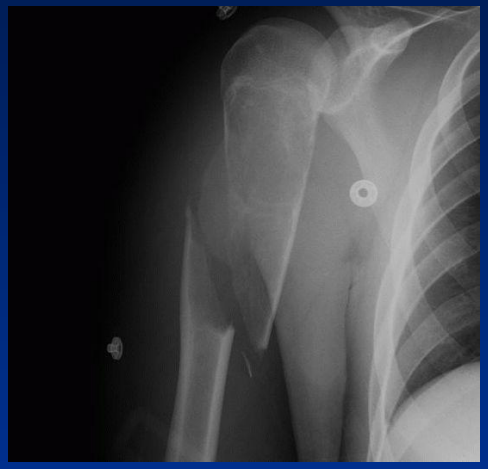
- **Fracture Dislocation:-**

Association!

Always X-Ray Joint Above and Below



Defintions.



- **Pathological Fracture:-**

  Fracture abnormal bone

  Cyst, Tumour, Infection

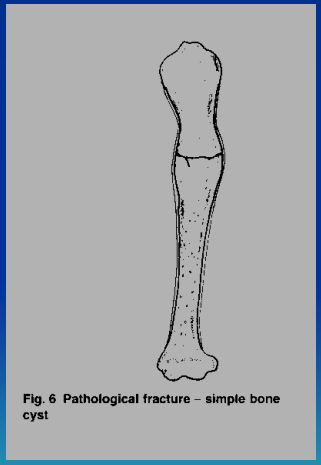


Fig. 6 Pathological fracture – simple bone cyst

Defintions.

- Pathological fracture.

Mechanisms

- **Amount of Force:-**
  - * **Trivial force = Pathological**
  - * **Magnitude = Non-pathological**
- **Direction of Force:-**
  - * **Direct Force**
  - * **Indirect Force**

Mechanisms

Indirect Force

On Long Bones:-

1) **Twisting Force**

Spiral Line

Mechanisms

Indirect Force

On Long Bones:-

2) Angulating Force

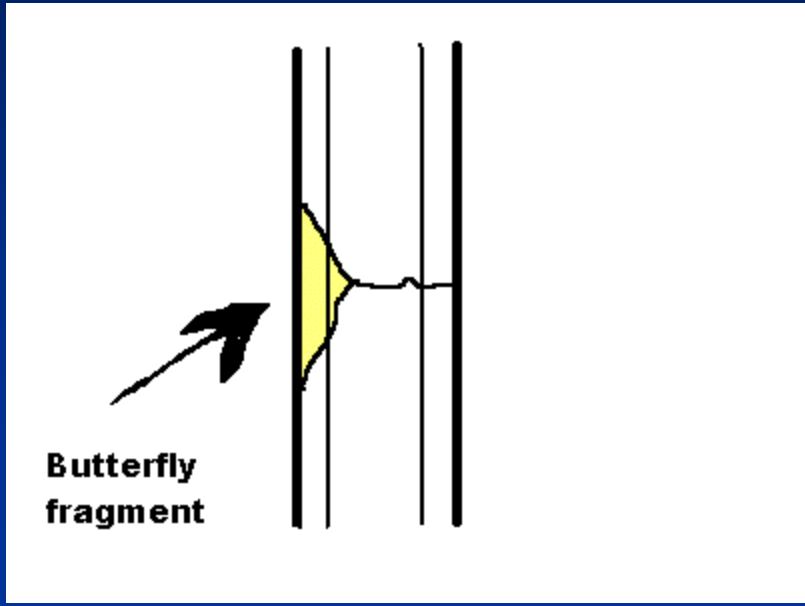
Transverse pattern

Mechanisms

Indirect Force
on Long Bones

3) Angulating
+ Axial compression

Transverse line
+ Triangular
"Butterfly"



Mechanisms

Indirect Force
on Long Bones

4) Angulating
+ Axial compression
+ Twisting forces

(short oblique pattern)

Mechanisms

Indirect Force

On Long Bones:-

5) **Vertical compression**

comminuted

Mechanisms

Direction of Force

On Cancellous Bones:-

Direct OR Indirect

Comminuted Pattern

Burst

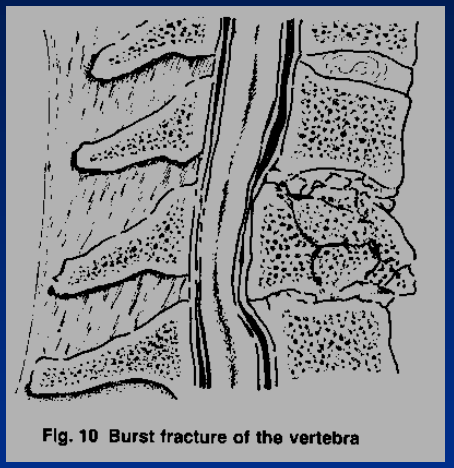
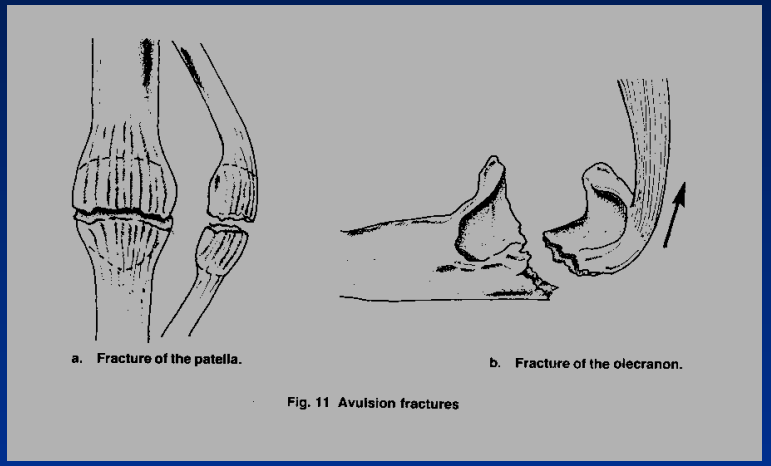
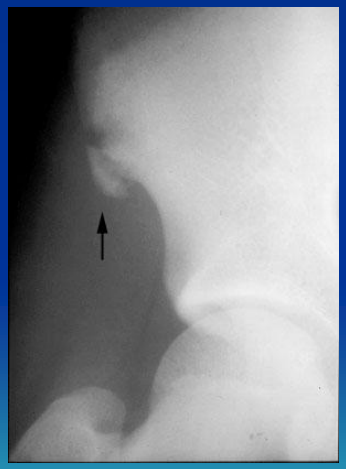


Fig. 10 Burst fracture of the vertebra

Mechanisms

Force due to Resisted Muscle Action:-





"Avulsion"

Transverse pattern

Diagnosis

I- HISTORY

II- EXAMINAION

A- General

B- Local

III- INVESTIGATIONS

Diagnosis

I- HISTORY

1) Trauma
   * Pathological (trivial)
   * Non-pathological (magnitude)
2) Mechanism
   * Fall from height,
   * RTA, pedestrian, Driver….?

Diagnosis

I- HISTORY

3) Complaint:

a) Pain sharp, increase by movement, Not radiating

b) Loss of Function

c) Deformity

d) Symptoms of complications

e) Other organs: head, chest, abdomen

Diagnosis

II- EXAMINATION

A- General examination

B- Local examination

Diagnosis

A- General examination :

1) Signs resulting from fracture or trauma:

   a) Vital signs, Shock A,B,C

   b) Associated Head, Chest, Abdomen

2) Signs related to cause of fracture:

   Pathological # …CA Lung, Prostate..

Diagnosis

B- Local Examination

- LOOK : Skin damage, deformity, swelling
- FEEL : Localized tenderness
- MOVE : Abnormal movement, crepetus
- DO :

  a) Special tests : Circulation & Nerves

  b) Measurements : shortening

  [Always compare]

Diagnosis

INVESTIGATIONS X-RAY:-

A- Essential requirements:

1) Two views
AP & Lateral.

2) Two joints
Above & below #.


LT

Diagnosis

INVESTIGATIONS

X-RAY:-

B- Occasional Requirements

* Two Limbs " Compare "
* Two Occasions "Scaphiod"
* Special X-rays Stress, CT..

Diagnosis

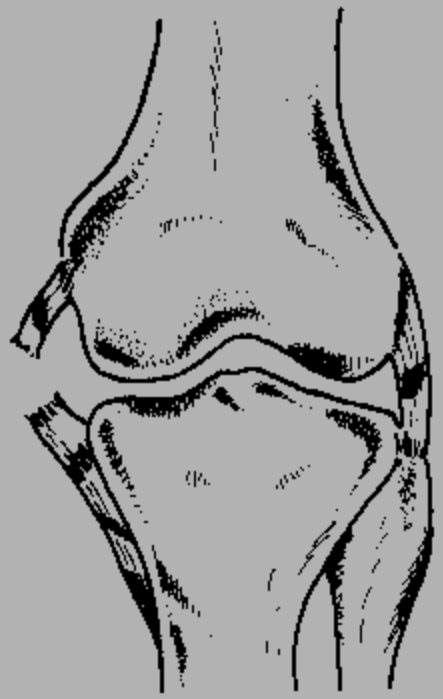


Fig. 13 The knee looks normal although the medial ligament is ruptured

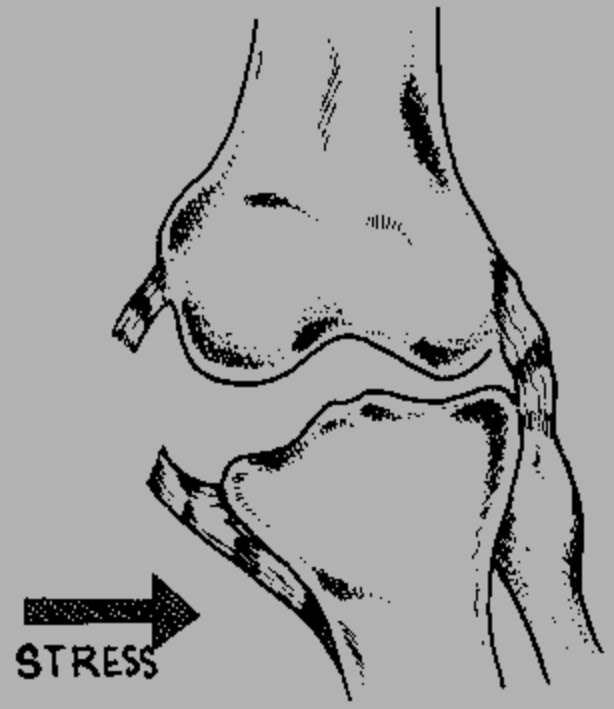


Fig. 14 Same knee under valgus tress shows widening due to the ruptured medial ligament.

Diagnosis

C- Description of X-ray :

1) **Situation :** side, site, localization

2) **Pattern :** line of fracture

3) **Displacement :**

a) **Shift :** lateral,medial,anterior,posterior

b) **Tilt :** angulations

c) **Twist :** rotation , internal, external

d) **Shortening:** overriding, impaction

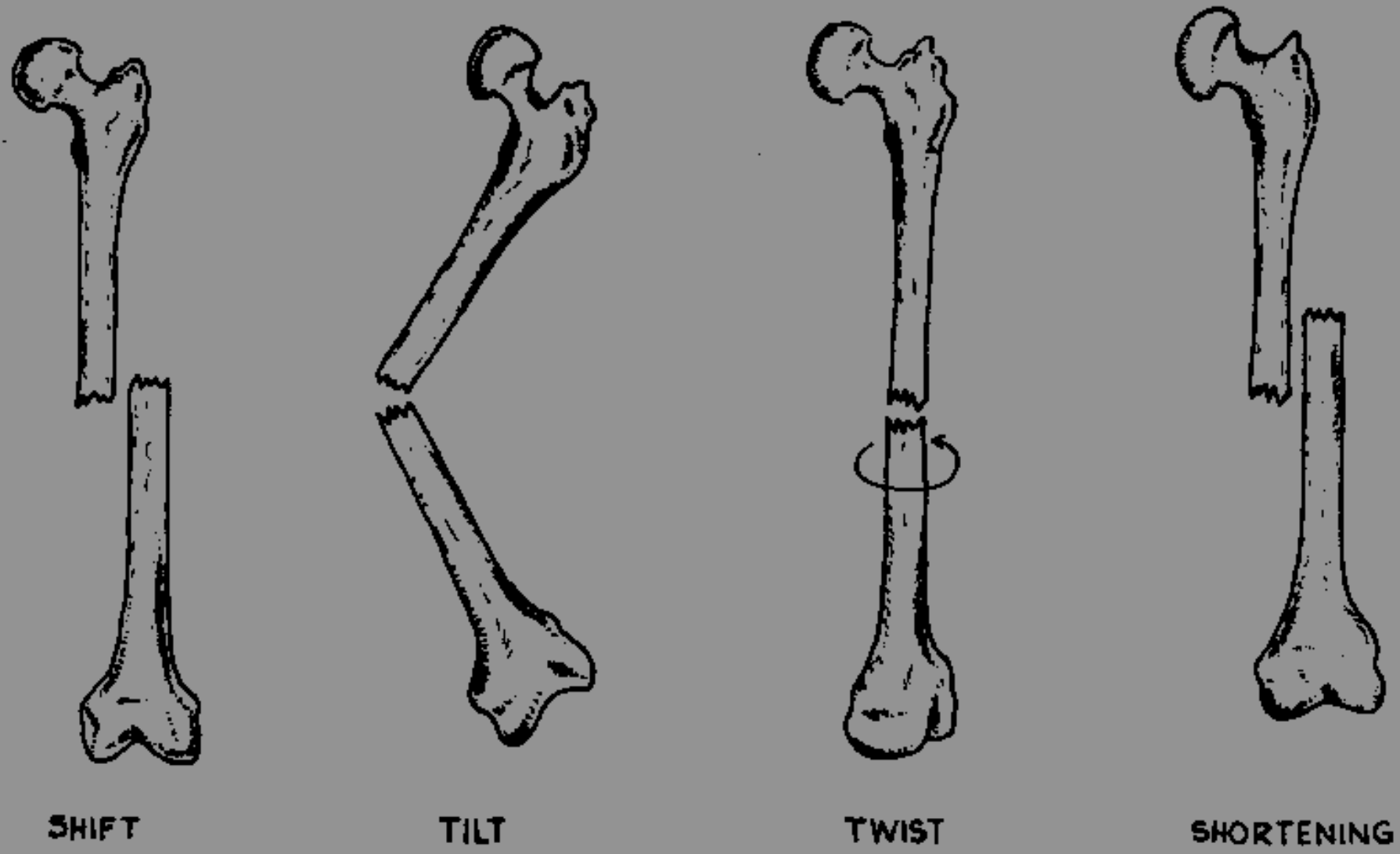


Fig. 15 Displacement

Repair of Fracture

A - Primary repair

- With Rigid Internal Fixation
- No Callus formation
- Active Haversian remolding
- Long time

Repair of Fracture

B - Secondary Repair

- **Without rigid fixation**
- **Commonest type even with I.F.**
- **Stages :**

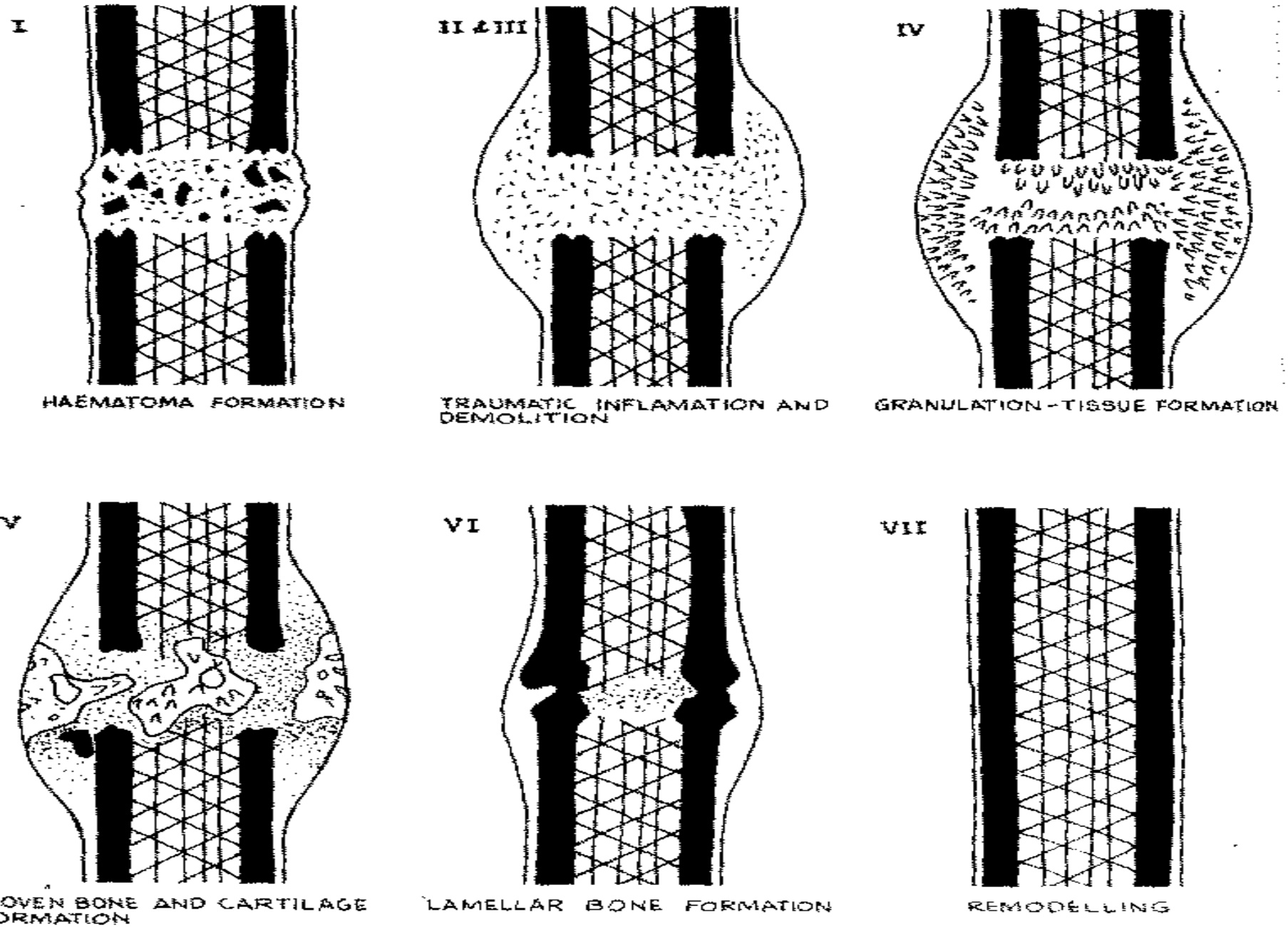


Fig. 37 Stages in fracture repair without rigid fixation

Time Factor- Perkin's formula

	Union	Consolidation
Upper limb	Spiral 3 Transverse 6	6 weeks 12 =
Lower Limb	Spiral 6 Transverse 12	12 = 24 =

Children Half this time is needed