Principles of fractures management

Fracture = break in structural continuity of bone.

1-closed = skin intact
2-compound = fracture hematoma connected to surface of skin or one of the body cavities.

Compound fractures

classified according to Gustillo classification.

Gustillo classification:

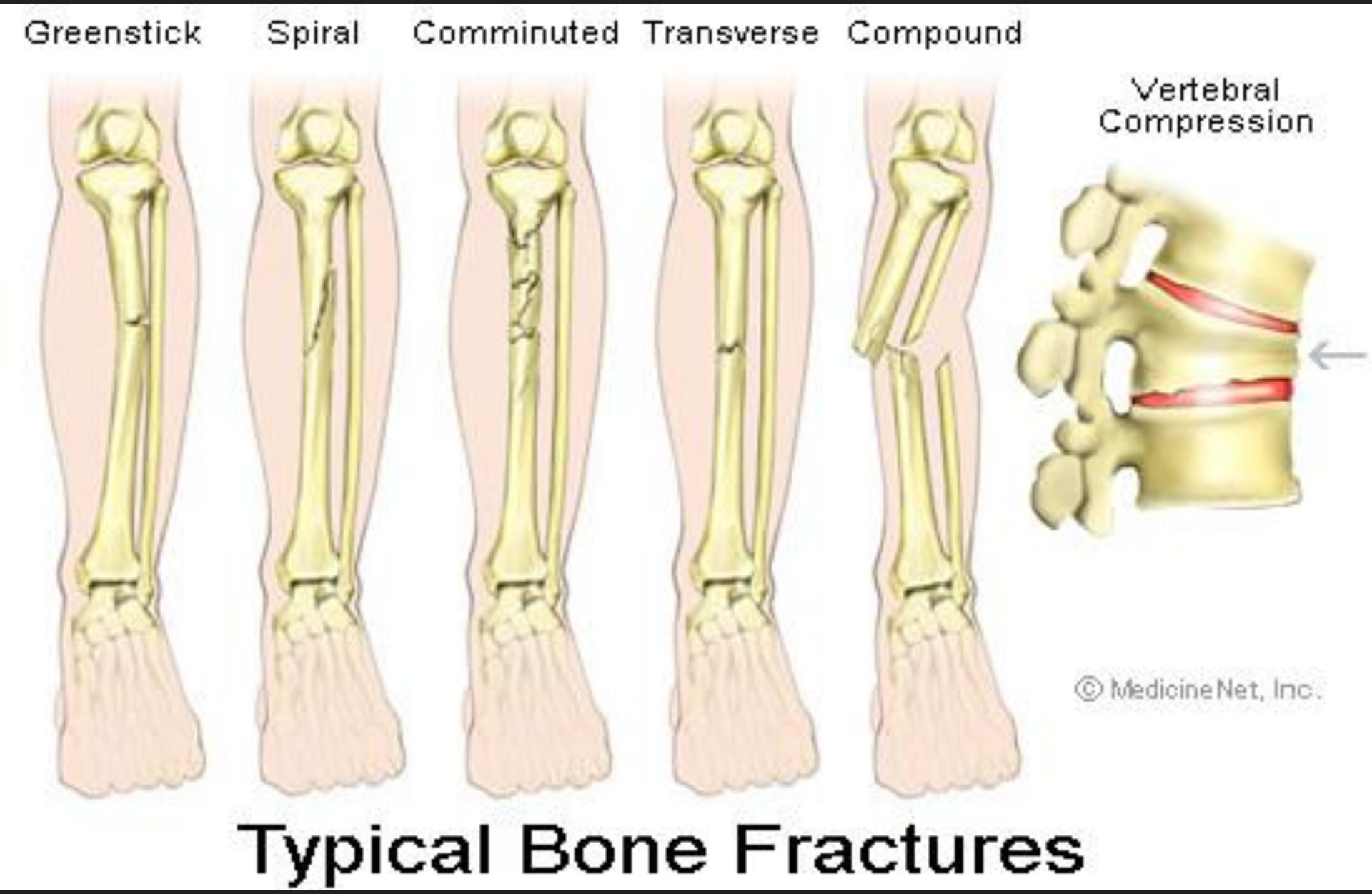
G.1 naht ssel:1 cm wound
G.1< :2cm but Less than 10 cm wound
G10 < :3cm wound with
G.3 A: adequate soft tissue coverage.
G.3 B: inadequate soft tissue covering.
G.3 C: neurovascular injuries
regardless the soft tissue covering.

G 1

G2

G3A

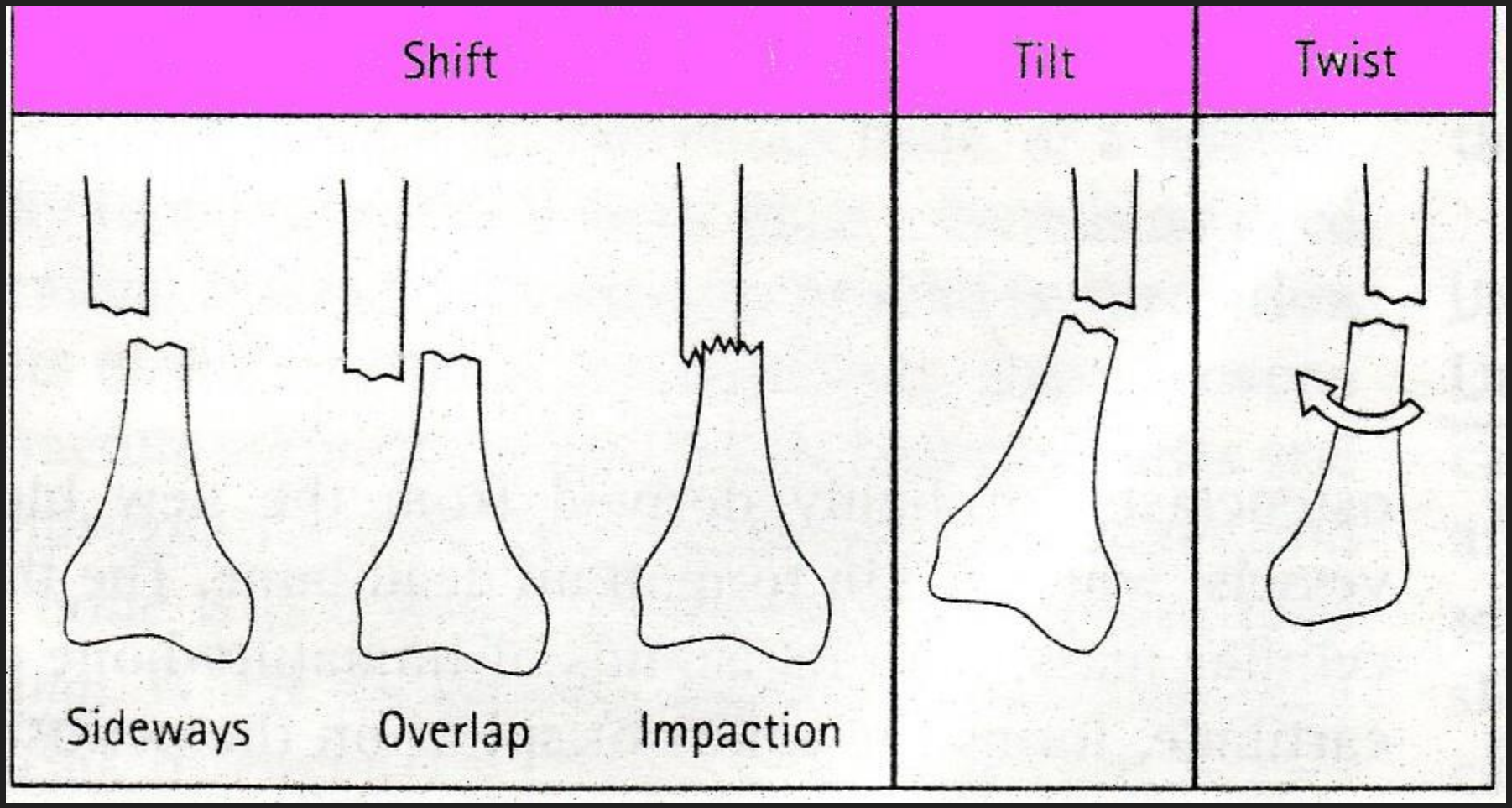
Gustillo fractures



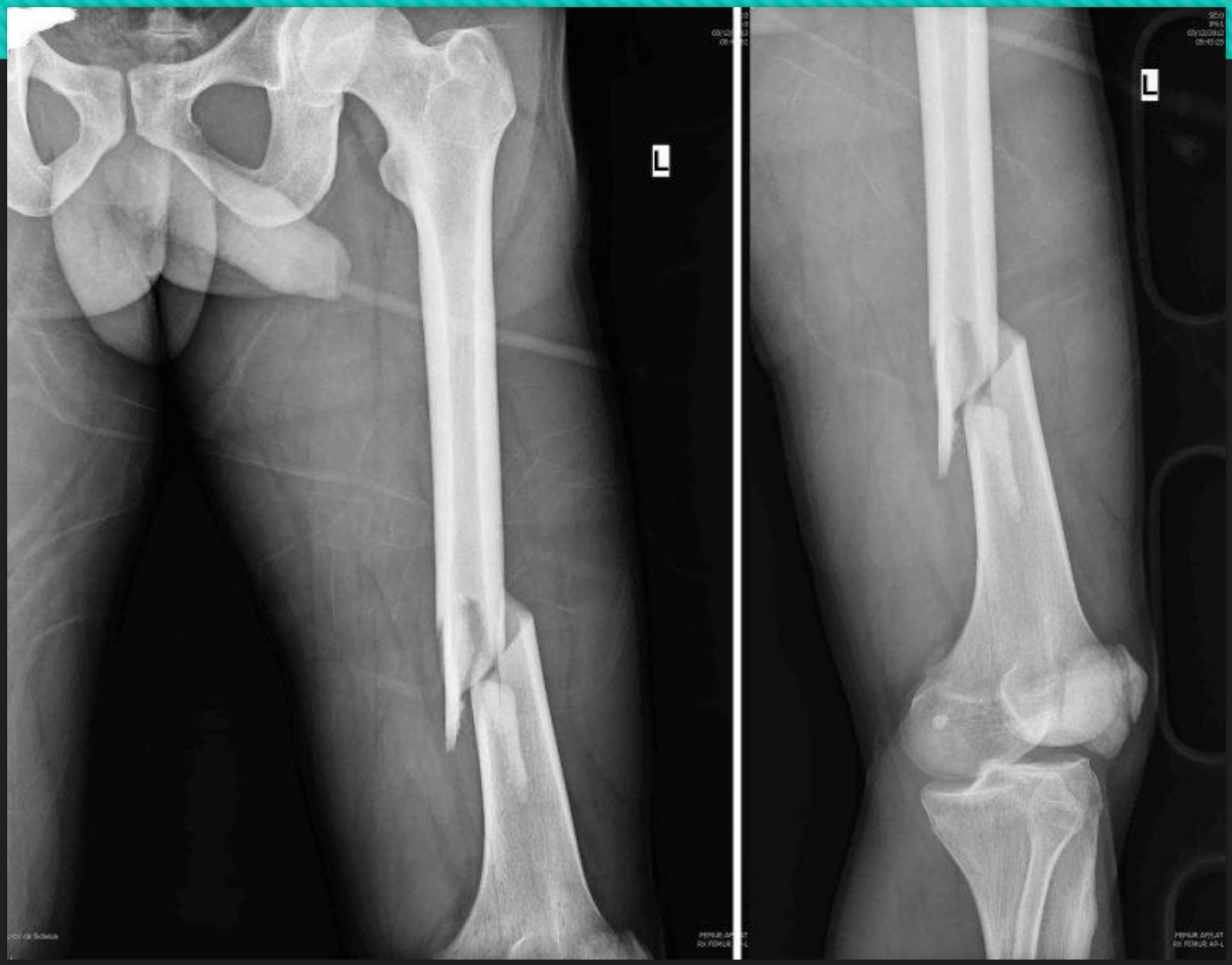
Typical Bone Fractures

How fractures are displaced:

- In complete fracture the bones displaced by gravity or pull of muscles.
  - translation (shift)
  - alignment (angulation)
  - rotation (twist)
  - Overlap (shortening)

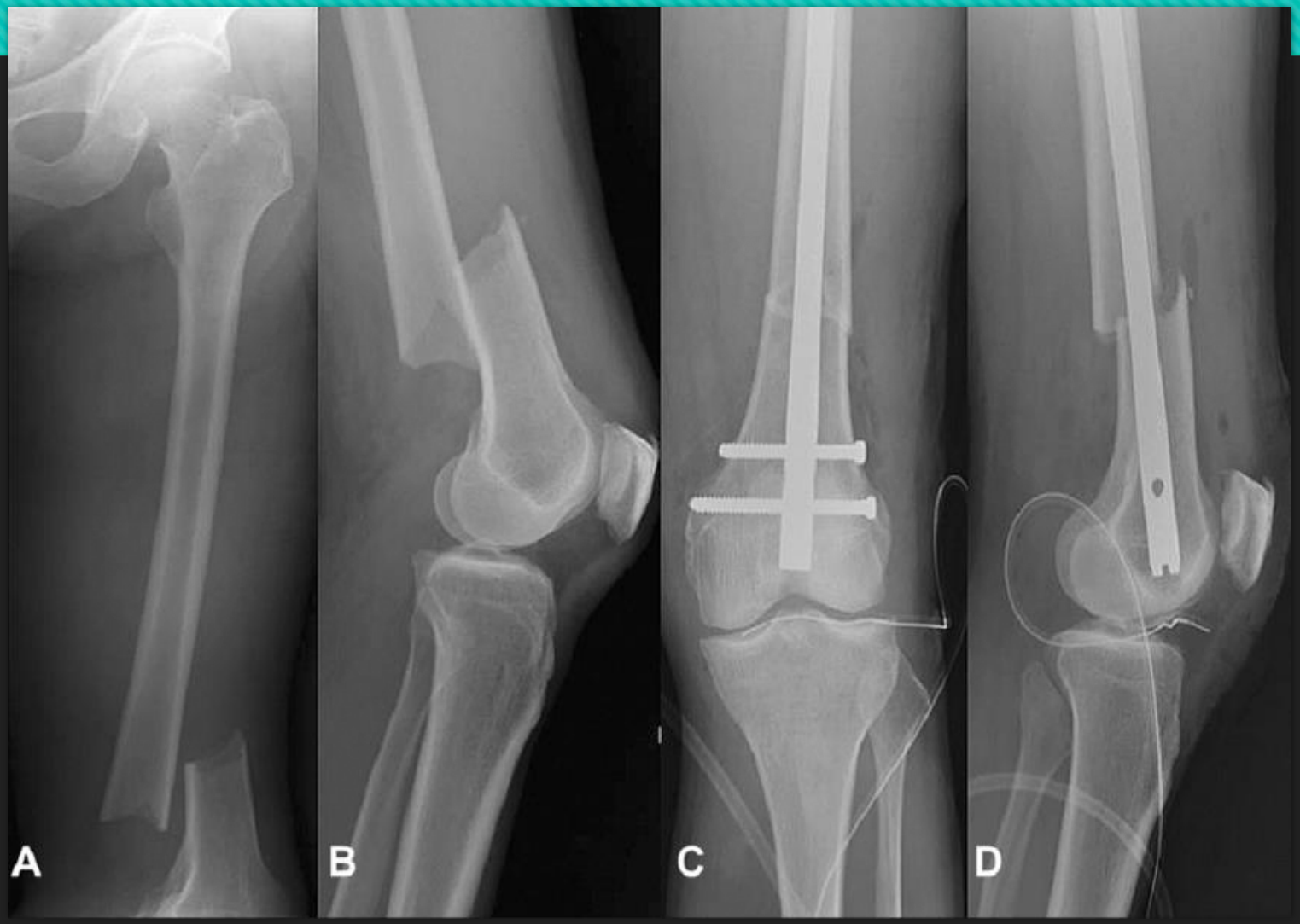

Shift
Tilt
Twist
Sideways
Overlap
Impaction

Translation



Angulation

Overlap



X – Ray

The rule of two:

- **Two views** anteroposterior and lateral views
- **Two joints** joint above and below fracture included.
- **Two limbs** as in children for comparison .
- **Two injuries** sever injury cause injuries in more than one level.
- **Two occasions** some not seen at the time of injury but only one or two weeks later as in **fracture scaphoid or stress fractures.**

Fracture healing calendar:

the upper limbs in children in general	3Wks
The lower limbs in children	Double the time i.e. 6 wks
The upper limbs in adults	Double the time needed in children i.e. 6 wks
The lower limbs in adults	Double the time needed in children i.e. 12 wks

Treatment of closed fractures:

Three important rules:

1. reduce
2. hold
3. exercise

Reduce:

- Reduction aim
  - adequate apposition
  - acceptable alignment of the bone fragments..

methods of reduction:

closed reduction:

- under anesthesia or muscle relaxation
- the distal part of the bone is pulled in line of bone
- disengaged – reverse mechanism of injury – repositioned

open reduction: **indications:**

- failure of closed reduction
- displaced articular fractures

Hold

Immobilization is performed by:

1. continuous traction
2. cast splint
3. functional brace
4. internal fixation
5. external fixation

Continuous Traction

problems

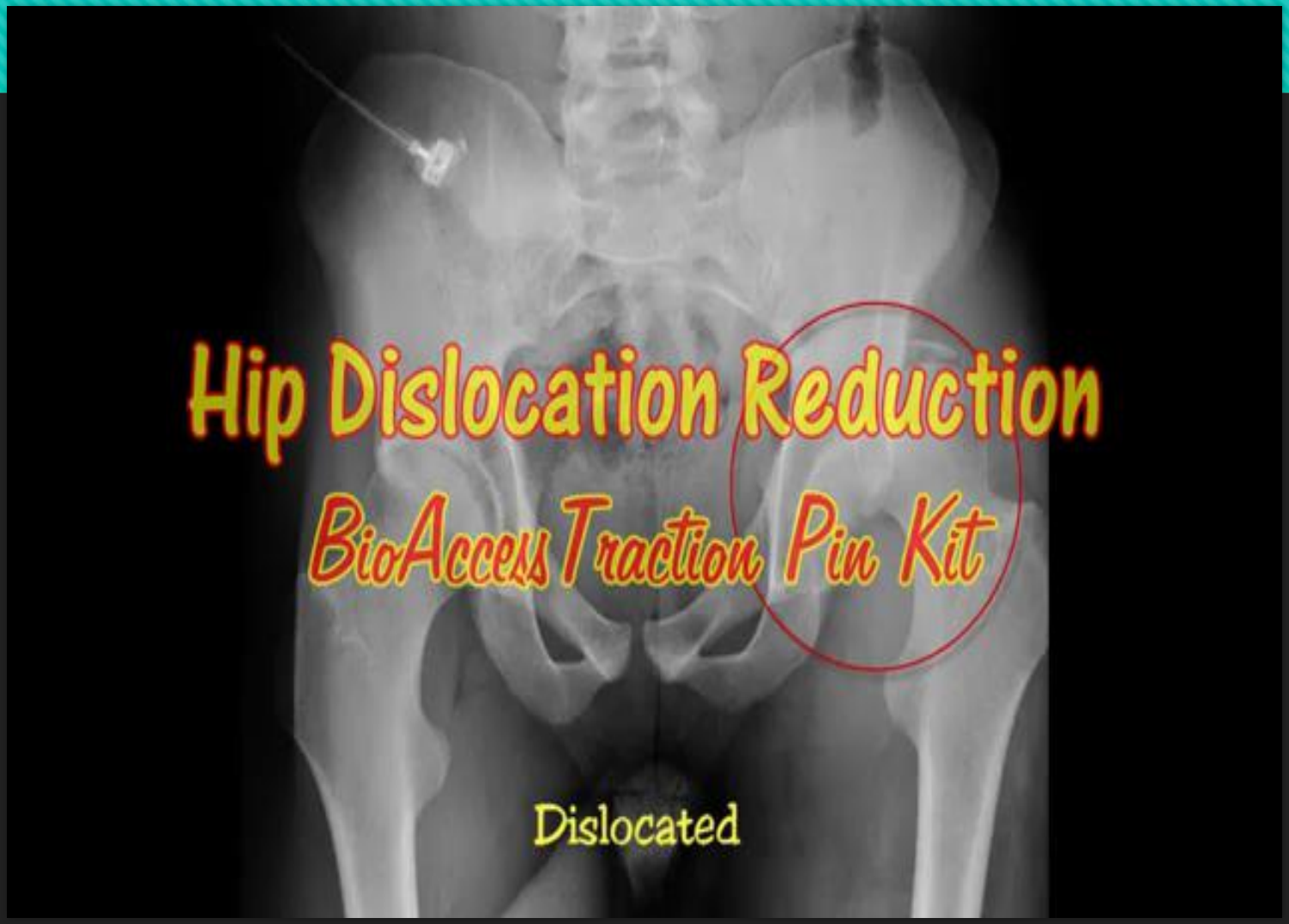
- not accurate reduction
- patient remain in bed for long period.

Two types ?

1. **skin traction:** not more than 5 kg using adhesive straps
2. **skeletal traction:** pin inserted in the bone distal to the fracture , this when high weight is needed.

Skin traction application

Skeletal traction



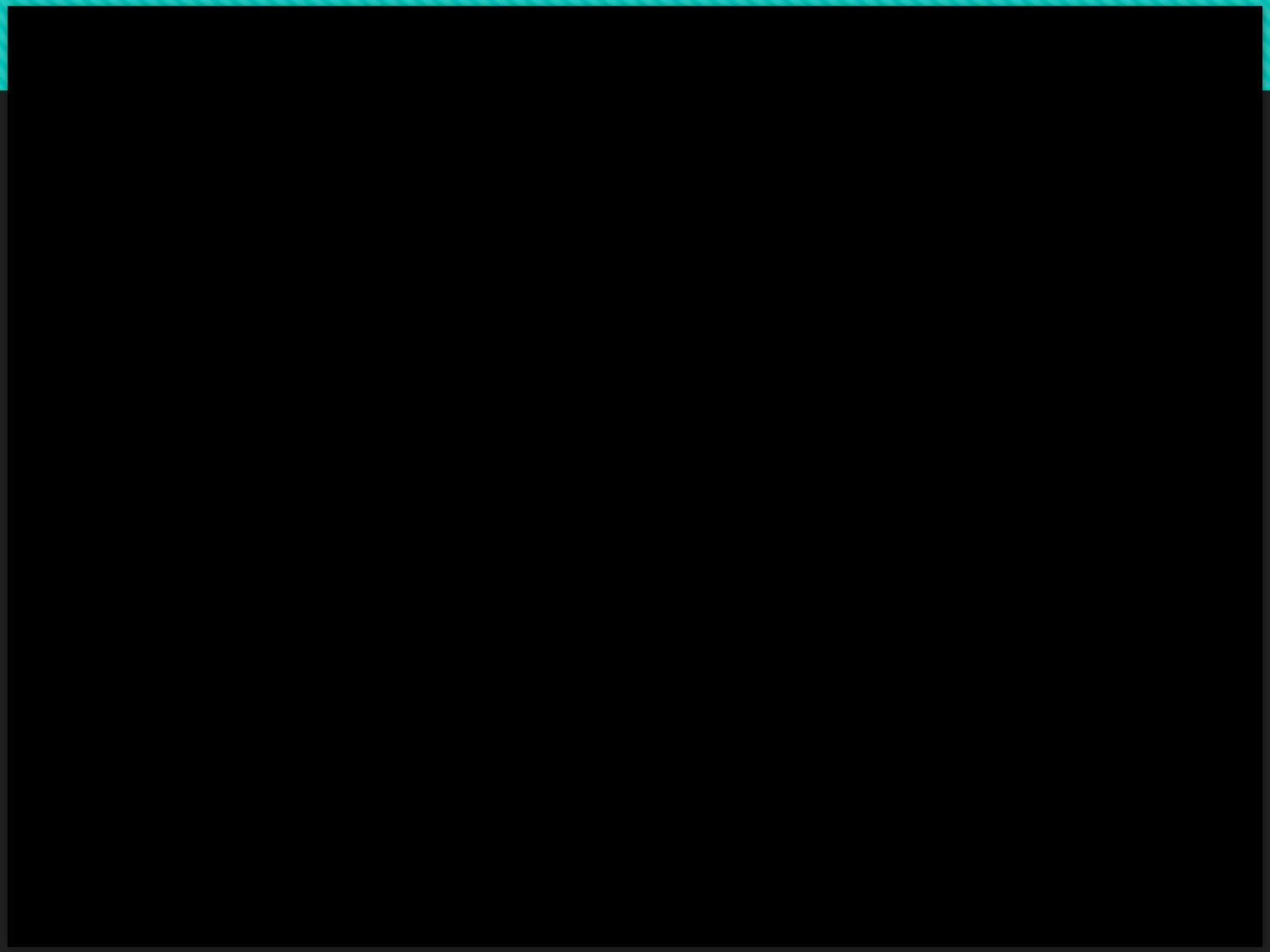
Complication of traction:

1. circulatory embarrasement. Especially in children.
2. nerve injury . in older people, drop foot may happen
3. pin-site infection.

Cast splint :

- **Plaster of Paris (POP)**
  - Hold fractures after reduction
  - rotation of the fracture prevented by including the joint above and the joint below,
  - The patient can leave the bed early in LL fractures using of crutches allow ambulation.

Pop casting



Closed reduction and POP casting

Complication of POP

1. stiffness of joints 'fracture disease' - avoide by early physiotherapy.
2. tight cast -- leading to compartment syndrome
3. pressure sores over bony prominences , localized burn precisely over pressure spot.
4. skin abrasion or laceration -- during removal.
5. lose cast after swelling subside --- should be replaced.

Functional bracing

- Using POP or plastic materials
- cast are applied over the shaft of the bones leaving the joints free,
- cast segments connected by metal or plastic hinges allowing movement in one plane.
- Not rigid !!! applied only when the fracture is beginning to unite.

Functional brace

Internal fixation

1. screws
2. transfixing pins ,
3. nails ,
4. plate and screws
5. intramedullary nail
6. circumferential bands

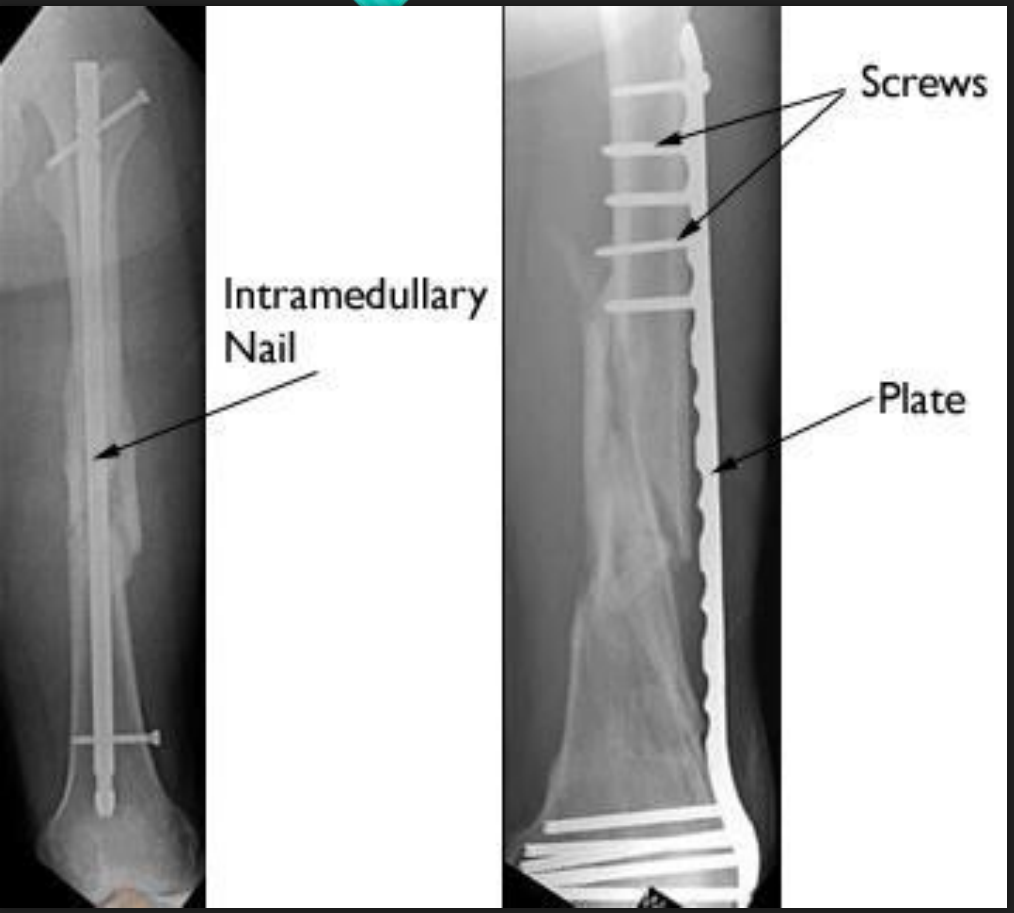
Advantages:

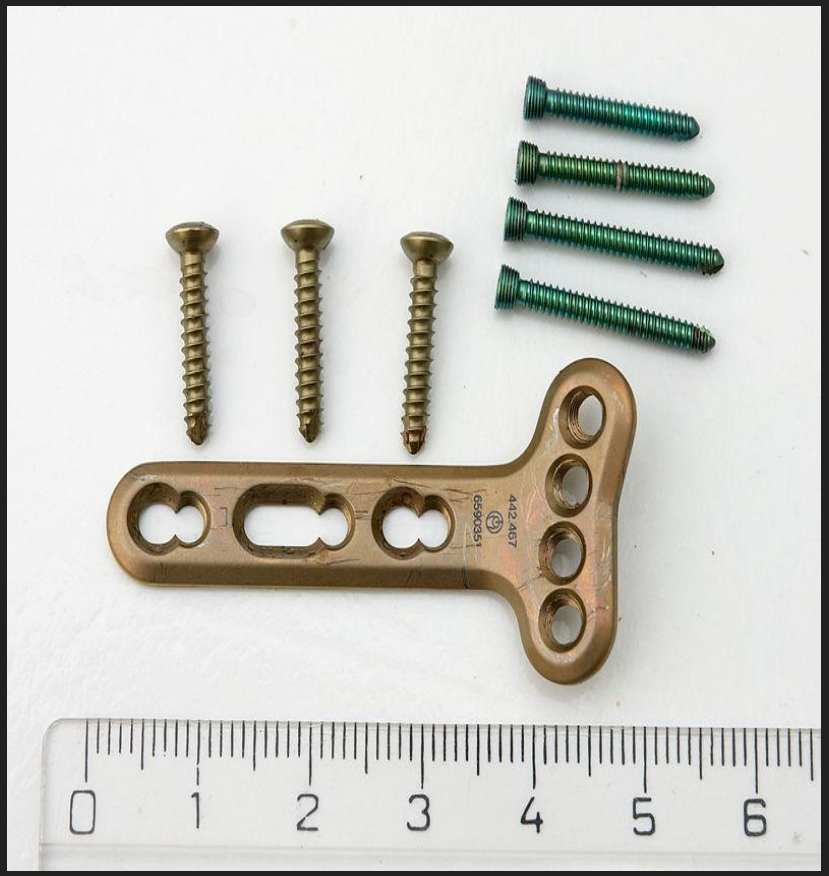
1. allow early movement and prevent stiffness.
2. allow early leaving of hospital.
3. accurate reduction as in intraarticular fracture.

Kirshner wire

screws

Plate and screws





Intramedullary nail

Indications of internal fixations

1. failure of closed reduction.
2. unstable fractures
3. fractures that unite poorly as in fracture neck femur.
4. pathological fractures.
5. multiple fractures.
6. For nursing purpose as in paraplegics , and multiple injuries.

Complications

1. Infection :
2. Non – union: if bone ends fixed rigidly with a gap between the ends.
3. Implant failure.
4. Refracture if the implant removed too soon

External fixation:

bone fixed below and above the fracture by pins or tensioned wires and these connected to each other by rigid bars.

Indications:

1. Fractures with sever soft tissue damage.
2. Fractures with sever nerve or vessels damage.
3. Severely comminuted and unstable fractures.
4. Non-uinited fractures .
5. bone elongation.
6. Pelvic fractures
7. Infected fractures.
8. Sever multiple injuries.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Complications of EX FIX

1. Damage to soft –injure nerves or vessels.
2. Over distraction
3. Pin – tract infection.