

# ORTHOPEDIC

Lec.3

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## Clinical Features of Fractures

### History:

1. There is usually history of injury or injurious factor followed by pain & inability to use the injured limb.
2. Mechanism of injury should be analyzed properly.
3. There is may be bruising & swelling.
4. Deformity if present is more suggestive.
5. Associated injuries:- always enquire about symptoms of associated injuries e.g. numbness, loss of movement, skin pallor or cyanosis, blood in urine, abdominal pain, difficulty of breath or transient loss of consciousness.
6. Once the acute emergency has been dealt with, ask about previous injuries, or any other musculoskeletal disease that may cause confusion when x-ray taken.
7. General (Medical & Surgical) history.

### Examination:

- 1) Examination of the patient as whole (ABC & general examination. PR, BP....)
- 2) Examination of most obviously injuries part.
- 3) Check for arterial damage.
- 4) Test for nerve injury.
- 5) Look for injuries of local soft tissues.
- 6) Look for associated injuries indistinct part.
- 7) Then follow the role [L ☺ ☺ K, FEEL, MOVE]

### **Radiological examination:**

Most of fracture can be diagnosed from x-ray & rarely need other modalities e.g. C.T. & MRI which are most useful in spine & pelvic injuries.

## Principles of Fracture Treatment

General resuscitation is the first consideration & treats the patient, not only the fracture. Treatment in general consists of:

1. **Reduce:** means manipulation to improve fracture alignment.
2. **Hold:** means splintage to fix the fragments until union.
3. **Exercise:** means preservation of joint movement & function of the limb.

### I. Treatment of Closed Fractures

#### 1. Reduce:

Reduction should aim for adequate apposition & normal alignment of the bone fragment best to be done as early as possible after general resuscitation treatment & better within 12 hr, before swelling & oedema has been developed which make reduction difficult.

There is some situation in which reduction is unnecessary:

- ❖ When there is little or no displacement.
- ❖ When displacement does not matter (e.g. fracture Clavicle).
- ❖ When reduction is unlikely to succeed (e.g. fracture Vertebrae).

There are 2 methods of reduction:

**a) Closed reduction:** in general closed manipulation is used for:

- ❖ All displaced fracture.
- ❖ Most fracture in children.
- ❖ That is not unstable after reduction & can hold in cast.
- ❖ Unstable fracture can be reduced closed prior to external or internal fixation.

Under appropriate anesthesia & muscle relaxation, the fracture is reduced by:

- ❖ Pulling the distal part of the limb in the line of the bone.
- ❖ As the fragments disengage, they are repositioned by reversing the original direction of force that causes the deformity.
- ❖ Alignment is adjusted in each plane.

**b) Open reduction:** operative reduction indicated in:

- ❖ Failure of close reduction.
- ❖ Large articular fragment need accurate positioning.
- ❖ Avulsion fracture due to muscle pull that held fragment apart.
- ❖ When operation is needed for associated injury e.g. vascular damage.
- ❖ When a fracture will anyhow need internal fixation.

## 2. Hold:

It means hold the fracture reduced until union occur and start normal function. The available methods for holding reduction are: -

**A. Cast Splintage:** by Plaster Of Paris (POP), which is a hemihydrated  $\text{Ca}^{++}$  sulphate; when it reacts with  $\text{H}_2\text{O}$  give heat and solid substance.

*Complication of POP:* -

1. *Joint stiffness:* - The joint encased in POP, cannot move, and are liable to stiffen as the swelling and hematoma resolve, adhesions form, which bind muscle fibers to each other and to the bone. This decreased by either use delayed casting after a period of traction or by early replacing of the cast by functional brace.
2. *Tight cast:* - The cast may be put on too tightly, or it may become tight if the limb swells. The patient complains of diffuse pain or even vascular ischemia. The limb should be elevated, but if the pain doesn't subside during the next hour, the only safe course is to split the cast, ease it open through out its length and cut through all the padding down to skin.
3. *Pressure sore:* - develop in skin over the bony prominence and patient complains of local pain. Treated by opening a window and inspect the area, prevented by well padding over the bony prominence.
4. *Skin abrasion or laceration:* - it may occur after uncarefull removal of the cast especially by using electrical saw.
5. *Loose cast:* - once the swelling has subsided, the cast may no longer hold the fracture securely. If it is loose, the cast should be replaced.

**B. Continuous traction:** is applied to the limb distal to the fracture, so as to exert a continuous pull in the long axis of the bone. Traction is applied either by way of adhesive strapping which kept in place by bandage (skin traction) (figure 3-1) or via stiff wire or pin inserted through the bone distal to the fracture (skeletal traction) (figure 3-2). Skin traction use no more than 5 Kg while skeletal can withstand more.

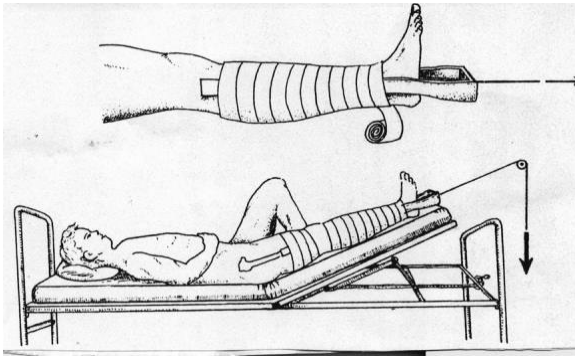


Figure 3-1: skin traction

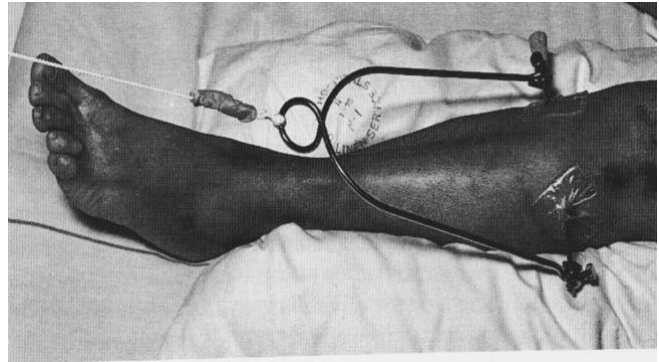
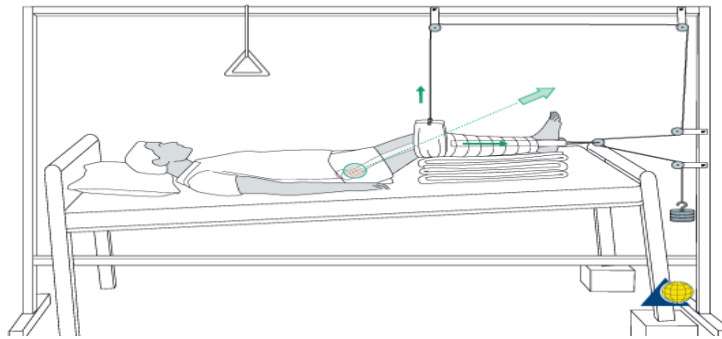


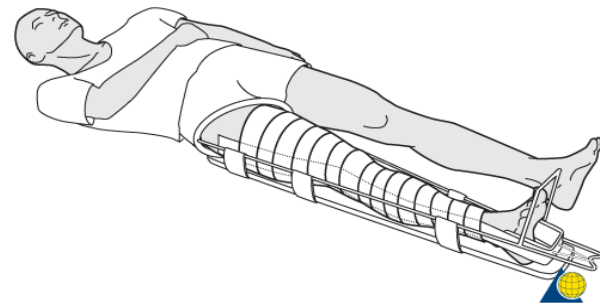
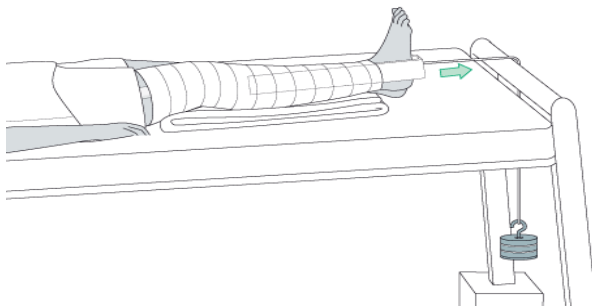
figure 3-2: skeletal traction

Traction in general is of 3 types:

1. **Balanced traction:** Traction is applied to the limb and counter traction is usually supplied by raising the foot of the bed on the opposing weight of the patient body.



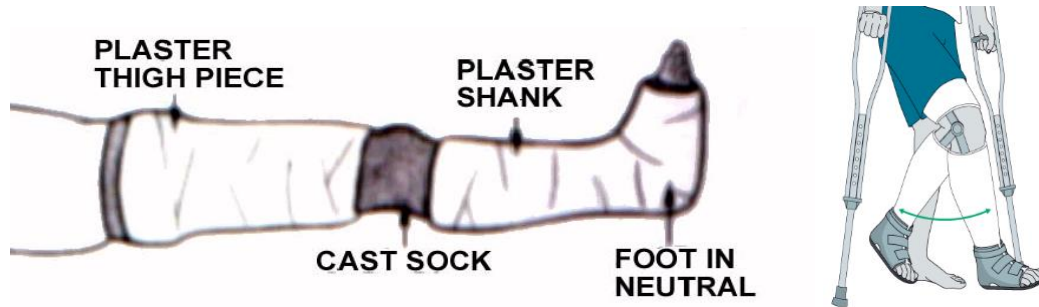
2. **Fixed traction:** - the limb is held in a Thomas splint and the traction tapes are tied to the distal end of the splint while the proximal padded ring of the splint abuts firmly against the pelvis.



3. **Traction by the gravity:** - traction is supplied by the weight of arm and cast this used for fracture humerus.



**C. Functional bracing:** in which we use segment of cast above and below the joint, leaving the joint free. These segment are connected by metals or plastic hinges which allow movement in one plane.



**D. Internal fixation:** the bones fragments are fixed internally through an operation by screws, plate, nail or tension band.

**Indication of internal fixation: -**

1. Fractures that cannot be reduced unless by operation.
2. Fracture that is inherently unstable and prone to re-displacement
3. Fractures that unite poorly and slowly e.g. fracture neck femur.
4. Pathological fracture
5. Multiple fractures, where fixation reduce the risk of general complication.
6. Fractures of patient with nursing difficulties.
7. Failure of conservative treatment.
8. Displaced intra-articular fracture.

**Complication of internal fixation: -**

1. Infection.
2. Non-union (due to excessive strapping of periosteum and soft tissue damage).
3. Implant failure.
4. Re-fracture after removal of the implant.

**E. External Fixation: -** the principle of external fixation is simple; the bones are transfixed above and below the fracture with schanz or pin and these are then clamped to a frame or connected to each other by rigid bars. It may be uniplane E.F., biplane E.F., multiplane E.F. or circular and semi circular E.F.

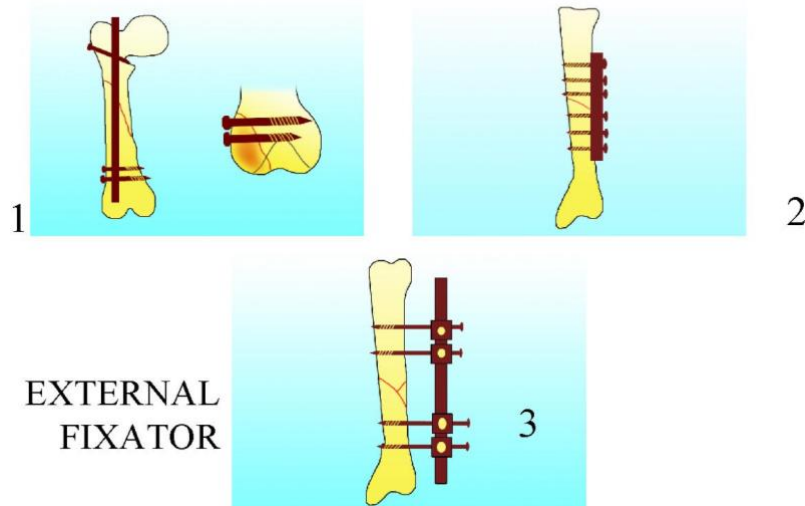
**Indications:**

1. Fracture associated with severe soft tissue damage (open fracture).
2. Severely comminuted and unstable fracture.
3. Fracture of the pelvis.
4. Fracture associated with nerve or vascularity.
5. Infected fracture.
6. Non-united fracture.
7. E.F. used for bone transport to fill bone gap.
8. E.F. used for bone elongation.

**Complications:**

1. Pin-track infection at the site of pin insertion.
2. Damage to the soft tissue structures, e.g.: nerve or vessels.
3. Over destruction: if there is no contact between the fragment, union may be delayed or prevented.

## INTERNAL FIXATION OF FRACTURES



### **3. Exercise:**

Exercise to restore the function not only to the injured parts but also to the patient as a whole. The objectives:

- Reduce edema.
- Prevent joint stiffness and restore movement.
- Restore muscle power.
- Guide the patient back to normal activity.

### **II. Treatment of Open Fracture:**

#### Principles:

- a) Rapid general assessment is the first step, and any life threatening conditions are addressed.
- b) Splinting the limb and the wound should be covered with sterile dressing.
- c) Peripheral nerve function and circulation are examined.
- d) Tetanus prophylaxis.
- e) AB. Prophylaxis.
- f) Debridement and wound excision.
- g) Stabilization of fracture (up to G/IIIa can treat as closed fracture if no obvious contamination and time less than 8 hours.).
- h) Early definitive wound cover.

### **Gustilo's classification of compound fractures:**

- **G I:** low energy fracture with small clean wound (<1cm) and little soft tissue damage.
- **G II:** moderate energy fracture with a clean wound (> 1cm) long, but no much soft tissue damage.
- **G III:** high-energy fracture with extensive damage to the skin, soft tissue and neurovascular structures and contamination of the wound. It subdivided into:
  - ❖ **IIIa:** the bone can adequately cover by soft tissue.
  - ❖ **IIIb:** cannot.
  - ❖ **IIIc:** arterial injury needs treatment regardless of the amount of soft tissue injury.

Gustilo and Anderson classification of open fracture



**Type I.** Wound <1 cm long



**Type II.** Wound 1 to 10 cm long but without significant soft tissue stripping, gross contamination, or high-energy fracture patterns



**Type IIIA.** Wound >10 cm long or lesser skin lesions with gross contamination and/or high-energy fracture patterns. Bone coverage adequate



**Type IIIB.** Extensive soft tissue stripping that typically needs some type of soft tissue flap for coverage



**Type IIIC.** Large wound with major arterial injury

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