

## Treatment of closed fracture

General treatment is the first consideration: *treat the patient, not only the fracture.*

These objectives of treatment are covered by three simple injunctions:

- Reduce.
- Hold.
- Exercise.

The most important factor in determining the natural tendency to heal is the state of the surrounding soft tissues and the local blood supply.

### **Tscherne classification of closed injuries:**

- *Grade 0* – a simple fracture with little or no soft tissue injury.
- *Grade 1* – a fracture with superficial abrasion or bruising of the skin and subcutaneous tissue.
- *Grade 2* – a more severe fracture with deep soft tissue contusion and swelling.
- *Grade 3* – a severe injury with marked soft-tissue damage and a threatened compartment syndrome.

## **REDUCTION**

### **Aim of reduction**

1. adequate apposition and normal alignment of the bone fragments.
2. The greater the contact surface area between fragments the more likely healing is to occur.

3. A gap between the fragment ends is a common cause of delayed union or nonunion.
4. a fracture involving an articular surface; this should be reduced as near to perfection as possible .

### **Reduction is unnecessary ;**

1. when there is little or no displacement.
2. when displacement does not matter initially (e.g. in fractures of the clavicle).
3. when reduction is unlikely to succeed(e.g. with compression fractures of the vertebrae).

### **methods of reduction:**

1. CLOSED REDUCTION used for:
  - minimally displaced fractures
  - most fractures in children
  - fractures that are not unstable after reduction
  
2. OPEN REDUCTION used :
  - when closed reduction fails,
  - when there is a large articular fragment that needs accurate positioning
  - for traction (avulsion) fractures in which the fragments are held apart

### **HOLD REDUCTION**

The available methods of holding reduction are:

- Continuous traction.
- Cast splintage.
- Functional bracing.
- Internal fixation.
- External fixation.

- **Continuous traction**

Traction is applied to the limb distal to the fracture, so as to exert a continuous pull in the long axis of the bone with a counterforce in the opposite direction.

**Traction includes:**

- *Traction by gravity* : This applies only to upper limb injuries.
- *Skin traction* : Skin traction will sustain a pull of no more than 4 or 5 kg.
- *Skeletal traction* : A stiff wire or pin is inserted –usually behind the injuries,

**Complications of traction**

*Circulatory embarrassment* : In children especially, traction tapes and circular bandages may constrict the circulation.

*Nerve injury* : In older people ,like peroneal nerve injury and cause a drop foot.

*Pin site infection* : Pin sites must be kept clean and should be checked daily.

- **Cast splintage**

Plaster of Paris is still widely used as a splint .

**Complications of cast**

1 . *Tight cast* : which lead to pain and later signs of vascular compression appear (parasthesia ,pain , paralysis , pallor , pulse less).

2 . *Pressure sores* : Even a well-fitting cast may press upon the skin over a bony prominence The patient complains of localized pain precisely over the pressure spot.

3 . *Skin abrasion or laceration* : especially if an electric saw is used.

4 . *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.

- **Functional bracing** : Segments of a cast are applied only over the shafts of the bones, leaving the joints free; the cast segments are connected by metal or plastic hinges that allow movement in one plane. it is usually applied only when the fracture is beginning to unite, i.e. after 3–6 weeks of traction or conventional plaster.

- **Internal fixation** : holds a fracture securely so that movement can begin at once; with early movement

Can achieved by

1. screw
2. plate and screw
3. intramedullary nail or rod
4. k wire
5. tension band

The greatest danger is sepsis The risk of infection depends upon (1) the patient (2) the surgeon (3) the facilities

### **Indications**

1. Fractures that cannot be reduced except by operation.
2. Fractures that are unstable and prone to re-displace after reduction (e.g. mid-shaft fractures of the forearm and some displaced ankle fractures). Also included are those fractures liable to be pulled apart by muscle action (e.g. transverse fracture of the patella or olecranon).
3. Fractures that unite poorly and slowly, principally fractures of the femoral neck.
4. Pathological fractures in which bone disease may prevent healing.
5. Multiple fractures where early fixation (by either internal or external fixation) reduces the risk of general complications and late multisystem organ failure.
6. Fractures in patients who present nursing difficulties (paraplegics, those with multiple injuries and the very elderly).

## Complications of internal fixation

1. *Infection* : Iatrogenic infection is now the most common cause of chronic osteomyelitis may fail to unite.
2. *Non-union* : If the bones have been fixed rigidly with a gap between the ends, the fracture
3. *Implant failure* : Metal is subject to fatigue and can fail unless some union of the fracture has occurred. stay away from partial weight bearing for 6 weeks or longer, until callus formation.
4. *Refracture* It is important not to remove metal implants too soon, or the bone may refracture. A year is the minimum and 18 or 24 months safer; for several weeks after removal the bone is weak, and care or protection is needed.

### • External fixation :

A fracture may be held by transfixing screws or tensioned wires that pass through the bone above and below the fracture and are attached to an external frame.

### Indications :

1. Fractures associated with severe soft-tissue damage(including open fractures) or those that are contaminated.
2. Fractures around joints that are potentially suitable for internal fixation but the soft tissues are too swollen to allow safe surgery.
3. Patients with severe multiple injuries, and associated chest or head injuries.
4. Ununited fractures, which can be excised and compressed; sometimes this is combined with bone lengthening to replace the excised segment.
5. Infected fractures, for which internal fixation might not be suitable.

Complications :

1. *Damage to soft-tissue structures* : Transfixing pins or wires may injure nerves or vessels.
2. *Over distraction* : If there is no contact between the fragments, union is unlikely.
3. *Pin-track infection* : antibiotics should be administered immediately if infection occurs.

### **How long should fixation be maintained?**

Fractures vary in the length of time needed for union. Most fractures of the shafts of long bones in adults take at least 12 weeks to unite. Fractures in the cancellous ends of the long bones and in short bones take from 6 to 8 weeks.

In children the times are proportionately reduced with age down to 2–3 weeks for a fracture of the shaft of a long bone in a baby.

If fixation has been used simply to relieve pain rather than to hold an unstable Position , it will usually be possible to discard it after 2–3 weeks in an adult and less in a child.

### **EXERCISE**

More correctly, restore function – not only to the injured parts but also to the patient as a whole. The objectives are to reduce oedema, preserve joint movement, restore muscle power and guide the patient back to normal activity.