Upper Limb Injuries

The great problem with upper limb injuries is joint stiffness should. Two points should be considered:

1. Whatever the injury – should encourage exercise from the start especially the fingers.
2. In elderly patients it is sometimes best to disregard the fractures and concentrate on regaining movements.

Anatomy of the Shoulder region

Fractures of the Clavicle

It is a common fracture. In children it is almost rapidly unites, often without complications. In adults it can be a much more troublesome injury.

Mechanism of injury: A fall on the shoulder or the outstretched hand.

Types:
Type I: Middle 1/3 fractures: it is the commonest type. The outer fragment is pulled down by the weight of the arm and the inner fragment is held up by the sternomastoid muscle.

Type II: Lateral 1/3 fractures: if the coracoclavicular ligament is intact there is only little displacement, but if torn, displacement may be severe and closed reduction is impossible.

Type III: medial 1/3 fracture: it is rare.
**Clinical Features**

the arm is held to the chest to prevent movement, an acutely tender subcutaneous lump may be obvious and occasionally a sharp fragment threatens the skin. Lateral third fracture may be missed or mistaken for acromioclavicular joint injury.

**X-ray:**
at least an AP view, additional views. The ‘clinical’ union usually precedes ‘radiological’ union by several weeks.

**CT scan** is indicated:
- Need to assess accurately the degree of shortening
- For diagnosing sternoclavicular joint fracture-dislocation.
- Establish whether a fracture has united.

**Treatment**

**Non-operative:** arm sling for 1-3 weeks, followed by gradual shoulder exercise. Non-displaced or mildly displaced.

**Indications of surgery:**

1. Associated major neurovascular injury.
2. Compound fracture.
3. Middle 1/3 fracture if grossly displaced or there is more than 2 cm shortening.
5. Symptomatic non-union.
6. Medial 1/3 fracture displacement threatens the mediastinal structures.

Complications:
- **Early:** very rare: pneumothorax, subclavian vessels and brachial plexus injuries.
- **Late:**
  - Non-union, risk factors: increasing age, displacement, comminution, and female sex, and lateral third fracture (11-40%).
  - Malunion: shortening more than 1.5 cm lead to periscapular pain.
  - Stiffness of the shoulder joint, and sometimes fingers.

Fractures of The Scapula
Types:
1. Scapular body fracture.
2. Glenoid neck (most common).
3. Glenoid fossa # (intra-articular).
4. Acromion fracture.
5. Coracoid process.

Clinical features
- the arm is held immobile, and there may be severe bruising over the scapula or the chest wall.
- Always look for associated serious injuries: the chest, spine, abdomen, head, vessels, and brachial plexus.

X-ray: scapular fractures can be difficult to define on plain x-rays because of the surrounding soft tissues. CT is useful for demonstrating fractures especially body and glenoid fracture.

Treatment
- Sling, analgesia, and exercise.
- Grossly displaced # or associated with shoulder instability, needs open reduction and internal fixation.
- Combine fractures: fracture of glenoid neck and fracture clavicle ‘floating shoulder’: surgical fixation.
Fractures of Proximal Humerus

Types (Neer’s Classification):
The proximal humerus:

- Shaft.
- Head.
- Greater tuberosity.
- Lesser tuberosity.

N.B: The fragment considered to be displaced: if there is more than 1cm separation or more than 45- degree angulation.

Neer’s Classification:

- **One-part fracture**: even if there are many fracture lines, if the fragments are undisplaced. It is the most common type.
- **Two-part fracture**: if one major fragment is displaced, as displaced fracture of anatomical neck, surgical neck.
- **Three-part fracture**: if two major fragments are displaced.
- **Four-part fracture**: if all the major fragments are displaced.
- **Fracture-dislocation**: if the head of humerus is dislocated plus two-, three-, or four- part fracture.
- It can occur at any age, but it is most commonly seen after a middle age. Most of the patients are osteoporotic, postmenopausal women.
- It is usually occurring after a fall on outstretched hand. In young patient this injury may cause shoulder dislocation.
- Fracture displacement is usually not marked and only in about 20% of cases there is considerable displacement of one or more fragment.

**Clinical Features**

because the fracture fragments are often firmly impacted, pain may not be severe. However, the appearance of a large bruise is suspicious.

**Radiology:** plain x-ray has high level of inter-observer variation. CT scan greatly clarifies the fracture fragments.

**Treatment**

- **One-part #:** only 1-2 weeks arm sling then exercise; passive then active.
- **Two-part fracture:**
  - **Surgical neck:** the fragments are gently manipulated into alignment and the arm is immobilized in a sling or cast for 4 weeks. If the fracture cannot be reduced closed or very unstable, then fixation is required.
  - **Greater tuberosity:** it is often associated with anterior dislocation and usually it reduces to a good alignment when the shoulder is relocated.
  - **Anatomical neck #:** young: fixation with a screw. old patients: prosthetic replacement: high risk of avascular necrosis of the humeral head.
- **Three-part #:** best treatment is open reduction and internal fixation.
- **Four-part #:** very difficult, young patient: ORIF. Elderly patient: prosthetic implant.
- **Fracture dislocation:** With two-part#: closed reduction. With three-part#: ORIF. With four-part#: young active: ORIF, old patient: prosthetic replacement.
Complications

Early:
- Vascular injury.
- Nerve injury: axillary nerve is at particular risk. brachial plexus may be also injured.
- Chest wall injury.

Late:
- Avascular necrosis of humeral head, especially in three and four part fractures.
- Stiffness of the shoulder. Especially in old age.
- Malunion: in children even considerable displacement or angulation can be accepted, because of the marked growth and remodeling of the proximal humerus.
- Downward subluxation of humeral head: it is due to muscle atony and it usually recovers once exercises begun.

Fracture Shaft of Humerus

Mechanism of injury:
- Fall on the hand (spiral fracture).
- Fall on the elbow (oblique or transverse fracture).
- Direct blow (transverse or comminuted fracture).
- Pathological fracture.
Pathological anatomy:
If the fracture is above the deltoid insertion, the proximal fragment is adducted by pectoralis major. If the fracture is lower down, the proximal fragment is abducted by the deltoid.

Clinical features:
- the arm is painful, bruised, and swollen.
- It is important to test for radial nerve function before and after treatment. Best by assessing the active extension of the MP joint.

X-ray: pathological fracture should be kept in mind.
Treatment:

A. **Conservative:** the fracture shaft humerus, does not require perfect reduction.

The weight of the arm with an external cast (hanging cast) is usually enough. This cast is usually replaced after 2-3 weeks by a short cast (shoulder to elbow- U shape) or a functional brace for a further 6 weeks.

![U-slab and Hanging cast](image)

B. **Operative:** surgery is indicated in the following situations:
1. Severe multiple injuries.
2. Open fracture.
3. Associated major vascular injury.
5. Displaced intra-articular extension of the fracture.
6. Pathological fracture.
7. Floating elbow (simultaneous unstable fracture of the humerus and forearm).
8. Radial nerve palsy after manipulation. **NEVER!!!**
Types of fixation:
1. Plate and screws.
2. Intramedullary nail.
3. External skeletal fixation.

Humorous Fracture Recovery: based on several factor:
1. Severity of trauma and soft tissue injury.
2. Number and displacement of bone fragments.
5. Humorous fracture rehabilitation exercises.

Complications:

Early:
- Nerve injury: radial nerve injury is common especially in oblique fractures at the junction of middle and distal thirds of the bone (HolsteinLewis fracture).