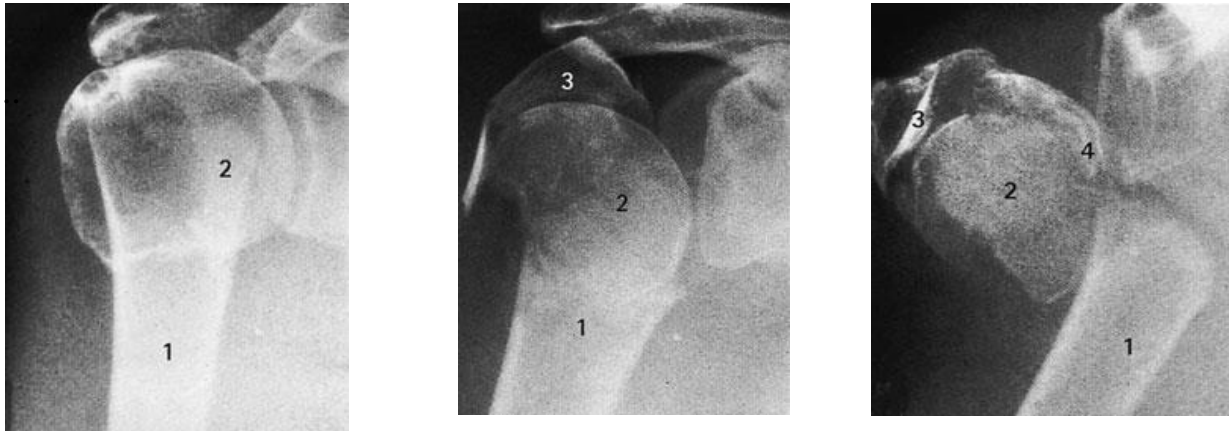


## FRACTURES OF THE PROXIMAL HUMERUS

Fracture usually follows a fall on the out-stretched arm

**Neer's classification** distinguishes between the number of displaced fragments, with displacement defined as greater than 45 degrees of angulation or 1 cm of separation.



### Clinical features

The fracture is often firmly impacted, pain may not be severe. However, the appearance of a large bruise on the upper part of the arm is suspicious. Signs of axillary nerve or brachial plexus injury should be sought.

### Treatment

#### MINIMALLY DISPLACED FRACTURES

They need no treatment a week or two period of rest with the arm in a sling until the pain subsides, and then gentle passive movements of the shoulder. Once the fracture has united (usually after 6 weeks), active exercises are encouraged; the hand actively exercised from the start.

## **TWO-PART FRACTURES**

### ***Surgical neck fractures***

Immobilized in a sling for about 4 weeks or until the fracture heals then shoulder exercises are commenced at about 4 weeks. Elbow and hand exercises from the start .if not reduced ORIF done.

### ***Greater tuberosity fractures***

associated with anterior dislocation and it reduces to a good position when the shoulder is relocated. If it does not reduce, the fragment can be re-attached through a small incision with interosseous sutures or, in young hard bone, cancellous screws.

### ***Anatomical neck fractures***

These are very rare. In young patients the fracture should be fixed with a screw. In older patients prosthetic replacement (hemiarthroplasty) is preferable because of the high risk of avascular necrosis of the humeral head.

## **THREE-PART FRACTURES**

These usually involve displacement of the surgical neck and the greater tuberosity; they are extremely difficult to reduce closed.ORIF is performed .

## **FOUR-PART FRACTURES**

These are severe injuries with a high risk of complications such as vascular injury, brachial plexus damage, injuries of the chest wall and (later) avascular necrosis of the humeral head. pain and stiffness are later sign malunion .ORIF in young arthroplasty in old patient .

## **FRACTURE-DISLOCATION**

Two-part fracture-dislocations (greater tuberosity with anterior dislocation and lesser tuberosity with posterior) can usually be reduced by closed means.

## **FRACTURED SHAFT OF HUMERUS**

It either spiral, oblique, transverse, or comminuted.

### **Pathological anatomy**

With fractures above the deltoid insertion, the proximal fragment is adducted by pectoralis major. With fractures lower down, the proximal fragment is abducted by the deltoid. Injury to the radial nerve is common, though fortunately recovery is usual.

## **Clinical features**

The arm is painful, bruised and swollen. test for radial nerve function before and after treatment. by active extension of the metacarpophalangeal joints; active extension of the wrist can be misleading because extensor carpi radialis longus is sometimes supplied by a branch arising proximal to the injury.

## **Treatment**

It heal readily. They require neither perfect reduction nor immobilization; the weight of the arm with an external cast is usually enough to pull the fragments into alignment. A 'hanging cast' is applied from shoulder to wrist with the elbow flexed 90 degrees, and the forearm section is suspended by a sling around the patient's neck. This cast may be replaced after 2–3 weeks by a short (shoulder to elbow) which is worn for a further 6 weeks.

The wrist and fingers are exercised from the start. Pendulum exercises of the shoulder are begun within a week, but active abduction is postponed until the fracture has united about 6 weeks (for spiral fractures often twice as long for other types); once united, only a sling is needed until the fracture is consolidated.

## **OPERATIVE TREATMENT**

It is well to remember

- (a) that the complication rate after internal fixation of the humerus is high
- (b) that the great majority of humeral fractures unite with non-operative treatment.
- (c) There is no good evidence that the union rate is higher with fixation

## **indications for surgery:**

- severe multiple injuries
- an open fracture
- segmental fractures
- displaced intra-articular extension of the fracture
- a pathological fracture
- a 'floating elbow' (simultaneous unstable humeral and forearm fractures)
- radial nerve palsy after manipulation
- non-union
- problems with nursing care in a dependent person.

## **Complications**

### **EARLY**

*Vascular injury* brachial artery damage must be excluded.

*Nerve injury* Radial nerve palsy (wrist drop and paralysis of the metacarpophalangeal extensors)

### **LATE**

*Delayed union and non-union* The treatment of established non-union is operative. The bone ends are freshened, cancellous bone graft is packed around them and the reduction is held with an intramedullary nail or a compression plate.

*Joint stiffness* Joint stiffness is common. It can be minimized by early activity, but transverse fractures (in which shoulder abduction is ill-advised) may limit shoulder movement for several weeks.

## **FRACTURES OF THE DISTAL HUMERUS IN ADULTS**

The AO-ASIF Group have defined three types of distal humeral fracture:

Type A – an extra-articular supracondylar fracture;

Type B – an intra-articular unicondylar fracture (one condyle sheared off);

Type C – bicondylar fractures with varying degrees of comminution.

### **TYPE A – SUPRACONDYLAR FRACTURES**

These extra-articular fractures are rare in adults they are usually displaced and unstable. In high-energy injuries there may be comminution of the distal humerus.

### **Treatment**

Open reduction and internal fixation is the treatment of choice. The distal humerus is approached through a posterior exposure. It is sometimes possible to fix the. A simple transverse or oblique fracture can usually be reduced and fixed with a pair of contoured plates and screws.

## **TYPES B AND C – INTRA-ARTICULAR FRACTURES**

intra-articular

condylar fractures should be regarded as high-energy injuries with soft-tissue damage. prolonged immobilization will certainly result in a stiff elbow.

### **Treatment**

*Undisplaced fractures* applying a posterior slab with the elbow flexed almost 90 degrees; movements are commenced after 2 weeks.

*Displaced Type B and C fractures* the open reduction and internal fixation is the treatment of choice for displaced fractures

### **Complications**

EARLY

*Vascular injury* Always check the circulation

*Nerve injury* either the median or the ulnar nerve.

LATE

*Stiffness* reduced by encouraging an energetic exercise programme.

*Heterotopic ossification* Severe soft-tissue damage may lead to heterotopic ossification. Forced movement should be avoided.

## **FRACTURED HEAD OF RADIUS**

Radial head fractures are common in adults but are hardly ever seen in children (probably because the proximal radius is mainly cartilaginous)

### **Mechanism of injury**

A fall on the outstretched hand with the elbow extended and the forearm pronated causes impaction of the radial head against the capitulum.

## **Clinical features**

This fracture is sometimes missed, but tenderness on pressure over the radial head and pain on pronation and supination should suggest the diagnosis.

## **X-ray**

Type I An undisplaced vertical split in the radial head

Type II A displaced single fragment of the head

Type III The head broken into several fragments (comminuted).

Type IV has been proposed, for those fractures with an associated elbow dislocation.

## **Treatment**

*An undisplaced split (Type I)* The arm is held in a collar and cuff for 3 weeks; active flexion, extension and rotation are encouraged.

*(Type II)* If the fragment is displaced, it should be reduced and held with one or two small headless screws.

*(Type III)* Always assess for an associated soft tissue injury Rupture of the medial collateral ligament or the interosseous membrane. Combined fractures of the radial head and coronoid process plus dislocation of the elbow – the excision of the radial head is contra-indicated .otherwise gives a good long-term result.

## **Complications**

**Joint stiffness** is common and may involve both the elbow and the radioulnar joints. Even with minimally displaced fractures the elbow can take several months to recover, and stiffness may occur whether the radial head has been excised or not.

**Myositis ossificans** is an occasional complication.

**Recurrent instability of the elbow** can occur if the medial collateral ligament was also injured and the radial head excised.