Upper Limb Fracture

Fracture clavicle

Mechanism of injury
- A fall on the shoulder or outstretched hand may break the clavicle in common mid shaft, fracture outer end.

Clinical features
- The arm is clasped to the chest to prevent movement.
- Subcutaneous lump obvious.
- Occasionally sharp fragment threatens the skin.
- Vascular complication rare.

X-ray
- We can see the site of the fractures.
- Middle, outer third

Treatment
- Accurate reduction is neither possible nor essential.
- All that is needed is to support the arm in a sling (2-3 weeks).
- Or figure of eight bandage.
- Internal fixation rarely done. (in outer third fracture).
- Then physiotherapy.

Complications

Early:
- Pneumothorax,
- damage to subclavian artery,
- brachial plexus injures.

Late:
- Non union,
- Malunion
- stiffness of the shoulder

Dislocation of the shoulder
- Of the large joints the shoulder is the one that most commonly dislocate it is due to the following.

Predisposing factors:
1. shallowness of the glenoid.
2. extraordinary range of movement.
3. ligament laxity, or glenoid dysplasia.
Anterior dislocation
Pathology and mechanism
- Caused by a fall on the hand
- Humerus is driven forwards, tearing the capsule or avulsing the glenoid labrum.
- Occasionally posteriolateral part of the head is crushed.

Clinical features
- Pain sever.
- Patient support the arm with the opposite hand and prevent any kind of examination.
- Flattened lateral outline of shoulder
- Bulge below the clavicle.
Examination for axillary nerve and nearby vessel is important

Radiological examination
- Ap will show overlapping shadows of the humeral head and glenoid.
- Head usually lying below and medial to the glenoid.

Treatment
- Stimson’s technique.
- Hippocratic method.
- Kochers’ method.
- Spaso technique

Stimsons’ technique:
- Patient is left prone with the arm hanging over the side of the bed. after 15-20 min the shoulder may reduce.

Hippocratic method:
- Gently increasing traction is applied to the arm with the shoulder is slight abduction
- Counter traction either by assistant with towel slung or the foot of the examiner.

Kochers’ method:
- Under G/A. with assistant
- Elbow is bent 90 degree and held close to the body.
- No traction.
- The arm slowly rotated 75 degree externally.
- The elbow is lifted forwards.
- Finally the arm is rotated medially.
- The arm rest in sling for 3 weeks
- Then movement started with avoidance abduction and lateral rotation.
Complications

Early:
- Rotator cuff tear.
- Nerve injury.
- Vascular injury.
- Fracture dislocation.

Late:
- Shoulder stiffness.
- Unreduced dislocation.
- Recurrent dislocation

Fractures of the humerus
- Fracture proximal humerus.
- Fracture shaft of the humerus.

Fractured shaft of humerus

Mechanism of injury:
- A fall on the hand may twist the humerus.
- A fall on the elbow.
- A direct blow to the arm.
- In elderly may be metastasis.

Clinical features
- The arm is painful.
- Bruised and swollen.
- It is important to test the radial nerve (before and after treatment).

X-ray
- Site of the fracture.
- Type of the fracture
- Degree of displacement.
- Any evidence of pathological fracture.

Treatment
- Fracture of the humerus heal readily.
- External cast 2-3 weeks.
- Replaced with polypropylene brace worn for 6 weeks more.
- physiotherapy.
- If failed surgery. internal fixation, external.
Complications

**Early:**
- Vascular injury (brachial artery).
- Nerve injury (radial nerve) wrist drop.

**Late**
- Delayed union.
- Joint stiffness.
- Non union.

Fractures around elbow in children

Supracondylar fractures

1. Anterior displacement (Rare)

**Mechanism of injury**
- 2. Posterior displacement or angulation (95%) of all cases.
- Fall on outstretched hand.
- Humerus break just above the condyles.
- Distal segment pushed backwards and twisted inwards.
- Some time injury to brachial artery or median nerve.

**Clinical features**
- History of fall.
- Severe pain.
- Swollen elbow.
- (S shape deformity).
- Abnormal bony landmark.
- It is important to feel distal pulse and capillary return.
- Dorsiflexion wrist should pain free.
- Distal nerve should be examined.

**Radiological examination**
- AP AND LATERAL
- We can see the degree of displacement.

**Treatment**
- Depend on the degree of displacement.

Undisplaced:
- In cast for at least 3 weeks.

Displaced
- Under anesthesia.
- Traction 2-3 min in the length with the length of the arm.
• Counter traction.
• Correction of deformity.
• Gradual flexion of the elbow with pronation of the forearm.
• Then feel the pulse and capillary return.
• If distal circulation suspicious immediate relaxing the elbow till improvement.
• Back slab splint.
• X-ray to confirm

**Sever displaced**
• Open and internal fixation with k-wire

**Complications**

**Early:**
• Vascular injury.
• Compartment syndrome.
• Nerve injury (median nerve, ulnar nerve).

**Late:**
• Malunion is common (gunstock deformity).
• Elbow stiffness and Myositis ossificans

**Fractures of the lateral condyle (capitellar)**

**Mechanism of injury:**
• Falls on the hand with the elbow extended and forced into Varus
• A large fragment which includes the lateral condyle, breaks off and is pulled upon by the attached wrist extensor.
• The fracture line usually runs along the physis and in to the trochlea.

**Clinical features**
• Swollen elbow.
• Deformed.
• Tenderness over the lateral condyle
• Passive flexion of the wrist may be painful.

**X-ray**
• Must include oblique view or the fracture may be missed.
• Ap and lateral.
• We can see the fracture.

**Treatment**
• If no displacement
• Splint applied and exercise after 2 weeks
• Displaced > 2mm
• Open and k-wire applied.
• With cast immobilization to be removed with the wire after 4 weeks.

Separation of the medial epicondylar apophysis
Mechanism of injury
• Fall on the outstretched hand with the wrist and elbow extended.
• Avulsion occurred.
• Sometimes the apophysis is dragged within the joint.

Clinical features
• Swelling and bruising on the medial side of the elbow.
• If elbow dislocated the deformity is obvious.
• Sensation for the ulnar should be checked.

X ray
• Ap and lateral to confirm
• The epicondyle may sometime appeared within the joint.
• Normal limb should be x-rayed for comparison.

Treatment
• Minor displaced only slab.
• If the epicondyle within the joint surgery advised.
• If displaced fracture and the fracture not trapped within the joint. joint manipulation can improve the position

Fractured neck of the radius
Mechanism of injury:
• A fall on outstretched hand forces the elbow into valgus and pushes the radial head against the capitellum.

Clinical features
• Pain in the elbow.
• Pain in rotating forearm.
• Localized tenderness over the radial head.

X-ray
• The fracture line transverse.
Treatment
• Up to 30 degree radial head tilt and up to 3 mm displacement are acceptable.
• So put arm in collar and cuff and exercise after a week.
• More than 30 reduction by
• manipulation \ anesthetia.
• If fail open and internal fixation
• Then put in pop .for 2 weeks.

Pulled elbow
• In young children the elbow may be injured by pulling on the arm. usually with the forearm pronated.
• It is due to slipping of the orbicular ligament over the head to the joint

Clinically
• A child age with 2-3 years brought with a painful dangling arm.
• History of jerky movement of the arm .
• The forearm held with pronation and extension.
• No x-ray changes.

Treatment
• Dramatic cure obtained by forcefully supinating and then flexing the elbow

Fractures around elbow

in adult

Fractured head of the radius

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

Clinical features
• This fracture some time missed.
• Pain on pronation and supination should suggest the diagnosis.
• Tenderness over the head by direct pressure over the head.

X ray
• Three types
• Type 1 (vertical split)
• Type 2 (single fragment laterally displaced).
• Type 3 (comminuted head.)

Treatment
• Type 1 analgesia with collar and cuff. then exercise.
• Type 2: segment should be reduced and fixed.
• Type 3: excision of radial head.

**Complications**
• Joint stiffness.
• Myositis ossificans.
• Recurrent instability.

**Fractures of the olecranon**
• Comminuted due to direct blow.
• A clean transverse break (indirect force).
• Due to traction when the patient falls onto the hand while the triceps is contracted.

**Clinical features**
• Painful swelling around the elbow.
• Localized tenderness.
• Bruise over the elbow.
• May be palpable gap and the patient unable to extend the elbow against resistance.

**X-ray**
• Either comminuted or transverse.
• The position of the radial head should be checked.

**Treatment**
• Comminuted:
  • By holding and exercise after clinical improvement.
• Undisplaced transverse:
  • Cast immobilization then exercise.
• Displaced:
  • Operative fixation.

**Complications**
• Stiffness.
• Non union
• Osteoarthritis.

**Dislocation of the elbow**

**Mechanism of injury**
• In 90% posterior or posteriolateral.
• The cause of posterior dislocation is usually a fall on the outstretched hand with elbow in extension.
• There might be associated fracture to the near by structure, and near by soft tissue disruption.

**Clinical features:**
• His or her forearm with the elbow in slight flexion.
• Sever swelling
• Obvious deformity
• The bony landmark around elbow **abnormally displaced** (olecranon and epicondyle)

**x ray:**
• is essential to confirm dx
• to identify any associated fractures.

**Treatment**

**Uncomplicated dislocation.**
• Under anesthesia, elbow is slightly flexed olecranon process is pushed forward with the thumb.
• Distal neurovascular reexamination should be done.
• and x-ray to confirm diagnosis.
• Arm hold in a collar with flexed elbow in 90 degree
• Then 1 week after start physiotherapy.
• Dislocation with associated fractures:
• Might need open and correction accordingly.

**Complications**

**Early:**
• Vascular (brachial artery may be damaged.
• Nerve injury median or ulnar

**Late**
• Stiffness
• Heterotopic ossification
• Unreduced dislocation.
• Recurrent dislocation.
• Osteoarthritis.

**Injuries of the forearm and wrist**
• Fractures of the radius and ulna:

**Mechanism :**
• Fractures of the shafts of both forearm bones occur quite commonly in road accident.
• Twisting force (usually a fall on the hand) produce spiral fractures.
• Direct blow produce transverse fracture.
• Additional rotation deformity may produced by muscle pull (biceps and supinator )to the upper third.
- Pronator teres to the middle
- Pronator quadratus to the lower third
- Bleeding and swelling of the muscle compartment of the forearm may cause circulatory impairment

Clinical features
- Pain
- obvious deformity.
- Swelling
- Distal neural and vascular examination is essential
- Repeated examination is necessary to detect an impeding compartment syndrome

x-ray
- different type of fracture appeared.

Treatment:
- In children
  - Closed reduction is usually successful because the periostum tends to guide and then control reduction.
  - Immobilization with pop cast.(6-8 weeks).
- Proximal to Pronator teres limb held in supination
- Distal to it in pronation.
- If failed surgery done.

Adults:
- Unless the fragments are held in close apposition reduction is difficult
- and open and internal fixation done.

Complications:
  Early.
  - Nerve injury
  - Vascular injury
  - Compartment syndrome

Late:
  - Delayed union.
  - non union.
  - Malunion

Monteggia fracture – dislocation of the ulna:
  Fracture of the ulna upper third associated with dislocation of the proximal radioulnar joint, radiocapitellar subluxation.

Mechanism of injury:
- A fall on the hand with the body twisting.

Clinical features:
- Pain
- Obvious deformity
- Tenderness on the lateral side of the elbow.
- Distal neurovascular examinations should be done.

**X ray:**
- AP and lateral view.
- Either there were forward bowing, backward or lateral bowing of the ulna.
- Posterior or lateral displacement of the radial head may appear.

**Treatment:**
- The clue to successful treatment is to restore the length of the fractured ulna.
- This mean operation.

**Complications:**
- Nerve injury.
- Malunion
- Non union

**Galeazzi fracture – dislocation of the radius**

**Mechanism**
- A fall on the hand with superimposed rotation, the radius fractures in its lower third and the inferior radioulnar joint subluxates or dislocation.

**Clinical features**
- Much more common than Monteggia.
- Prominence or tenderness over the lower end of the ulna is the striking feature.
- Balloting the distal end of the ulna (piano – key sign)
- Distal ulnar nerve examination is important.

**X ray**
- A transverse or short oblique fracture is seen in the lower third of the radius, with angulations or overlap.
- The inferior radioulnar joint is subluxated or dislocated.

**Treatment**
- In children closed is often successful
- In adult open and internal fixation.

**Smith's fracture**
- The distal fragment is displaced anteriorly (reverse colles')

**Clinical features**
- Fall on the back of the hand.
- Pain
- No dinner fork deformity.
X ray
- Fracture through distal radial metaphysis
- The distal fragment is displaced and tilted anteriorly opposite colles'

Treatment
- Under anesthesia
- Traction
- And extension of the wrist
- The forearm is immobilized in a cast for 6 weeks.

Colles' fracture
- Is a transverse fracture of the radius just above the wrist, with dorsal displacement of the distal fragment.

Mechanism
- Force is applied in the length of the forearm with the wrist in extension.
- The bone fracture at the corticocancellous junction and the distal fragment collapses into extension, dorsal displacement, radial tilt and shortening.

Clinical features
- History fall on outstretched hand
- Pain deformity in form of dinner - fork shape.
- Local tenderness.

X-ray
- There is transverse fracture, often ulnar styloid process fracture, there might be impaction of the distal piece, some time severely comminuted or crushed.

Treatment
- Undisplaced fracture.
- Dorsal cast applied for 4 weeks then physiotherapy.

Displaced fracture
- Must reduced under anesthesia
- The hand is grasped and traction is applied in the length of the bone some time with wrist extension for disimpaction
- The distal segment is then pushed into place by pressing on the dorsum while manipulating the wrist into flexion
- Ulnar deviation
- And pronation.
- Dorsal slab applied from just below the elbow to the metacarpal necks.
- Elevation of the arm 2-3 days
- Shoulder and finger exercise are started as soon as possible.
- Check up after 10 days by x-ray
- If any redisplacement to be corrected.
- Treatment completed for about 6 weeks.
Comminuted fracture:
- Plaster in addition with k-wire
- Or external fixation with bone graft.

Complications
Early
- The circulation of the finger.
- Nerve injury median nerve compression is fairly common
- Reflex sympathetic dystrophy.

Late
- Malunion is common.
- Delayed union and non-union are rare
- Stiffness of the shoulder, elbow and finger.
- Tendon rupture (of extensor pollicis longus). occur after weeks

Fractured scaphoid:
- It is account for 75% of all carpal fractures.

Mechanism
- Combination of forced carpal movement and compression as a fall on dorsiflexed hand, exerts severe stress on the bone and is liable to fracture.
- The blood supply is diminished proximally and is result into non union or a vascular necrosis.

Clinical features
- History of fallen on the ground.
- Pain around wrist
- The appearance may be normal.
- Tenderness at snuffbox
- Some time observer can detect fullness in the anatomical snuffbox
- Proximal pressure along the axis of the thumb may be painful.
- Ap, lat, oblique, all essential.
- A recent fracture show only in oblique view as transverse line (through the waist)
- But may be proximally.
- or tubercle of the scaphoid.
- A few weeks after the injury evidence of non union
- or a vascular necrosis appear of the proximal segment.

Treatment
Undisplaced fracture:
- Need no reduction
- Treated in plaster. the cast is applied from the upper forearm to just short of the mp joints of the fingers but incorporating the proximal phalanx of the thumb
- The wrist hold dorsiflexion and the thumb forward (glass-holding) position.
- After 6 weeks the plaster opened
If no pain and tenderness so finished
If pain and tenderness re applying of the pop for another 6 weeks.

Displaced fracture:
- Can be treated by pop
- If failed open and fixation with compression screw

Complications:
- Avascular necrosis (the proximal segment die).
- Non union appeared by 3 months.
- Osteoarthritis

Metacarpal fractures
Fracture of the metacarpal shaft:
- Direct blow may fracture one or several bones transversely.
- Twisting force may cause spiral fracture.

Clinically:
- Pain
- Swelling
- Some time local hump.

Treatment:
- Oblique or transverse fracture with slight displacement only crepe bandage
- Transverse fracture with displacement may need slight manipulation if failed may need k-wire
- Spiral fracture may need k-wire or plate.

Fracture metacarpal neck
- A direct blow usually the fifth finger (boxer's fracture) and occasionally one of the others

Clinically
- Pain
- Local swelling,
- Flattening of the knuckle.
- X-ray show an impacted transverse fracture with volar Angulation of the distal fragment.

Treatment
- Flexion deformity about 40 deg is accepted, and a good outcome can be accepted
- Hand is splinted with gutter splint.

Bennett's
Fracture – Dislocation
- This fracture occurs at the base of the first metacarpal bone and is commonly due to punching
• Fracture is oblique and extends into the carpometacarpal joint and is unstable.
• The thumb looks short and carpo metacarpal region swollen.
• x-rays show the fracture at the base of the metacarpal bone

Treatment
• Perfect reduction is essential
• by pulling the thumb then abducting and extending it
• then reduction held by pop or internal fixation.

MALLET FINGER INJURY
• There are three types of mallet finger:
  1. A tendinous avulsion
  2. A small flake of bone
  3. A large dorsal bone fragment.
• After a sudden flexion injury the terminal phalanx droops and cannot be straight

Treatment
• Immobilizing the terminal joint in slight hyperextension by special mallet splint
• Occasionally k-wire used.

Fractures of the phalanges
• Direct blow
• This will lead to considerable swelling.

Treatment
• Undisplaced by functional splint (finger is strapped to its neighbour and movement is encouraged.
• Displaced fracture must reduced and immobilized. with either splint or (k-wire).
• Treatment may result to stiff finger which in some time can be worse than no finger.

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