Lec: 2

Posterior shoulder dislocation:
It is rare & accounts for less than 2% of all dislocations

*Mechanism of injury:* it is caused by either *indirect* force that cause forceful adduction & internal rotation of the shoulder which may occur during fit or convulsion & electrical shock or a fall on the hand with the shoulder adducted & internally rotated. *Or direct force* by direct blow to the front of the shoulder.

*Clinical features:* the diagnosis is usually missed because one fail to think about it as it is rare & because the x-ray look normal.
Clinically the patient presented with the arm locked in internal rotation & any attempts at external rotation is painful & resisted; the front of the shoulder is flat with posterior prominence (the dislocated head).

![Posterior Dislocation Image]

**Electric light bulb & empty glenoid sign**

*X-ray:* the internally rotated humeral head looks like "electric light bulb" the head stands away from the glenoid fossa which look empty "empty glenoid sign" as normally there is overlap between the humeral head & the glenoid. Axillary view will show the dislocation or subluxation. In difficult cases CT scan of the shoulder is helpful.

*Treatment:* reduction by pulling the adducted arm for few minutes, then lateral rotation while the humeral head is pushed forward, if the reduction is stable then arm sling, if not then spica cast with the shoulder abducted & laterally rotated for 3 weeks

*Complications:* (1) unreduced dislocation, if the dislocation is less than 8 weeks & the patient is young then open reduction, if the dislocation is late especially in elderly it is left & we concentrate on movements. (2) Recurrent dislocation or subluxation.

Luxatio erecta (inferior shoulder dislocation): is very rare.

*Mechanism of injury:* it is caused by severe hyperabduction force with the humerus as the lever & the acromion process as a fulcrum, levering the humeral head out the glenoid fossa through the inferior part of the glenoid, the humeral head remain in the subglenoid position with the humeral shaft pointing upward.

*Clinical features:* the arm locked in full abduction, the humeral head can be felt in the axilla, we should always examine for neurovascular damage.
**x-ray:** the humerus shaft is fully abducted & the head is below the glenoid.

**Treatment:** it is reduced by pulling on the arm in the line of the abducted arm, if this fail then open reduction, after reduction the arm rested in arm sling.

**Fractures of the proximal humerus**
This fracture can occur at any age but it is more common in postmenopausal osteoporotic women & elderly patient.

**Mechanism of injury:** it is caused by fall on outstretched hand.

**Classification:** the proximal humerus is divided into 4 segments (greater tuberosity, lesser tuberosity, head of the humerus & shaft of the humerus) the most widely used classification is **Neer’s classification** which depends on the number of displaced segments:

- If there is no displacement = one part # e.g. undisplaced neck #.
- If one fragment is displaced = 2 part # e.g. displaced neck # or greater tuberosity #.
- If 2 fragments are displaced =3 part # e.g.displaced neck # and grater tuberosity away.
- If all fragments are displaced = 4 part # e.g. displaced neck # + grater & lesser tuberosities are away.

Fracture dislocation: if head is out of glenoid +2, 3 or 4 part #
Clinical features: bruises on the arm, usually the patient has pain, but sometime it is mild especially in elderly with impacted #. test the function of axillary nerve.

Treatment:
- Undisplaced fracture or minimally displaced # need arm sling, when pain decrease then passive movements but active movements is allowed after 6 weeks when the # united.
- Widely displaced # in young patient needs manipulation under anesthesia if this fails then open reduction & internal fixation or external fixation.
  - Internal fixation include: percutaneous pinning, intramedullary pin with wiring, locked intramedullary nail, bone sutures and plate & screws.
- Widely displaced 4 part # in elderly needs prosthetic replacement of proximal humerus.

Plate& screw  K-wires  intramedullary nail  prosthetic replacement

Complications:
1- Associated shoulder dislocation: reduce the dislocation, and then treat the #.
2- Axillary nerve injury.
3- Avascular necrosis of humeral head.
4- Shoulder stiffness.
5- Malunion.

Fractures shaft of the humerus
Mechanism of injury: fall on the hand may cause twisting injury leading to spiral #, a fall on the elbow with the arm abducted may cause bending force leading to transverse or oblique #, direct trauma to the humerus may cause a comminuted or transverse #. In elderly patient the # may be due to metastasis.
Clinical features: the arm is painful, bruised, swollen, & deformity. it is important to test for the radial nerve by active fingers extension both before & after treatment.

Deformity  radial nerve injury  wrist drop
Treatment:

- Conservative treatment, this include hanging cast from the shoulder to the wrist with the elbow flexed to 90 degrees, the weight of the arm & the cast will pull the fragments into alignment after 2-3 weeks this replaced by short cast or polyethylene brace from shoulder to the elbow for another 6 weeks, early exercise of the fingers & wrist with pendulum movements of the shoulder.

- Operative treatment, this means fixation of the humerus by plate & screws, interlocking nail or external fixation, the indications for surgery are:
  1. Vascular & brachial plexus injury
  2. Severe multiple injuries
  3. Open #
  4. Segmental #
  5. Displaced intraarticular extension of the #
  6. Pathological #
  7. Floating elbow, means simultaneous unstable humeral and forearm #
  8. Radial nerve palsy after manipulation

Complications:

1. Vascular injury
2. Nerve injury: usually, radial nerve which is frequently neuropraxia that recovers within few weeks; if not, exploration is indicated.
3. Malunion.
4. Delayed union.
5. Nonunion: may require refreshing the bone ends, bone graft & rigid fixation.
6. Shoulder or elbow stiffness.
Fractures around elbow in children

Supracondylar fractures:
It is the commonest # in this children after the distal radial #, there are two types of the supracondylar #; 1 - posterior (extension type) common type account more than 95% and 2 - anterior (flexion type).

Mechanism of injury:
- Posterior type caused by fall on outstretched hand with elbow extended this will force the elbow into hyperextension breaking the humerus just above the condyles, the distal fragments will displaced posteriorly & rotated medially. The sharp end of the proximal fragment may injure the brachial artery or median nerve.
- Anterior type caused by fall on the point of the elbow with the elbow flexed, the distal fragment will displaced forward.

Classification: Wilkins classification depend on the degree of displacement of the distal fragment, it divide the # into 3 types:
- Type I - undisplaced #.
- Type II A - angulated # (intact posterior cortex).
- Type II B - angulated & malrotated #.
- Type III - completely displaced #.

Clinical features: the child is in pain, the elbow swollen & if the # is displaced there will be S-shape deformity, we examine for the distal pulses & nerve function.
**S-shape deformity**

**X-ray:** we take both AP & Lateral views,
- In the lateral view we look for fat pad sign, which is radiolucent area anterior to the distal humerus caused by displaced fat pad by fracture haematoma seen in type one occult #, for other types the displacement is obvious with the distal fragment displaced posteriorly or anteriorly.
- In the AP view we look for sideway displacement of the distal fragment; the Baumann’s angle can assess the degree of the medial tilt (varus) this angle subtended between the line through the long axis of the humerus & the line through the capitellar physis.

**Treatment:** it depends on the degree of the displacement:
- Type I, need splint for 3 weeks with checking x-ray after 1 week.
- Type IIA, need manipulation followed by splint for 3 weeks.
- Type IIB & type III, need manipulation under image intensifier followed by percutaneous K-wires. If this fails then open reduction & K-wires fixation.

**Complications:**

**A. Early**
- Vascular injury the great danger is brachial artery injury (1-5%). It can be: immediate & severe leading to peripheral gangrene (rare).
  - Or less severe & complicated by edema & compartment syndrome (more common) lead to (Volkmann's contracture) necrosis of muscles & nerves without peripheral gangrene.
- Nerve injury. Median nerve (usually recover 6-8 weeks), ulnar nerve (usually iatrogenic during closed K-wire placement).

**B. Late**
- Elbow stiffness: takes months to recover completely.
- Malunion; usually cubitus varus can be treated by supracondylar osteotomy.
Volkmann's contracture  cubitus varus

Lateral condyle fracture

The lateral condylar epiphysis begin to ossify during the first year of the life & fuse with the body between the age of 12-16 years, between these two ages it can be avulsed or sheared off from the humeral shaft.

Mechanism of injury; it is caused by fall on the hand with the elbow extended & forced into the varus this will break the lateral condyle by the attached lateral collateral ligament, then the lateral condyle will be pulled upon by the wrist extensors.

The # is important for two reasons;

1. It may damage the growth plate
2. It always involve the articular surface of the joint

Clinical features: pain, swelling and tenderness on lateral side of the elbow

X-ray; the fragment is larger than it appear on x-ray because it is largely cartilaginous, on x-ray there are two types of the #:

A. In the first type the fracture line pass lateral to the trochlea (humero-ulnar joint) therefore the elbow is stable, it is usually Salter Harris type IV.
B. In the second type the fracture line pass through the trochlea, the elbow is unstable & may dislocate. It is usually Salter Harris type II.

Treatment:
1-undisplaced or mildly displaced # need 3weeks back slab (90°elbow, neutral forearm rotation).
2-moderately displaced or hinged # need closed reduction & percutaneous K-wire fixation.
3-Severely displaced & rotated (capsized) # need open reduction & K-wire fixation.
Complication:
1- Malunion. 2- Nonunion 3-deformity of the elbow most commonly cubitus varus, less common is cubitus valgus which may lead to tardy ulnar nerve palsy.

**Medial condyle fracture:** this is rarer than the # of the lateral condyle

*Mechanism of injury:* it is caused by a fall on outstretched hand with the elbow extended & forced into valgus leading to avulsion # of the medial condyle by the medial collateral ligament, the fracture line extend through the growth plate into the elbow joint.

*Clinical features:* there is pain, swelling of the elbow, there may be bruises on the medial aspect of the elbow

*Treatment:* the same as for lateral condylar #.

**Separation of the medial epicondylar apophysis**

It occurs more in boys than girls & rarely cause growth disturbance.

*Mechanism of injury:* fall on outstretched hand with the elbow forced into the valgus causing avulsion of epicondyle by the common flexor origin or by the medial collateral ligament.
**Clinical features:** pain, swelling & bruising. Test for ulnar nerve. Sometime, the elbow dislocates and the epicondyle may be trapped inside the elbow joint which looks like a loose body in the joint on x-ray.

**Treatment:** it is usually conservative, the# needs 2-3 weeks of immobilization until the pain subside then movements allowed. Surgery is indicated in the following situation;

1) Severely displaced # i.e. more than 1 cm
2) trapped intra-articular fragment
3) signs of ulnar nerve injury.

**Complications:** ulnar nerve injury, elbow stiffness.

**Fractured neck of radius**

**Mechanism of injury:** fall on outstretched hand with the elbow extended & in valgus pushing the radial head against the capitulum causing neck #; while in adults, usually the head of radius is fractured.

**Clinical features:** pain, tenderness over the radial head & painful forearm rotation.

**X-ray:** transverse # through the growth plate with small triangle fragment from the metaphysis (salterII) or through the metaphysis. The head is usually tilted distally foreword & outward.

**Treatment:** it depend on the degree of the displacement & angulation:

- If the angulation less 30 degrees or the shift less than 3 mm no reduction is needed just splinte for 1-2 weeks then exercise.
- If the angulation more than 30 degrees or the shift more than 3 mm it need closed reduction followed by splinte if this fail then open reduction & K-wire fixation.

**Pulled elbow**

It is a common injury in the children, the child usually between the ages of 1-5 years, because in this age the radial head is small & largely cartilaginous.

**Mechanism of injury:** the typical history is that the child is being pulled from the hand with elbow extended & the forearm pronated, this will lead to radial head pulled down & the annular ligament of the proximal radio-ulnar joint being subluxed upward into the radiocapitellar joint i.e. it is subluxation of the ligament rather than the radial head.
**Subluxation of the annular ligament**

**Clinical features:** a history of arm being pulled; the elbow extended & the forearm pronated, supination is painful; x-ray is normal.

**Treatment:** by forceful supination & elbow flexion, the ligament will return back with a snap & rapid pain relief.