

# Upper Limb Fractures Part 1

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# The Upper Limb

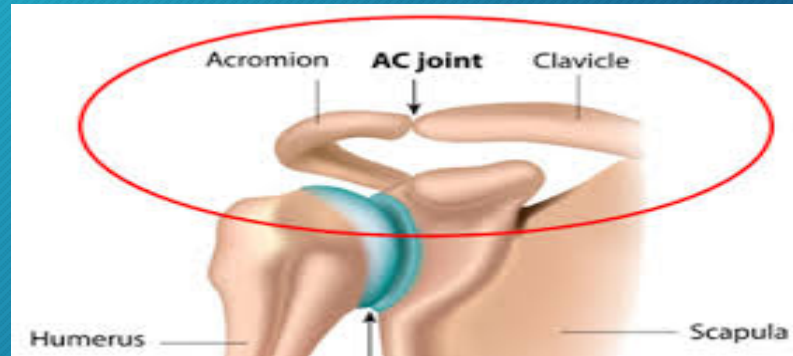
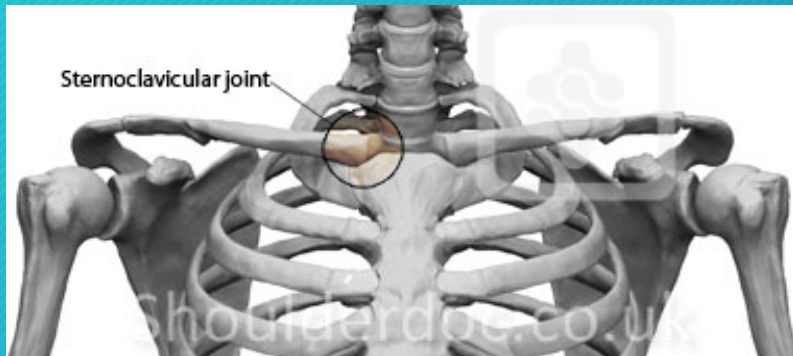
- The upper limb consists of three sections, the upper arm, forearm, and hand. It extends from the shoulder joint to the fingers and contains 30 bones. It also consists of many nerves, blood vessels, and muscles.
- The nerves of the arm are supplied by one of the two major nerve plexus of the human body, the brachial plexus.

# The Clavicle



# The Clavicle

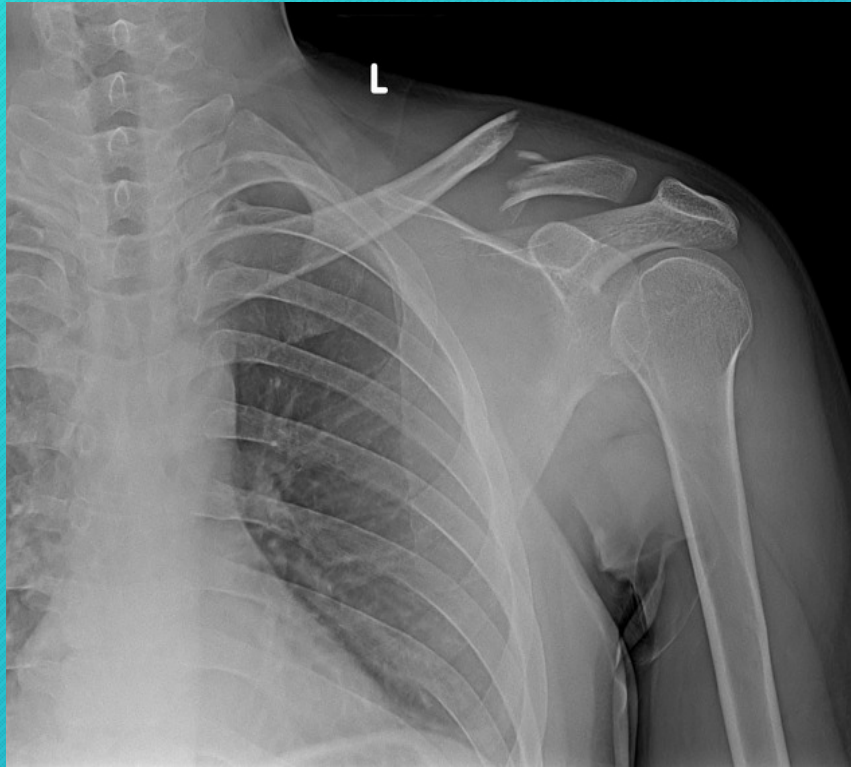
- The clavicle has three regions: the medial end, the lateral end, and the shaft.
- Medial end articulates with the sternum (Sternoclavicular joint).
- Lateral end articulates with the acromion of the scapula.



# Clavicular Fracture

- Fractures can occur at any part of the clavicle. However, the vast majority occur in the Midshaft. This is due to two factors: firstly this is the thinnest part of the bone, and secondly, it is the only part of the bone not reinforced by attached musculature and ligaments.
- Typically, fractured clavicles occur as the result of a direct blow to the shoulder. Fall onto the shoulder or onto an outstretched arm can cause this. They are common in very young and very old patients.

# Clavicular Fracture X-Rays



# Treatment & Prognosis

- Traditionally Midshaft fractures of the clavicle have been treated with immobilisation and a sling or figure-of-8 dressing, and in most cases, results are said to be excellent with low non-union rates and minimal functional impairment.
- Usually, the breaks heals in around 6-8 weeks, However, the patient should be informed that they should NOT participate in any kind of contact sports for 4-5 months.

# Treatment & Prognosis

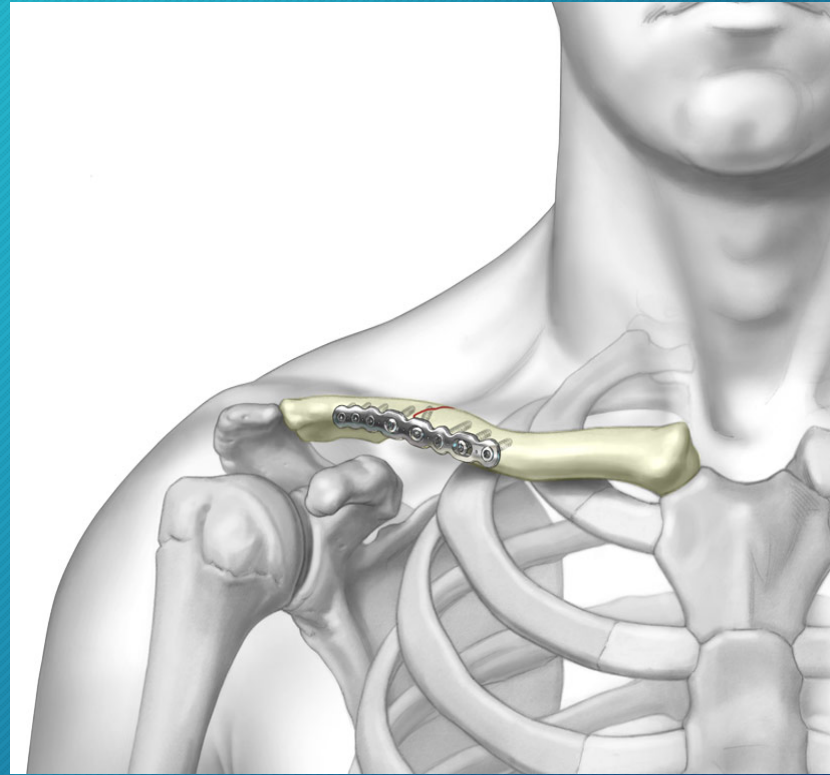
- In cases where there is significant displacement, angulation, shortening (>2 cm) or comminution, internal fixation either with plate-and-screw fixation have shown to result in a better cosmetic outcome and higher rates of union. Internal fixation is thus probably advisable in such cases and in patients who are at risk of non-union (e.g. elderly).



Figure of 8 splint



Plate and screw fixation



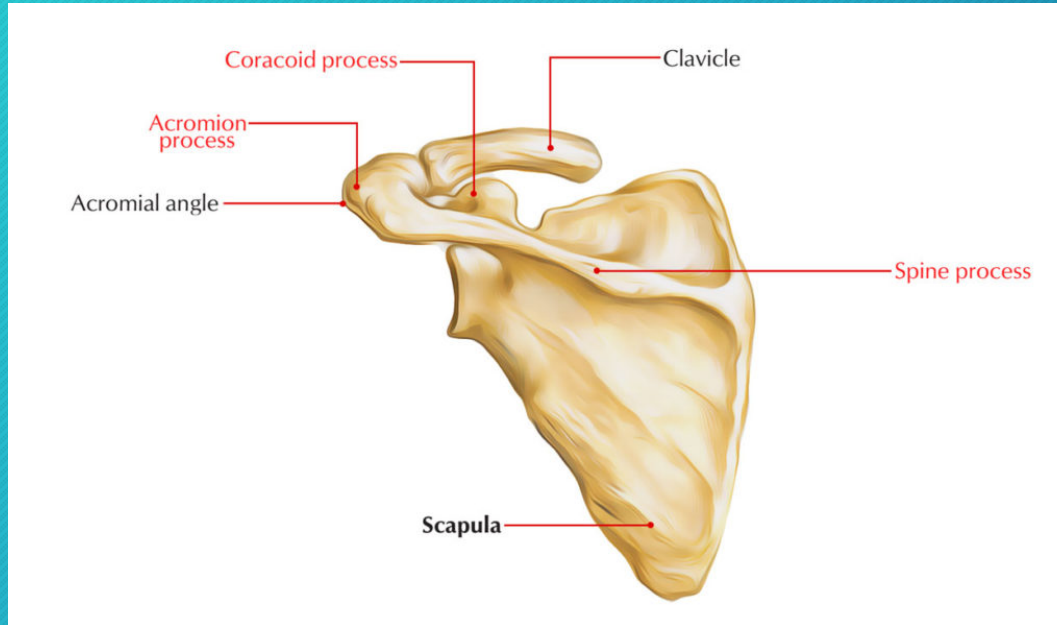
# The Scapula



# The Scapula

- The **scapula**, is a large triangular-shaped bone that lies in the upper back.
- is the bone that connects the humerus (upper arm bone) with the clavicle (collar bone).
- The spine ends in the Acromion, a process that articulates with the Clavicle. The lateral apex of the triangle is broadened and presents a shallow cavity, the Glenoid cavity, which articulates with the head of the bone of the upper arm, the Humerus, to form the shoulder joint.

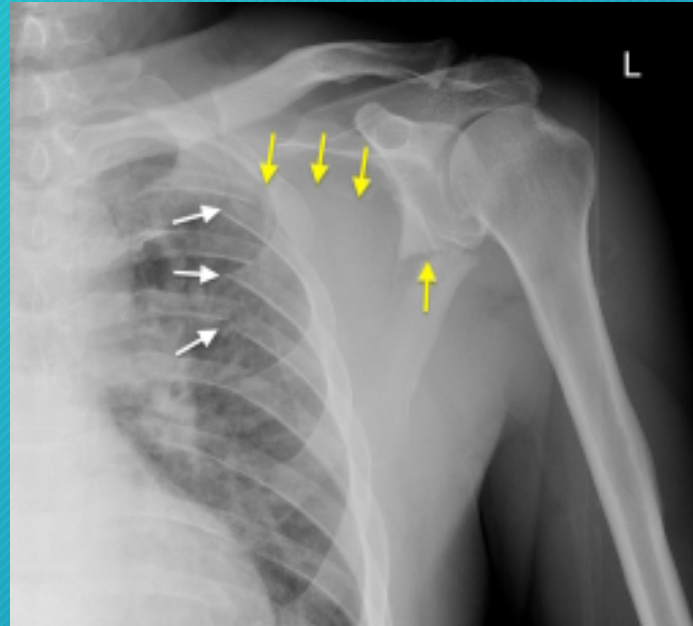
# Anatomy of the Scapula



# Scapular Fracture

- Fractures in Scapula are usually caused by a high-energy trauma (RTA), However, a direct trauma to the scapula that is severe enough could cause a fracture too.
- Scapular fractures are usually associated with other fractures including Clavicle, Spine, Rib fractures.
- Some report suggests the association between scapular fractures and Pneumothorax.

# Scapular Fracture X-Ray



# Treatment & Prognosis

- Most fractures of the scapula can be treated without surgery. Treatment involves immobilization with a sling or a shoulder immobilizer, icing and pain medications.
- Fractures that require surgery usually have fracture fragments involving the shoulder joint or an additional fracture of the clavicle. Surgery involves fixation of the fracture fragments with plates and screws.
- Usually takes 6-8 weeks to heal.

# The Humerus





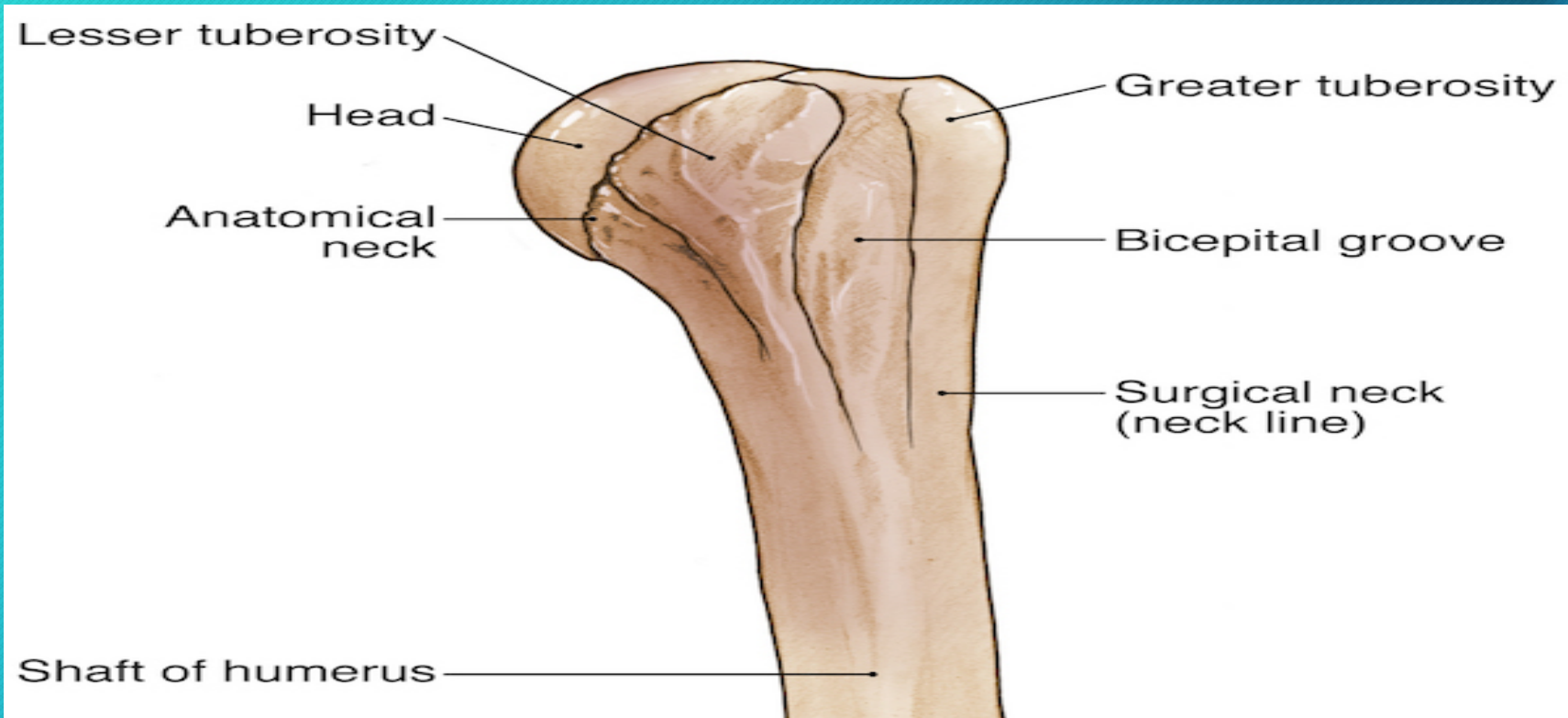
# The Humerus

- The humerus is the single bone of the upper arm, At its proximal end is the **head of the humerus**. This is the large, round region that faces medially. The head articulates with the glenoid cavity of the scapula to form the shoulder joint.
- The **surgical neck** is located at the base of the proximal end of the humerus, where it joins the **shaft of the humerus**. The surgical neck is a common site of arm fractures.

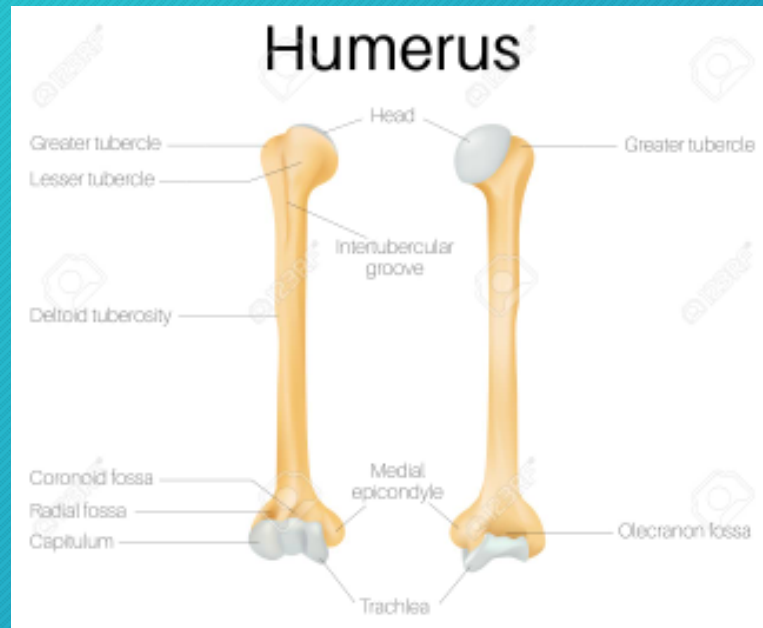
# The Humerus

- The prominent bony projection on the medial side is the **medial epicondyle of the humerus**. The much smaller **lateral epicondyle of the humerus** is found on the lateral side of the distal humerus.
- The distal end of the humerus has two articulation areas, which join the ulna and radius bones of the forearm to form the **elbow joint**.
- The Trochlea (Medial) articulates with Ulna, The capitulum (Lateral) articulates with the Radius.

# Anatomy of the Humerus



# Anatomy of the Humerus



# Fractures of the Humerus

- Proximal humeral fractures represent around 5% of all fractures . They are most common in older populations and especially in those who are osteoporotic.
- Proximal humeral fractures usually result from a fall on an outstretched arm. Indirect forces transmitted through the proximal humerus and shoulder are the cause of most fractures.
- Elder patients present following a fall, Younger patients present following high trauma incident.

# Fractures of the Humerus

- Sometimes, Fracture of the humerus is associated with nerve injury (axillary nerve injury most common).
- In case of Axillary nerve damage, patients will present with loss of sensation over the deltoid muscle and lateral arm, the deltoid will be flattened and there will be loss of arm abduction (>15 degree).
- Arterial injury is uncommon (5-6%), However, it may be masked by extensive collateral circulation preserving distal pulses.

# Proximal Fracture Of The Humerus X-Rays



# Neer's Classification

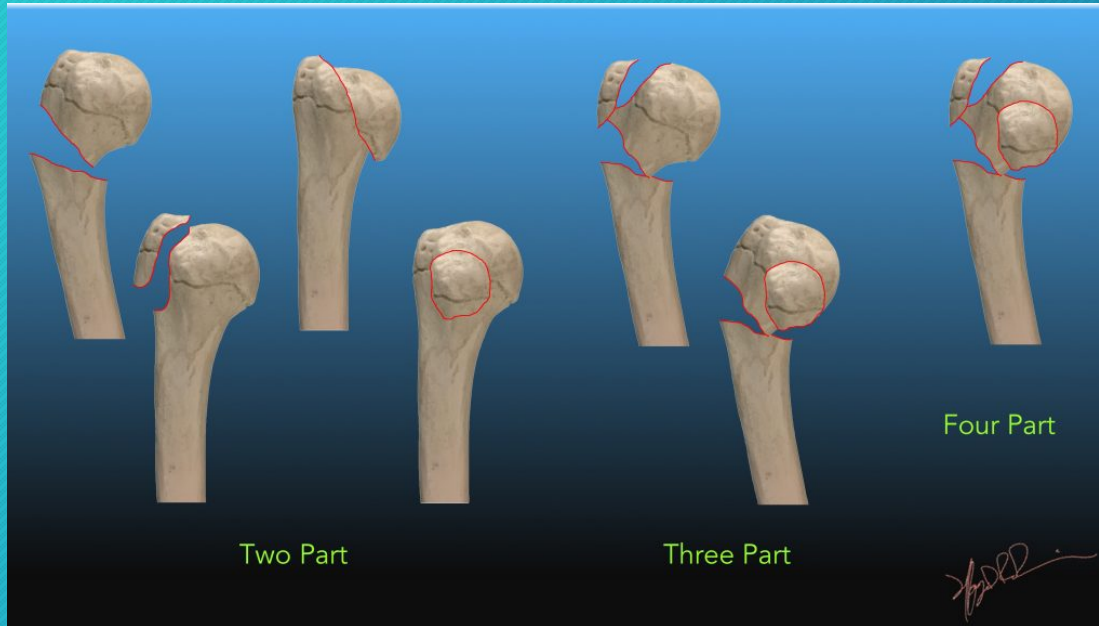
- Fractures are classified by the number of parts that result; a part is defined as a key anatomic structure that is displaced ( $> 1$  cm) or angulated ( $> 45^\circ$ ) in relation to its normal anatomic position. The 4 key anatomic structures of the proximal humerus are the
  - Anatomic neck
  - Surgical neck
  - Greater tuberosity
  - Lesser tuberosity



# Neer's Classification

- For example, if no structures are displaced or angulated, the fracture has one part. If one structure is angulated or displaced, the fracture has 2 parts. Almost 80% of proximal humeral fractures have only one part; they are usually stable. Fractures with  $\geq 3$  parts are uncommon.

# Neer's Classification



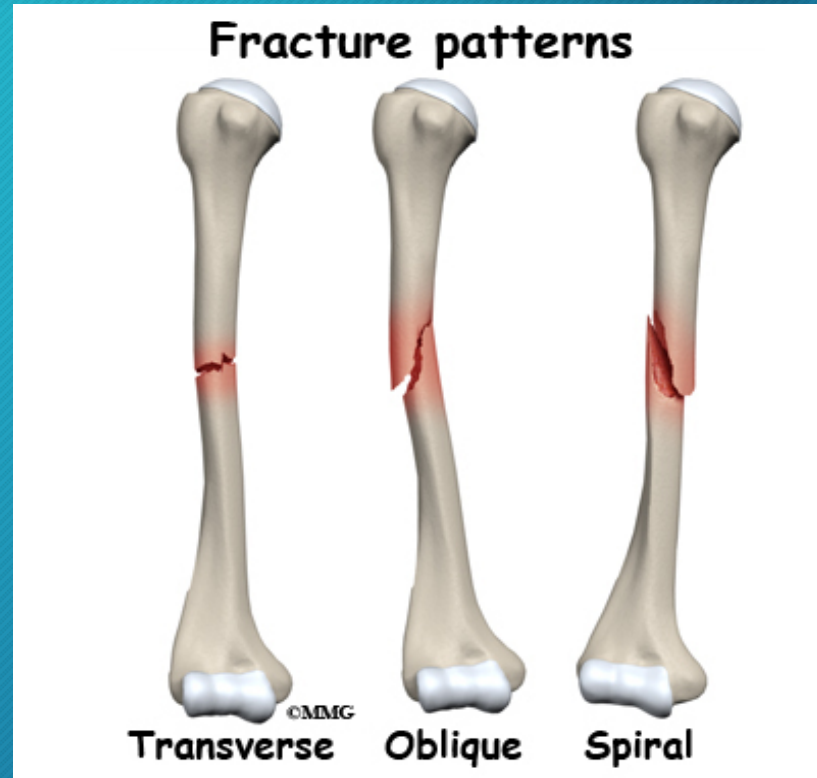
# Treatment & Prognosis

- 1 Part : Sling with short period of rest and EXCERCISE after 6 weeks.
- 2 Parts : Closed reduction and fixation for 3 or 4 weeks.
- 3 Parts : Open reduction and internal fixation & physiotherapy.
- 4 Parts : Open reduction and internal fixation or prosthetic replacement.  
(The the risk of malunion and avascular necrosis are high).
  
- The pt will be prone to dislocation in the future.

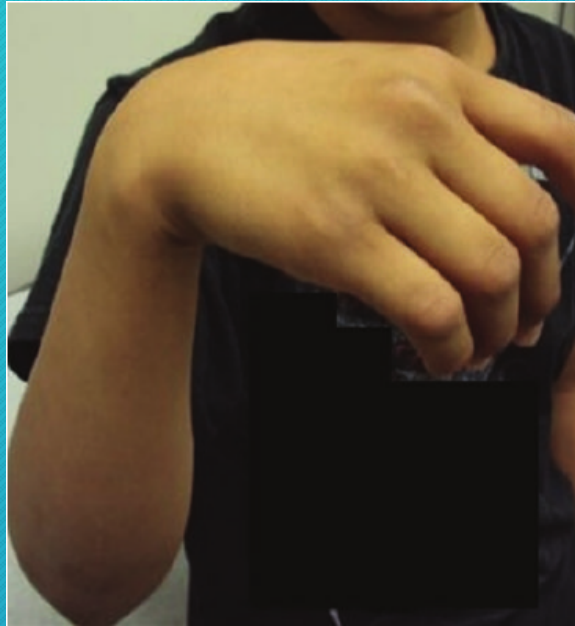
# Humeral Shaft Fractures

- The cause of a **humerus fracture** is usually physical trauma such as a fall.
- Other causes include conditions such as cancer in the bone.
- It is associated with Radial Nerve injury, Patients with this nerve injury present with “Wrist Drop” (Loss of Extension) and loss of sensation over forearm.
- We have to look for pathological indications on imaging to rule out bone Ca/Mets.

# Humeral Shaft Fracture



# Wrist Drop



# Treatment & Prognosis

- Humeral shaft fractures are usually treated with a supportive/hanging cast followed by a supportive splint and infrequently require open reduction.
- Although anatomical reduction is not easily achieved, significant angulation (20 degrees) can be tolerated with little functional impairment. Similarly, up to 3-5 cm of shortening is in many cases acceptable.

# Treatment & Prognosis

Open reduction - internal fixation is required in a number of scenarios, including:

- adequate alignment cannot be maintained (more commonly encountered in transverse fractures).
- open fractures.
- presence of vascular injury.
- segmental fracture.
- presence of significant other injuries (brachial plexus injury)
- non-union.



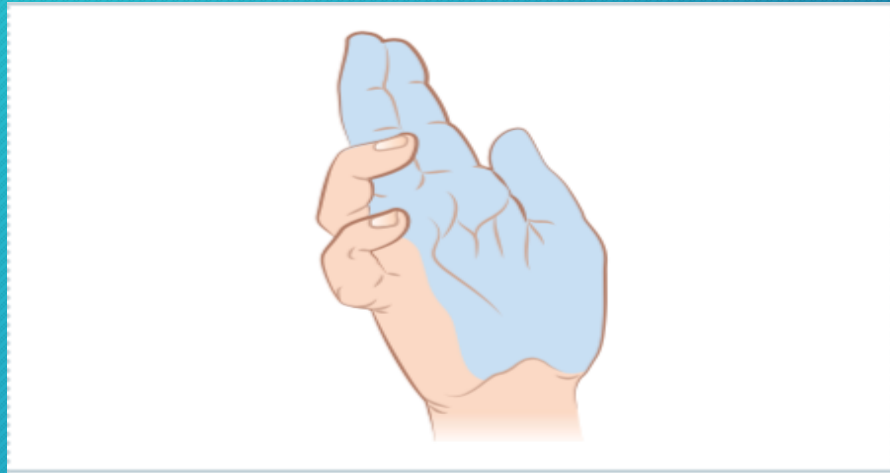
# FRACTURES OF THE DISTAL HUMERUS

## Supracondylar Fractures :

- The most common type of elbow fracture in children, Rare in adults.
- Occur as a result of a fall on a hyper-extended elbow.
- These injuries are almost always due to accidental trauma, such as falling from a moderate height (bed/monkey-bars).

# FRACTURES OF THE DISTAL HUMERUS

- Might be associated with Median Nerve injury.
- If so, patients usually present with “Ape hand” –Loss of Wrist flexion, Flexion of lateral fingers, Thumb opposition-



# Supracondylar Fracture X-Ray



# Treatment & Prognosis

- Although traditionally these fractures were treated non-operatively with cast immobilisation of the flexed arm to 120 degrees, this however dramatically increases the risk of ischaemic contracture (Volkmann contracture).
- Open reduction and internal fixation is the treatment of choice (plates and screws).

Thank You