Humeral Fractures

Classification of humerus fractures

- Proximal humerus fractures
- Humeral shaft fractures
- Distal humerus fractures
- Pathological #s (quite common site 5-10%)
    - Bone pain preceding fracture
    - Limb swelling predating fracture, or marked post-fracture swelling
    - Cystic abnormality of the humerus on x-ray
    - History of malignancy, particularly metastatic
    - Paget's disease of bone

Proximal humerus fractures

Features

- Common #, particularly elderly osteoporotic women with falls.
- Usually FOOSH, direct blow or 2° to seizure/electrocution ± post shoulder dislocation
- Imaging: XR – AP/Lat/Axillary views of shoulder

Classification (Neer):

- Sites anatomical neck, surgical neck, greater tuberosity, lesser tuberosity
- Parts displaced by ≥1cm or angulated ≥45°. If less than these values then "1-part" #.
- 2-, 3-, 4-part #'s are for displaced 1, 2, or 3+ elements.
- Paediatric #s SH_I (<5y) and SH_{II} (>13y). Usually remodel w/o surgery.

Management

Analgesia
Broad arm sling/shoulder immobiliser.
Physio/mobility exercises.
May need social admission or increased home help.
OT (<15%) for:

- Open # or >2 part #s
- Impaction or splitting of >50% articular surface.
- Fracture/disloc where reduction has not been fully successful.

Complications

Associated injuries

- Neuro: Most often axillary n. related to surgical neck. Also radial or musculocutaneous nn.
- Vascular – axillary artery.
- Shoulder dislocation

AVN: in 3-4 part #
Malunion
Stiffness: Elderly rarely get complete resolution, otherwise 8w healing & up to 1 yr to complete.

Hill-Sachs lesion

Type of proximal humerus #, defined as a posterolateral humeral head compression # and can occur following anterior shoulder dislocation. The reverse Hill-Sachs lesion is a compression # of the anteromedial humeral head as a result of posterior shoulder dislocation.

Humeral shaft fractures

Features

- Quite common #, caused usually by simple fall. Also bending, torsion or direct blow.
- Common in elderly. Consider NAI if child<3y.
- Imaging: XR – AP/Lat of humerus. Include shoulder & elbow joints.

Classification

- Open or closed
- Type of fracture line - transverse, oblique, spiral, comminuted, segmental
- Location - proximal, middle, distal. Distal 1/3 spiral # aka Holstein-Lewis fracture.

Management

Analgesia

Immobilisation:

- Long arm POP
- U-splint or Coaptation splint (a splint from the axilla to the nape of the neck with a stirrup around the elbow)+strap from proximal end of POP, around neck to wrist.

Functional brace for transverse # or once swelling reduced.

Physio/mobility exercises.

May need social admission or increased home help.

OT (<15%) for:

- Open #
- Unacceptable position (>20° AP angulation, >30° varus angulation, >2.5cm shortening)
- Pathological #
- New onset radial nerve palsy following closed reduction
- Floating elbow (concomitant ipsilateral forearm injury)
- Vascular compromise

Complications

Associated injuries

- Radial nerve injury: 10-20% #s. Most common in middle & distal third fractures. Spontaneous recovery occurs in 70%
- Brachial artery injury

Non-union

Distal humerus fractures

Classification

Supracondylar (extension-type or flexion-type), transcondylar, intercondylar, condylar, capitellum, trochlea, medial epicondylar, lateral epicondylar, or #s of supracondylar process.

Supracondylar/transcondylar Fractures

- Most are extension-type injuries (>95%) from FOOSH.
- Transcondylar fractures are more common in elderly.
- Supracondylar fractures are more common in children. Peak aged 5-8y. 2M:1F
    - **Gartland Classification**: I non-displaced, II displaced but posterior cortex intact, III completely displaced
- Patient usually presents with elbow swelling and pain.

- Risk of damage to brachial artery and nerves.
- Marked forearm swelling or palpable induration of forearm flexors, with pain on passive extension of the fingers suggests acute volar compartment syndrome → urgent surgery.
- Imaging: XR - AP and lateral of elbow. NB: Fat pad signs. CRITOE for paed ossification.

Management

- Analgesia
- Non-/minimally displaced #: long arm posterior POP with elbow at 90° (110° if displaced)
- May need OT if:
    - Open #
    - <50% bony apposition
    - Dorsal angulation >15° from norm (45°)
    - Lat/med tilt>10°
    - Flexion displacement.
- Ice and elevation important.
- Check distal pulses after splint applied and ensure frequent checking (for compartment syndrome) of neural and vascular function for first 7–10 d.
- Early protected mobilisation starting at 2-3wk

Intercondylar fractures

- T- or Y-shaped fractures with varying displacement between the condyles and the humerus.
- May feel crepitus of movement when condyles are pressed together.
- Mx: Most fractures require surgery because they are displaced otherwise as above.

Condylar fractures

- Lateral condyle fractures are more common than medial.
- Lateral condylar SH_I # easily missed
- Usually due to direct impact on a flexed elbow. Also sudden adduction or hyperextension.
- If medial epicondyle – find avulsed fragment as may be in jt between olecranon/humerus
- Tenderness over the condyle and crepitus with motion is frequently present.
- Mx: Aspiration of joint haemarthrosis relieves discomfort. As for supracondylar.

Capitellum Fracture

- Fracture involving the distal humeral articular surface.
- Mx: undisplaced fractures splinted, displaced require surgical fixation.

Complications

Associated injuries:

- Nerve injury: risk to median, radial & ulnar nerves.
- Vascular injury: risk to brachial artery.

Compartment syndrome

Volkmann's ischaemic contracture: neurovasc compromise 2° missed compartment syndrome

Stiffness: early range of motion may prevent or reduce its severity

Cubitus varus – mainly cosmetic

Post-traumatic arthritis: can result from the initial articular impact

Heterotopic ossification

Mal-union