Fractures Of The Humerus

FRACTURES OF THE PROXIMAL HUMERUS

- Fractures of the proximal humerus usually occur after middle age and are most common in osteoporotic individuals.
- The patient falls on the outstretched hand, fracturing the surgical neck; one or both tuberosities may also be fractured.

SPECIAL FEATURES

- Pain may not be very severe because the fracture is often firmly impacted. However, the appearance of a large bruise in the upper arm is very suspicious.
- The patient should be examined for signs of axillary nerve or brachial plexus injury.

IMAGING

- X-ray examination in elderly patients often appears to show a single, **impacted fracture extending across the surgical neck;** sometimes a separate fracture of the greater tuberosity is also seen.
- However, with good definition x-rays several undisplaced fragments may be visible.
- In **younger** patients the fragments are usually more clearly defined. **Axillary and scapular lateral views** should always be obtained, to exclude dislocation of the shoulder.

IMAGING

- In common with **so many other complex fractures**, a **CT scan** will help to diagnose the fracture configuration and plan treatment.
- As the fracture heals, the humeral head is sometimes seen to be subluxated downwards (inferiorly); this is due to muscle atony and it usually recovers once exercises are begun.

TREATMENT

TYPE OF FRACTURE	MANAGEMENT
Impacted or minimally displaced fractures	• Need no treatment apart from a short period of rest with the arm in a sling. • Active movements are begun as soon as practicable, but the sling is retained until the fracture has united (usually after 6 weeks).

TREATMENT

TYPE OF FRACTURE	MANAGEMENT
Two-part fractures	• Can usually be reduced closed; the arm is then bandaged to the chest for 3 or 4 weeks, after which shoulder exercises are commenced (the elbow and hand are, of course, exercised throughout). • If the fragments cannot be reduced then fixation, particularly in younger patients, is considered.

TREATMENT

TYPE OF FRACTURE	MANAGEMENT
Three-part fractures	• Active individuals usually require open reduction and internal fixation with a plate and screws. • In elderly patients with osteoporotic bone, the results are less certain and manipulative reduction followed by physiotherapy may be equally satisfactory in the long term.

TREATMENT

TYPE OF FRACTURE	MANAGEMENT
Four-part fractures	• Which carry additional risks of incomplete reduction, non-union and avascular necrosis of the humeral head, are best treated by prosthetic replacement, particularly in elderly patients.

COMPLICATIONS

Shoulder dislocation

Vascular and nerve injuries

Shoulder stiffness

FRACTURES OF THE SHAFT OF THE HUMERUS

- A fall on the hand may twist the humerus, causing a spiral fracture.
- A fall on the elbow with the arm abducted may hinge the bone, causing an oblique or transverse fracture.
- A direct blow to the arm causes a fracture which is either transverse or comminuted.
- A fracture of the shaft in an elderly patient may be through a metastasis.

SPECIAL FEATURES

- The arm is painful, bruised and swollen.
- Active extension of the wrist and fingers should be tested before and after treatment because the radial nerve may be damaged.

X-rays

- The fracture is usually obvious, but don't forget to look for features suggesting a pathological lesion (e.g. fracture through a bone cyst or metastasis).

TREATMENT

- Fractures of the humerus require neither perfect reduction nor total immobilization; the weight of the arm with an external cast is usually enough to pull the fragments into alignment.
- The cast is applied from the shoulder to the wrist with the elbow flexed to 90 degrees; after 2–3 weeks, it may be replaced by a shorter cast (shoulder to elbow) or by a removable brace.
- Exercises of the shoulder can be started within 1 week, but abduction is avoided until the fracture has united.

COMPLICATIONS

Nerve injury

- Radial nerve palsy (wrist-drop and paralysis of the metacarpophalangeal [MCP] extensors) may occur with oblique fractures of the shaft.
- In closed injuries the nerve is very seldom divided, so there is no hurry to operate. Passive and active movements of the wrist and hand are encouraged while recovery is awaited.

COMPLICATIONS

Non-union

- Midshaft fractures sometimes fail to unite.
- This is treated by bone grafting and internal fixation.
- Care must be taken not to injure the radial nerve.

FRACTURES OF THE DISTAL HUMERUS (SUPRACONDYLAR FRACTURES)

SUPRACONDYLAR FRACTURES

- These are among the commonest fractures in children.
- The distal fragment may be displaced and/ or tilted either posteriorly or anteriorly, medially or laterally; sometimes it is also rotated.
- Posterior displacement and tilt is the commonest (95% of all cases), suggesting a hyperextension injury, usually due to a fall on the outstretched hand.

SUPRACONDYLAR FRACTURES

- The jagged end of the proximal fragment pokes into the soft tissues anteriorly, sometimes injuring the **brachial artery** or **median nerve**.
- Anterior displacement is rare, but may result from over-reduction of the usual posterior displacements.

SPECIAL FEATURES

- Following a fall, the child is in pain and the elbow is swollen; with a posteriorly displaced fracture, the S-deformity of the elbow is usually obvious.
- It is essential to feel the pulse and check the capillary return.

X-RAYS

- Undisplaced fractures are easily missed; there may be no more than subtle features of a soft-tissue hematoma.
- In the common posteriorly displaced fracture the distal fragment is tilted backwards and/ or shifted backwards.
- In the rare anteriorly displaced fracture the fragment is tilted forwards.
- The anteroposterior x-ray is often difficult to interpret because it is taken with the elbow flexed.

TREATMENT

- If there is even a suspicion of a fracture, the elbow is gently splinted in 30 degrees of flexion to prevent movement and possible neurovascular injury during the x-ray examination.

TYPE OF FRACTURE	MANAGEMENT
Undisplaced fractures	• The elbow is immobilized at 90 degrees and neutral rotation in a lightweight splint or cast and the arm is supported by a sling. • It is essential to obtain an x-ray 5–7 days later to check that there has been no displacement. The splint is retained for 3 weeks

TREATMENT

TYPE OF FRACTURE	MANAGEMENT
Posteriorly displaced fractures	• Fracture should be reduced under general anesthesia as soon as possible. • And then held with percutaneous crossed K-wires; this obviates the necessity to hold the elbow acutely flexed. • Care should be taken not to injure the ulnar and radial nerves.

TREATMENT

TYPE OF FRACTURE	MANAGEMENT
Anteriorly displaced fractures	• The fracture is reduced by pulling on the forearm with the elbow semi-flexed, applying thumb pressure over the front of the distal fragment and then extending the elbow fully. • A posterior slab is bandaged on and retained for 3 weeks. • Thereafter, the child is allowed to regain flexion gradually

COMPLICATIONS

Vascular injury

The great danger of supracondylar fracture is injury to the **brachial artery.**

More commonly, the injury is complicated by **forearm oedema** and a mounting **compartment syndrome**.

Nerve injury

The **median** nerve may be injured. Fortunately, loss of function is usually **temporary** and recovery can be expected in 6–8 weeks.

Malunion

Malunion is common. However, backward or sideways shifts are gradually smoothed out by modelling during growth and they seldom give rise to visible deformity.

Elbow stiffness

Full movement may take months to return and must not be hurried. Forced movement will only make matters worse and may contribute to the development of heterotopic ossification.