

Upper Limb Fractures

Patterns, mechanisms, and management from the clavicle to the distal radius.

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Proximal humerus radiograph

How upper limb fractures heal

Rich vascularity, faster healing

The upper limb heals faster than the lower limb. Mature skeleton heals in about 6 weeks; the immature skeleton in about 3 weeks.

Reduction depends on the joint

Extra-articular fractures need only functional reduction and relatively stable fixation. Intra-articular fractures need anatomical reduction and absolutely stable fixation.

Anatomical fixation of intra-articular fractures prevents secondary osteoarthritis and joint stiffness.

Simple vs. comminuted

The number of fragments predicts how well a fracture heals.



Simple

One fracture line resulting in two pieces. Heals better.



Comminuted

More than one line with three or more pieces. Also called multifragmentary.

Mechanism shapes the fracture line

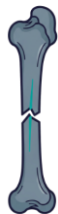
Most upper limb fractures come from a fall on an outstretched hand (FOOSH). The force type sets the pattern and the soft tissue damage.



Spiral

Twisting force

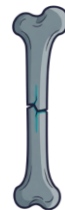
Least energy and soft tissue damage; large surface area gives excellent callus.



Oblique

Bending force

Moderate energy; angled line with a healthy healing surface.



Transverse

Direct force

Highest energy, most soft tissue damage, longest to heal.

Clavicle fractures

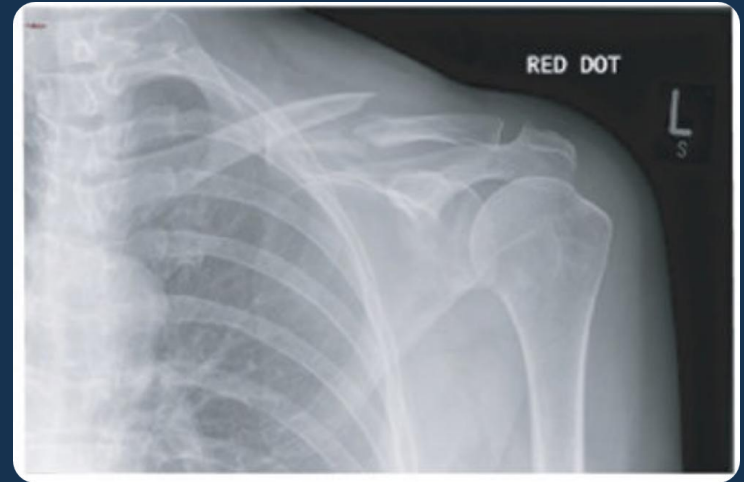
- Divided into three thirds; most occur in the middle third.
- Proximal piece points up (sternocleidomastoid pull); distal piece is pulled down by the weight of the arm.
- Lateral third fractures are usually unstable — they involve ligamentous injury.

Middle third

Conservative — sling or figure-of-eight brace.

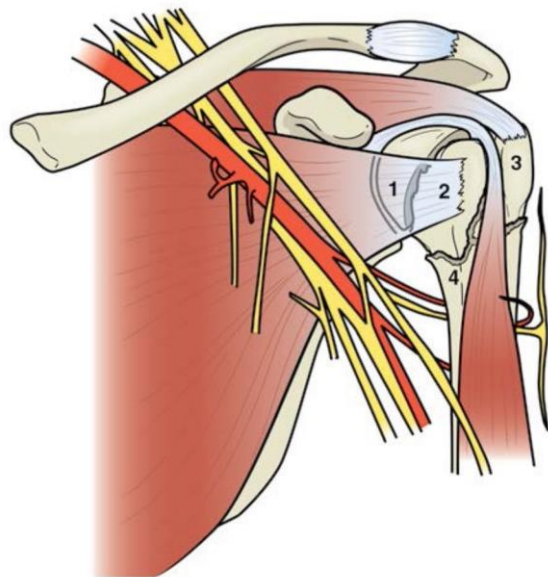
Lateral third

Operative fixation.



Know the anatomy

- 1 Head of humerus
- 2 Lesser tuberosity — subscapularis tendon
- 3 Greater tuberosity — supra- and infraspinatus tendons
- 4 Shaft of the humerus



Anatomical neck

Line between the head and the rest.

Surgical neck

Line between the shaft and the rest.

The axillary nerve runs close by — it innervates the deltoid and abducts the shoulder. Always assess it.

Fracture types and management

Anatomical neck

High risk of avascular necrosis and nonunion — go for surgical reduction.

Greater tuberosity

Avulsion fracture (supra- and infraspinatus pull); may accompany shoulder dislocation.

Surgical neck

Most frequent and a fragility fracture. No risk of avascular necrosis or nonunion.



Treatment ranges from an arm sling to fixation or replacement, depending on comminution and bone quality. Always assess the axillary nerve.

Watch the radial nerve

The patient presents with arm pain after trauma. Exam may show swelling, bruising, deformity, or wounds.

Why it matters

The radial nerve lies against the distal half of the humeral shaft, so it is at risk in these fractures.

If it is injured

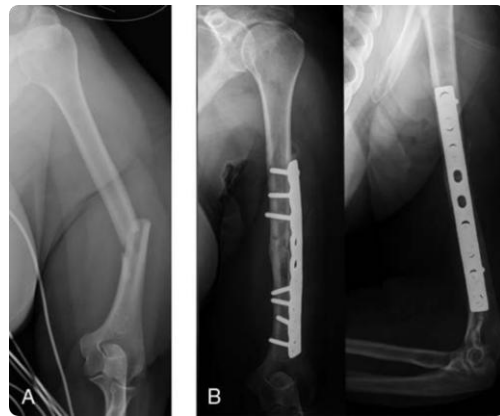
Wrist drop, plus decreased sensation over the dorsal first web space.

Two ways a bone heals



Secondary (indirect) healing

Functional reduction with relative stability. Initial films show varus angulation from deltoid pull; at 6 weeks callus forms, and by 3 months it consolidates.



Primary (direct) healing

Open reduction and internal fixation with a compression plate gives absolute stability. At 3 months there is no callus — a sign of direct healing.

Olecranon fractures

- These are intra-articular: treat with anatomical reduction and absolutely stable fixation.
- Anatomical reduction avoids osteoarthritis; stable fixation allows early movement to prevent stiffness.
- Mechanism is an avulsion from forceful triceps pull — a fracture gap is usually seen.

Tension band wiring converts the triceps pull into compression — a method of absolute stability.





Radius and ulna work as one unit

- The radius rotates around the ulna to pronate and supinate, so they act functionally as a joint.
- A fracture in one bone is usually paired with injury to the other — fracture or dislocation.
- Treat like intra-articular fractures: anatomical reduction and absolutely stable fixation.
- This does not apply to children — they have a high remodeling capacity.

Monteggia fracture-dislocation

- 1 Fracture of the proximal half of the ulna.
- 2 Dislocation of the proximal radius.
- 3 Possible radial nerve injury as it turns around the radial neck.

An elbow-level radial nerve injury causes finger drop at the MCP joints, not wrist drop — the branch to extensor carpi radialis longus arises above the injury.



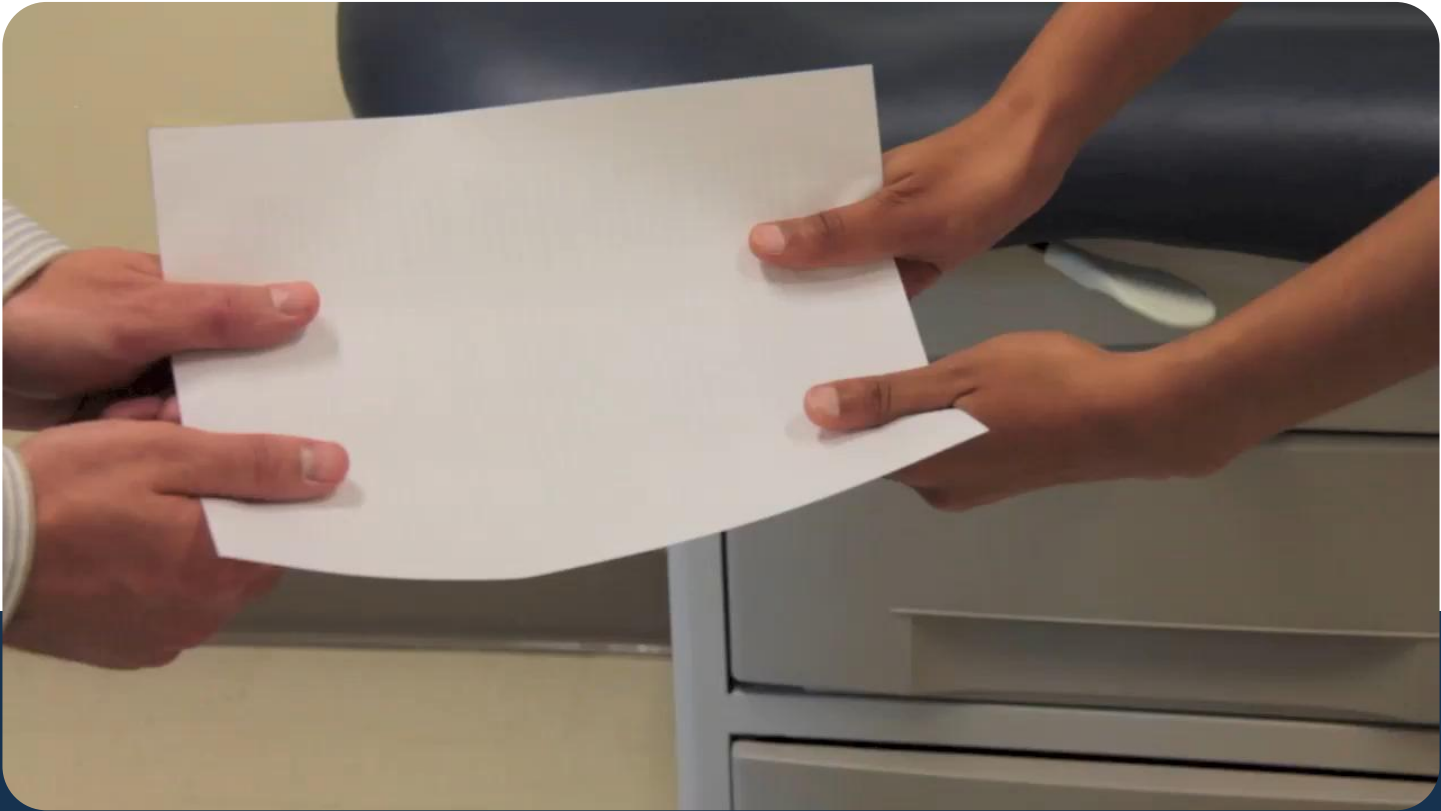


12 — FOREARM — FRACTURE-DISLOCATION

Galeazzi fracture-dislocation

- 1 Fracture of the distal half of the radius.
- 2 Dislocation of the distal ulna.
- 3 Possible ulnar nerve injury.

If the ulnar nerve is injured: weak finger abduction and adduction, and a positive Froment's sign.



Froment's sign

Isolated ulna fracture

The nightstick injury

- Results from direct trauma to the ulna — note the transverse fracture pattern.
- The radius stays intact.
- Carries a risk of non-union — consider surgical fixation if conservative care fails.



Transverse ulna fracture, radius intact

Colles' fracture

- A distal radius extra-articular fracture from hyperextension.
- Occurs in the elderly after minor trauma — a fragility fracture.
- Dorsally displaced, seen best on the lateral view.
- Presents with the classic dinner-fork deformity.



Dorsal displacement — dinner-fork deformity

Treatment is usually closed reduction and casting for 6 weeks.

Smith's fracture

The reverse Colles'

- Same features as Colles' but with volar angulation.
- Caused by falling with the wrist in flexion — the opposite of Colles', where the wrist is extended.
- Treatment is closed reduction and casting for 6 weeks.





Triangular fragment on the lateral view

16 — DISTAL RADIUS

Barton's fracture

- An intra-articular fracture from a shearing force; can be volar or dorsal.
- Best seen on the lateral view — it resembles a triangle of articular surface, fracture, and cortex.
- Treatment is anatomical reduction and fixation.

Radial styloid fracture

The chauffeur fracture

- Caused by sudden forceful radial deviation of the wrist.
- An intra-articular fracture.
- Treatment is anatomical reduction and fixation.



Fracture through the radial styloid

Pulling it together

Reduction rule

Extra-articular needs functional reduction; intra-articular needs anatomical reduction and absolute stability.

Nerves at risk

Axillary at the proximal humerus, radial at the shaft and elbow, ulnar in Galeazzi.

Named patterns

Monteggia, Galeazzi, Colles', Smith's, Barton's, and chauffeur — recognize each on the film.