

Fractures around elbow



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Supracondylar fracture of humerus

- A supracondylar fracture is an injury to the humerus, or upper arm bone, at its narrowest point, just above the elbow.
- Supracondylar fractures are the most common type of upper arm injury in children. They are frequently caused by a fall on an outstretched elbow or a direct blow to the elbow. These fractures are relatively rare in adults.
- The child is in pain and the elbow is swollen; The S-deformity of the elbow is usually obvious and the bony landmarks are abnormal.



The Gartland classification

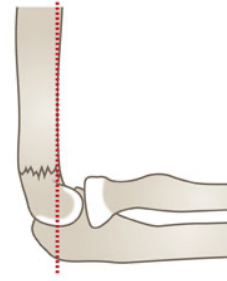
Type I is an undisplaced fracture.

Type II is an angulated fracture with the posterior cortex still in continuity.

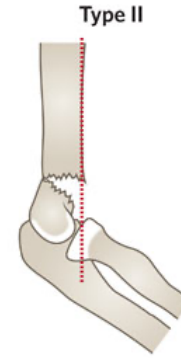
IIA – a less severe injury with the distal fragment merely angulated.

IIB – a severe injury; the fragment is both angulated and malrotated.

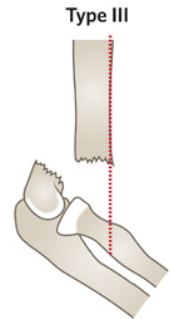
Type III is a completely displaced fracture (although the posterior periosteum is usually still preserved, which will assist surgical reduction).



Type I



Type II



Type III

X-ray of supracondylar fracture

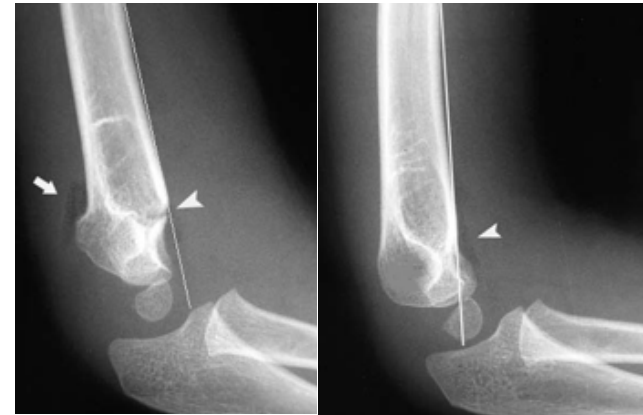


Investigations

X-ray

The fracture is seen most clearly in the lateral view:

- **In type I** the ‘fat pad sign’ should raise suspicions.
- On a normal lateral x-ray, a line drawn along the anterior cortex of the humerus should cross the middle of the capitulum. If the line is anterior to the capitulum then a **Type II** fracture is suspected.



X-ray of supracondylar fracture



Treatment

TYPE I: UNDISPLACED FRACTURE

The elbow is immobilized at 90 degrees and neutral rotation in a 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.

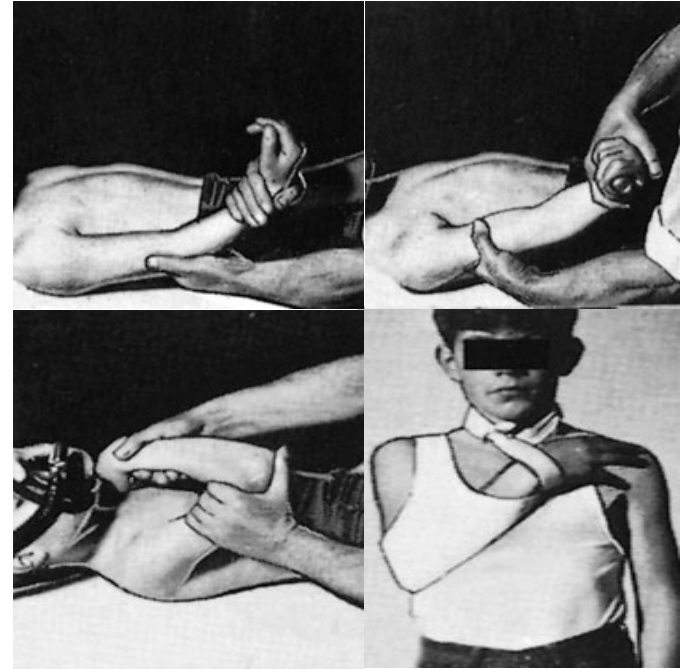
The splint is retained for 3 weeks and supervised movement is then allowed.



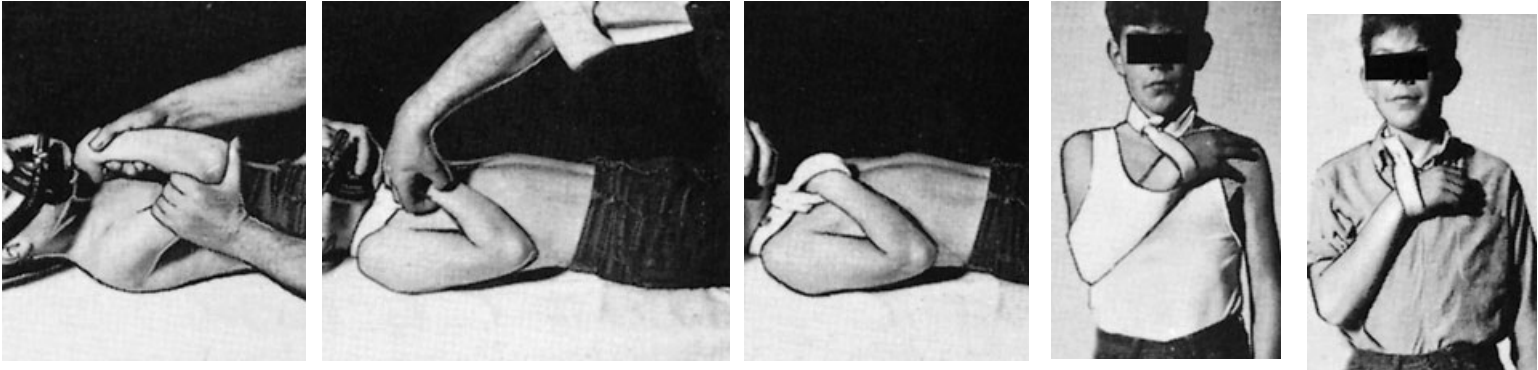
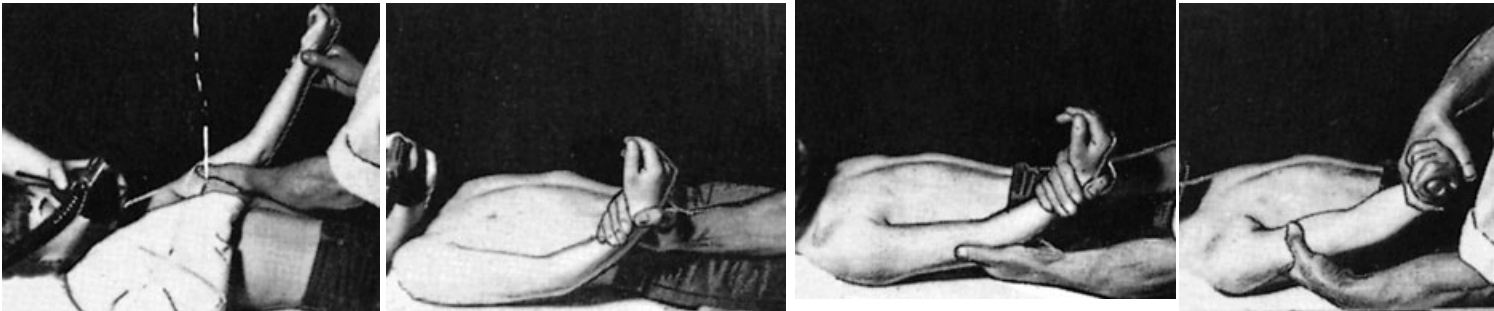
Treatment

TYPE II A : POSTERIORLY ANGULATED FRACTURE – MILD

- Reduction under GA.
- Check the pulse and the capillary return .X-rays are taken to confirm reduction
- Then, the arm is held in a collar and cuff;
- An x-ray is obtained after 3–5 days to confirm that the fracture has not slipped.
- The splint is retained for 3 weeks, after which movements are begun.
- If the reduction is unstable, the fracture should be fixed with percutaneous crossed K-wires.



Closed reduction under GA



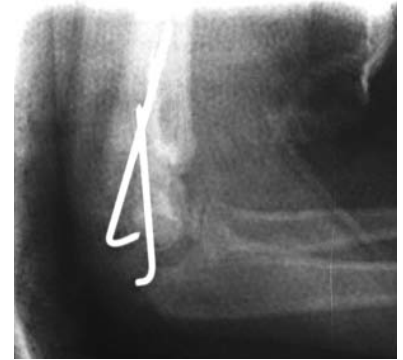
Treatment

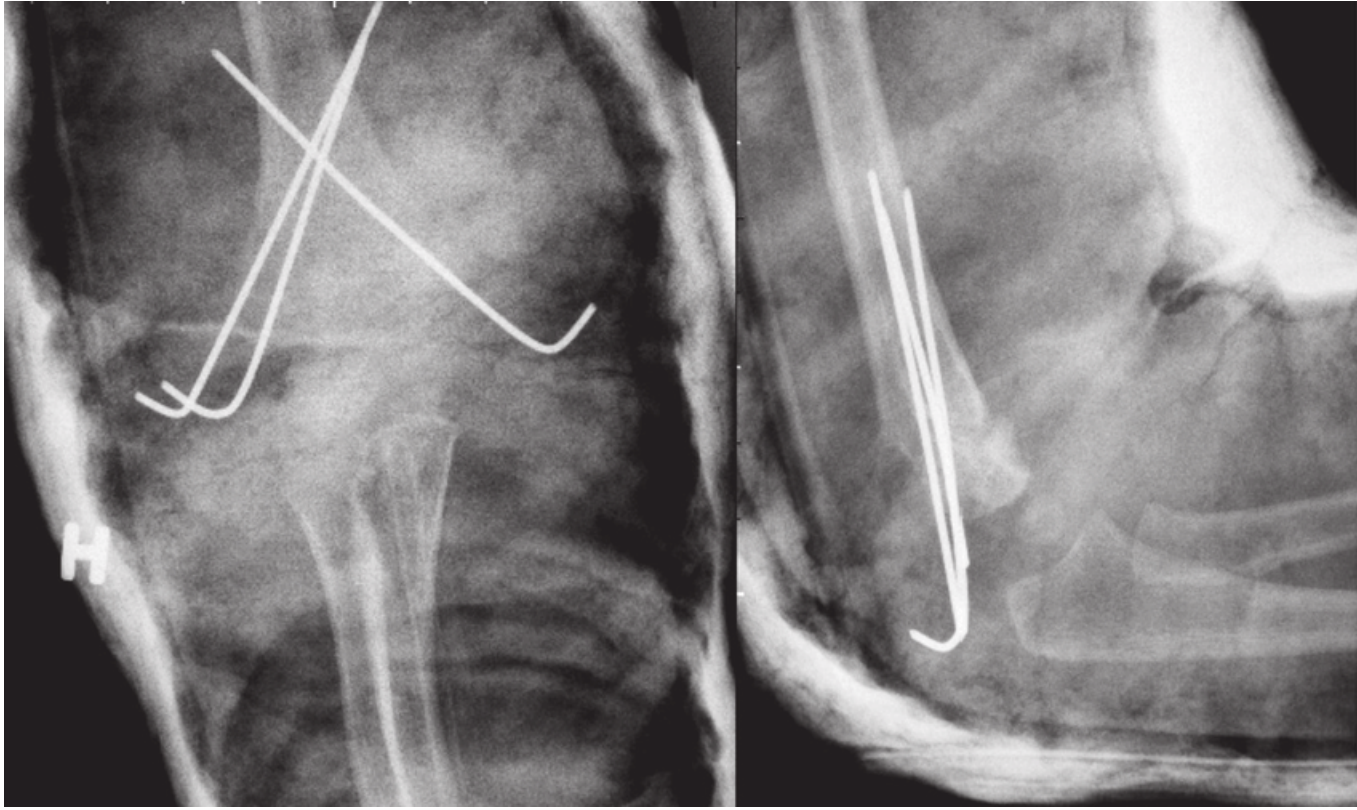
TYPES II B AND III: ANGULATED AND MALROTATED OR POSTERIORLY DISPLACED

Reduction under GA as soon as possible, by the same method, and held with percutaneous crossed K-wires;

OPEN REDUCTION: The fracture is exposed, the hematoma is evacuated and the fracture is reduced and held by two crossed K-wires. This is sometimes necessary for

- (1) a fracture which simply cannot be reduced closed;
- (2) an open fracture;
- (3) a fracture associated with vascular damage.





Complications

EARLY

Vascular injury

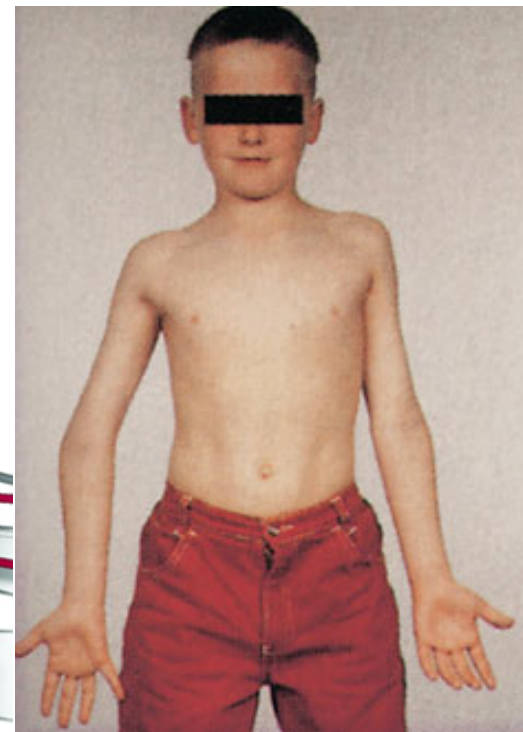
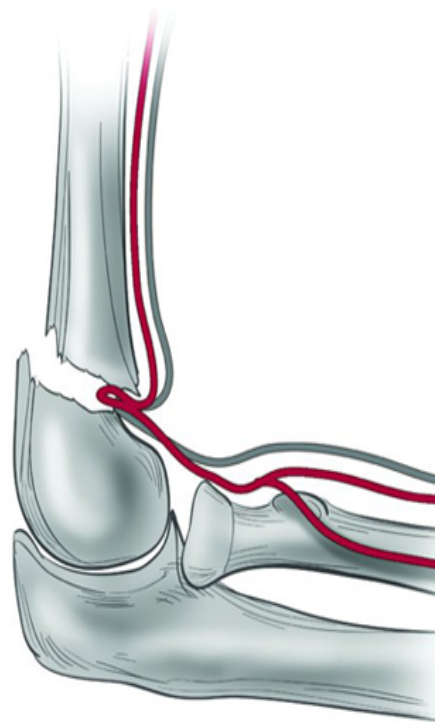
Nerve injury

LATE

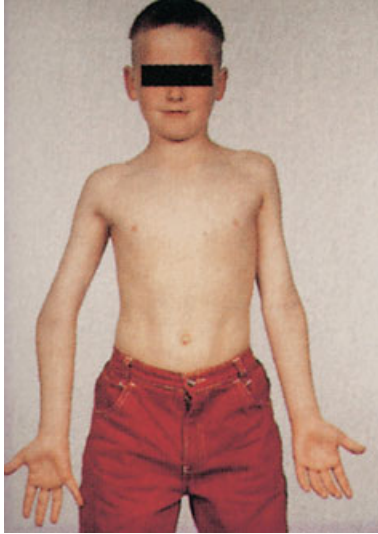
Malunion (cubitus varus)

Elbow stiffness

Myositis ossificans



Cubitus varus



Dislocation of the elbow

- A fall on the outstretched hand may dislocate the elbow. In 90% of cases the forearm bones are pushed backwards and dislocate posteriorly or posterolaterally.
- Provided there is no associated fracture, reduction will usually be stable and recurrent dislocation unlikely.

Clinical features

- **Deformity** is usually obvious and the bony landmarks are displaced. In very severe injuries,
- **pain** and swelling are so marked that examination of the elbow is impossible; however, the hand should be examined for signs of vascular or nerve damage.

X-ray examination is essential: (a) to confirm the presence of a dislocation and (b) to identify any associated fractures.



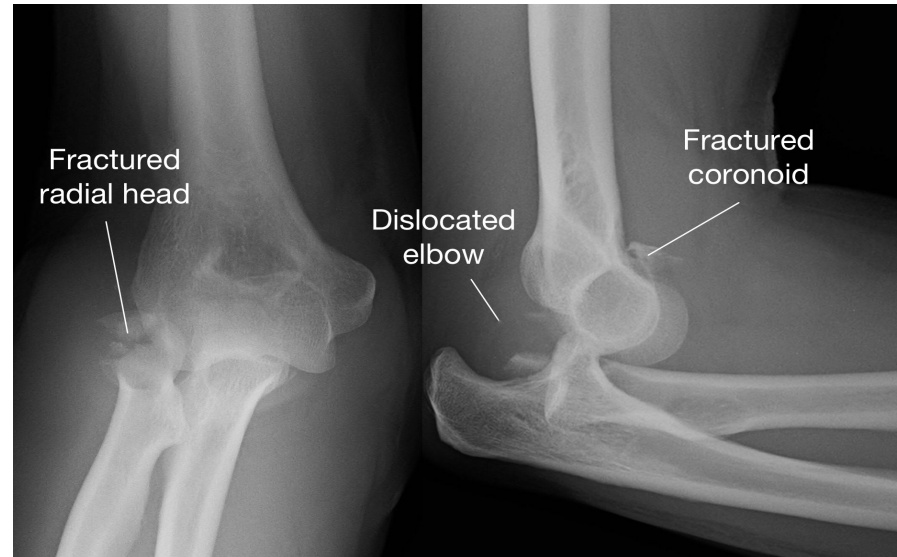
Treatment

A-Uncomplicated dislocation

- Closed reduction of dislocation under GA
- Nerve function and circulation are checked again
- The arm is held in a light cast with the elbow flexed to just above 90 degrees and the wrist supported in a collar and cuff. After 1 week the cast can be removed and gentle exercises begun; at 3 weeks the collar and cuff are discarded.

- **B-Fracture–dislocation**

- The combination of radial head fracture, coronoid fracture and medial collateral ligament injury is known as the ‘**terrible triad**’ Associated fractures will **need internal fixation**.
- In cases where the elbow remains unstable after the bone and joint anatomy has been restored, the ligaments may need repair and a hinged **external fixator** can be applied in order to maintain mobility while the tissues heal.



complications

- Vascular injury
- Nerve injury
- Stiffness
- Heterotopic ossification
- Osteoarthritis

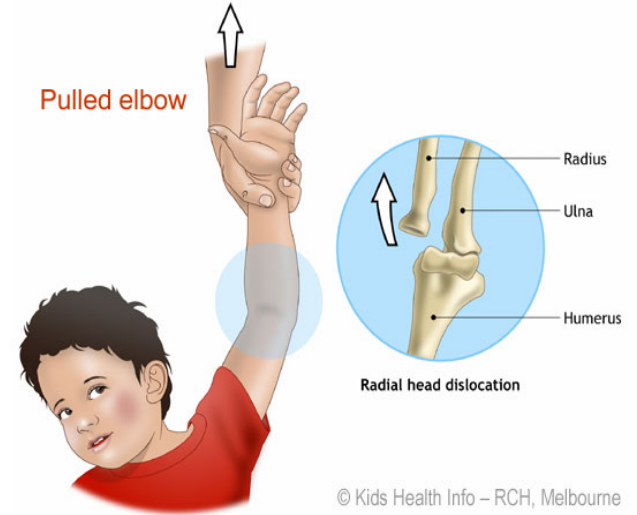
Pulled elbow'

In young children the elbow is sometimes injured by a sharp tug on the wrist. The child is in pain; the elbow is held in extension and he or she will not allow it to be moved.

There are no x-ray changes.

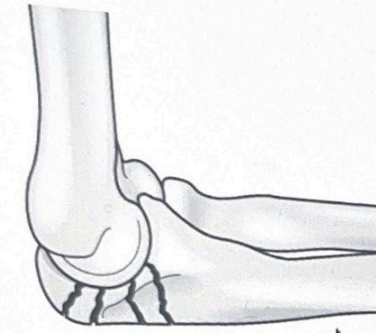
What has happened is that the radius has been pulled distally and the annular ligament has slipped up over the head of the radius.

A dramatic cure is achieved by forcefully supinating and then flexing the elbow; the ligament slips back with a snap

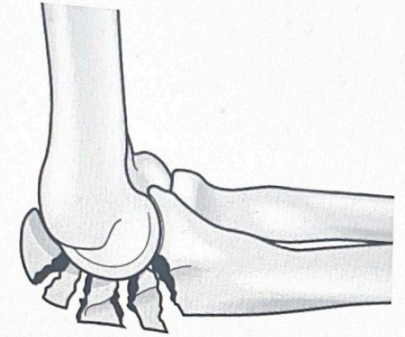


Fractures of the olecranon

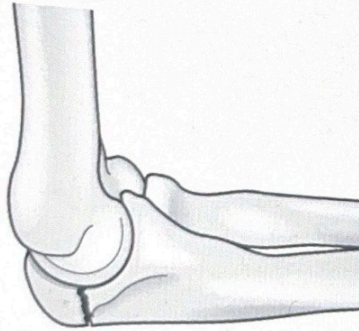
- Two broad types of injury are seen: (1) a comminuted fracture which is due to a direct blow or a fall on the elbow.
- (2) a transverse break, due to traction when the patient falls onto the hand while the triceps muscle is contracted. These two types can be further sub-classified into
- (a) displaced (b) undisplaced fractures.



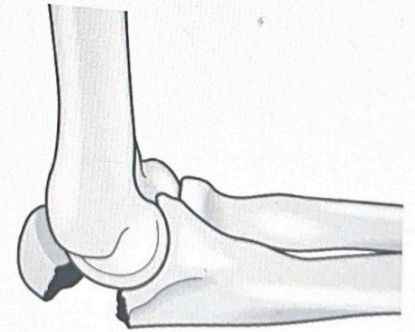
(a)



(b)



(c)



(d)

24.26 Fractured olecranon (a,b) Comminuted fractures, undisplaced and displaced. (c,d) Transverse fractures, undisplaced and displaced.

Clinical features

A graze or **bruise** over the elbow suggests a comminuted fracture: the triceps is intact and the elbow can be extended against gravity.

With a transverse fracture there may be a **palpable gap** and the patient is unable to extend the elbow against resistance.

X-rays

- A properly orientated lateral view is essential to show details of the fracture, as well as the associated joint damage. The position of the radial head should be checked: it may be dislocated.
- **Treatment**
- An undisplaced comminuted fracture with the triceps intact can occasionally be treated conservatively if the patient is old and osteoporotic; internal fixation is challenging and immobilizing the elbow will lead to stiffness.

An undisplaced transverse fracture that does not separate when the elbow is flexed can be treated by immobilizing the elbow in a cast in about 60 degrees of flexion for 1 week; then exercises are begun.

- **Displaced transverse fractures** Operative treatment is preferred here .
The fracture is reduced under vision and held by one of three methods:
 - (a) fixation with a long cancellous screw inserted from the tip of the olecranon.
 - (b) tension-band wiring – two stiff wires driven across the fracture, leaving their ends protruding proximally and distally to anchor a tight loop of wire which will pull the fragments together; or
 - (c) a contoured low-profile plate and screws. Early mobilization should be encouraged.

Fixation of Olecranon fracture



Fractures of the proximal end of the radius

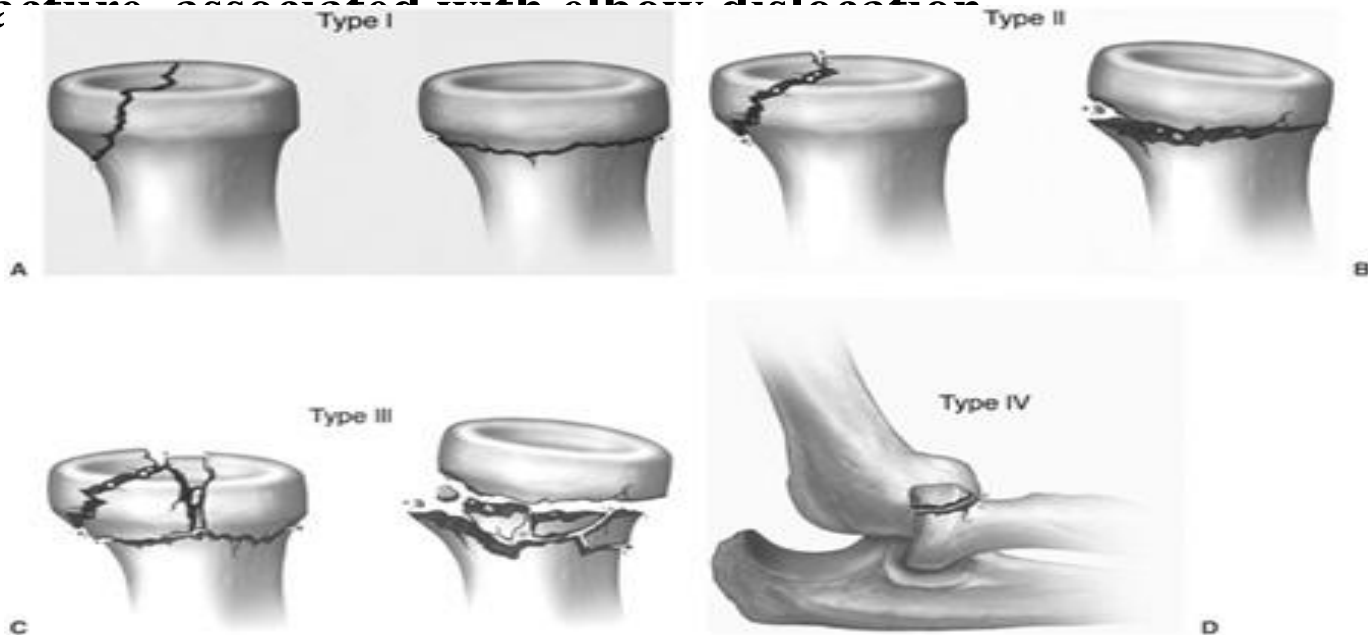
mason classification of radial head in adult:

type I undisplaced

type II displaced two parts from head

type III comminuted

type IV fracture associated with elbow dislocation



In children, it is more likely to fracture the neck of the radius (possibly because the head is largely cartilaginous).

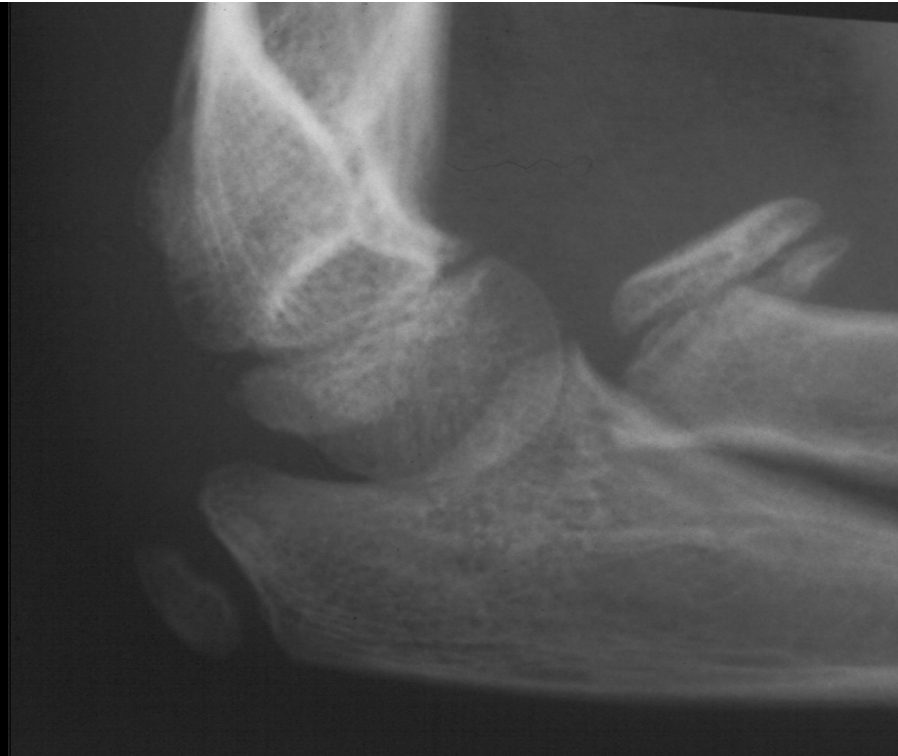
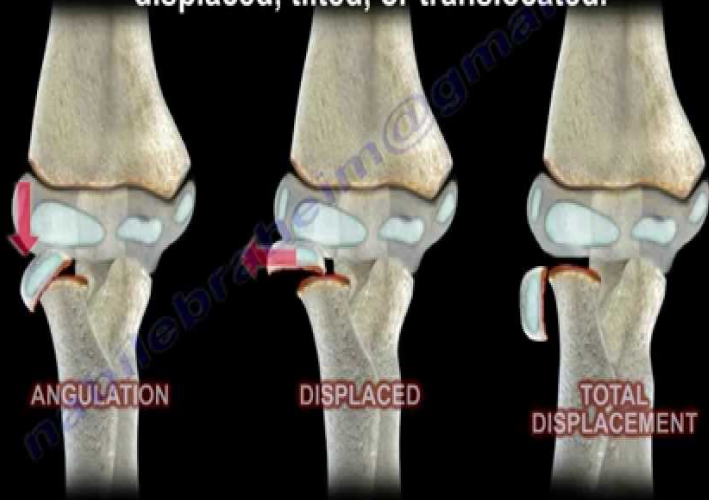
Clinical features

Following a fall on the outstretched arm, the patient complains of **pain** and **local tenderness** posterolaterally over the proximal end of the radius. A further clue is a marked increase in pain

- on pronation and supination of the forearm.

Radial Head & Neck Fractures in Children

The fracture can be non - displaced, displaced, tilted, or translocated.



X-rays

1-In children the fracture is through the neck; the proximal fragment may be tilted forwards and outwards.

2-In adult the fracture is a vertical split or marginal fracture through the radial head; less often there is a transverse neck fracture. Sometimes the head is crushed or comminuted.

Treatment

1-Children

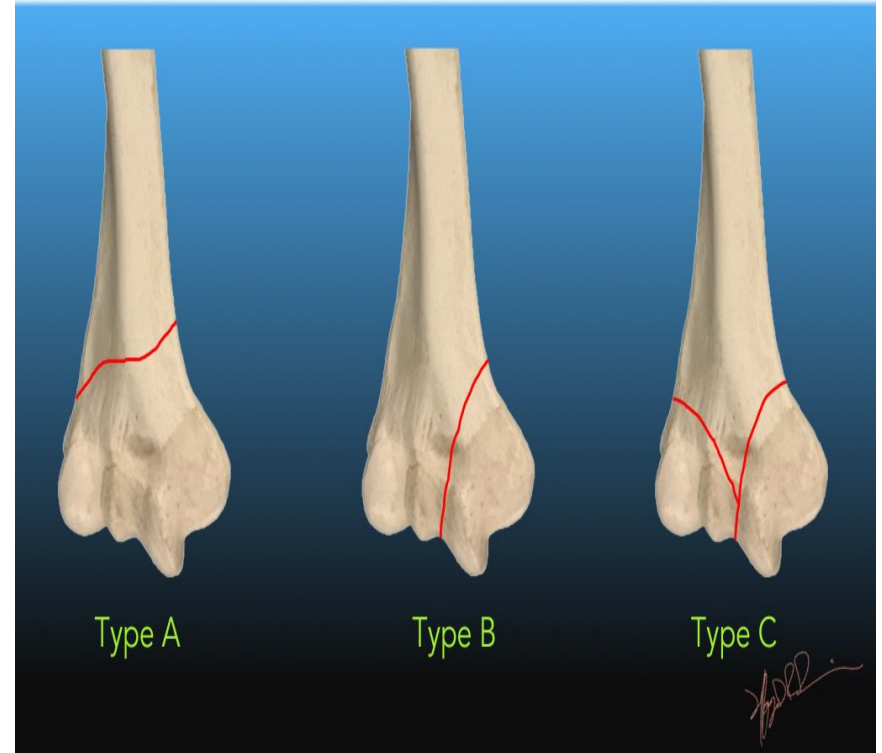
- **In fractures** of the radial neck, up to 30 degrees of radial head tilt and up to 3 mm of transverse displacement are acceptable. The arm is rested in a collar and cuff, and exercises are commenced after 1 week.
- **Displacement** of more than 30 degrees should be corrected with closed reduction or open reduction with splint 90 degree for 1-2 weeks.

2-Adults

- **Undisplaced fractures** of the radial head can be treated by supporting the elbow in a collar and cuff for 2 weeks; active flexion, extension and rotation are encouraged.
- **Displaced fractures** are treated by open reduction and fixation with small screws.
- **Comminuted fractures** have in the past been by excising the radial head with reconstruction and replacement by metal head prosthesis .

Fracture of distal humerus in adult

- **MULLER CLASSIFICATION:**
- TYPE A EXTRAARTICULAR FRACTURE
- TYPE B UNICONDYLAR FRACTURE
- TYPE C INTERCONDYLAR FRACTURE



Fracture of distal humerus in adult



X-rays

The fracture extends from the lower humerus into the elbow joint; it may be difficult to tell whether one or both condyles are involved, especially with an undisplaced condylar fracture. Sometimes the fracture extends into the metaphysis as a T-shaped or Y-shaped break, and the bone between the condyles may be comminuted.

Treatment

- **Undisplaced fractures**
- These can be treated by applying a posterior slab with the elbow flexed almost 90 degrees; gentle movements are commenced after 1 week
- **Displaced condylar fractures**
- Open reduction and internal fixation by locked plates and screws through a posterior approach is the treatment of choice.

Complications

- **Vascular injury**
- **Nerve injury**
- **Stiffness of elbow joint**
- **Heterotopic ossification**