

ORTHOPAEDICS



FOR PRIMARY
HEALTH CARE



UNIVERSITY OF CAPE TOWN'S **ORTHOPAEDIC DEPARTMENT**

Paediatric fractures: Upper limb 1

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Learning objectives

1. Common paediatric upper limb fractures; recognising patterns.
2. Fractures around the elbow
3. Non-operative management

Common upper limb fractures

- Children tend to sustain fractures in predictable locations.
- The most common mechanism of injury for all upper limb fractures is a fall on an outstretched hand (FOOSH).
- The most common fractures are clavicle > distal radius (+/- ulna) > supracondylar.
- The growth plate is a weak spot in children's bones and fractures often occur through and around them.
- It is important to know what normal growth plates and ossification centres look like.

Clavicle fractures

- These are the most common fractures in children.
- Exclude neurovascular injury as close proximity to brachial plexus and large vessels.
- Common birth injury.
- Conservative management indicated for all clavicle fractures in children. This involves a collar and cuff or arm sling.
- Exceptions: Open clavicle fractures, vascular injury (both exceedingly rare).

Humerus fractures: Proximal and diaphyseal

- Rule out axillary nerve (proximal humerus) or radial nerve (midshaft) injury.
- Spiral humerus fractures in small children are suspicious for NAI.

- These fractures can largely be treated with simple immobilisation in the form of a collar and cuff or U-slab.
- Three weeks of immobilisation is usually adequate.



A large degree of angulation can be accepted. Remodeling is robust and as a non-weight bearing limb a small amount of residual deformity is acceptable.

Fractures around the elbow

There are many ossification centres around the elbow appearing at different times as the child matures. These ossification centres may look like fractures to the inexperienced eye. The acronym CRITOE/CRMTOL is useful to remember the ossification centres and when they appear.



CRITOE/ CRMTOL

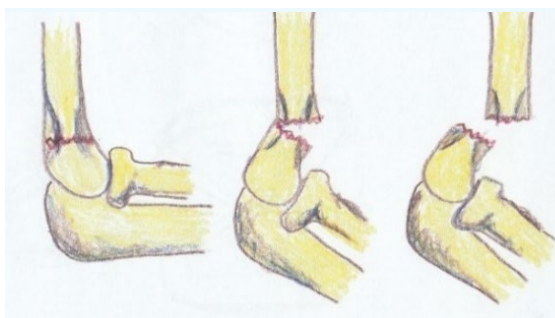
Appearance of ossification centres:

- C - Capitellum (1-2 yrs)
- R - Radial head (3-4 yrs)
- I/M - Internal/medial epicondyle (5-6 yrs)
- T - Trochlea (7-8 yrs)
- O - Olecranon (9-10 yrs)
- E/L - External/lateral epicondyle (11-12 yrs)

NB: Never use a circular cast for elbow fractures; always use a back slab.

Supracondylar fractures

- Weak spot above the humeral condyles at the level of the olecranon and coronoid fossae.
- Typically FOOSH.
- Clinical: Diffusely swollen elbow. Exclude vascular and neurological injury.
- Arteries: Brachial artery. Check radial pulse and hand perfusion.
- Nerves: Median > ulnar > radial.
- X-rays: AP and lateral elbow. Contralateral only in cases of uncertainty.



Gartland classification

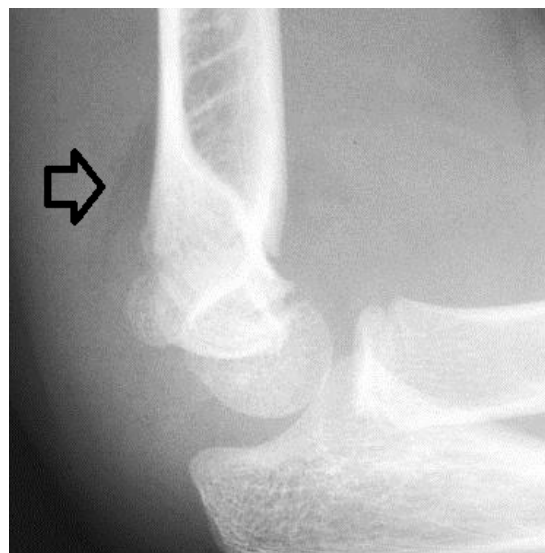
Grade I

Grade II

Grade III

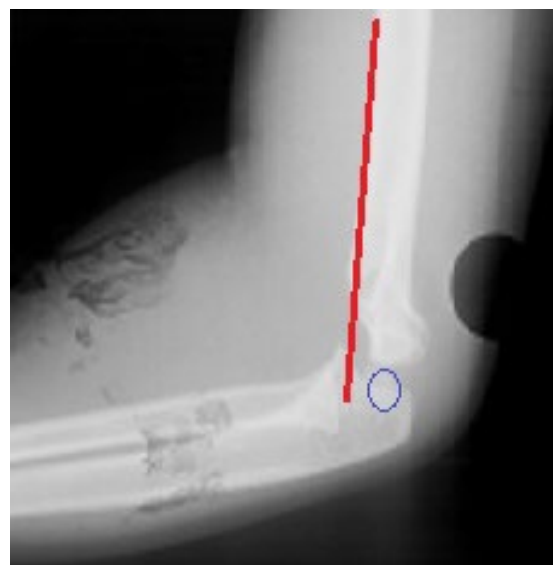
Grade I

- Undisplaced fracture.
- May only see fat pad sign. This is indicative of fluid (blood) in the joint.
- Treatment: Simple immobilisation in above elbow back slab for 3 weeks.



Grade II

- Partially displaced, posterior periosteal hinge intact.
- If the anterior humeral line crosses the capitellum, no reduction is required and management is as for Type 1.
- For displaced Type 2 fractures, closed reduction with or without wire fixation is indicated.

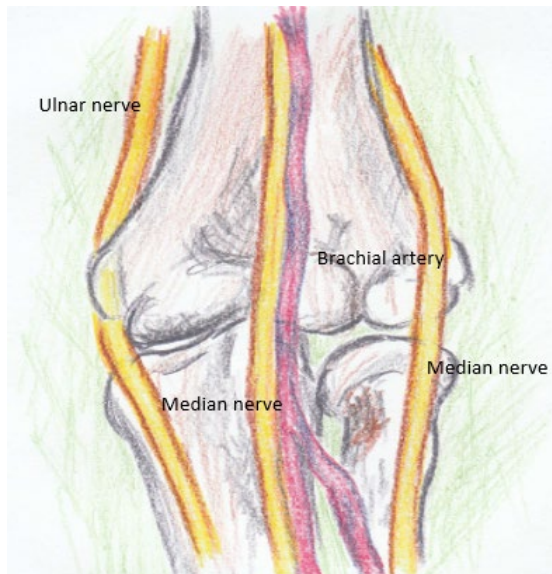


Lateral X-ray of Type 2 supracondylar fracture with the anterior humeral line not crossing the capitellum

Grade III

- Completely displaced fracture.
- High risk of neurovascular injury. Orthopaedic emergency!
- Needs urgent reduction and referral for operative management.

Elbow anatomy



Displaced Type 3 supracondylar fracture

Complications

- Compartment syndrome of the forearm. Also known as Volkmann's ischaemia.
- Neurological injury. Median nerve most commonly injured.
- Malunion leading to gunstock deformity.



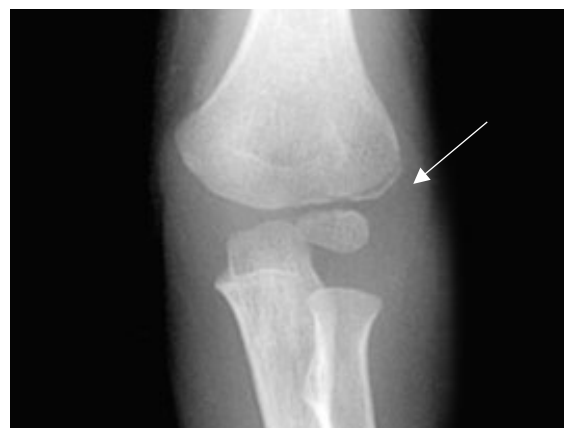
Gunstock deformity (cubitus varus)

Lateral condyle fractures

- These fractures are commonly missed so look out for them!
- All these fractures need to be immobilised and referred for possible surgical fixation.



Widely displaced lateral condyle fracture



Minimally displaced lateral condyle fracture

Dislocations and medial epicondyle fractures



Elbow dislocations should be reduced once identified.

Steps to reduction:

1. Neurovascular examination documented.
2. Sedation and analgesia.
3. 2 people involved.
4. Longitudinal traction for 3–5 minutes.
5. Elbow flexion with downward pressure on distal humerus.
6. Immobilisation in above elbow back slab.
7. Control X-rays.

The medial epicondyle is often avulsed at the time of dislocation.



Medial epicondyle avulsion following elbow dislocation

Following reduction it may be incarcerated in the joint.
Actively exclude this!

Medial epicondyle fractures may be treated conservatively regardless of displacement.



Medial epicondyle incarcerated in joint.

NB: All irreducible elbow dislocations or incarcerated epicondyles should be urgently referred.

Proximal radius and ulna fractures

Less common than distal humerus fractures. Look out for them!

Proximal radius fractures occur through the growth plate or the radial neck.



Fractures of the radial neck and head can be managed conservatively if $<30^\circ$ degrees angulation.

Proximal ulna or olecranon fractures are very rare in children.

As they are usually intra-articular, they should be referred following immobilisation in an above elbow back slab.

References

Evol K, Koval K, Zuckerman J. 2010. Handbook of Fractures, 4th Edition. Lippincott Williams & Williams. Philadelphia, USA.

Assessment

Regarding supracondylar fractures of the humerus in children, which statement is incorrect?

- A. Supracondylar fractures are usually caused by a FOOSH
- B. Neurovascular injury is common and the ulnar nerve is most frequently involved.
- C. Grade I fractures only needs simple immobilization
- D. There is a weak spot above the condyles at the level of the olecranon and coronoid fossae.
- E. Displaced grade 2 fractures are treated as Grade 3 fractures with reduction and percutaneous wiring.

(B) is incorrect, as the median nerve is most commonly injured.