PAEDIATRIC ACUTE CARE GUIDELINE	
Fractures – Elbow Region	
Scope (Staff):	All Emergency Department Clinicians
Scope (Area):	Emergency Department

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Fractures – Elbow Region

This guideline is specific for the assessment and management of elbow region fractures

Background

- Supracondylar fractures are the most common elbow fracture
- Paediatric elbow X-Rays can be difficult to interpret due to ossification centres - a systematic approach should identify most elbow fractures

General

- Elbow fractures account for about 15% of all paediatric fractures
- Supracondylar fractures are the most common paediatric elbow fractures with a peak incidence at 5 - 8 years of age
- Radial neck fractures are fairly common and occur in children from 4 years to puberty
- Other elbow fractures include condyle and epicondyle (usually medial) fractures
- Elbow injuries have the potential for adverse outcomes

Assessment

- Displaced supracondylar fractures may be associated with significant vascular (brachial artery) injury or nerve damage (ulna, median and radial nerves)
- Thorough neurovascular assessment and timely management is required if any deficit
- Use a systematic approach when interpreting elbow X-Rays

History

- The most common mechanism of injury for supracondylar fractures is a fall onto an outstretched hand (FOOSH) with hyperextension of the elbow
- Direct blow or fall onto the elbow may also cause elbow fractures
- Non-accidental injury is an unlikely mechanism unless the child is non-ambulatory
- If the mechanism is a fall from a height the elbow fracture is more likely to have a serious neurovascular injury

Examination

- There is usually swelling, tenderness and a limited range of motion of the elbow
- Obvious deformity and antecubital bruising will be seen in displaced supracondylar fractures
- Examine for neurovascular compromise - palpate the distal pulses, assess distal perfusion and assess radial, median and ulnar nerve function
- Be wary of signs and symptoms of compartment syndrome if there is marked swelling of the elbow

Investigations

Radiology:

- Radiological Requests - Limb X-Rays - true lateral and antero-posterior (AP) views required
- A visible effusion (e.g. positive fat pad sign) on X-Ray indicates an injury around the elbow, and may be the only radiological evidence of a fracture. See **Fat Pad Signs** below.

Elbow X-Rays in children can be difficult to interpret. A systematic approach should detect most elbow fractures.

1. Ensure true lateral view of humerus

[caption id="attachment_2968" align="aligncenter" width="500"] The"Hourglass Sign" indicates a true lateral view[/caption]

2. Assess the radiological lines of normal anatomy on lateral elbow X-Ray

A: Normal 45 degrees anterior angulation of lateral condyle relative to humerus shaft
B: Anterior humeral line should pass through the middle of the capitellum
C: Coronoid line: a line extended proximally along the anterior border of the coronoid process should just touch the anterior portion of the lateral condyle

D: Radio-capitellar line: a line drawn through the long axis of the radius should bisect the capitellum, irrespective of the degree of flexion or extension of the elbow (the X-Ray must be a true lateral view for this to apply). If the line does not pass through the capitellum, look for an associated ulnar fracture (Monteggia fracture - see Forearm Fractures)

3. Fat Pad Signs

A: Normal relationship of the two elbow fat pads. Normally, the distal fat pad may be **just** visible as a dark triangle anterior to the distal humerus. Any visible posterior fat pad is always abnormal.
B: Intra-articular effusion displacing both fat pads (visible as dark radiolucent areas anterior and posterior to the distal humerus)
C: Intra-articular effusion displacing only the anterior fat pad (dark radiolucent area noticeably anterior to expected position)

[caption id="attachment_2973" align="alignnone" width="300"] A posterior fat pad is always abnormal[/caption]

4. Look for any cortical disruption

- Follow the anterior and posterior humerus looking for any cortical disruption

5. Look at the contour of the radial head

- Any subtle angulation may indicate a fracture of the radial head

6. Look for obvious fracture lines on the AP view

[caption id="attachment_2975" align="alignnone" width="213"] Supracondylar fracture evident on the AP view[/caption]

7. Assess ossification centres

[caption id="attachment_3248" align="aligncenter" width="567"] Elbow Ossification Centres[/caption]

- Ensure all ossification centres present are appropriate for age
- A lateral epicondyle fracture is commonly missed in younger children
- Ossification centres appear in the following order (CRITOE):
    - **C**apitellum (1 year)
    - **R**adial head (3y)
    - **I**nternal (Medial) epicondyle (5y)
    - **T**rochlea (7y)
    - **O**lecranon (9y)

- **E**xternal (lateral) epicondyle (11y)

Management

- Non and minimally displaced supracondylar fractures are managed in a collar and cuff with Orthopaedic Fracture clinic follow up.
- Neurovascular compromise requires urgent Orthopaedic Team referral

Initial management

- Analgesia
- Examination for neurovascular injury (if deficits evident manage immediately)
- Ice and elevation of effected limb
- Immobilise suspected fracture before the X-Ray (e.g. splint, board)
- Consider tetanus and antibiotics for compound fractures
- Complete an Injury Proforma form for children < 2 years (A3 folded sheet located in the Doctor's office)

Further management

Supracondylar Fracture - Distal Humerus

- Uncomplicated supracondylar fractures which are undisplaced or have minimal (< 20 degrees) angulation are managed in a collar & cuff at 90 degrees with Orthopaedic Fracture clinic follow up in 7-10 days.

Undisplaced supracondylar fracture

Supracondylar Fractures Requiring Urgent Orthopaedic Referral

- Any supracondylar fracture with neurovascular compromise requires **urgent** Orthopaedic Team referral
- Other supracondylar fractures for Orthopaedic Team referral include compound fractures, significant (> 20 degrees) angulation, any displacement and signs of compartment syndrome

Supracondylar fracture with posterior angulation	Displaced supracondylar fracture - ensure adequate neurovascular status

Epicondyle Fractures - Distal Humerus

- Medial epicondyle fractures are often missed because they are easily mistaken as an ossification centre. Assess the ulnar nerve function in any medial epicondyle fracture.
- Undisplaced medial epicondyle fractures are managed in an above elbow plaster backslab at 90 degrees and followed up in Orthopaedic Fracture clinic in 7-10 days.
- Displaced medial epicondyle fractures should be discussed with the Orthopaedic Team for further management

Displaced medial epicondyle

Lateral Condyle Fractures Distal Humerus

- All lateral condyle fractures should be discussed urgently with the Orthopaedic Team for further management. They are generally unstable and prone to displacement and often require operative fixation.

Lateral condyle fracture

Olecranon Process Proximal Ulna

- Olecranon fractures are often seen in combination with other elbow fractures (lateral condyle, supracondylar, radial neck or radial head dislocation)
- Isolated undisplaced olecranon fractures are managed in an above elbow plaster backslab with Orthopaedic Fracture clinic follow up.
- Displaced fractures require urgent Orthopaedic Team referral for further management

Olecranon fracture with associated radial head dislocation - Monteggia fracture

Fractured Neck of Radius - Proximal Radius

- Fractures of the radial head and neck with < 30 degrees angulation and minimal displacement are managed in an above albow plaster backslab in 90 degrees flexion with follow up in Orthopaedic Fracture clinic in 1 week.
- Fractures with significant angulation (> 30 degrees) or displacement should be referred

urgently to the Orthopaedic Team for reduction.

Minimally displaced radial neck fracture

Elbow Fractures Requiring Urgent Orthopaedic Referral

- Neurovascular compromise
- Compound fractures
- Significant angulation or displacement
- Lateral condylar fractures
- Intra-articular fractures of the distal humerus (involve capitellum or condyles)

Referrals and follow-up

- All elbow fractures should be followed up in the Orthopaedic Fracture clinic in 1 week. See Outpatient Clinics.
- All children who have a plaster placed should have a plaster check at 24 hours. They can return to the Emergency Department to be assessed by the triage nurse.

Health information (for carers)

- Pain Management Health Fact Sheet
- Collar & cuff care - must wear at all times (place underneath the child's clothing)
- Patients with Plaster Health Fact Sheet

Tags

capitellum, collar, condyle, cuff, dislocation, elbow, epicondyle, fracture, fractures, monteggia, olecranon, radial, radiocapitellar, supracondylar, trochlea

References
PMH ED Guideline: Fractures - Elbow Region: Last updated December 2014

This document can be made available in alternative formats on request for a person with a disability.

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