Common upper limb injuries in childhood

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Abstract
Orthopaedic injuries of the upper limb in children are common. The majority may be managed by simple non-operative means but others require surgical intervention. Common injuries in children will be discussed along with the principles of their management and the possible complications.

Keywords Children; fracture; orthopaedic; paediatric; upper limb

Introduction

Fractures of the upper limb account for more than half of the bony injuries sustained in children. They are uncommon below the age of 18 months as infants are less likely to fall on their outstretched arms. The frequency of injury rises with increasing mobility.

Children's bones are more malleable than those of adults. The periosteum is thicker and the physes are open. They may therefore suffer fracture patterns not seen in adults such as buckle (torus) or greenstick fractures, plastic deformation and injuries affecting the physes (Figure 1).

The majority of fractures affecting a child's upper limb will heal rapidly and with minimal intervention. The modelling capabilities of growing bones can compensate for some degree of malunion so perfect anatomical reduction may not always be necessary.

A proportion of these injuries will, however, require stabilisation. Complications are few but may be significant and will be discussed in relation to specific fractures.

No discussion of children's fractures is complete without reference to non-accidental injury. Factors such as an inconsistent history, multiple injuries, and delayed presentation should raise the suspicions of the examining practitioner, and initiate appropriate referral for further investigation.

Clinical assessment

Injured children are usually reluctant to be examined. Appropriate analgesia will make the child more comfortable and more prone to comply with examination. A 'look, feel, move' sequence can be followed (Table 1) and the diagnosis is confirmed with radiographs.

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Paediatric fracture patterns

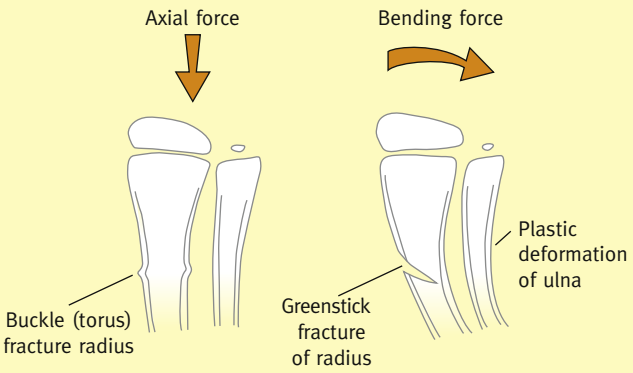

Figure 1

It is essential at this point to identify limb-threatening injuries, including vascular injury, compartment syndrome and open fractures. An assessment of the distal nerve function can be difficult in young children, as they will not understand complicated instructions. It is easier to assess their motor function by asking them to copy simple movements and to assess their sensation by touching areas reliably supplied by each nerve (Table 2 and Figure 2).

Fractures of the clavicle

Aetiology

Most are caused by a fall onto the outstretched arm or onto the shoulder. Midshaft clavicle fractures account for 10–15% of children's upper limb fractures.

Examination sequence

Look	Discolouration, deformity, swelling, wounds
Feel	Warmth, pulses, capillary refill, tenderness, crepitation
Move	Active – if the child is cooperative Passive – except when there is an obvious extremity fracture or dislocation, as further soft tissue injury may be inflicted unnecessarily

Table 1

Simple examination of the nerves of the upper limb

Nerve	Motor	Sensory
Median	'ROCK'	Pulp of index finger
Radial	'PAPER'	First dorsal web space
Ulnar	'SCISSORS'	Pulp of little finger
Anterior interosseous	'OK'	Anterior interosseous nerve has no sensory function

Table 2

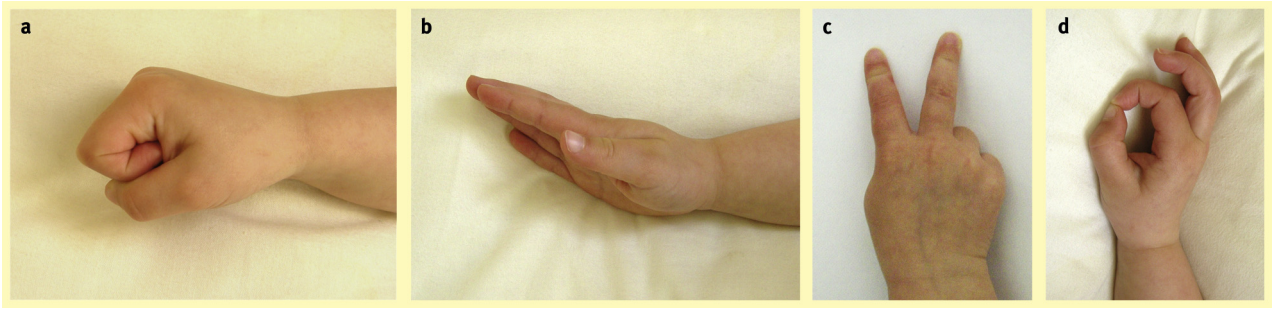

Figure 2 Simple motor testing of the nerves of the upper limb using 'rock **(a)**, paper **(b)**, scissors **(c)**, OK **(d)**'. 'ROCK' tests the median nerve. 'PAPER' tests the radial nerve. 'SCISSORS' tests the ulnar nerve. 'OK' tests the anterior interosseous nerve. (Images courtesy of A Marsh and J Huntley.)

Diagnosis

A swelling may be visible over the clavicle and the area of the fracture will be tender to palpation. Most of these fractures in children are of the greenstick type.

Treatment

The vast majority of clavicle shaft fractures will heal with no intervention. A prominent bump is usually seen but will model over the next year. A broad arm sling is provided for comfort and may be discarded after 1–2 weeks.

Fractures through the lateral physis are uncommon. Most are treated non-operatively.

Fractures through the medial physis are rare. Posterior displacement may compromise the airway and require surgical reduction. Diagnosis on radiographs is difficult. A CT may be more useful.

Fractures of the proximal humerus (Figure 3)

Aetiology

These injuries are more likely than dislocation of the gleno-humeral joint in children. Even so they account for only 1% of upper limb fractures in this age group.

Diagnosis

There may be tenderness to palpation. Sensation in the chevron area should be assessed to exclude injury to the axillary nerve.

Treatment

Most may be managed non-operatively with a collar and cuff for comfort for the first week or two, then gentle mobilization as tolerated.

If the diaphyseal fragment is prominent, having buttonholed through the deltoid for example, the fracture should be reduced by closed or open means. If unstable it may be stabilized with K wires or elastic nails.

Fractures of the humeral shaft

Aetiology

These account for 1–3% of children's fractures and may be caused by twisting or a direct blow.

Diagnosis

Clinical examination may identify tenderness, deformity or crepitus. The radial nerve should be assessed as it is easily injured where it passes through the spiral groove.

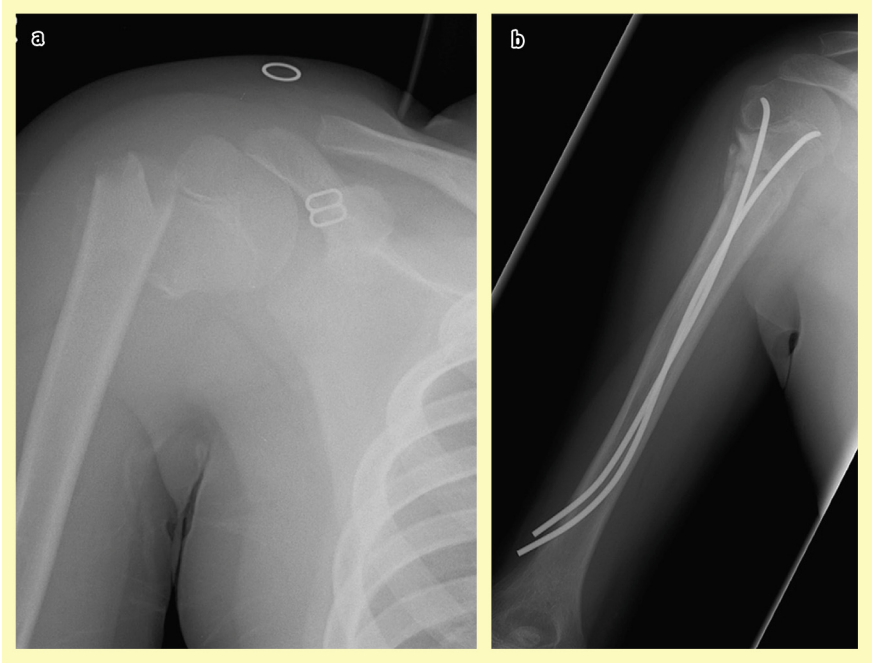

Figure 3 (**a**) Pre- and (**b**) postoperative radiographs of a displaced humeral fracture, treated with intramedullary nailing.