ORTHOPAEDICS



FOR PRIMARY HEALTH CARE



UNIVERSITY OF CAPE TOWN'S ORTHOPAEDIC DEPARTMENT

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Forearm injuries in children

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Learning Objectives

By the end of this chapter, students will be able to:

- 1. Identify and describe common forearm fractures in children
- 2. Recognise and differentitae a Monteggia and Galleazi fracture
- 3. Conservatively manage forearm fractures
- 4. Identify acceptable deformity in paediatric forearm fractures

Introduction

Forearm fractures in children are common. They are typically caused by a fall on an outstretched hand (FOOSH) with a rotational component. One bone fracture is usually a result of direct trauma.

Clinical evaluation

The patient usually presents with a clinical deformity, pain and swelling. On examination one should always exclude neurological and vascular compromise. An AP and lateral X-ray of the wrist and elbow should be ordered. One should exclude a Monteggia and Galleazzi fracture. When describing the fracture, consider the following:

- 1. Open vs closed fracture
- Position: metaphyseal vs diaphyseal; proximal vs distal
- 3. Complete vs incomplete
- 4. Location: the bone involved
- Displacement: length, angulation, rotation (apex volar, dorsal, radial or ulnar), apposition

Monteggia and Galeazzi fractures

The radius and ulna form a 'ring' of sorts. Therefore shortening and marked angulation of the one bone has to be accompanied by fracture of the other bone or dislocation on either end of the unbroken bone. **GRUM** (Galeazzi: **R**adius and Ulna: Monteggia) is a useful mnemonic to remembering which bone is involved with each fracture.

Galeazzi fractures

A Galeazzi fracture is an isolated radial fracture with distal ulna dislocation. This is rare in children as distal ulna physeal fractures are more likely.



Figure 1.8.3.1A: Displaced distal radius fracture with volar dislocation of the distal ulna

Monteggia fractures

A Monteggia fracture is a displaced ulna fracture, usually proximal, accompanied by dislocation of the radial head. To identify a radial head dislocation, check that the capitellum and radial head are aligned on AP and lateral X-rays.



Figure 1.8.3.1B: Angulated and shortened ulna fracture with intact radius C: Radial head dislocation: the radial head (green) is not aligned with the capitellum (blue).

Management

The majority of paediatric forearm fractures can be managed conservatively in plaster of paris, with or without closed reduction. All fractures proximal to the distal radial physis should be immobilised in an above elbow cast to control elbow movement. Due to remodeling, certain degrees of angulation, shortening and rotation can be accepted. The table below describes the acceptable degrees of deformity in forearm fractures.

	<9 years	≥9 years
Distal forearm	25°	15°-20°
Mid- and proximal shaft	25°	10°
Rotation	45°	30°
Shortening	1cm	1cm

Reduction of displaced or angulated fractures

- 1. Check and document the neurovascular status of the limb
- 2. The patient needs to be sedated and relaxed
- The deforming force needs to be reversed. Most commonly this requires traction and flexion (volar angulation).
- 3-point moulding is employed to ensure maintenance of the reduction once achieved.
- 5. Interosseus moulding will help restore the radial bow.
- 6. X-rays are performed to confirm adequacy of reduction
- 7. The patient is observed for a few hours to exclude a compartment syndrome.
- It is important to educate parents regarding elevation, swelling and warning signs of a compartment syndrome.
- 9. Arrange follow-up after one week to check the position of the fracture.

What to do if there are features of a compartment syndrome

- 1. Elevate the limb
- 2. Encourage finger movement
- 3. Split/ bivalve the cast and the padding.
- Refer urgently if no alleviation of symptoms.

Indications for referral or surgery

- Unacceptable deformity following attempted closed reduction
- Recurrence of the deformity
- Open fractures
- Pathological fractures
- Neurological or vascular compromise
- Galeazzi and Monteggia fractures
- Older children (≥ 13) with limited remodeling potential

References

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- Roth KC, Denk K, Colaris JW et al. Think twice before re-manipulating distal metaphyseal fractures in children. Arch Orthop Trauma Surg 2014; 134:1699-1707

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About the book

Informed by experts: Most patients with orthopaedic pathology in low to middle-income countries are treated by non-specialists. This book was based on a modified Delphi consensus study with experts from Africa, Europe, and North America to provide guidance to these health care workers. Knowledge topics, skills, and cases concerning orthopaedic trauma and infection were prioritized. Acute primary care for fractures and dislocations ranked high. Furthermore, the diagnosis and the treatment of conditions not requiring specialist referral were prioritized.

The LION: The Learning Innovation via orthopaedic Network (LION) aims to improve learning and teaching in orthopaedics in Southern Africa and around the world. These authors have contributed the individual chapters and are mostly orthopaedic surgeons and trainees in Southern Africa who have experience with local orthopaedic pathology and treatment modalities but also in medical education of undergraduate students and primary care physicians. To centre this book around our students, iterative rounds of revising and updating the individual chapters are ongoing, to eliminate expert blind spots and create transformation of knowledge. Reference: Held et al. Topics, Skills, and Cases for an Undergraduate Musculoskeletal Curriculum in Southern Africa: A Consensus from Local and International Experts. JBJS. 2020 Feb 5;102(3):e10.

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