ORTHOPAEDICS

FOR PRIMARY HEALTH CARE

LION
LEARNING INNOVATION VIA ORTHOPAEDIC NETWORKS

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Fractures of the forearm and wrist

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Learning objectives

1. Identify and describe forearm fractures in children.
2. Manage Monteggia and Galleazi fractures.
3. Understand conservative management of forearm fractures.
4. Gauge acceptable deformity in paediatric forearm fractures.

Forearm fractures in children

- Very common fracture.
- Caused by a fall on an outstretched hand (FOOSH) with a rotational component. Single bone fractures are usually a result of direct trauma.
- Present with clinical deformity, pain and swelling.
- Exclude neurological and vascular compromise.
- X-rays: AP and lateral including wrist and elbow.
- **Must exclude Monteggia and Galeazzi fractures.**

Fracture description:

1. Complete vs incomplete (greenstick) vs plastic deformity.
2. Open vs closed.
3. Distal vs diaphyseal vs proximal
4. Shortening
5. Angulation (apex volar/dorsal/radial/ulnar)
6. Translation
7. Rotation

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.

Useful mnemonic: GRUM - Galeazzi Radius Ulna Monteggia

Monteggia fractures

This is a displaced ulna fracture, usually proximal, with a radial head dislocation. To identify a radial head dislocation, check that the capitellum and radial head are aligned on AP and lateral X-rays.

Angulated and shortened ulna fracture with intact radius and radial head dislocation

The radial head is not aligned with the capitellum

Galeazzi fractures

Isolated radial fracture with distal ulna dislocation.

Extremely rare in children as distal ulna physeal fracture more likely.

Displaced distal radius fracture with volar dislocation of the distal ulna

The treatment for Galeazzi and Monteggia fractures usually involves anatomical reduction and fixation of the fractured bone. This leads to spontaneous reduction of the dislocated joint. These fractures should always be referred urgently.

Conservative management of paediatric forearm fractures

The majority of paediatric forearm fractures can be managed conservatively in plaster, 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.

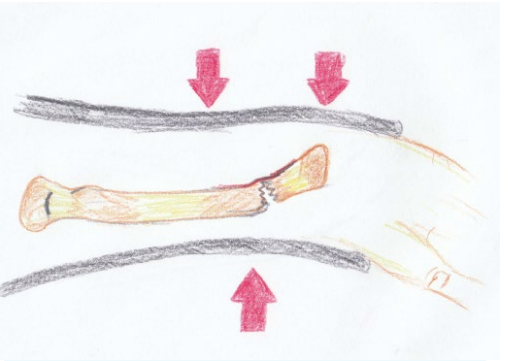
Due to remodeling, certain degrees of angulation, shortening and rotation can be accepted.

Acceptable degrees of deformity in paediatric forearm fractures

	< 9 years	≥ 9 years
Distal forearm	25°	15-20°
Mid and proximal shaft	15°	10°
Rotation	0°	0°
Shortening	1cm	1cm

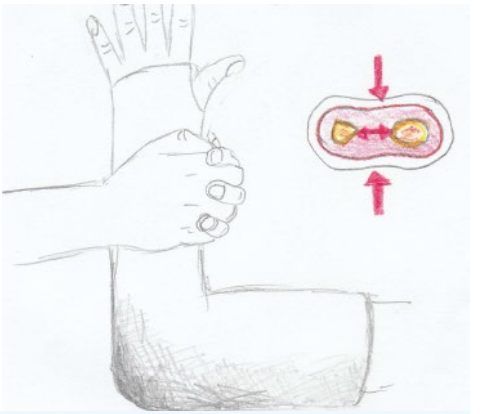
Reduction of displaced / angulated fractures

1. Check the neurovascular status of the limb and document it.
2. The patient needs to be sedated and relaxed.
3. The deforming force needs to be reversed. Most commonly this requires traction and flexion (volar angulation).
4. Three-point moulding is employed to ensure maintenance of the reduction once achieved.



Three-point moulding for apex volar fracture

5. Interosseus moulding will help restore the radial bow.



Interosseous moulding

6. X-rays are performed to confirm adequacy of reduction
7. Patient is observed for a few hours to exclude features of compartment syndrome.
8. NB: Educate parents regarding elevation, swelling and warning signs of compartment syndrome.
9. Arrange follow-up after one week to check the position of the fracture.

What to do if excessive swelling/ features of compartment syndrome:

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

Indications for referral and surgery

1. Unacceptable deformity following attempted closed reduction.
2. Recurrence of deformity.
3. Open fractures.
4. Pathological fractures.
5. Neurological or vascular compromise.
6. Galeazzi and Monteggia fractures.
7. Older children (≥ 13) with limited remodeling potential.

References

Pace JL. Pediatric and Adolescent Forearm Fractures: Current Controversies and Treatment Recommendations. J Am Acad Orthop Surg 2016;24:780–788

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

Assessment

When a child presents with a forearm fracture, it is important to (choose the most correct answer):

A. Interview the family through to exclude non-accidental injury.

B. Take X-rays of the joint above and below to exclude Monteggia or Galleazi fractures.

C. Take X-rays of the contralateral limb to compare.

D. Not apply a circumferential cast due to the risk of compartment syndrome.

E. Refer all patients for orthopaedic assessment, even if the fracture is undisplaced.

The correct answer is (B) - take X-rays of the joint above and below to exclude Monteggia or Galleazi fractures.

A. Forearm fractures are usually not suggestive of NAI.

C. Only take contralateral X-rays in instances of doubt.

D. Circumferential casts are indicated for most fractures, patients should be warned about the risk and signs of compartment syndrome.

E. Undisplaced and buckle fractures do not require orthopaedic referral.

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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 prioritised. Acute primary care for fractures and dislocations ranked high.

Furthermore, the diagnosis and the treatment of conditions not requiring specialist referral were prioritised.

* 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.

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.

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The information in this book is meant to supplement, not replace, Orthopaedic primary care training. The authors, editor and publisher advise readers to take full responsibility for their safety and know their limits. Before practicing the skills described in this book, be sure that your equipment is well maintained, and do not take risks beyond your level of experience, aptitude, training, and comfort level.

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ACKNOWLEDGEMENTS

This work was carried out with the aid of a grant from the International Development Research Centre, Ottawa, Canada. Thanks to Johan Fagan, Michelle Willmers and Glenda Cox for their mentorship and support.