

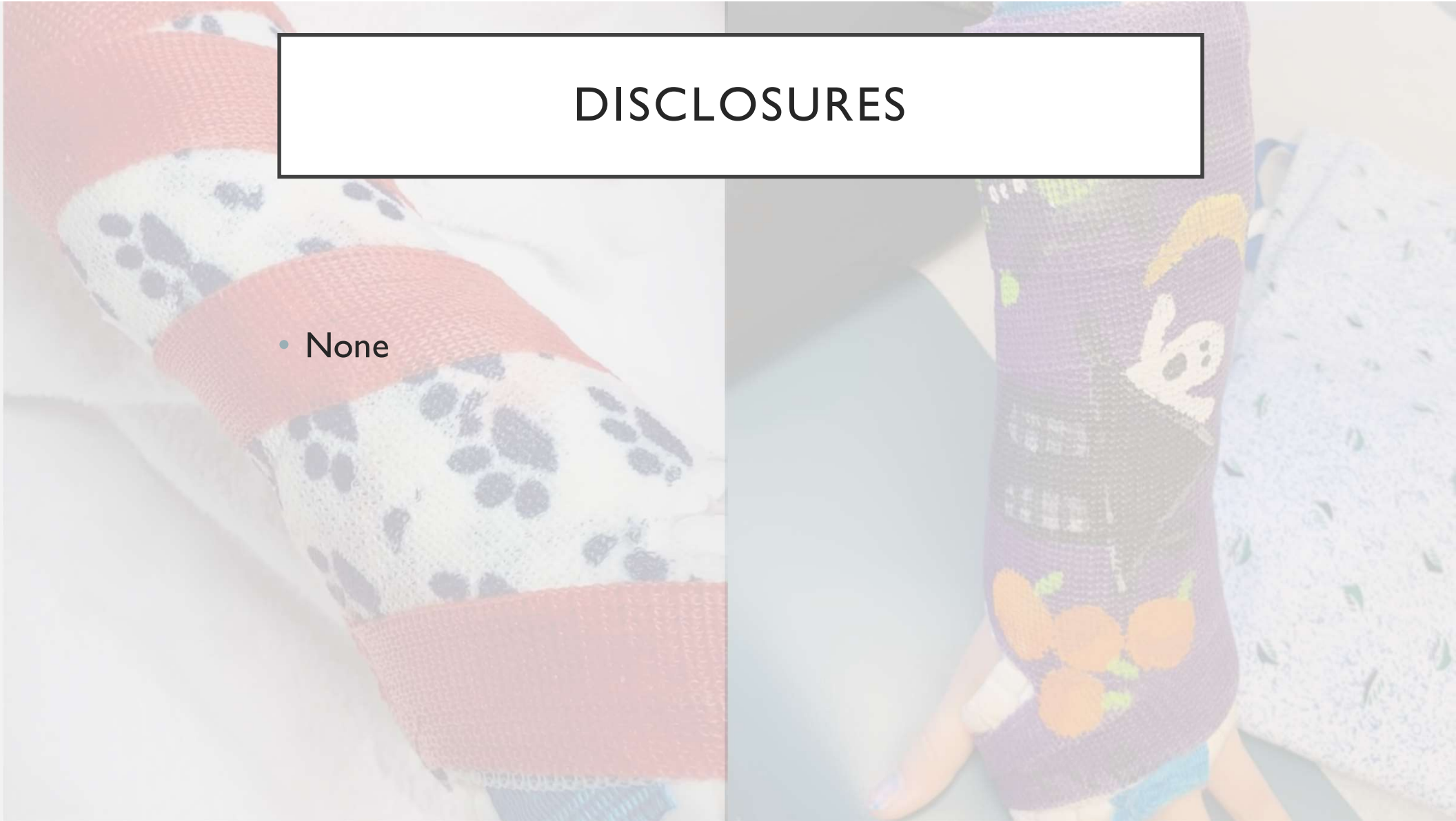


Identification and Management of Upper Extremity Pediatric Fractures

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DISCLOSURES

- None



OBJECTIVES

1. Review long bone anatomy and variations of fracture displacement
2. Identify the most common upper extremity pediatric fractures
3. Distinguish between common pediatric fracture patterns and develop an appropriate initial closed treatment plan

PEDIATRIC UPPER EXTREMITY ANATOMY



AP Wrist XR



AP Elbow XR



Lateral Elbow XR

LONG BONE ANATOMY

- Epiphysis
- Physis
- Metaphysis
- Diaphysis

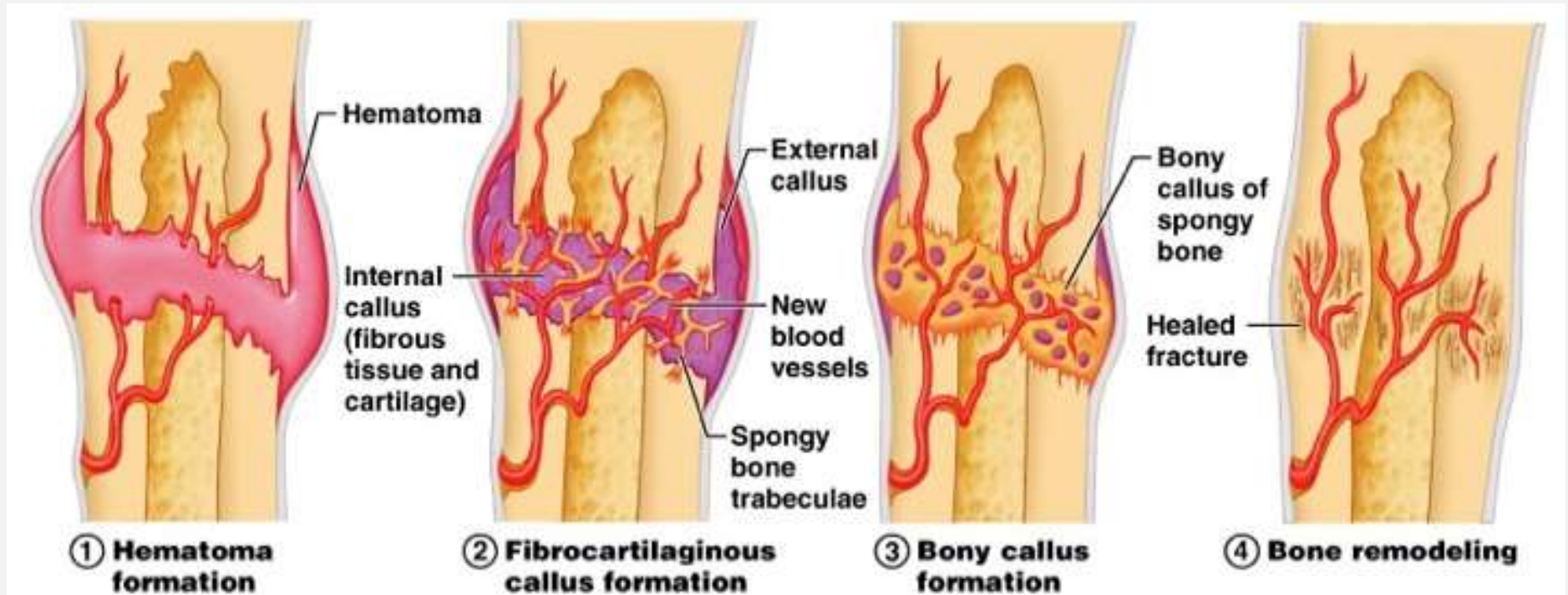


FRACTURE DISPLACEMENT

- Displaced = Abnormal positioning
 - Shortened
 - Translated
 - Angulated
 - Rotated



PHASES OF FRACTURE HEALING



Inflammatory Phase

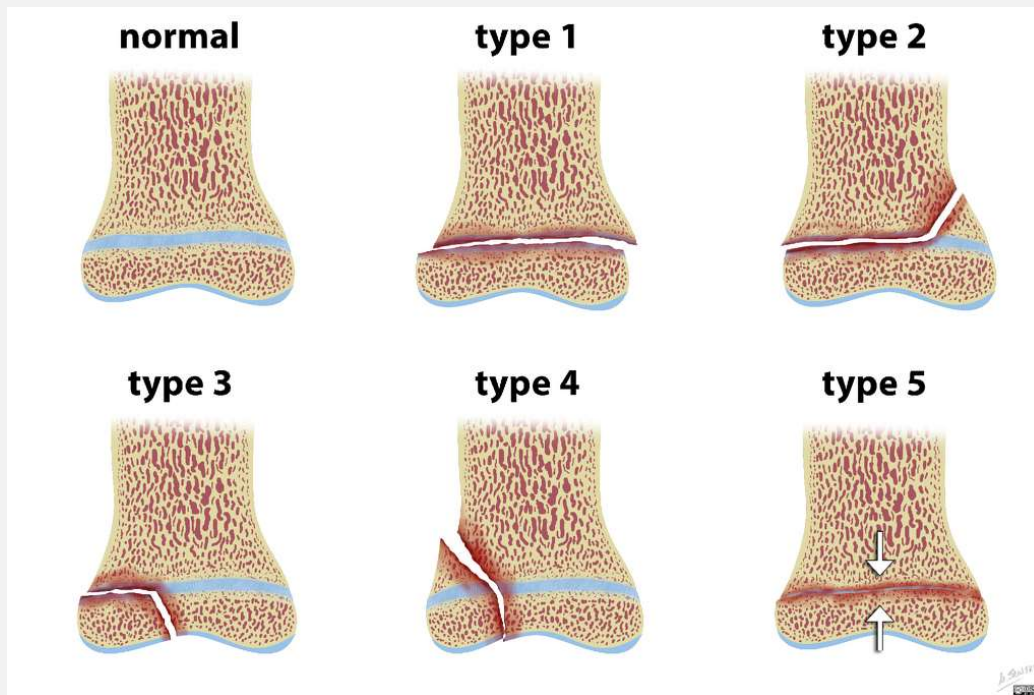
Reparative Phase

Remodeling Phase

COMMON UPPER EXTREMITY PEDIATRIC FRACTURES

- Physeal Fractures (Salter Harris I-V)
- Distal Radius and/or Ulna Fractures
 - Buckle
 - Greenstick
 - Bowing/plastic deformity
 - Complete
- Supracondylar Humerus Fractures

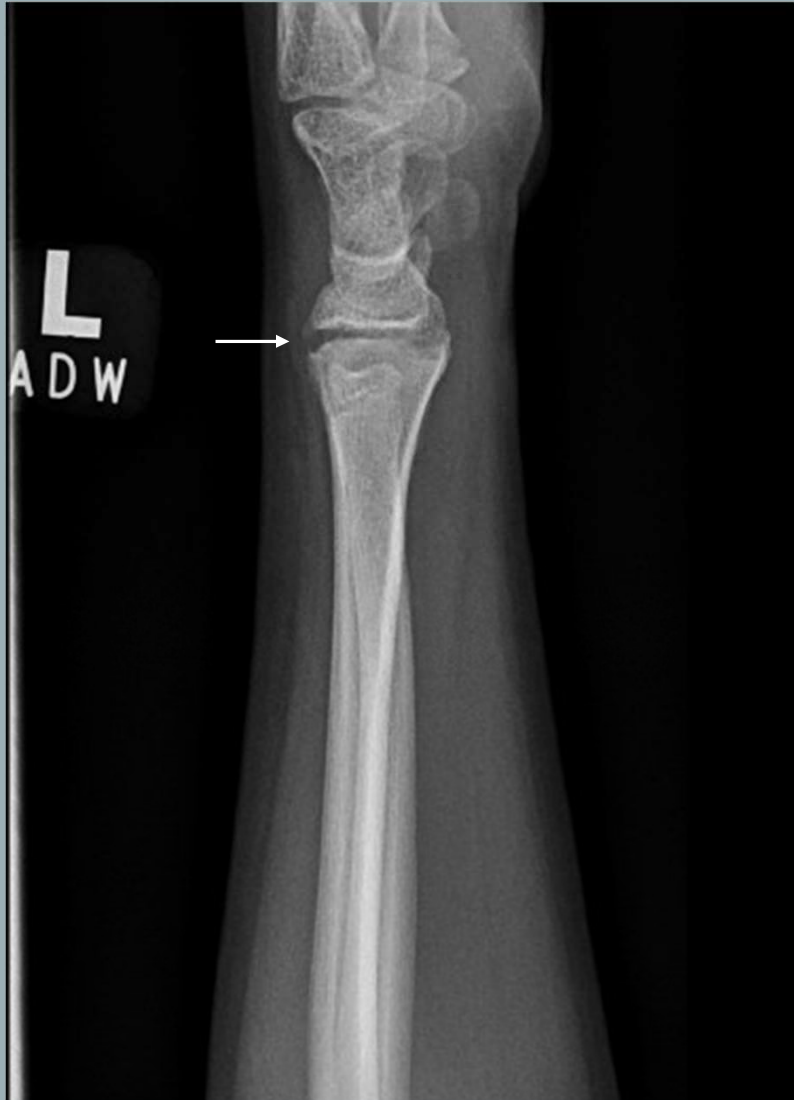
PHYSEAL FRACTURES



- Salter Harris Classification (I-V)
 - I – Separation
 - II – Above and extending into the physis
 - III – Below and extending into the physis
 - IV – Through the physis
 - V – Physis is rammed/ruined/erased

PHYSEAL FRACTURES

- The physis is made of cartilage = weakened portion of the bone
- Fractures in this location heal very quickly and require a short course of immobilization
 - Typically, 3-4 weeks followed by wrist brace for another 1-2 weeks



SALTER HARRIS TYPE I



SALTER HARRIS TYPE II



SALTER HARRIS TYPE III



SALTER HARRIS TYPE IV



SALTER HARRIS TYPE V

RADIUS AND ULNA FRACTURES

- Occur in the metaphysis and/or diaphysis
 - Distal versus proximal
- Classified as:
 - Buckle – only one cortex is damaged, no displacement
 - Greenstick – one cortex breaks and the other is bent
 - Bowing/plastic deformity – bone is bent but does not “break”; no fracture line
 - Complete – fracture line visible all the way through the bone



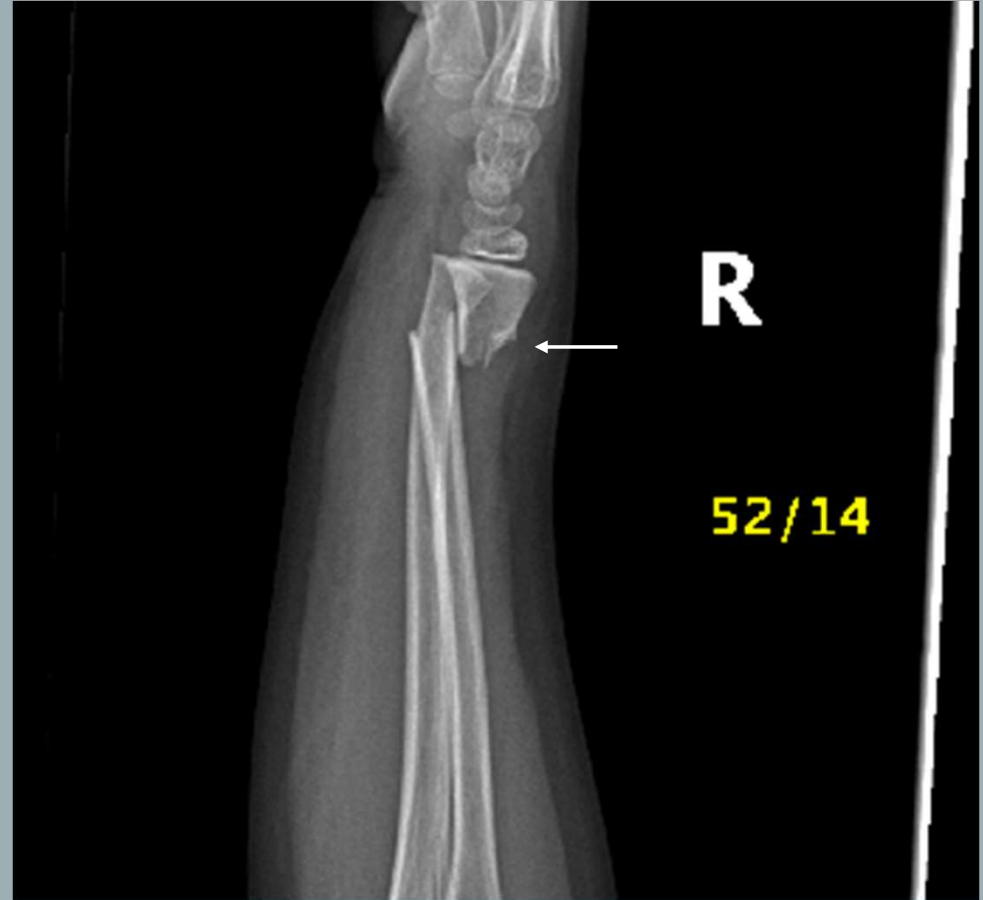
BUCKLE FRACTURE



GREENSTICK FRACTURE



BOWING
DEFORMITY



COMPLETE FRACTURE

Closed Treatment of Overriding Distal Radial Fractures without Reduction in Children

Crawford, Scott N. MD¹; Lee, Lorrin S.K. MD¹; Izuka, Byron H. MD²

[Author Information](#) 

The Journal of Bone & Joint Surgery 94(3):p 246-252, February 1, 2012. | DOI: 10.2106/JBJS.K.00163

ARTICLE

Forearm and Distal Radius Fractures in Children

Noonan, Kenneth J. MD; Price, Charles T. MD

[Author Information](#) 

Journal of the American Academy of Orthopaedic Surgeons 6(3):p 146-156, May 1998.

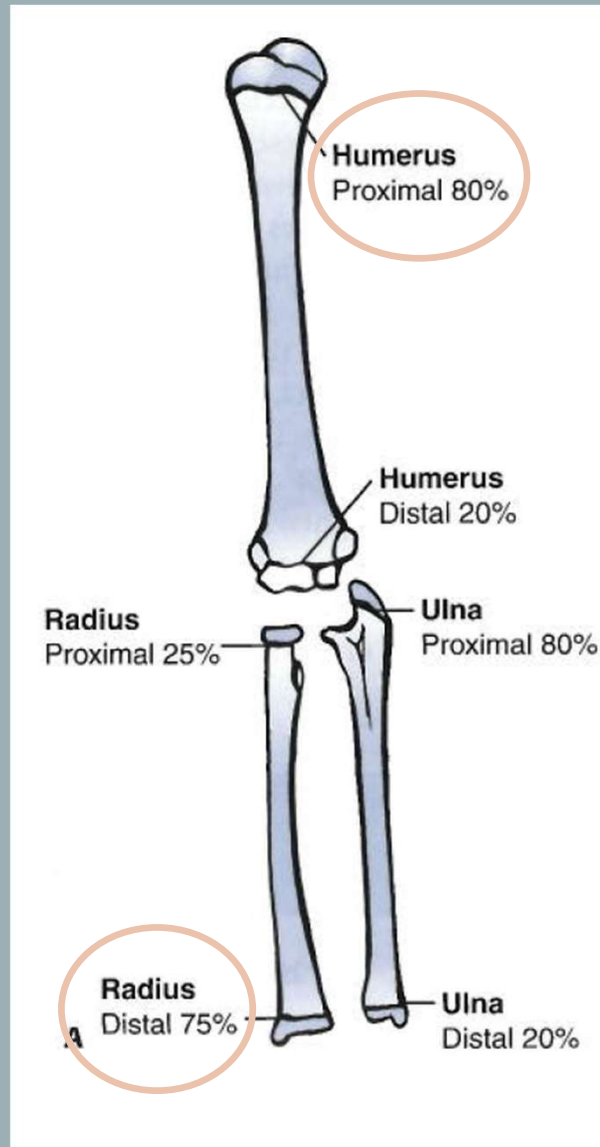
Reduction versus remodeling in pediatric distal forearm fractures: a preliminary cost analysis

Do, Twee T.; Strub, William M.; Foad, Susan L.; Mehlman, Charles T.; Crawford, Alvin H.

[Author Information](#) 

Journal of Pediatric Orthopaedics B 12(2):p 109-115,

UPPER EXTREMITY LONG BONE GROWTH



RADIUS DISPLACEMENT PARAMETERS

AGE	ACCEPTABLE SHORTENING	ACCEPTABLE ANGULATION (SHAFT)	ACCEPTABLE ANGULATION (DISTAL)
<10	≤1 CM	15-20 DEGREES	30 DEGREES
>10	NONE	10 DEGREES	20 DEGREES



SUPRACONDYLAR HUMERUS FRACTURES

Fracture of the distal humerus

Common between 5-7 years of age

- Type I
 - Treated with cast immobilization for 3-4 weeks
- Type II
 - CRPP vs ORIF
- Type III
 - CRPP vs ORIF



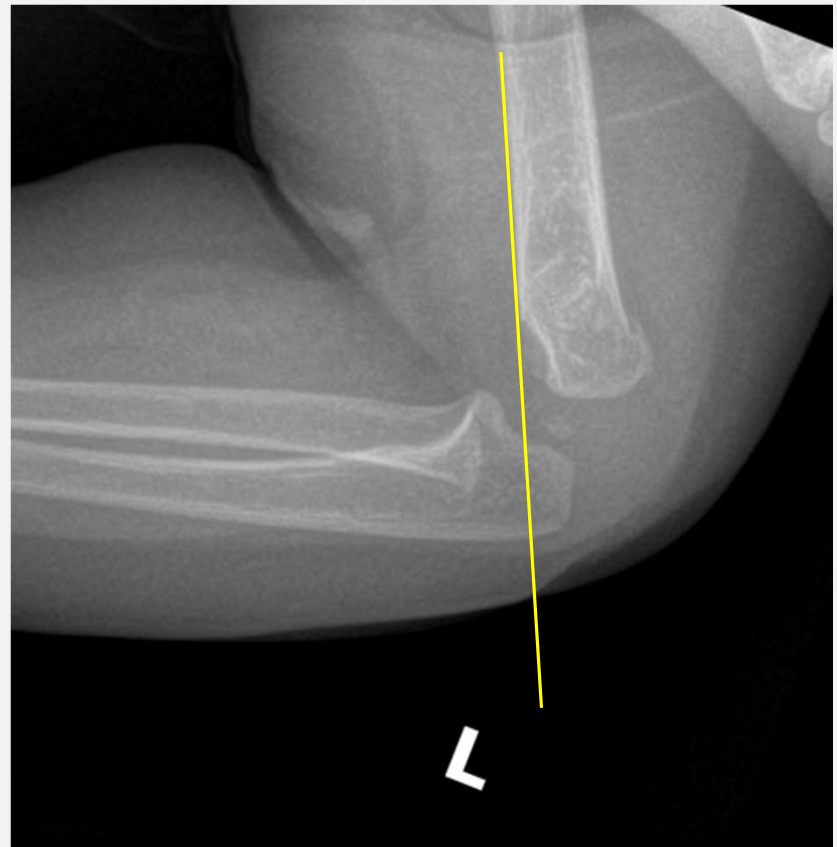
Anterior humeral line on normal elbow XR

TYPE I SUPRACONDYLAR HUMERUS FRACTURE

- Posterior fat pad
 - Indicates a posterior joint effusion
 - Radiographically indicates a fracture even if not visualized



TYPE II SUPRACONDYLAR HUMERUS FRACTURE



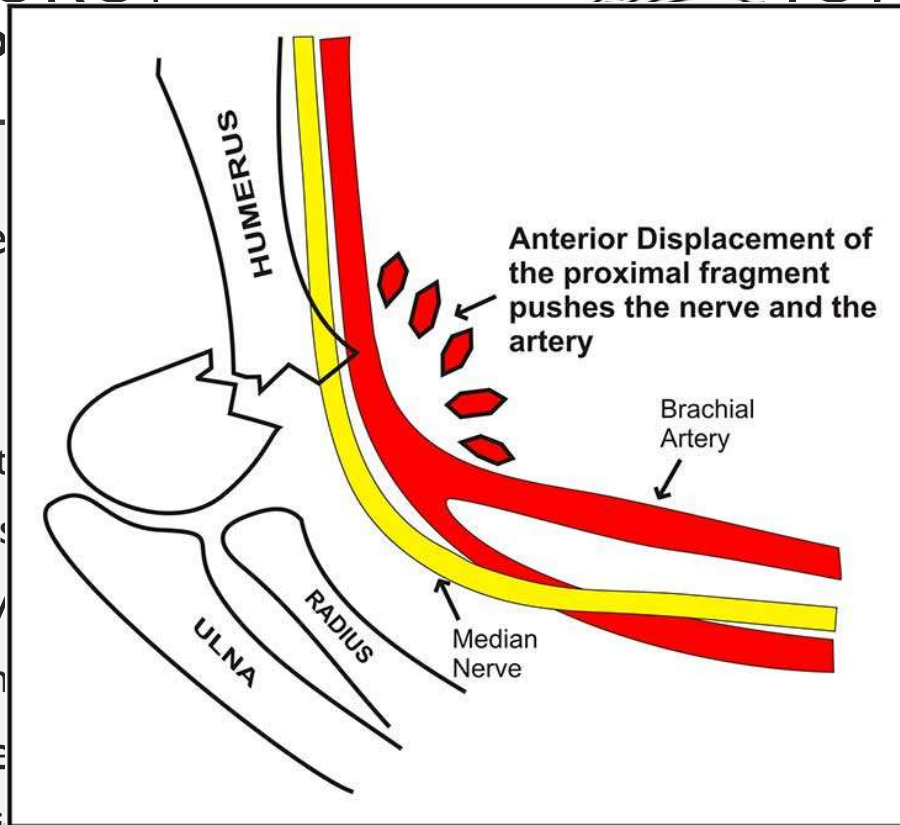
TYPE III SUPRACONDYLAR HUMERUS FRACTURE



NEUROI UP

ION IN ES

- Radial Nerve
 - Thumbs up
- Ulnar Nerve
 - Finger abduct
 - “criss-cross”
- Median Nerve
 - Make a fist, m
- Anterior Inte
 - “OK” sign with index



INITIAL TREATMENT

- Check neurovascular status
- Obtain plain films
 - Include joint above and below
- Determine need for orthopedic consultation for fracture reduction
- Apply a sugar tong splint versus long arm posterior
 - *Distal radius and/or ulna = sugar tong splint*
 - *Proximal radius and/or ulna = long arm posterior splint*

MONTEGGIA FRACTURE

- Radial head dislocation with a proximal third ulna fracture
- Should get elbow x-rays in all suspected forearm fractures to rule out *this* fracture pattern
- Requires orthopedic consultation for reduction



6 year old

Initial



6 months



11 year old

Initial



7 months



12 year old

Initial



6 months



12 year old

Initial



1 year





THANK YOU!

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QUESTIONS??

