Upper Extremity Fractures

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Skeletal Trauma

- 10 to 15 % of all Childhood Injuries
- Physeal (Growth Plate) Injuries are ~ 15% of all Skeletal Injuries

Orthopaedic Assessment

- Always start with the History
- How, What ,When and Where
- Is there a clear cut history of trauma?
- Other Complaints - Constitutional Symptoms, Recent Illnesses

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Orthopaedic Assessment

- Palpate for Tenderness
- Deformity
- Evaluate Neurologic Status
- Evaluate the Vascular Status
- Assess the Soft Tissue Injury
- Understand the Mechanism of Injury
- Examine the Joints , and Extremity Above and Below the site of Injury

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Radiographs

- Two Views at 90 degrees to each other (ex. AP and Lateral) - Fractures are 3 dimensional deformities
- Some areas require more than two views

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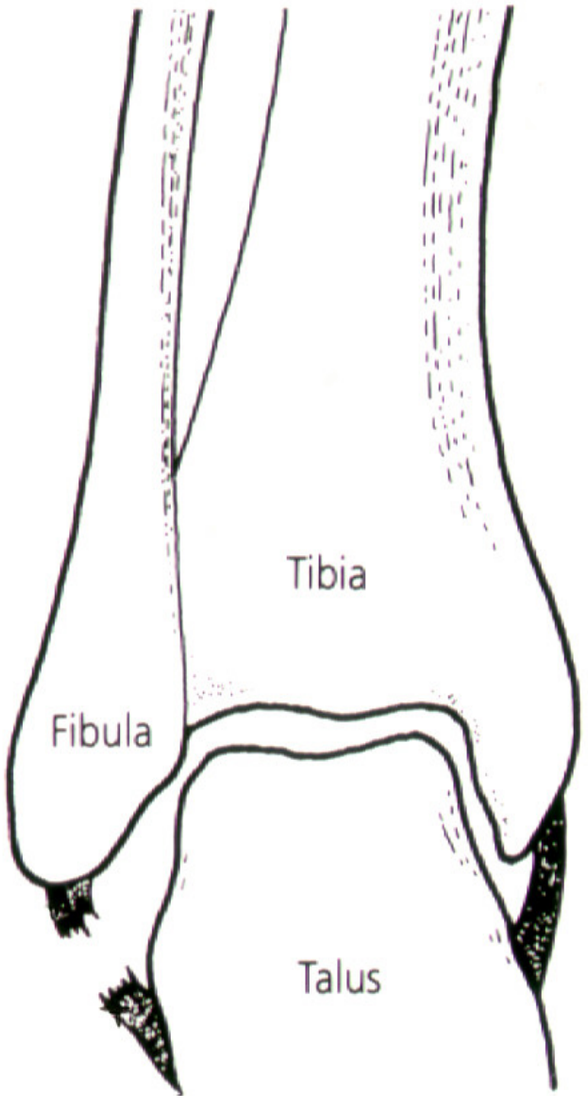
Radiographs and Anatomy

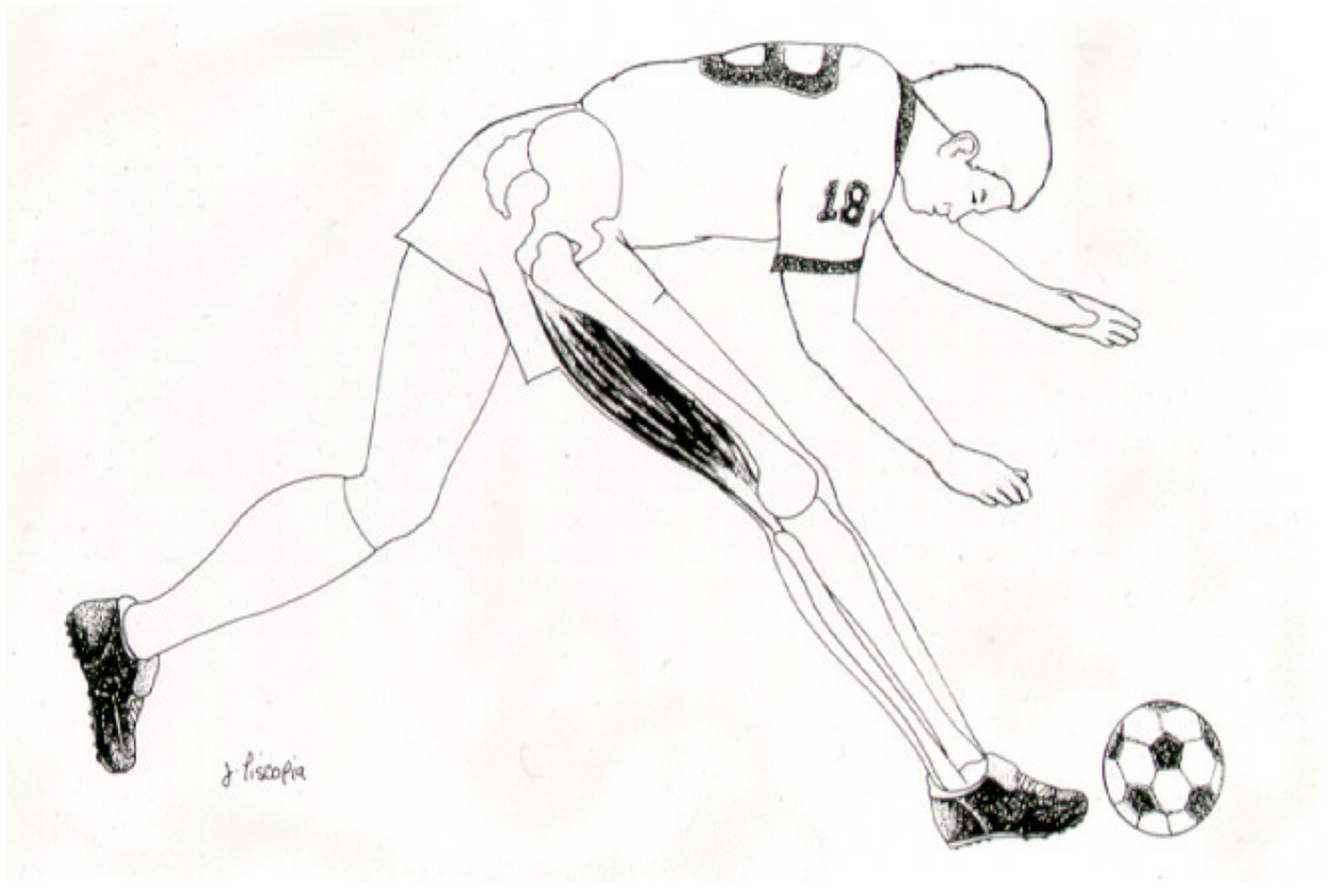
Comparison Radiographs at times can be Helpful.

Because of Secondary ossification centers, and differences in timing of ossification of the epiphysis

Sprain vs. Strain

Ligament vs. Muscle





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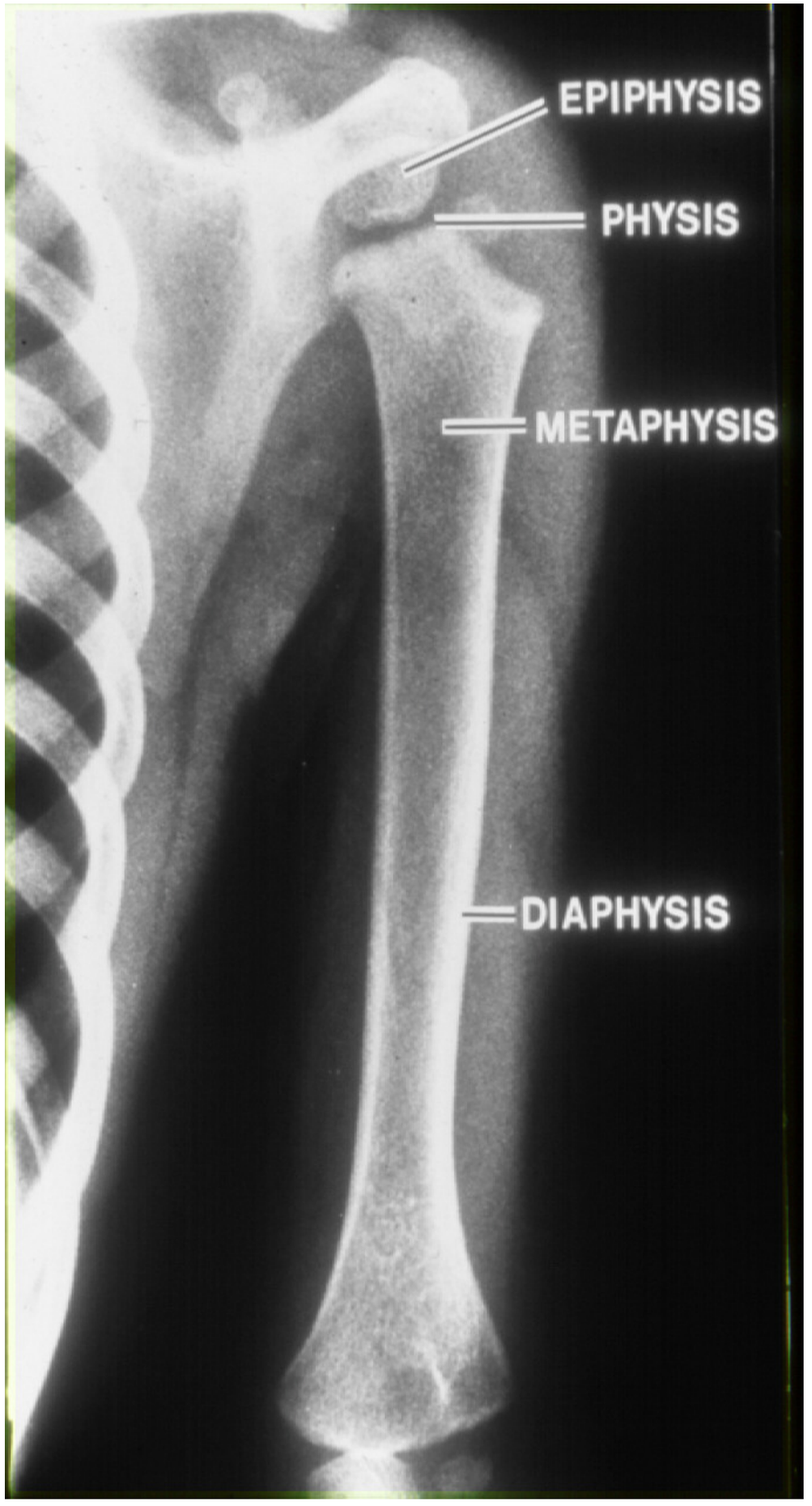
Injury Terms: Fractures

- Fracture , Break, Crack
- Open
- Closed
- Comminuted

Injury Terms: Fractures

<u>Parts of a growing bone</u>

- Epiphysis
- Physis
- Metaphysis
- Diaphysis



Unique Fracture Types Skeletally Immature Patients

- Plastic Deformation - The Bone is bent or bowed beyond its ability to recoil - remains deformed
- Greenstick Fracture - The Bone is fails completely on one side but the opposite side is plastically deformed but remains in continuity
- Torus - “Buckle” Fractures where the Metaphysis fails in Compression

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Torus (Buckle) and Greenstick

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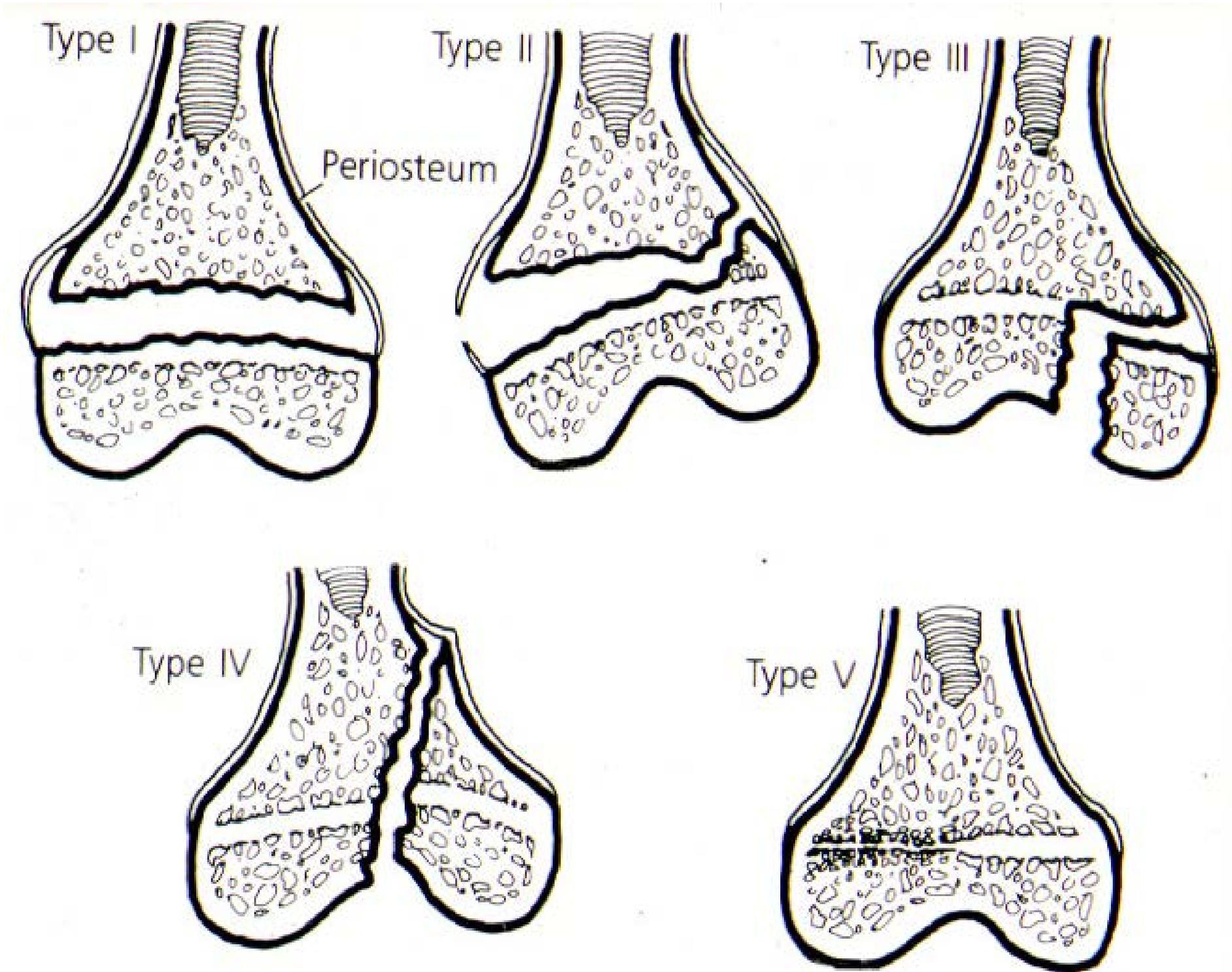
Physeal Fracture Patterns - “Growth Plate Fractures “ - The Salter Harris Classification



Fracture Remodeling

- Improvement in the Angulation of the Fracture over time
- Rotational Malalignment does not Remodel
- It Occurs best in Skeletally Immature Patients

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Complete Fractures

Distal Radius and Ulna Fractures

- 9y/o girl - 2 weeks out from injury
- She is in a poorly molded Cast
- Yikes!

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Complete Fractures
Distal Radius and Ulna Fractures

- 7 months later

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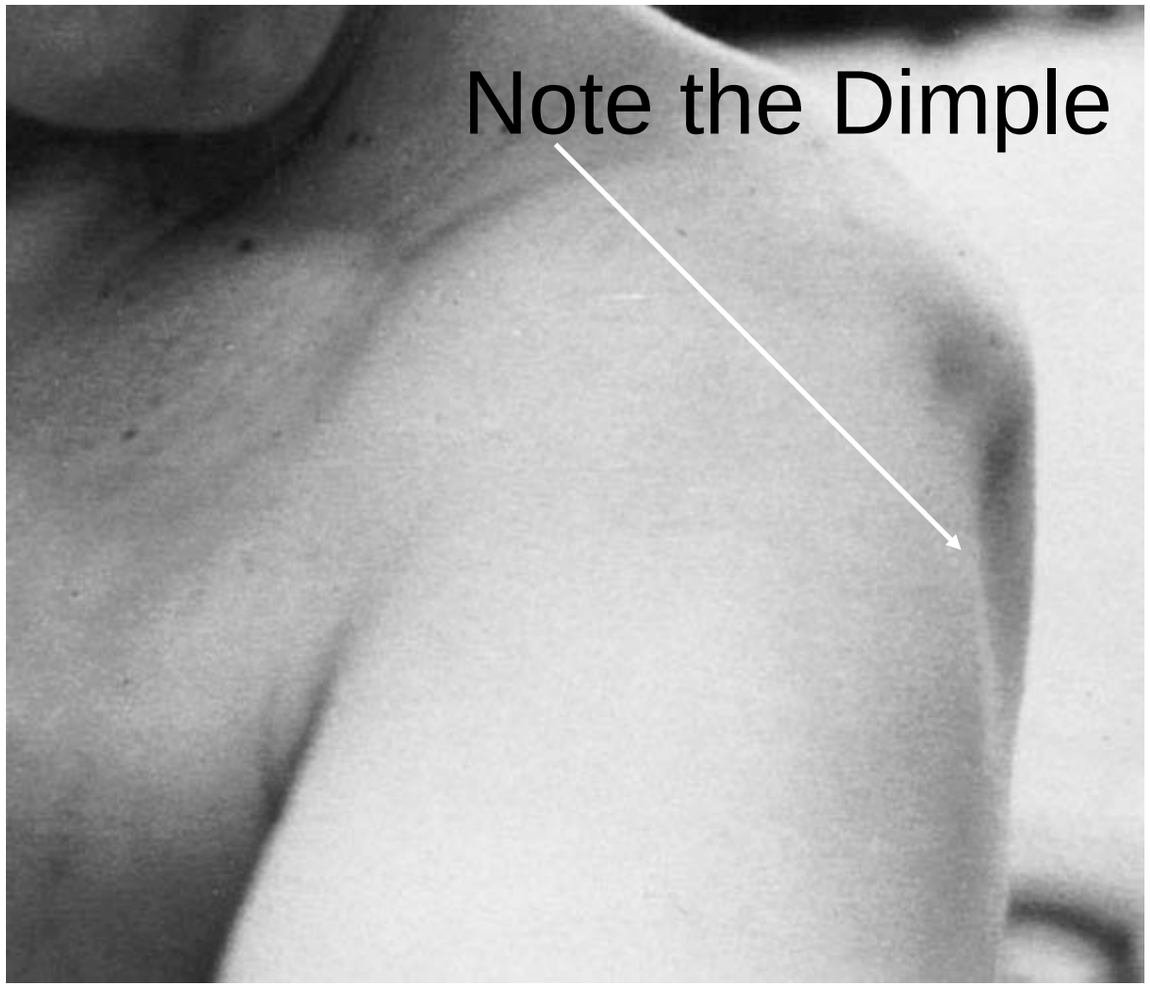
Clavicle Fractures

- “S” shaped bone.
- Middle 1/3 is most common site of fracture.
- MOI is fall on shoulder.
- Neurovascular Exam Important - Sublcavian Vessels and Brachial Plexus
- Majority Treated with Sling

Shoulder Dislocations



- Uncommon in children less than 12.
- Most common direction is anterior and inferior.
- Mechanism of Injury often abduction and external rotation.
- N/V status very important.
- Refer to ER for Reduction

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Humerus Fractures

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Diaphyseal Humerus Fracture

- Best Managed By Orthopaedist
- Coapt Splint
- Acutely may use Sling - try and let the weight of the arm act as “traction”
- Apply splints if available

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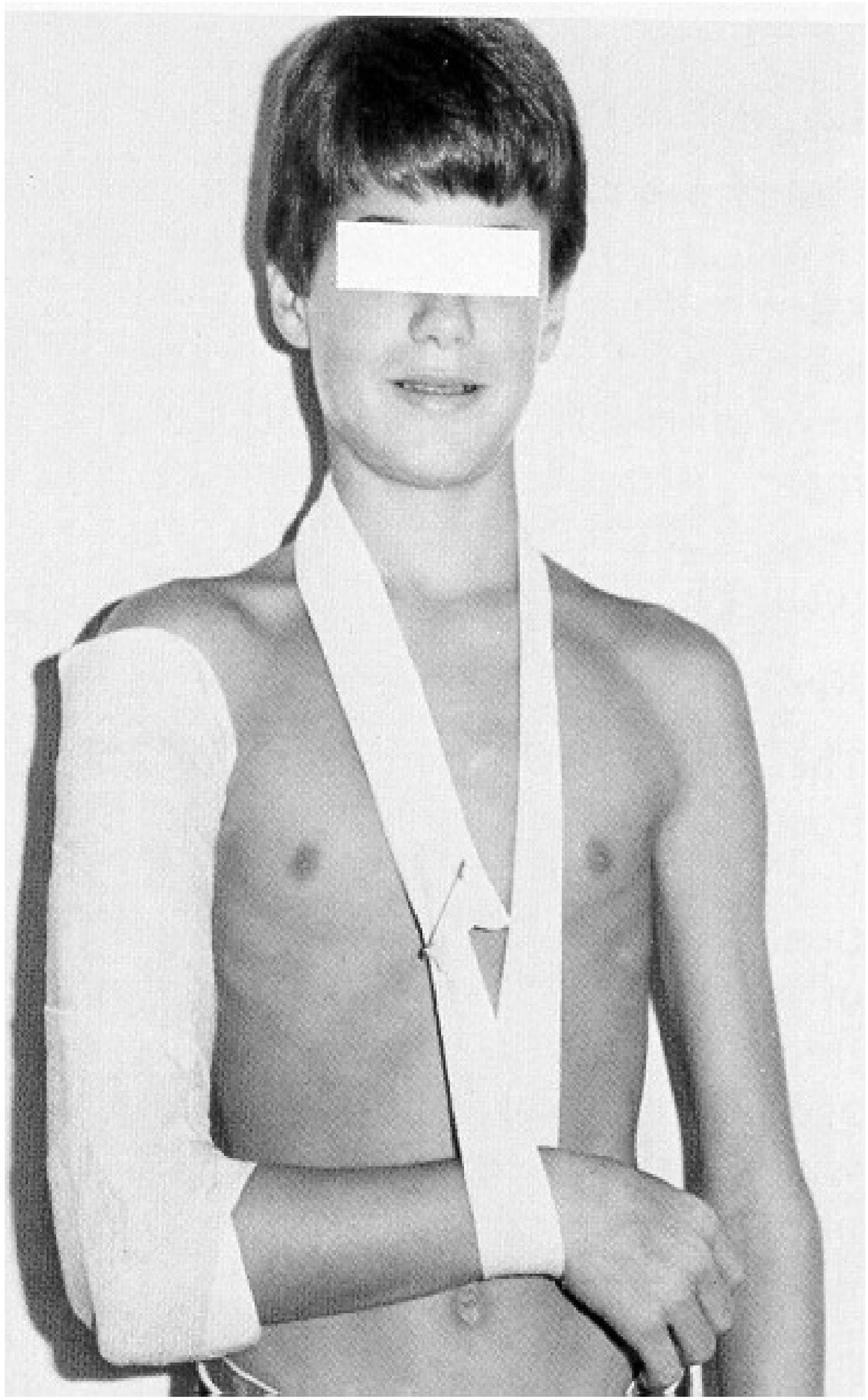

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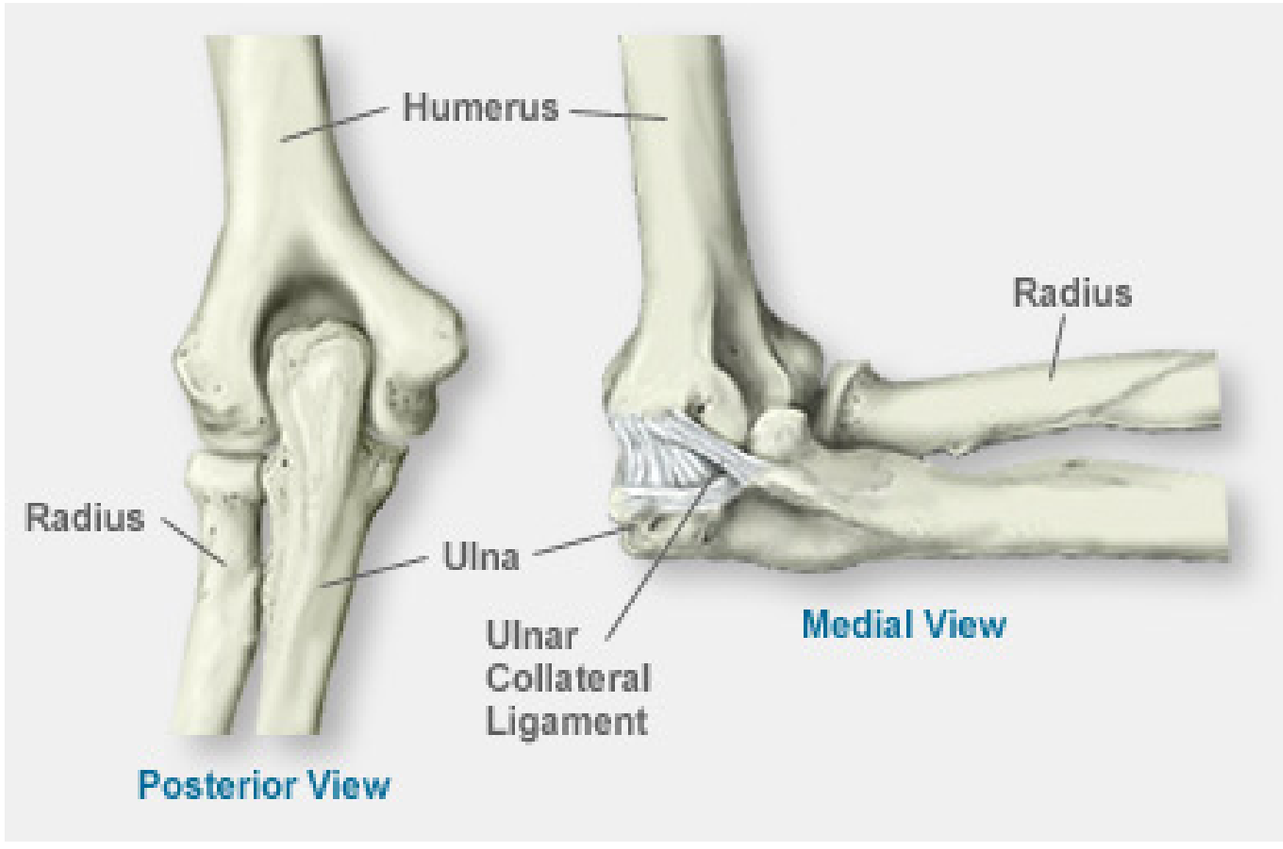
Elbow Assessment

- Identify landmarks.
  - Medial and lateral epicondyle
  - Proximal ulna
  - Radial Head
  - Ulnar Nerve



www.scoi.com/images/scoi-elbow.jpg

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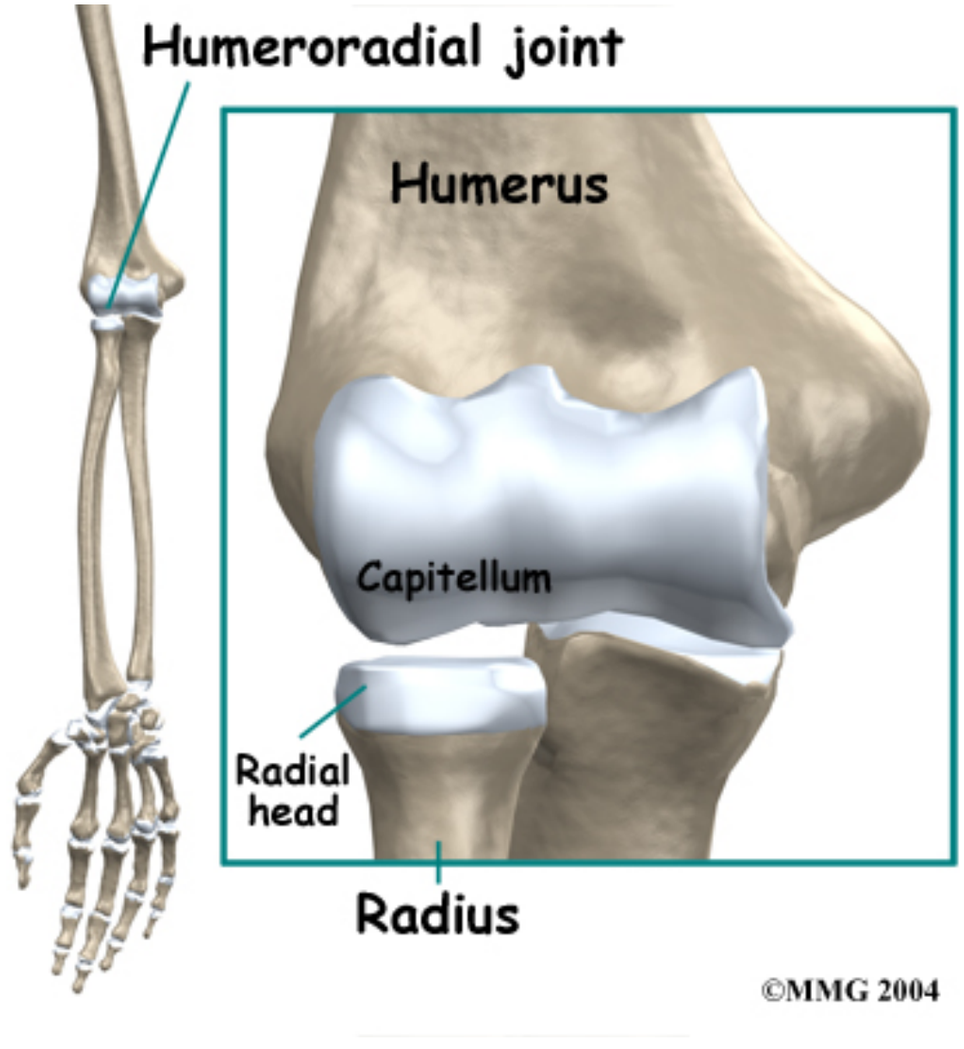
Elbow Assessment



- Swelling
  - Diffuse or Localized
- Range of Motion:
  - Can they move?
  - Flexion/Extension
  - Pronation/Supination

www.orthopediatrics.com/.../elbow_panners.html

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Supracondylar Humerus

- Typical age range 1-10 years
- Males > females by 2:1
- Peak incidence: 5 to 8 years
- Approximately 1% are open
- ~5% also have forearm fracture

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Supracondylar Fractures

- Most common type is from fall on outstretched elbow
  Diffuse Swelling
- Splint with long arm splint with comfortable position flexion
  referral

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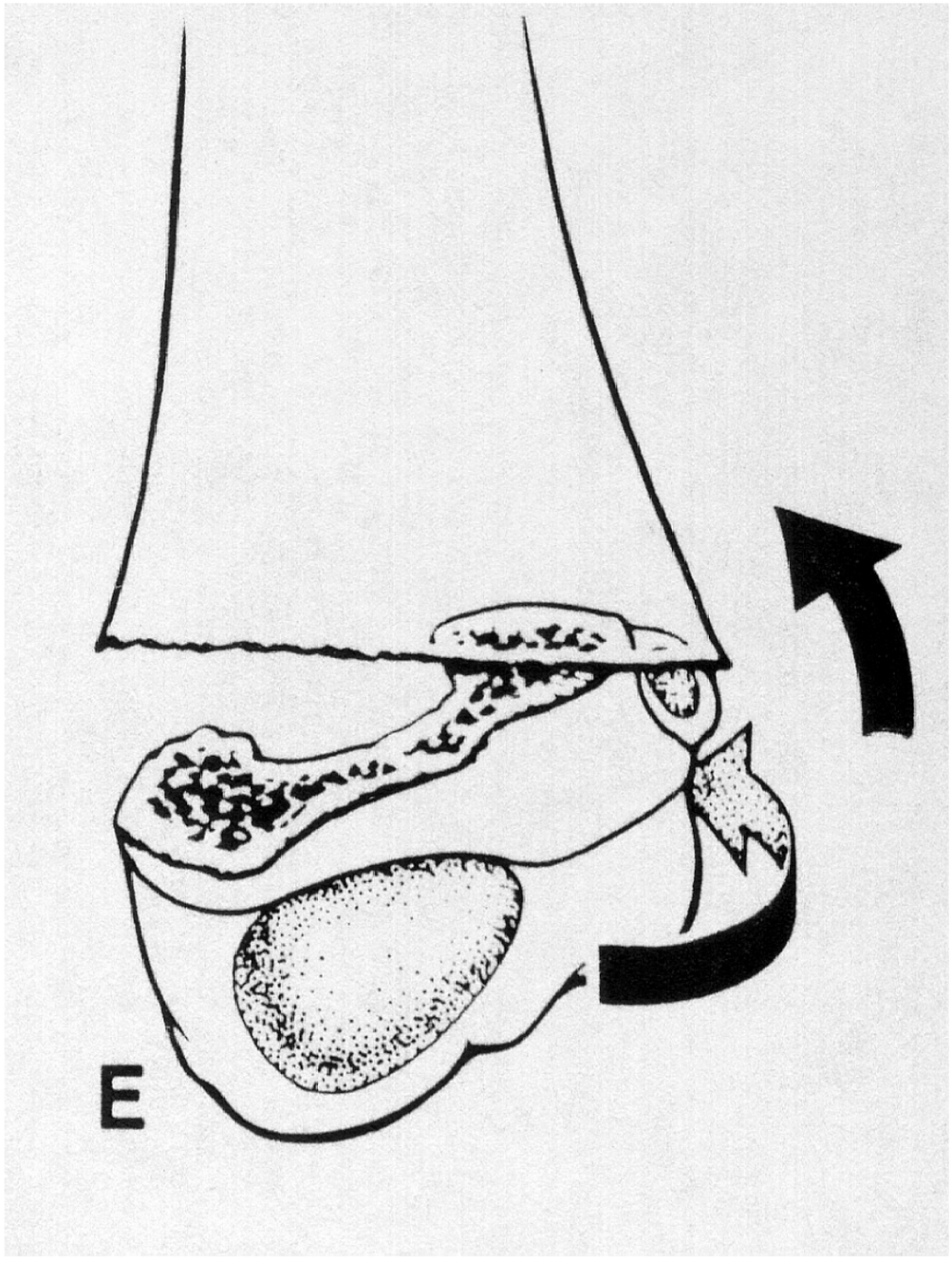
Supracondylar Humerus Anatomy



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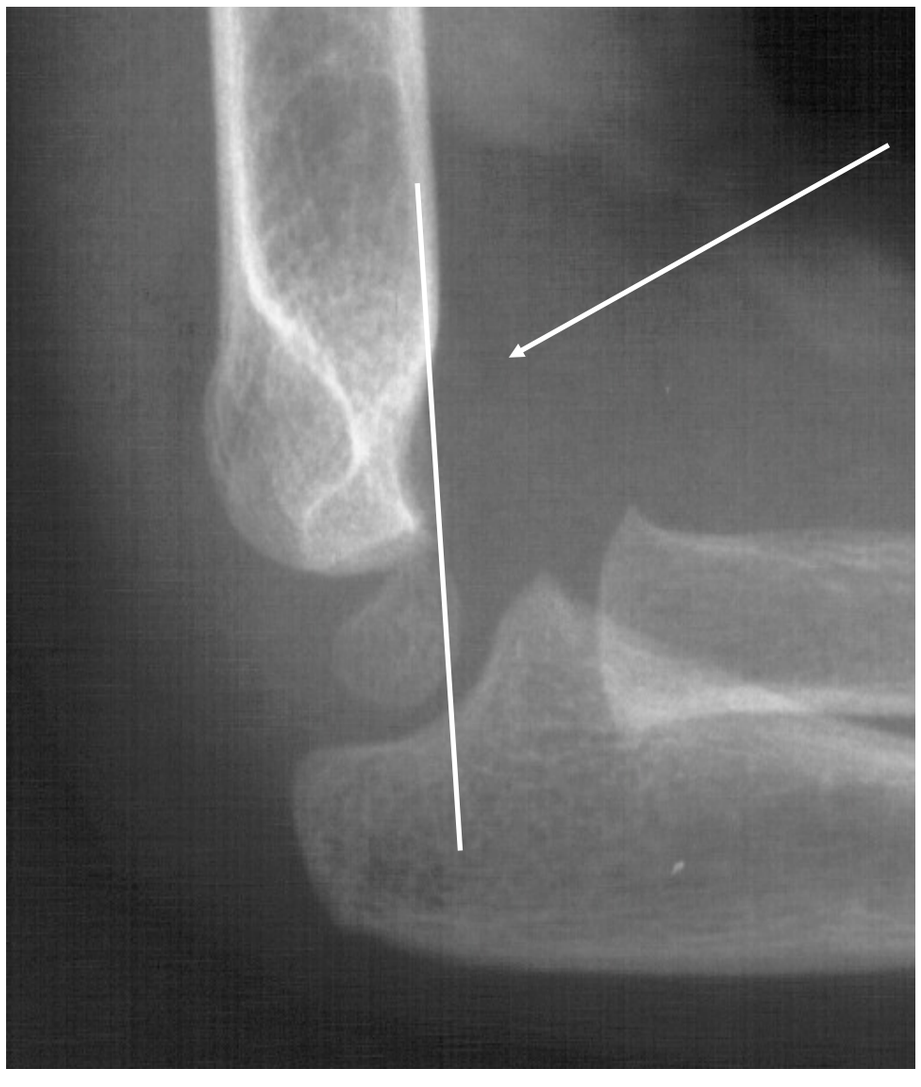
Supracondylar Humerus Fractures

- They can range from Nondisplaced to Completely Displaced



“Fat Pad”

- Occult intraarticular (injury inside the joint capsule) fracture
- Often is a Type I Supracondylar Fracture
- Blood in the Joint Creates radiographic density difference with the fat in the synovium appearing darker
- We often treat as occult fracture unless there are other concerns from the history or exam to make us consider other diagnosis such as infection

Type III Supracondylar Humerus

- Complete Displacement
- Require Surgery

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Supracondylar Humerus

- Examination
  - Always check for palpable pulses (Doppler pulse may be present in spite of complete of occlusion of the brachial artery)
  - Check compartments
  - Always document detailed neurovascular examination before any treatment !!

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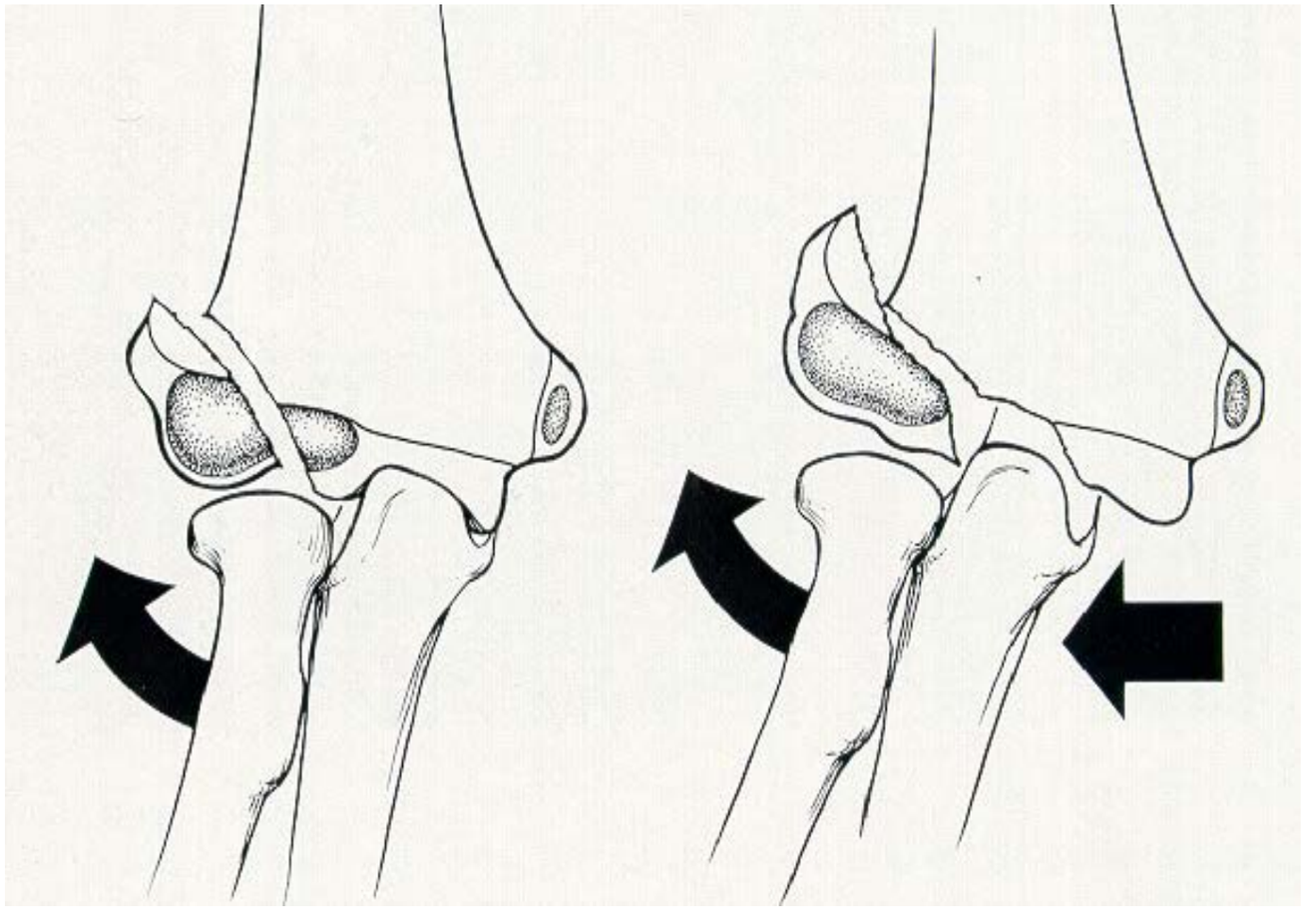
Completely Displace Supracondylar Humerus Fracture

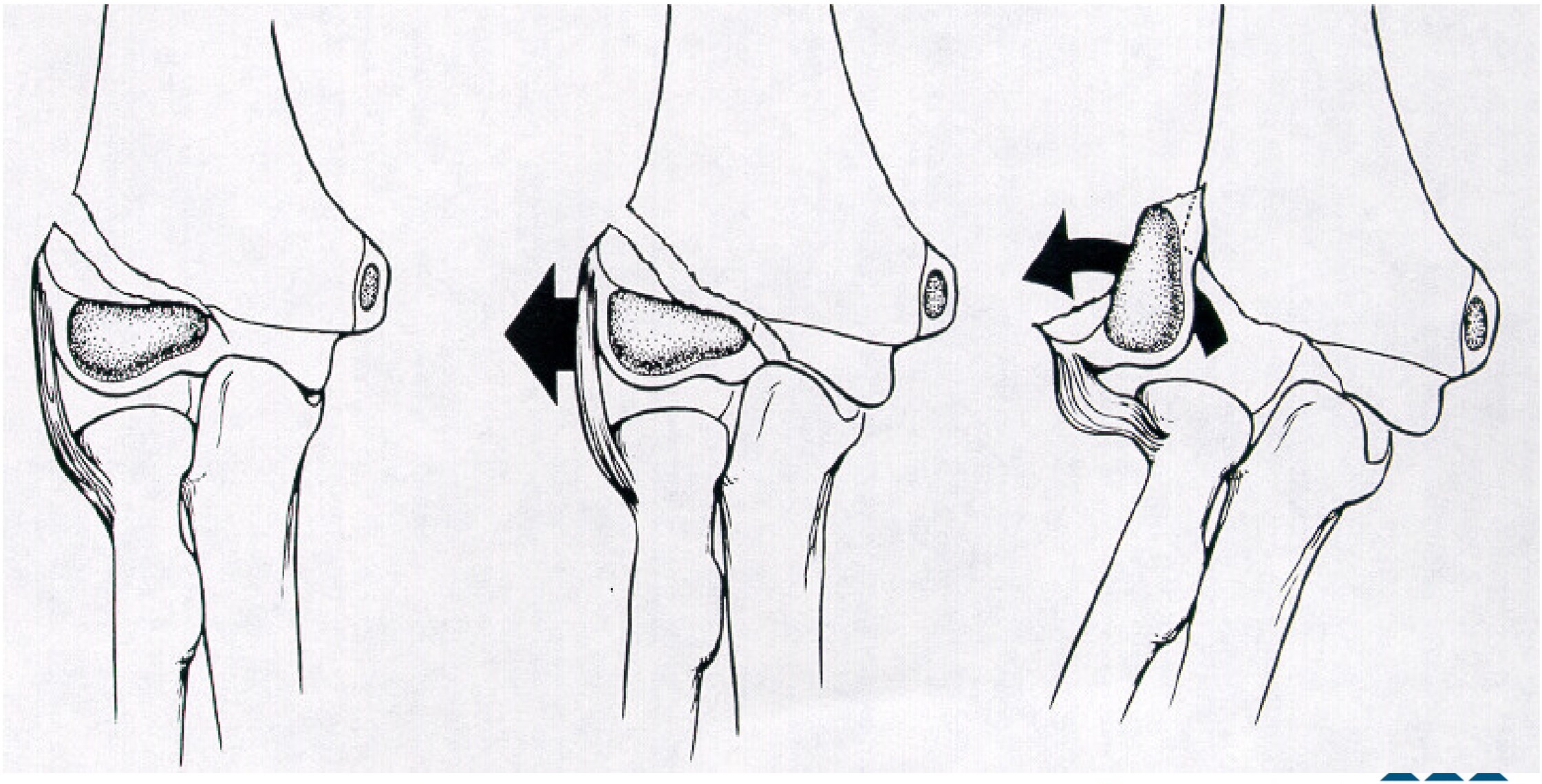
- Neurologic Examination
  - Nerve injury is present in about 8%
  - To Assess you would need to know the Radial, Median, Ulnar, and Anterior Interosseous Nerve (branch of the Median Nerve) function for the forearm and hand.

Lateral Condyle Fracture Humerus



Lateral Condyle Fracture Humerus

Stages of Displacement



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Lateral Condyle

- Treatment: Min (< 2 mm):
- Cast until radiographic union.

Lateral Condyle Fracture

- Treatment: Displaced fx’s
- ORIF lateral approach

Radius and Ulna Fractures

- Radius most commonly Fractured Bone in childhood
- About 3/4 of all radial fractures are in the distal 1/3
- Most common Physeal injury is at the distal radius
- Typically these are falls on the outstretched arm

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Wrist Sprain?

- Not common in children, because bones can fail more commonly in compression than adults
- More commonly this is a buckle or greenstick type fracture in the distal radius and/or ulna

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Salter 2 Distal Radius Fracture

Monteggia Fracture

- Pitfalls
  - Failure to dx radial head dislocation!
  - ulna fracture with a radial head dislocation
  - always evaluate the joint above and below an injury

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Radius and/or Ulna Fractures

- Fall on outstretched forearm
- Splint this like you found it.
- Always do a Neurovascular

Greenstick
Distal Radius and Ulna Fractures

- Disruption of cortex on convex side and deformity on the concave
- Fails on the tension side

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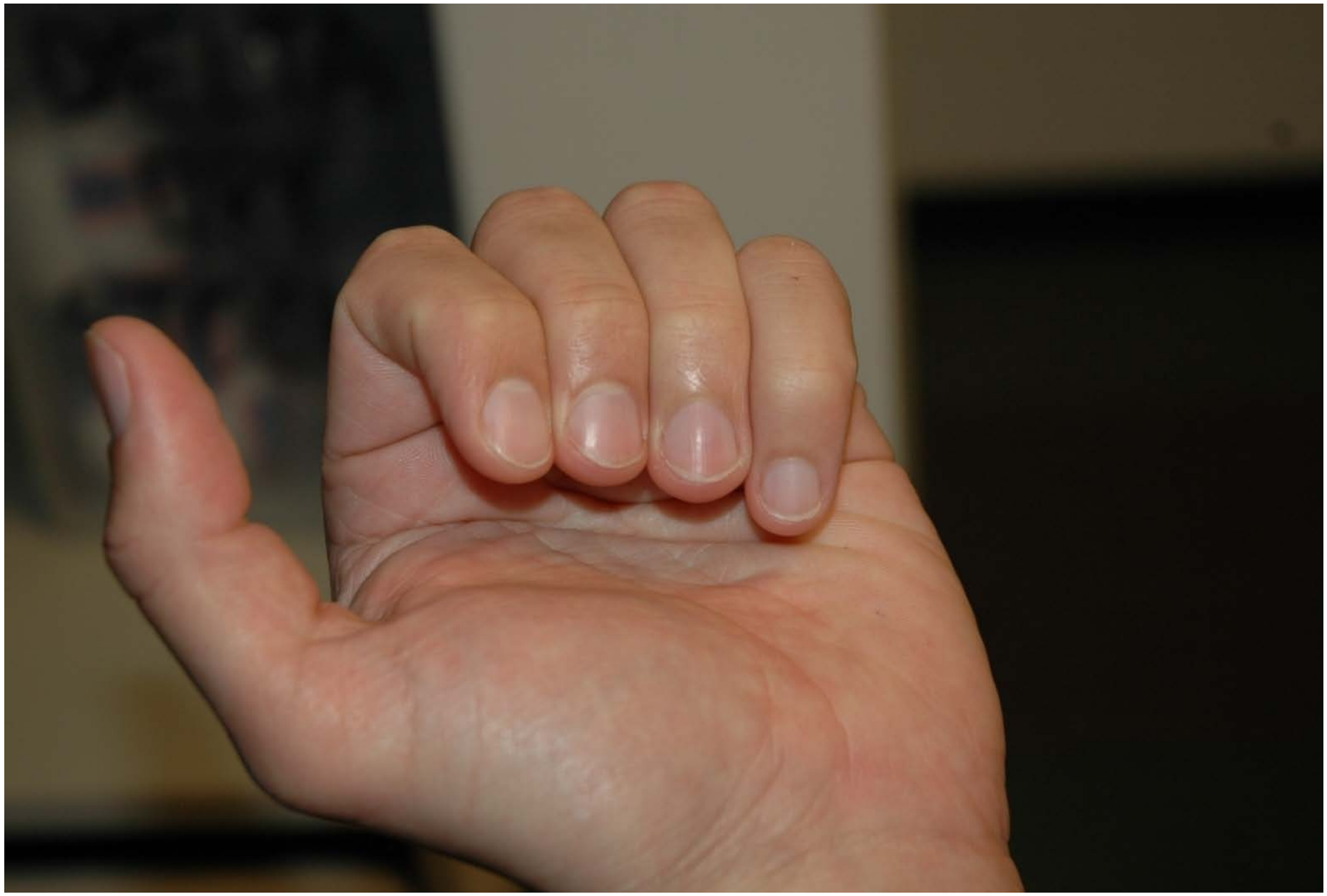
Symmetric Hand Closure



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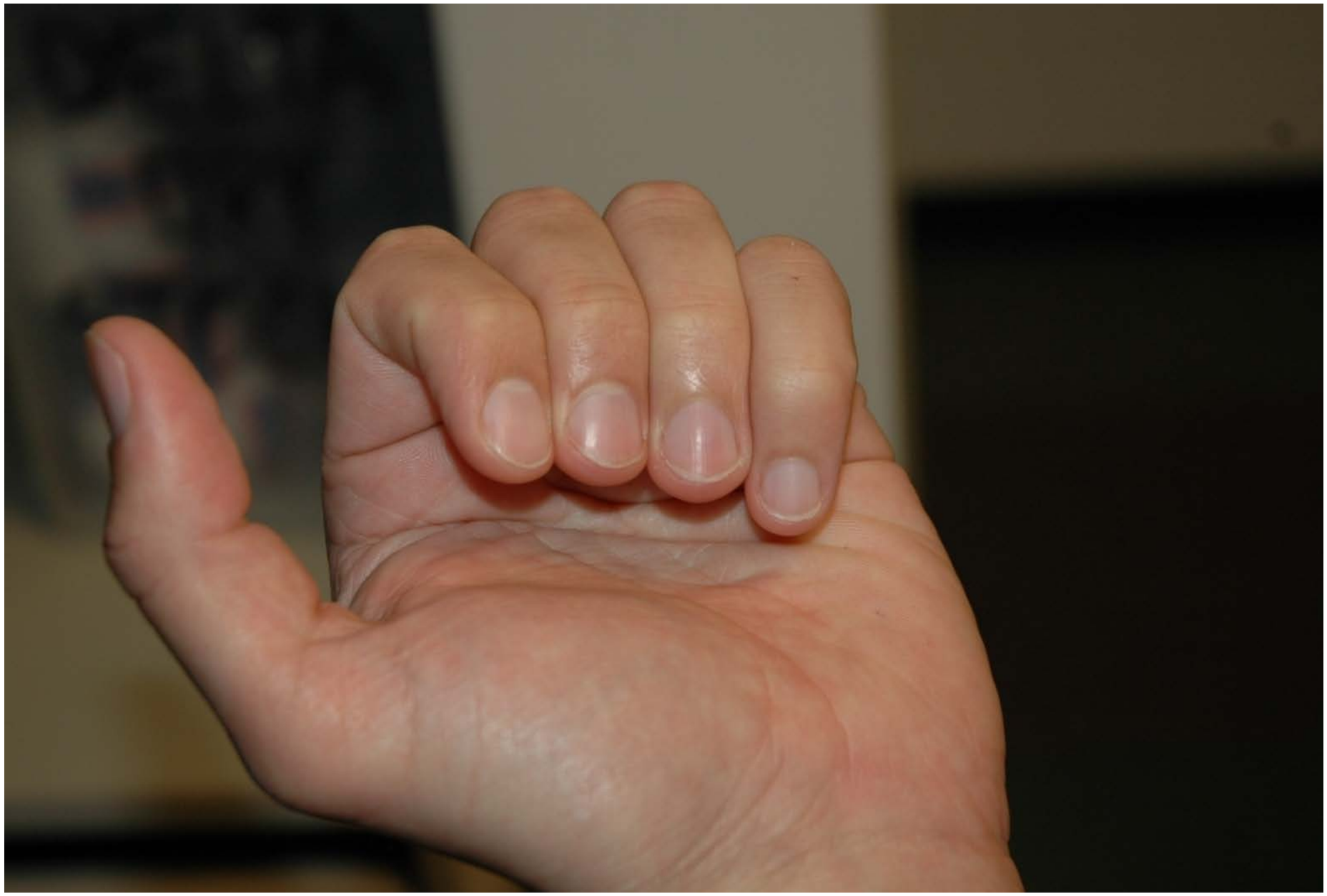
Inspection of the Hand and Fingers

- Palmar View-
  - Attitude of the Hand
  - Check creases for deformity swelling or loss of the crease.
  - Thenar and Hypothenar Eminence
  - Attitude of the Hand
  - Symmetric closure of the hand and fingers

Inspection of the Hand and Fingers

- Dorsal View-
  - Swelling and deformity
  - Can you see the knuckles/metacarpals?
  - Fingernails for color.
  - Subungual hematoma.

Symmetric Hand Closure



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