How to Approach the Pediatric Elbow Radiograph

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Step 1: know your Elbow Ossification Centers (and rough age of appearance)

- CRITOE!!
- C – Capitellum (1 yr)
- R – Radial head (2-4 yrs)
- I – Medial (Internal) epicondyle (4-6 yrs)
- T – Trochlea (8-11 yrs)
- O – Olecranon (9-11 yrs)
- E – Lateral (External) epicondyle (10-11 yrs)

H - humerus, U - ulna, R - radius
Ossification Centers

Frontal radiograph of elbow in 12 year old girl
Ossification Centers

- olecranon
- Medial epicondyle
- trochlea
- Lateral epicondyle
- capitellum
- Radial head
Step 2: Elbow Fat Pads

- Anterior fat pad (highlighted in yellow) – coronoid fossa, normally visible in lateral view with patient in flexion
- Posterior fat pad – olecranon fossa, not normally visible
- Fat pads are intracapsular
- When displaced, they indicate the presence of joint effusion or hemarthrosis, ie. fracture in setting of trauma!
Displaced fat pads
Step 3: Joint Alignment

A) **Radiocapitellar line** – a line drawn through the center of the radial head should intersect the center of the capitellum on all projections.

- If it doesn’t – radial head dislocation, radial neck fracture.
Step 3: Joint Alignment

- B) **Anterior humeral line** – intersects the ossified capitellum through middle or posterior third
- If it passes through anterior third or misses capitellum – supracondylar fracture is present
Displaced anterior humeral line, Ex. 1 yo, fall from bed

- Displaced posterior fat pad
- Displaced capitellum

Fracture
Elbow fractures

- Most common fractures in children (65-75%)
- Most commonly occurring after FOOSH (hyperextension forces or extreme valgus)
- Difficult to detect due to ossification centers
- Supracondylar > lateral condyle > medial epicondyle > radial neck, olecranon
Supracondylar fractures

- Most common pediatric elbow fracture
- Type 1 - non-displaced
- Type 2 – displaced with intact posterior cortex
- Type 3 – displaced with no cortical contact
Supracondylar fracture
Lateral condylar fracture

- FOOSH with extreme varus force and extension
Medial epicondylar fracture

- 3rd most common fracture
- Valgus stress
- Commonly associated with elbow dislocation
Radial neck fracture
Test your knowledge!
Name the ossification centers!

Slide 4 for answers!
What type of fracture?
Supracondylar Fracture
Summary

- Identify ossification centers (CRITOE!)
- Use a search pattern - fat pads, alignment (anterior humeral line, radiocapitellar line)
- Look for:
  - Supracondylar fx
  - Lateral condyle fx
  - Position of medial epicondyle
  - Radial neck fx