MI 133: Clinical Seminar II

Forearm & Elbow

Pathology & Image Analysis

2021

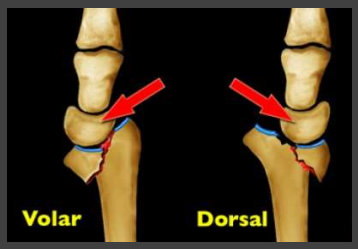
1

Pathology

2

Barton fracture

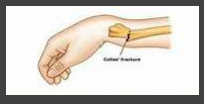
- **Description:** intraarticular fracture involving dorsal or volar tip of distal radius affecting radiocarpal joint, often with dislocation
- **Causes:** Trauma; predominantly falling on outstretched hands
- **Prognosis:** Normal fracture healing time
- **Complications:** Mal-union if not reduced in a timely manner; post traumatic carpal tunnel syndrome; arthritis
- **Technique:** No change in exposure factors usually required
- **Radiographic appearance:** Fracture lines intraarticular from distal radius



3

Colle's fracture

- **Description:** Transverse fracture through the distal radius with **posterior** angulation
- **Causes:** Trauma; predominantly falling on outstretched hands
- **Prognosis:** Normal fracture healing time
- **Complications:** Mal-union if not reduced in a timely manner; post traumatic carpal tunnel syndrome; arthritis
- **Technique:** No change in exposure factors usually required
- **Radiographic appearance:** Fracture lines usually 1 inch from distal end of radius with posterior angulation of hand, arm often presents in dinner fork deformity



4

Smith (Reverse Collies) fracture

- **Description:** Transverse fracture through the distal radius with **anterior** angulation
- **Causes:** Trauma; predominantly falling backward on wrist when flexed or direct hit to back of wrist
- **Prognosis:** Normal fracture healing time
- **Complications:** Mal-union if not reduced in a timely manner; post traumatic carpal tunnel syndrome; arthritis
- **Technique:** No change in exposure factors usually required
- **Radiographic appearance:** Fracture lines usually 1 inch from distal end of radius, anterior angulation of hand

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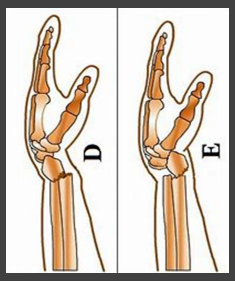
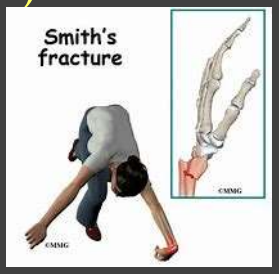
Collies (posterior) vs Smith (anterior)





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Monteggia fracture

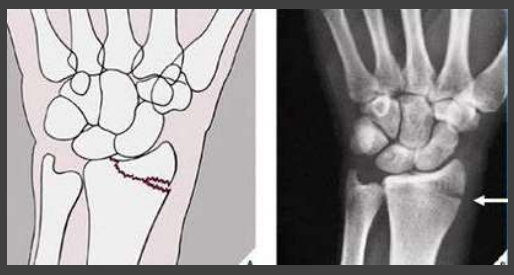
- **Description:** proximal half of ulna along with dislocation of radial head
- **Causes:** Trauma, falls, may result from defending blows with raised forearm
- **Prognosis:** Normal fracture healing time
- **Complications:** Mal-union if not reduced in a timely manner; nerve damage, compartment syndrome
- **Technique:** No change in exposure factors usually required
- **Radiographic appearance:** Fracture line proximal ulna – can sometimes see associated dislocation of radial



7

Hutchinson (Chauffeur) fracture

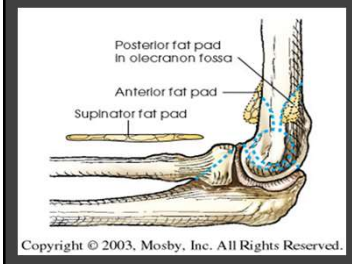
- **Description:** intraarticular fracture of radial styloid process
- **Causes:** Trauma; falls, strike to lateral forearm
- **Prognosis:** Normal fracture healing time
- **Complications:** Mal-union if not reduced in a timely manner, arthritis
- **Technique:** No change in exposure factors usually required
- **Radiographic appearance:** Fracture lines extends proximally in a variable oblique direction. Often not displaced.




8

Fat Pad Sign

- **Description:** Distention of the elbow joint capsule due to injury elevates the posterior and anterior fat pads along the distal humerus
- **Causes:** Elbow fractures; osteoarthritis; gout
- **Prognosis:** dependent upon extent of injury or underlying pathology
- **Complications:** None
- **Technique:** No change in exposure factors usually required
- **Radiographic appearance**: An elevated anterior lucency and/or a visible posterior lucency on a true lateral radiograph of an elbow flexed at 90°



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Bursitis

- **Description:** Painful inflammation of a bursa
- **Causes:** Injury; rheumatoid arthritis; gout; increased activity level of the joint
- **Prognosis:** Healing takes several weeks after underlying pathology is treated
- **Complications:** Septicaemia and osteomyelitis can occur in severe septic bursitis
- **Technique:** No change in exposure factors usually required – important to see soft tissue detail
- **Radiographic appearance:** Diagnostic x-rays are used to rule out bony abnormalities

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Image Analysis

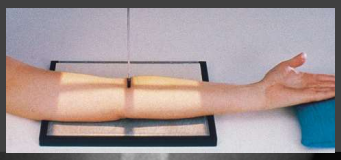
Exposure Index:
100-300
Direct System

11

Elbow

12

Elbow - AP



- Evidence of proper collimation and presence of side marker placed clear of anatomy of interest
- Radial head, neck, and tuberosity slightly superimposed over the proximal ulna
- Elbow joint open and centered to the exposure field
- Open humeroradial joint
- No rotation of humeral epicondyles (coronoid and olecranon fossae approximately equidistant to epicondyles)
- Bony trabecular detail and surrounding soft tissues

13

18.

AP

EI: 220

14

19.

AP

EI: 230

15

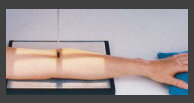
20.

AP

EI: 200

16

Elbow – Medial Oblique (internal)



- Evidence of proper collimation and presence of side marker placed clear of anatomy of interest
- Elbow joint opened and centered to the exposure field
- 45-degree medial rotation of the elbow:
  - Coronoid process in profile
  - Elongated medial humeral epicondyle
  - Ulna superimposed by the radial head and neck
- Trochlea
- Olecranon process within the olecranon fossa
- Bony trabecular detail and surrounding soft tissues

17

Under rotated, coronoid not in profile

Proper rotation, coronoid in profile. Radial head/neck superimposed by ulna

Over rotated, coronoid superimposed by radial head

18

21.

Medial Oblique

EI: 100

19

22.

Medial Oblique

EI: 100

20

23.

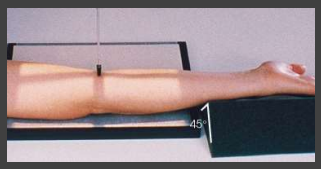
Medial Oblique

EI: 100

21

Elbow – Lateral Oblique (external)

- Evidence of proper collimation and presence of side marker placed clear of anatomy of interest
- Elbow joint open and centered to the exposure field
- 45-degree lateral rotation of elbow:
  - Radial head, neck, and tuberosity projected free of the ulna
  - Elongated lateral humeral epicondyle
- Capitulum
- Bony trabecular detail and surrounding soft tissues



22

24.

Lateral Oblique

EI: 120

23

25.

Lateral Oblique

EI: 300

24

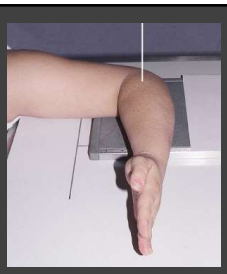
26.

Lateral Oblique

EI: 300

25

Elbow – Lateral



- Evidence of proper collimation and presence of side marker placed clear of anatomy of interest
- Elbow joint centered to the exposure field
- Elbow in true lateral position:
  - Superimposed humeral epicondyles
  - Radial tuberosity facing anteriorly
  - Radial head partially superimposing the coronoid process
  - Olecranon process in profile
- Elbow flexed 90 degrees
- Boney trabecular detail and any elevated fat pads in the soft tissue at the anterior and posterior distal humerus and the anterior proximal forearm

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Wrist not in same plane

All body parts in same plane

Shoulder not in same plane

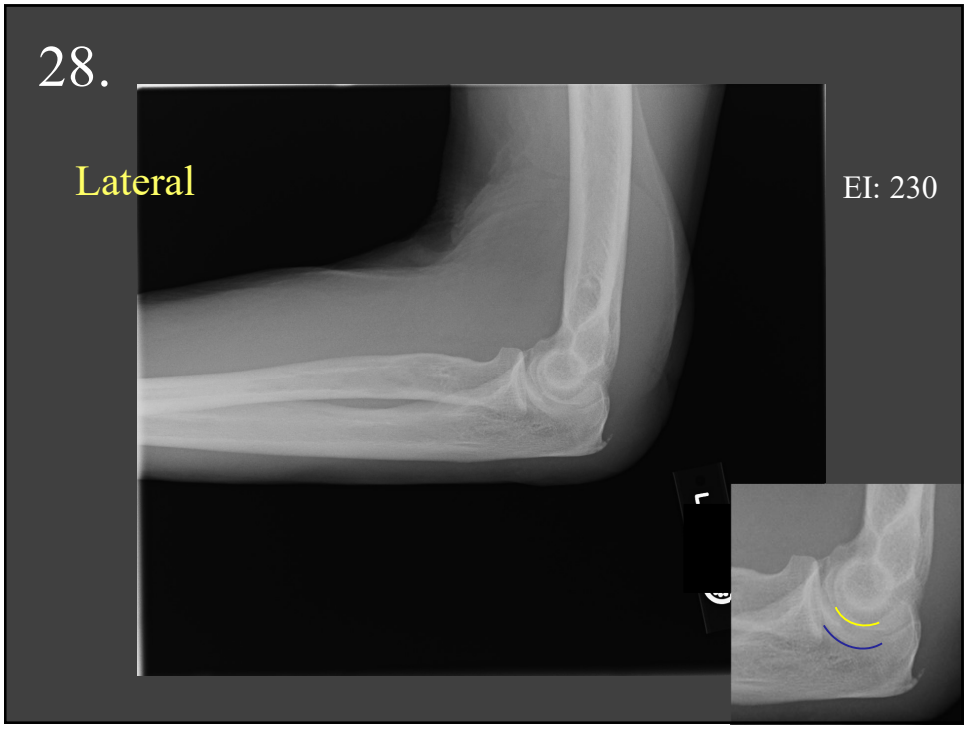
27

27.

Lateral

EI: 400

28



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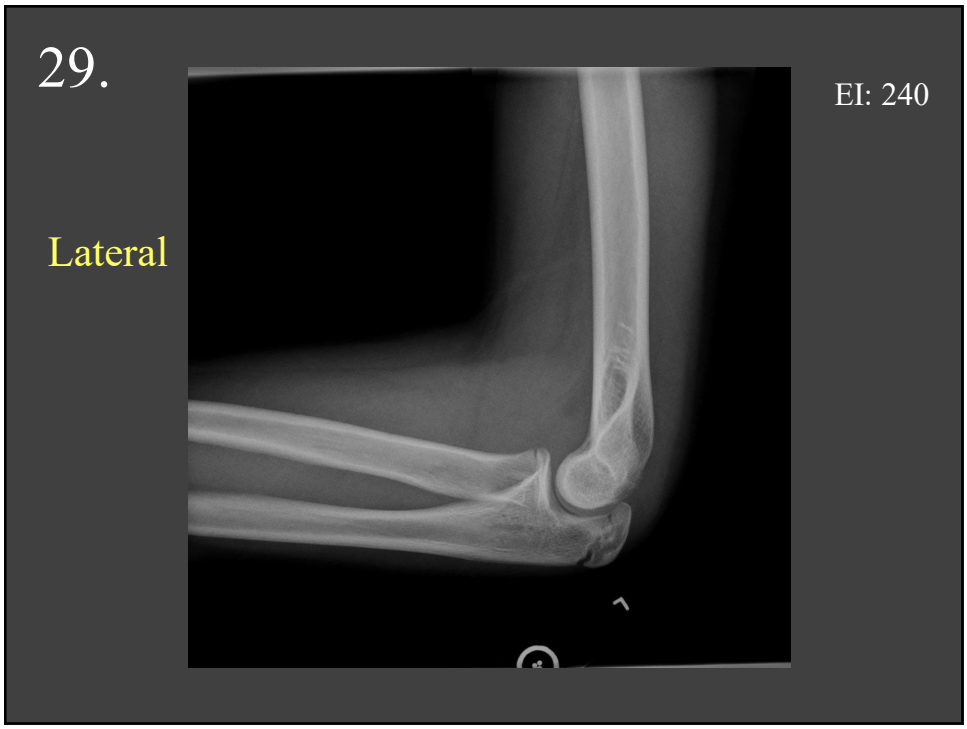

30

30.

Lateral

EI: 250

31

31.

Lateral

EI: 130

32

32.

Lateral

EI: 100

33

Forearm

34

Forearm - AP

- Evidence of proper collimation and presence of side marker placed clear of anatomy of interest
- Entire forearm, including wrist and distal humerus
- Slight superimposition of the radial head, neck, tuberosity over the proximal ulna
- No elongation or foreshortening of the humeral epicondyles
- Partially open elbow joint if the shoulder was placed in the same plane as the forearm
- Open radiolunlar space **(Merrill's only)**
- Bony trabecular detail and surrounding soft tissues

RH Protocol: Repeat images to correct the positioning of the wrist or elbow joint only should be performed as separate elbow or wrist images, not the entire forearm.

35

33.

AP

EI: 100

36

34.

AP

EI: 100

37

Forearm - Lateral

- Evidence of proper collimation and presence of side marker placed clear of anatomy of interest
- Entire forearm, including wrist and distal humerus in a true lateral position
- Superimposition of the radius and ulna at their distal end
- Superimposition by the radial head over the coronoid process
- Radial tuberosity facing anteriorly
- Superimposed humeral epicondyles
- Elbow flexed 90 degrees
- Bony trabecular detail and surrounding soft tissues

38

35.

Lateral

EI: 200

39

36.

Lateral

EI: 250

40

37.

Lateral

EI: 200

41

38.

Lateral

EI: 200

42

Insufficient collimation - It's unnecessary to include all soft tissue unless looking for foreign body

43