

WHAT'S IN A NAME?
DESCRIBING EPONYMOUS
EXTREMITY FRACTURES
(AND FEW OTHER NAMED INJURIES)

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Disclosures

Non-declaration Statement:

I have no relevant relationships with ineligible companies to disclose within the past 24 months

Session Objectives

- Review fracture terminology
- Identify common radiographic findings associated with extremity fractures
- Accurately describe common extremity fracture patterns
- Determine components of eponymous fractures and fracture-dislocations

Fracture Description

Clinical Presentation is Key:

- Always evaluate the joint above, joint below, and contralateral side.
- Let exam findings and MOI guide your imaging.
- If open fracture, start with this description!

Fracture Description: Radiographs

Location

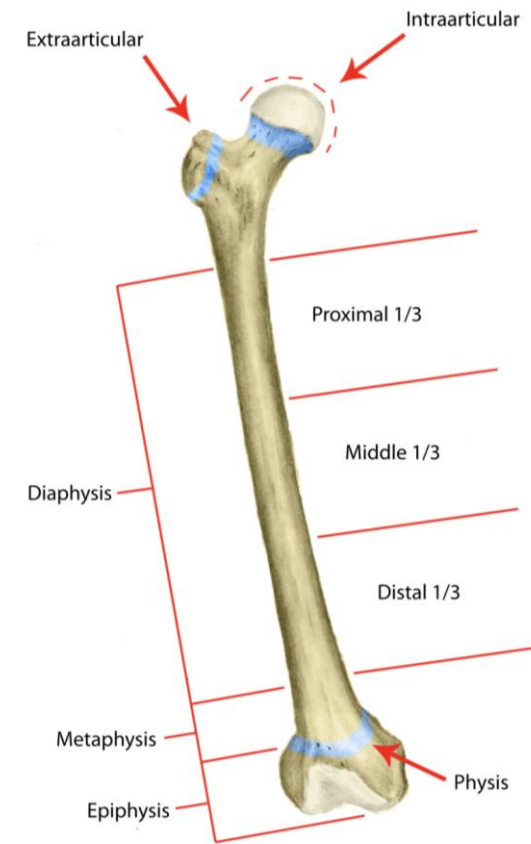
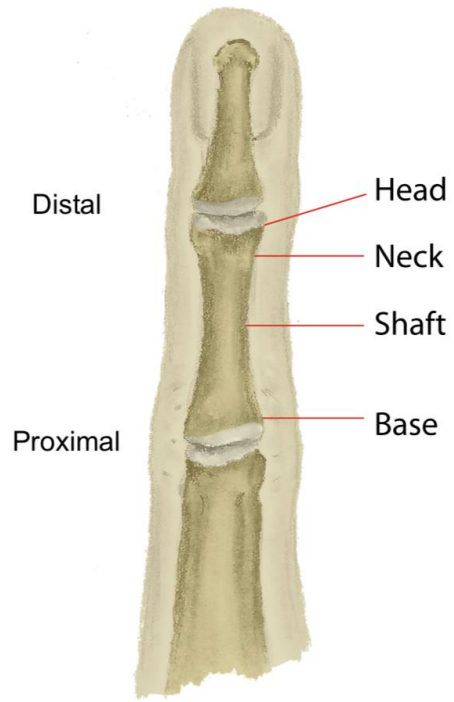
Type

Pattern

Position

Possible complications: open fractures, physeal involvement, pathologic

Anything else: additional injuries, artifacts, occult fractures



LOCATION

Which bone? Where in the bone? Joint involvement?



Transverse



Oblique



Spiral



Bowing



Greenstick



Torus

Pattern

Complete: transverse, oblique, spiral

Incomplete: greenstick, torus, bowing

Unique pattern

considerations: compression, impaction, avulsion, stress

Type Severity in Complete Fractures:

Number of fragments

Simple

- **Two fragments**

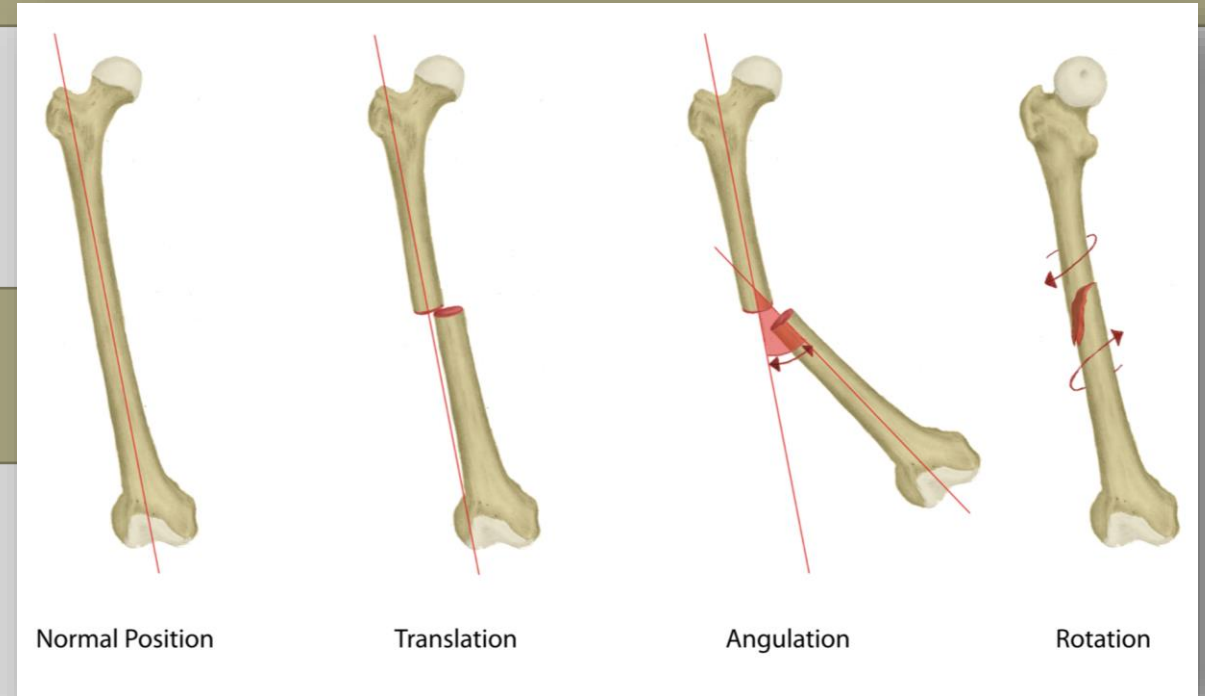
Comminuted

- **More than two fragments**

Position

- Non-Displaced vs Displaced?
- Displaced: Translation, Angulation, or Rotation?

*Description of position is based on distal fragment placement.



Translation: Described by % of Width or Measurement

Angulation: Measured in Degrees

Rotation: Best seen Clinically

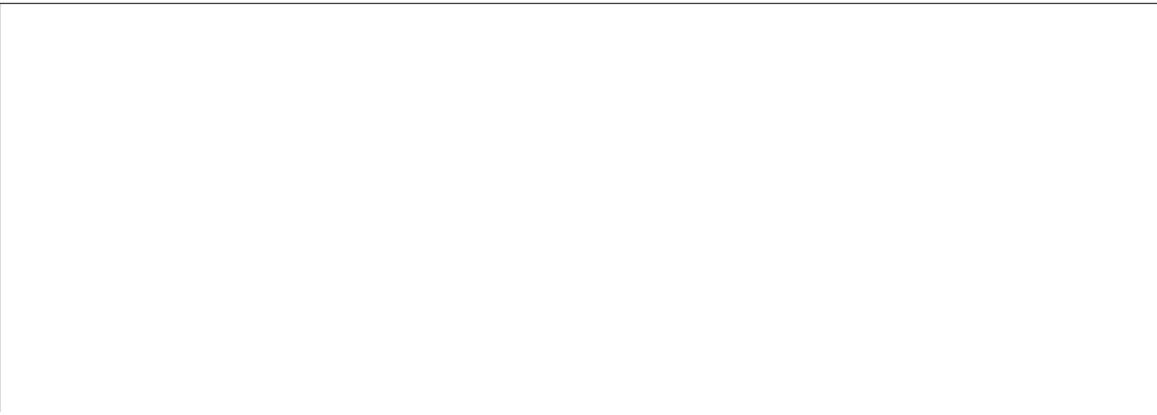
Length: Shortening, Distraction, or Impaction



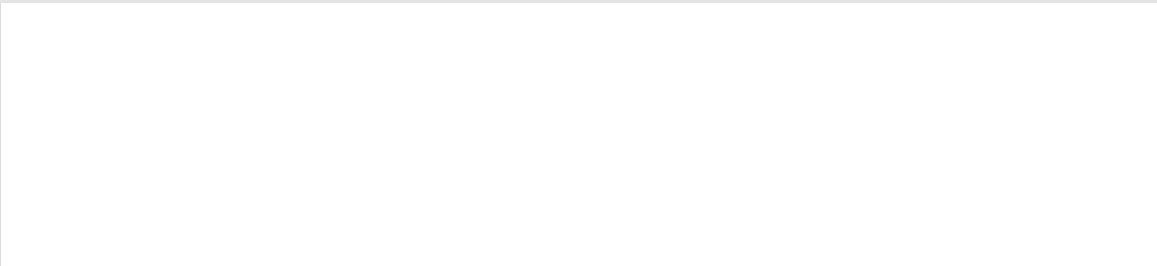
EPONYMS

Eponymous Fractures/Fracture-Dislocations

- Named fractures for who first described or classified the injury
- **Benefit:** Provides rapid, succinct description of complex fracture patterns.
- **Disadvantage:** Often mistermmed which creates confusion and misdirects management. *Does not always account for severity of the injury.*



TYPE I	TYPE II	TYPE III	TYPE IV	TYPE V
S	A	L	T	R



Salter-Harris Fracture

- Robert B Salter and William H Harris
- Pattern: Fracture classification system involving the physis in pediatric patients
 - **SH Type II is the most common**

Tip: Follow-up for at least 1 year to assess the risk to the growth plate



*UPPER EXTREMITY
EPONYMOUS FRACTURES*

Case #1

40 yo, male

Left shoulder pain following
anterior shoulder dislocation

Hx of repeat dislocations
(7 episodes in 6 months)





Case courtesy of Dr Benoudina Samir, Radiopaedia.org, rID: 58016

Hills Sachs Defect

- Radiologists Arthur Hill and David Sachs
- Pattern: compression fracture of the posterolateral humeral head
- MOI: Anterior shoulder dislocations
 - Impaction- anterior glenoid rim

TIP: AP with internal rotation of the shoulder provides best view

Case #2

25 yo, male

Right shoulder pain following
anterior shoulder dislocation

Hx of recurrent dislocations





Bankart Lesion

- English orthopedic surgeon Arthur Bankart
- Pattern: Soft tissue injury of the anteroinferior glenoid labrum (detachment/tear)
 - Bony Bankart is a fracture of the anteroinferior glenoid
- MOI: anterior shoulder dislocation
- *Commonly associated with Hills Sachs*

TIP: MRI preferred if additional imaging needed



CASE #3

Patient presents 5 weeks following injury to
right distal humerus





Holstein-Lewis Fracture

- American orthopedic surgeons Arthur Holstein and Gwilym Lewis
- Pattern: Spiral fx of the distal third of the humerus
- MOI: trauma

TIP: Radial nerve at risk for neuropraxia

Case #4

Young adult, male

Fall while playing sports

Right forearm and wrist
pain with obvious deformity



Galeazzi Fracture - Dislocation

- Italian surgeon Ricardo Galeazzi
- Pattern: radial shaft fracture (middle/distal third) with associated dislocation of the distal radioulnar joint (DRUJ)
- MOI: FOOSH, forearm pronation or supination

TIP: Galeazzi equivalent is a more common fracture pattern if seen in kids

- Radial shaft fx with ulnar physis displacement distally (DRUJ remains intact)



Case #5

30 yo, male

Assault with iron bar while
trying to protect head

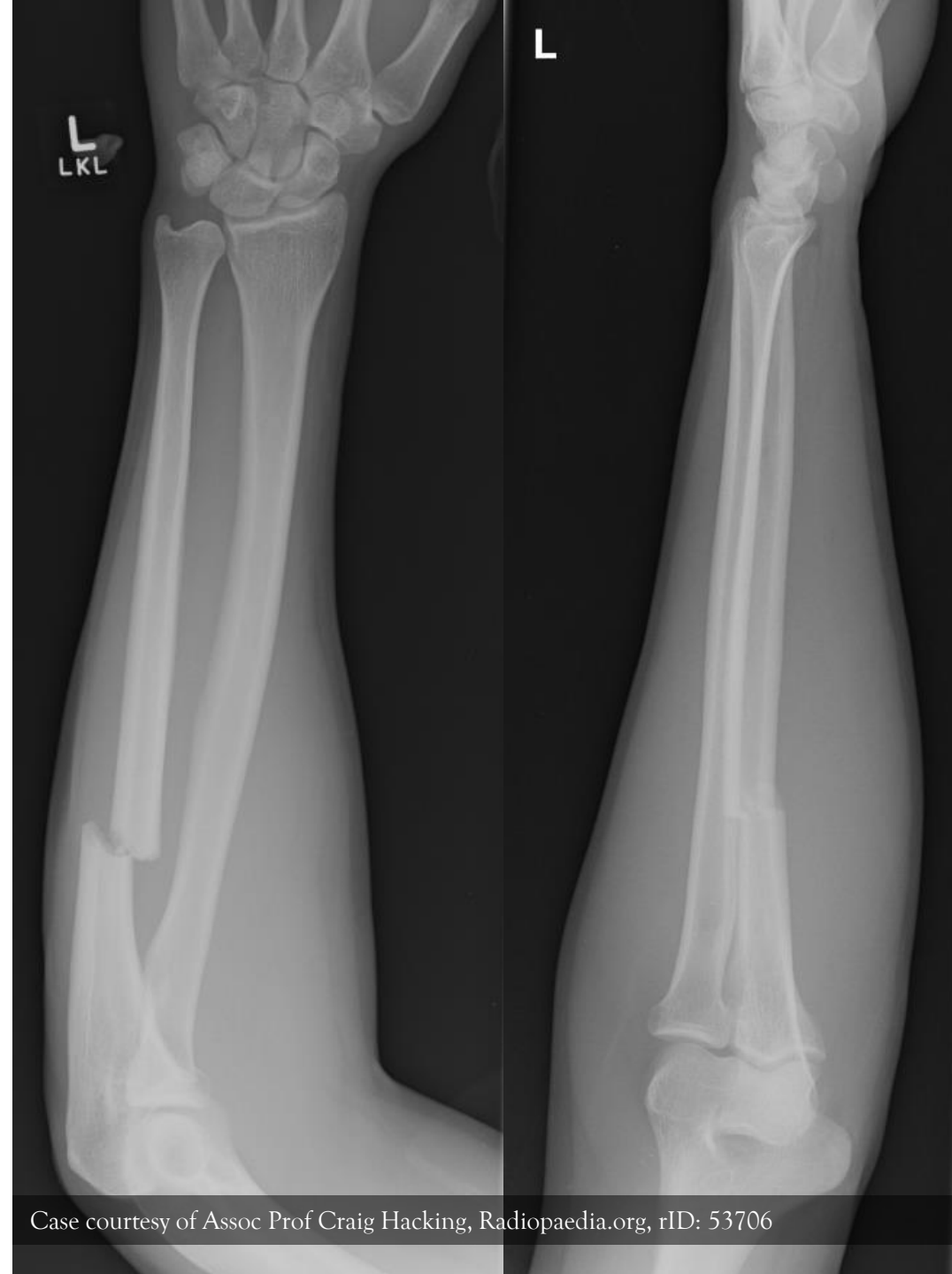
Left forearm pain



Nightstick Fracture

- Named after police baton (nightstick) impacting the midshaft of the ulna with a direct blow
- Pattern: isolated ulnar shaft fracture
 - Typically, transverse in midshaft
- MOI: direct impact of blunt object to the forearm often while attempting to block a blow to head
 - Must consider defensive wound, assault

TIP: When “isolated” ulnar shaft fx identified, complete elbow and wrist examination with images are necessary to assess for associated injuries



Case #6

Child, male

Fall

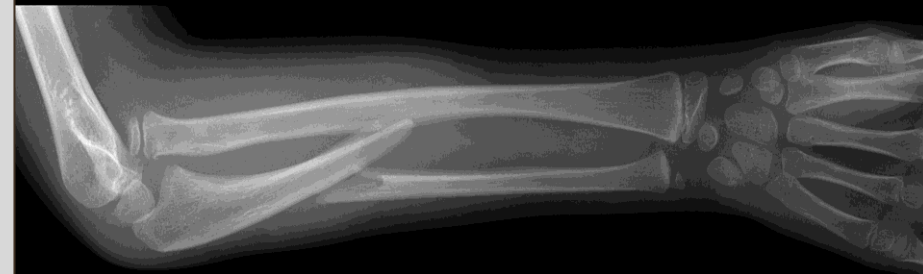
Right arm pain



Monteggia Fracture - Dislocation

- Milanese surgeon Giovanni Battista Monteggia
- Pattern: **ulna** shaft (proximal third) fx with dislocation of radial head
- MOI: majority are FOOSH with forearm pronation or hyper extension
- *Pattern and MOI variability: Bado classification (Type I-IV)

TIP: Majority require surgery and delayed treatment increases risk for complications



Case #7

Adult

Fall

Right wrist pain



Colles Fracture

- Irish surgeon Abraham Colles
- Pattern: extra-articular distal radius fracture with impaction and dorsal angulation/displacement
 - “dinner fork deformity”
- MOI: FOOSH or high impact trauma

TIP: 50% associated ulnar styloid fracture



Case #8

35 yo, female

Slipped on ice and fell
onto flexed wrist

Right wrist pain

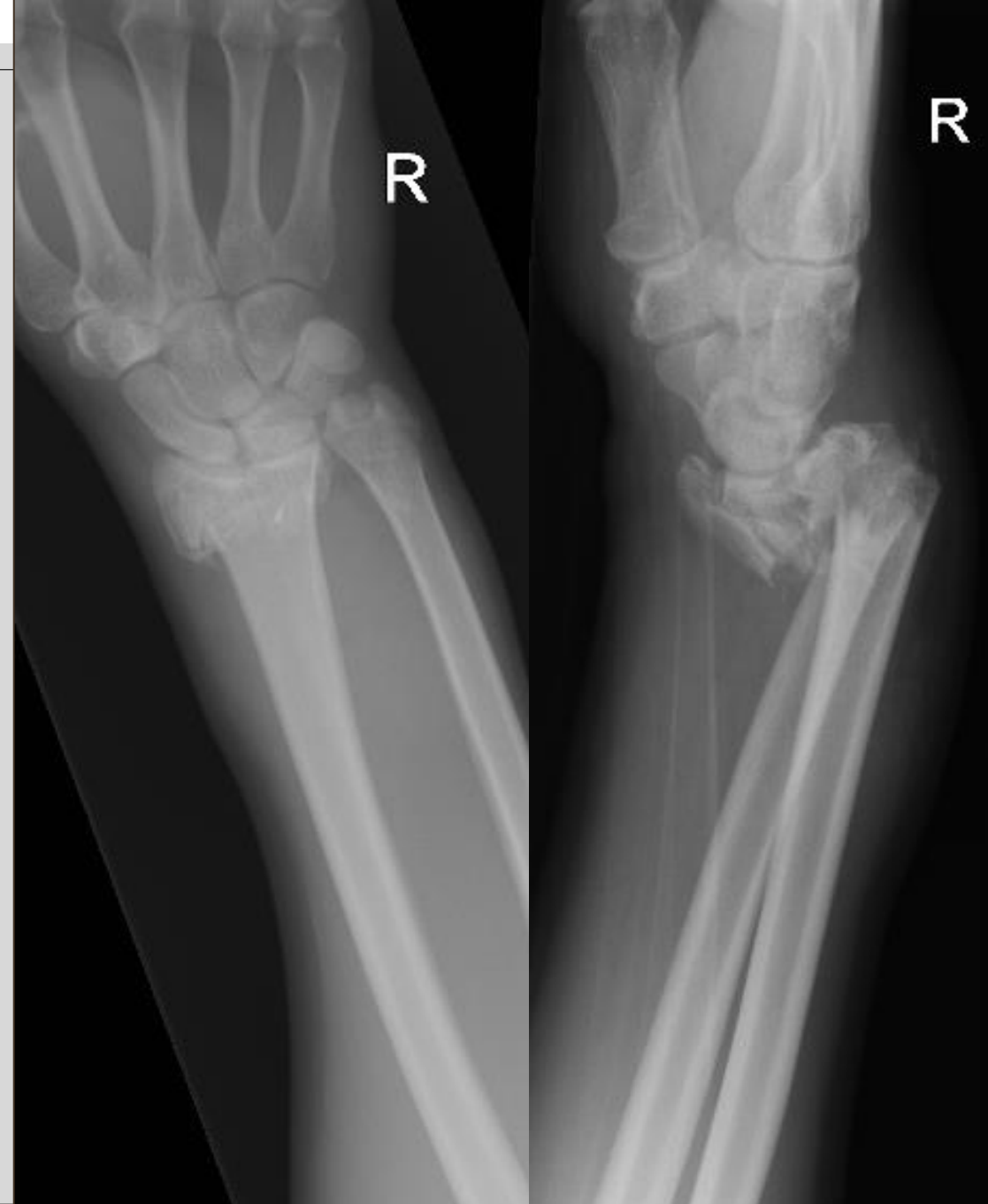


Smith Fracture

- Irish surgeon and pathologist Robert Smith
- Pattern: transverse fracture of the distal radius with volar angulation/displacement
 - Also termed Reverse Colles
- MOI: Fall on flexed wrist

TIP: Smith fx with articular extension is termed Reverse Barton (Volar-type)

37



Case #9

30 yo, male

Fall

Right wrist pain



Barton Fracture

- American surgeon John Rhea Barton
- Pattern: oblique fracture of the distal radius with articular extension dorsally
 - Dorsal-type: Barton fracture
 - Volar-type: reverse Barton fracture

TIP: Often associated with dorsal subluxation/dislocation of radiocarpal joint

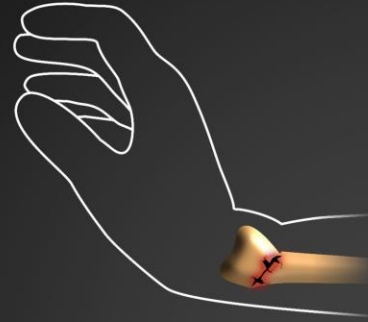


Common distal radius fractures

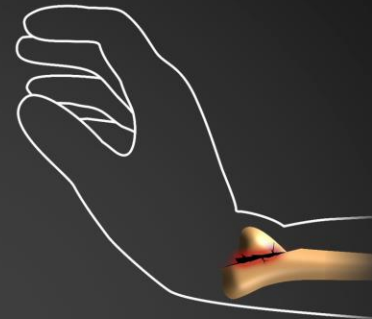
Extra-articular

Intra-articular

Dorsal angulation

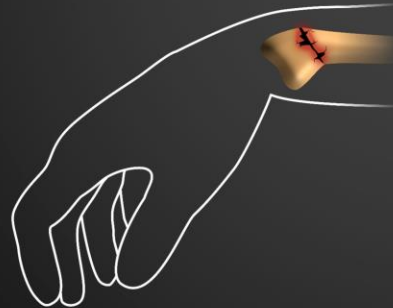


Colles

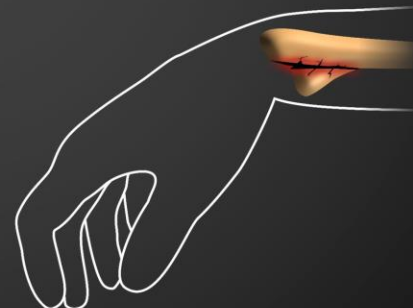


Dorsal Barton

Volar angulation



Smith



Volar Barton /
Reverse Barton

Case courtesy of Dr Maciej Debowski, Radiopaedia.org, rID: 66146

Case #10

30 yo, female

Fall from a horse

Right wrist pain



Chauffeur Fracture

- Also known as Hutchinson or Backfire
- British Surgeon, Johnathan Hutchinson
- Named for injury sustained when using a hand crank and it unexpectedly jerked back impacting wrist
- Pattern: intra-articular oblique fracture of radial styloid process
 - Scaphoid impacts radius
- MOI: direct trauma to dorsum of wrist or FOOSH

TIP: May be considered avulsion fracture as the radiocarpal ligaments remain attached to styloid



Case courtesy of Dr Alexandra Stanislavsky, Radiopaedia.org, rID: 12360

Case #11

30 yo, male

Trauma

Left thumb and hand
pain



Bennett Fracture

- Irish surgeon, Edward Bennett
- Pattern: intra-articular oblique fracture at the base of the first metacarpal
 - Associated with subluxation or dislocation of carpometacarpal joint
- MOI: axial trauma with partially flexed metacarpal

TIP: Consider Rolando fx if in more than two parts



Case #12

40 yo, male

Trauma

Right thumb and
hand pain



Rolando Fracture

- Silvio Rolando
- Pattern: comminuted intra-articular first metacarpal base fracture
 - ≥ 3 parts
- MOI: axial trauma with partially flexed metacarpal

TIP: unstable fx typically requiring surgery with hand specialist



Case #13

25 yo, female

Punched wall

Right ulnar-sided
hand pain

R



R



Boxer Fracture

- Named attributed to MOI typically caused by punching with a closed fist
- Pattern: Transverse fracture of 5th MC neck
 - Must assess amount of volar angulation and rotation to determine management
- MOI: direct blow with clenched fist
 - Vast majority are young adult men

TIP: Long-term effects may include loss of prominence to the the knuckle and potential overlapping of digits if rotation deformity





*LOWER EXTREMITY
EPONYMOUS FRACTURES*



CASE # 14

Left knee trauma and acute pain





Segond Fracture

- French surgeon Paul Segond
- Pattern: avulsion fracture of the proximal lateral tibia (inferior to the tibial plateau)
- MOI: internal rotation of the knee with varus stress

TIP: frequent association with ACL tears, meniscal tears, and other soft tissue injuries

- MR imaging of the knee

Case #15

30 yo, female

Slipped down the
stairs

Right lower leg pain



Maisonneuve Fracture

- French surgeon Jacque Gilles Maisonneuve
- Pattern: spiral fracture of the proximal fibula with associated unstable ankle injury
 - Disruption of the distal tibiofibular syndesmosis +/- medial malleolus fx, and interosseous tear
 - May have widening at ankle mortise
- MOI: force on externally rotated ankle with a pronated foot

TIP: Always assess proximal fibula with ankle injuries to avoid missing this injury



Case #16

30 yo, male

MVA

Right ankle pain

R



R



Pilon Fracture

- Named after the French word for pestle which is used for crushing with a mortar
- Pattern: tibial plafond intra-articular fracture

- MOI: axial load
 - Talus impacting tibia

TIP: CT scan may be beneficial to define fracture pattern and severity



Case #17

16 yo, male

Fall and unable to
bear weight

Right ankle pain

R



Tillaux Fracture

- French surgeon Paul Tillaux
- Pattern: fracture of the anterolateral tubercle of the distal tibia
- Salter Harris Type III
- MOI: pull of the anteroinferior tibiofibular ligament in abduction/external rotation
- Fracture requires an open physis: Adolescent injury

TIP: If metaphyseal involvement consider Triplane fracture (SH Type IV)



Case #18

15 yo, male

Twist injury

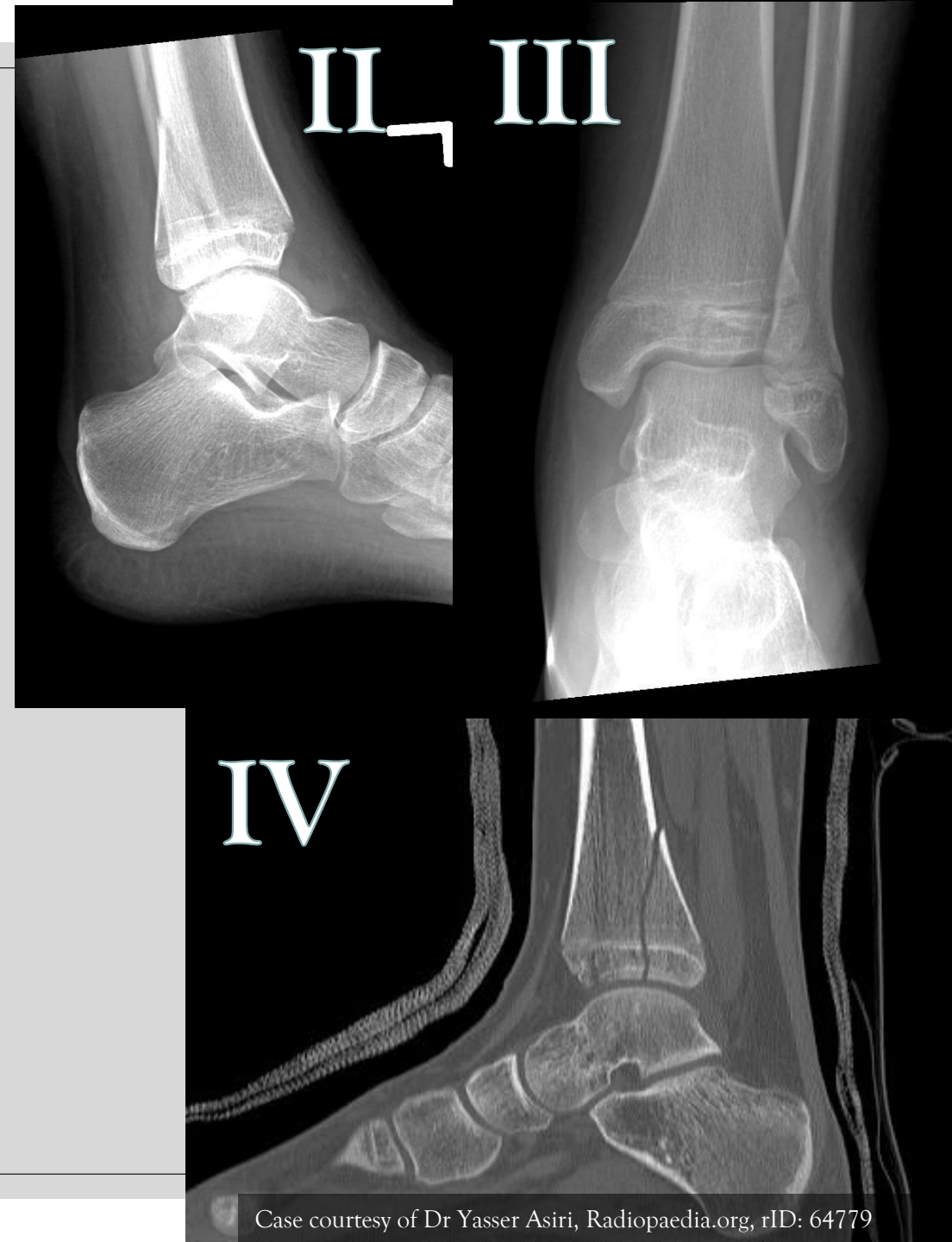
Left ankle pain



Triplane Fx

- Name reflects the injury extending along the frontal, lateral, and transverse planes
- Pattern: SH IV fracture of the distal tibia
 - Epiphysis: vertical fx
 - Physis: horizontal fx
 - Metaphysis: oblique fx
- MOI: External rotation and supination injury in adolescents as epiphyseal plate is closing

TIP: Fractures appear as a SH II on lateral view and SH III on AP view



Case #19

3 yo, male

Jumped off sofa

Unable to bear weight
on the right



Toddler Fracture

- Named for typical age for injury to occur
- Ambulatory child between 9 months - 3 years
- Pattern: minimal or nondisplaced tibia spiral or oblique fracture
 - Typically, 9 months - 3 years
- MOI: falling while running/twisting mechanism
- SLIDES!

TIP: Fracture is commonly subtle or occult on initial radiographs.

Case #20

35 yo, male

Trauma

Right lateral foot pain



Jones Fracture

- Welsh Orthopaedic Surgeon Sir Robert Jones
- Pattern: transverse fracture at the metadiaphyseal junction without articular or distal extension of the fracture
 - Pseudo-Jones (Dancer Fracture): avulsion fracture of the fifth metatarsal base
- MOI: plantarflexion with adduction force to forefoot

Tip: Higher rate of nonunion, delayed union, or refracture due to the watershed blood supply





QUICK REVIEW









Final Tips

1

Correlate with
clinical findings

2

Document
presence of
potential associated
injuries

3

Describing a fracture is far
more important than the
unique name!

References

1. Espinosa JA, Nolan TW. Reducing errors made by emergency physicians in interpreting radiographs: longitudinal study. *BMJ*. 2000;320(7237):737-740.
2. Eng J, Mysko WK, Weller GE, et al. Interpretation of emergency department radiographs a comparison of emergency medicine physicians with radiologists, residents with faculty, and film with digital display. *AJR AM J Roentgenol*. 2000;175:1233-1238.
3. Bolander, S. A systematic approach to describing fractures. *JAAPA*. 2019;32(5):23-29.
4. Martin J, Marsh JL, Nepola JV, Dirchl DR, Hurwitz S, DeCoster TA. Radiographic fracture assessments: which ones can we reliably make? *J Orthop Trauma*. 2000;14(6):379-385.
5. Nguyen JC, Markhardy BK, Merrow AC, Dwek JR. Imaging of pediatric growth plate disturbances. *Radiographics*. 2017;37(6):1791-1812.
6. Wong PK, Hanna TN, Shuaib W, et al. What's in a name? Upper extremity fracture eponyms (part 1). *Int J Emerg*. 2015;8:27.
7. Wong PK, Hanna TN, Shuaib W, et al. What's in a name? Lower extremity fracture eponyms (part 2). *Int J Emerg*. 2015;8:25.

Resources

- AAOS: <http://www.aaos.org/>
- POSNA: <https://posna.org/>
- AAFP: <http://www.aafp.org/>

- Radiopaedia: <http://radiopaedia.org/>
- OrthoBullets: <https://www.orthobullets.com>

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