A Fracture, By Any Other Name: Identifying and Describing Eponymous Extremity Fractures

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Disclosures

- No relevant commercial relationships to disclose

Session Objectives

- Recognize common radiographic findings associated with orthopedic injuries of the extremities
- Describe a fracture in terms of site, location, configuration, articular involvement, displacement, and other associated findings
- Identify and describe components required for eponymous fractures and fracture-dislocations
- Articulate and document radiographic findings succinctly for common extremity fractures

Eponymous Fracture or Fracture-Dislocation

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

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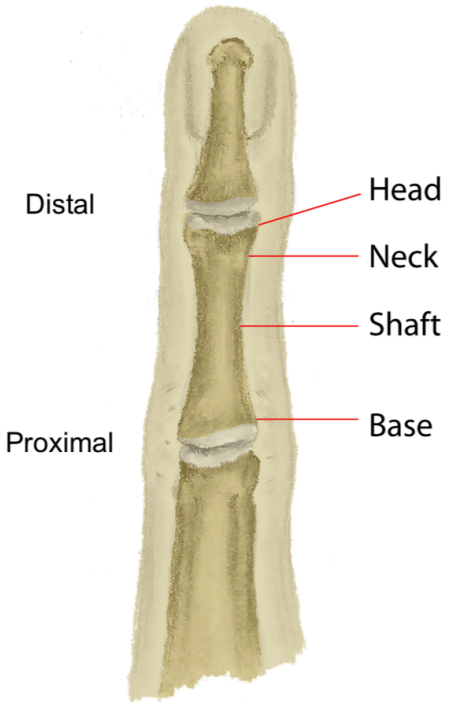
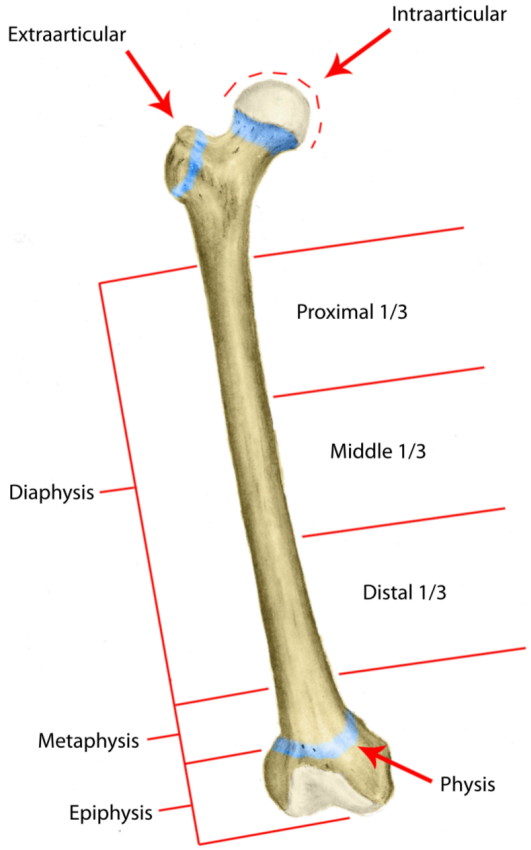




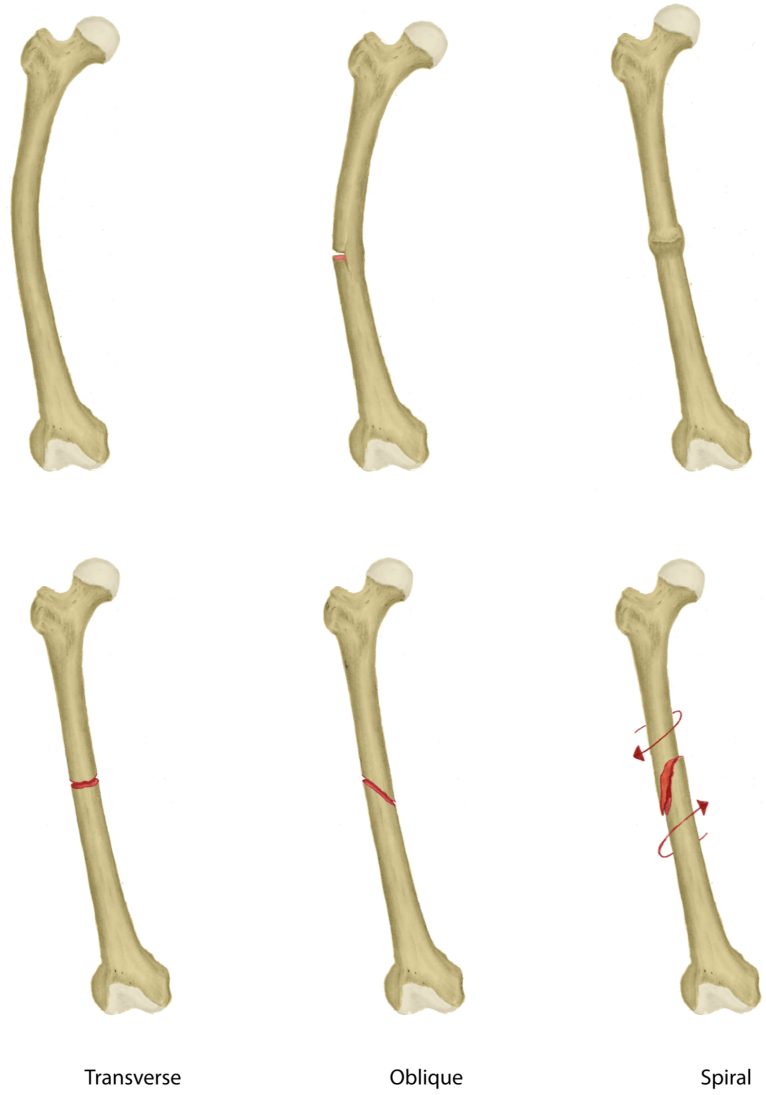
LOCATION

Which bone? Where in the bone? Joint involvement?

Articular Extension

Case courtesy of Dr Aditya Shetty, Radiopaedia.org, rID: 28755

Case courtesy of eduardo bravo, Radiopaedia.org, rID: 55586

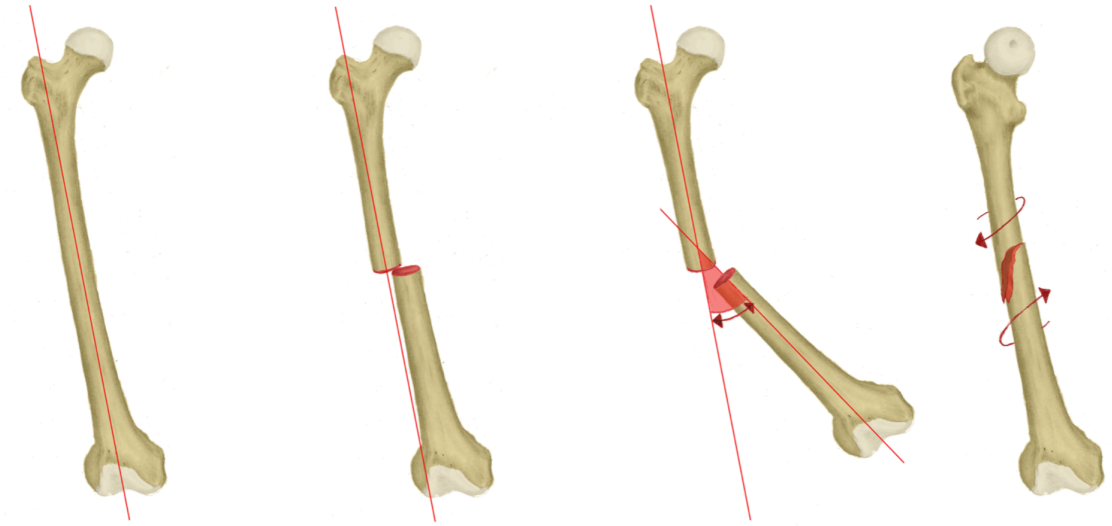


Pattern

Complete: transverse, oblique, spiral

Incomplete: greenstick, torus, bowing

Unique pattern considerations: compression, impaction, avulsion, stress



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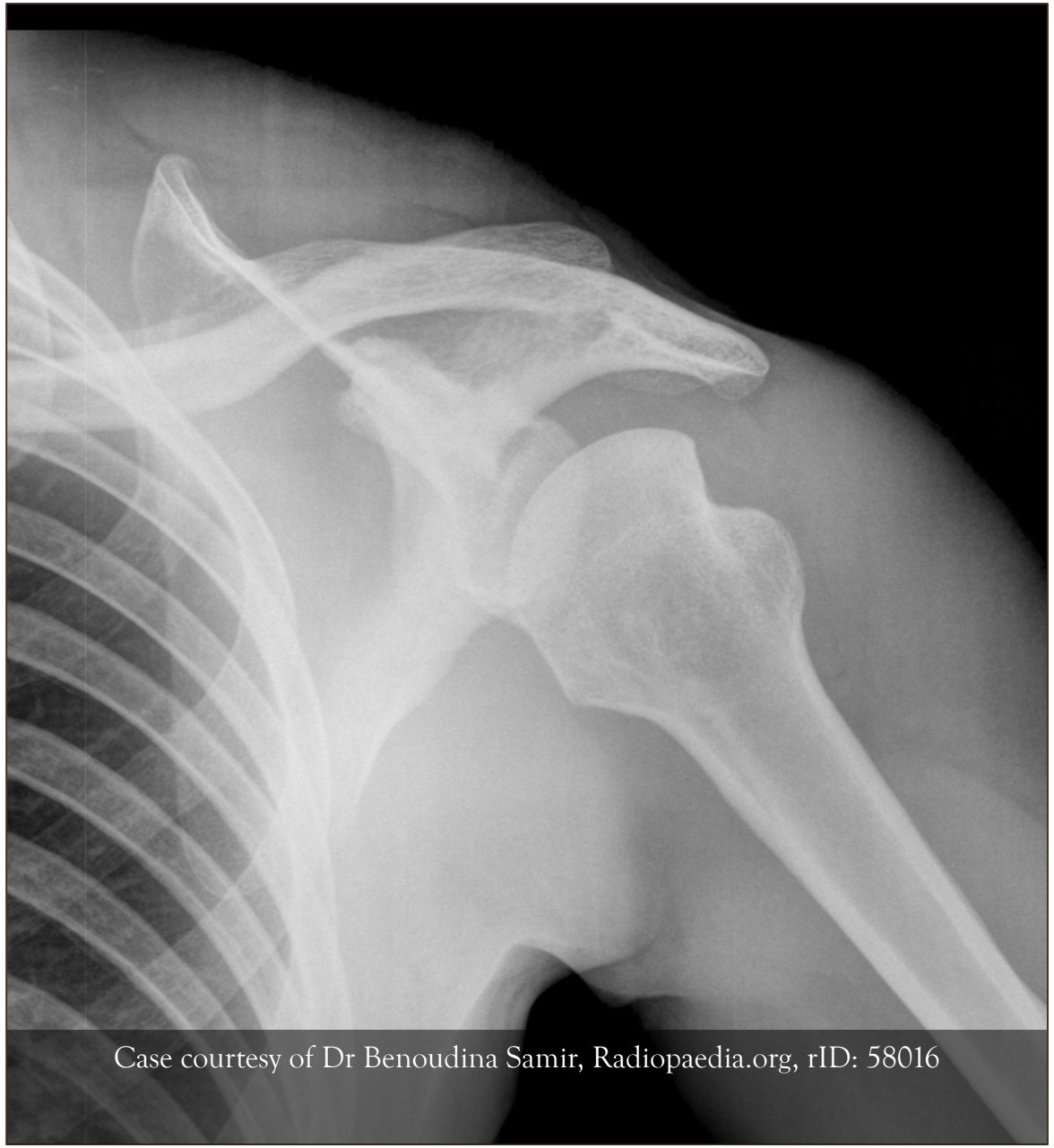
Position

Nondisplaced vs Displaced:

- Translation (Apposition)
- Angulation
- Rotation
- Shortening
- Distraction

UPPER EXTREMITY EPONYMOUS FRACTURES



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
- *Commonly associated with Bankart lesion*

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

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 courtesy of Dr Maulik S Patel, Radiopaedia.org, rID: 10089

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

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 courtesy of Dr Alexandra Stanislavsky, Radiopaedia.org, rID: 10961

Monteggia Fracture - Dislocation

- Milanese surgeon Giovanni Battista Monteggia
- Pattern: **ulna** shaft (proximal third) fx with dislocation of radial head
- MOI: Direct blow to the ulna or FOOSH

TIP: When "isolated" ulnar shaft fx identified, complete elbow and wrist examination with images are necessary

- Major medicolegal concern if missed

Case courtesy of Assoc Prof Frank Gaillard, Radiopaedia.org, rID: 8012

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

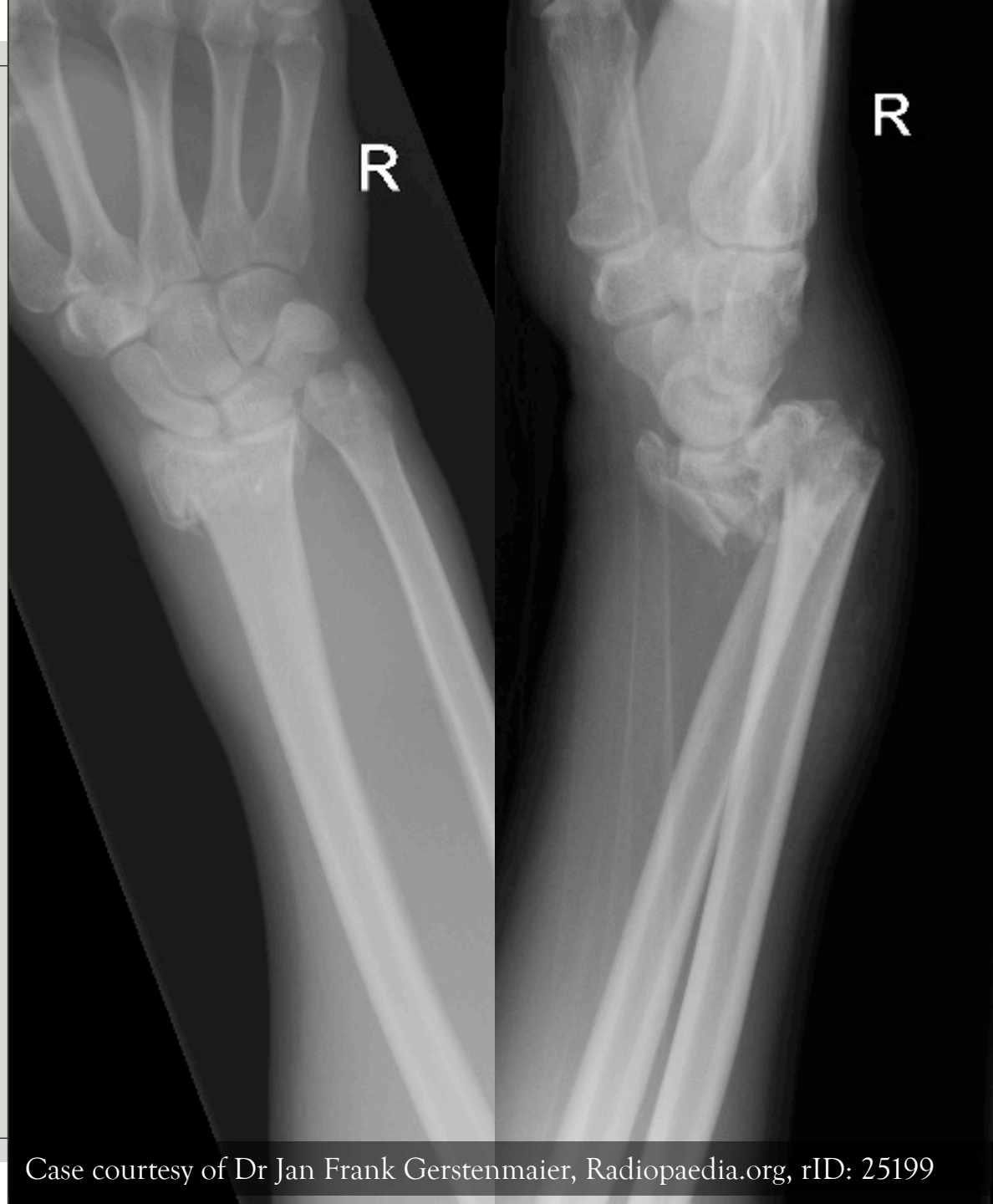
TIP: 50% associated ulnar styloid fracture

Case courtesy of Townsville radiology training, Radiopaedia.org, rID: 17977

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 articulation is termed Reverse Barton (Volar-type)



Case courtesy of Dr Jan Frank Gerstenmaier, Radiopaedia.org, rID: 25199

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

Case courtesy of Dr Aditya Shetty, Radiopaedia.org, rID: 28755

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 courtesy of eduardo bravo, Radiopaedia.org, rID: 55586

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

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LOWER EXTREMITY EPONYMOUS FRACTURES

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

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 courtesy of RMH Core Conditions, Radiopaedia.org, rID: 29088

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 courtesy of Dr Balint Botz, Radiopaedia.org, rID: 74925

Lisfranc Injury
(Sprain - Fracture - Dislocation)

- French surgeon Jacque Lisfranc de Saint-Martin
- Pattern: tarsometatarsal fracture-dislocation (multiple variants)
  - Disruption typically between the articulation of the medial cuneiform and base of the second/third metatarsal
- MOI: crush injury or indirect force in hyperplantarflexion

Radiographs- weight bearing images may be helpful

  - Widening and /or avulsion at the interval between the 1st and 2nd MT ("fleck sign") or Step-off on lateral views:

Case courtesy of Radswiki, Radiopaedia.org, rID: 1158

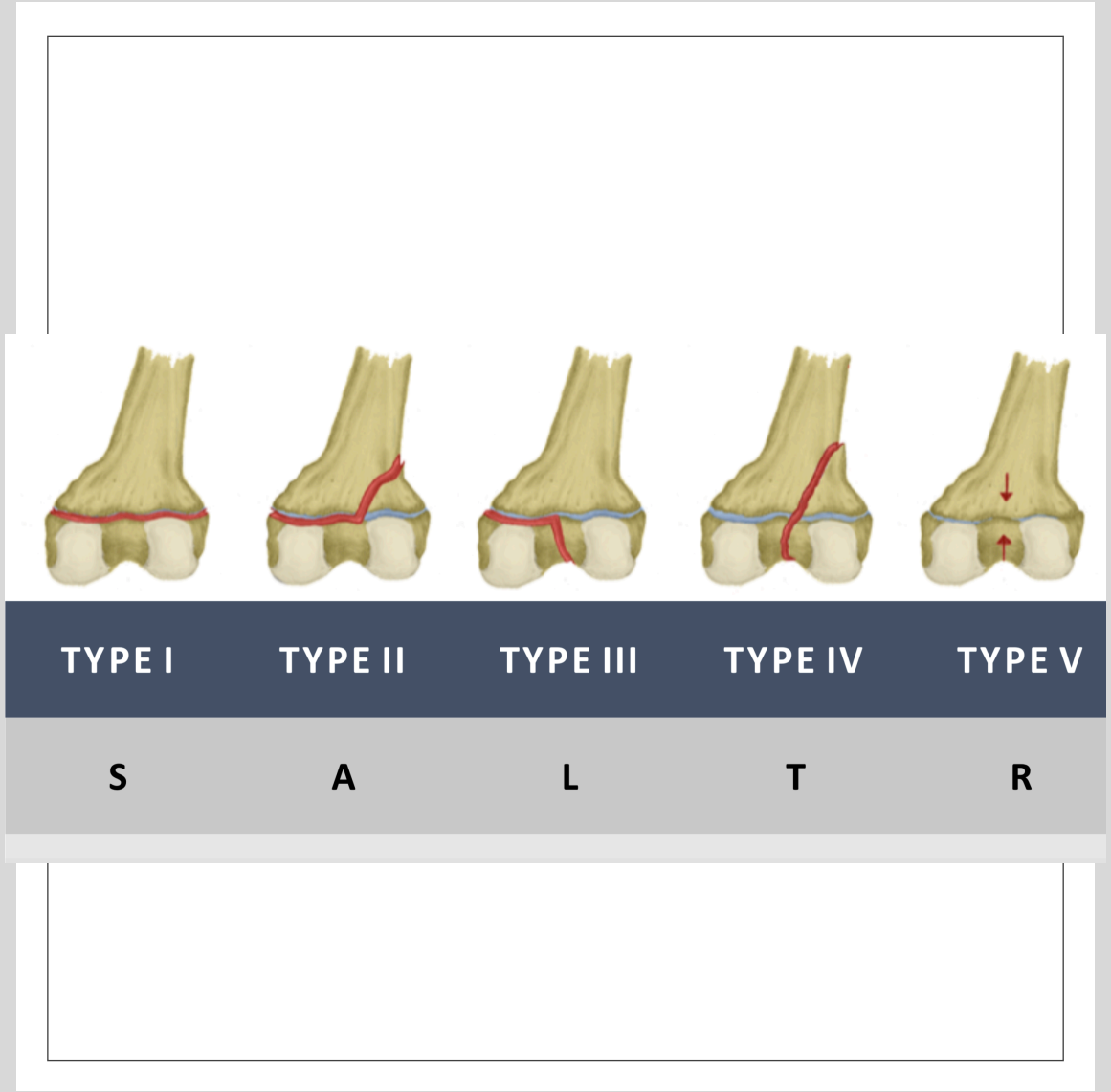
TIP: Risk for post-traumatic arthritis and chronic pain

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

Case courtesy of Dr Matt Skalski, Radiopaedia.org, rID: 35716



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

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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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