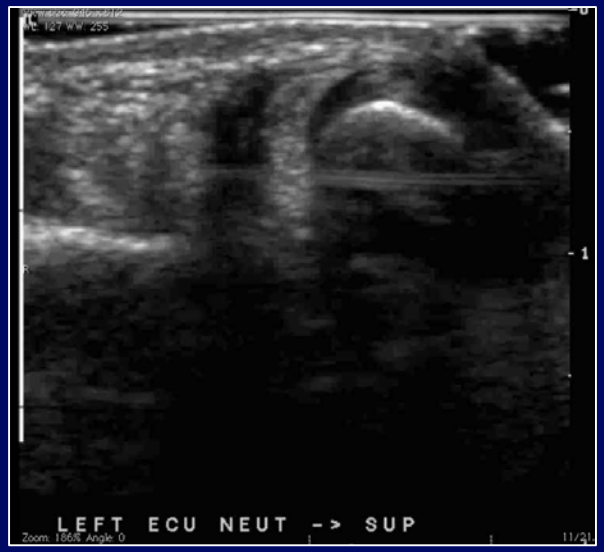
Musculoskeletal US: Common Wrist Pathology



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Disclosures

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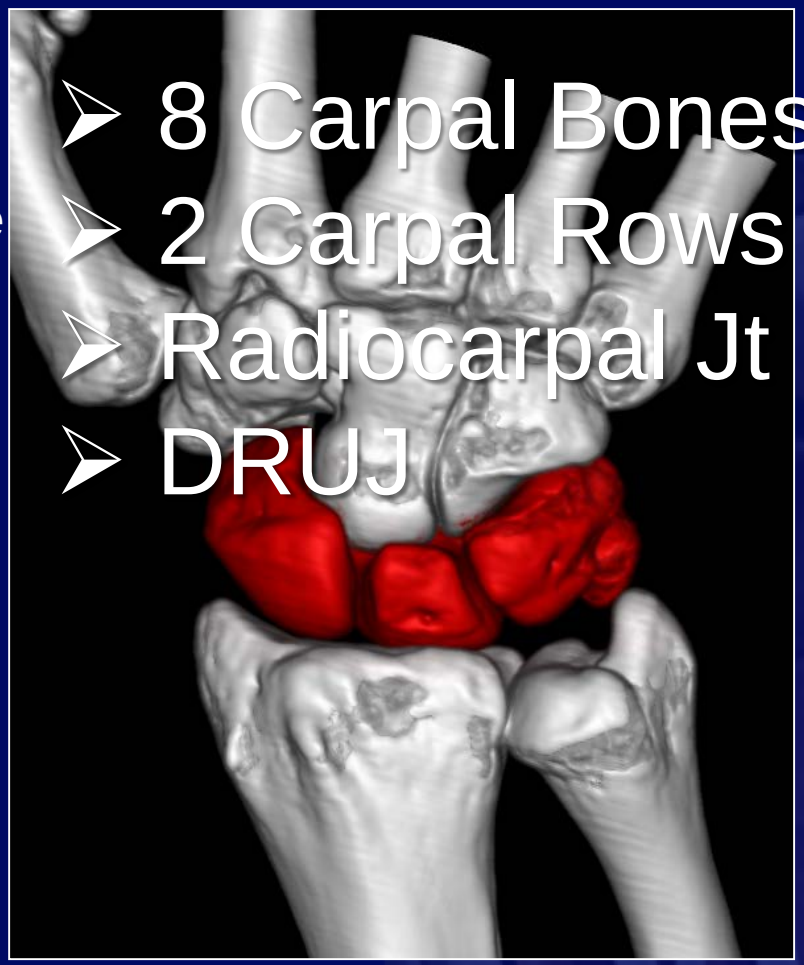
- Research: Supersonic Imagine
- Royalties: Elsevier

Objectives

- Show that ultrasound is well-suited to evaluate the normal structures of the wrist
- Discuss the normal US appearance and dynamic movement of the ECU
- Demonstrate common pathology involving the wrist

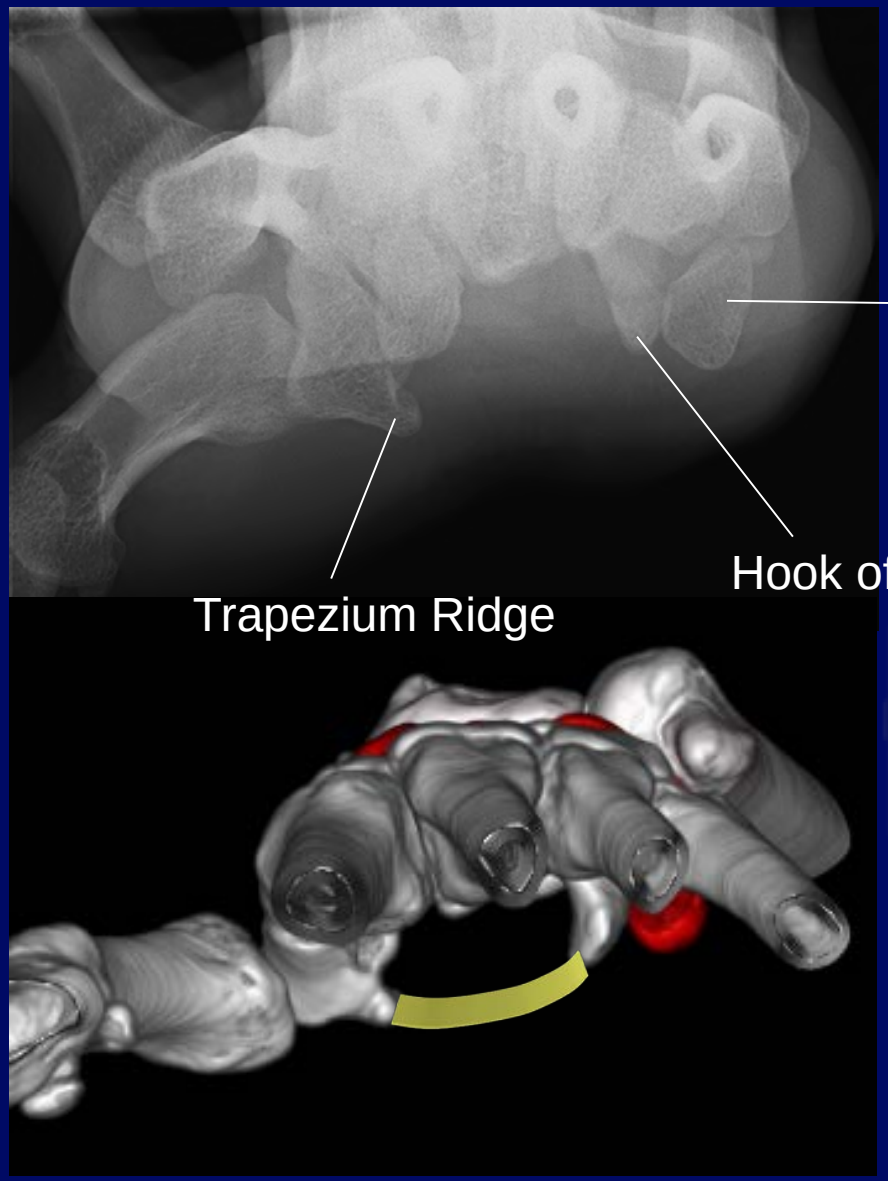
Bone Anatomy

PA View

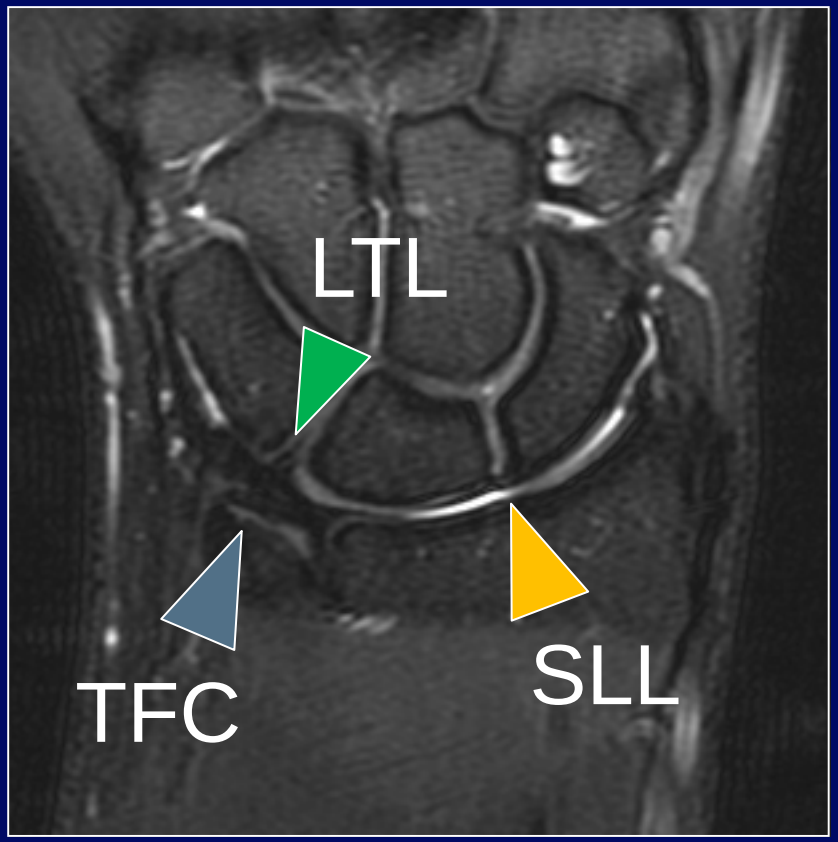


- 8 Carpal Bones
- 2 Carpal Rows
- Radiocarpal Jt
- DRUJ

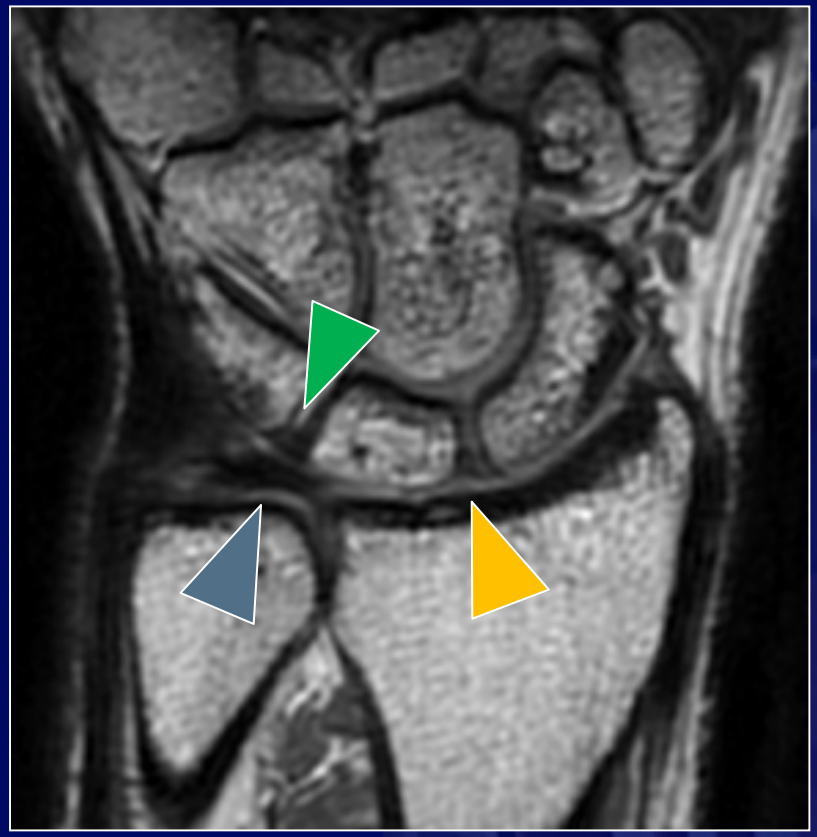
Carpal Tunnel View



Intrinsic Ligaments

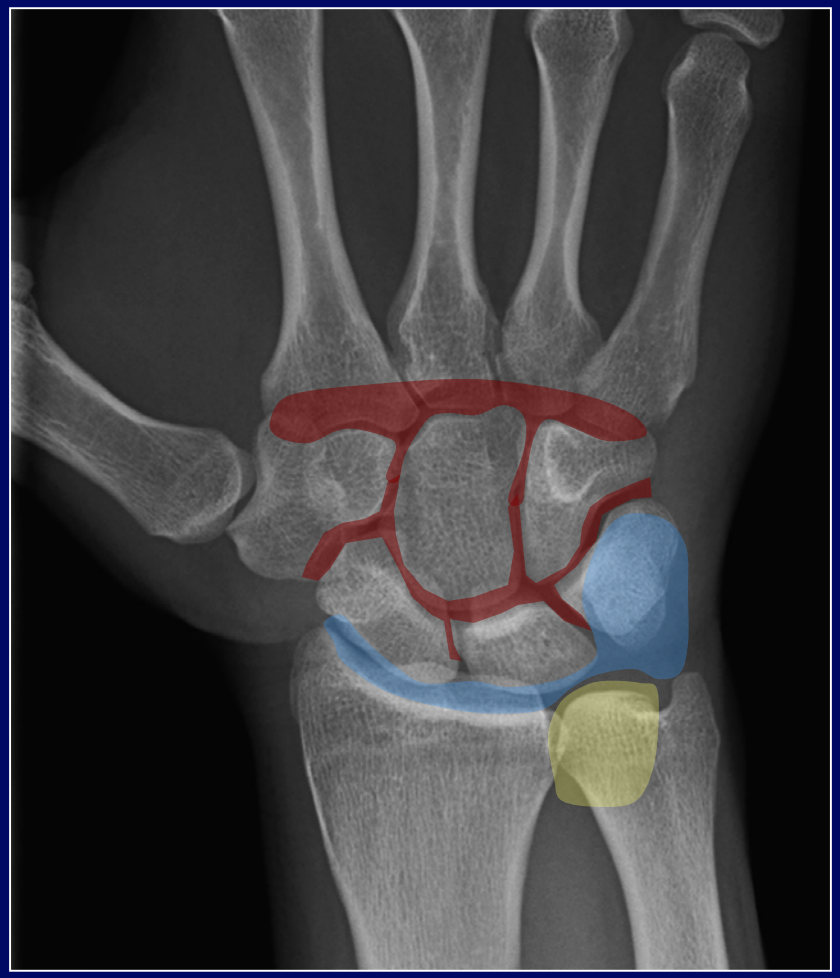


MRI T2-W



MRI PD-W

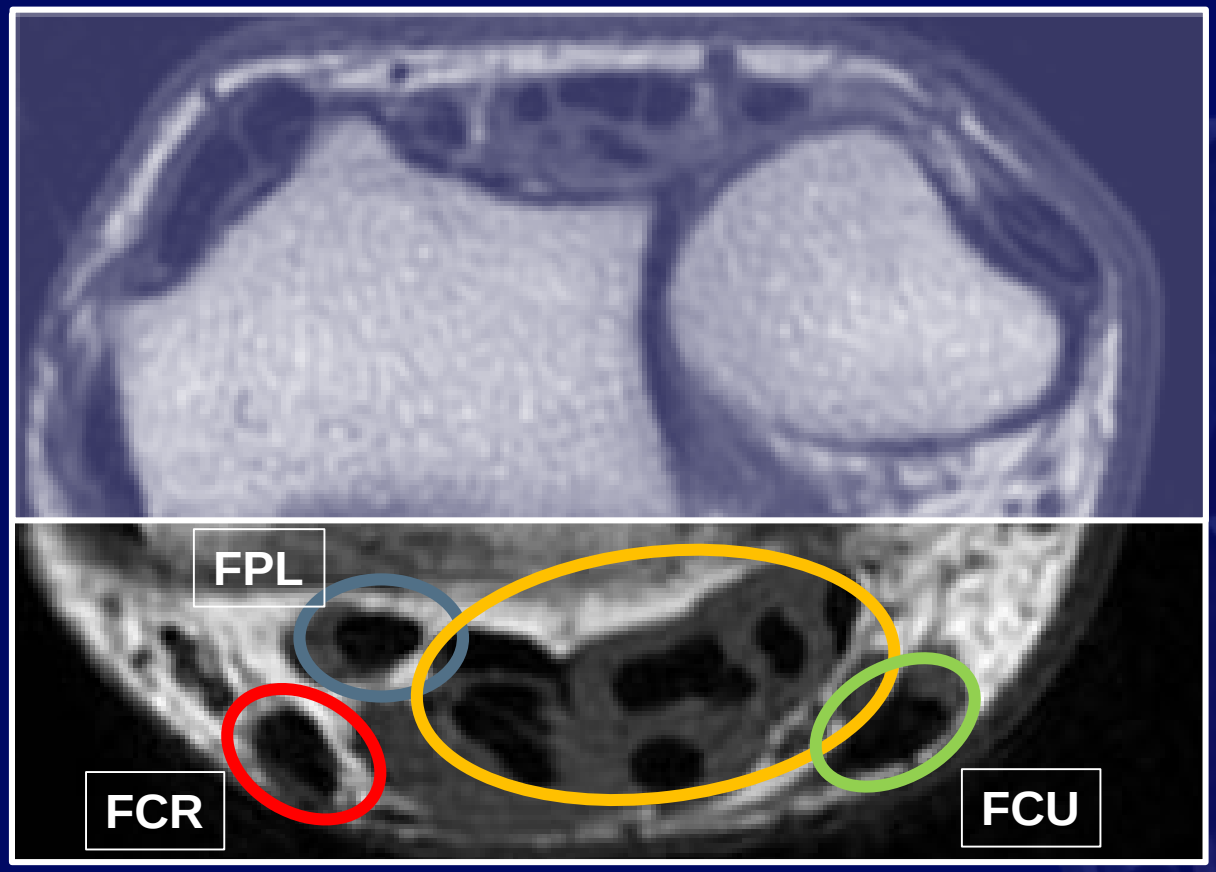
Three Compartments



Musculoskeletal Ultrasound

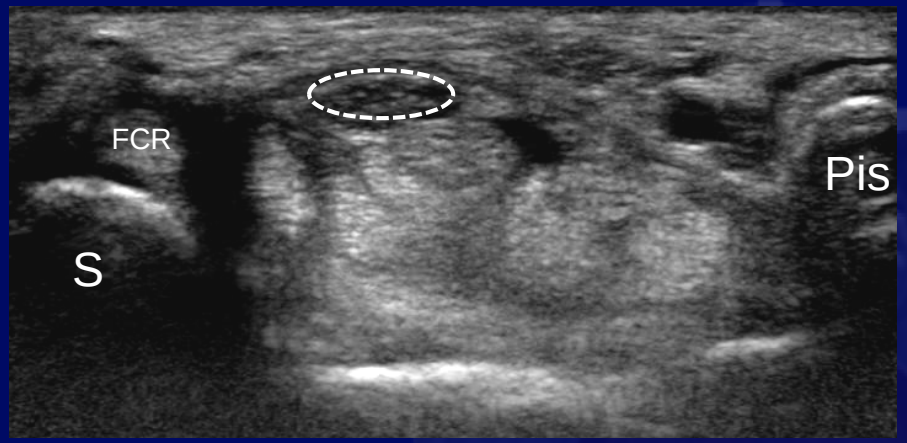
- Indications
  - Focused but complete exam
  - Characterize soft tissue mass
    - Cyst or Solid
- US-Guided Procedures
    - Injection
    - Aspiration

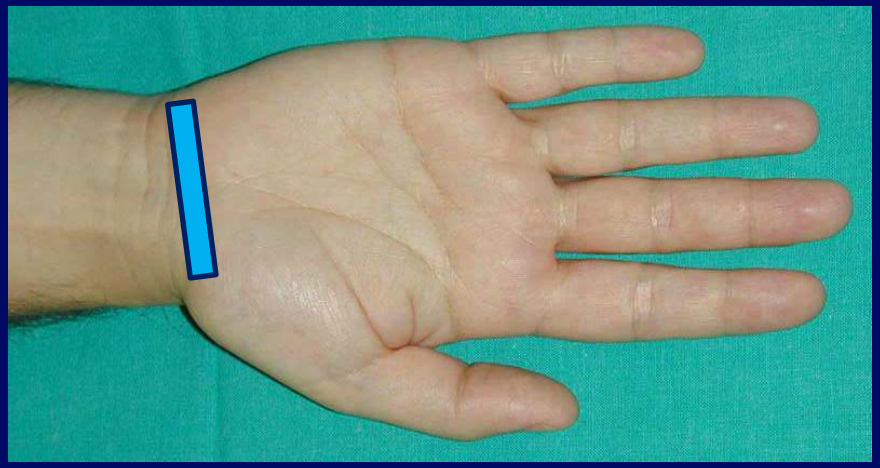
Flexor Tendons



Volar Wrist: Technique

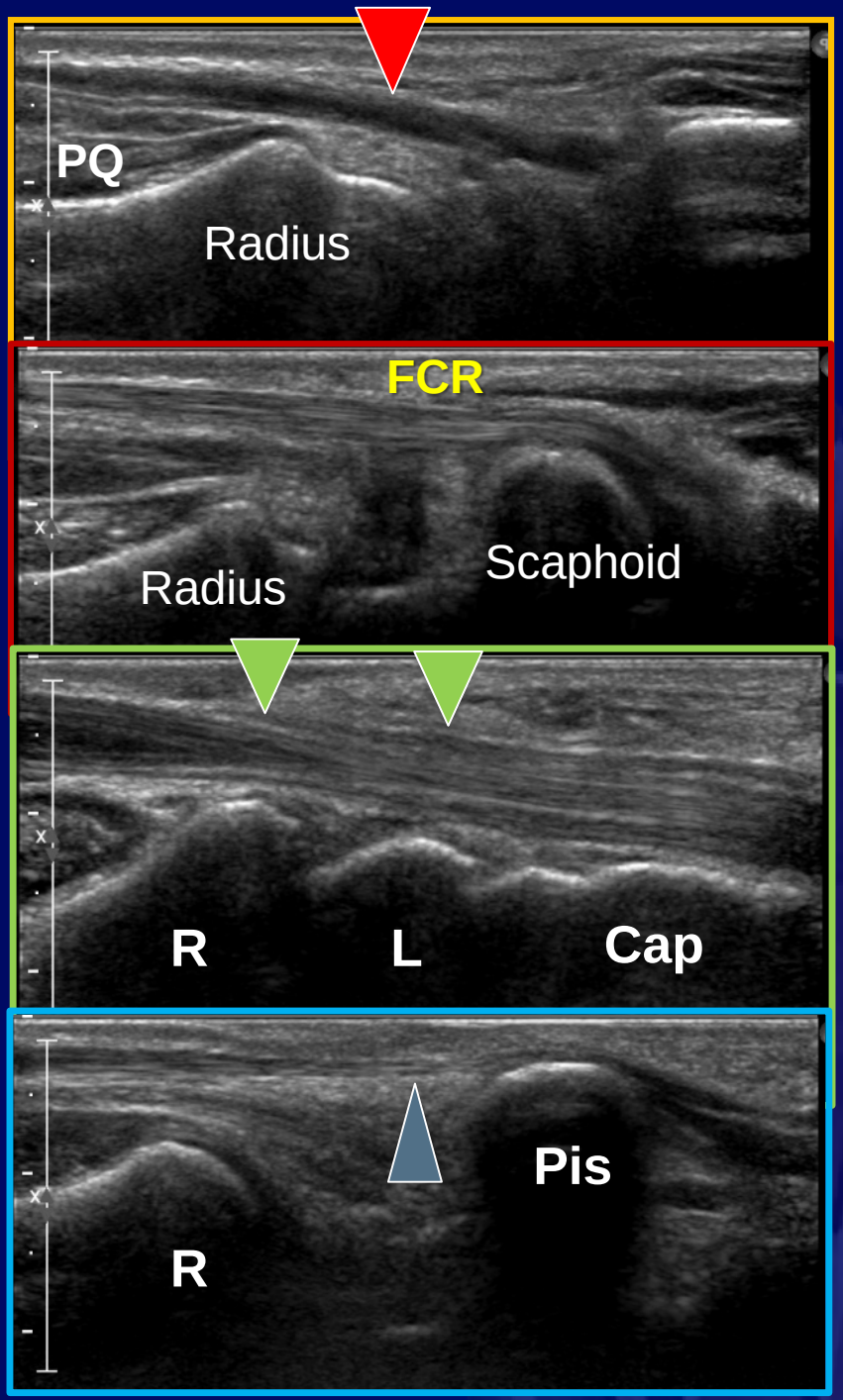
- Median Nerve
- Flexor Tendons
  - FCR & Radial Artery
  - Occult Ganglia
- Volar Joint Recesses



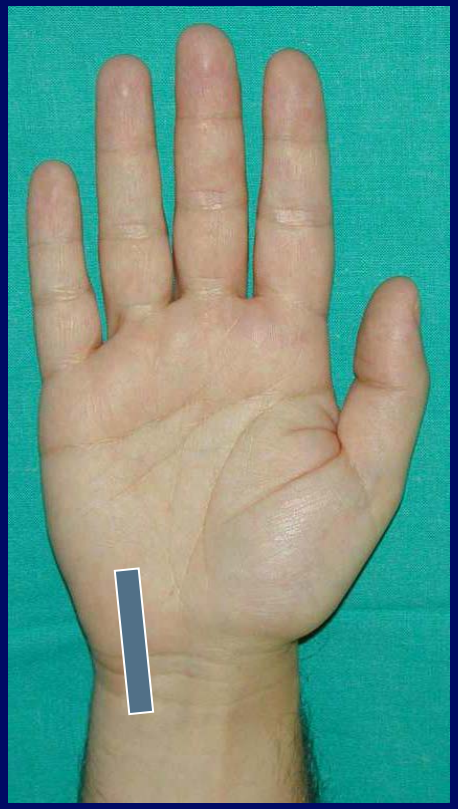


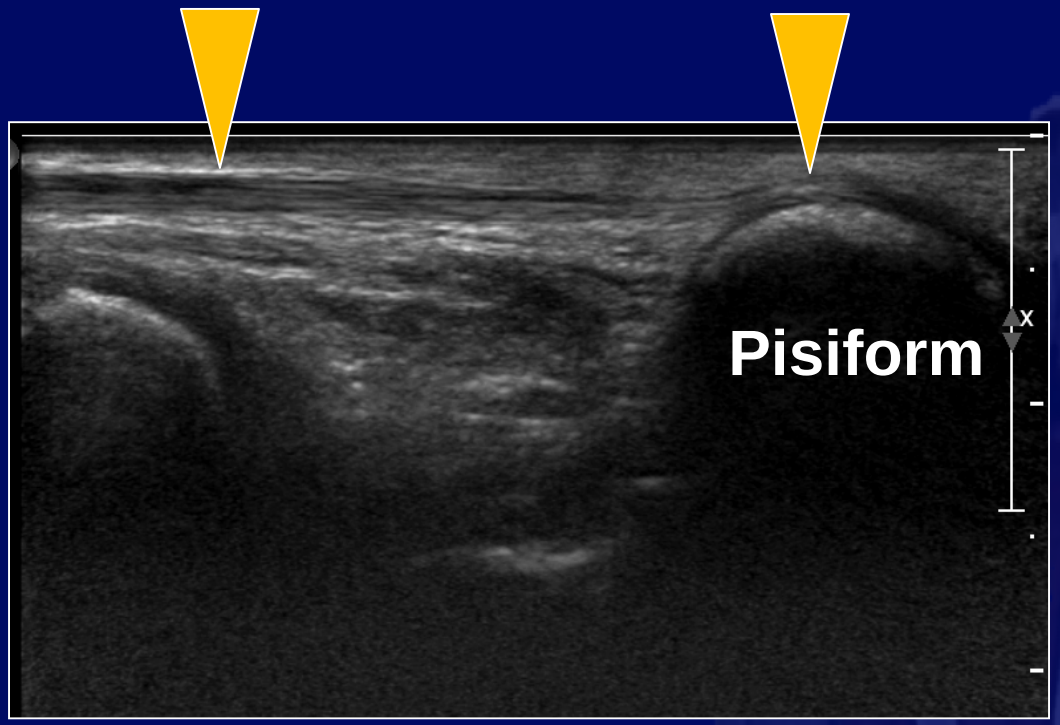
Volar Wrist

Radial ➡ Ulnar



Volar Wrist: Flexor Carpi Ulnaris





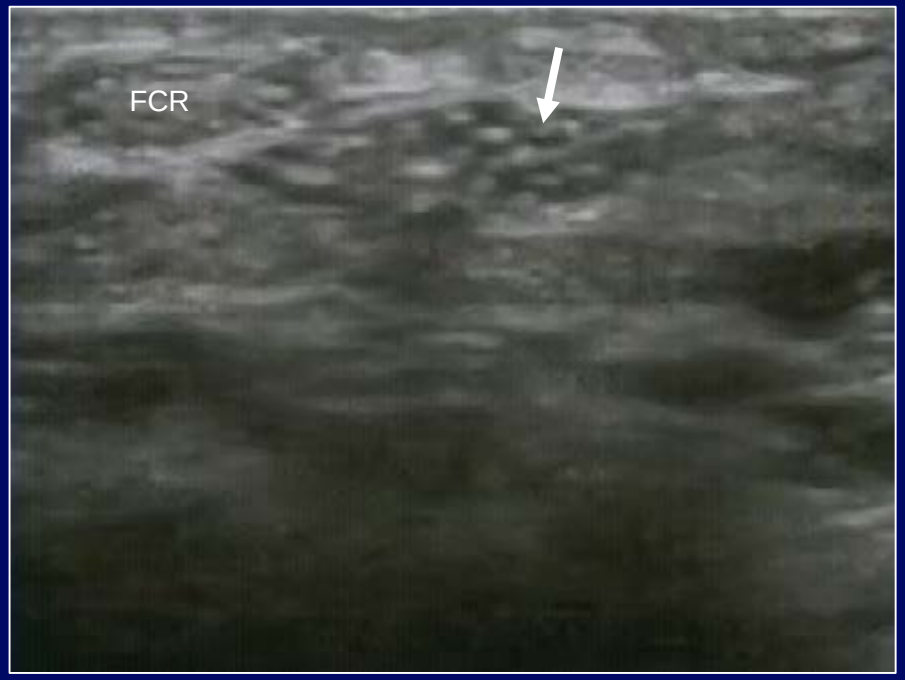
- No synovial sheath

Normal Peripheral Nerve

- US Appearance
  - Hypoechoic Fascicles
  - Hyperechoic Conn Tis
- Transverse
  - Honeycomb
- Minimal Anisotropy

Silvestri et al. Radiology 1995; 197:291

Volar Wrist: Median Nerve



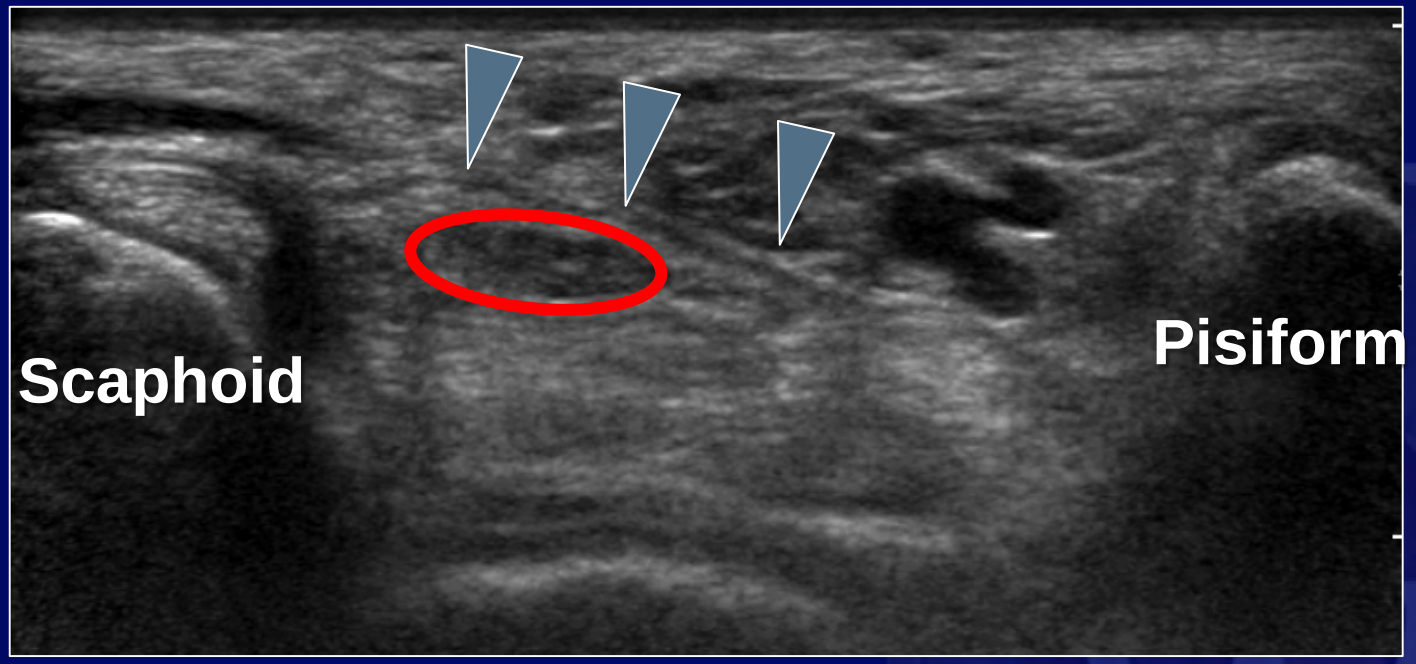
Take home point: Tendons more susceptible to anisotropy!!

Volar Wrist: CTS

- Proximal Enlargement of Median Nerve
  - > $10mm^2$ cross-sectional area[1]
  - > $9mm^2$ circumferential[2]
  - Measure at level of pisiform
- Distal Nerve Compressed
- Bowing of the Flexor Retinaculum

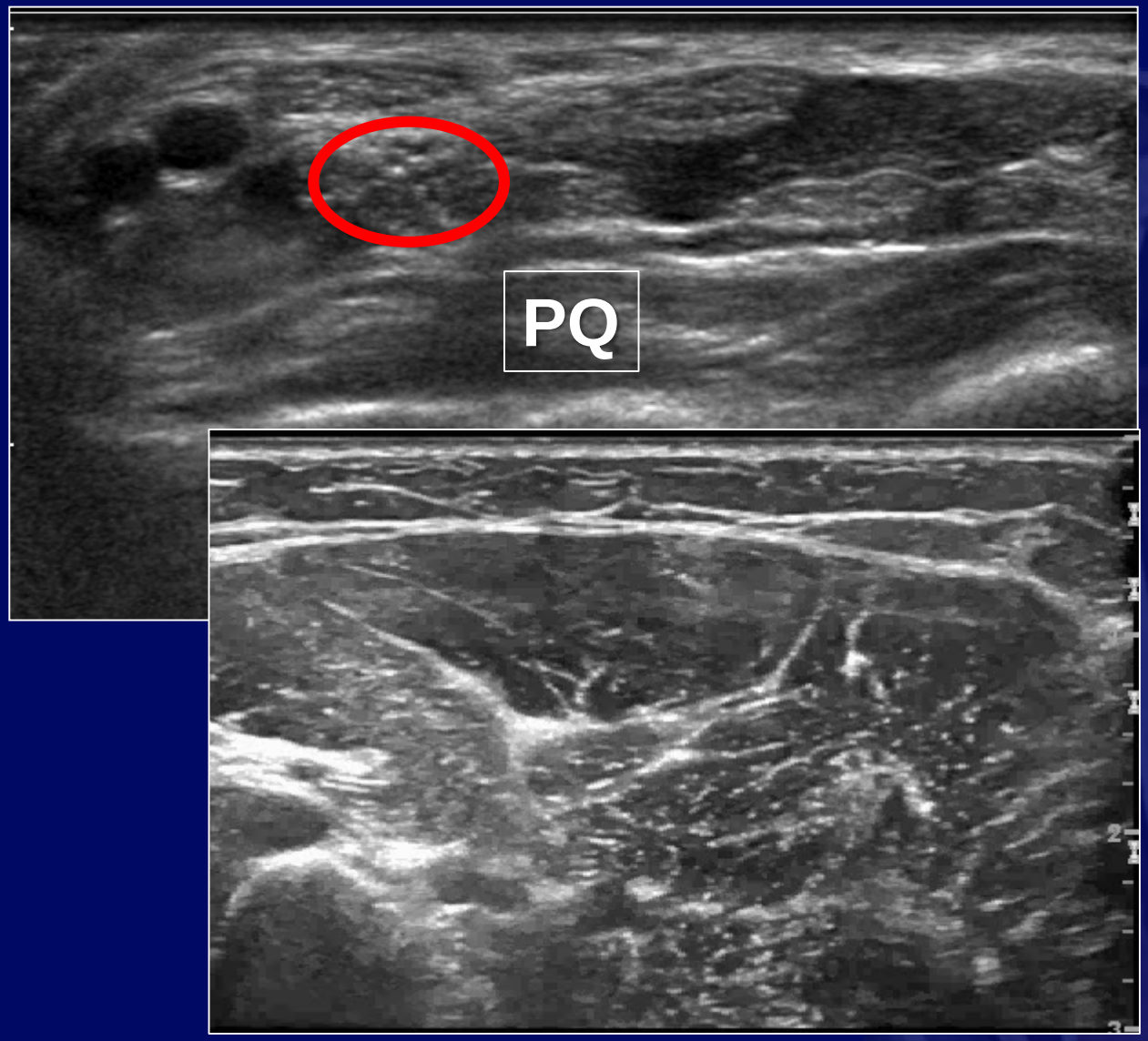
1 Chen et al. AJR 1997; 168:533
2 Duncan et al 199; 173:681

Median Nerve - Carpal Tunnel



Radial → Ulnar

Median Nerve - Proximal



Median Nerve

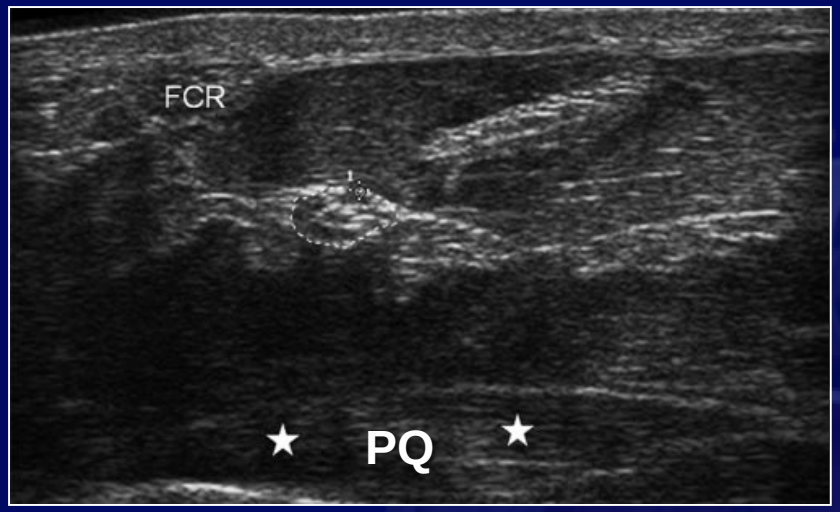
Cross-Sectional Area Measurement

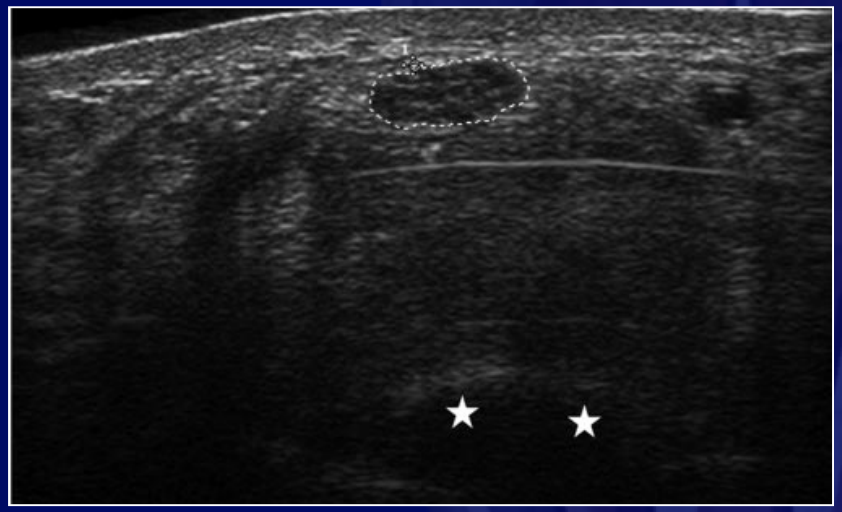
- CSA of the median nerve
  - Carpal Tunnel (C)
  - Pronator Quadratus (P)

- Mean CSAc in normals = 9.0 mm^2
- Difference of CSA to normalize

Δ CSA = CSAc – CSAp

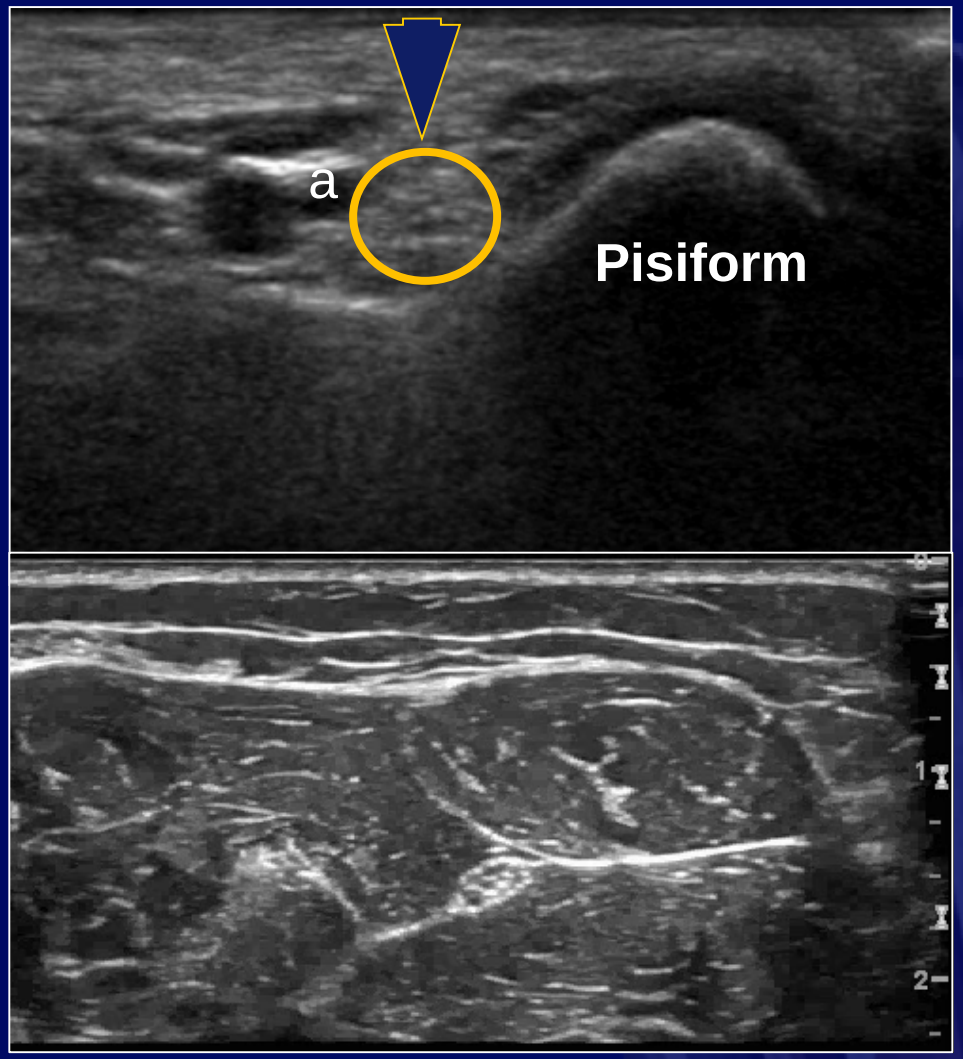
Threshold of 2 mm^2
Sensitivity = 99%
Specificity = 100%



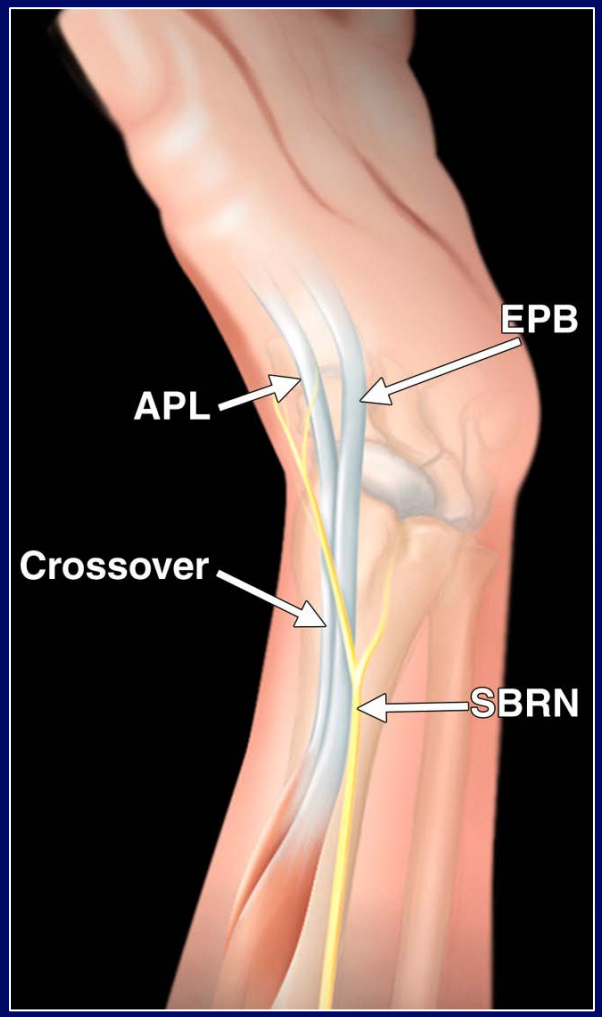


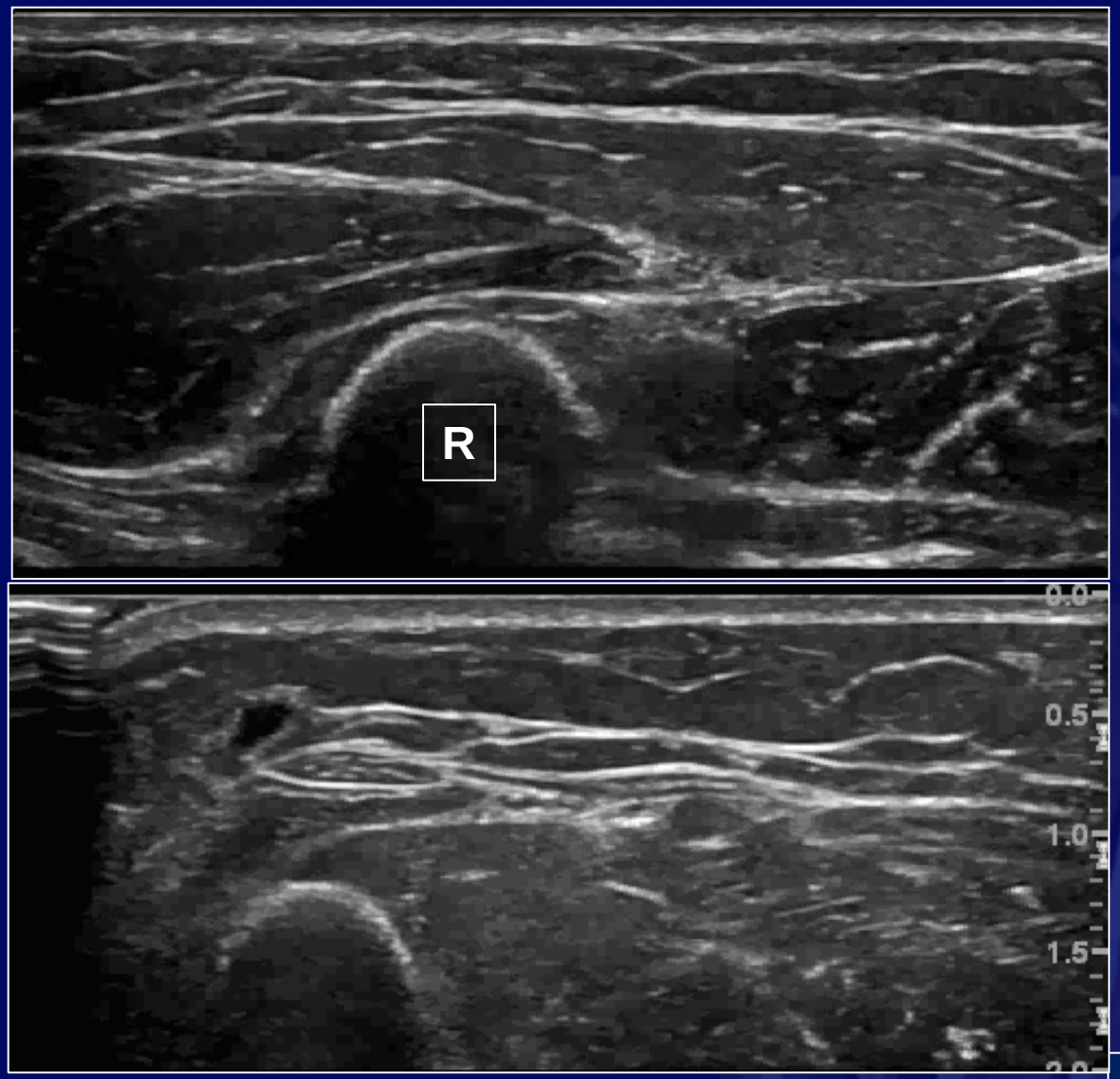
Klauser A. Radiology 2009;250:171

Ulnar Nerve – Guyon Canal



Radial Nerve – Superficial Branch

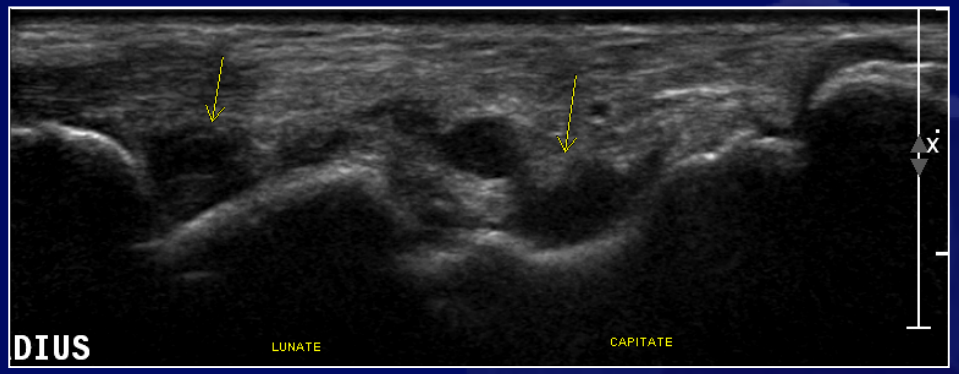


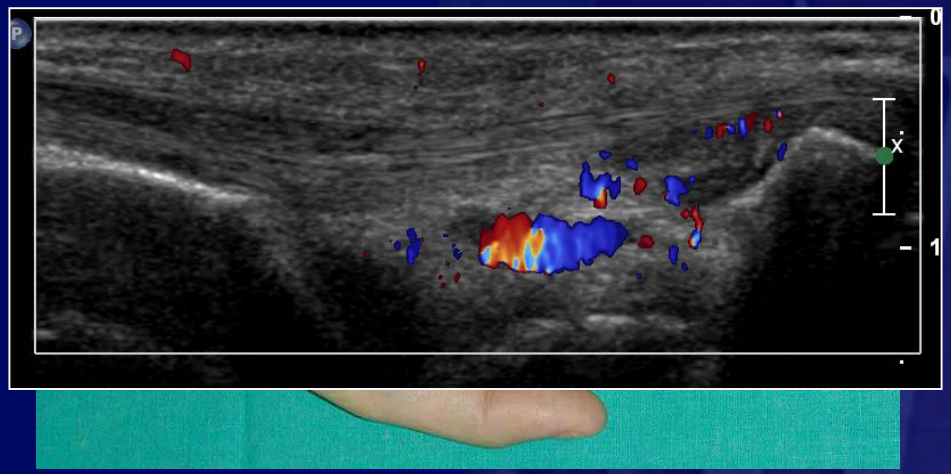


Linda D. *Radiographics* 2010;30:1373

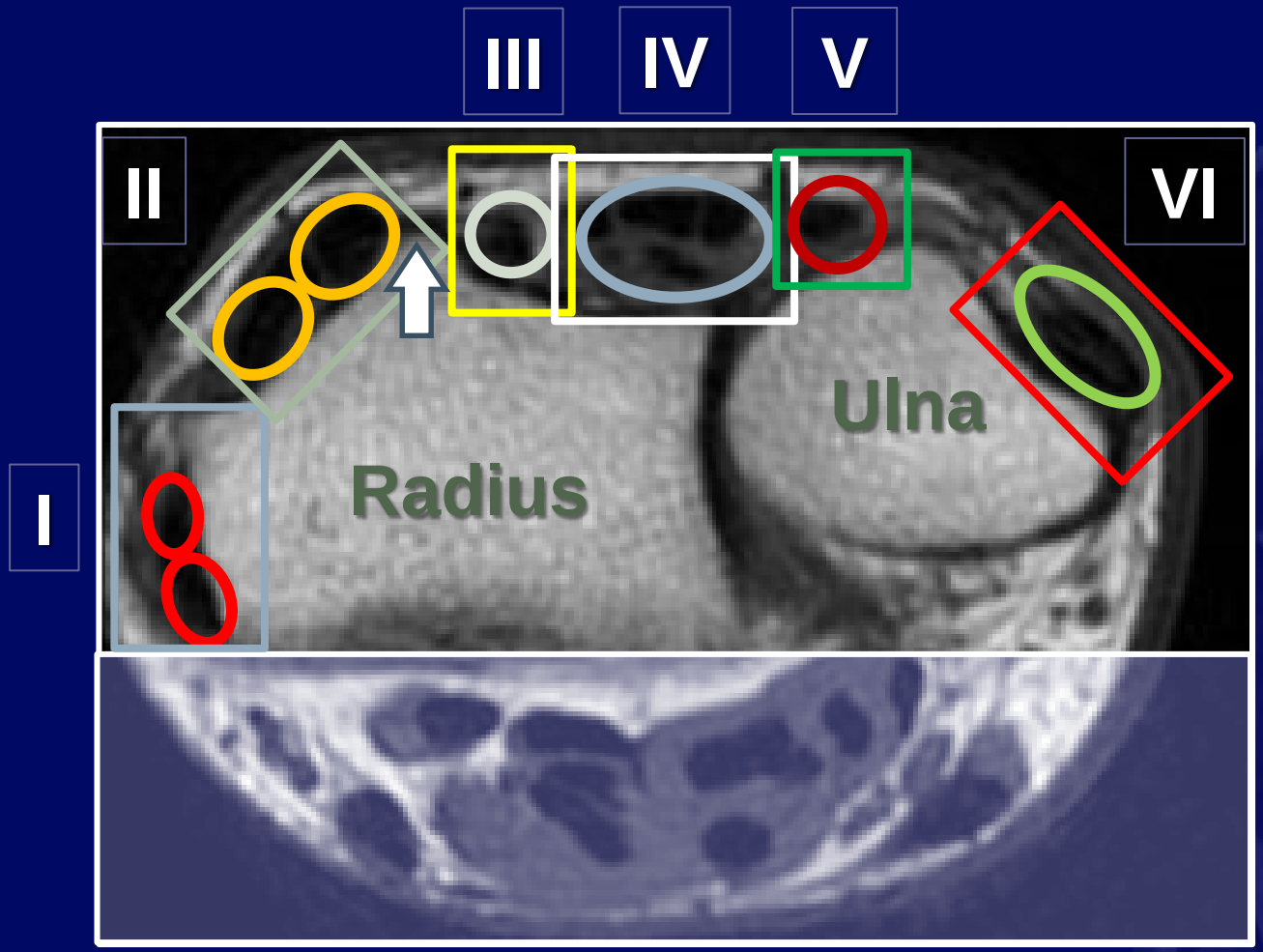
Volar Wrist: Joint Recesses

- Anechoic: Simple fluid
- If not anechoic
  - Compressible
  - Noncompressible
  - Hyperemia
- Cannot differentiate sterile from septic joint fluid





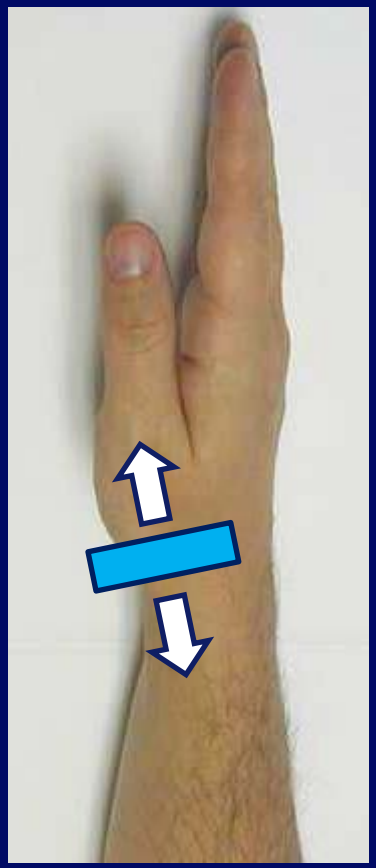
Dorsal Wrist: Extensor Tendons

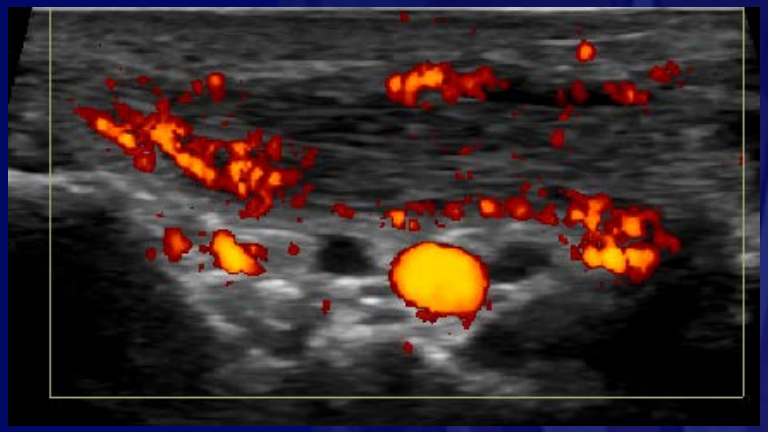


Wrist Ganglia

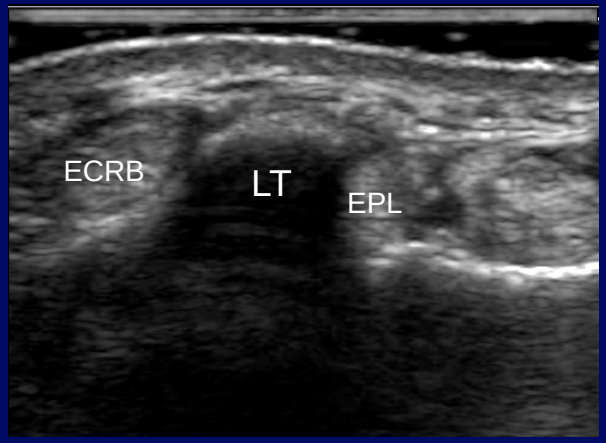
- Most common wrist mass
- Not compressible!!
- Dorsal
  - 70%
  - Originates from Scapholunate ligament
- Volar
  - Identify between radial artery and FCR
  - Proximal to the radiocarpal joint capsule

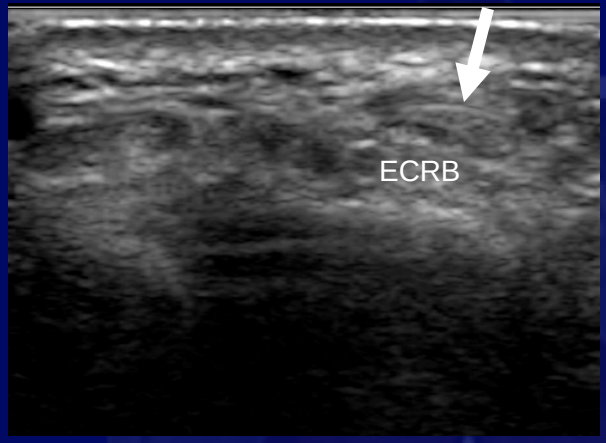
De Quervain's Tenosynovitis

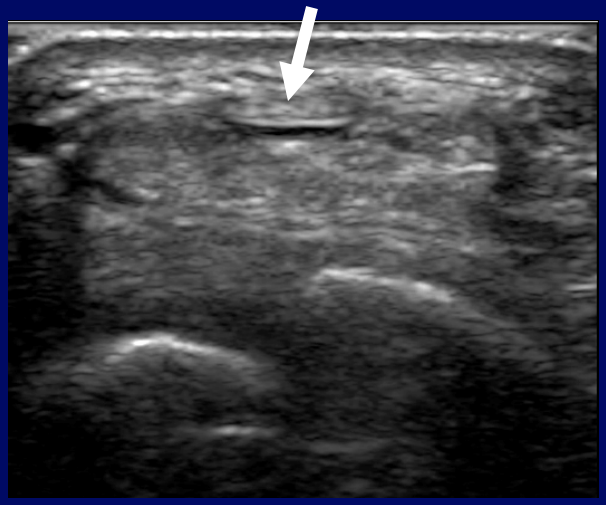


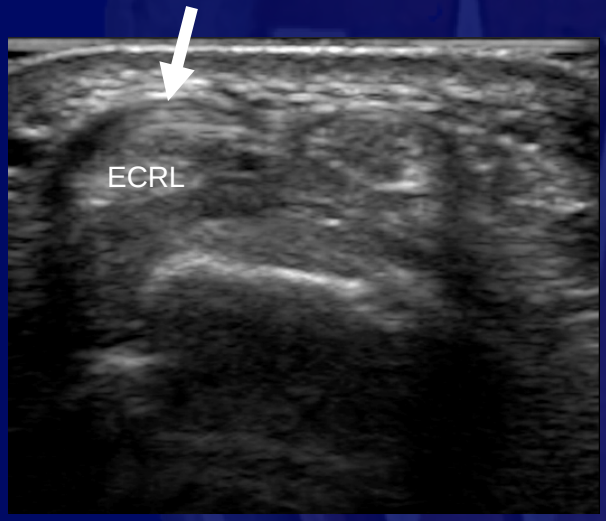


Dorsal Wrist: Extensor Tendons



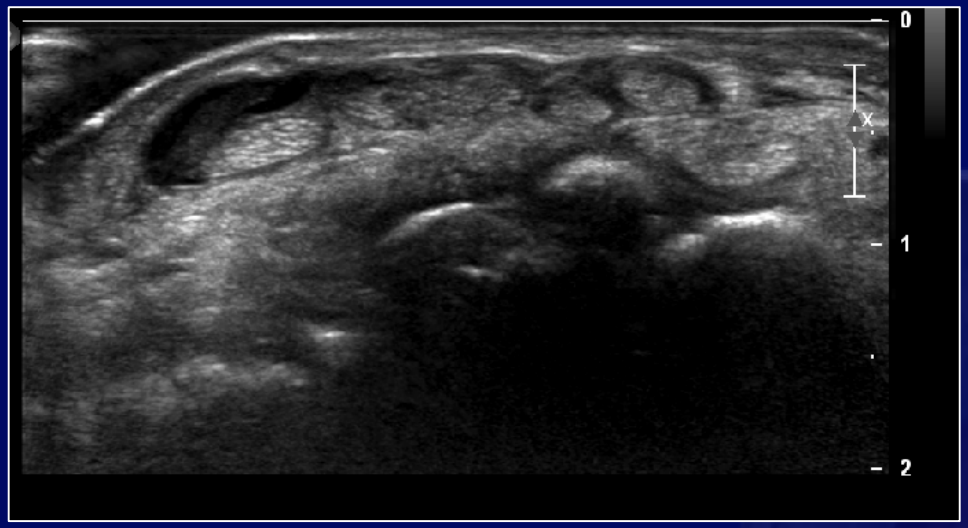


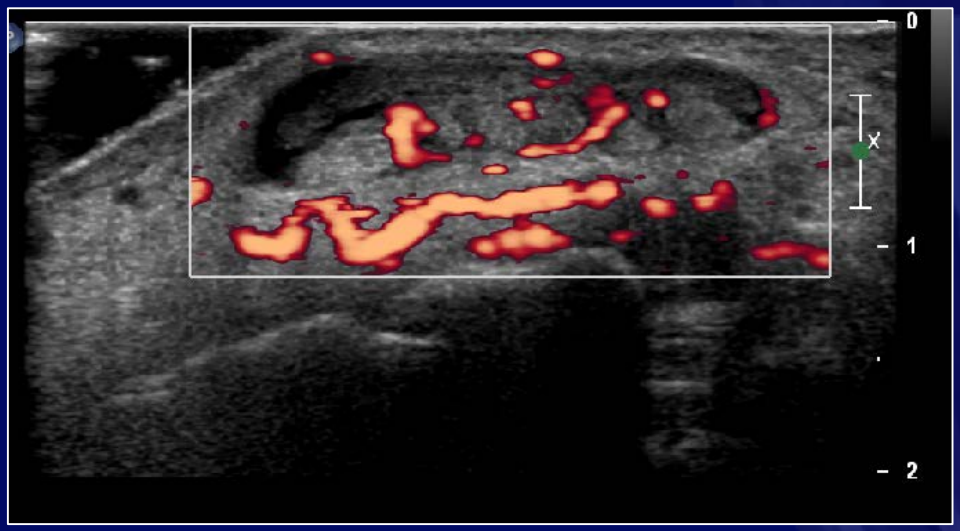




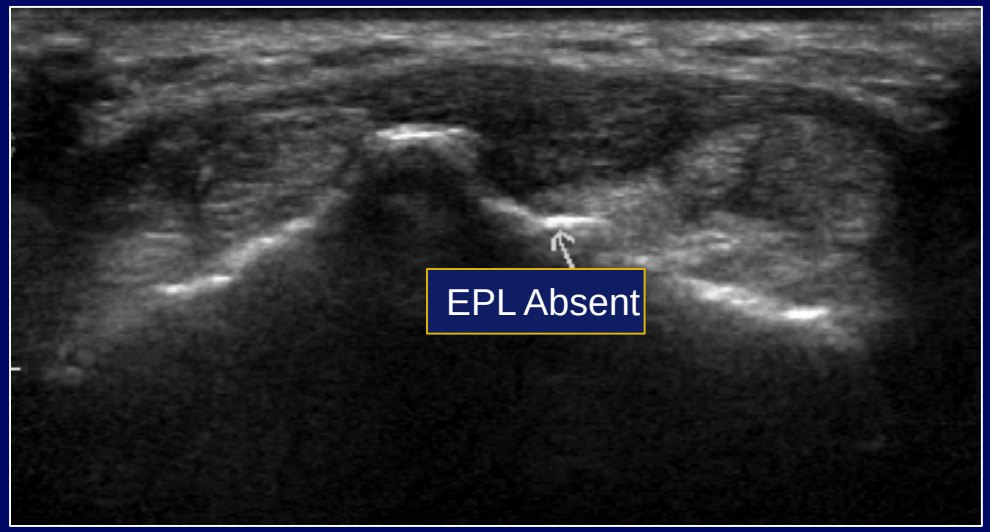
Extensor Tendons: Tenosynovitis

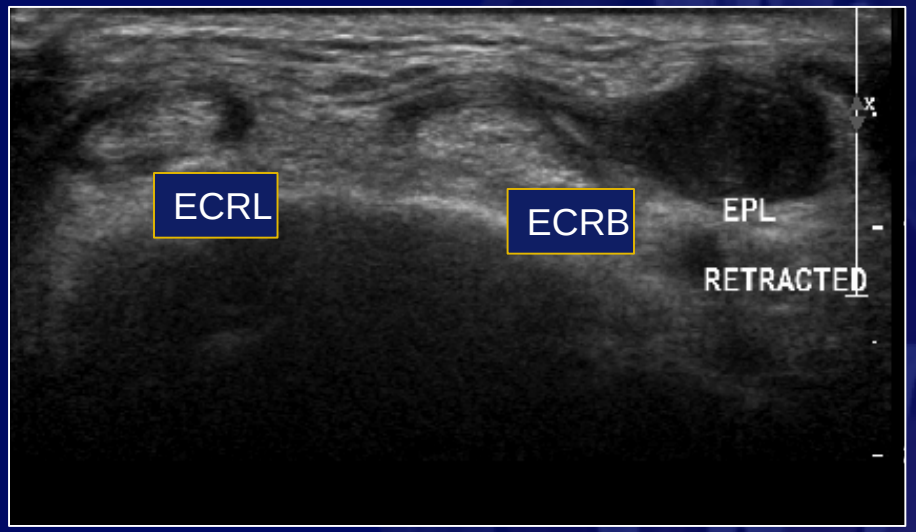
Can be hyperechoic!





Dorsal Wrist: EPL Tear





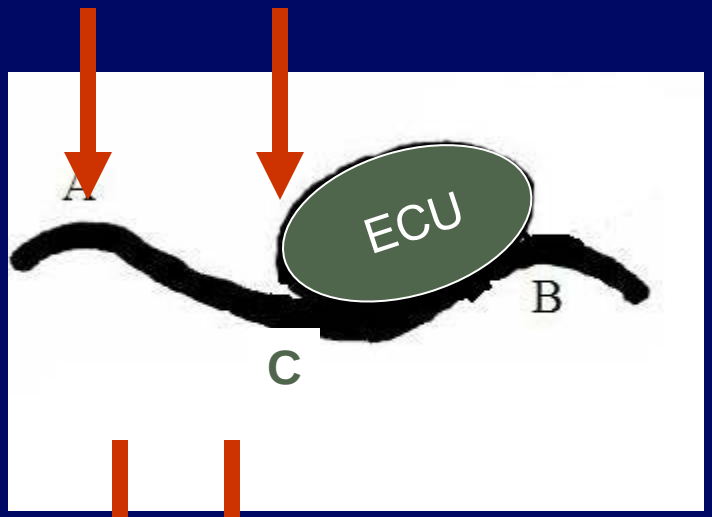
Use Dynamic Imaging!!

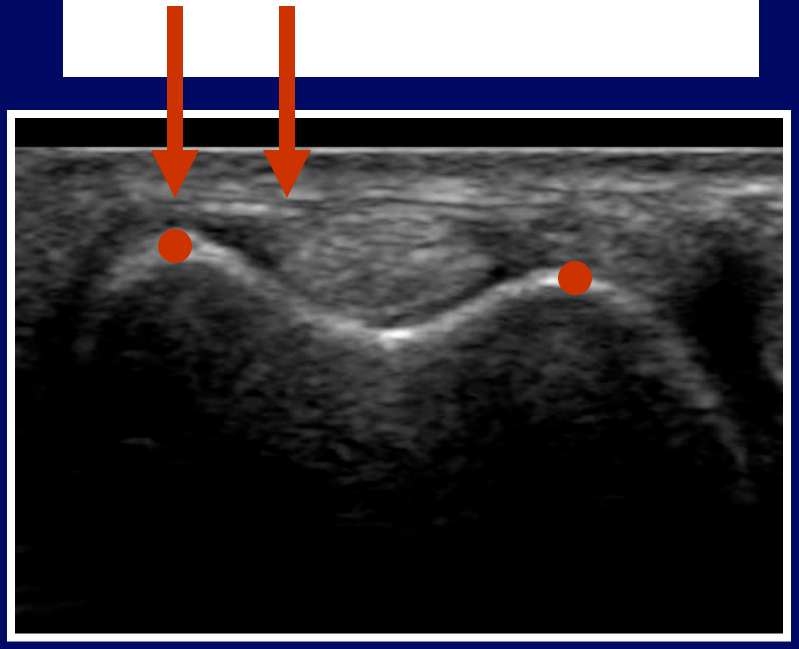
6th Extensor Compartment

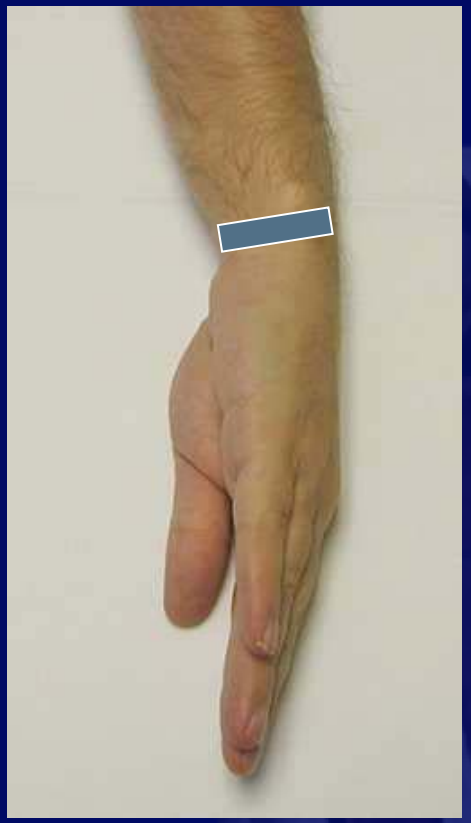
- Extensor Carpi Ulnaris Tendon (ECU)
  - Own fibro-osseous tunnel
  - Stabilizer of the DRUJ: own subsheath
  - Overlying extensor retinaculum
  - Instability of the ECU: a difficult clinical diagnosis

Spinner and Kaplan, 1970

6th Extensor Compartment







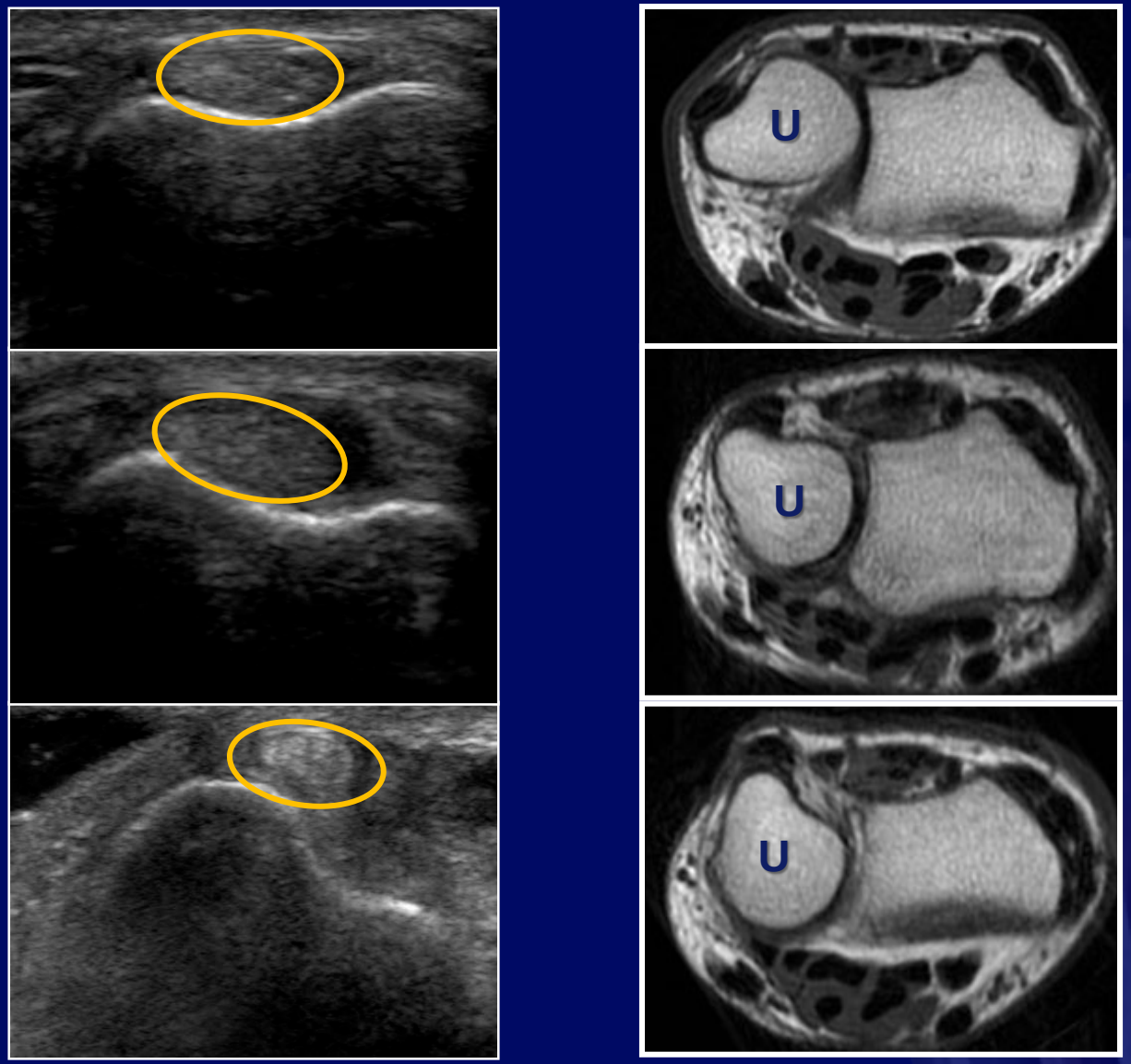
Pratt et al, 2004

US - MRI Correlation

Pronation

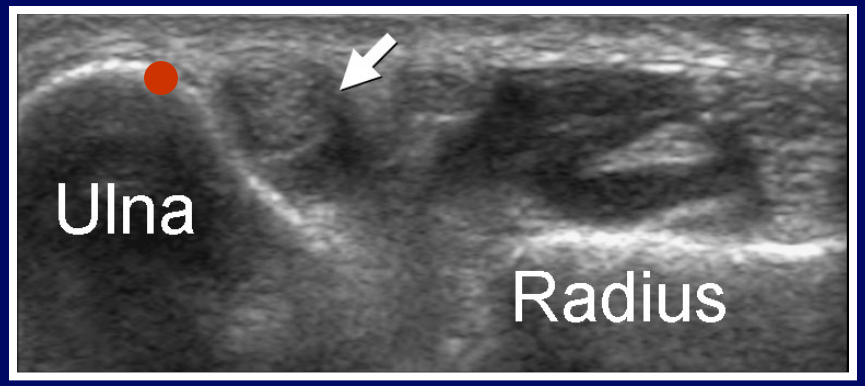
Neutral

Supination

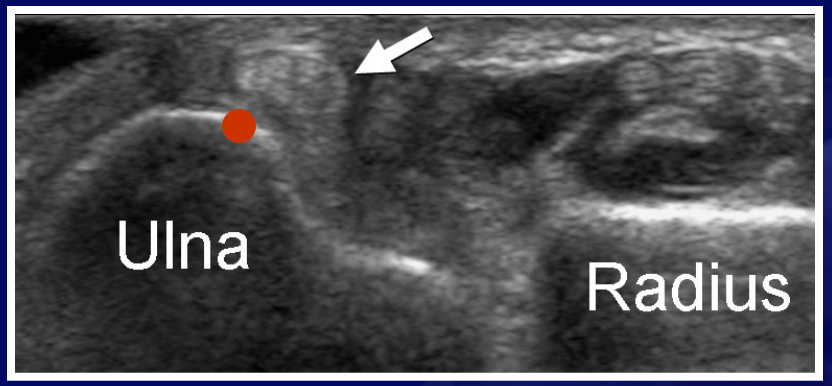


Lee KS. *AJR* 2009;193:651

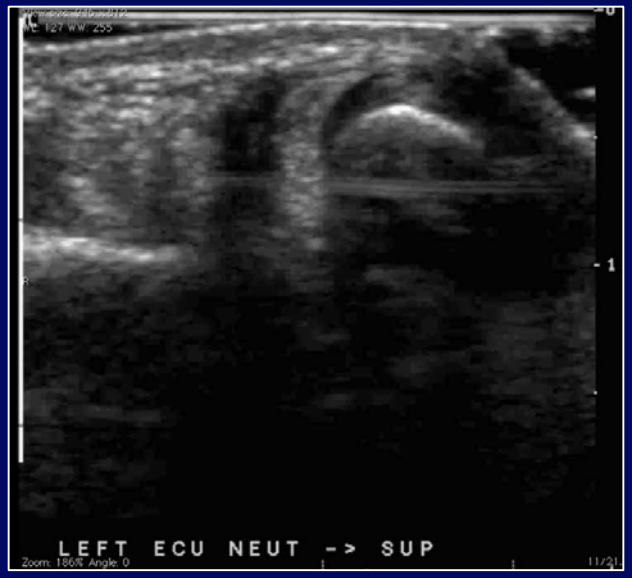
Normal Movement of the ECU



Supinated - Radial



Supinated - Ulnar



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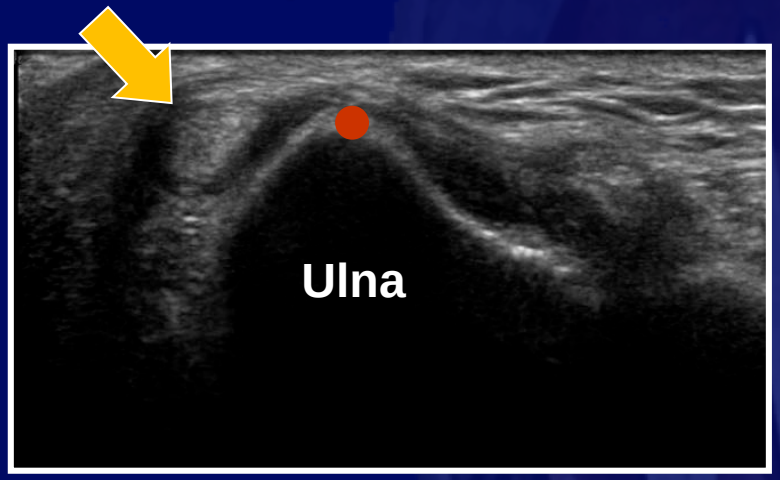

Supinated - Ulnar

Summary

- Ultrasound is well-suited for evaluating common wrist pathology
  - Tendons – Extensors and Flexors
  - Dynamic – ECU
  - Nerves – Median, Ulnar, Radial

Thank You

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