

Ultrasound of the Elbow, Wrist, and Hand with MRI Correlation

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Disclosures

- Book Royalties: Elsevier
- Consultant: Bioclinica
- Advisory Board: POCUSPRO
- Not relevant to this talk

Syllabus on line and other educational material:
www.jacobsonmskus.com

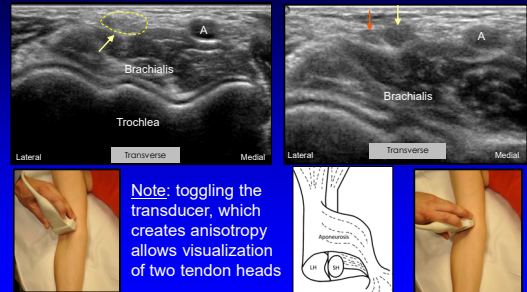
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Pathology

- Elbow
 - Biceps brachii
 - Epicondylitis
 - Cubital tunnel
- Wrist and Hand
 - Tendon and pulley pathology
 - Carpal tunnel syndrome
 - Gamekeeper's thumb

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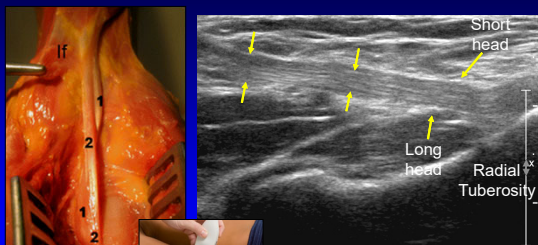
Biceps Brachii: terminal bifurcation



Courtesy of M. Chiavaras, Hamilton, Ontario

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Biceps Brachii Tendon: distal

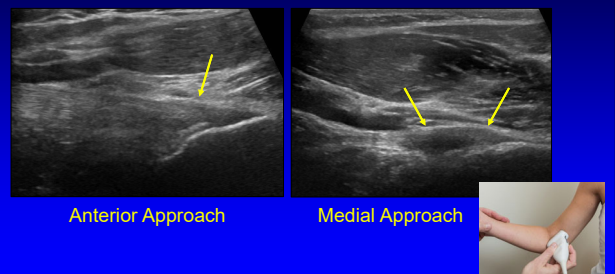


1 = long head
2 = short head

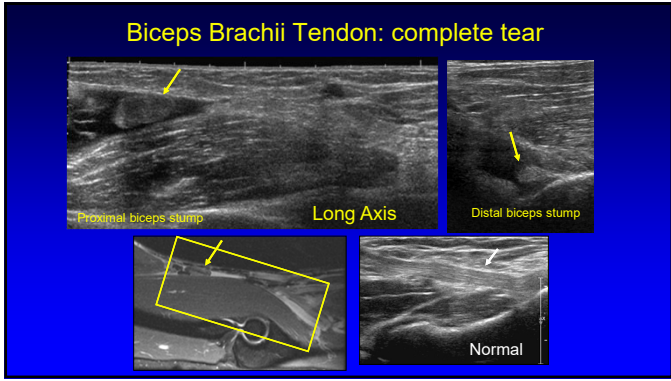
Long Axis
Tagliafico A., et. al. Eur Radiol 2010

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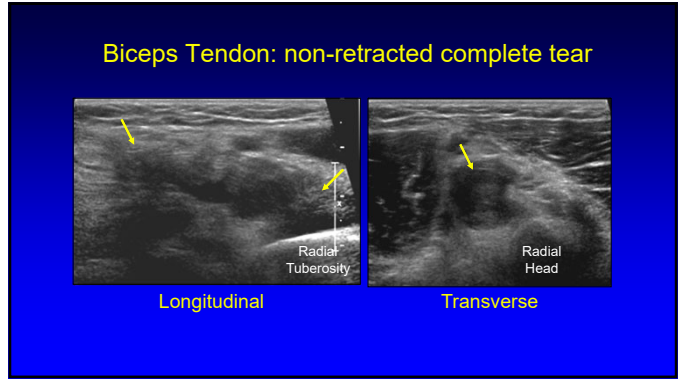
Biceps Brachii Tendon: tendinosis



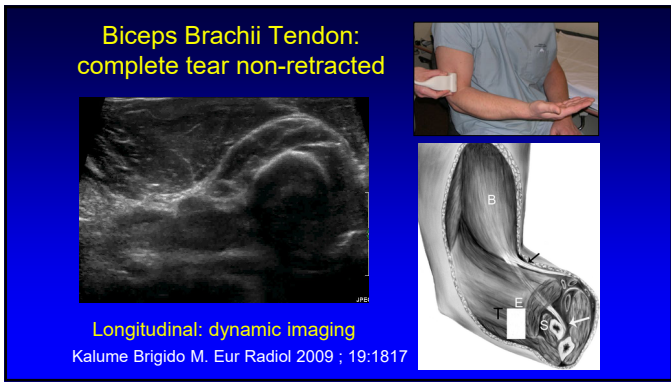
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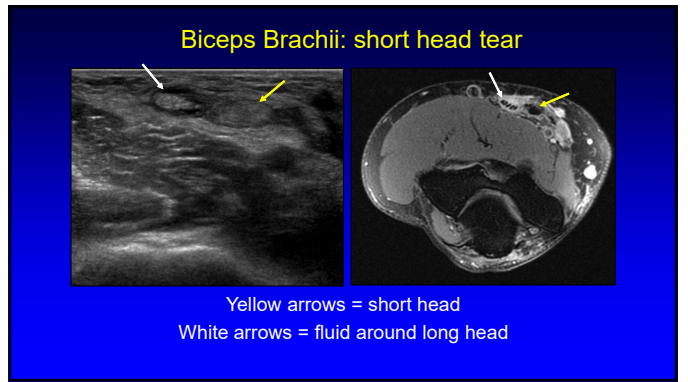
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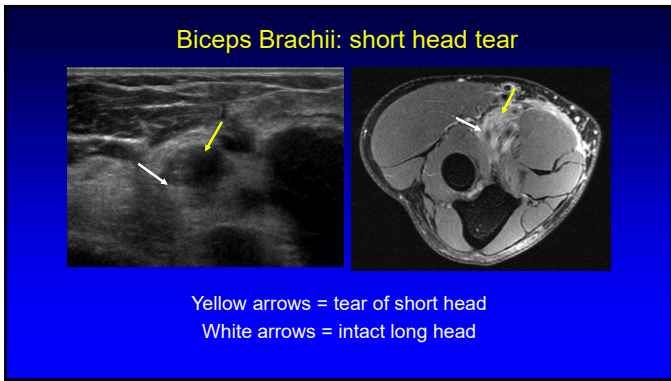
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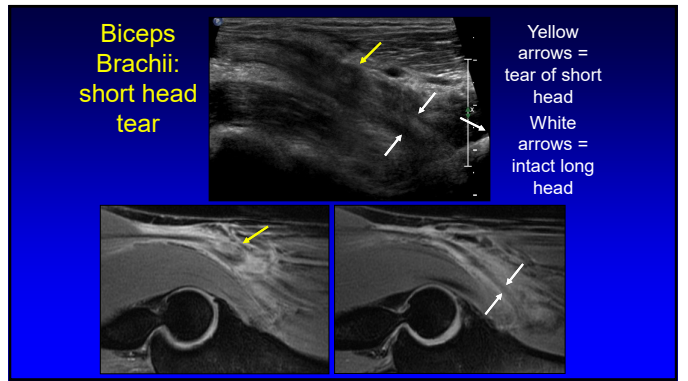
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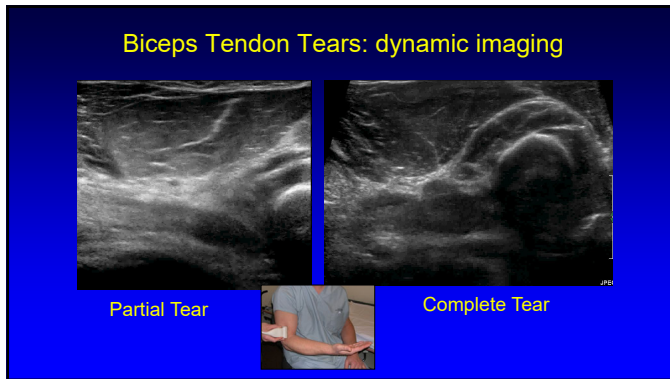
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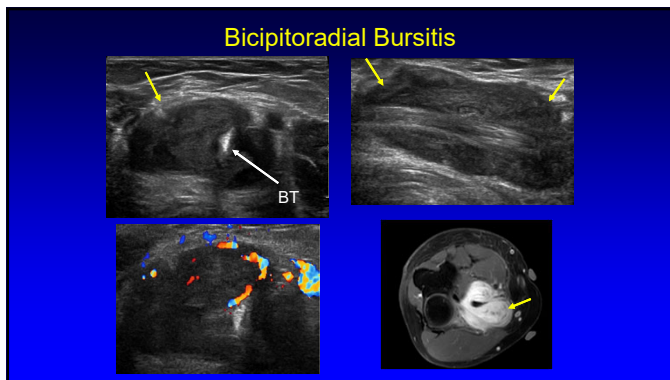
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Bicipitoradial Bursa

- Surrounds distal biceps
 - Does not communicate to elbow joint
 - No distal biceps tendon sheath
- If distended:
 - Mechanical, inflammatory
 - Characteristic “U” shape
 - Average: 1.8 – 2.5 cm in size
 - May displace deep branch of radial nerve

Skaif AY, Radiology 1999; 212:111

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Epicondylitis:

- Common flexor and extensor tendons
- Abnormal hypoechoogenicity
 - Mucoïd degeneration, tendinosis
- Anechoic: partial-thickness tear
- No inflammatory cells*

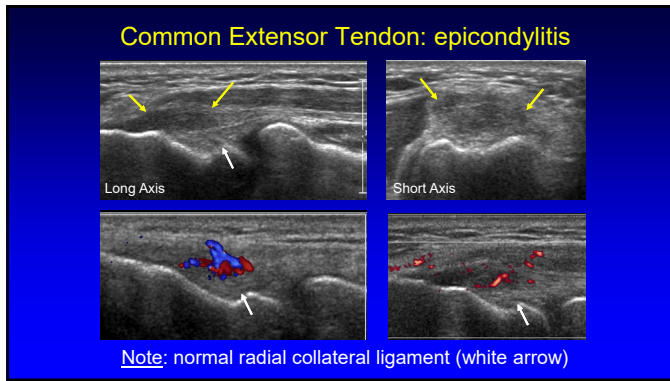
Potter, Radiology 1995; 196:43
Connell, AJR 2001; 176:777

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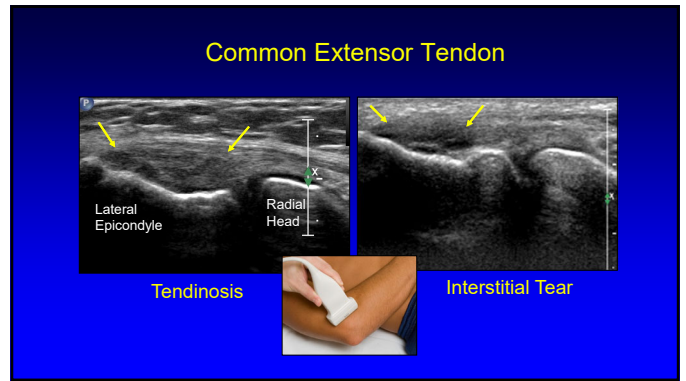
Common Extensor Tendon: elbow

- Often called “tennis elbow” or “lateral epicondylitis” or “epicondylosis” or
- All terms are misnomers
- Those inflicted usually do not play tennis (professionally or correctly)
- It is not inflammatory
- It is not a primary problem of the epicondyle

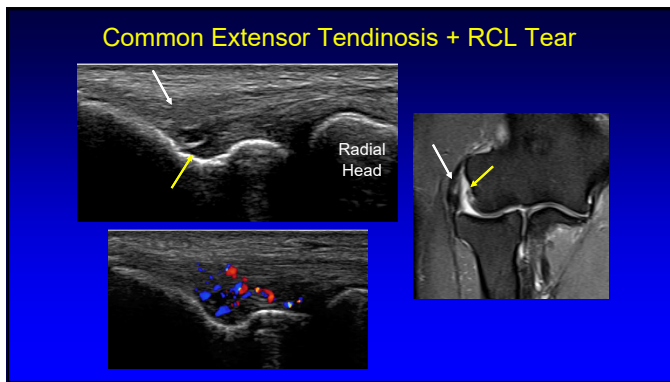
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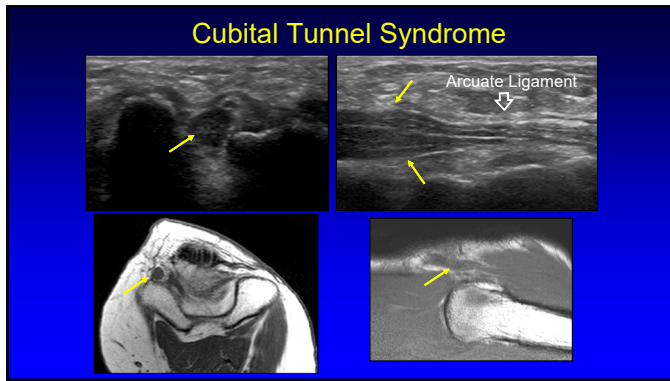
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- ### Ulnar Nerve: anatomy
- Behind medial epicondyle of humerus:
 - Cubital tunnel retinaculum or Osborne fascia
 - Distal to epicondyle:
 - True cubital tunnel
 - Between ulnar and humeral heads: flexor carpi ulnaris
 - Under arcuate ligament
-
- Martinoli, C. et al. Radiographics 2000;20:S199-S217

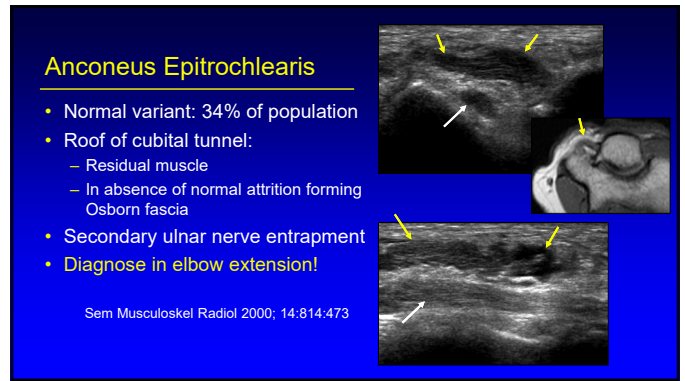
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- ### Ulnar Nerve: cubital tunnel syndrome
- Hypoechoic and enlarged
 - > 9 mm² area¹
 - Ratio greater than 2.8 compared to proximal²
 - Mild hypoechoic alone: may be normal
 - Causes:
 - Idiopathic, overuse, joint process
 - Anconeus epitrochlearis: compression
 - Normal variant accessory muscle
- ¹Thoirs K et al. J Ultrasound Med 2008; 27:737
²Yoon JS et al. Muscle Nerve 2008; 38:1231

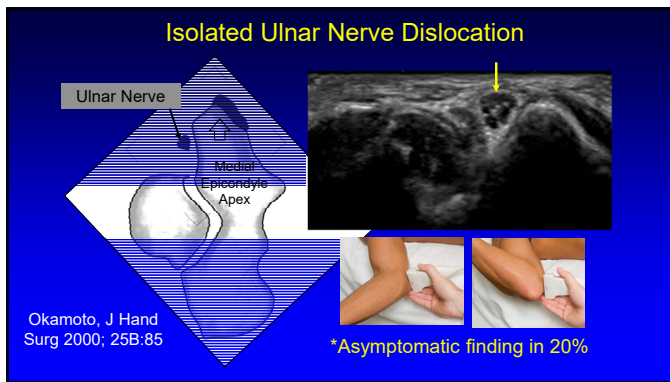
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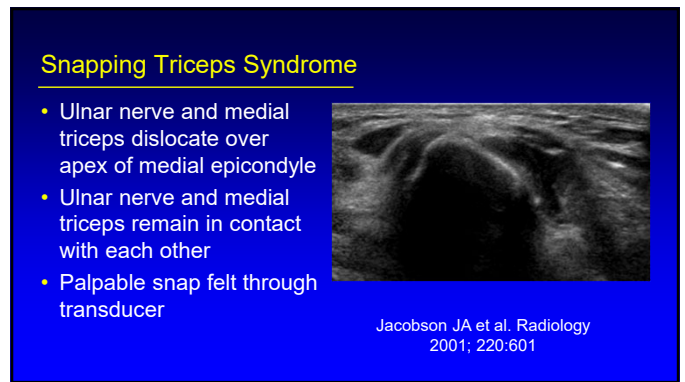
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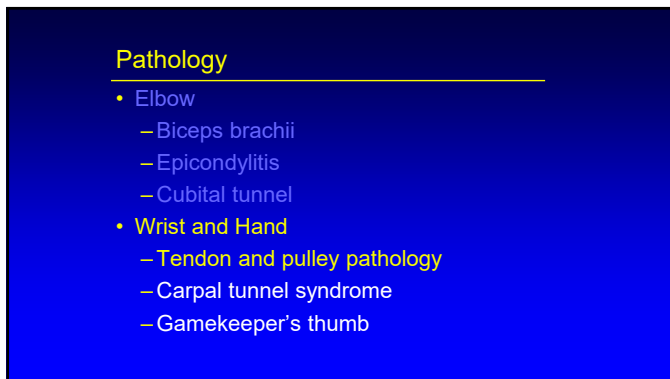
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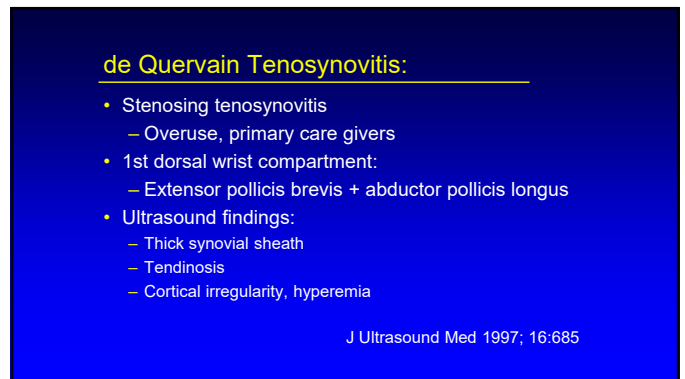
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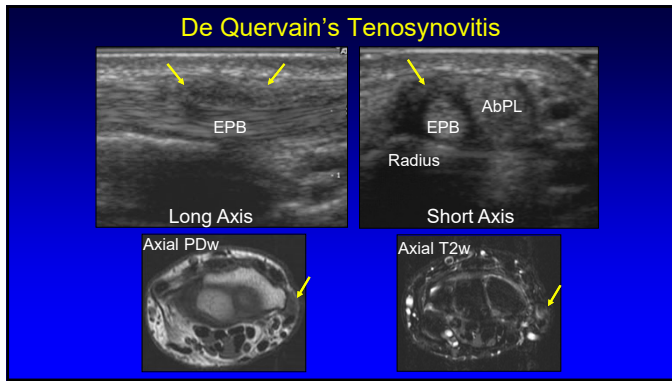
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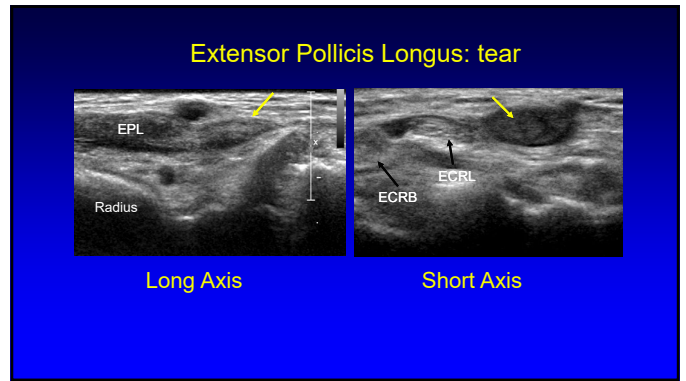
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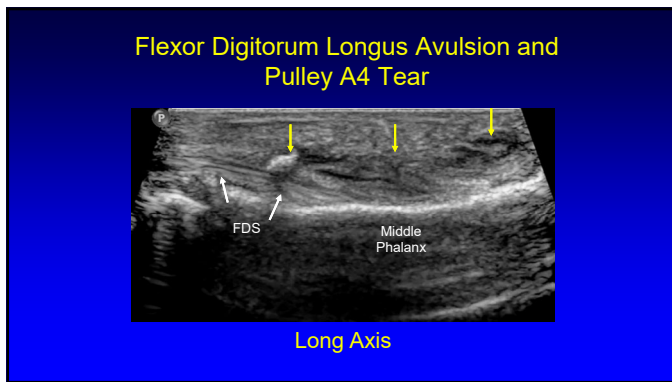
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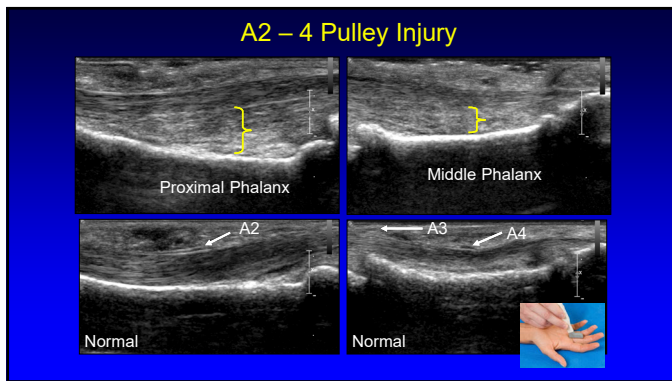
Pulley Tear

- A2 and A4 pulleys: most important
- Sagittal image
 - Bowstringing
 - Hypochoic edema / hemorrhage
- Dynamic evaluation*

*Radiology 2002; 222:755

Radiology 1998; 206:339

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Normal Peripheral Nerve

- Ultrasound appearance:
 - Hypoechoic nerve fascicles
 - Hyperechoic connective tissue
- Transverse:
 - Honeycomb appearance


Silvestri et al. Radiology 1995; 197:291

Median Nerve

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Carpal Tunnel Syndrome:

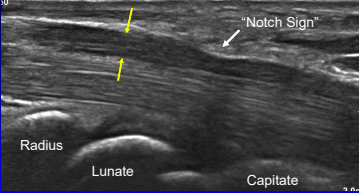
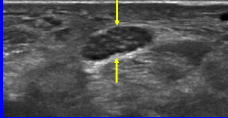
- Proximal median nerve swelling
 - Area: circumferential trace
 - Normal: $< 6 \text{ mm}^2$
 - Borderline: $9 - 12 \text{ mm}^2$
 - Abnormal: $> 12 \text{ mm}^2$
 - 12.8 mm^2 = moderate (83% sens, 95% spec)
 - 14.0 mm^2 = severe (77% sens, 100% spec)



Peetrons et al. Sem Musculoskel Rad 2013; 17:28
Ooi et al. Skeletal Radiol 2014; 43:1387

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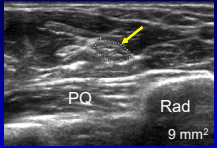
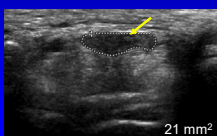
Carpal Tunnel Syndrome

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Carpal Tunnel Syndrome

- Compare areas:
 - Proximal: pronator quadratus
 - Distal: carpal tunnel
- $\geq 2 \text{ mm}^2$ = carpal tunnel syndrome
 - 99% sensitivity
 - 100% specificity¹
- $> 6 \text{ mm}^2$ = moderate
- $> 9 \text{ mm}^2$ = severe²

¹Klauser et al. Radiology 2009; 250:1712
²Klauser et al. Eur Radiol 2015; 25:2419

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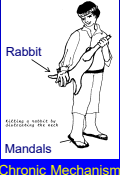

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Gamekeeper's or Skier's Thumb

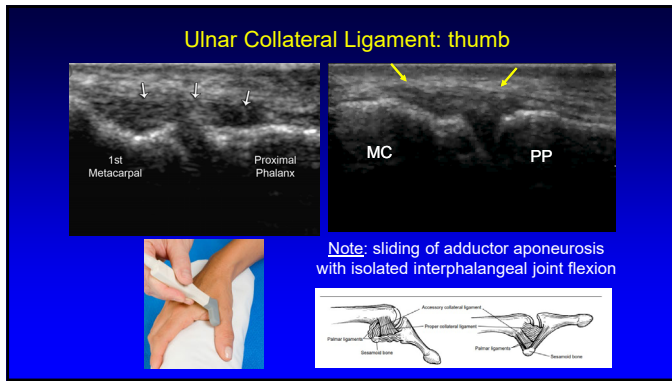
- Injury: ulnar collateral ligament of first MCP joint
- Chronic (gamekeeper's thumb): historically in Scottish gamekeepers
- Acute (skier's thumb): acute hyperabduction

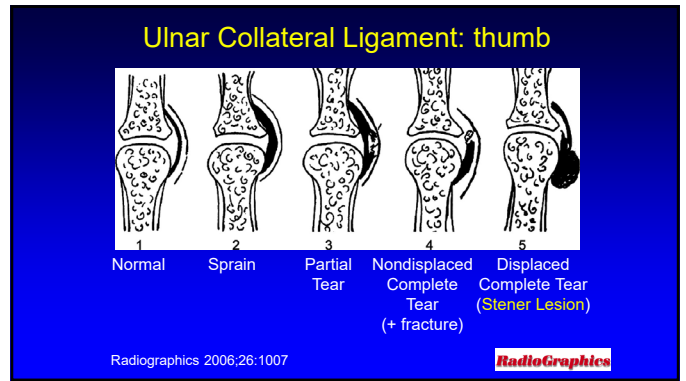
Acute Mechanism

Chronic Mechanism

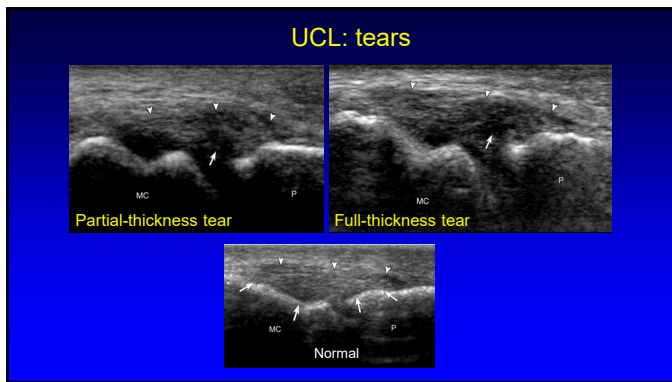
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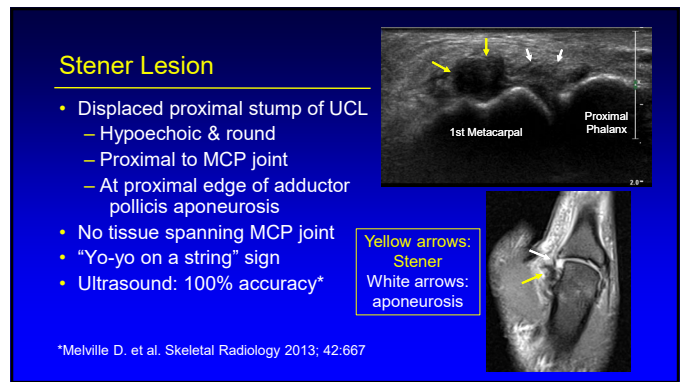
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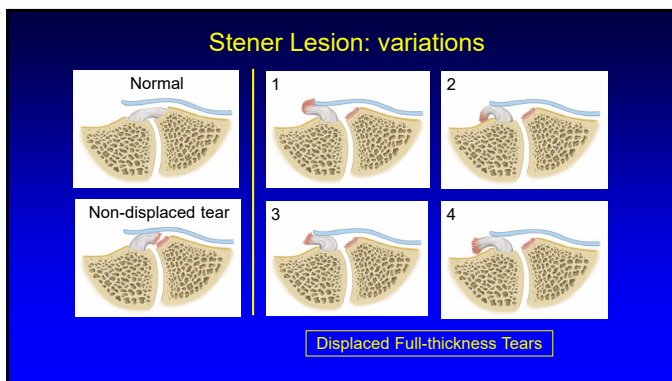
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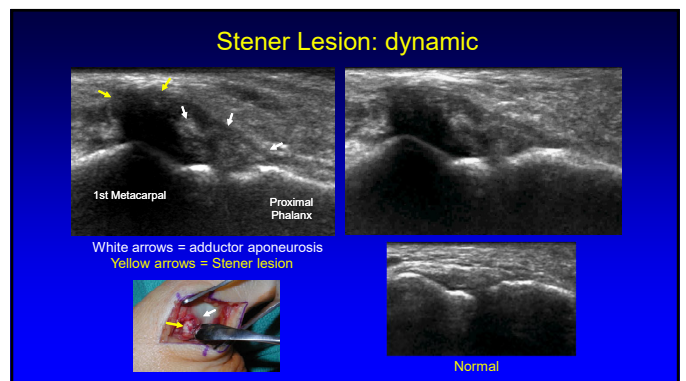
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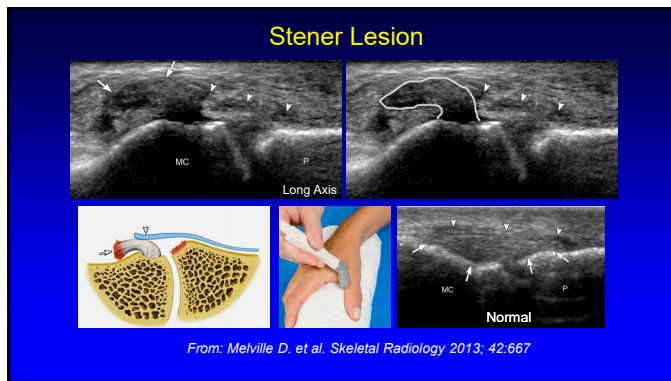
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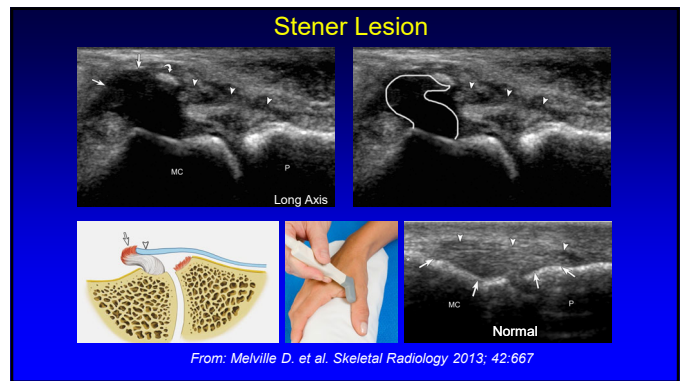
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Take-home Points

- Anatomy & Scanning Technique:
 - Distal biceps terminal bifurcation
 - Common extensor tendon (elbow)
 - First MCP joint: Skier's thumb
- Dynamic Evaluation:
 - Biceps: full vs. partial tear
 - Ulnar nerve: dislocation vs. snapping triceps
 - Skier's thumb: aponeurosis identification

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Thank you!

Syllabus on line and other educational material:
www.jacobsonmksus.com

Twitter handle: @jjacobsn

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