The Art of Musculoskeletal Ultrasound

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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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Introduction

- Important aspects of ultrasonography
  - Anatomy and imaging appearances
  - Scanning protocol
  - Pathology and imaging appearances
  - In context with history, physical exam findings, laboratory, and other imaging findings

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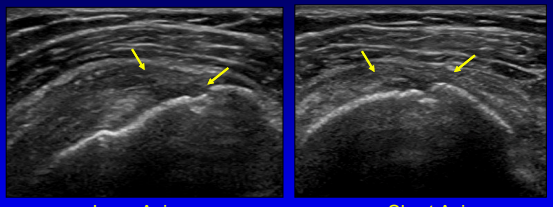
Case #1: 58-year-old male with "shoulder pain"



Long Axis Short Axis

Diagnosis:
Partial-thickness bursal supraspinatus tear

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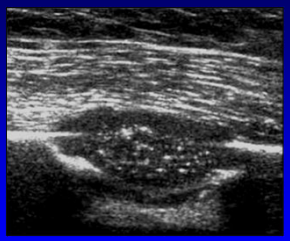
When asked, patient pointed where pain was most severe



Diagnosis:
Lung cancer metastasis

Teaching Point: point tenderness and unusual history were clues

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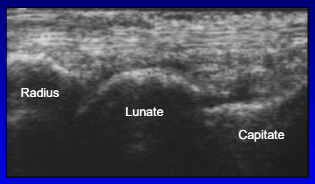
Case #2: "rule out inflammatory arthritis"



Diagnosis:
No evidence for inflammatory arthritis

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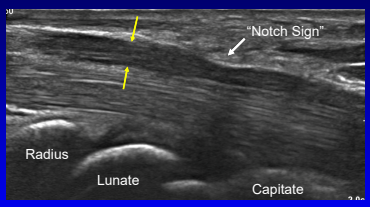
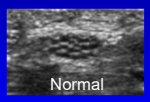
Comprehensive “complete” imaging protocol





Diagnosis:
Carpal tunnel syndrome

Teaching Point: comprehensive imaging enabled diagnosis correlating with symptoms

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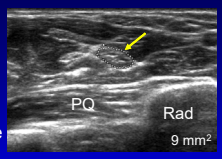
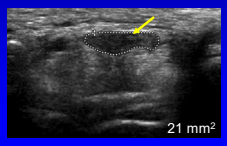
Carpal Tunnel Syndrome

- Compare areas:
  - Proximal: pronator quadratus
  - Distal: carpal tunnel
- ≥ 2 mm² = carpal tunnel syndrome
  - 99% sensitivity
  - 100% specificity[1]
- > 6 mm² = moderate
- > 9 mm² = severe[2]

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





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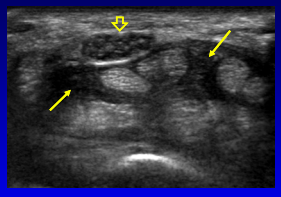
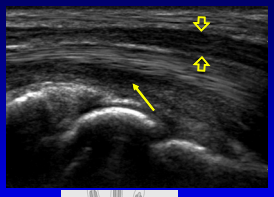
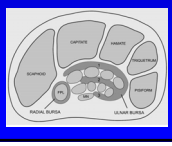
Carpal Tunnel Syndrome: ulnar bursa distention







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Erosions

- US criteria:
  - Disrupted cortex, two planes
  - Adjacent synovitis increases specificity
- US better than radiographs[1]
- 29% false-positive rate compared to CT[2]
- 40% sensitivity[3]

[1]Lopez-Ben, et al. Skeletal Radiol 2004; 33: 80
[2]Finzel S. et al. Arth Rheumatism 2011; 63:1231
[3]Dohn UF M, Arthritis Res Ther 2006; 8:1

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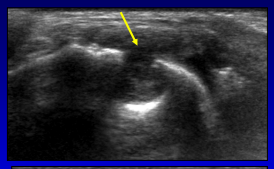
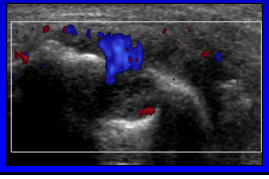
Rheumatoid Arthritis





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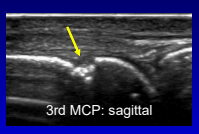
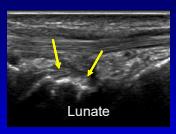
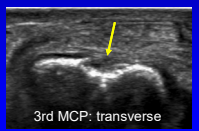
Pitfall Alert! Pseudoerosions Are Everywhere!

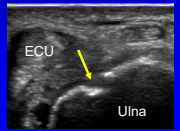
- Pseudoerosions: 100%
- Metacarpal heads: all
  - 2nd: 92%
  - 3rd: 86%
- Carpal bones:
  - Lunate: 82%
  - Triquetrum: 84%
  - Distal ulna: 22%

Falkowski A et al. Eur J Radiology 2020; 124









*Note lack of adjacent synovitis

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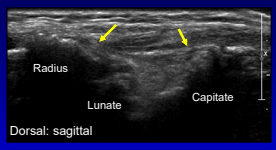
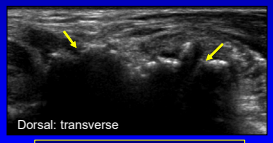
Case #3: “rule out inflammatory arthritis”





Diagnosis:
Psoriatic arthritis

Teaching Point: radiographic findings are diagnostic and explain ultrasound findings

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Cortical Irregularity

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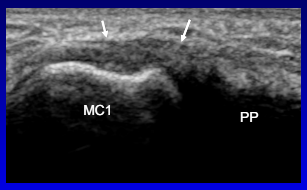
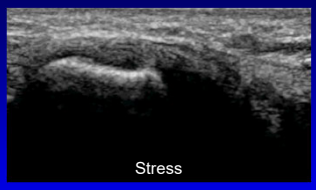
Case #3: “rule out ulnar collateral ligament tear”





Diagnosis:
Chronic full-thickness tear of MCP1 UCL

Teaching Point: dynamic imaging demonstrated the abnormality

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Gamekeeper’s Thumb

- Injury of the ulnar collateral ligament (UCL) of the thumb MCP
  - Historically, chronic injury in Scottish gamekeepers
  - Frequently, due to acute MCP joint hyperabduction
  - Skier’s thumb: acute injury

Acute Mechanism

Chronic Mechanism

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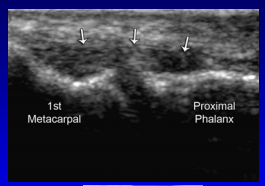
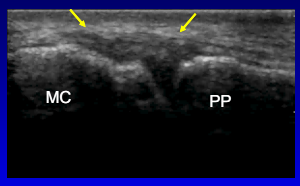
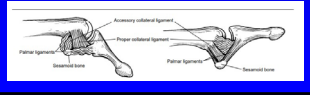
Ulnar Collateral Ligament: thumb





Note: sliding of adductor aponeurosis with isolated interphalangeal joint flexion



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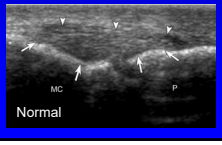
UCL: tears



Teaching Point:
90% of UCL injuries are distal

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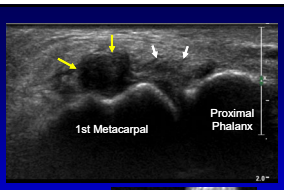
Stener Lesion

- Displaced proximal stump of UCL
  - Hypoechoic & round
  - Proximal to MCP joint
  - At proximal edge of adductor pollicis aponeurosis
- No tissue spanning MCP joint
- "Yo-yo on a string" sign
- Ultrasound: 100% accuracy



Yellow arrows: Stener
White arrows: aponeurosis

*Melville D. et al. Skeletal Radiology 2013; 42:667

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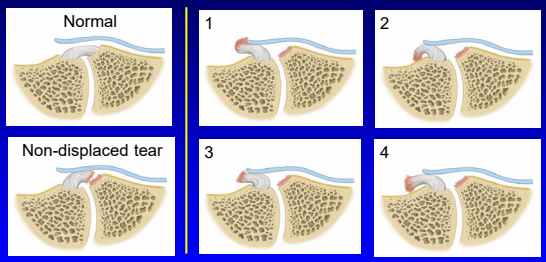
Stener Lesion: variations



Displaced Full-thickness Tears

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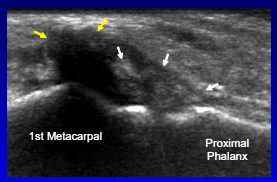
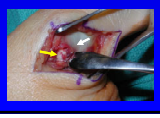
Stener Lesion: dynamic



White arrows = adductor aponeurosis
Yellow arrows = Stener lesion



Teaching Point:
Note importance of active IP joint flexion at imaging showing aponeurosis

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Case #4: "ankle pain"

Diagnosis: Peroneus (fibularis) longus muscle hernia and neuroma of superficial peroneal (fibular nerve)

Teaching Point: history guided dynamic imaging demonstrated the abnormality

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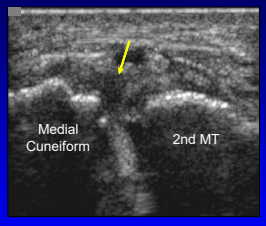
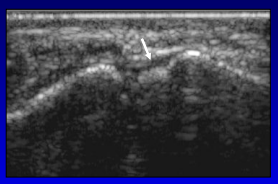
Case #5: "foot pain"





Normal

Diagnosis:
Lisfranc ligament tear

Teaching Point: point tenderness was clue to image the midfoot

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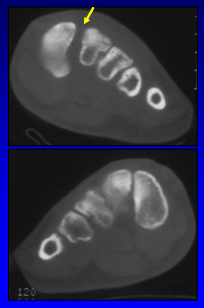
Lisfranc Ligament Injury



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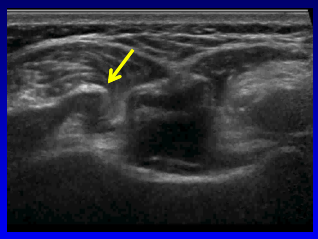
Case #6: “anterior chest discomfort”



Diagnosis:
Slipping rib syndrome

Teaching Point: focal symptoms and dynamic imaging allowed diagnosis

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Take Home Points

- Do not rely on clinical history
- Emphasize a complete or comprehensive imaging protocol
- Focus where focal symptoms are located
- Incorporate dynamic imaging
- Patient history and physical exams findings are important clues
- Correlate with other imaging and laboratory values

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Thank you!

Syllabus on line and other educational material:
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