

MRI of the Wrist with US Correlation

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Disclosures

- Consultant: Bioclinica
- Contractor: POCUS PRO
- Book Royalties: Elsevier
- I now follow Nicki Minaj's cousin's friend in Trinidad on Twitter

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Pathology:

- Tendon
- Joint disease
- Ligament and TFC
- Nerves
- Osseous
- Cysts and masses

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Tendon Abnormalities:

- Tenosynovitis
- Tendinosis
- Tendon tear:
 - Partial-thickness
 - Full-thickness

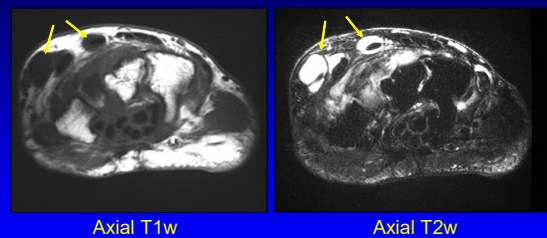
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Tenosynovitis:

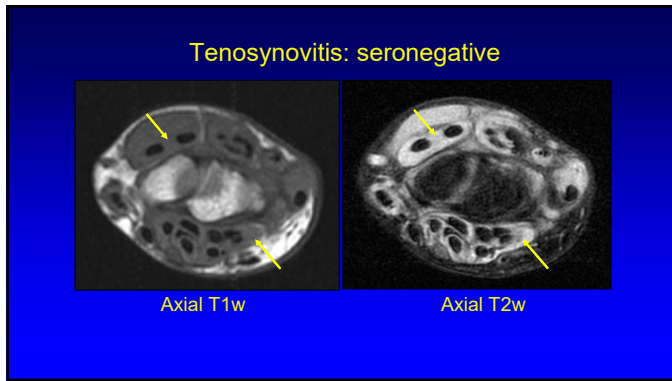
- Fluid distending tendon sheath
 - High signal T2w images
- Synovial hypertrophy:
 - Intermediate to high signal on T2w images
 - Immediate enhancement
- Inflammatory, reactive

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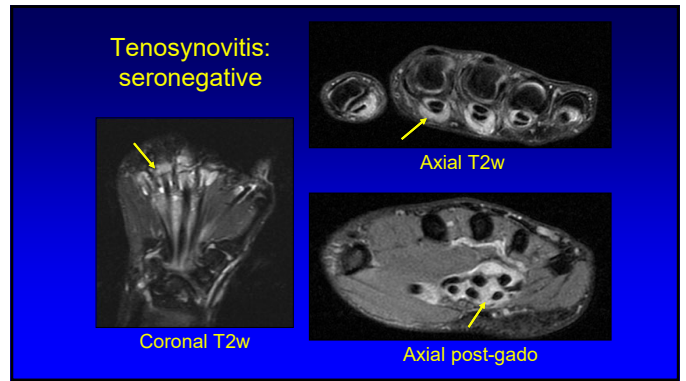
Tenosynovitis: mechanical



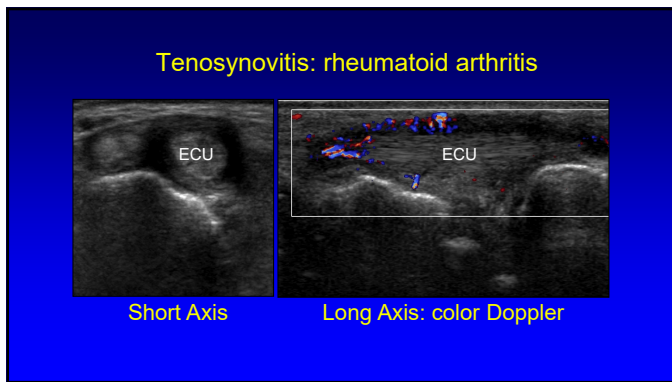
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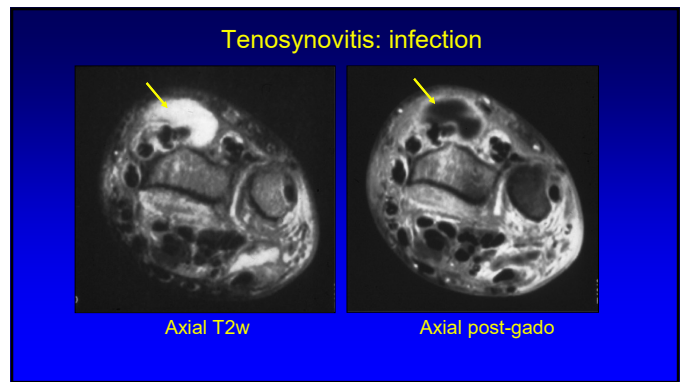
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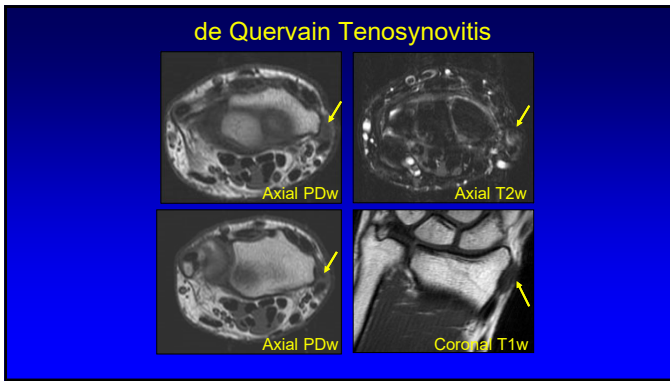
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- Tendinosis:
- No acute inflammatory cells
 - Tendon:
 - Swollen
 - Intermediate signal: similar to muscle
 - Associated tenosynovitis
 - Overuse conditions

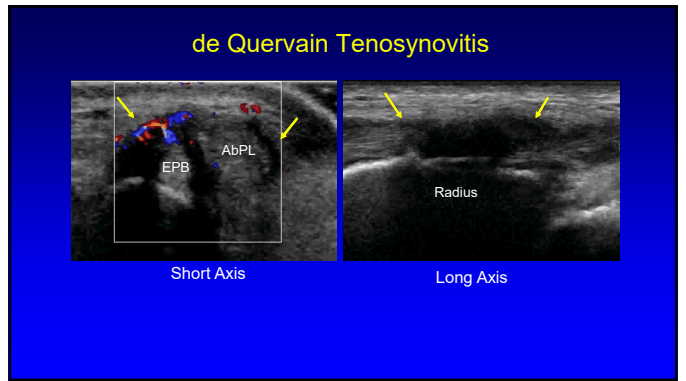
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- de Quervain Tenosynovitis:
- Stenosing tenosynovitis
 - 1st dorsal wrist compartment:
 - Extensor pollicis brevis
 - Abductor pollicis longus
 - Thick tendons, adjacent edema
- Glajchen. Skeletal Radiol 1996;25:63.

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Tendon Tear

- Full-thickness tear
 - Acute trauma or laceration
 - Tendon discontinuity
 - Tendon retraction

Hamate Fracture

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Pathology:

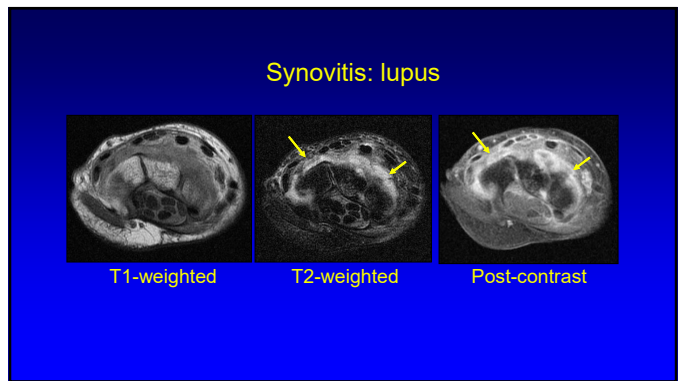
- Tendon
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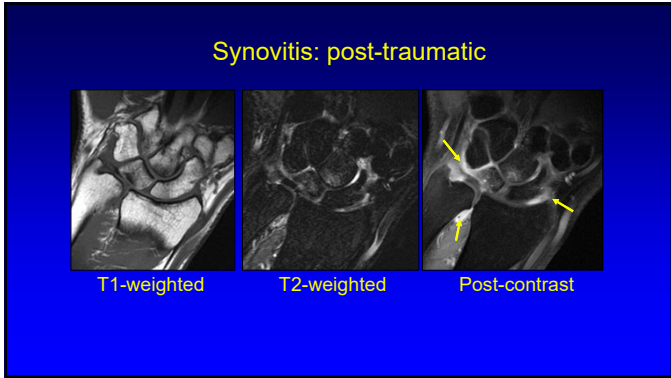
Joint Disease

- Inflammatory arthritis:
 - Synovitis
 - Erosions
 - Possible tenosynovitis
- Degenerative arthritis
- Correlate with distribution, radiographs, and clinical information

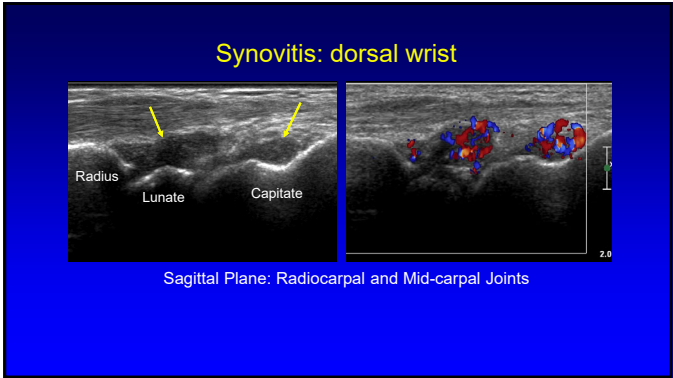
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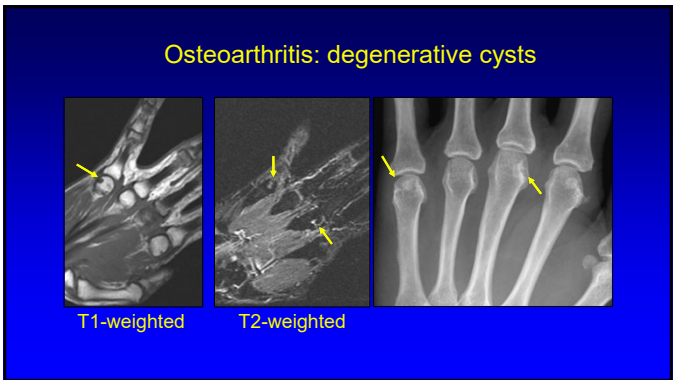
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Erosions

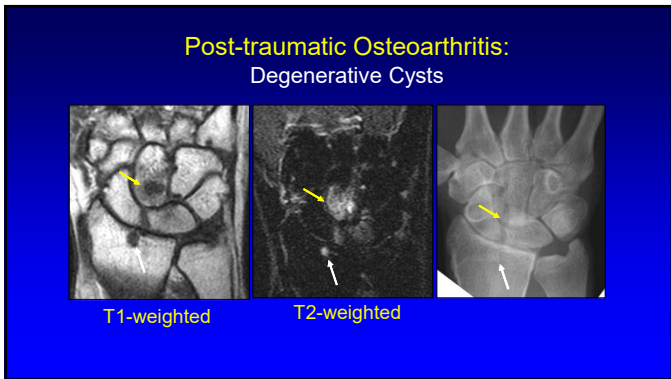
- MRI better than radiographs
- Cortical irregularity: ? erosion
 - Not specific by MRI
 - Rely on coexisting synovitis & radiographs
- Bone marrow edema (MRI): not specific
 - Precursor of erosion or mechanical edema

McQueen. Rheumatology 2000; 39:700

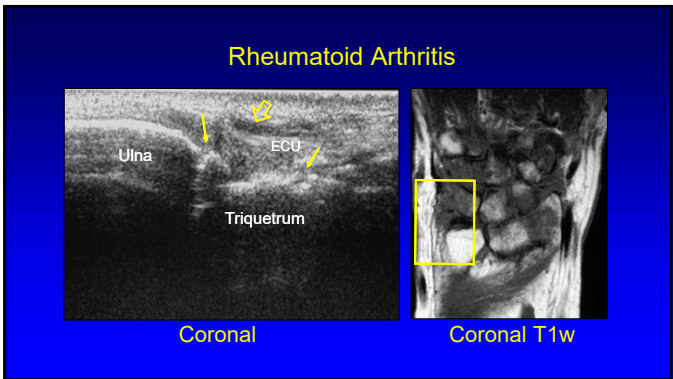
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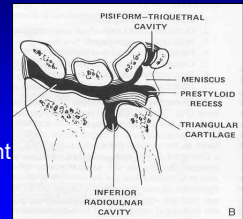
Pathology:

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Wrist: anatomy

- Distal radioulnar joint
 - Triangular fibrocartilage
- Radiocarpal joint
 - Scapholunate ligament
 - Lunatotriquetral ligament
- Midcarpal joint



From: Resnick's Diagnosis of Bone and Joint Disorders

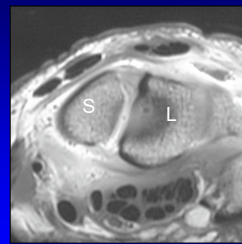
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Scapholunate Ligament Tear

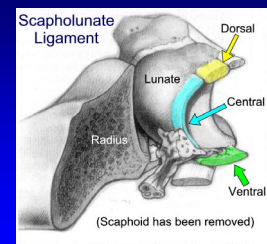
- Central component: perforation
 - Asymptomatic pathology
 - Degeneration and tear
- Dorsal component:
 - Most important functionally
 - Most significant tears

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Scapholunate Ligament



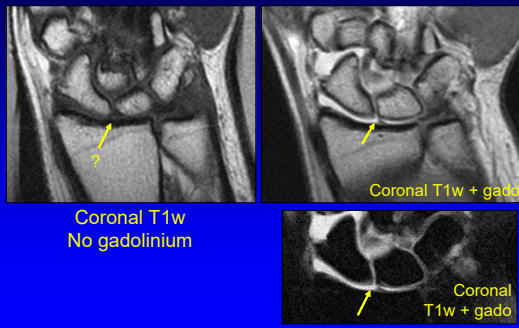
Axial T1w



From: Linkous MD, et al. Radiology 2000; 216:846

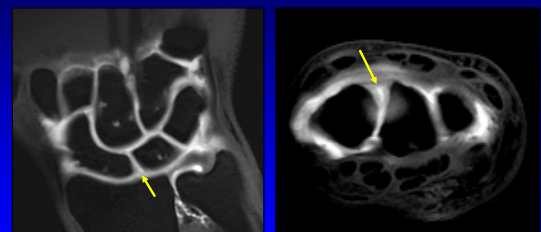
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Scapholunate Ligament: tear



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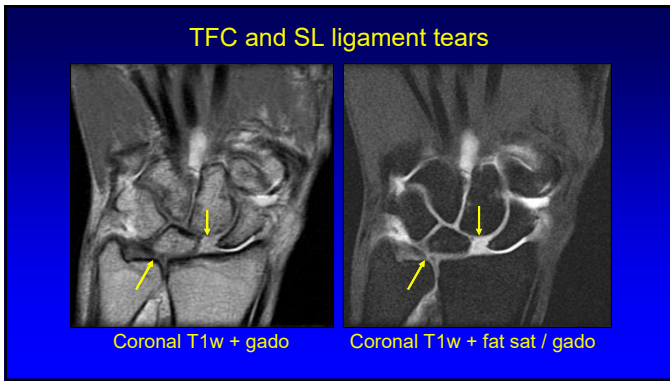
Scapholunate Ligament: tear



Coronal T1w + fat sat / gado

Axial T1w + fat sat / gado

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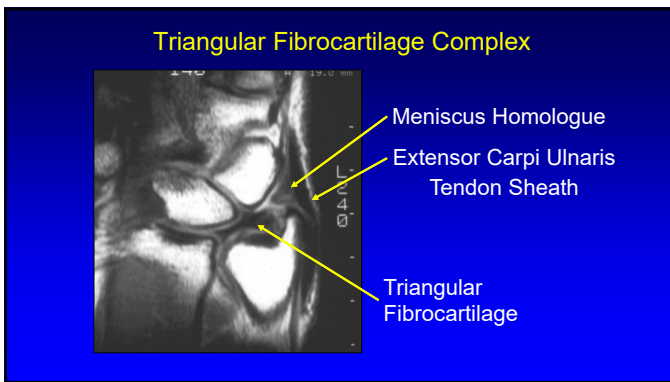


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Triangular Fibrocartilage Complex

- Triangular fibrocartilage
- Meniscus homologue
- Ulnar collateral ligament
- Extensor carpi ulnaris tendon sheath
- Volar radioulnar ligament
- Dorsal radioulnar ligament

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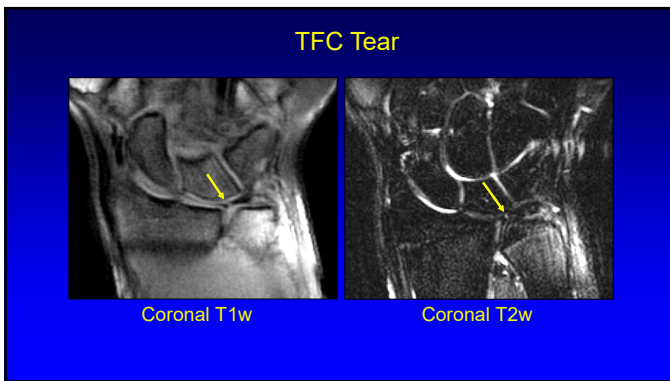
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Palmer Classification

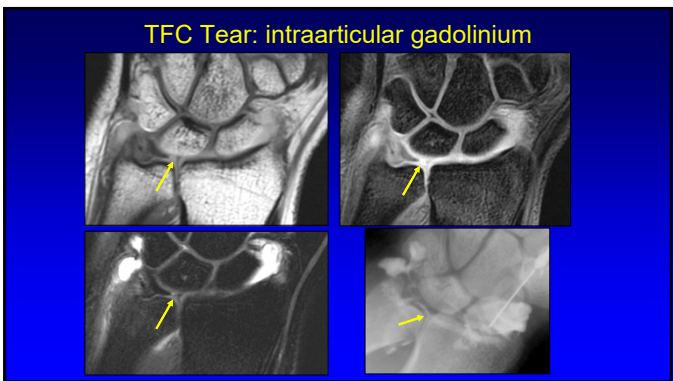
TABLE I Palmer's Classification of Triangular Fibrocartilage (TFC) Lesions			
Traumatic Injury		Degenerative Injury	
Class	Features	Class	Features
IA	Central perforation	IIA	TFC wear
IB	Ulnar avulsion	IIB	TFC wear and chondromalacia
IC	Distal avulsion	IIC	TFC perforation and chondromalacia
ID	Radial avulsion	IID	TFC perforation, chondromalacia, lunatotriquetral ligament perforation
		IIE	TFC perforation, chondromalacia, lunatotriquetral ligament perforation, and ulnocarpal or radioulnar arthritis

From: Resnick's Diagnosis of Bone and Joint Disorders

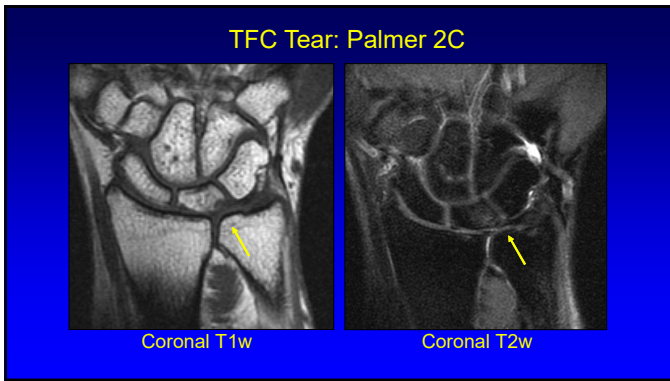
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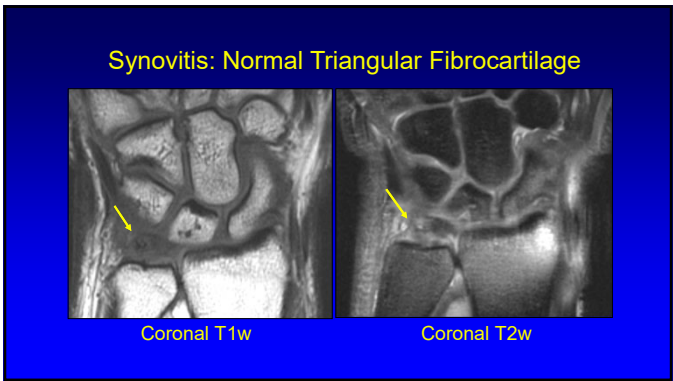
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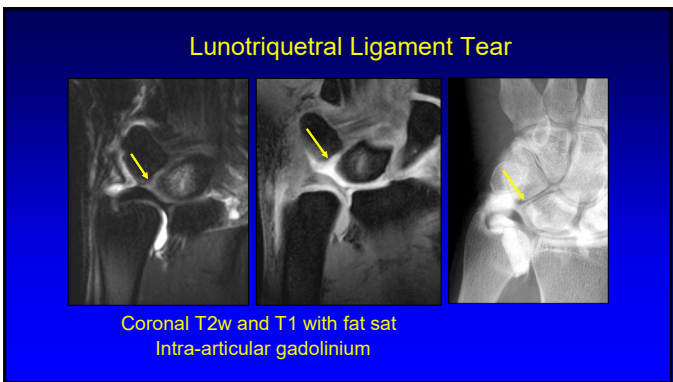
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Ulnar Abutment Syndrome

- Positive ulnar variance
- Degenerative tear of TFC
- Degenerative / traumatic changes:
 - Corner of lunate
 - Variant: ulnar styloid on triquetrum

Cerezal. RadioGraphics 2002;22:105.

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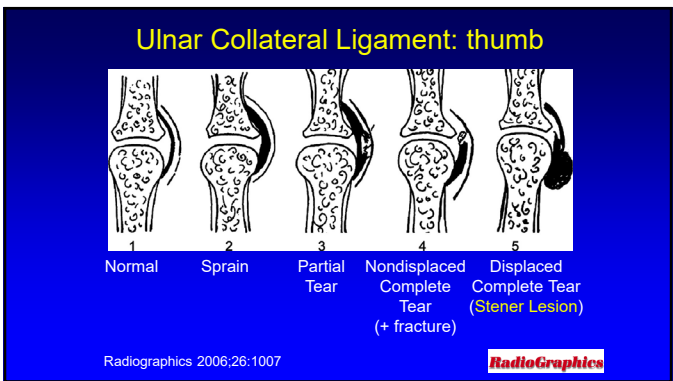
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Gamekeeper's Thumb

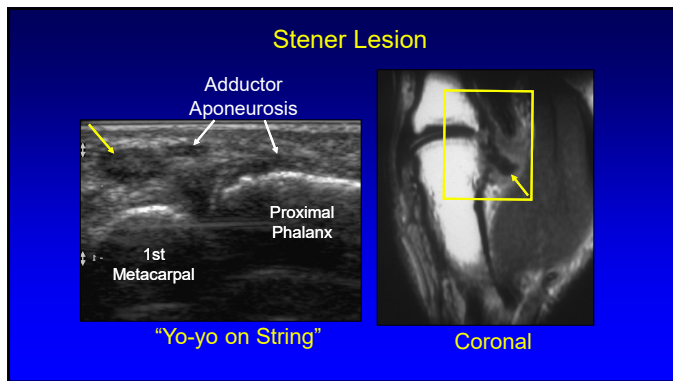
- Injury of the ulnar collateral ligament (UCL) of the thumb
 - Historically, chronic injury in Scottish gamekeepers
 - Frequently, due to acute MCP joint hyperabduction
 - **Skier's thumb**: up to 86% of thumb base injuries

Acute Mechanism Chronic Mechanism

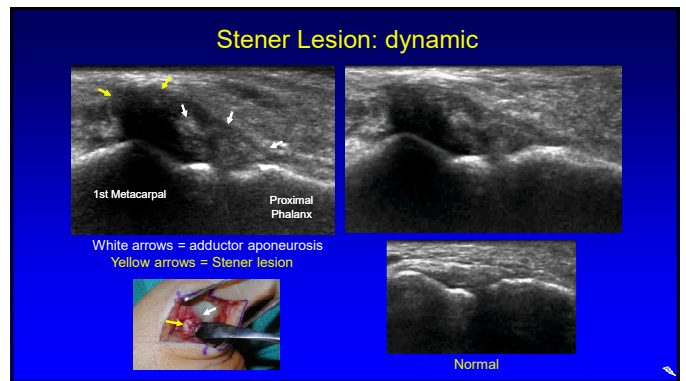
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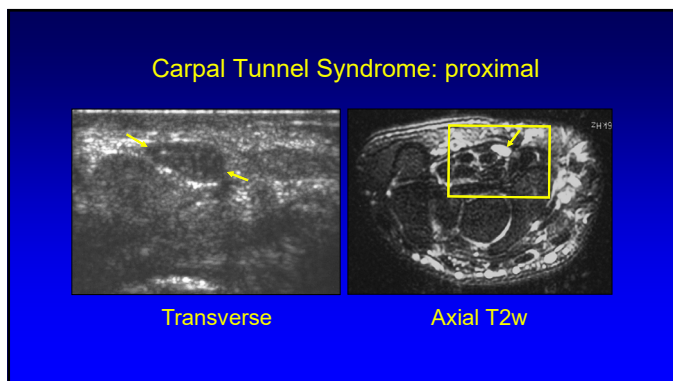
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- ### Pathology:
- Tendon
 - Joint disease
 - Ligament and cartilage
 - **Nerves**
 - Osseous
 - Cysts and masses

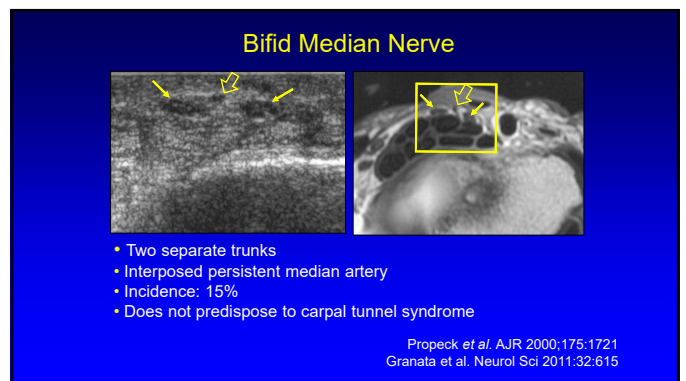
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- ### Carpal Tunnel Syndrome:
- Proximal median nerve swelling
 - >10 mm² cross-sectional area¹
 - >9 mm circumferential²
 - Distal median nerve flattening
 - Flexor retinaculum bowing
 - Abnormal fluid signal
-
- ¹AJR 1997; 168:533
²AJR 1999; 173:681

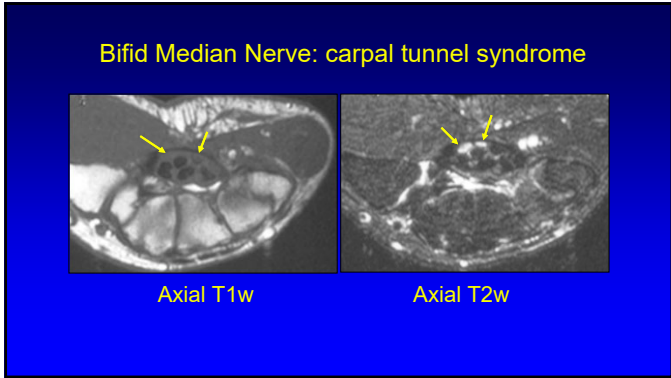
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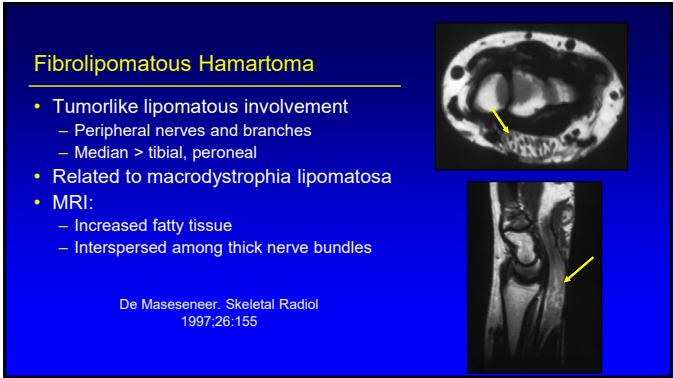
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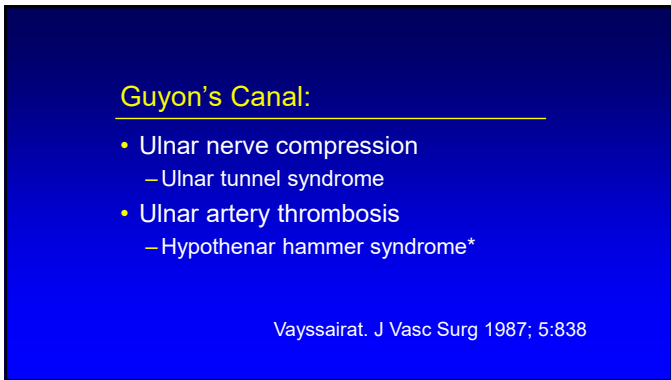
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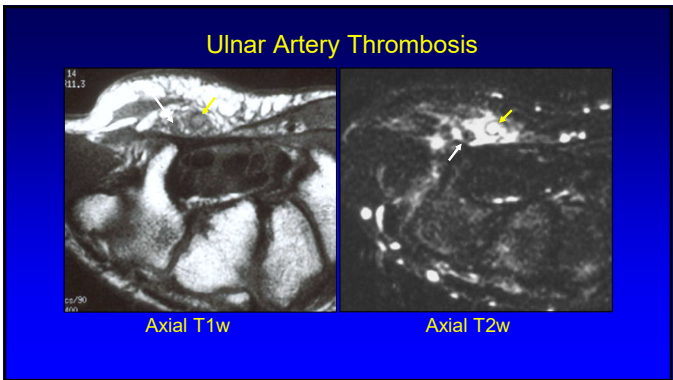
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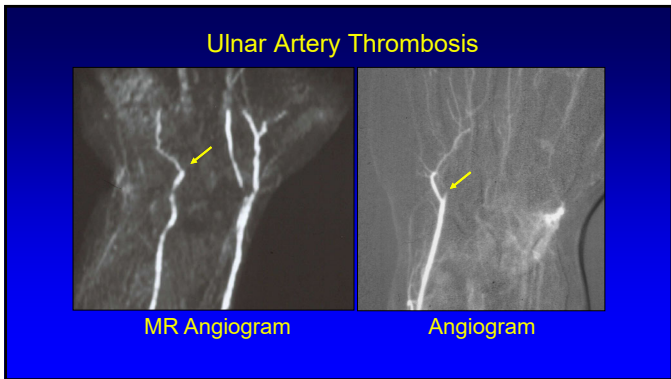
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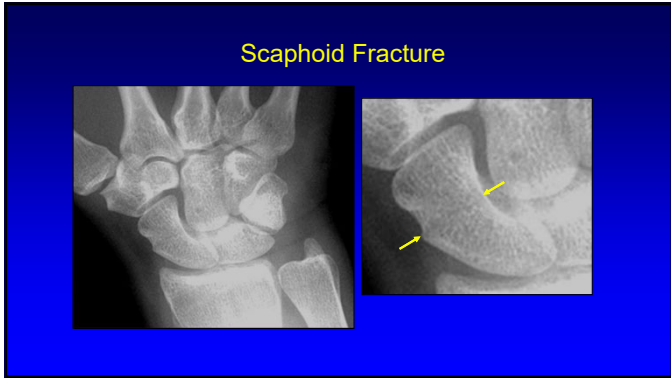
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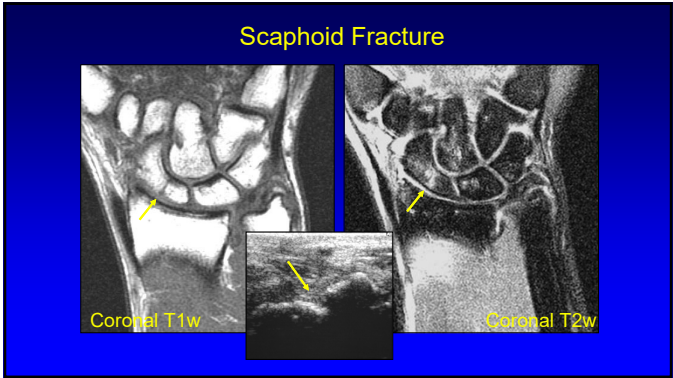
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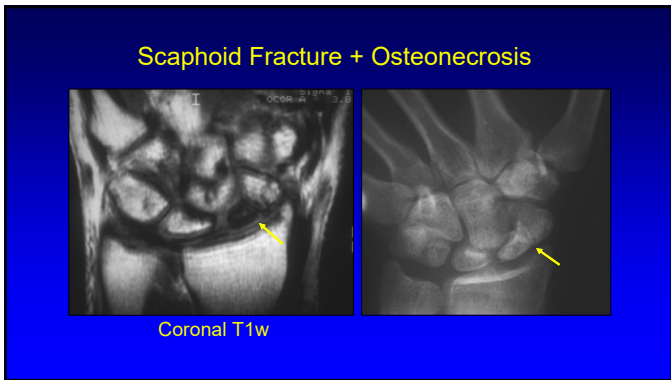
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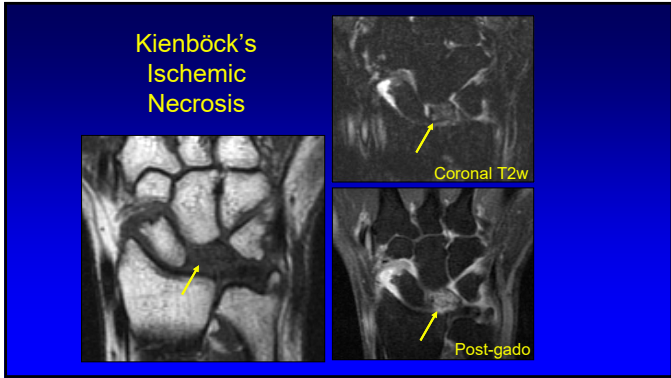
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Kienböck's Ischemic Necrosis:

- Trauma
- Negative ulnar variance
- Idiopathic
- MRI:
 - Bone marrow edema
 - Collapse, low signal

Dalinka. AJR 1995; 164:1

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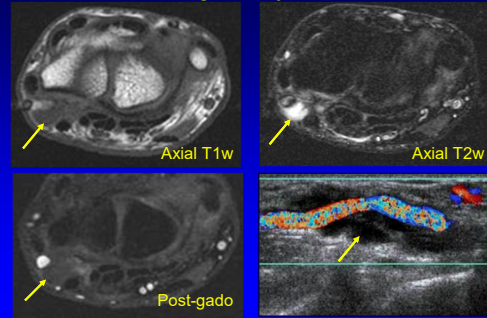
Soft Tissue Mass: wrist ganglia

- Most wrist masses are ganglion cysts
- Multi-locular fluid
- Volar (70%): radial artery & flexor carpi radialis
 - Proximal from radioscaphoid joint capsule
- Dorsal (30%): scapholunate ligament
 - Not compressible (unlike joint recess)

*Skeletal Radiol 1994; 23:201

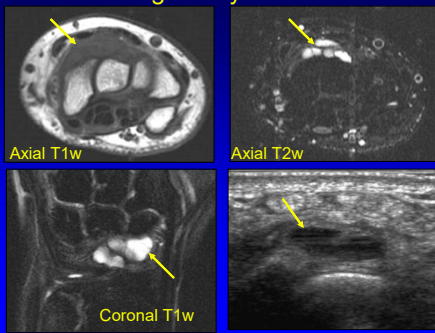
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Ganglion Cyst: volar



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Ganglion Cyst: dorsal

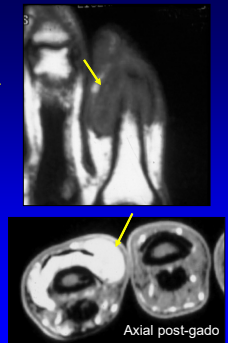


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Giant Cell Tumor Tendon Sheath

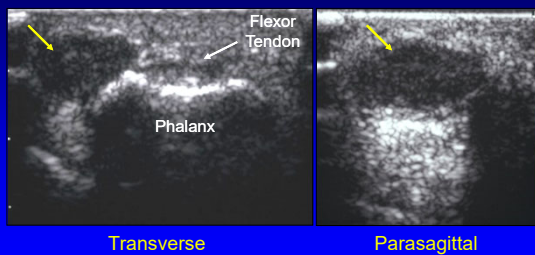
- Tenosynovial giant cell tumor
- 2nd most common mass of the hand
- Volar digits: #1 and 3
- Mass associated with tendon sheath
 - Intermediate to low signal

Walker EA. Semin Roentgenol 2010; 45:277



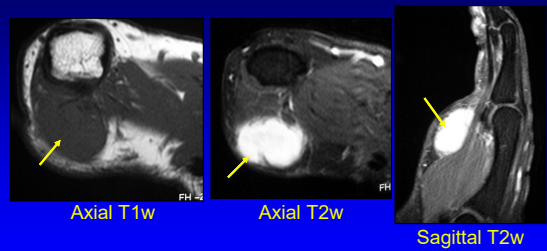
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Giant Cell Tumor of Tendon Sheath



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Fibroma of Tendon Sheath



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Glomus Tumor

- Hamartoma:
 - Neuromyoarterial glomus body
- 75% in hand: subungual
- Pain, tenderness, temperature sensitivity
- MRI:
 - Intermediate T1-w, high T2-w
 - Vascular, enhancement

Drape. Radiology
1995;195:507

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Take Home Points:

- Common pathologies involve specific structures in the wrist
- Image interpretation: checklist
- Familiar with pathologies of these structures

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

Twitter handle: @jjacobsn

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