

Wrist Ligaments

Timothy W. Deyer, MD Musculoskeletal and Interventional Radiology East River Medical Imaging Clinical Instructor New York Presbyterian Hospital



A copy of the presentation can be found at:

eastriverimaging.com/blog/lenox-hill-wrist/



Wrist Ligaments

- Intrinsic
 - Attach solely to carpal bones in wrist
- Extrinsic
 - Additional attachments to the forearm, retinacula, or tendon sheaths
 - Location
 - Volar
 - Dorsal



Imaging Modalities

- X-ray
- Ultrasound
- CT
- MRI



X-ray - Wrist

Views

PA/Lat/Oblique

Evaluate carpal arcs

Broken arc = ligament or osseous injury





X-ray – SL Ligament Tear

- Widening of SL interval
- Views
 - Clenched fist
 - AP not PA
 - Suppinated
 - Ulnar deviation
 - Clenched Pencil
- May show dorsal intercalated instability





X-ray – LT Ligament Tear

- Often normal
- May show volar intercalated instability





Not a primary imaging modalityCan see dorsal SL and LT ligaments





CT – Wrist Ligaments

- Must be an arthrogram
 - Identify contrast traversing ligament
 - Ligament injury also inferred by contrast extension between compartments
- Best for evaluating intrinsic ligaments

• Utility

- Evaluation of concomitant bony injury
- If MRI contraindicated
- 95% sensitive, 96% specific for SL ligament tear



CT Arthrogram - Volar Mid Carpal Extension Intact LT Torn Volar SL



CT Arthrogram - Central

Mid Carpal Extension

Intact LT

Torn Membranous SL



CT Arthrogram - Dorsal



Intact Dorsal SL



Wrist MRI Imaging

- Need
 - High spatial resolution
 - High SNR
 - High contrast to noise



Wrist MRI Imaging

- Limit artifacts
 - Chemical shift
 - Magic angle
 - Motion
 - Intrinsic
 - Extrinsic
 - Wrap
 - Partial volume



MRI Sequences for Ligament Imaging

- Correct protocol imperitive
 - FSE Proton Density
 - 1-2 mm thick
 - 2D/3D GRE Proton density weighted
 - 1-2 mm thick
 - Fat saturated or inversion recovery



1.5 T Extremity MRI







Spatial Resolution



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Sequence Selection





MRI of Intrinsic Ligaments of the Wrist

- Scapholunate ligament
- Lunotriquetral ligament



Intrinsic Ligaments

- MR diagnosis
 - Sensitivity 59%
 - Specificity 70%
- Arthrogram improves
 - Sensitivity 68%
 - Specificity 87%
- Why?
 - Low resolution study contrast and spatial
 - Normal variants
- Why not use arthrography
 - Invasive
 - Limits evaluation of other structures

Moser et al. American Journal of Roentgenology. 2007;188: 1278-1286



Scapholunate Ligament -Shape

- Dorsal and volar band like true ligaments
- Membranous
 - Fibrocartilage
 - Band like dorsally
 - Triangular centrally
 - Trapezoidal volarly



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Scapholunate Ligament – Signal Intensity

- Volar
 - Low signal (though slightly higher than dorsal)
- Membranous
 - Heterogeneous signal
- Dorsal
 - Low signal intensity













Scapholunate Ligament -Pathology

- Sprain
 - Hyperintense
 - Thickened
- Tear
 - Findings
 - Abnormal morphology
 - Traversing fluid/contrast
 - Widening
 - Tear of membranous component often seen in asymptomatic patients
 - Often associated with extrinsic ligament injury















Lunotriquetral Ligament

- V-Shape
- Dorsal and Volar best seen axially
- Membranous seen best on coronal
 - Varies in shape
- Signal similar to SL







Lunotriquetral Ligament





Extrinsic Ligaments

- Triangular Fibrocartilage Complex
- Volar
- Dorsal



Triangular Fibrocartilage Complex

- Components (terminology variable)
 - Triangular fibrocartilage
 - Articular disk
 - Dorsal and radioulnar ligaments
 - Meniscal homologue
 - Ulnar ligaments collateral, ulnolunate, ulnotriquetral, triangular ligaments
 - ECU tendon sheath

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- Articular disk
 - Uniform low signal
 - Thins with pronation
- Radioulnar ligaments
 - Band like
 - Uniform low signal
- Triangular ligament
 - Laminated
 - Proximal Lamina (Foveal)
 - Distal Lamina (Styloid)
 - Lamina separated by loose connective tissue ligamentum subcruentum



- Meniscal homologue
 Uniform low signal
- Ulnocarpal ligaments
 - Small structures
 - Not well seen

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Normal Signal at TFC Attachments

- Proximal lamina (foveal attachment)
 - High signal loose connective tissue
- Distal lamina (styloid attachment)
 - May have intermediate signal due to hyaline cartilage at tip of ulnar styloid
- Radial attachment
 - Intermediate signal hyaline cartilage centrally







TFCC Pathology

- Degeneration
 - Intra-substance high signal
- Perforation of the disc
 - Focal traversing high signal
 - Incidence in asymptomatic individuals increases with age
- Tear
 - Ulnar or radial attachments



TFCC Disk Degeneration





TFC - Disk Perforation



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Peripheral Tear of the TFCC



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Peripheral Tear of the TFCC





Volar Extrinsic Ligaments

- Radioscaphocapitate
- Radiolunotriquetral





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Injury of Radioscaphocapitate and Radiolunotriquetral Ligaments



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Dorsal Extrinsic Ligaments

- Intercarpal
- Radiotriquetral
- Radioulnar



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- Detailed knowledge of anatomy important as is normal variants and artifact
- CT
 - Needs arthrography
- MRI needs appropriate protocol
 - Technical factors can result in false negative/positive
 - Pick correct protocol maximize signal and resolution and minimize noise and artifacts



Questions?



Thank You



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