Dynamic Ultrasound Findings

No Disclosures

Linda Probyn, MD, FRCPC
MSK Radiologist
Objectives

At the end of this presentation, the participant will be able to:

1. Describe relevant anatomy and US appearances of joints and soft tissue structures
2. Improve knowledge of common pathologies, pitfalls and artifacts
3. Describe dynamic US findings that aid in diagnosis
Structure

- Tendons
  - Echogenic and fibrillar
  - Uniform thickness
  - Synovial sheath – thin echogenic line around tendon
  - Small amount of fluid normal
Retinaculum

- Retinaculum
- Normal structures
Tenosynovitis

- Distention of tendon sheath with fluid or synovial hypertrophy
- Possible hyperemia
Synovitis

• Synovitis vs Fluid
  – Fluid –
    • anechoic and compressible
  – Synovitis –
    • Thick, hypoechoic, edematous synovium
    • non-compressible +/- hyperemia on Doppler flow

Fessell DP, Jacobson JA, et. al. AJR 2000
Doppler

- Importance of using Doppler or Power US
- Case: ? Muscle tear

Pseudoaneurysm
Pitfalls

• Anisotropy
  – Beam reflected away from transducer if probe not perpendicular to the structure
  – Appears hypoechoic
Pitfall - Anisotropy

• Solution
  – Heel toe transducer in longitudinal
  – Rock transducer in transverse
Shoulder
Biceps

- Long head of biceps
  - Located in bicipital groove
  - Can sublux or dislocate
Biceps

• Long head of biceps
  – Externally & Internally rotate to assess for subluxation
Supraspinatus Impingement

- Supraspinatus can impinge under acromion
- Abduct shoulder actively to 45 deg
Elbow
Biceps brachii: Anatomy

- Insertion: Radial tuberosity
- Blends with aponeurosis
- No synovial sheath
Biceps brachii tendon: Transverse
Biceps brachii tendon: Long

Medial approach

Long axis
Biceps brachii tendon: Lateral

Supinator
Radial head
Proximal
Distal
Kalume Brigido M. Eur Radiol 2009
Biceps brachii tendon: Lateral

Pronation

Supination

Radial head

Proximal

Distal

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Ulnar nerve
Ulnar nerve

Short axis

Long axis

Ulnar groove
Ulnar nerve – Dynamic Assessment
Snapping Ulnar Nerve & medial head of triceps

- Ulnar nerve dislocates over medial epicondyle with flex/ext of elbow
- Medial head of triceps can also dislocate
- May have double snap

Medial Elbow

Wrist
Extensor tendons

- 6 Extensor compartments

- Extensor carpi radialis brevis (ECRB)
- Extensor carpi radialis longus (ECRL)
- Extensor pollicis brevis (EPB)
- Abductor pollicis longus (APL)
- Extensor pollicis longus (EPL)
- Extensor digitorum (ED)
- Extensor indicis (EI)
- Extensor digiti minimi (EDM)
- Extensor carpi ulnaris (ECU)

Lister’s tubercle

Radius

Ulna
Extensor tendons
Extensor tendons

- Compartment 1 – crosses over 2
- Compartment 3 – crosses over 2
Intersection Syndrome (distal)

- Compartment 3 – crosses over 2
Guyon’s Canal

- Semi-rigid canal
- **Medial** – pisiform, FCU
- **Superficial** – palmar carpal ligament
- **Deep** – flexor retinaculum
- Passage of ulnar artery and nerve
Guyon’s Canal

Ulnar Nerve

Area of sensation

www.emedmd.com

www.capefearcyclists.org
Guyon’s Canal
Screw Impingement

- Metalwork can impinge upon nerves and tendons
- Dynamic assessment helpful
Hand
Anatomy

Adductor Pollicis
- Transverse Head
- Oblique Head

Extensor Pollicis
- Longus Tendon

www.eorthopod.co
www.winkingskull.com
www2.aofoundation.org
Skier’s Thumb

- Avulsion of UCL at MCP joint (usually distal)
- May see # fragment (usually base of phalanx)
- May be isolated ligament injury
- Skier’s thumb – acute
- Gamekeeper’s – chronic

[Image: http://www.houstonmet hodist.org/orthopedics]
Skier’s Thumb
Stener Lesion

- UCL ligament stump displaced
- Lies superficial to adductor aponeurosis

UCL

Metacarpal  Proximal Phalynx

Metacarpal  Proximal Phalynx
UCL

Metacarpal
Proximal Phalynx
UCL – Adductor apponeurosis

Metacarpal

Proximal Phalynx
UCL – Adductor apponeurosis

- Location of the adductor aponeurosis explains why a displaced UCL tear does not reduce (Stener lesion)
Pulley Anatomy

- Fibrous expansion of flexor tendon sheath
- Function as fulcrum
- Assist finger flexion
Pulley system

- **A2 and A4** pulleys most important for function
- Most common in rock climbers
  - **A2** pulley
  - Hyperextension DIP with PIP flexion
Pulley system

Proximal phalanx

A2 Pulley
Pulley Injury

Normal

A2 Pulley Injury

Courtesy Dr. Mark Cresswell
Trigger Finger

- Mostly at MCP A1 pulley
- US
  - Thickening of pulley
  - Associated cystic lesion
  - +/- tendinopathy (50%)
HIP
Snapping Iliopsoas Tendon

- Cause of external snapping hip
- Portion of the tendon moves abruptly over ilioplectoneal eminence
Snapping Iliopsoas Tendon

• Portion of tendon transiently trapped during flexion, external rotation and abduction of the hip

• Other causes:
  – Bifid tendon moving around itself
  – Snapping over paralabral cyst

Case courtesy of Dr Matt Skalski, Radiopaedia.org, rID: 45907
Snapping Iliopsoas Tendon

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Ankle
Peroneal Tendons

- Peroneus Brevis
- Peroneus Longus

Fibula
Tendon Subluxation

- Peroneal Tendons
  - Tendons more anterior and lateral than normal
  - Elicited with dorsiflexion & eversion
Achilles & Plantaris Tendon

Plantaris
- Origin: lateral supracondylar ridge of femur above lat.

Gastrocs
- Insertion: Medial Achilles tendon at calcaneus
- Can mistake for intact Achilles tendon

https://www.pinterest.ca/Effiekusuma/muscle/?lp=true
Achilles Tear & Intact Plantaris

Long

Calcaneus

Trans

Trans
Achilles Tear & Intact Plantaris

Treatment

• Nonoperative vs. Operative
• Level 1 evidence: no difference in re-rupture rates with functional rehabilitation


- <1 cm: non-operative (maybe elite athlete)
- 1-2.5 cm: non-operative older pt. & offer choice for active pt.
- >2.5 cm: surgery
The End
Happy Scanning

Linda Probyn, MD FRCPC
linda.probyn@sunnybrook.ca
References