Musculoskeletal Ultrasound: Dynamic Imaging

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Outline:

- Dynamic imaging
- Calf ultrasound
- Plantar plate ultrasound

Adhesive Capsulitis:

- Frozen shoulder
- Gradual limitation in motion
- Incidence 2 – 5%
- Diabetic (insulin dependent): 30%
- Associations: female, trauma, >40 years old, diabetes, immobilization, thyroid disease, stroke, MI, autoimmune disease

Griesser, et al, JBJS 2011; 93:1727

Adhesive Capsulitis:

- Supraspinatus tendon does not slide beneath acromion with lateral elevation of arm
- Sensitivity 91%, specificity 100%, accuracy 92%

Subacromial Impingement

- Thickened tendon or bursa
  - Possible snapping of thickened bursa
  - "Gathering" of bursa: may be asymptomatic
- Superior movement of humeral head
  - Possible contact between humerus and acromion

1Daghir A et al. Skeletal Radiol 2012; 41:1047
2Bureau N et al. AJR 2006; 187:216

Impingement Syndrome

Subacromial Impingement: anterior

Impingement: osseous

Joint Effusion: subscapularis recess

Rotator Interval Tear

- Abnormal hypoechogenicity, non-visualization
- Abnormal supraspinatus, superior glenohumeral ligament, subscapularis
- Biceps instability
  - "Chondral Print Sign"
  - Intracapsular instability

*Zappia M et al. Skel Radiol 2018: 45:35
Boxer Knuckle:
- Damage to the sagittal bands of extensor hood
  - Transverse orientation
- Extensor tendon subluxation or dislocation with finger flexion

Lopez-Ben et al. Radiology 2003; 228:642

Patellar Clunk Syndrome:
- After total knee arthroplasty
- 1% to 7.5% incidence
- Fibrous nodule: intercondylar notch
- Pain with flexion - extension


Snapping: sartorius over pes anerinus bursa

Snapping: semitendinosus over semimembranosus
Snapping: semitendinosus over semimembranosus

Muscle Hernia
- Cause: trauma, activities, weak fascia
- Lower leg: especially anterior tibialis
- Swelling with muscle contraction
- US: muscle bulge, possible fascial defect
  - Site of perforating vessel

Muscle Hernia: anterior tibialis

Slipping Rib Syndrome
- Abnormal mobility of cartilaginous rib
- Slips over adjacent rib with muscle contraction or activity
- Visible with dynamic ultrasound

Slipping Rib Syndrome
Outline:
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Calf: pathology
• Tendon tear:
  – Medial gastrocnemius: distal
  • Tennis leg
  – Plantaris: proximal, tubular
  – Lateral gastrocnemius and soleus: less common

Medial Head of Gastrocnemius Tear

Medial Head of Gastrocnemius Tear

Plantaris Tendon: tear
• Between medial gastrocnemius & soleus muscles
• Hypoechoic fluid: tubular
  • *Mid-calf level
  • Between medial gastrocnemius & soleus
• Tendon fiber disruption

AJR 1999; 172:185
Outline:
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Plantaris Tear
- Long Axis
- Short Axis

Soleus Hematoma
- Long Axis
- Short Axis

Tumor
- Metastasis: Renal Cell Carcinoma
- Sarcoma: high grade
Plantar Plate

- Fibrocartilage
- Central stabilizing structure
- Plantar to metatarsal head
- Does not attach to metatarsal
- Firmly attached to proximal phalanx

From: Gregg JM et al. AJR 2006; 186:984

FHL and Plantar Plate: Long and Short Axis

Yellow arrows = plantar plate
* = Sesamoid phalangeal ligaments in short axis (hypoechogenic)

Plantar Plate Injury

- US: hypoechoic defect
- At proximal phalanx
- Partial tear: articular surface
- Full-thickness tear: complete detachment
- May be asymptomatic finding in 47% (MTP 2 – 4)

From: Gregg JM et al. AJR 2006; 186:984
Gregg JM et al. Eur Radiol 2006; 16:2661

Pericapsular Fibrosis

- From plantar plate tear
- Simulate Morton neuroma
- 2nd MTP joint
- Hypoechoic, eccentric
- No nerve continuity

Courtesy of H. Umans, New York
Umans et al. Skeletal Radiol 2014; 43:1361

Plate Plate Injury and Pericapsular Fibrosis

Contralateral Normal