Post-operative Imaging
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- Not relevant to this talk

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Objectives
- Review expected post-operative appearances
  - Joint, tendon, ligament
- Review post-operative complications
  - Tendon retear, infection, nerve injury

Outline: post-operative
- Shoulder: rotator cuff, joint replacement, neuroma
- Elbow: biceps repair, ulnar nerve transposition
- Wrist: carpal tunnel, Wartenberg syndrome, de Quervain
- Hip: arthroplasty, neuroma
- Ankle: tendon injury, ligament repair

Postoperative Cuff
- Partial tear repair:
  - Articular <50% and bursal: debridement
  - Articular >50%: repair or convert to full tear
- Full-thickness repair:
  - Trans-osseous fixation + trough
  - Deconticated tuberosity + direct apposition
- Suture anchors:
  - Metal, plastic, bioabsorbable
  - Single, multiple, single or double row

Rotator Cuff Repair Techniques

**Post-operative Rotator Cuff:**
- Post-op tendon: echogenic & thin*
- Reimplantation trough
- Echogenic sutures & anchors

*Mack et al. AJR 1988; 150:1089

**Post-operative cuff: intact**

- T1w fat-sat coronal
- Long Axis
- Open arrows = suture

**Post-operative cuff: intact**

- T1w fat-sat sagittal
- Short Axis
- Open arrow = suture

**Post-operative cuff: intact**

- PDw fat-sat coronal
- Long Axis
- Open arrow = trough

**Recurrent Cuff Tear: ultrasound results**
- Sensitivity = 95%, specificity = 90%, accuracy = 94%
- Tendon defects at 1 year may heal
- Defects increase in size with decreased strength but may be asymptomatic
- Structural integrity does not correlate with pain or function

1Yen, Clin Imaging 2004; 28:69
4Russell RD et al. JBJS 2014; 96A:265
Post-operative Rotator Cuff

- Recurrent tear:
  - Defined tendon defect
  - Ultrasound: anechoic or hypoechoic
  - MRI: fluid or contrast signal
  - Tendon non-visualization (ultrasound)
  - Tendon retraction

Post-operative Cuff: retear

Long Axis  
Coronal-oblique T2w

Post-operative cuff: recurrent tear

Long Axis  
PDw fat-sat coronal
Open arrow = bioabsorbable suture anchor

Post-operative cuff: recurrent tear

Short Axis  
PDw fat-sat sagittal
Open arrow = suture

Rotator Cuff Repair:

- How does the repaired tendon appear at specific time points after surgery?
- How does the appearance change over time?
- When should the tendon appear “normal”?

Post-operative Cuff: Intact

2 weeks  
6 weeks  
3 months

Subject B.A.
**Rotator Cuff Repair:**
- Most recurrent tears: within 3 months
- Tendons start to look “normal” by 6 to 9 months
- Focal defects are equivocal, may be post-surgical, may disappear
- Recurrent tears tend to be larger or get larger
- If unsure, get follow-up scan

**Rotator Cuff Repair:**
- Patients with intact tendons may have continued symptoms
- Patients with recurrent tears may be asymptomatic
- Large recurrent tears are more likely symptomatic

**Biceps Tendon:**
- Tenotomy: surgical transection of intra-articular aspect of long head biceps brachii tendon
- Tenodesis: surgical transection + fixation of proximal stump to intertubercular groove

**Biceps Tendon:** tenodesis

**Biceps Tendon:** failed tenodesis

**Shoulder Arthroplasty:**
- Total shoulder arthroplasty or hemiarthroplasty
  - Rotator cuff normally inserts onto tuberosities
- Reverse total shoulder arthroplasty:
  - Used when tear of rotator cuff
  - No cuff or tuberosities
Shoulder Arthroplasties

Total  Hemi  Hemi  Reverse  Total

Note: normal tuberosities and cuff attachments
Do not do US here

Arthroplasty: Intact Cuff

Long Axis  Short Axis

Arthroplasty: Cuff Tear

Long Axis

Arthroplasty

GT

Gossypiboma

- Retained surgical sponge or cotton
  - Textiloma
  - Latin “gossypium” = cotton
  - Swahili “boma” = place of concealment
- Complications:
  - Foreign body response
  - Infection
- May remain silent for years

AJR 2009; 193:S94

Transection Neuroma: brachial plexus

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Biceps Brachii Tendon: repaired

Anterior    Lateral

Biceps Repair: superficial radial nerve entrapment

Lateral    Medial

Isolated Ulnar Nerve Dislocation

Short Axis

Ulnar Nerve Transposition

Subcutaneous    Submuscular

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Carpal Tunnel Syndrome

Short Axis    Long Axis
Postoperative Carpal Tunnel
- Discontinuous or thickened transverse carpal ligament
- Anterior displacement of transverse carpal ligament\(^1\)
- Median nerve size:
  - May decrease\(^2\)
  - Does not correlate with success\(^3\)

\(^1\)Lee CH et al. Ann Plast Surg 2005; 54:143
\(^3\)Naranjo A et al. Scand J Rheum 2010; 39:49

Wartenberg Syndrome

Radial Nerve, Superficial Branch Injury
Post-operative distal radius fracture

De Quervain Tenosynovitis

Tendon Subluxation: post-retinaculum release
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Total Hip Arthroplasty:

- Metal components demonstrate posterior reverberation
- Artifact occurs deep to prosthesis away from fluid collection (unlike MRI, CT)

Hip Arthroplasty:

- Ultrasound cannot differentiate small effusion from post-op change
- Suspect infection:
  - Pseudocapsule > 3.2 mm: suspect infection
  - Extra-articular fluid collection
  - Not visualized with arthrography if non-communication

Hip Arthroplasty: infection

Teaching Point:
Always screen soft tissues about an arthroplasty prior to fluoroscopic joint aspiration

Metal-on-Metal Arthroplasty: pseudotumor
Incisional Abscess

Trochanteric Bursa: infection + gas

Nerve Transection
- Hypoechoic and retracted nerve ends if complete
- Neuroma formation:
  - Disorganized and tangled nerve end
  - Normal response to nerve transection
- After amputation:
  - US important to determine if symptomatic

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J Clin Ultrasound 1997; 25:85

Partial-thickness Tear: tibialis posterior

Short Axis

Long Axis
Flexor Hallucis: screws

1st Proximal Phalanx

Extensor Hallucis: screw

Anterior Talofibular Ligament Tear

Patient #1
Patient #2
Patient #3

Anterior Talofibular Ligament Repair

Brostrøm Procedure

Talus
Fibula
Normal
Tear
Repaired

Take-home Points

- Rotator cuff repair:
  - Look for defined defect: often anechoic
  - Small tears may heal
- Hip arthroplasty: aspirate if infection concern
- Nerve injury: neuroma, entrapment
- Tendon and ligament repair: heterogeneous, hypoechoic, echogenic suture

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