Dynamic Imaging:
- Shoulder
- Elbow
- Wrist and Hand
- Hip and Thigh
- Knee
- Ankle and Foot
- Soft Tissues

Biceps Brachii Tendon:
- Subluxation:
  - Partially perched on lesser tuberosity
- Dislocation:
  - Empty bicipital groove
  - Simulates biceps tendon tear
  - Associated subscapularis tears

Farin et al. Radiology 1995; 195:845
Biceps Tendon Dislocation

Impingement Syndrome
- Cuff impingement
- Subacromial enthesophyte or acromioclavicular joint osteophyte
- Associated tendon degeneration and tear

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

Subacromial Impingement: anterior

Impingement: supraspinatus

Dynamic Imaging:
- Shoulder
- Elbow
- Wrist and Hand
- Hip and Thigh
- Knee
- Ankle and Foot
- Soft Tissues

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

- Occurs in elbow flexion
- Reduces in extension
- Nerve irritation, predisposes to injury
- Found in 20% asymptomatic volunteers

Okamoto, J Hand Surg 2000; 25B:85

---

**Technique: ulnar nerve subluxation**

---

**Isolated Ulnar Nerve Dislocation**

---

**Snapping Triceps Syndrome**

- Ulnar nerve and medial triceps dislocate over apex of medial epicondyle
- Ulnar nerve and medial triceps remain in contact with each other
- Palpable snap felt through transducer

Radiology 2001; 220:601

---

**Snapping Triceps Syndrome: dynamic imaging**

---

**Dynamic Imaging:**

- Shoulder
- Elbow
- Wrist and Hand
- Hip and Thigh
- Knee
- Ankle and Foot
- Soft Tissues
**Extensor Carpi Ulnaris:**
- 6th extensor wrist compartment
- Asymptomatic subluxation
  - Supination
  - Up to 50% out of groove
  - No tear or tenosynovitis

Lee KS et al. AJR 2009; 193:651

**Trigger Finger:**
- Stenosing tenosynovitis: A1 pulley
- Thick and hypoechoic pulley
- Hyperemia: 91%
- Tendinosis: 48%
- Tenosynovitis: 55%


**Dislocation: extensor carpi ulnaris**

**Dynamic Imaging:**
- Shoulder
- Elbow
- Wrist and Hand
- Hip and Thigh
- Knee
- Ankle and Foot
- Soft Tissues
Snapping Hip Syndrome
- Painful snap with hip motion
- Intraarticular
- Extraarticular:
  - Anterior: iliopsoas tendon
  - Lateral: iliotibial tract or gluteus maximus

Snapping Hip Syndrome: iliopsoas
- Long axis to inguinal ligament superior to femoral head
- Extension of flexed abducted and externally rotated hip
- Abrupt movement of iliopsoas as ilacus muscle interposed between tendon and bone moves

Snapping Hip Syndrome: lateral
- Transverse over greater trochanter
- Hip external rotation / flexion
- Abrupt motion of iliotibial tract or gluteus maximus over greater trochanter
Dynamic Imaging:

- Shoulder
- Elbow
- Wrist and Hand
- Hip and Thigh
- Knee
- Ankle and Foot
- Soft Tissues

Intra-articular Body

Nodular Synovitis: Snapping

Patellar Clunk Syndrome:

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

Sartorius Snapping over Pes Anerinus Bursa

Semitendinosus Snapping over Semimembranosus

Semitendinosus Snapping over Semimembranosus

Dynamic Imaging:
- Shoulder
- Elbow
- Wrist and Hand
- Hip and Thigh
- Knee
- Ankle and Foot
- Soft Tissues

Peroneal Tendon: dislocation
- Implies retinaculum injury
- Associated with tendon tear
- Examine with dorsiflexion and eversion
- Lateral subluxation / dislocation

Rosenberg et al. AJR 2003; 181:1551
Dislocation: peroneus brevis & longus

*Anterior*  
*Posterior*  

**Short axis**

**Intrasheath Peroneal Subluxation**

- Abnormal snapping of peroneal tendons
- No lateral displacement, intact retinaculum
- Associations:
  - Convex posterior fibula in 92%
  - Tendon tear in 86%
  - Low lying peroneus brevis muscle in 71%

*J Foot Ankle Surg* 2009; 48:323

**Intrasheath Peroneal Subluxation**

- Type A:
  - Peroneal tendon switch position within sheath
  - No coexisting peroneal tendon tear
- Type B:
  - Subluxation of peroneus longus tendon into longitudinal split of peroneus brevis tendon


**Morton Neuroma:**

- Interdigital nerve entrapment
- Edema, fibrosis, necrosis
- 3rd intermetatarsal space > 2nd
- Sharp, burning pain from metatarsal head to toes
- Females: pliable foot, high-heeled narrow-toed shoes

*From: Martinoli, RadioGraphics 2000; 20:S199*

**Technique:**

- Interdigital space
  - Transducer:
    - Plantar
    - Dorsal
  - Normal digital nerve difficult to visualize
  - Correlate with symptoms
Morton Neuroma
- Hypoechoic 5 mm mass
  - Sensitivity: 100%; Specificity: 83%
  - Accuracy equal to MRI
  - Nerve continuity: sagittal plane
- Intermetatarsal bursa
  - Associated with neuroma
  - "Neuroma-bursal complex"

Quinn T et al. AJR 2000; 174:1723

Dynamic Evaluation
- Compression
  - Between transducer and palpation
  - Bursae (dorsal) compress, neuromas (plantar) do not
- Sonographic Mulder Sign
  - Scan plantar: coronal plane
  - Neuroma displaces: plantar
  - Palpable click

Tomiani M et al. AJR 2003; 180:1121
Zanetti M et al. Radiology 1997; 203:516

Dynamic imaging: Mulder’s Maneuver

Dynamic Imaging:
- Shoulder
- Elbow
- Wrist and Hand
- Hip and Thigh
- Knee
- Ankle and Foot
- Soft Tissues

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

Dynamic Imaging: summary

- Dynamic pathologic conditions
  - Limited number
  - Involve specific structures
- Consider ultrasound for any snapping or painful dynamic situation