Ultrasound Evaluation of the Hip

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Pathology:
• Joint abnormalities
• Bursal pathology
• Muscle and tendon injury
• Snapping hip syndrome
• Miscellaneous pathology

Hip: anterior recess
• Anterior and posterior layers
  – Fibrous tissue + minute layer of synovium
  – Hyperechoic
  – Each 2 - 4 mm thick

Radiology 1999; 210:499

Hip Effusion:
• Separation of anterior and posterior layers
• Capsule distention at femoral neck > 7 mm or difference of 1 mm from opposite side
• Extension & abduction improves visualization
• Do not internally rotate hip: capsule thickens

1Radiology 1999; 210:449
2Scand J Rheumatology 1989; 18:113
3Acta Radiologica 1997; 38:867
Hip Joint: septic effusion

Long Axis

Hip Effusion: misconception
- It is incorrect to assume that joint fluid may not be seen anterior due to gravity
- Native hip: joint fluid distributes around femoral neck
- In no cases was fluid only seen posterior
- Exception: after hip surgery

Moss et al. Radiology 1998; 208:43

Hip Effusion:
- Cannot predict infection by ultrasound
- Negative power color Doppler does not exclude infection*
- Guided aspiration

* AJR 1998; 206:731

Joint injection
- Anterior recess
- In plane
- Transducer:
  - Parallel to femoral neck
  - Consider curvilinear
- Needle: distal to proximal
- 97% accuracy1

1Smith J. J Ultrasound Med 2009; 28:329

Joint Injection
- Femoral neck target
- Preferred over aiming for femoral head
- Allows higher injection volumes
- Less extra-articular contrast


Pigmented Villonodular Synovitis

Erosion
**Hip Labrum**

- Normal:
  - Hyperechoic, triangular
- Degeneration: hypoechoic
- Tear:
  - Anechoic cleft
  - Most common anterior
  - Possible paralabral cyst
  - Sensitivity 82%, specificity 60%∗


**Femoroacetabular Impingement:**

- Pincer-type: deep acetabulum
- Cam-type
  - Broad irregular femoral neck
  - Possible cortical irregularity at US
- Associated with anterior labrum tear
- Consider dynamic evaluation

Radiology 2005; 236:588

**Cam Impingement**

Note: labral tear (yellow arrow) and osseous bump (white arrow)

Courtesy of M. van Holsteijn, Detroit, MI

**Femoroacetabular Impingement**

**Hip Arthroplasty:**

- Prosthesis identifiable
- May use sonography to guide hip aspiration
- Most useful: non-communicating abscess, bursitis, incision infection
Total Hip Arthroplasty:
- Metal components demonstrate posterior reverberation
- Artifact occurs deep to prosthesis away from fluid collection (unlike MRI, CT)

Hip Arthroplasty:
- Pseudocapsule distention: > 3.2 mm: suspect infection*
- Extra-articular fluid collection:
  - Suspect infection
  - Not visualized with arthrography if non-communication

*AJR 1994; 163:381

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Trochanteric Pain Syndrome:

- Most commonly caused by gluteus minimus and medius tendon abnormalities
- Trochanteric bursitis: uncommon
  - 20% of symptomatic patients
  - Not actually inflamed
  - Not associated with pain

1. Eur Rad 2007; 17:1772
2. Long SS et al. AJR 2013; 201:1083
3. Clin Rheumatol 2008; 14:82

Greater Trochanter

FACETS: AF = anterior; LF = lateral; SPF = superoposterior; PF = posterior

Pfirrmann et al. Radiology 2001; 221:469

Greater Trochanter

AF, anterior facet; LF, lateral facet; PF, posterior facet

Trochanteric Bursitis

Transverse

Coronal

Note: ITB is formed by fascia from gluteus maximus and tensor fascia latae

Trochanteric Bursitis

Iliopsoas Bursa:

- Hip joint communication in 10%
  - Increased with hip joint pathology
- May extend cephalad into abdomen
- May be mistaken for abscess:
  - Look for hip joint communication

Radiology 1995; 197:853
**Iliopsoas Bursal Fluid**

- **Femoral Head**
- **Iliopsoas Bursa**
- **Short Axis**
- **Long Axis**

**Iliopsoas Bursa**

- Oblique-axial plane:
  - Superior to femoral head
  - Lateral to medial
  - Inject between tendon and ilium
- Pain relief = successful iliopsoas surgical release

Blankenbaker DG. Skeletal Radiol 2006; 35: 565

**Gluteal Tendon Pathology:**

- Tendinosis: hypoechoic, no defects
- Partial tear: anechoic clefts
- Complete tear: discontinuous tendon
- >2 mm cortical irregularity is associated with tendon tear
  - Positive predictive value = 90% (xray)*

*Steinert et al. Radiology 2010; 257:754

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**Tendinosis: Gluteus Minimus**
**Sports Hernia?**

- Bulge posterior wall of inguinal canal
  - Direct inguinal hernia
- Osteitis pubis
- Common aponeurosis abnormality:
  - Rectus abdominis and adductors tendons
- Obturator nerve entrapment

Garvey JFW, et al. Hernia 2010; 14:17

Author: Joe Lemire, Hemisphere Magazine, Feb. 2015
Rectus Abdominis + Adductor: “Sports Hernia”

Note: common aponeurosis
From: RadioGraphics 2008; 28:1415

Rectus Abdominis / Adductor Tendinosis: “Sports Hernia”

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Snapping Hip Syndrome
• Painful snap with hip motion
• Intraarticular
• Extraarticular:
  – Anterior: iliopsoas tendon
  – Lateral: iliotibial tract or gluteus maximus

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

Deslandes et al. AJR 2008; 190:576
Snapping Hip Syndrome: iliopsoas

Snapping Hip Syndrome: iliopsoas

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

Snapping Gluteus Maximus / Iliotibial Band

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Cellulitis
• Early: thickened and hyperechoic subcutaneous fat
• Late: anechoic channels (distended lymphatics)
• May appear similar to simple edema

J Ultrasound Med 2000; 19:743
Cellulitis: acute

Cellulitis: chronic

Coronal Coronal T2w

Soft Tissue Abscess:
- Anechoic or hypoechoic
  - Less likely hyperechoic
- Posterior acoustic enhancement
- Swirling of contents with transducer pressure
- Hyperemia

AJR 1996; 166:149

Gluteus Muscle: abscess

Axial T1w post-gadolinium

Take-home points: hip
- Hip effusion: anterior recess
- Labrum: limited
- Gluteal tendinopathy: common
- Bursitis: very uncommon
- Iliopsoas snapping: dynamic

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