The Hip Region: Normal and Abnormal Features with MRI and Ultrasound Correlation

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

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

Hip Effusion:
- Separation of anterior and posterior layers\(^1\)
- Capsule distention at femoral neck > 7 mm or difference of 1 mm from opposite side\(^2\)
- Extension & abduction improves visualization\(^3\)
- Do not internally rotate hip: capsule thickens

\(^1\)Radiology 1999; 210:499
\(^2\)Scand J Rheumatol 1989; 18:113
\(^3\)Acta Radiologica 1997; 38:967
Hip Joint: septic effusion

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 Joint: aseptic effusion

Hip Effusion: aseptic effusion

• Cannot predict infection by ultrasound
• Negative power color Doppler does not exclude infection*
• Guided aspiration

* AJR 1998; 206:731

Pigmented Villonodular Synovitis
Juvenile Idiopathic Arthritis

Head

• Normal:
  – Hyperechoic, triangular
• Degeneration: hypoechoic
• Tear: anterior
  – Anechoic cleft
  – Sensitivity 82%, specificity 80%, accuracy 80%*

Femoral Head

Acetab

Labral Tear

Femoral Labral Tear

Chondrocalcinosis

Detachment

Labral Tear and Paralabral Cyst

• Associated with labral tear
  – Full-thickness or detachment
• Anechoic to hypoechoic
• Multilocular

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

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\(^1\)
- Suspect infection:
  - Pseudocapsule > 3.2 mm: suspect infection\(^2\)
  - Extra-articular fluid collection
  - Not visualized with arthrography if non-communication

\(^1\)Waybright PN et al. AJR 2003; 181:215
\(^2\)AJR 1994; 163:381

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

Metal-on-Metal Arthroplasty: pseudotumor

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Trochanteric Pain Syndrome:

- Most commonly caused by gluteus minimus and medius tendon abnormalities\(^3\)
- Trochanteric bursitis: uncommon
  - 20% of symptomatic patients\(^2\)
  - Not actually inflamed\(^3\)
  - Not associated with pain\(^4\)

\(^1\)Kong A et al. Eur Radiol 2007; 17:1772
\(^2\)Linn J et al. AJR 2013; 201:1183
\(^3\)Sylva F et al. Clin Rheumatol 2006; 14:82
\(^4\)Blankenbaker DG et al. Skeletal Radiol 2008; 37:903
Greater Trochanter

FACETS: AF = anterior, LF = lateral, SPF = superoposterior, PF = posterior
Pfirrmann et al. Radiology 2001; 221:469

Axial MRI

Greater Trochanter

Yellow arrow = gluteus medius
White arrow = gluteus minimus

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

Trochanteric Bursal Fluid + Glut Min Tear

Trochanteric Bursitis: Septic

Iliopsoas Bursa

• Hip joint communication in 10%
  – Increased with hip joint pathology
  – After joint replacement
• May extend cephalad into abdomen
• May be mistaken for psoas abscess
  – Look for hip joint communication

Radiology 1995; 197:853
Iliopsoas Bursal Fluid

Axial T1w post-gadolinium

Ischial or ischiogluteal Bursa

- Uncommon
- “Weaver’s Bottom”
- Between ischial tuberosity and gluteus maximus

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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

Gluteus Medius: tendinosis

Tear: Gluteus Medius

>2 mm cortical irregularity depth (x-ray) = 90% positive predictive value for gluteus tendon tear

Steinert et al. Radiology 2010; 257:754
Sports Hernia?:

- A non-anatomic, non-diagnostic term attributed to many causes of groin pain
- Tears or attenuation of inguinal structures
- Bulge posterior wall of inguinal canal
- Obturator nerve entrapment
- Common aponeurosis abnormality:
  - Rectus abdominis and adductors tendons
  - Associated: pubic symphyseal instability, FAI

Omar IM et al. Radiographics 2008; 28:1415
Garvey JP et al. Hernia 2010; 14:17
Hopkins JS et al. JBJS Reviews 2017; 5:1

Author: Joe Lemire, Hemisphere Magazine, Feb. 2015
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**Snapping Hip Syndrome**
• Painful snap with hip motion
• Intraarticular
• Extraarticular:
  – Anterior: iliopsoas tendon
  – Lateral: iliobibial 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: 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

Take-home points: hip
- Effusion: anterior hip
- Greater trochanteric pain syndrome:
  - Not bursitis, usually tendinosis
- Trochanter anatomy: facets
- Snapping hip syndrome
  - Iliopsoas, iliotibial band / gluteus maximus

Syllabus on line and other educational material:
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