

Ultrasound of the Hip and Labrum with MRI Correlation

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Disclosures

- Book Royalties: Elsevier
- Consultant: Bioclinica
- Medical Director: POCUSPRO
- Not relevant to this talk

Syllabus on line and other educational material:
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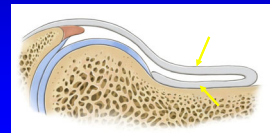
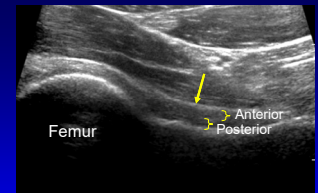
Pathology:

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

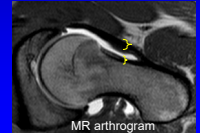
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Hip: anterior recess

- Anterior +posterior layers
 - Fibrous tissue + minute layer of synovium
 - Hyperechoic
 - Each 2 - 4 mm thick



Radiology
1999; 210:499



MR arthrogram

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Hip Effusion:

- Separation of anterior and posterior layers¹
- Capsule distention at femoral neck > 7 mm or difference of 1 mm from opposite side²
- Extension & abduction improves visualization³
- Do not internally rotate hip: capsule thickens

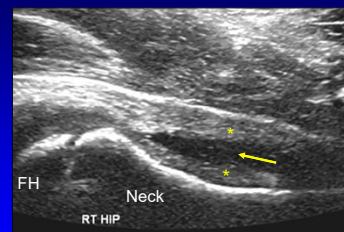
¹Radiology 1999; 210:449

²Scand J Rheumatology 1989; 18:113

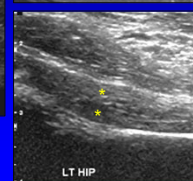
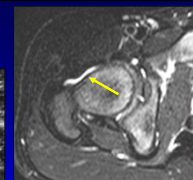
³Acta Radiologica 1997; 38:867

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Hip Joint: septic effusion



Long Axis



LT HIP

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Pitfall: capsule thickening

- Internal rotation of hip:
 - Anterior hip capsule
 - Thicker, convex anterior

External Rotation Internal Rotation

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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

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Hip Joint: aseptic effusion

Acet FH Neck

Sagittal

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Hip Effusion:

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

* AJR 1998; 206:731

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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

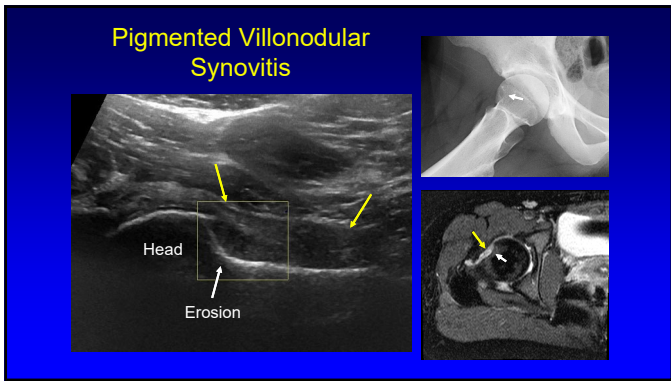
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Joint Injection

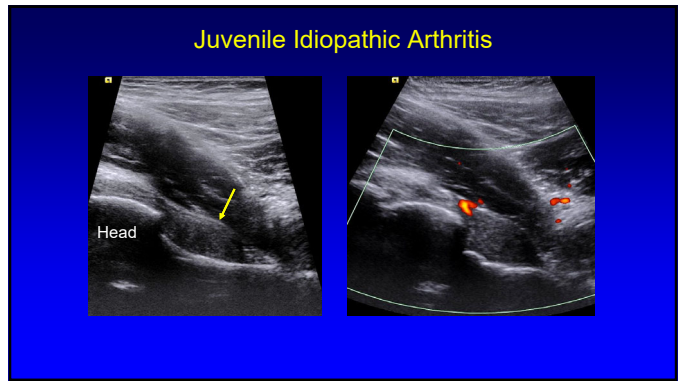
- Femoral neck target
- Preferred over aiming for femoral head
- Allows higher injection volumes
- Less extra-articular contrast

From Kantarci F et al. Skeletal Radiol 2013; 42:37.

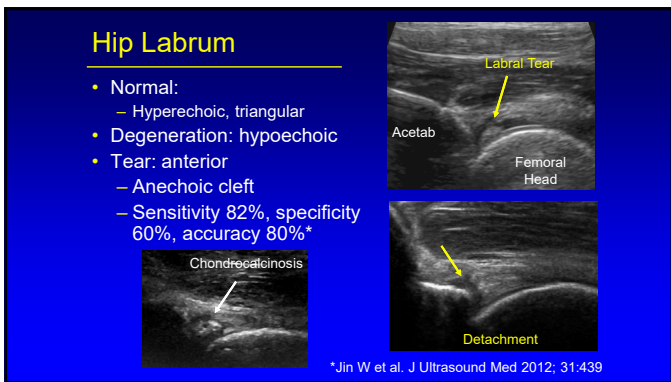
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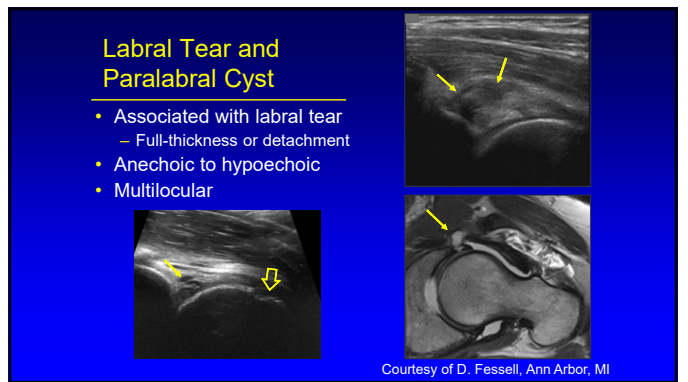
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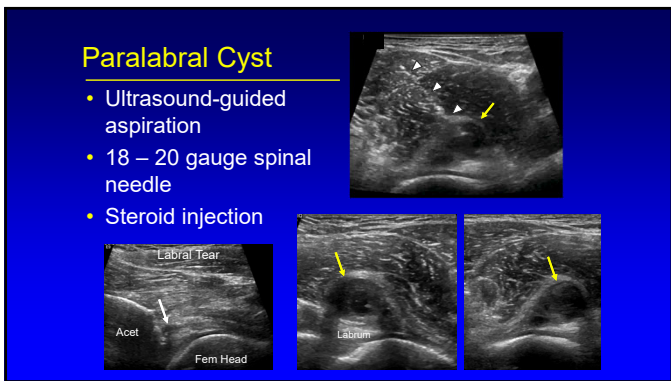
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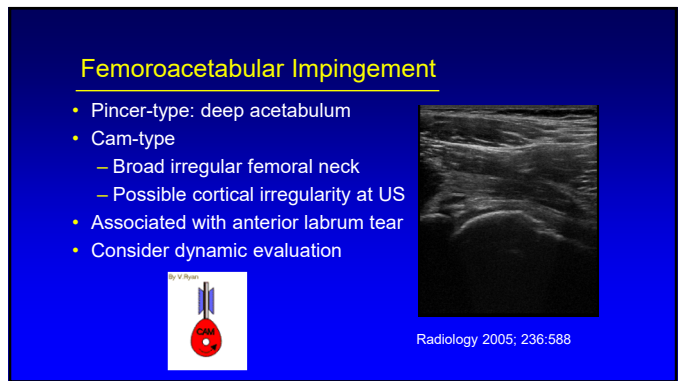
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CAM Impingement

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

Courtesy of M. van Holsbeeck, Detroit, MI

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FAI: Ultrasound

- Ultrasound can demonstrate a bony protuberance and non-spherical head associated with CAM FAI
- Alpha angle measurements
 - Buck et al.: unreliable
 - Lerch et al.: strong correlation with MRI

Buck FM et al. Eur Radiol 2011; 21:167
Lerch S et al. International Orthopaedics 2013; 37:783

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Femoroacetabular Impingement

Sagittal-oblique

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Total Hip Arthroplasty:

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

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Hip Arthroplasty:

- Ultrasound cannot differentiate small effusion from post-op change¹
- Suspect infection:
 - Pseudocapsule > 3.2 mm: suspect infection²
 - Extra-articular fluid collection
 - Not visualized with arthrography if non-communication

¹Weybright PN et al. AJR 2003; 181:215
²AJR 1994; 163:381

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Hip Arthroplasty: infection

Sagittal

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Hip Arthroplasty: infection

Coronal Radiograph

Femur

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

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Arthroplasty Impingement

- Anterior cup rim impingement
- Deep to iliopsoas tendon
- Ultrasound-guided steroid injection can be considered

Sagittal

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Metal-on-Metal: Pseudotumor

T1w STIR Troch

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Incisional Abscess

CU Trans RT LAT THIGH SUP AT INCISION Trans RT LAT THIGH SUP AT INCISION

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Pathology:

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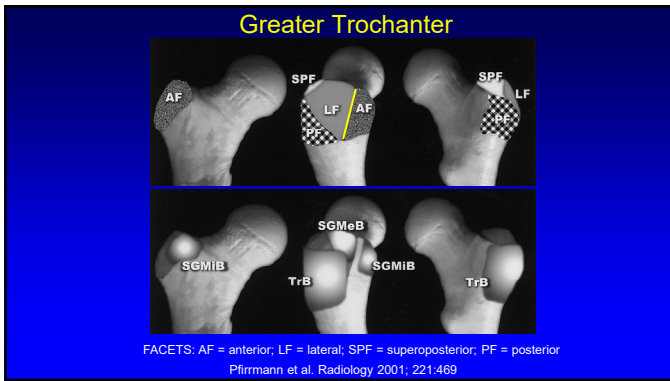
Trochanteric Pain Syndrome

- Trochanteric bursitis: **uncommon**
 - 20% of symptomatic patients¹
 - Not actually inflamed²
 - Not associated with pain³
- Most commonly caused by gluteus minimus and medius tendon abnormalities⁴

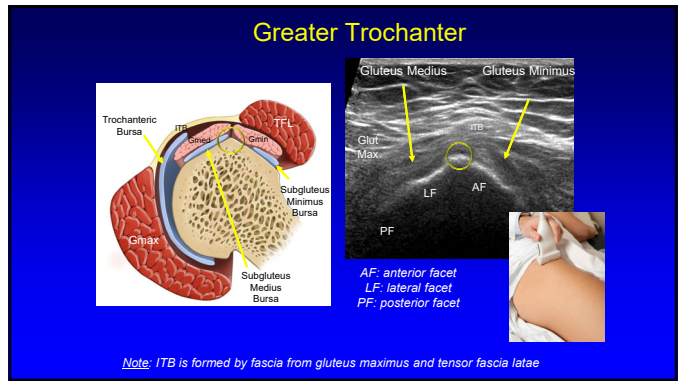
IT'S NOT BURSTITIS

¹Long SS et al. AJR 2013; 201:1083
²Clin Rheumatol 2008; 14:82
³Skeletal Radiol 2008; 37:903
⁴Eur Rad 2007; 17:1772

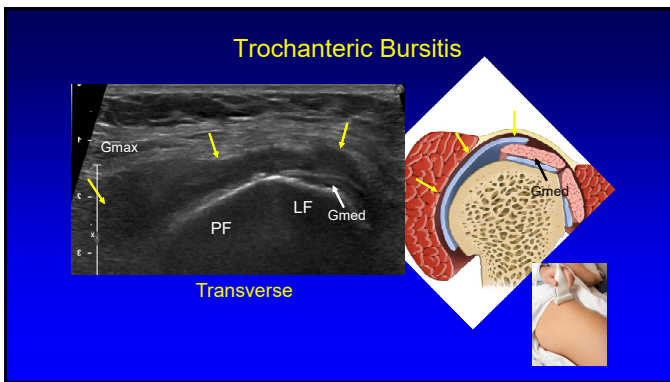
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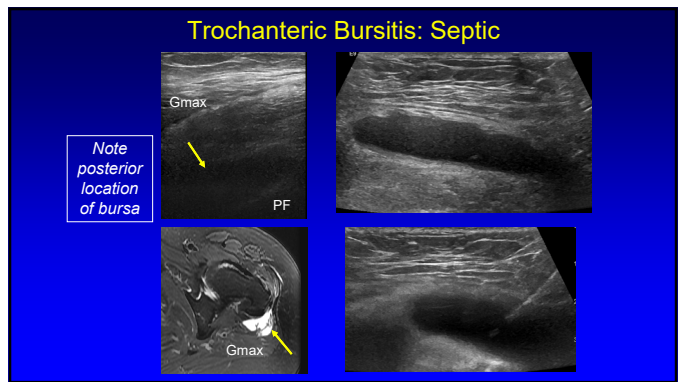
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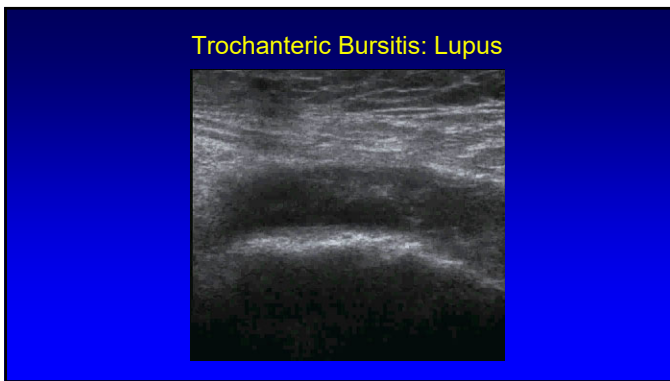
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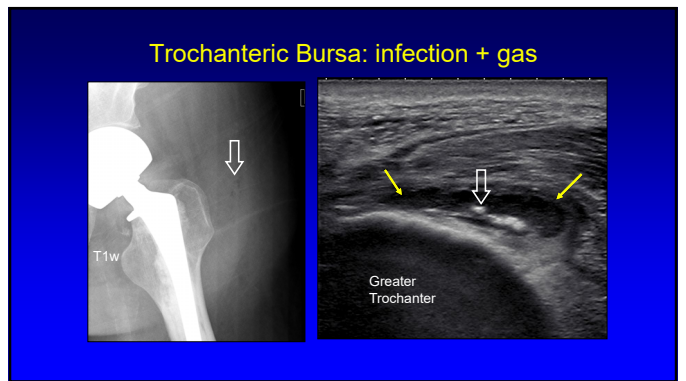
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Trochanteric Region Bursae

- Trochanteric: deep to gluteus maximus
- Subgluteus medius
- Subgluteus minimus
- Axial or coronal plane

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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

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Iliopsoas Bursa

- Oblique-axial plane:
 - Superior to femoral head
 - Lateral to medial
 - Inject between tendon, ilium¹
- Pain relief = successful iliopsoas surgical release²

¹Dauffenbach J et al. J Ultrasound Med 2014; 33:405

²Blankenbaker DG. Skeletal Radiol 2006; 35: 565

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Ischial or ischiogluteal Bursa

- Uncommon
- "Weaver's or Tailor's Bottom"
- Between ischial tuberosity and gluteus maximus

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Muscle and Tendon Injury

- Tear:
 - Anechoic or hypoechoic defect
 - Partial-thickness tear
 - Full-thickness tear: retraction
- Tendinosis:
 - Hypoechoic, enlarged
 - No inflammation (not tendinitis)

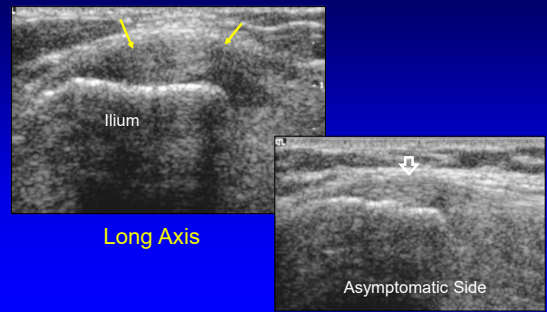
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Acute Muscle and Tendon Injury

- Direct impact: contusion, muscle belly
- Indirect (strain):
 - Musculotendinous junction
 - especially muscles that span 2 joints
 - hamstrings, gastrocnemius
 - Osseous avulsion

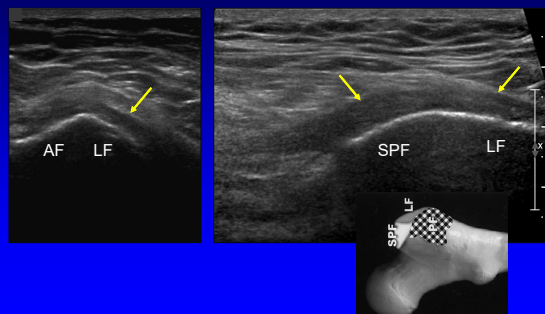
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Tendinosis: tensor fascia lata



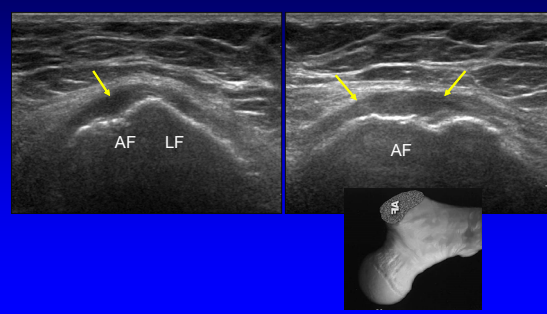
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Tendinosis: Gluteus Medius



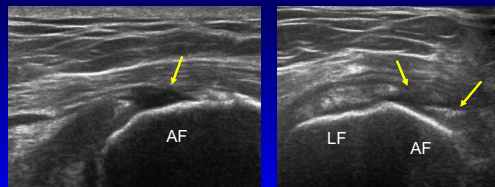
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Tendinosis: Gluteus Minimus



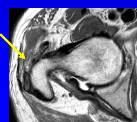
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Tear: Gluteus Minimus



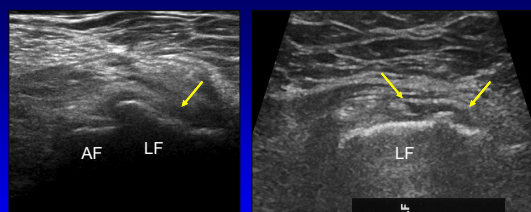
>2 mm cortical irregularity depth (x-ray) = 90% positive predictive value for gluteus tendon tear

Steinert et al. Radiology 2010; 257:754



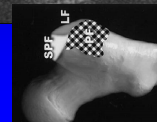
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Tear: Gluteus Medius

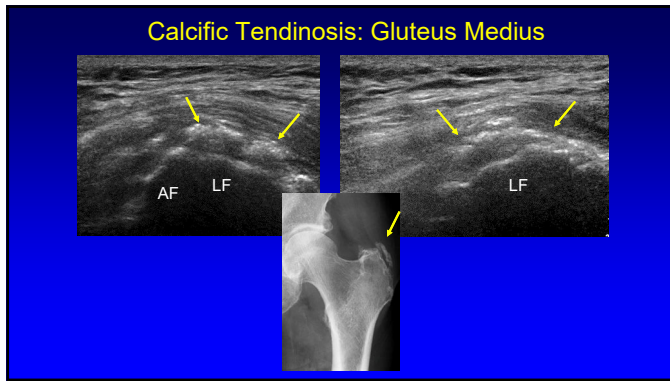


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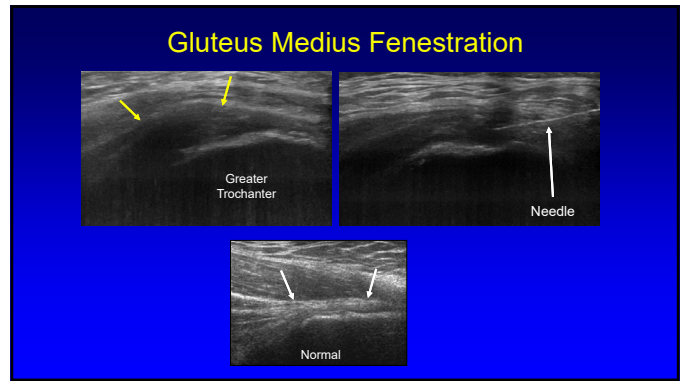
Steinert et al. Radiology 2010; 257:754



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Trochanteric Pain Syndrome: Potential Treatment Algorithm

- If bursa: aspirate, inject steroids
- If tendinosis:
 - Inject steroids superficial to tendon
 - Temporary pain relief: continue physical therapy
 - 72% of patients significantly improved¹
 - Tenotomy/fenestration
- If tendon tear: platelet-rich plasma injection?

¹Labrosse, et al. 2010 AJR 2010; 194:202

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Sports Hernia?:

- A non-anatomic, non-diagnostic term attributed to many cause 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 JFW et al. Hernia 2010; 14:17
Hopkins JN et al. JBJS Reviews 2017; 5:1

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to Durant, who missed 17 games and returned to action on December 2, the general public learned quickly about the injury and its ramifications. Even seasoned athletes were mystified.

"I'm so old that when you got hurt they didn't have names for it," says NBA Hall of Famer and TNT analyst Charles Barkley. "They come up with names for injuries now. Back in my day [they'd say], 'Oh, he broke a foot.'"

Durant's iliac fracture isn't the first time the sports media has felt the need for an explanatory article. Back in the mid-90s, when Cincinnati Reds shortstop and future Hall of Famer Barry Larkin suffered an injury in the groin area that defied any straight-ahead medical vernacular—it was kind of like a hernia, but not quite—reporters hounded the Reds' medical director and chief orthopedic surgeon, Dr. Timothy Kremchek.

"The newspaper writers—there was no HIPAA back then, nothing—kept asking me about it," Kremchek says now, "so I said he's got a *sports* hernia. I had never even heard of it. I made it up."

Kremchek is referring to the pubic rule of the Health Insurance Portability and Accountability Act (HIPAA), which Congress passed in 1996 and which forbids public disclosure of medical information without appropriate consent.

Author: Joe Lemire, Hemisphere Magazine, Feb. 2015

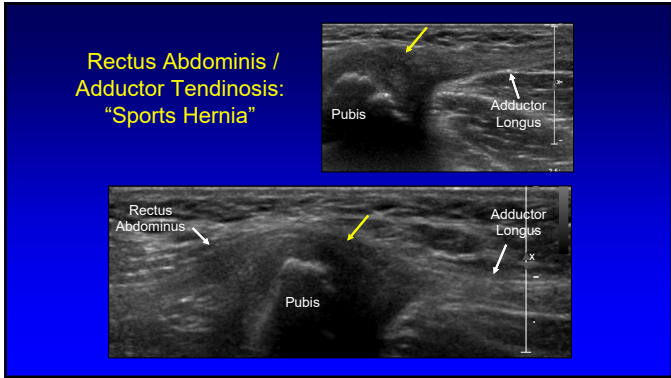
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Rectus Abdominis + Adductor: "Sports Hernia"

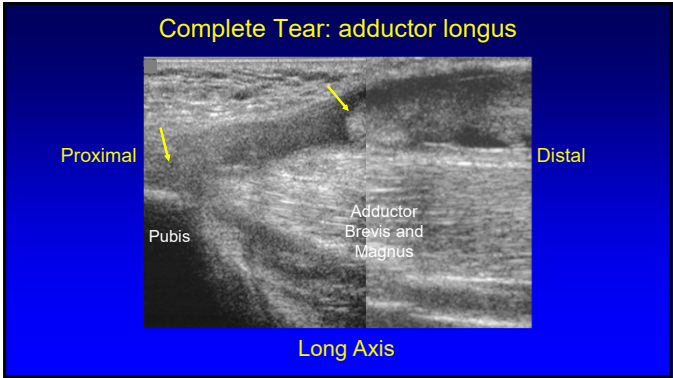
Note: common aponeurosis

From: RadioGraphics 2008; 28:1415

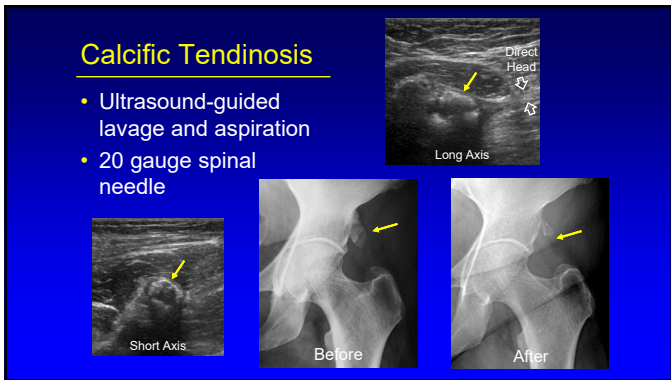
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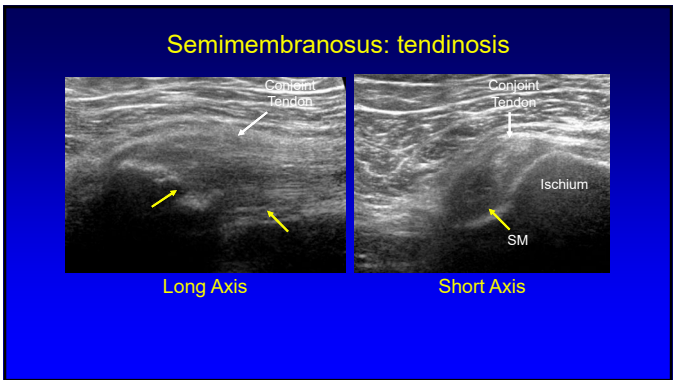
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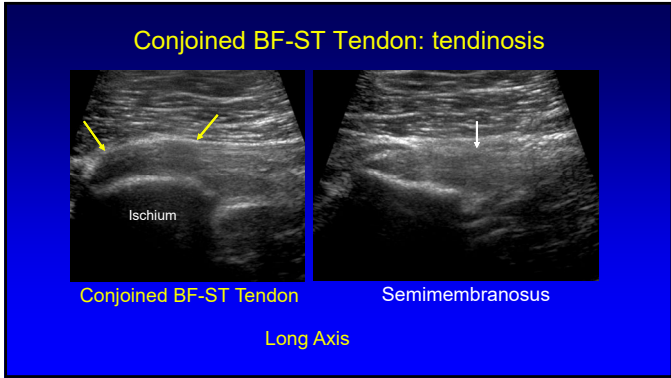
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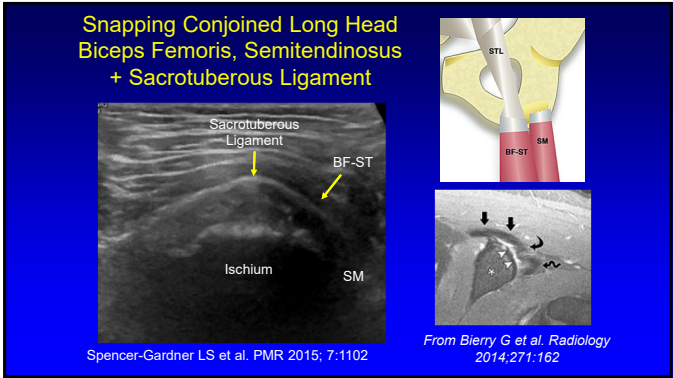
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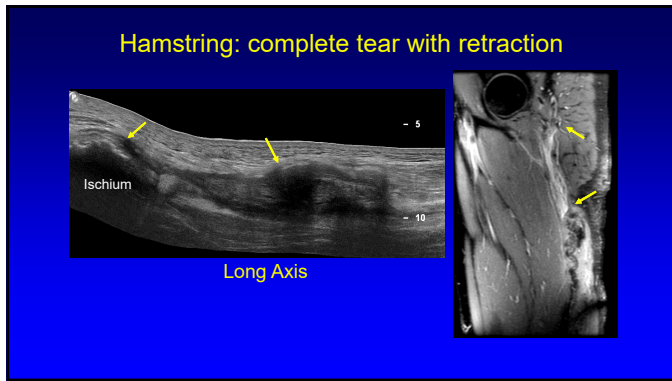
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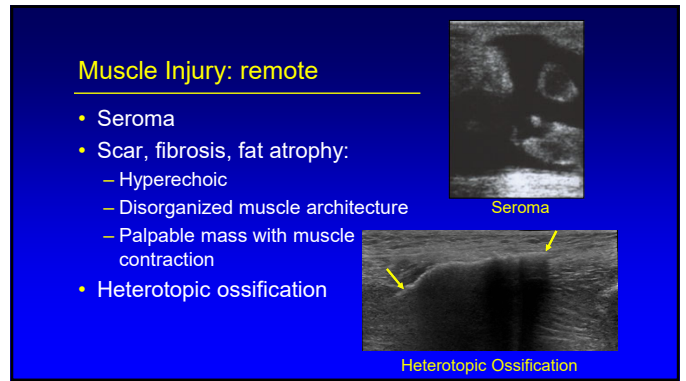
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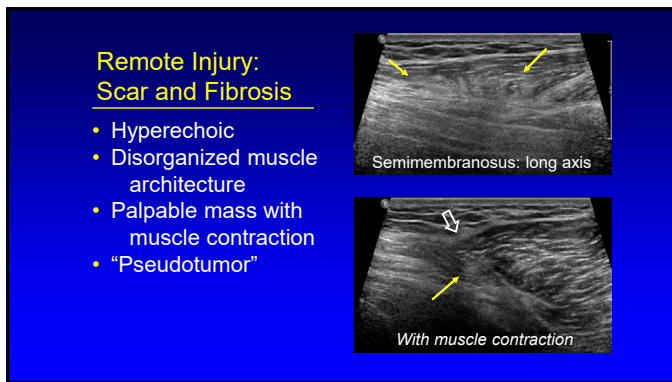
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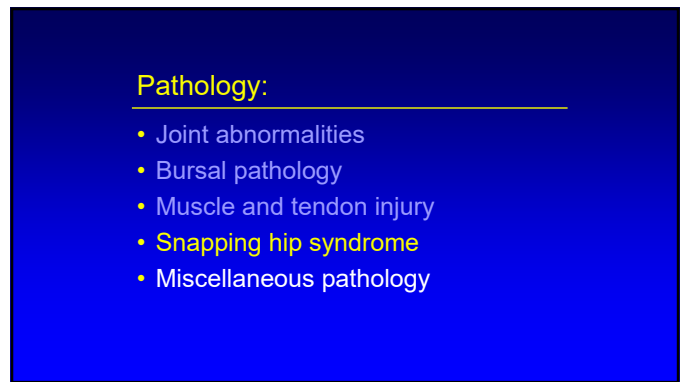
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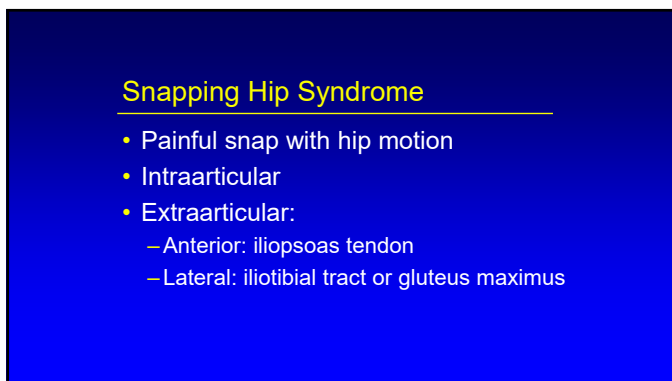
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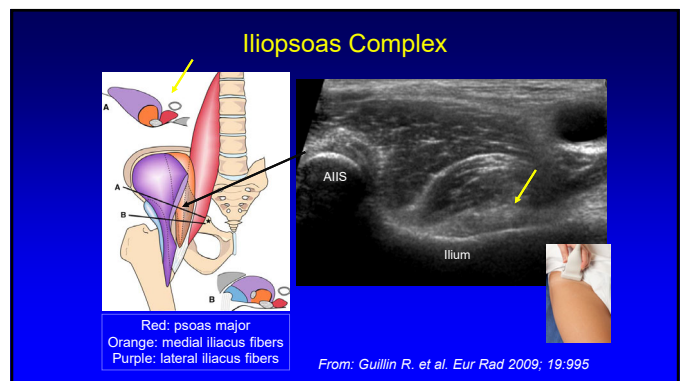
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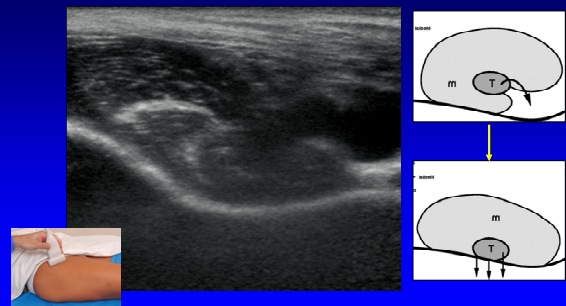
Snapping Hip Syndrome: iliopsoas

- 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

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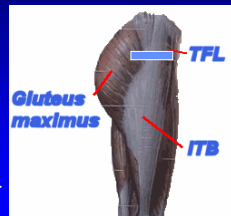
Snapping Hip Syndrome: iliopsoas



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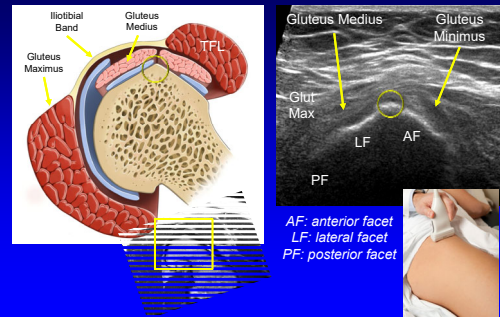
Snapping Hip: lateral

- Transverse over greater trochanter
- Hip external rotation / flexion
- Abrupt motion of iliotibial tract or gluteus maximus over greater trochanter



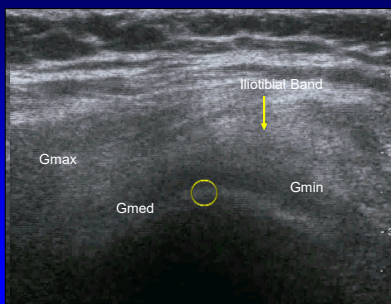
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Snapping Gluteus Maximus / Iliotibial Band



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Snapping Hip Syndrome: iliotibial tract



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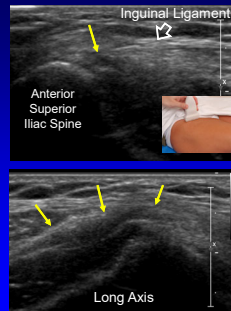
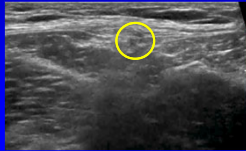
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Meralgia Paresthetica

- Sensory: anterolateral thigh
- Hypoechoic enlargement
- Ultrasound-guided steroid injection



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Take-home points

- Joint: anterior, aspirate if concern for infection
- Trochanter: anatomy, its not bursitis
- Tendons: tendinosis, tear
- "Sports hernia" is a misnomer
- Impingement syndromes
- Snapping: iliopsoas, iliotibial band/gluteus maximus

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Thank you!

Syllabus on line and other educational material:
www.jacobsonmskus.com

Twitter handle: @jjacobsn

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