

Ultrasound of Evaluation of Hip Pathology

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Disclosures

- Consultant: Bioclinica
- Advisor: Philips
- Book Royalties: Elsevier
- Not relevant to this lecture

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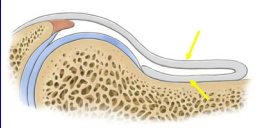

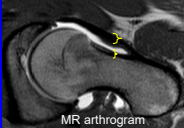
Pathology:

- 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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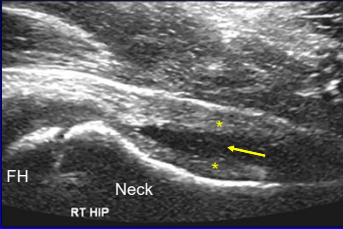
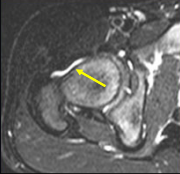
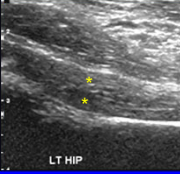
Hip Effusion:

- 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

RT HIP 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

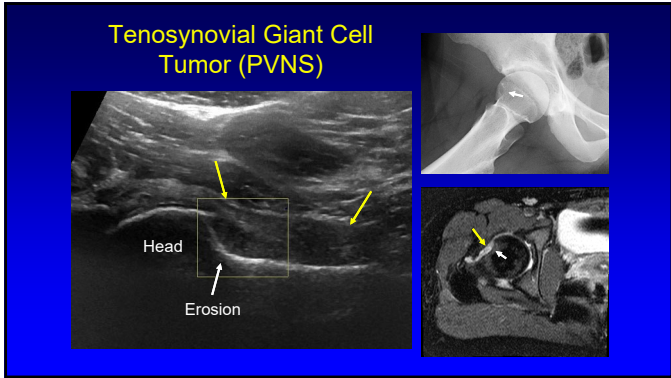
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Joint Injection

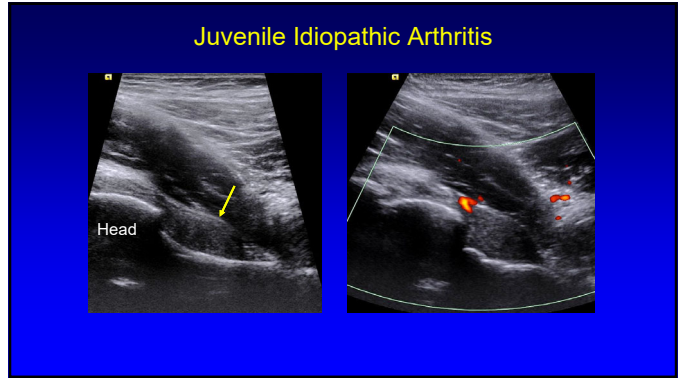
- Femoral neck target
- Preferred over aiming for femoral head
- Allows higher injection volumes
- Less extra-articular contrast

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

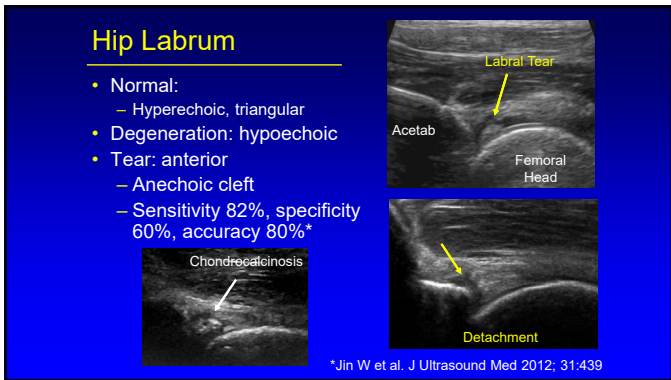
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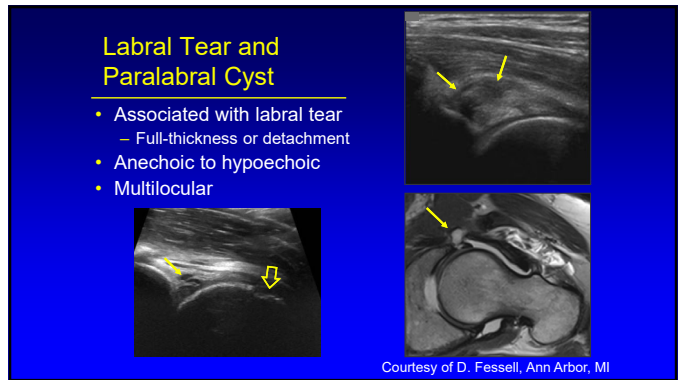
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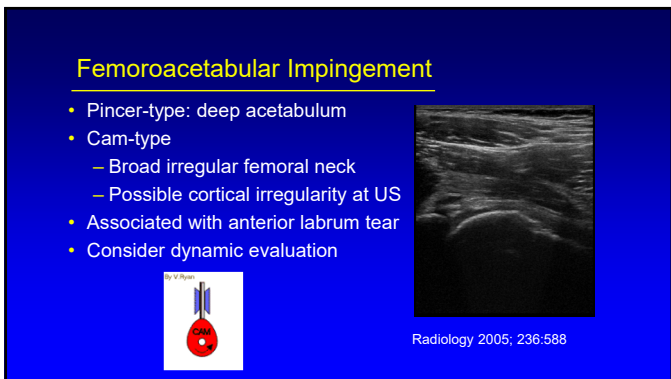
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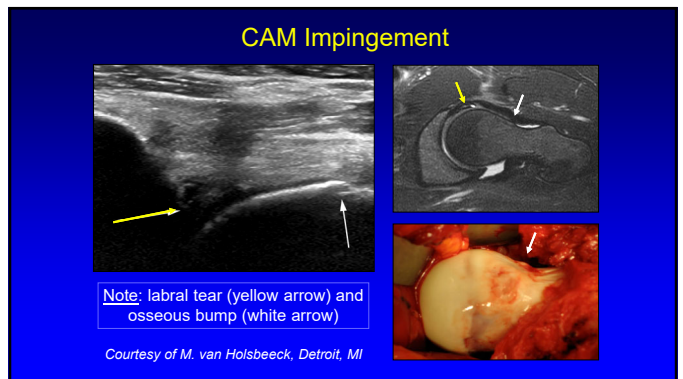
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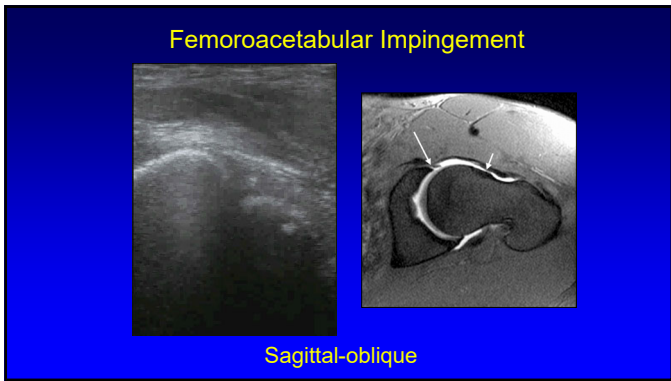
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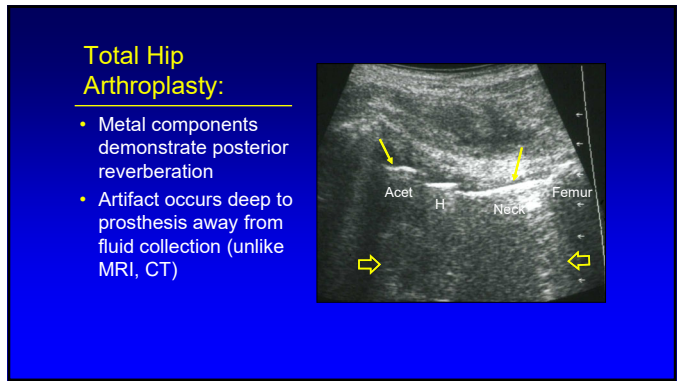
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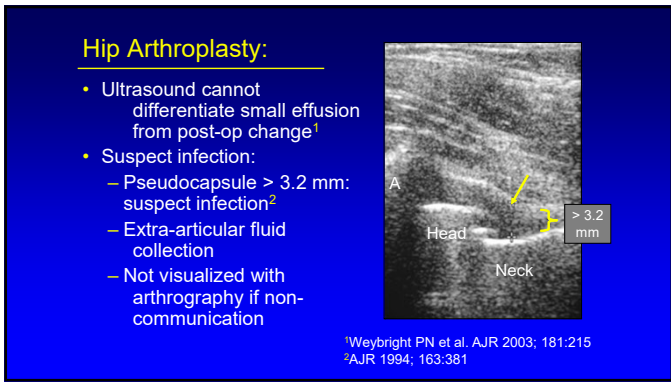
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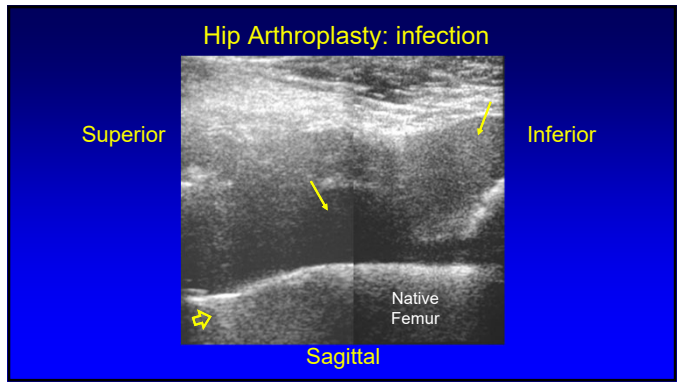
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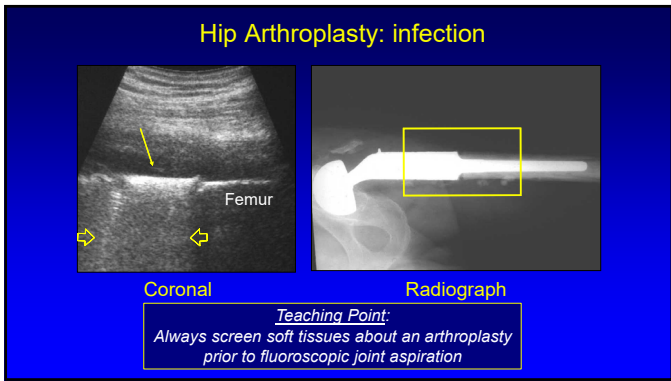
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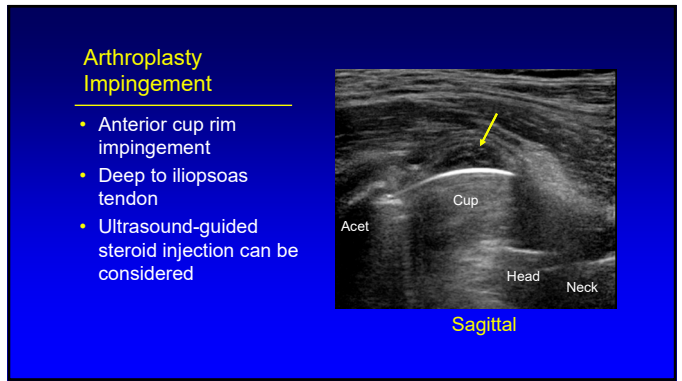
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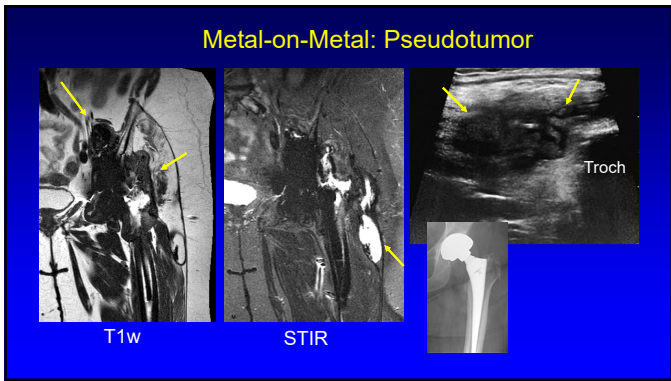
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- ### Pathology:
- Joint abnormalities
 - **Bursal pathology**
 - Muscle and tendon injury
 - Snapping hip syndrome
 - Miscellaneous pathology

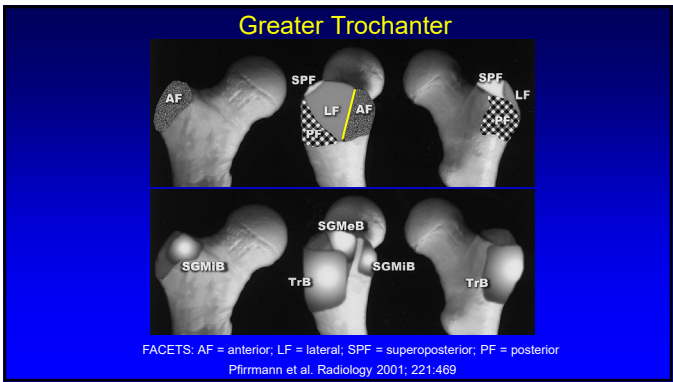
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- ### Trochanteric Pain Syndrome
- Trochanteric bursitis: **uncommon**
 - 20% of symptomatic patients¹
 - Not actually inflamed²
 - Not associated with pain³
 - Most commonly caused by gluteus minimus and medius tendon abnormalities⁴

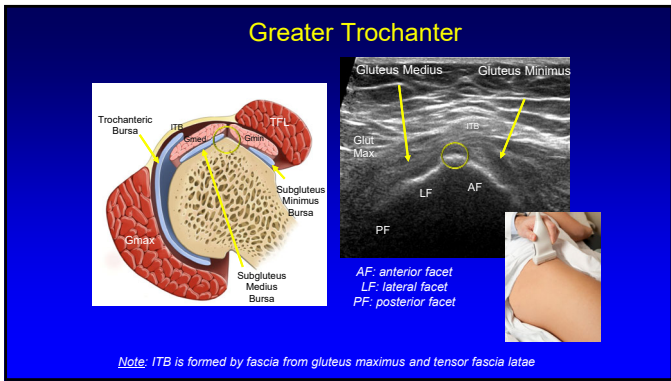


¹Long SS et al. AJR 2013; 201:1083
²Clin Rheumatol 2008; 14:82
³Skeletal Radiol 2008; 37:903
⁴Eur Rad 2007; 17:1772

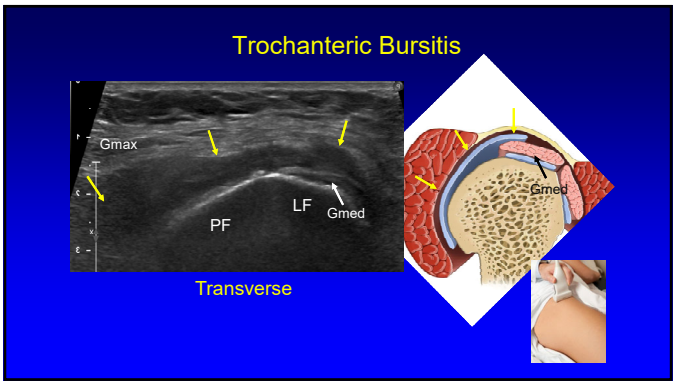
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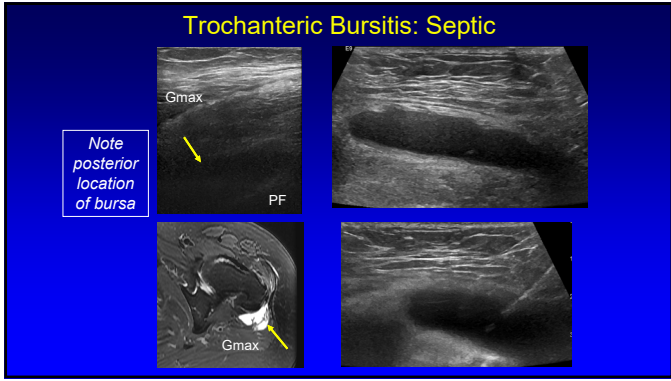
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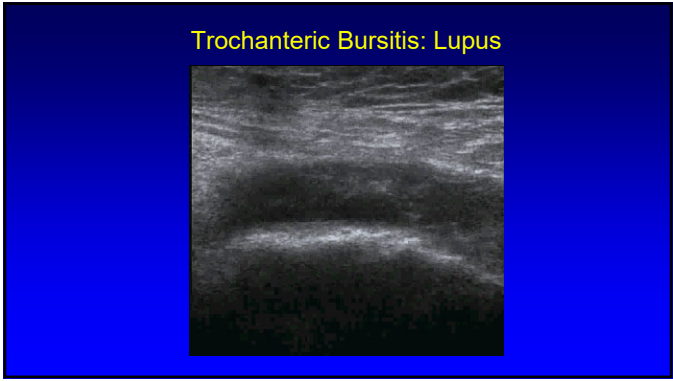
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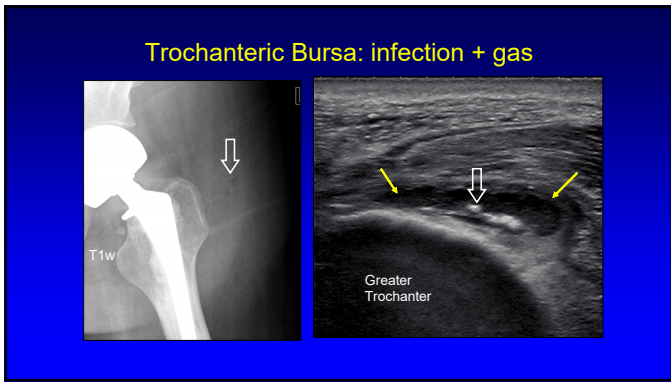
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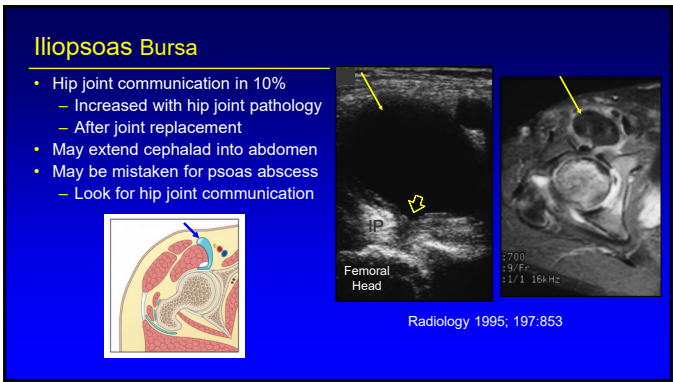
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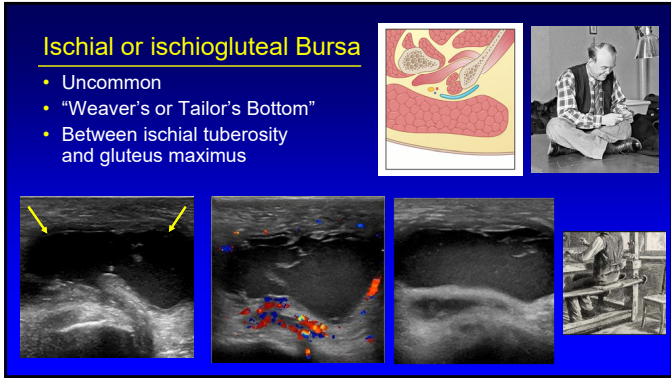
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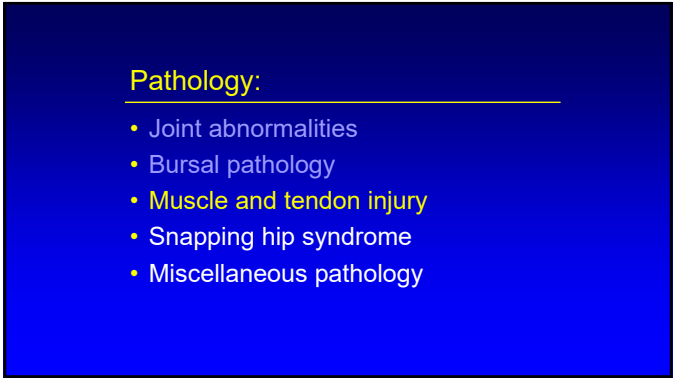
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Muscle and Tendon Injury

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

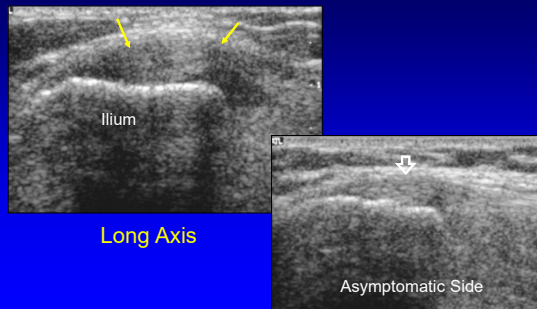
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Acute Muscle and Tendon Injury

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

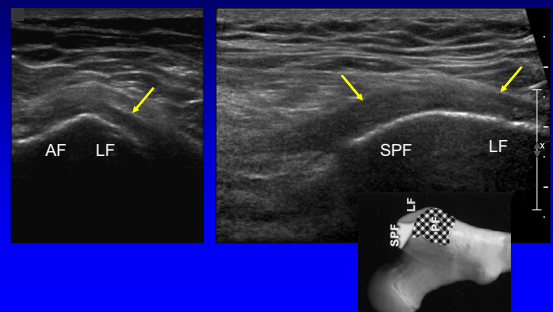
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Tendinosis: tensor fascia lata



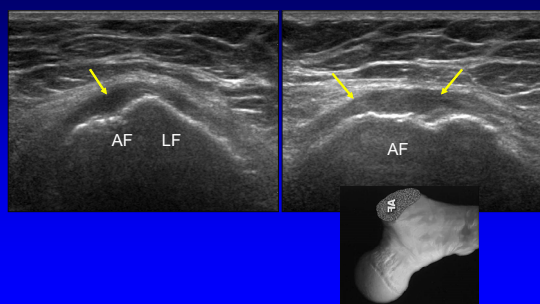
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Tendinosis: Gluteus Medius



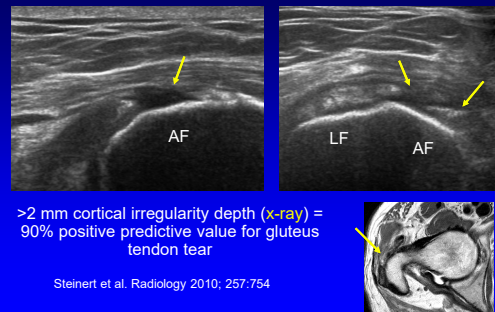
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Tendinosis: Gluteus Minimus

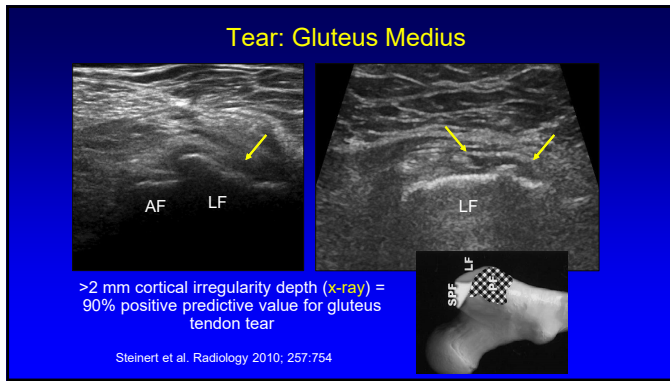


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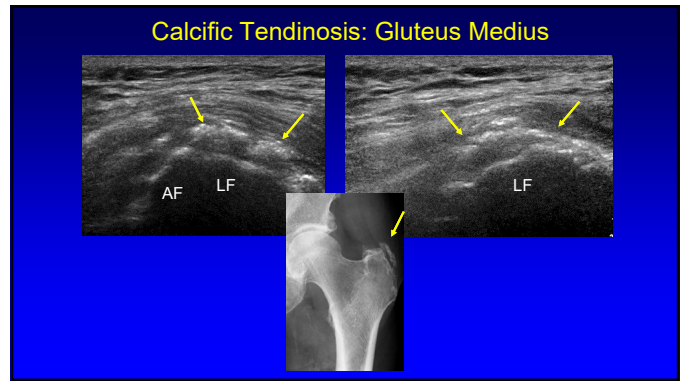
Tear: Gluteus Minimus



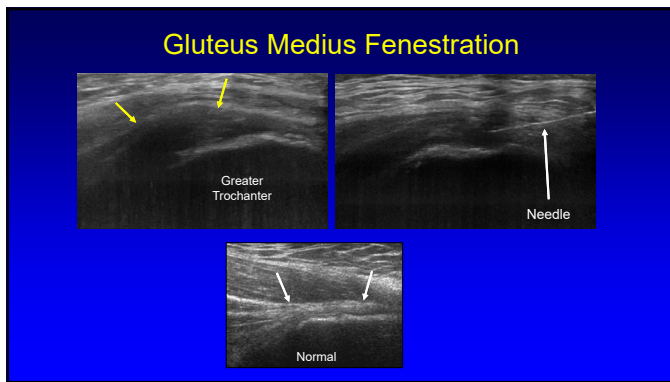
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Trochanteric Pain Syndrome:

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.'"

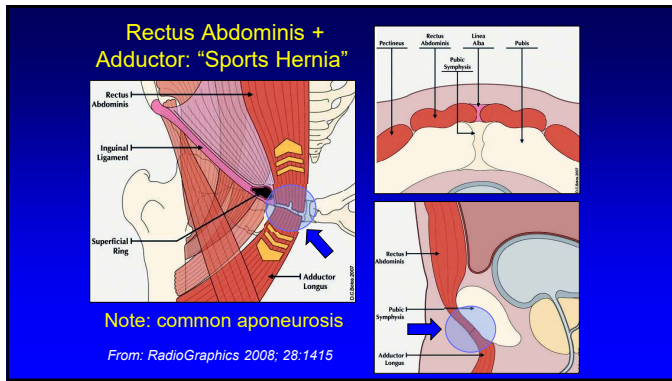
Durant's *groin* fractures isn't the first time the sports media has felt the need for an explanatory article. Back in the mid-'90s, when Cincinnati Reds shortstop and future Hall of Famer Barry Larkin suffered an injury in the groin area that defied any straight-ahead medical vernacular—it was kind 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 *groin* hernia. I had never even heard of it. I made it up."

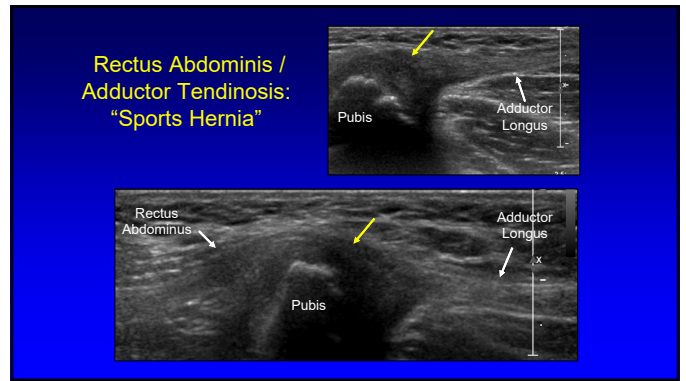
Kremchek is referring to the privacy rule of the Health Insurance Portability and Accountability Act (HIPAA), which Congress passed in 1996 and which forbids public disclosure of medical information without appropriate consent.

Author: Joe Lemire, Hemisphere Magazine, Feb. 2015

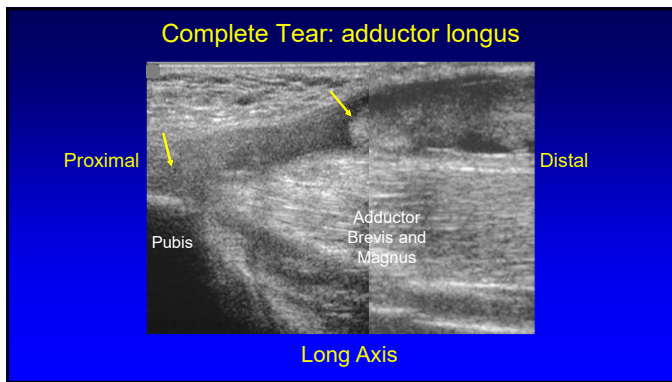
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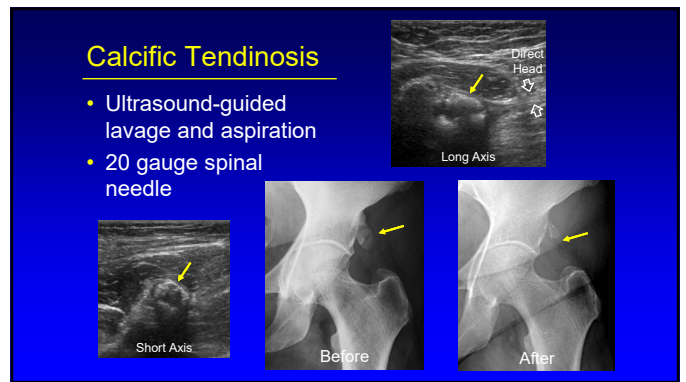
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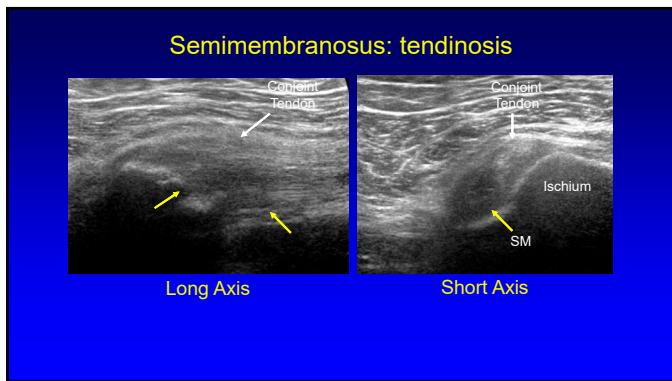
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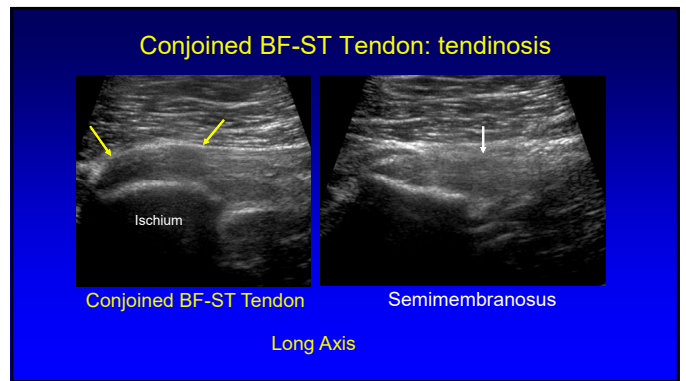
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Snapping Conjoined Long Head Biceps Femoris, Semitendinosus + Sacrotuberous Ligament

The image shows an ultrasound scan of the hip region with labels for the Sacrotuberous Ligament, BF-ST (conjoined long head biceps femoris and semitendinosus), and Ischium. An anatomical diagram above shows the relationship between the STL, BF-ST, and SM. A smaller ultrasound image below shows a snapping motion with arrows indicating the tendon's path.

Spencer-Gardner LS et al. PMR 2015; 7:1102
From Bierry G et al. Radiology 2014;271:162

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Hamstring: complete tear with retraction

The image displays two views of a hamstring tear. The main image is a longitudinal ultrasound view showing a gap in the muscle fibers with retraction, labeled 'Long Axis' and 'Ischium'. A smaller MRI image to the right shows the same area in cross-section, with yellow arrows pointing to the tear site.

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Muscle Injury: remote

- Seroma
- Scar, fibrosis, fat atrophy:
 - Hyperechoic
 - Disorganized muscle architecture
 - Palpable mass with muscle contraction
- Heterotopic ossification

Two ultrasound images illustrate remote muscle injury. The top image shows a 'Seroma' as a fluid-filled collection. The bottom image shows 'Heterotopic Ossification' as a hyperechoic, disorganized mass within the muscle.

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Remote Injury: Scar and Fibrosis

- Hyperechoic
- Disorganized muscle architecture
- Palpable mass with muscle contraction
- "Pseudotumor"

Two ultrasound images show scar and fibrosis. The top image is a 'Semimembranosus: long axis' view showing a hyperechoic area. The bottom image shows the same area 'With muscle contraction', where the mass is palpable and causes a 'Pseudotumor' appearance.

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Pathology:

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

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Snapping Hip Syndrome

- Painful snap with hip motion
- Intraarticular
- Extraarticular:
 - Anterior: iliopsoas tendon
 - Lateral: iliotibial tract or gluteus maximus

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Iliopsoas Complex

Red: psoas major
Orange: medial iliacus fibers
Purple: lateral iliacus fibers

From: Guillin R. et al. Eur Rad 2009; 19:995

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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

AF: anterior facet
LF: lateral facet
PF: posterior facet

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Snapping Hip Syndrome: iliotibial tract

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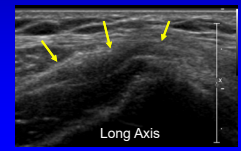
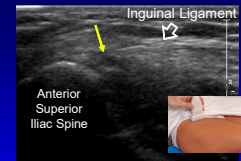
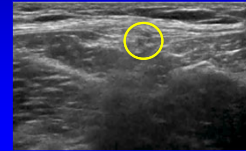
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Meralgia Paresthetica

- 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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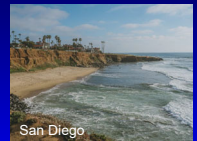
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