

Ultrasound Evaluation of Hip Pathology

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Disclosures

- Consultant: Bioclinica
- Book Royalties: Elsevier
- Contractor: POCUS PRO
- Advisory Board: Philips
- Not relevant to this talk

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Pathology:

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

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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

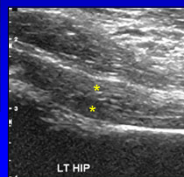
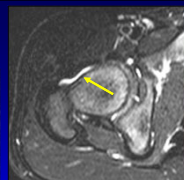
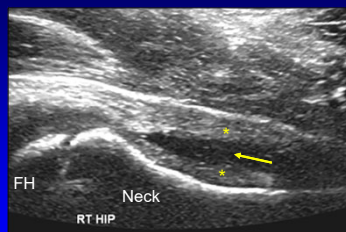
¹Radiology 1999; 210:449

²Scand J Rheumatology 1989; 18:113

³Acta Radiologica 1997; 38:867

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Hip Joint: septic effusion



Long Axis

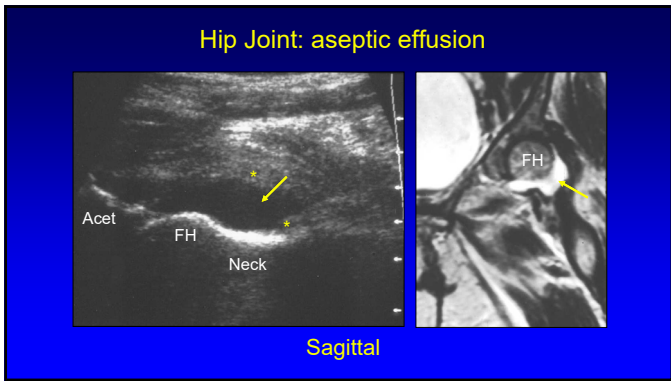
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Hip Effusion: misconception

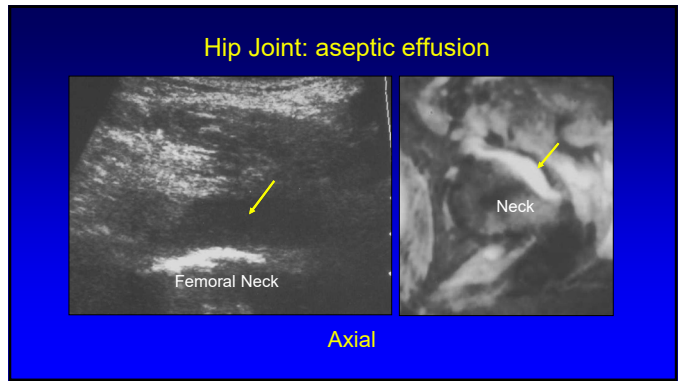
- It is incorrect to assume that joint fluid may not be seen anterior due to gravity
- Native hip: joint fluid distributes around femoral neck
- In no cases was fluid only seen posterior
- Exception: after hip surgery

Moss et al. Radiology 1998; 208:43

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Hip Effusion:

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

* AJR 1998; 206:731

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Synovial Hypertrophy: Infection

Longitudinal color Doppler

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Pigmented Villonodular Synovitis

Head Erosion

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Juvenile Idiopathic Arthritis

Head

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Hip Labrum

- Normal:
 - Hyperechoic, triangular
- Degeneration: hypoechoic
- Tear: anterior
 - Anechoic cleft
 - Sensitivity 82%, specificity 60%, accuracy 80%*

*Jin W et al. J Ultrasound Med 2012; 31:439

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Labral Tear and Paralabral Cyst

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

Courtesy of D. Fessell, Ann Arbor, MI

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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

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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

Superior Inferior
Sagittal
Native Femur

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Hip Arthroplasty: infection

Coronal Radiograph

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

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Metal-on-Metal Arthroplasty: pseudotumor

Anterior Lateral
Cup Neck Troch
Cup

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Pathology:

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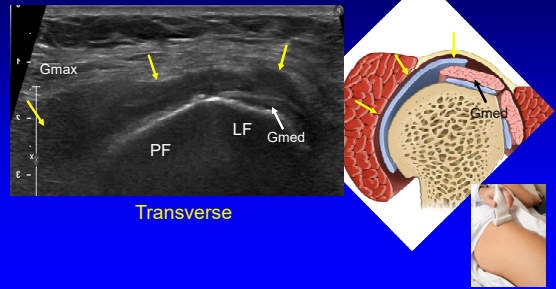
Trochanteric Pain Syndrome:

- Most commonly caused by gluteus minimus and medius tendon abnormalities¹
- Trochanteric bursitis: **uncommon**
 - 20% of symptomatic patients²
 - Not actually inflamed³
 - Not associated with pain⁴

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

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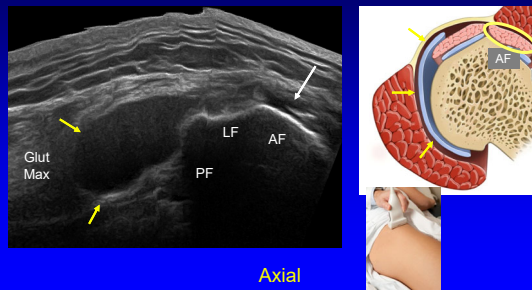
Trochanteric Bursitis



Transverse

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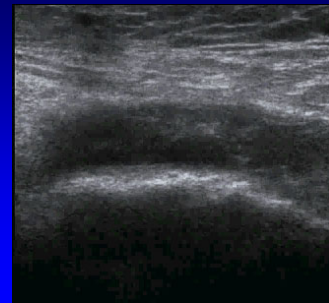
Trochanteric Bursal Fluid + Glut Min Tear



Axial

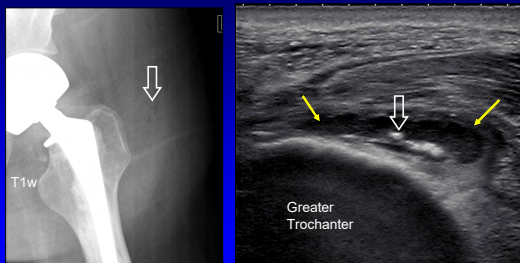
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Trochanteric Bursitis



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Trochanteric Bursa: infection + gas

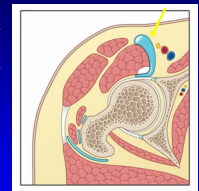


Greater Trochanter

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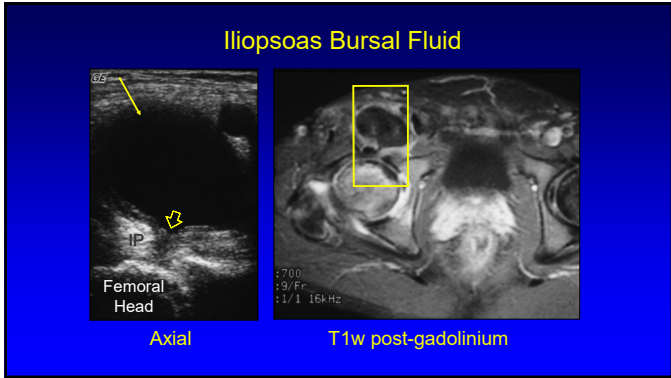
Iliopsoas Bursa

- 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

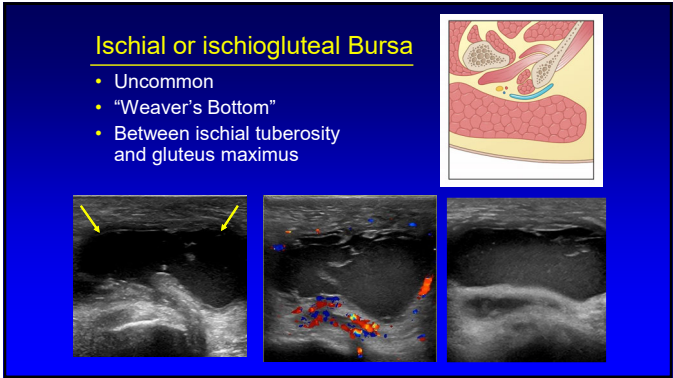


Radiology 1995; 197:853

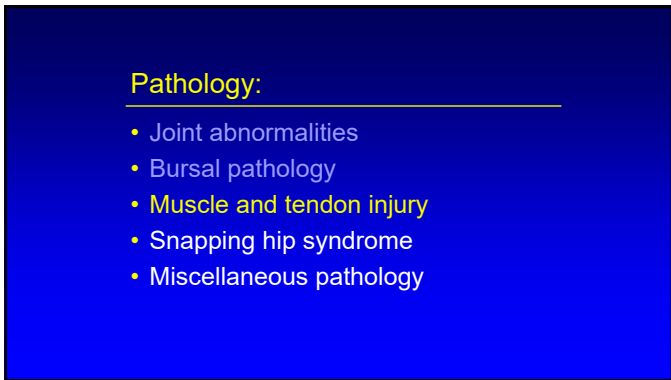
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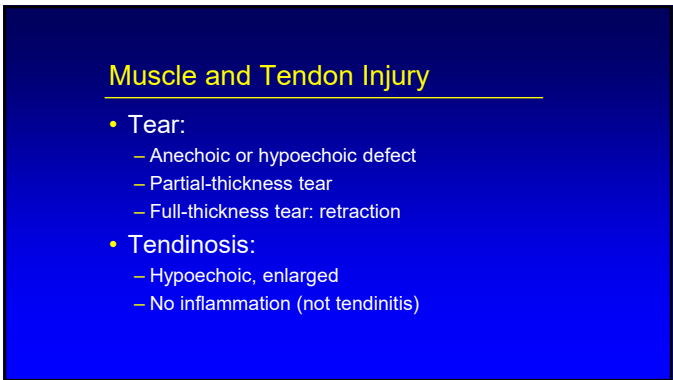
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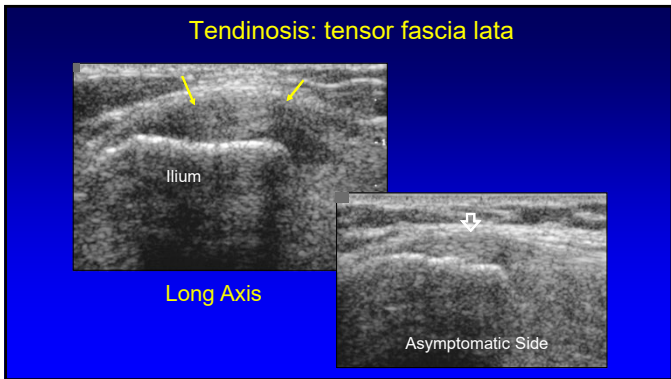
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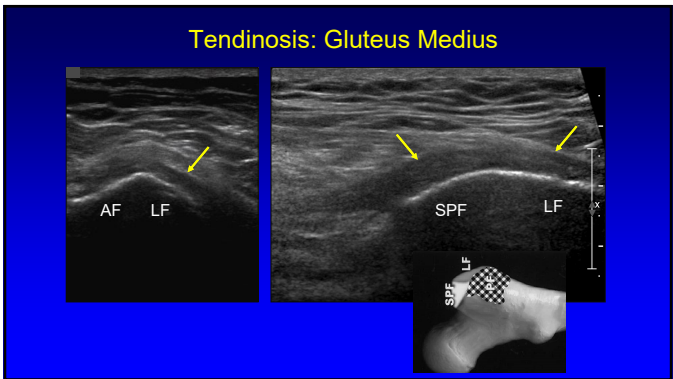
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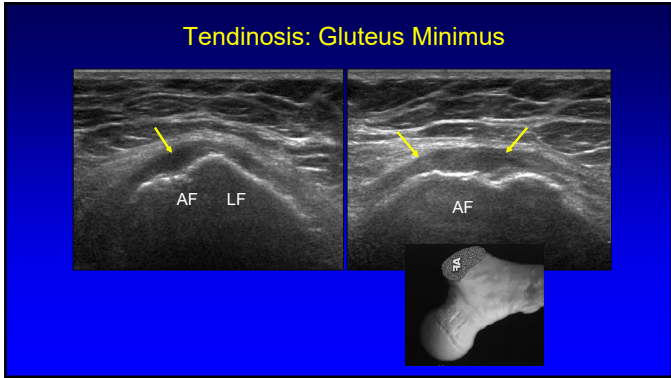
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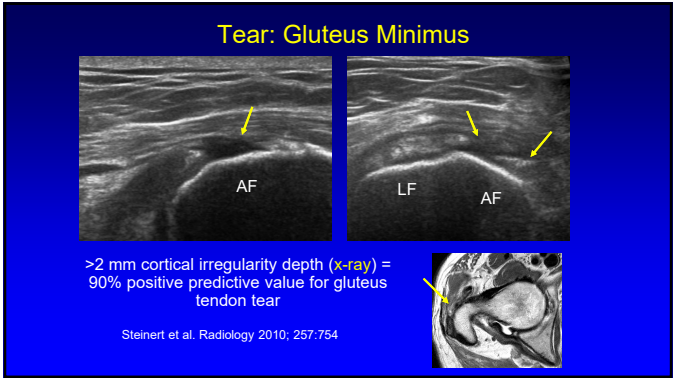
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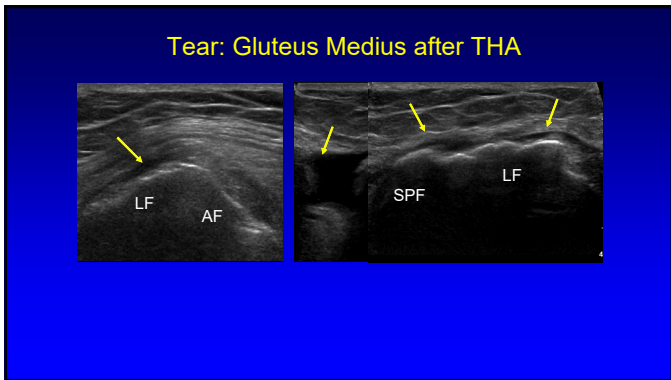
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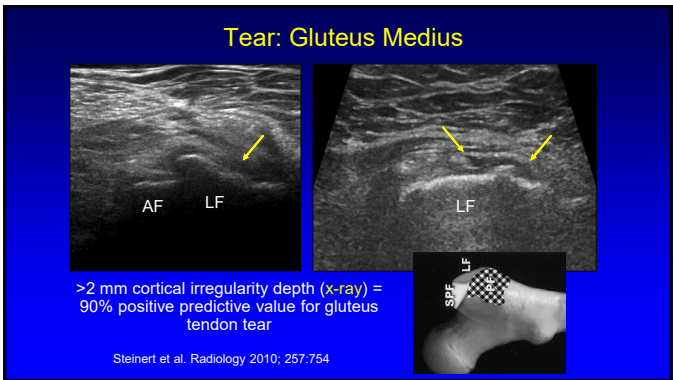
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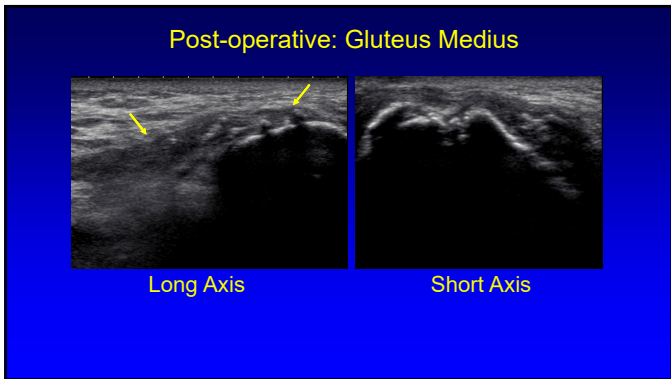
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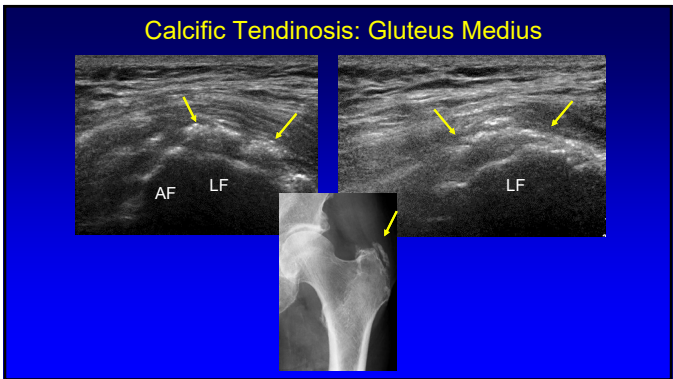
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Sports Hernia?

- 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

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 Jones 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."

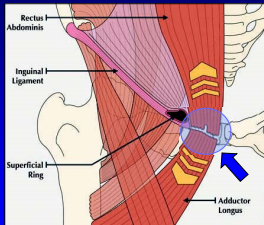
Kremchek is referring to the privacy rule of the Health Insurance Portability and Accountability Act (HIPAA), which Congress passed in 1996 and which forbids public disclosure of medical information without appropriate consent. ■■■■

Author: Joe Lemire, Hemisphere Magazine, Feb. 2015

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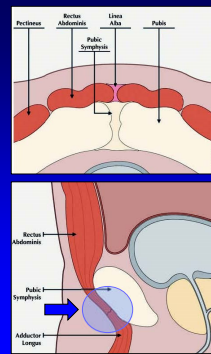
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Rectus Abdominis + Adductor: "Sports Hernia"



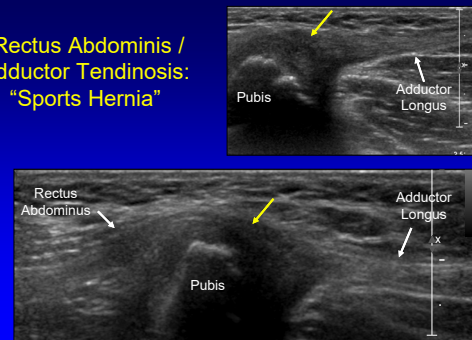
Note: common aponeurosis

From: RadioGraphics 2008; 28:1415



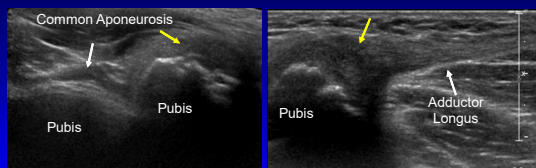
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Rectus Abdominis / Adductor Tendinosis: "Sports Hernia"



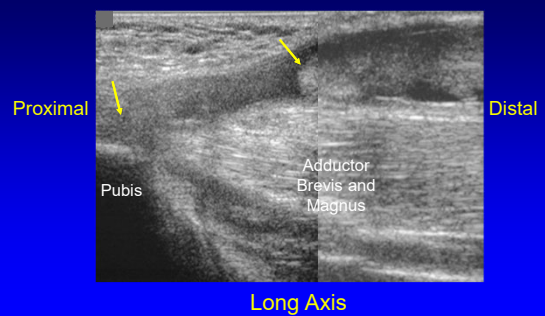
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Rectus Abdominis / Adductor Injury: "Sports Hernia"

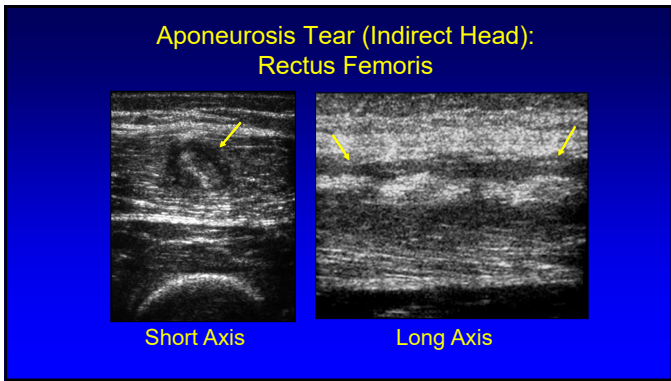


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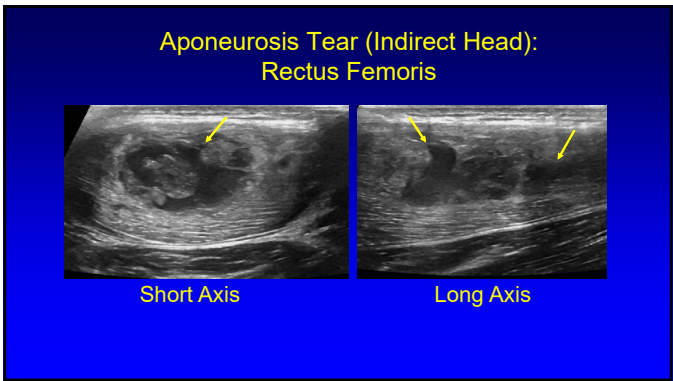
Complete Tear: adductor longus



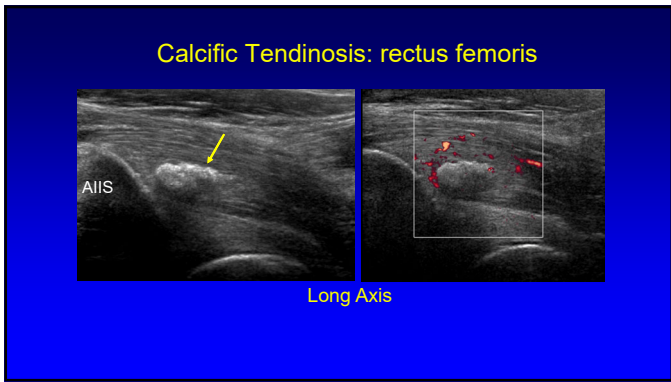
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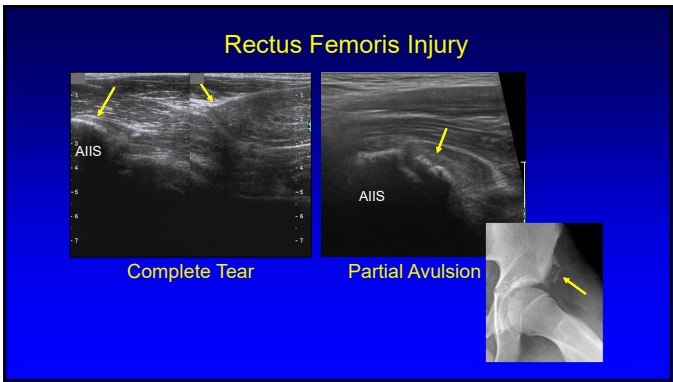
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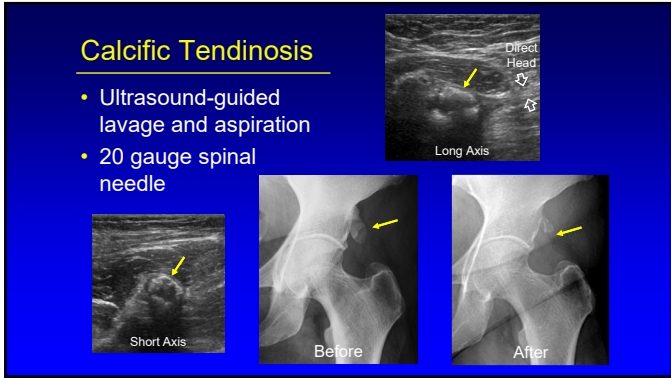
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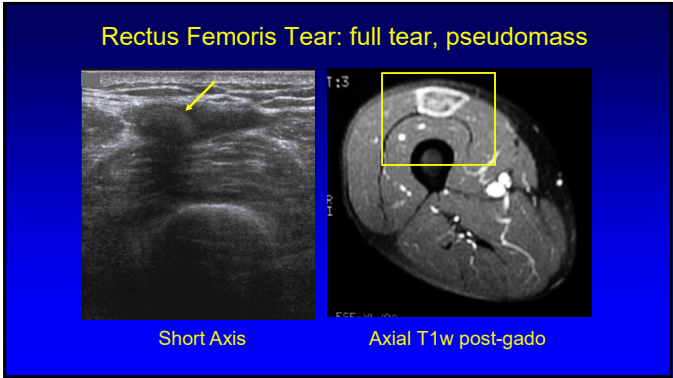
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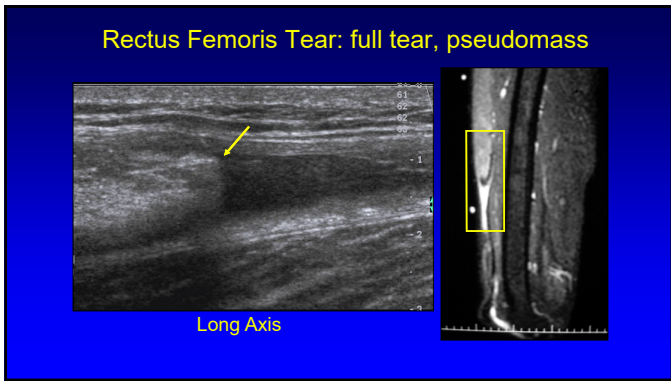
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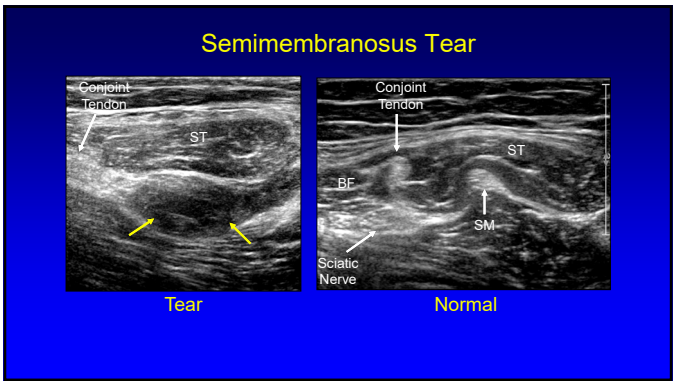
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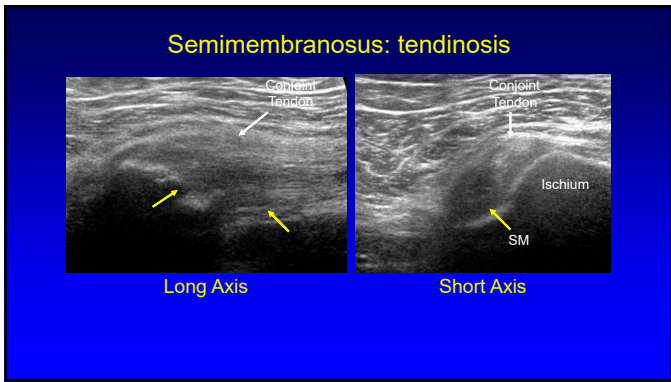
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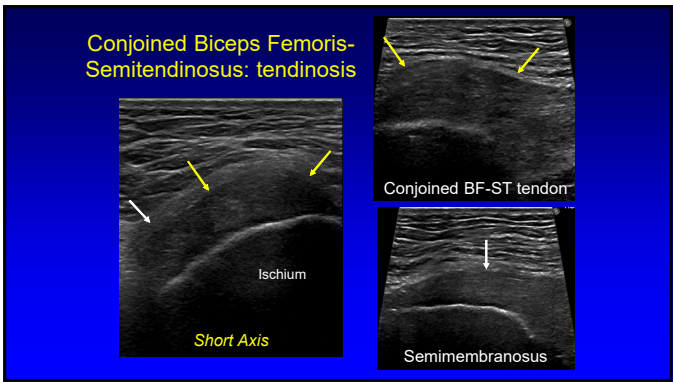
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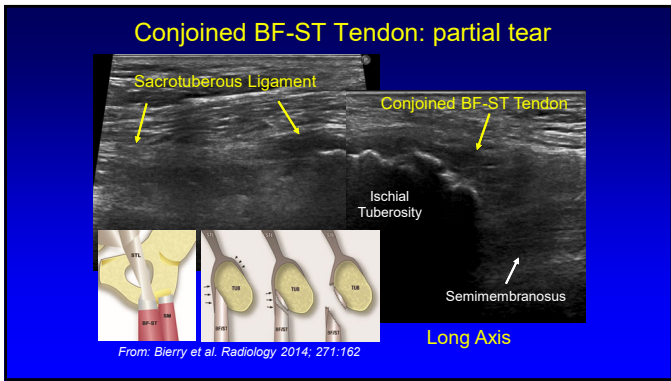
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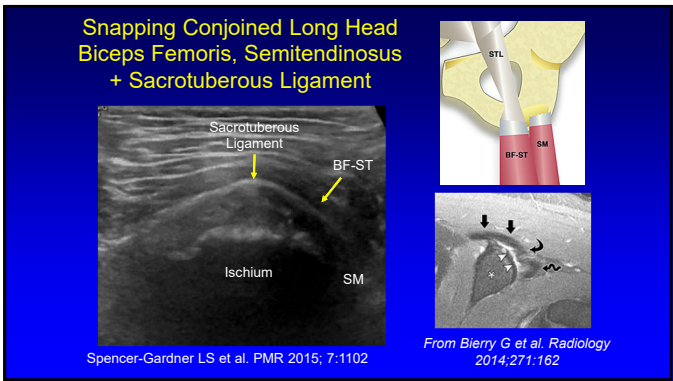
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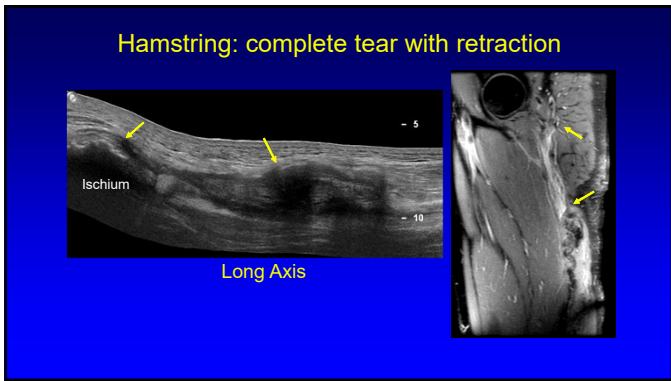
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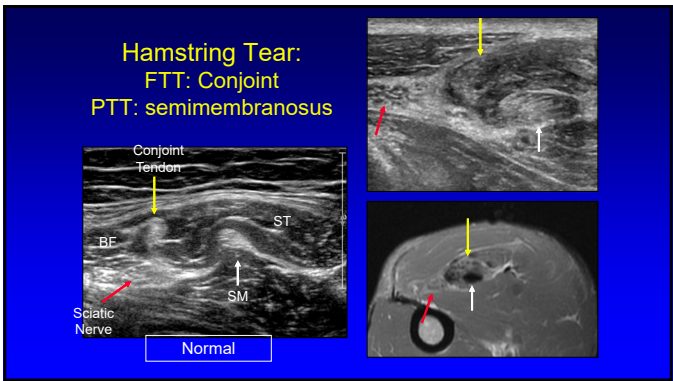
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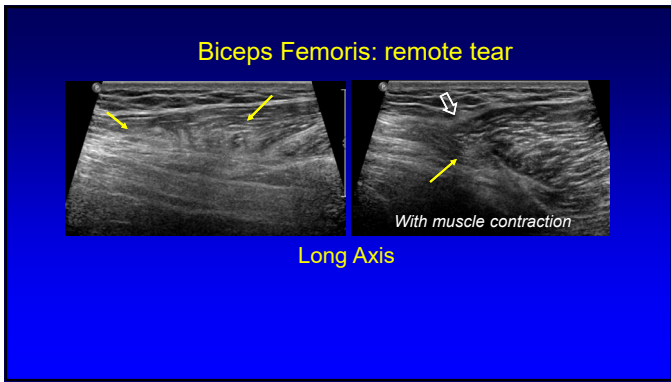
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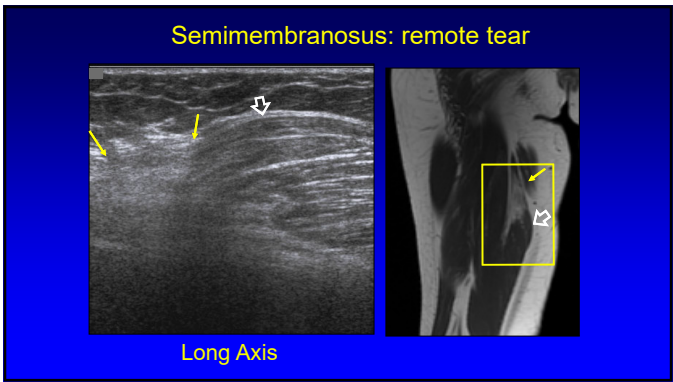
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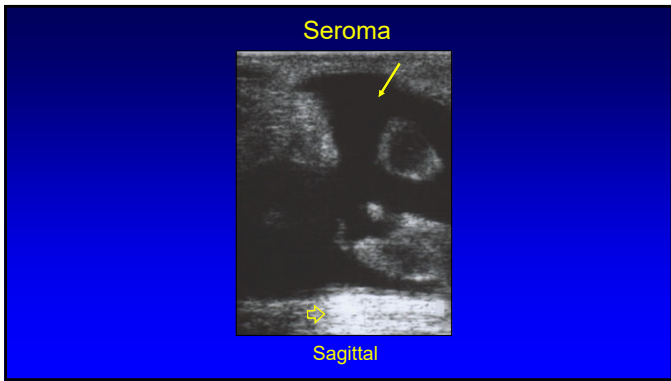
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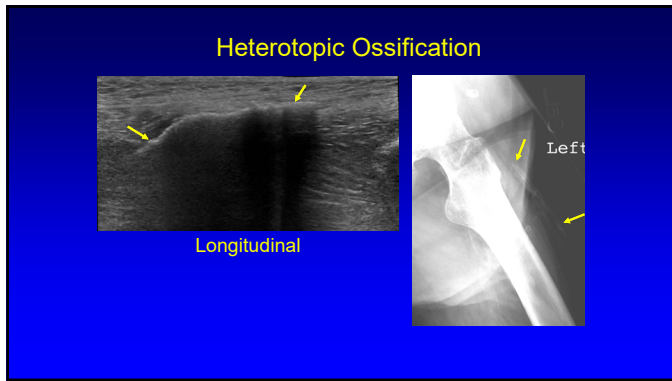
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Heterotopic Ossification:

- Hyperechoic
- Posterior acoustic shadowing and reverberation
- No surrounding soft tissue mass

J Ultrasound Med 1989; 8:463

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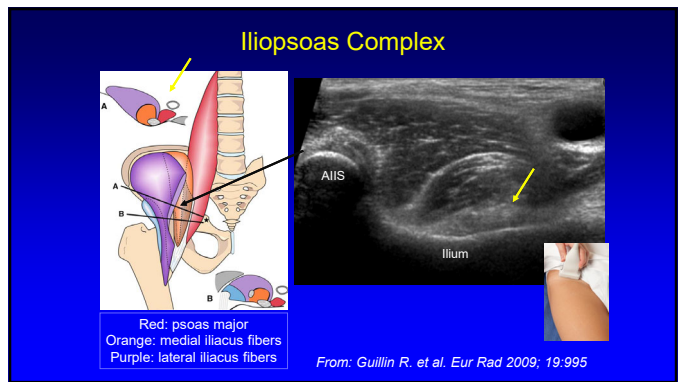
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- ### Pathology:
- Joint abnormalities
 - Bursal pathology
 - Muscle and tendon injury
 - **Snapping hip syndrome**
 - Miscellaneous pathology

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

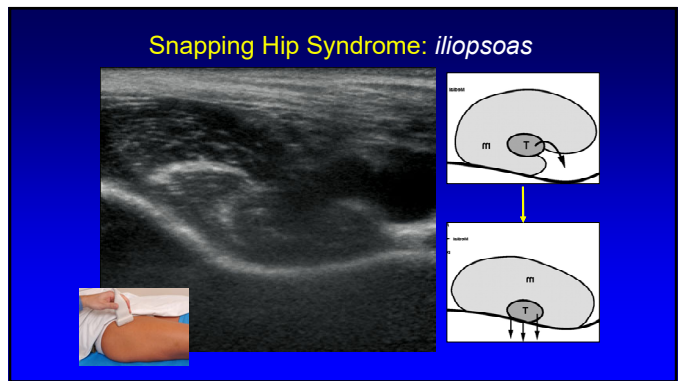
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- ### Snapping Hip Syndrome: iliopsoas
- Image long axis to inguinal ligament superior to femoral head
 - Extension of flexed abducted and externally rotated hip
 - Abrupt movement of iliopsoas as iliacus muscle interposed between tendon and bone moves
- Deslandes et al. AJR 2008; 190:576*

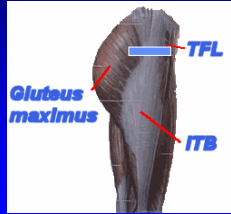
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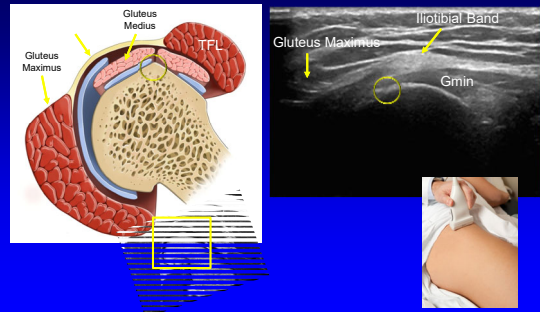
Snapping Hip: lateral

- 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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Pathology:

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

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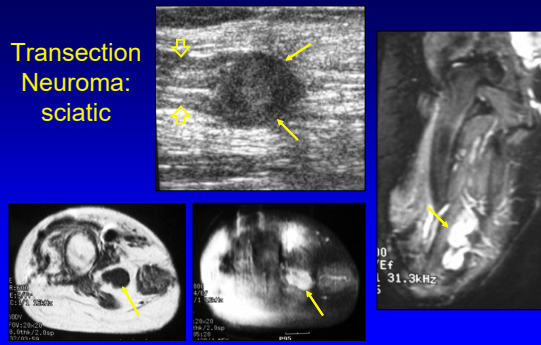
Transection Neuroma:

- Neuroma formation:
 - Disorganized and tangled nerve end
 - Normal response to nerve transection
 - US important to determine if symptomatic

J Clin Ultrasound 1997; 25:85

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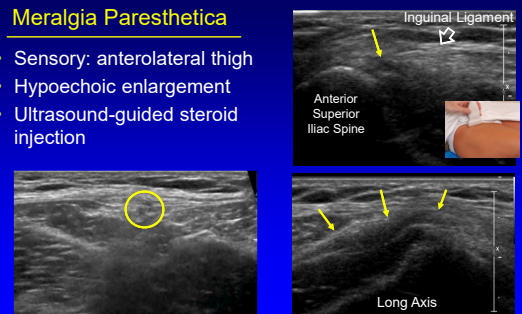
Transection Neuroma: sciatic



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Meralgia Paresthetica

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



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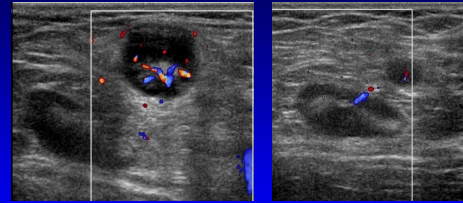
Lymph Node:

- Normal: echogenic hilum
 - Interfaces with fluid-filled sinuses
 - Not due to fat
- Abnormal: enlarged, short axis >1.5 cm

Radiology 1992; 183:215

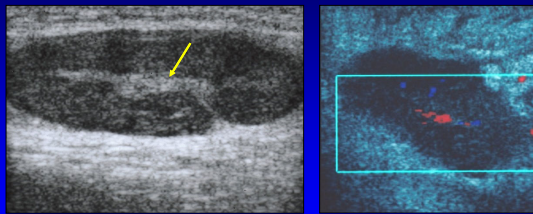
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Lymph Node: hyperplastic



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Lymph Node: reactive

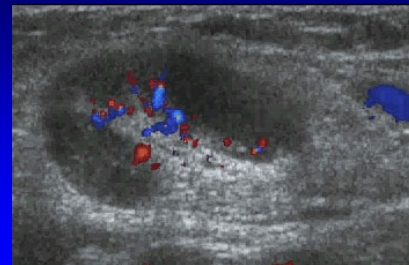


Longitudinal

color Doppler

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Lymph Node: reactive



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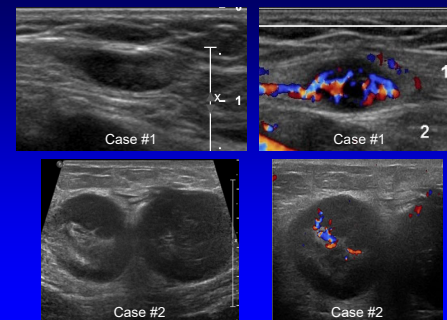
Lymph Node: malignant

- Gray scale:
 - Absent echogenic hilum
 - Narrow hilum with thick cortex
 - Round shape (not oval)
- Power Doppler:
 - Dense vascularity
 - Spotted, mixed, or peripheral (not hilar)
 - High resistance

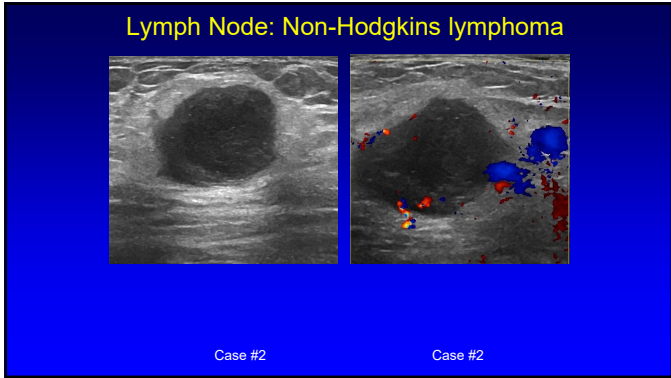
Radiology 1992; 183:215

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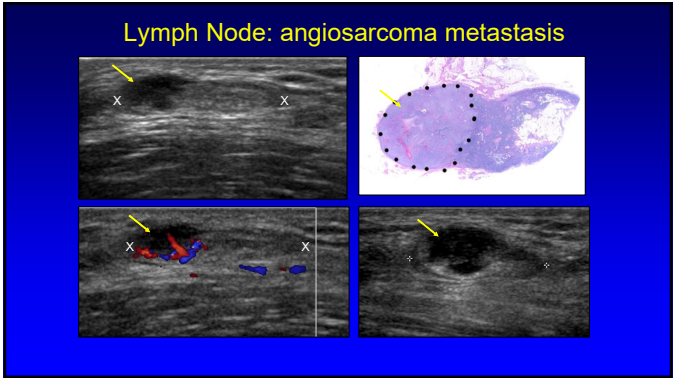
Lymph Node: B cell lymphoma



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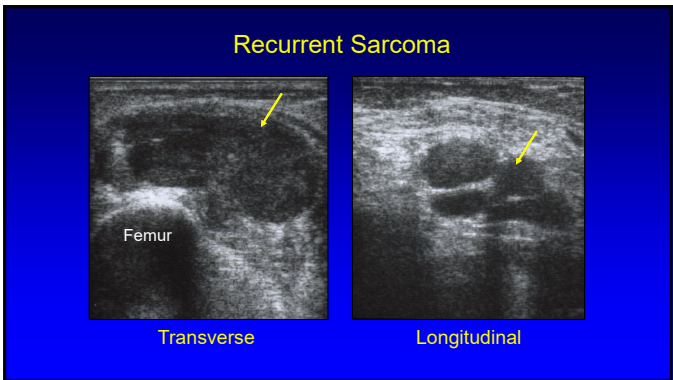
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Soft Tissue Sarcoma:

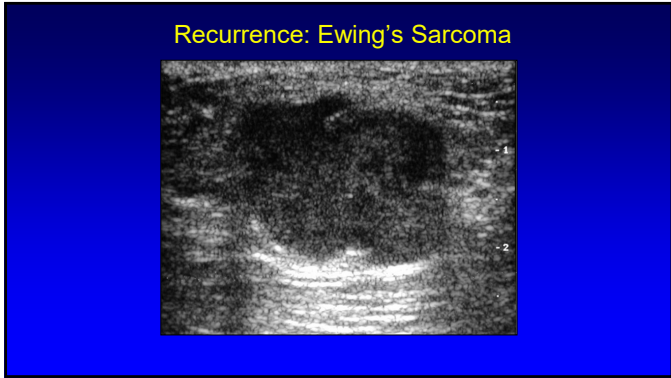
- Hypoechoic to mixed echogenicity
- US performs equal to MRI in detection of sarcoma recurrence¹
- US can detect non-palpable superficial recurrence²

¹AJR 1991; 157:353
²AJR 1997; 169:1449

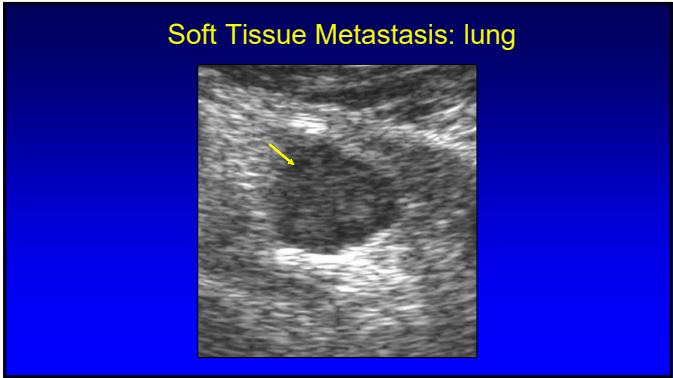
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Take-home points

- Joint effusion: anterior recess
- Bursae: know locations
- Trochanteric pain syndrome: its not bursitis
- Tendons: bone landmarks and footprints
- Snapping hip: dynamic evaluation

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www.jacobsonmskus.com

Twitter handle: @jjacobsn

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