

Common Musculoskeletal Ultrasound-guided Procedures

Jon A. Jacobson, MD, FACR

Musculoskeletal Radiologist
Lenox Hill Radiology, NYC

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Disclosures

- Consultant: Bioclinica
- Contractor: POCUS PRO
- Book Royalties: Elsevier
- Not relevant to this lecture

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Outline:

- Joint
- Tendon sheath
- Bursa
- Cyst
- Calcific tendinitis
- Miscellaneous

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Joint Aspiration and Injection

- Aspiration:
 - Infection, crystal disease
- Injection:
 - Anesthetic: Lidocaine, Ropivacaine
 - Steroids
 - Therapeutic or diagnostic

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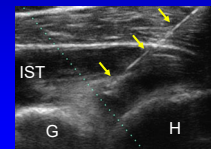
Joint Aspiration and Injection

- Know which joint recesses become distended and which are accessible
- For joint access:
 - Aim for joint fluid seen at ultrasound
 - Aim for specific joint recess
 - If no recess, aim for joint space

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Glenohumeral Joint

- Posterior joint recess
 - In plane
 - Transducer: axial
 - Lateral to medial
 - Most reliable site*



Eur Radiol 2011; 21:1858

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Acromioclavicular Joint

- In plane
- Transducer: coronal
- Lateral to medial

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Elbow Joint

- Olecranon recess
- Elbow flexed
- In plane
- Lateral to medial

Invest Radiol 1998;33:117

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Wrist Joints

- Dorsal recesses
- In plane
- Transducer: axial
- Medial or lateral

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MCP Joints

- Dorsal recesses
- In plane
- Parasagittal or transverse
- Sterile gel stand off

MC PP

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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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Joint injection

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


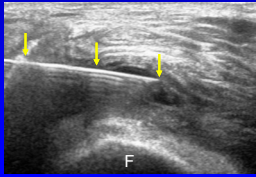
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¹Smith J. J Ultrasound Med 2009; 28:329

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Knee Joint


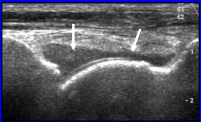
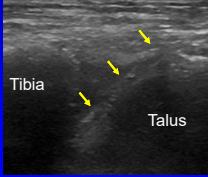
- Suprapatellar recess or medial/lateral recesses
- In plane
- Transducer: axial
- Needle: lateral to medial

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Ankle Joint


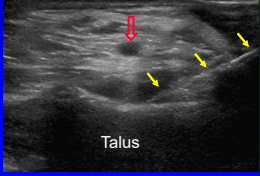
- Anterior joint recess
- In plane
- Transducer: sagittal
- Needle: inferior to superior

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Ankle Joint



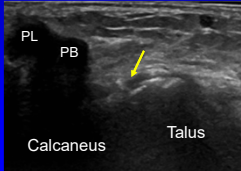
- Anterior joint recess
- In plane
- Transducer: axial
- Needle: medial to lateral
- Deep to dorsalis pedis

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Posterior Subtalar Joint



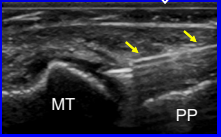
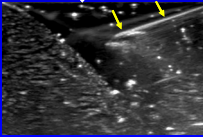
- Lateral joint recess
- Out of plane
- Transducer: coronal
- Place roll: varus
- Avoid: peroneal tendons

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MTP Joints

- Dorsal recesses
- In plane
- Parasagittal or transverse
- Sterile gel stand off

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- Bursa
- Cyst
- Calcific tendinitis
- Miscellaneous

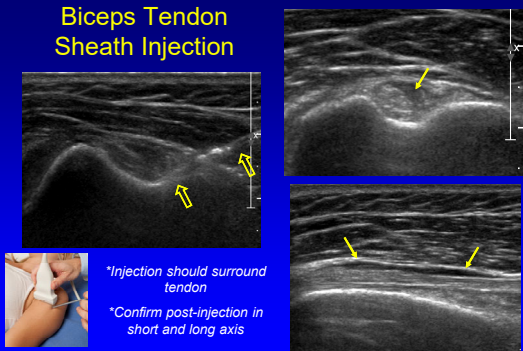
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Tendon Sheath

- Aspiration:
 - Infection, crystal disease
- Injection:
 - Anesthetic: Lidocaine, Ropivacaine
 - Steroids
 - Therapeutic or diagnostic

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Biceps Tendon Sheath Injection



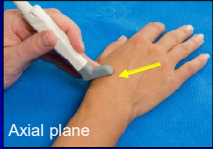
*Injection should surround tendon

*Confirm post-injection in short and long axis

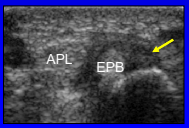
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De Quervain Tenosynovitis

- Inject short axis: dorsal
- Between EPB & radius
- Possible septation
- Inject around abnormal tendons
- Avoid superficial branch of radial nerve



Axial plane



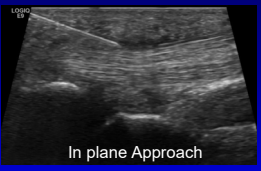
APL EPB

Bing J-H, et al. Skeletal Radiol 2018; 47:1483


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A1 Pulley Injection

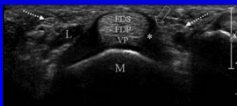
- In or out of plane
- 10 mg triamcinolone, 2% lidocaine
- 90% success rate: 1 year



In plane Approach



Out of Plane




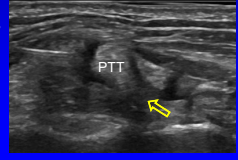
From: Bodor M, et al. JUM 2009; 28:737

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Tendon Sheath: injection

- Short axis to tendon
- Anterior or posterior
- Deep to tendon:
 - Decreased risk of depigmentation, fat atrophy
- 100% accurate

Muir JJ et al. Am J Phys Med Rehab 2011; 90:564

PTT

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Bursa

- Aspiration:
 - Infection, crystal disease
- Injection:
 - Steroids
 - Therapeutic

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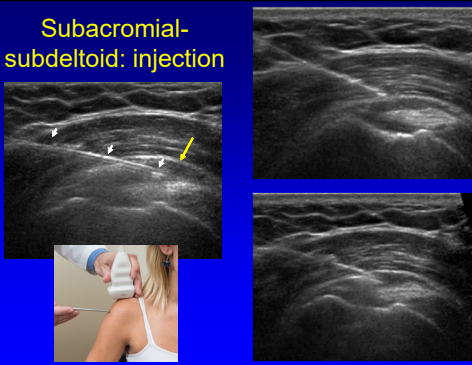
Subacromial-subdeltoid Bursa

- In plane
- Posterior to anterior or lateral to medial
- Patient supine
- Test inject
- Avoid rotator cuff



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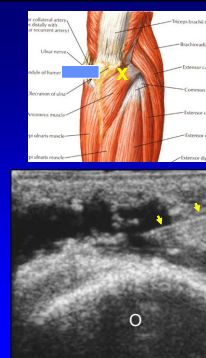
Subacromial-subdeltoid: injection



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Olecranon Bursa

- Arm extended
- Axial plane
- Lateral to medial
- Avoid cubital tunnel



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Iliopsoas Bursa

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

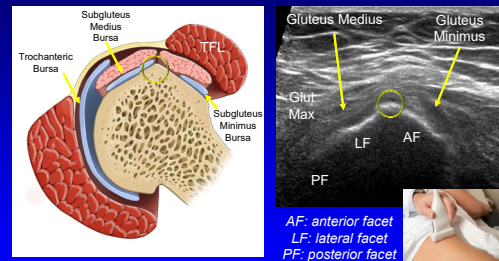
¹Dauffenbach J et al. J Ultrasound Med 2014; 33:405

²Blankenbaker DG. Skeletal Radiol 2006; 35: 565



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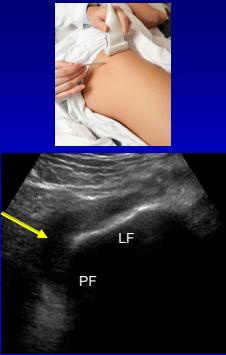
Greater Trochanter



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Trochanteric Region Bursae

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




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Baker Cyst

- Aspiration
 - Inferior to superior
 - Medial to lateral
- Aspirate joint effusion first if present
- Steroid injection
 - Baker cyst injection works better than intra-articular injection!

Banidelli F, et al. Clin Rheum 2012; 31:727

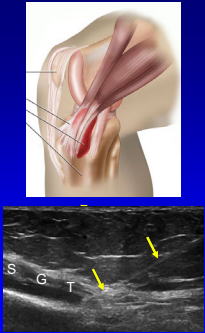


Inferior to superior

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Pes Anserinus

- Pes anserinus: "goose foot"
 - Sartorius
 - Gracilis
 - Semitendinosus
- Bursa:
 - Deep to tendons
 - Superficial to MCL

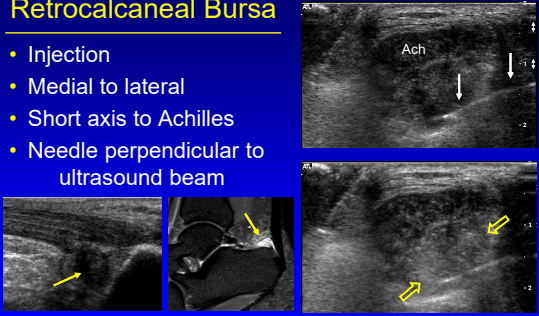


Radiology 1995; 194:525

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Retrocalcaneal Bursa

- Injection
 - Medial to lateral
 - Short axis to Achilles
- Needle perpendicular to ultrasound beam



Post steroid injection

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Outline:

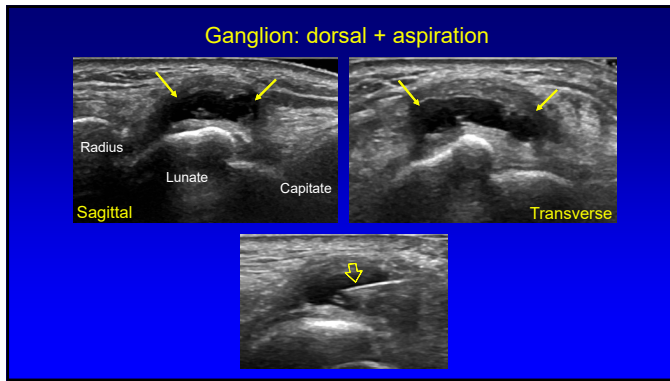
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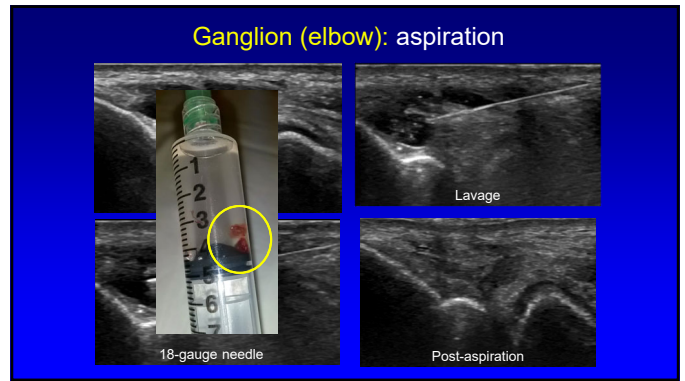
Cyst Aspiration

- Ganglion:
 - Large bore needle
 - Wrist, knee: lobular, anechoic or hypoechoic
- Other cysts:
 - Paralabral cysts: shoulder and hip labrum
 - Parameniscal cysts

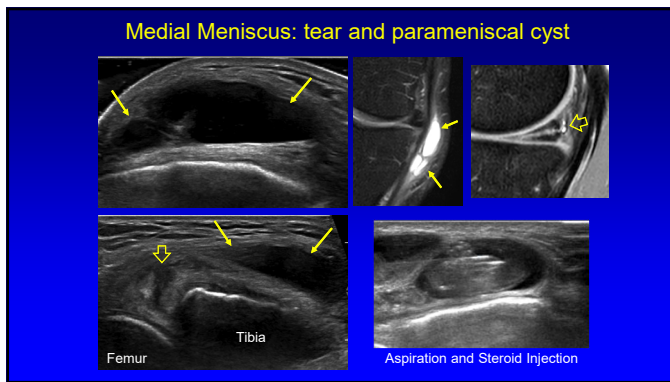
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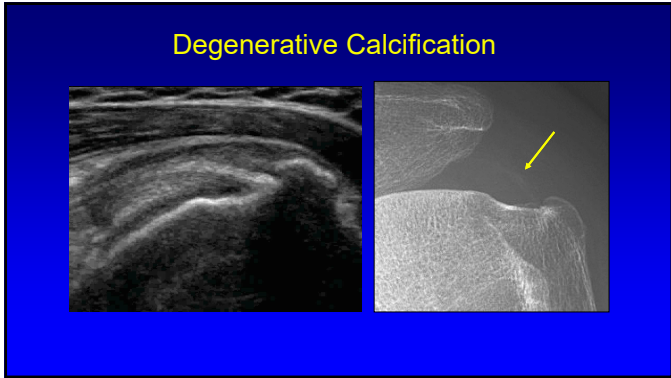
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- Calcific Tendinosis**
- Hydroxyapatite deposition: metaplasia
 - Usually do not have cuff tear
 - Appearance:
 - 79% hyperechoic & shadowing
 - No shadow: 7%
 - Two phases:
 - Formative
 - Resorptive: painful
- Farin et al. Skeletal Radiol 1996; 25:551

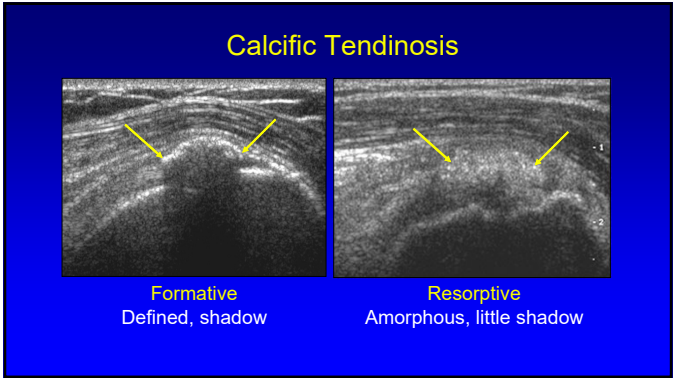
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- Tendon Calcification:**
- Degenerative: thin, linear deposit
 - Calcific tendinosis:
 - Formative: well-defined, dense shadow
 - Resorptive:
 - Globular, amorphous
 - Variable shadow
 - Best success with aspiration
- Uthoff. J Am Acad Ortho Surg 1997; 5:183

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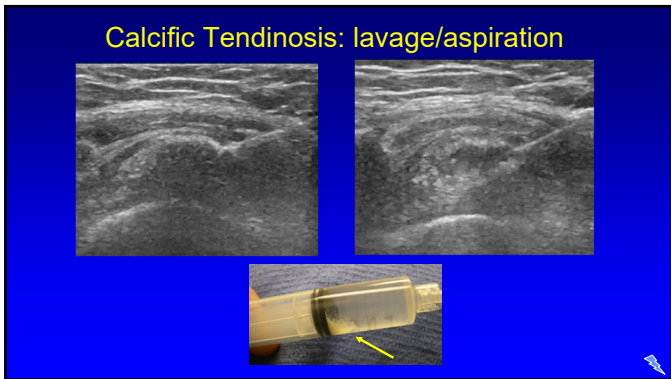
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- ### Calcific Tendinosis: aspiration
- Percutaneous lavage and aspiration
 - Best: rounded amorphous calcification
 - Correlate with radiography
 - 3- 10 cc syringes: Lidocaine
 - 20 – 22 gauge needle
 - Position patient: syringe is dependent

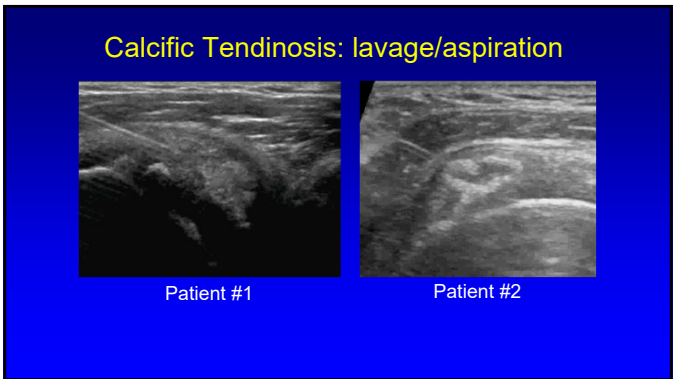
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- ### Calcific Tendinosis: aspiration
- Inject Lidocaine, then aspirate
 - Dilute calcification
 - Syringe dependent
 - Calcification will flow into needle
 - Repeat until calcification decreases
 - Inject steroids into adjacent bursa

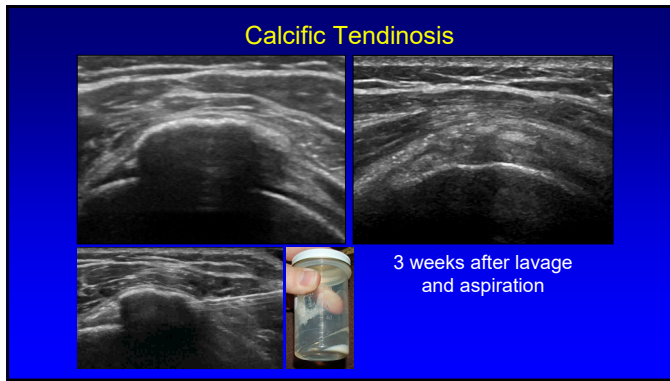
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Calcific Tendinosis: results

- Calcium decrease correlates with symptom improvement
- Improvement: 91% at 1 year*
 - Calcium gone in 89%
 - Transitory recurrence at 15 weeks: 44%
 - Improved symptoms at 1 year
- No difference at 5, 10 years**

*del Crura, AJR 2007; 189:W128
**Serafini G, Radiology 2009; 252:157

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Morton Neuroma

- Steroid injection¹
 - 3 month: pain relief
- Alcohol injection²
 - Symptoms return at 5 yrs
- Radiofrequency ablation³
 - 85% effective at 6 months

¹Thomson CE JBJS 2014; 96A:334
²Gurdezi S Foot Ank Int 2013; 34:1064
³Chuter GSJ Skeletal Radiol 2013; 42:107

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Carpal Tunnel Injection

- Axial plane: ulnar to radial
- Sterile gel stand-off
- Begin over ulnar nerve and stay superficial
- Inject adjacent to median nerve
- Cross-sectional area may decrease within 1 week after steroid injection¹

From: Smith J, et al. JUM 2008; 27:1485

¹Cartwright MS et al. Muscle Nerve 2011; 44:25.

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Meralgia Paresthetica

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

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Take Home Points:

- Joint:
 - Aim for recess
- Bursa:
 - Know anatomic locations
- Cyst:
 - Large bore needle
- Calcific tendinitis:
 - One puncture, lavage and aspiration

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Thank you!

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

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