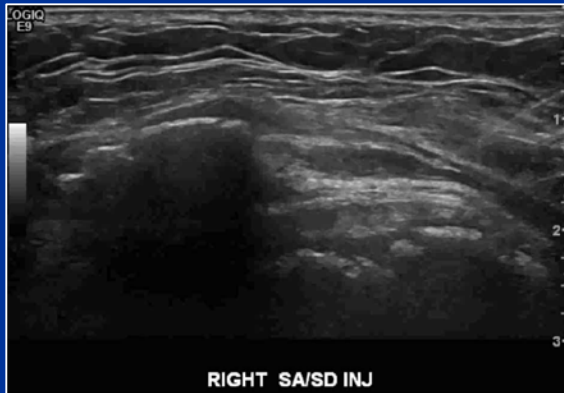


MSK US Shoulder:

Procedures: Joint, Calcific Tendinitis, and PRP



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Disclosures

- Grants: NBA/GE, Mitek
- Research: SuperSonic Imagine
- Royalties: Elsevier

Objectives

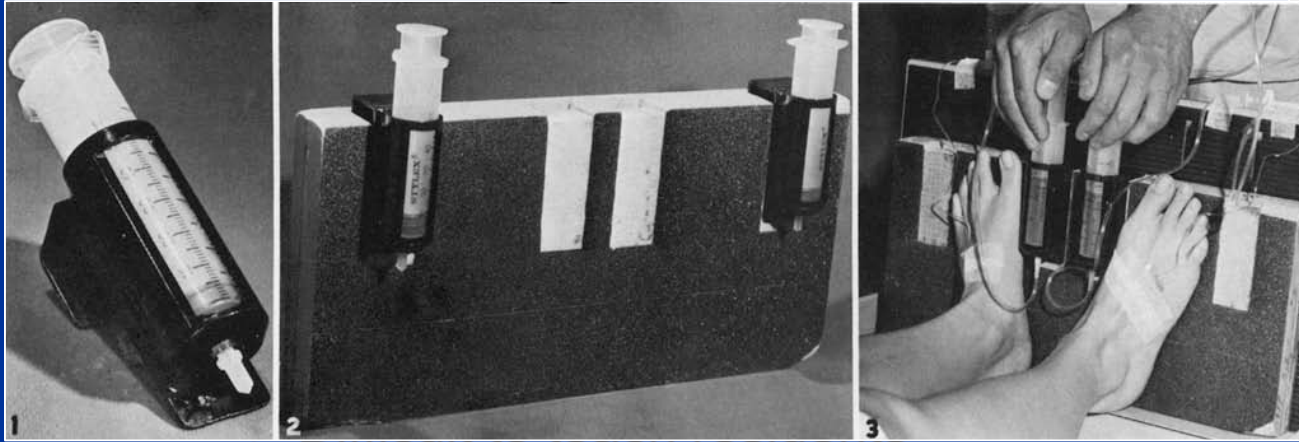
1. To highlight fluoro vs. US approach to shoulder arthrography
2. To demonstrate US-guided calcific tendinitis lavage using the single needle technique
3. To discuss platelet-rich plasma therapy as an emerging treatment for shoulder tendinopathy

Outline

- I. Shoulder Arthrography
 - A. Fluoro-guided
 - B. US-guided
- II. Calcific Tendinitis Lavage
 - A. Single needle
 - B. Double needle
- III. Platelet-Rich Plasma Therapy

Arthrography: History

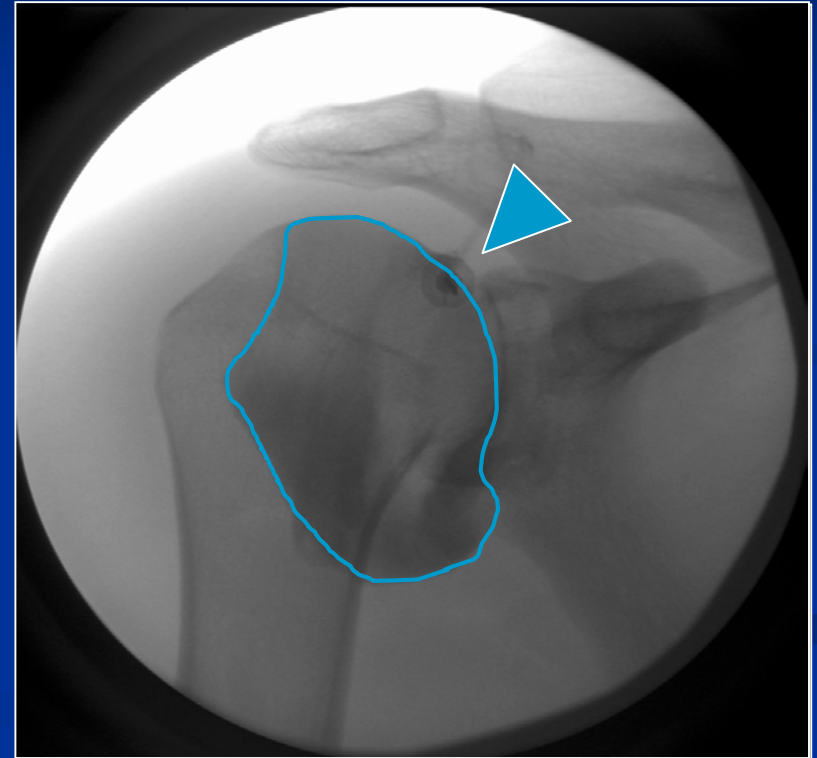
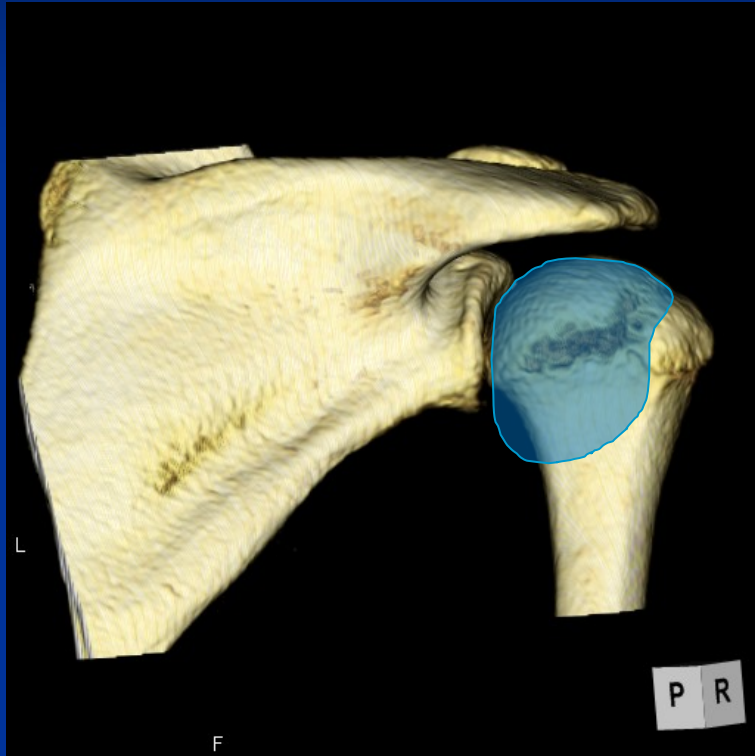
- Technique first described by Oberholzer in 1933
- Modified by Schneider in 1975



Vein Phlebography Device *Porte J. Radiology 1975;114*

Schneider R. *Radiology 1975;114:738*

Arthrography: Anatomy interval



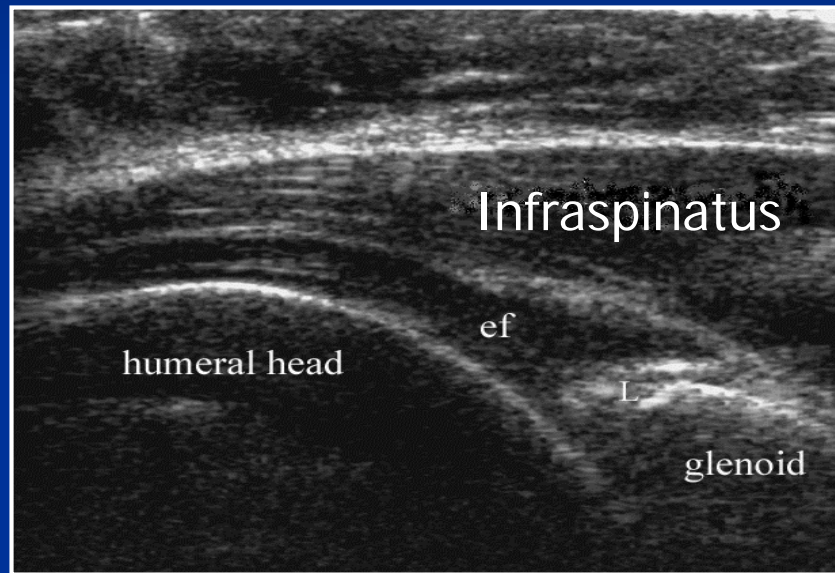
Arthrography: Rotator Interval

- Advantages:
 - Shorter needle (1.5", 23G)
 - No learning curve
 - Less painful
 - Avoids anterior structures
 - Subscapularis
 - Inferior GH Ligament
 - Anteroinferior Labrum



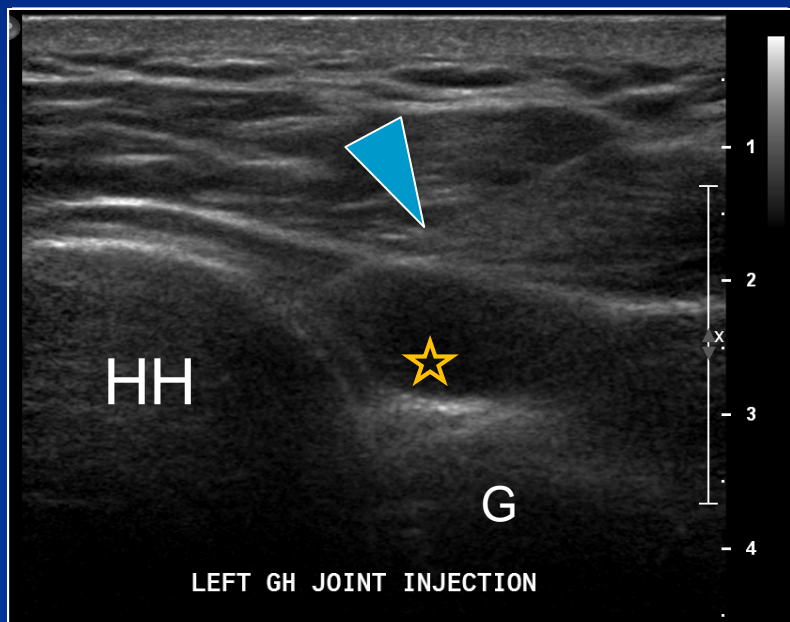
Arthrography: Posterior

- Advantages:
 - Avoid vital structures
 - Easy to perform
 - No radiation
 - No complications
 - Extravasation easily recognizable

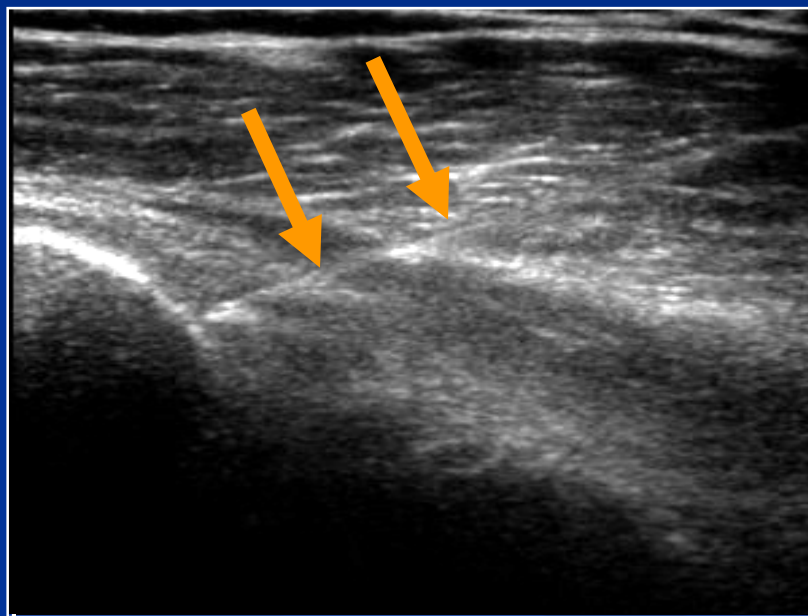


Long Axis

Arthrography: Posterior



Long Axis



Long Axis

Background: Calcific Tendinitis

- Common painful condition from hydroxyapatite crystal deposition in the rotator cuff
 - Mostly in women (4th-5th decade)
 - Supraspinatus (80%), Infraspinatus, Subscapularis
- Self-limiting, but affects ADL and lost days from work
- Treatment options: conservative or surgery
 - Alternative: Ultrasound-Guided Lavage

Ultrasound Probes



L 17-5 MHz

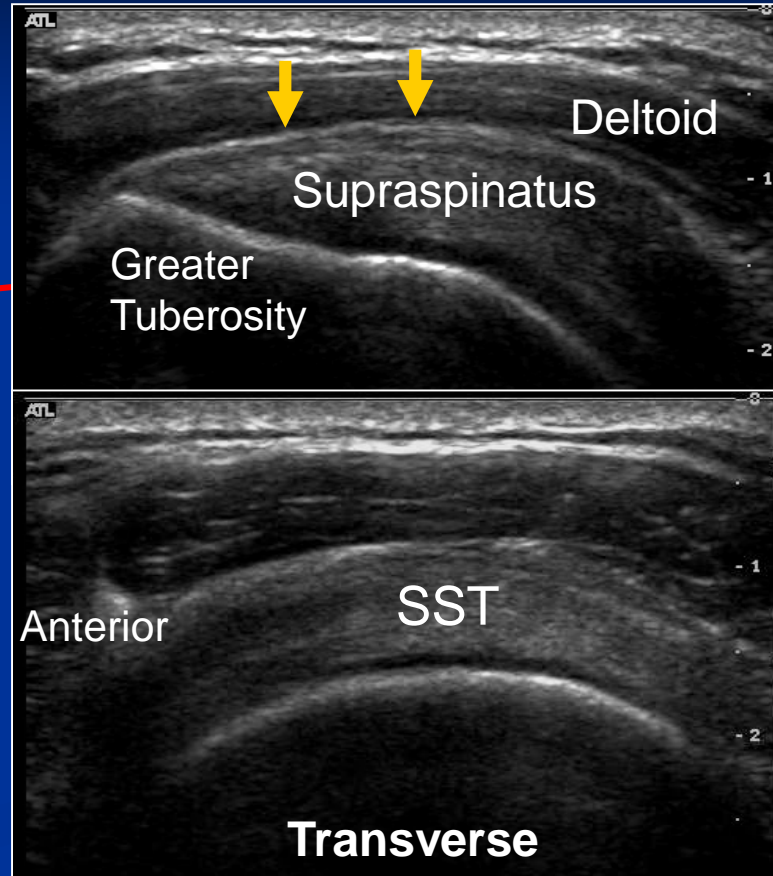
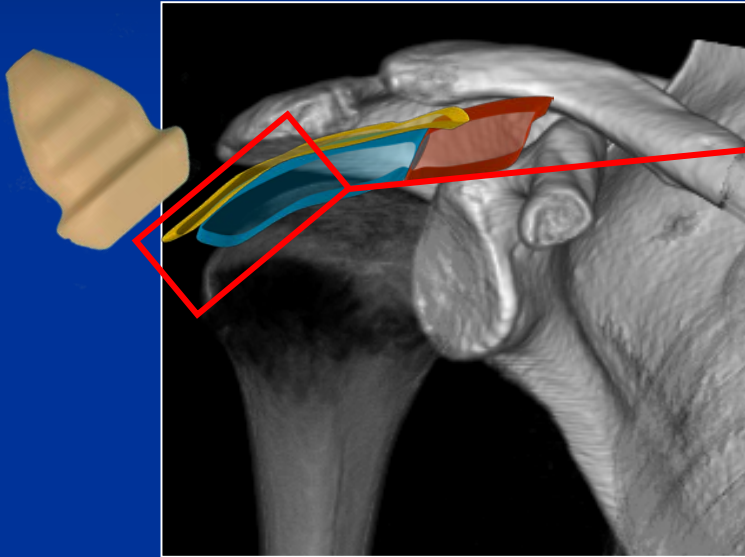


L 12-5 MHz

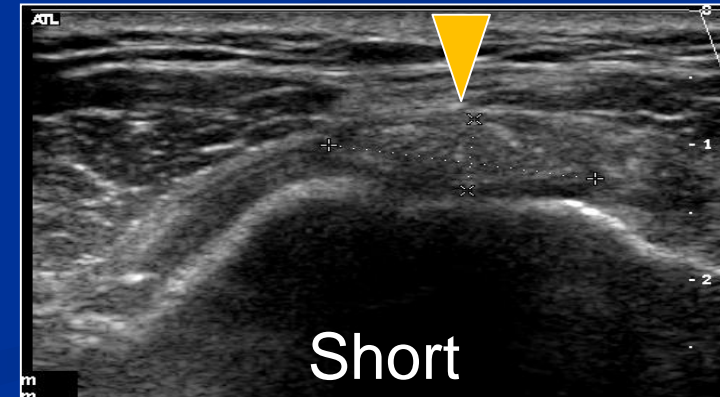
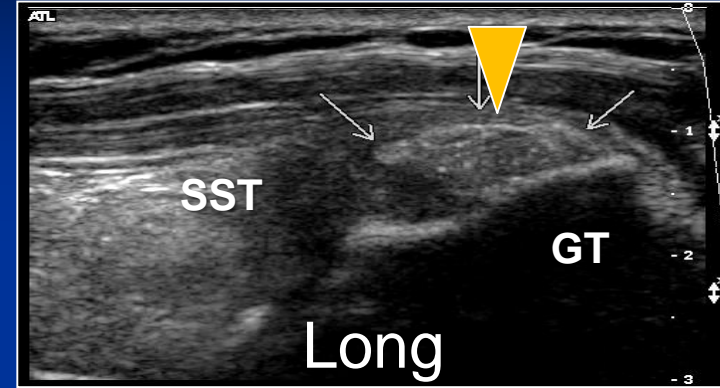


CL 15-7 MHz

US of Normal Rotator Cuff

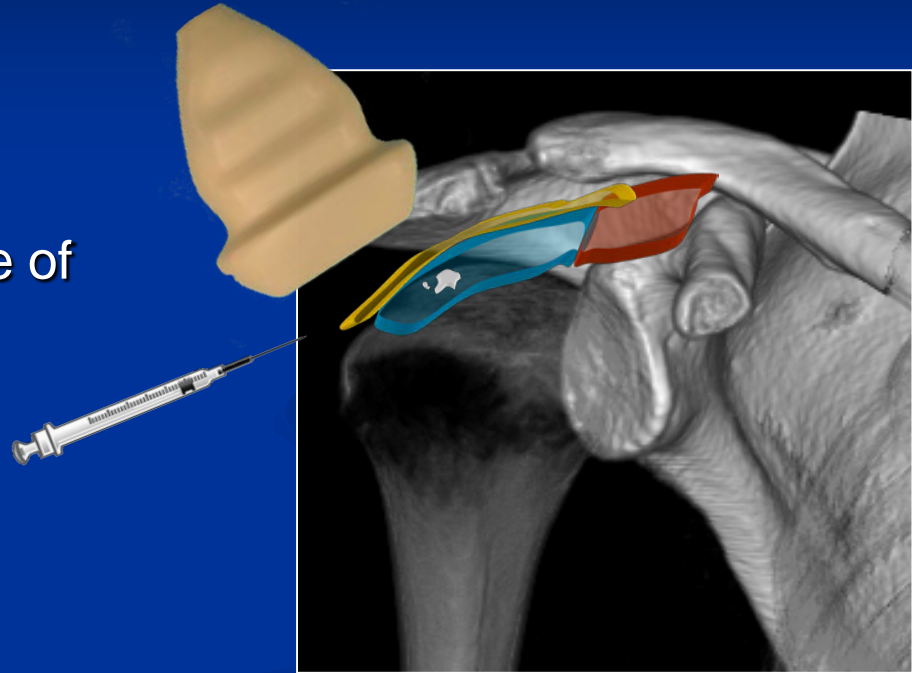


Shoulder Calcific Tendinitis



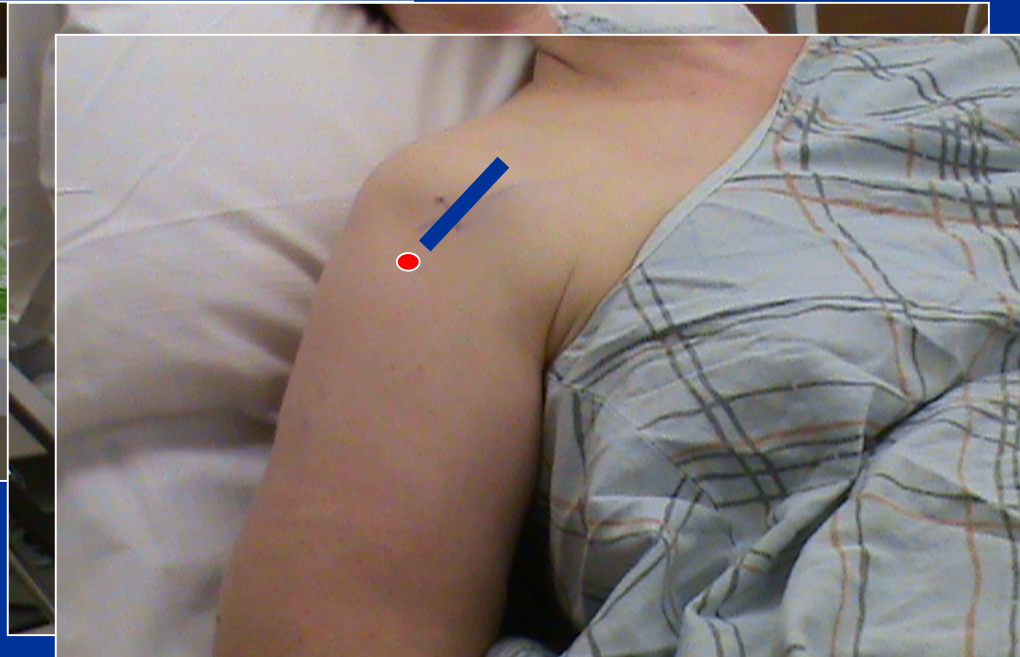
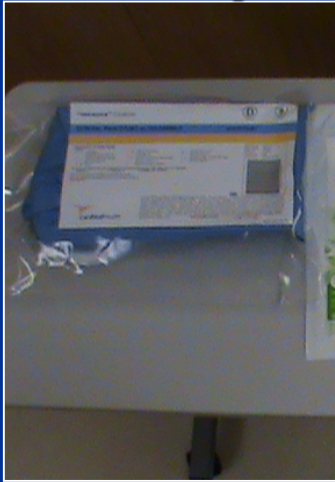
Calcific Tendinitis Lavage Protocol

1. 18-gauge (20G), 1.5 inch needle placement
2. Lavage with 10 mL syringe of equal parts:
 - 1% Lidocaine
 - Normal Saline
3. Inject steroid solution into subacromial-subdeltoid (SASD) bursa
 - Average time: 10 minutes

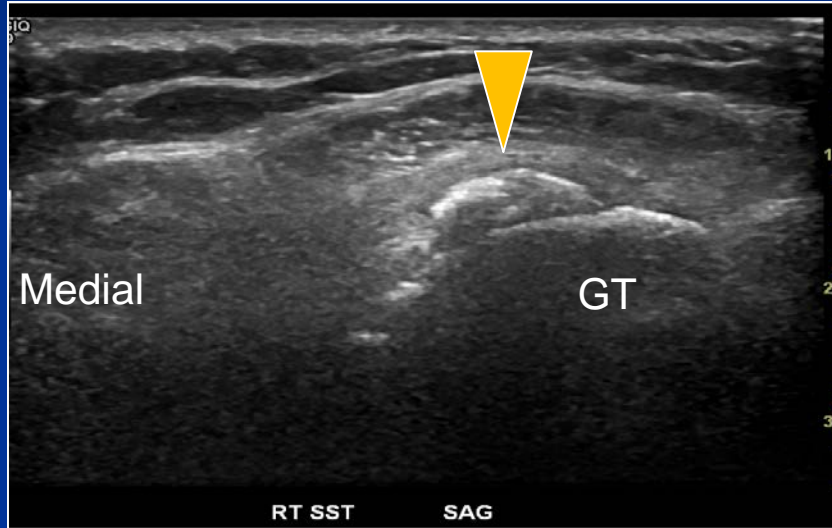


Before Injection:

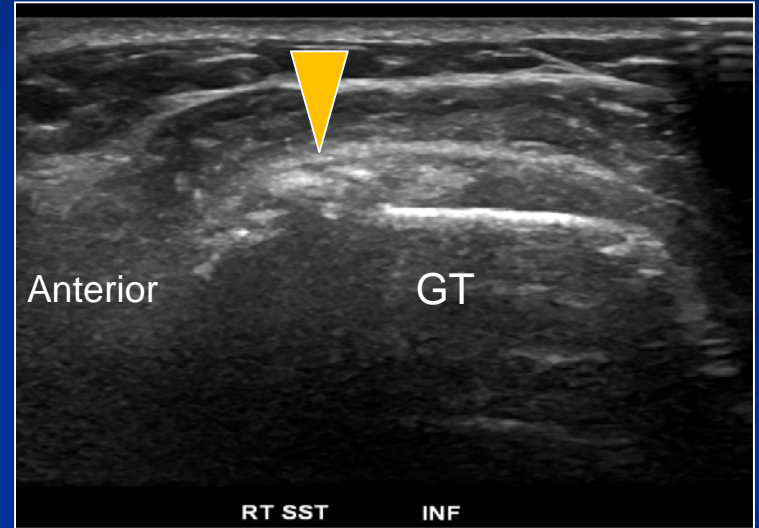
1. Supplies
2. Patient position



Localize Calcification

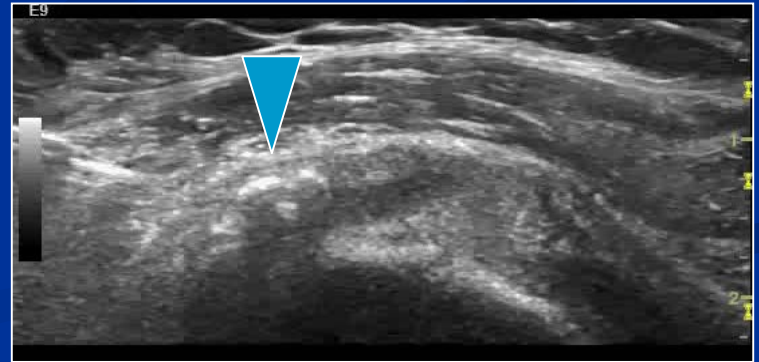
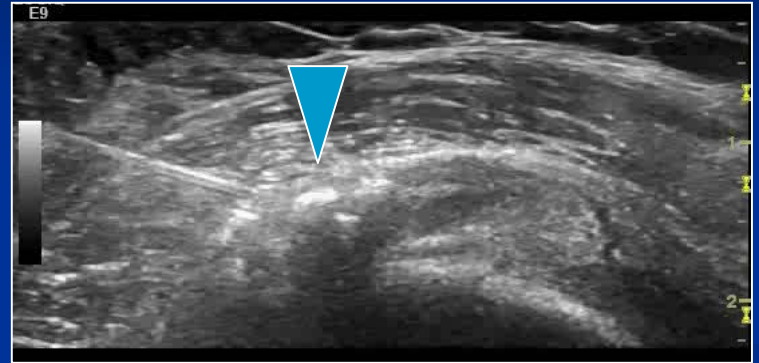


Long Axis



Short Axis

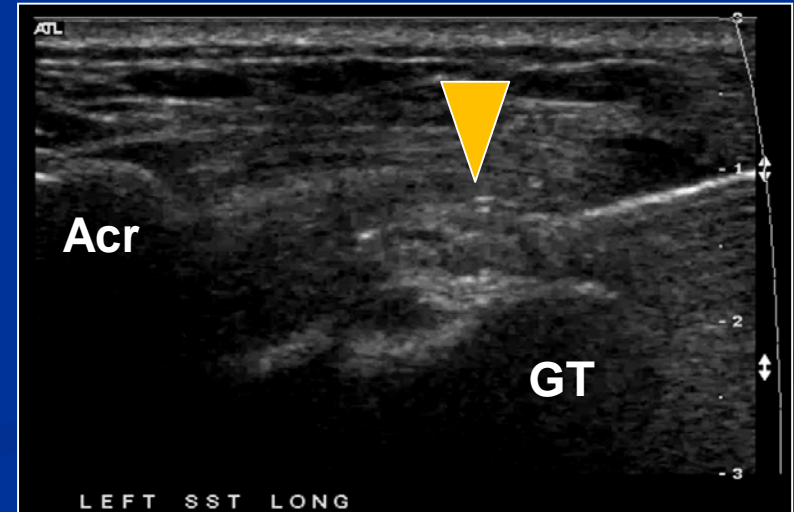
US-Guided Needle Placement



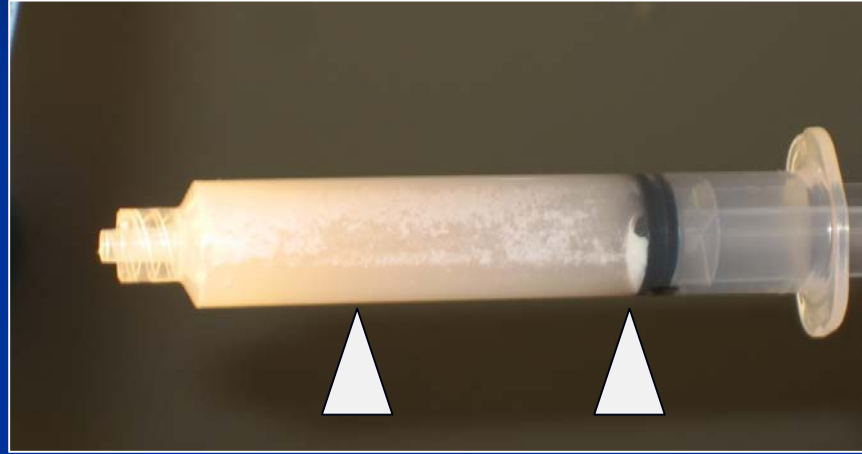
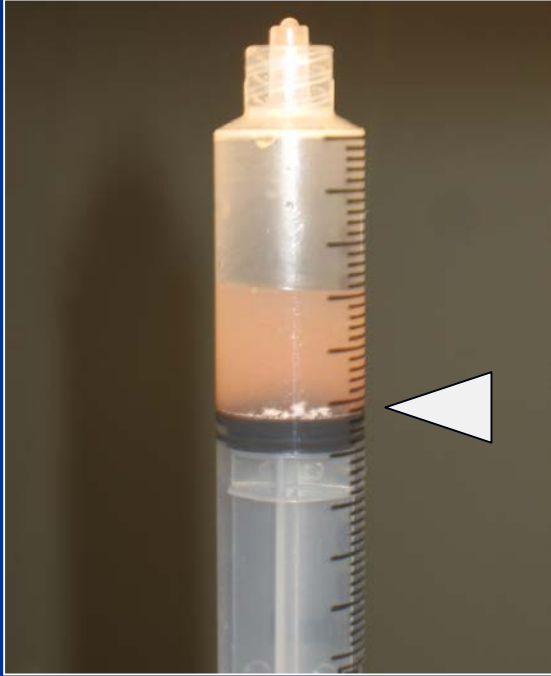
US-Guided Lavage



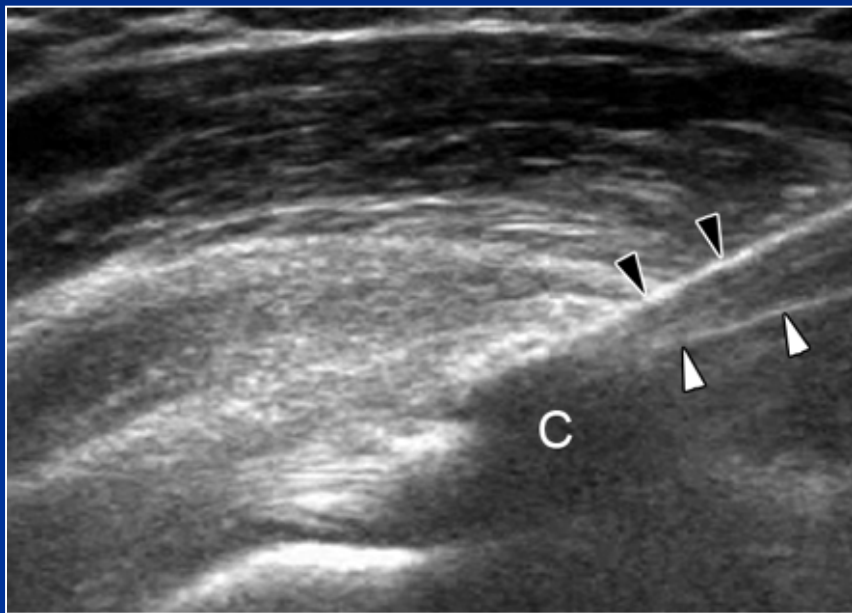
Lee KS. *AJR* 2010;195:638



Lavaged Calcium Crystals



Two-Needle Technique



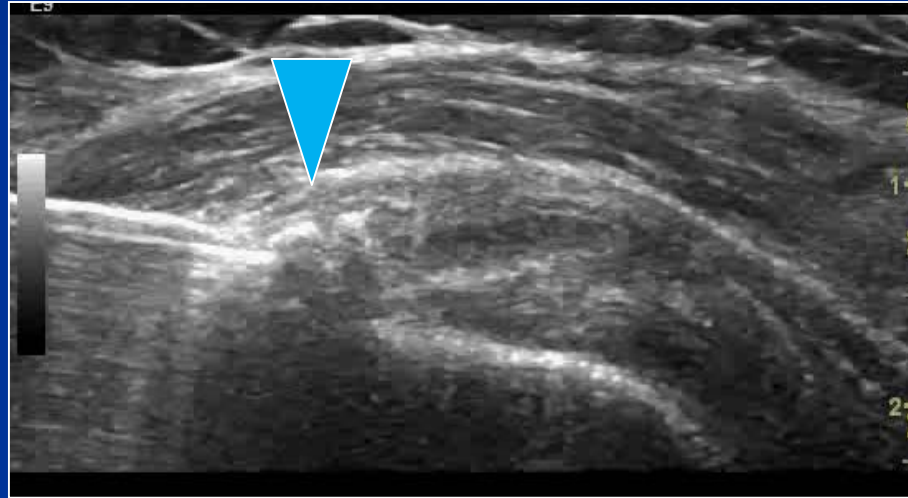
Serafini et al. *Radiology* 2009;252:157

- Two 16G needles
 - In-and-Out flow
 - 100% Ca^{++} removed
- Single 20G needle
 - 33% Ca^{++} in Aina study (2001)
 - 75% Ca^{++} in del Cura study (2007)
- **No difference in clinical outcome**

Does all the Ca^{++} need to be removed?



US-Guided Fenestration

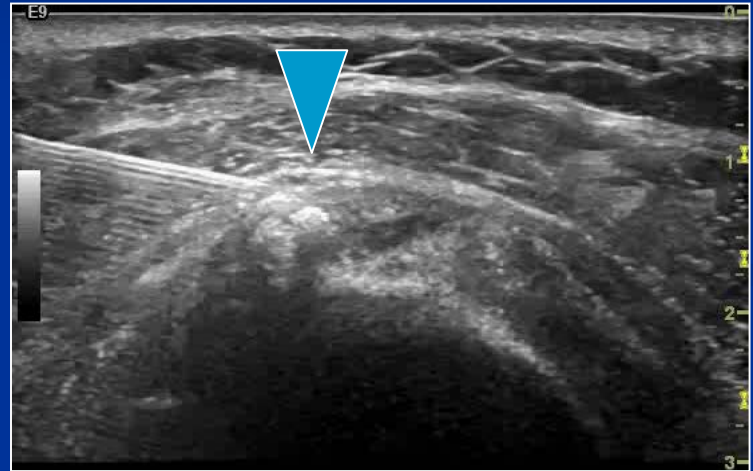


Long Axis

US-Guided SASD Bursa Injection



2 mL soln= 1 mL steroid + 1 mL anesthetic



Transverse

Post-Procedure Protocol



Long Axis

- Rest for 48 hours
- NSAIDs after procedure
- Avoid heavy lifting for 2 weeks
- Resume PT after 1 week
- Pain survey

UWHealth

University of Wisconsin
Sports Medicine



US-Guided Therapy: Platelet-Rich Plasma



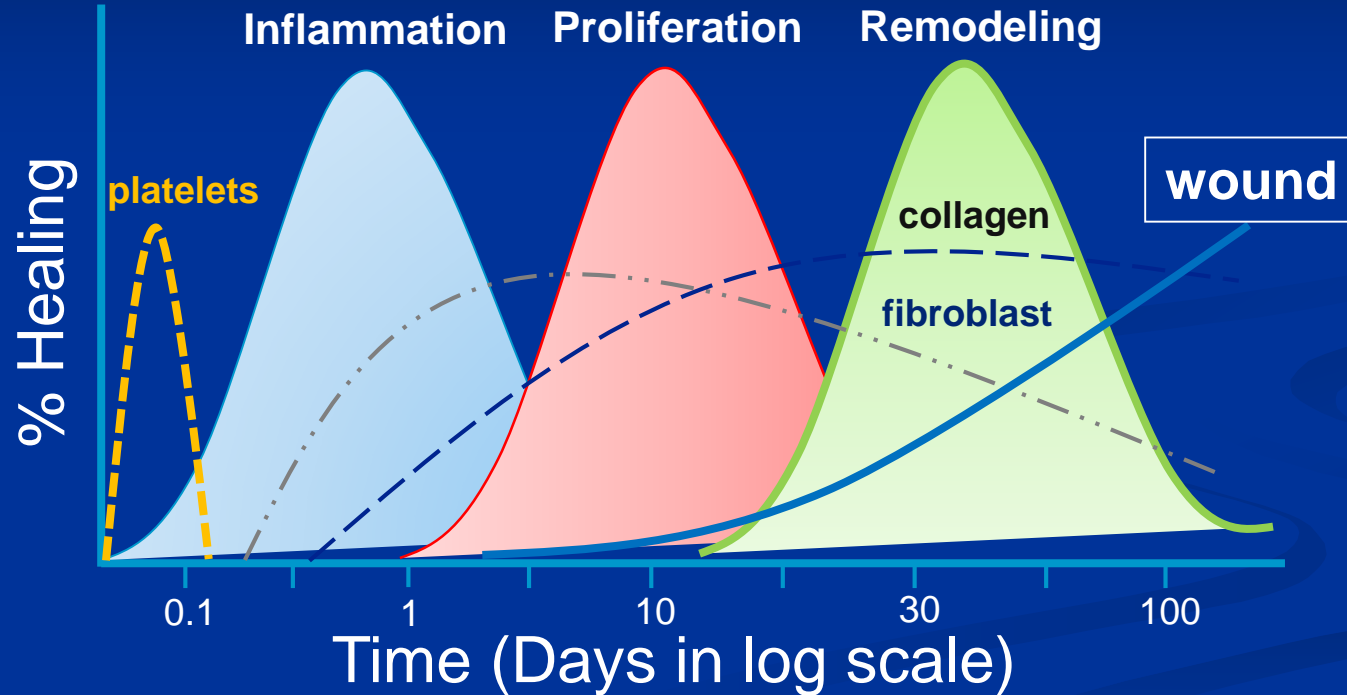
Background: PRP

■ Platelet-Rich Plasma

- Injection of autologous platelets
- Concentrated growth factors (5x)
 - [PDGF, TFG- β , PDGF, VEGF]
- ~ **100,000 athletes** in the US annually
- Media has outpaced the evidence



Healing Cascade: Platelet Activation



Recent Evidence on PRP

➤ Peerbooms JC, et al. *AJSM*, 2010; 38:255

- Randomized Controlled Trial; Level 1; **Lateral Epicondylitis**
- PRP (N=51) vs. Corticosteroid (N=49)
 - 73% PRP vs 49% Steroid (p<0.001)
 - Corticosteroid – better initially then declined
 - PRP – progressive improvement to 1 year
- 2-year follow-up: PRP >> Steroid

➤ De Vos RJ, et al. *JAMA* 2010; 303(2):144

- Randomized Controlled Trial; Level 1; **Achilles Tendinopathy**
- PRP (N=27) vs. Saline Control (N=27)
 - Both groups improved
 - PRP not superior
 - Drawbacks:
 - Eccentric exercise
 - Short follow-up (24 wks)
- 1-year follow-up: No difference

PRP: Preparation

- Outpatient sports medicine clinic or Radiology
 - Table-top centrifuge machine
- Centrifuge systems differ in ability to separate red blood cells from platelets affecting concentration and composition
- Working definition of PRP is **1,000,000 per μL** platelet count

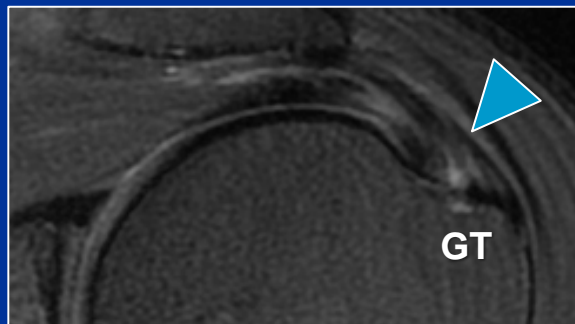
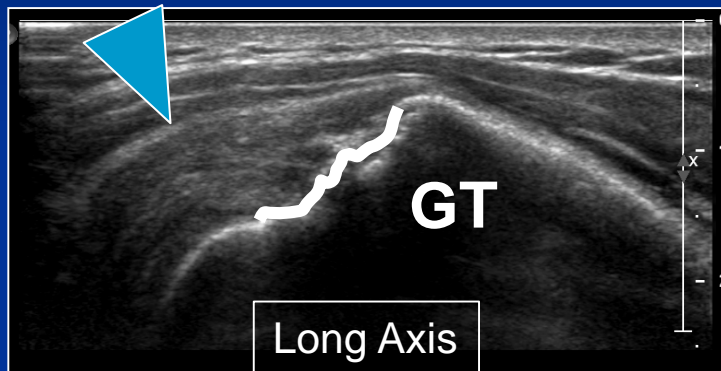


PRP: Centrifuge

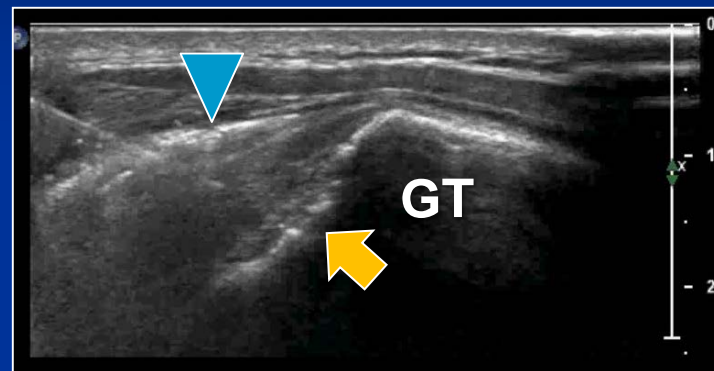


3 mL of PRP

US-Guided Therapy: PRP for Supraspinatus Tendinopathy



Coronal T2w-Fat Sat



Evidence on PRP for the Shoulder

➤ Barile A. *et al.*

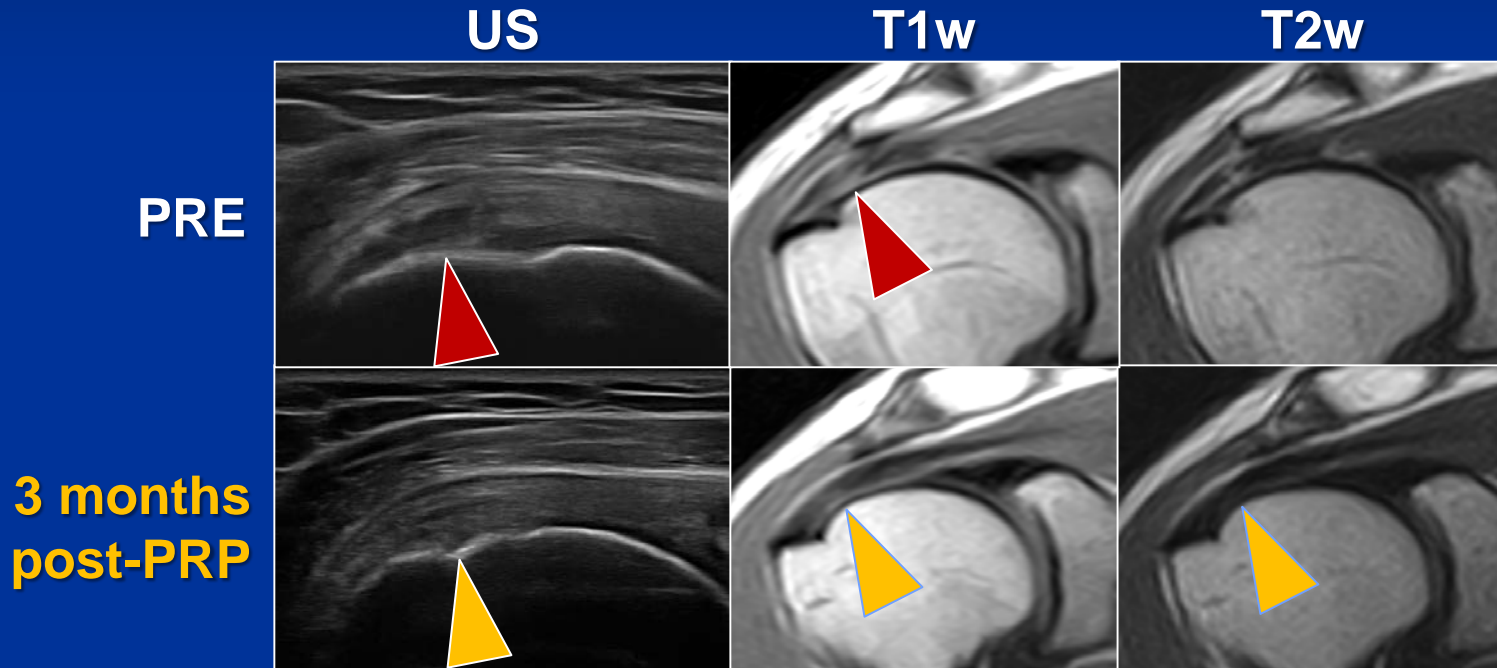
- RSNA 2011 Scientific Presentation; SSA13-06
- Sunday Nov. 27th
- Prospective Study
- 35 subjects: **Supraspinatus Tendinosis**
- MRI and US Day 0 and Day 90
- Pain scores (75%) and Function (56%)
- Morphologic changes (85%)



Celebrate the Image

PRP for Supraspinatus Tendinopathy

Imaging Evidence of Healing



Courtesy of Dr. Antonio Barile



Summary

- Several injection approaches for shoulder arthrography
 - Fluoro vs. Ultrasound
- US is well-suited for therapeutic procedures
 - Calcific tendinitis lavage of the rotator cuff
 - Platelet-rich plasma therapy for tendinopathy



References

1. del Cura JL, Torre I, Zabala R, Legorburu A. Sonographically guided percutaneous needle lavage in calcific tendinitis of the shoulder: Short and long-term results. *AJR* 2007;189:W128-134.
2. Aina R, Cardinal E, Bureau NJ, Aubin B, Brassard P. Calcific shoulder tendinitis: Treatment with modified US-guided fine-needle technique. *Radiology* 2001;221:455-461.
3. Serafini G, Sconfienza L, Lacelli F, Silvestri E, Aliprandi A, Sardanelli F. Rotator cuff calcific tendinitis: Short-term and 10-year outcomes after two-needle US-guided percutaneous treatment – Nonrandomized controlled trial. *Radiology* 2009;252:157-164.
4. Lee KS, Rosas HR. MSK US:how to treat calcific tendinitis of the rotator cuff by ultrasound-guided single needle lavage technique. *AJR* 2010;195:638
5. Depelteau H, Bureau NJ, Cardinal E, Aubin B, Brassard P. Arthrography of the Shoulder: A simple fluoroscopically guided approach for targeting the rotator cuff interval. *AJR* 2004;182:329.
6. Redondo MV et al. MR Arthrography of the shoulder using an anterior approach: Optimal injection site. *AJR* 2008;191:1397.
7. Lee KS, Wilson JJ, Rabago DP, Baer GS, Jacobson JA, Borrero CG. Musculoskeletal Applications of Platelet-rich Plasma: Fad or Future? *AJR* 2011;196:1-9
8. Peerbooms JC, Sluimer J, Bruijn DJ, Gosens T. Positive effect of an autologous platelet concentrate in lateral epicondylitis in a double-blind randomized controlled trial: platelet-rich plasma versus corticosteroid injection with a 1-year follow-up. *Am J Sports Med* 2010;38:255-262
9. de Vos RJ, Weir A, van Schie HT, et al. Platelet-rich plasma injection for chronic Achilles tendinopathy: a randomized controlled trial. *JAMA* 2010;303:144-149
10. Bathia N, Malanga G. Ultrasound guided aspiration and corticosteroid injection in the management of a paralabral ganglion cyst. *AAPMR* 2009; 1:1041.

