Musculoskeletal Ultrasound

Logistics, Economics and a Case based review

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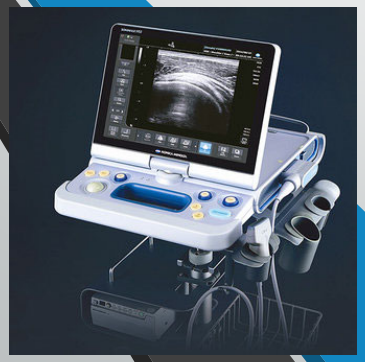
Diagnostic and Therapeutic

"The Dual role of Ultrasound"

- Diagnostic: Assess tendons, muscles, ligaments for mechanical failure or inflammation. Evaluate masses, fluid collection
  - Conduct dynamic testing
- Interventional: Guidance of injections into joints/ tendons

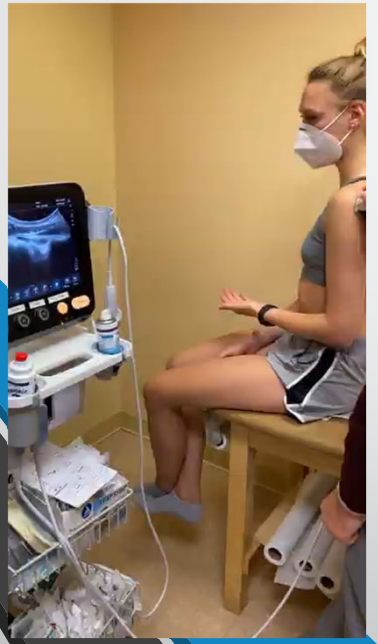
Ultrasound Vs. MRI: Clinical Differences

Ultrasound	MRI
Dynamic evaluation of anatomy	Static representation of anatomy
No contraindications	Can not undergo with a cardiac pacemaker or certain metal implants
In office by your trusted provider	Unknown or new provider
$	$$$$



Diagnostic

- Interactive dynamic tour of the patients pathology and anatomy



Reimbursement Information for Diagnostic Ultrasound

- Must meet all Medicare/ Insurance requirements for documentation and storage of images
- Diagnostic Ultrasound in particular requires a complete report

Musculoskeletal Ultrasound and Procedural CPT Codes and Descriptions

CPT Code	Description	Private Office	Professional Component	Technical Component
76881	Ultrasound, extremity, nonvascular, real time with image documentation; Complete		$33.44	$35.26
76882	Limited ultrasound, nonvascular, real time image documentation		$25.45	$41.09
76942	Ultrasonic guidance for needle placement (e.g., biopsy, aspiration, injection, localization device), imaging supervision and interpretation		$33.40	$34.01

A separate written record of the ultrasound procedure

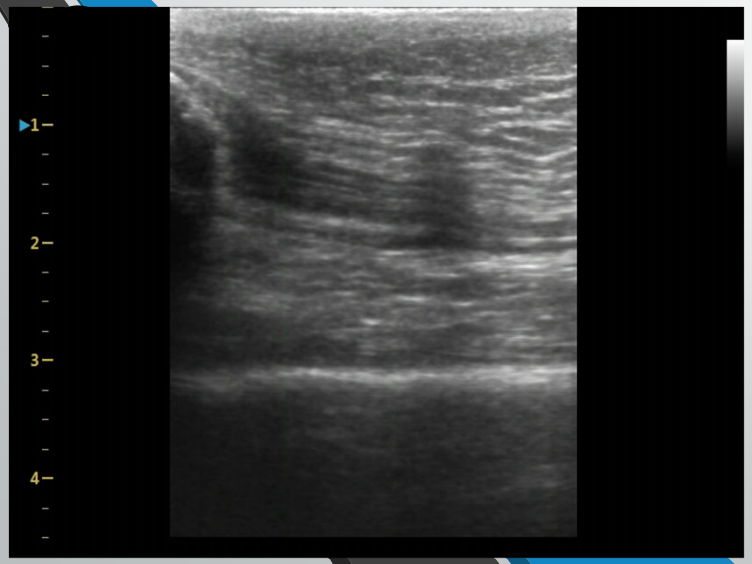
- Description of the structures or organs examined
- US findings
- Reason for the ultrasound procedure(s).

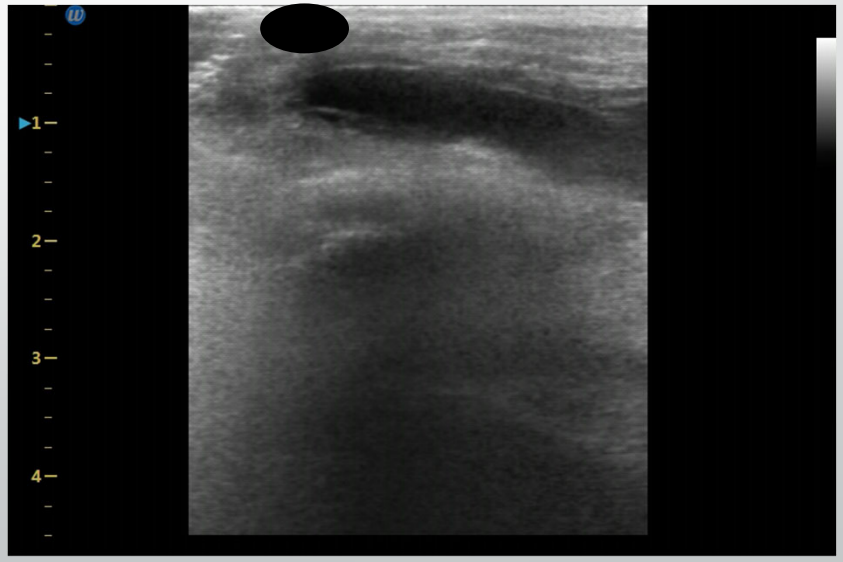
Images

- labeled with patient identification
- Facility identification
- Examination date
- The anatomical site imaged
- Transducer orientation

Quadriceps Tendon Tear – Dynamic Assessment

60 y/o male tripped stepping over a curb.
Comes into clinic with a knee immobilizer from the ED. Can't participate in a straight leg raise.





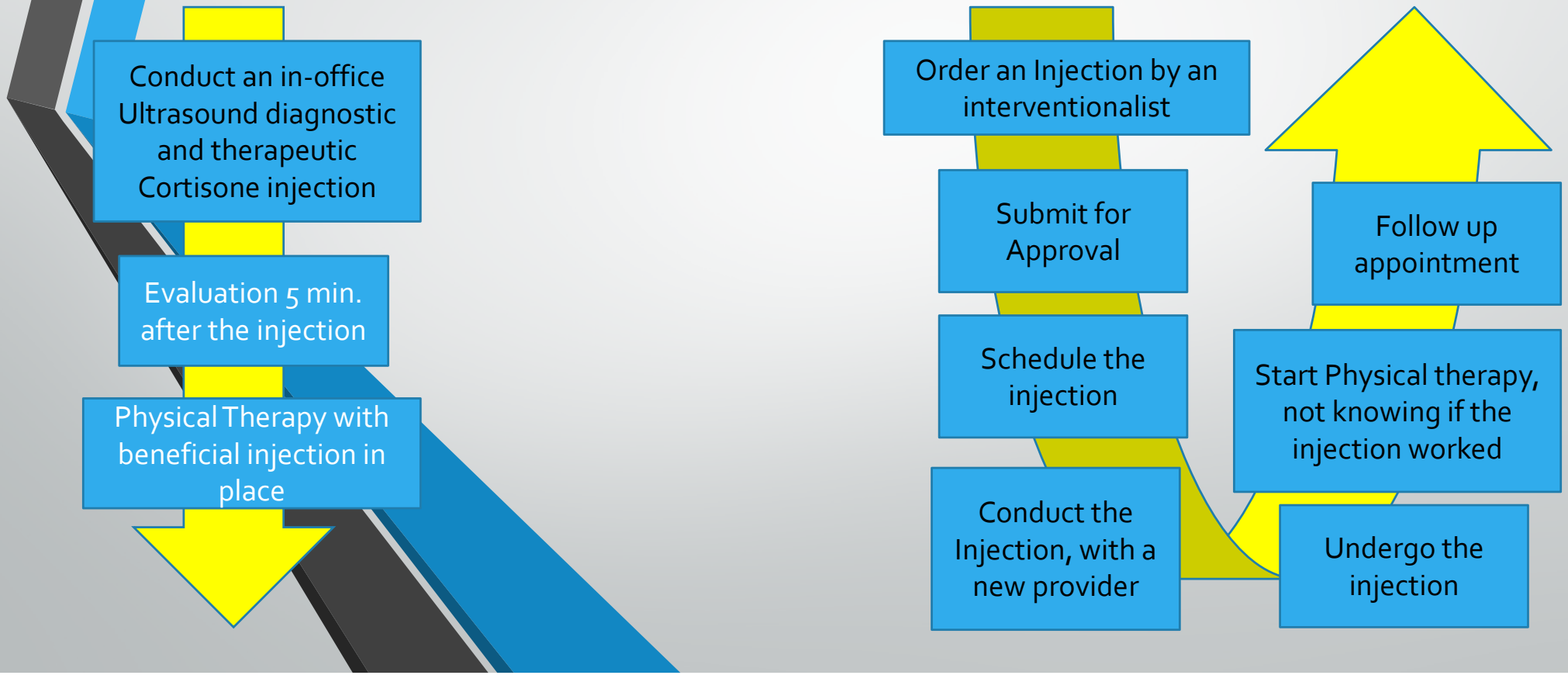
Dynamic Assessment – Anterior Shoulder

35 y/o male with anterior shoulder pain reproduceable with shoulder rotation. Pain pattern typical of a subluxing long head of the biceps.

Interventional Ultrasou

Optional Tracks for the care of your patient

Suspect a labral tear of the Hip



Interventional Ultrasound Billing

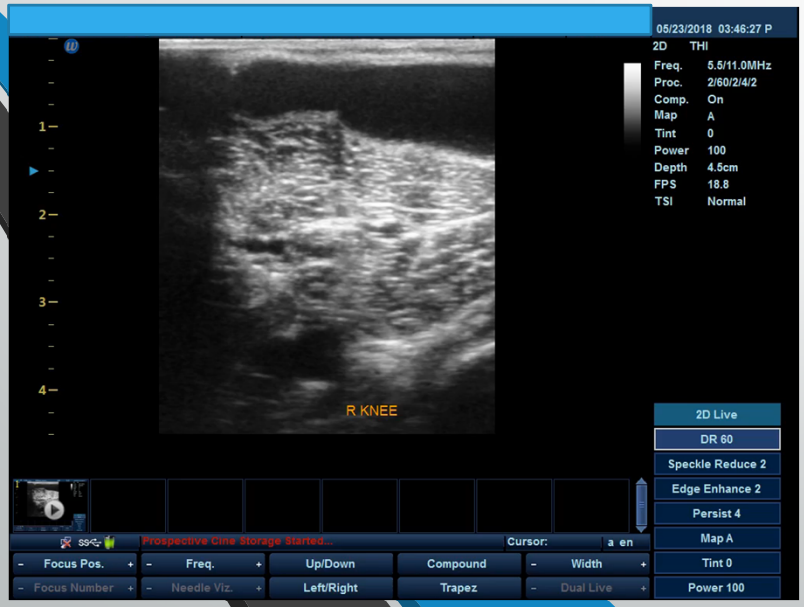
Procedures that include ultrasound guidance (do not report with 76942)
New codes for joint aspiration and/or injection have been created to include ultrasound guidance. The existing codes were revised to state "not using ultrasound guidance".

CPT CODE	Description	Private Office	Professional Payment	Technical Payment
10005	Fine needle aspiration biopsy; including ultrasound guidance; first lesion	$161.20	N/A	N/A
10006	Fine needle aspiration biopsy; including ultrasound guidance; each additional lesion (list separately in addition to code for primary procedure, e.g., CPT code 10005)	$67.53	N/A	N/A
20604	Arthrocentesis, aspiration and/or injection, small joint or bursa (e.g., fingers, toes); with ultrasound guidance	$95.17	N/A	N/A
20606	Arthrocentesis, aspiration and/ or injection, intermediate joint or bursa (e.g., temporomandibular, acromioclavicular, wrist, elbow or ankle, olecranon bursa); with ultrasound guidance	$103.20	N/A	N/A
20611	Arthrocentesis, aspiration and/or injection, major joint or bursa (e.g., shoulder, hip, knee, subacromial bursa); with ultrasound guidance	$115.20	N/A	N/A

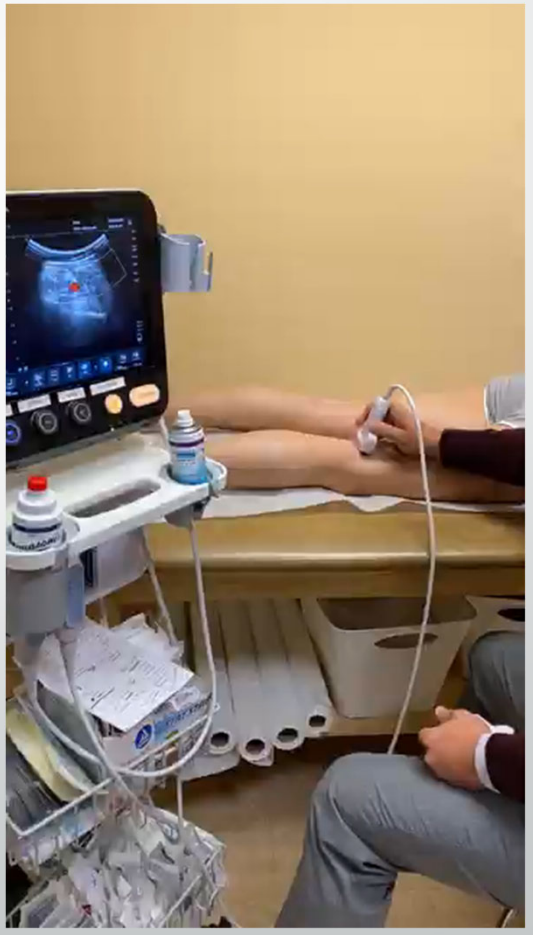
Expansion of Practice

- Move from simple and common injections to more complex interventions
- Keeping more “in-house”
- Increased confidence of the clinician
- Increased clinician retention and recruitment

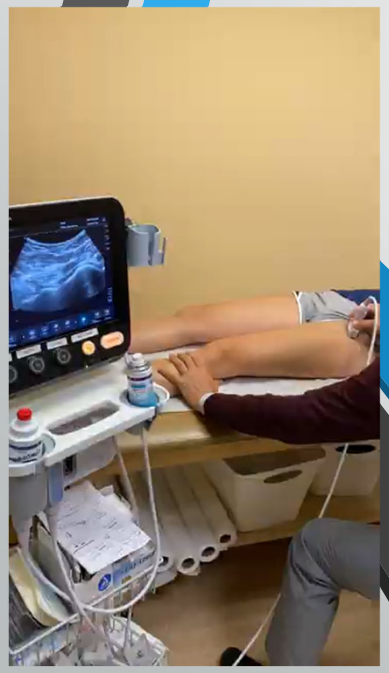
Ability to Participate in More Complex Procedures Once Reserved for the Fluoroscopist or Interventionalist

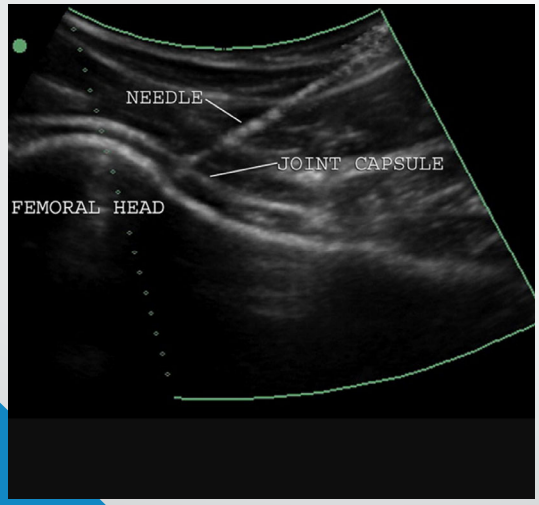


Baker's Cyst Aspiration



Ability to Expand Your Treatment Level to Other Joints





Its All About Accuracy

Existing Evidence on Ultrasound-Guided Injections in Sports Medicine

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Investigation performed at Penn State Hershey Medical Center, Hershey, Pennsylvania, USA

Office-based ultrasonography has become increasingly available in many settings, and its use to guide joint and soft tissue injections has increased. Numerous studies have been conducted to evaluate the use of ultrasound-guided injections over traditional landmark-guided injections, with a rapid growth in the literature over the past few years. A comprehensive review of the literature was conducted to demonstrate increased accuracy of ultrasound-guided injections regardless of anatomic location. In the upper extremity, ultrasound-guided injections have been shown to provide superior benefit to landmark-guided injections at the glenohumeral joint, the subacromial space, the biceps tendon sheath, and the joints of the hand and wrist. Ultrasound-guided injections of the acromioclavicular and the elbow joints have not been shown to be more efficacious. In the lower extremity, ultrasound-guided injections at the knee, ankle, and foot have superior efficacy to landmark-guided injections. Conclusive evidence is not available regarding improved efficacy of ultrasound-guided injections of the hip, although landmark-guided injection is performed less commonly at the hip joint. Ultrasound-guided injections are overall more accurate than landmark-guided injections. While current studies indicate that ultrasound guidance improves efficacy and cost-effectiveness of many injections, these studies are limited and more research is needed.

Keywords: musculoskeletal ultrasonography; ultrasound-guided injection; joint injection; osteoarthritis; tendinopathy; sports medicine

Since 1957, ultrasonography has been used to evaluate the musculoskeletal system. The first report of musculoskeletal ultrasonography was published by Dussik et al,[14] who measured the acoustic attenuation of articular and periarticular tissues. Since that time, the use of musculoskeletal ultrasonography has increased substantially. Ultrasonography is a useful tool because it is a repeatable, noninvasive imaging modality that is capable of providing real-time dynamic tissue assessment.[30] The term *sports ultrasound* was introduced in 2015 by the American Medical Society of Sports Medicine (AMSSM) and includes the diagnosis and treatment of both musculoskeletal and nonmusculoskeletal conditions applicable to the field of sports medicine.[16] Ultrasonography has become more widely used in sports medicine during procedures to assist with needle guidance and to visualize surrounding anatomic structures, thereby minimizing risk of injury to adjacent structures.[17] In this article, we review the existing evidence on ultrasound-guided injections in sports medicine.

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UPPER EXTREMITY INJECTIONS

Conflicting studies have been published regarding the effectiveness of ultrasound-guided injections at the shoulder. A Cochrane Review published in 2012 stated there was not enough evidence to recommend ultrasound-guided injections over landmark-guided injections at the shoulder.[6] A 2015 meta-analysis, however, showed that ultrasound-guided glenohumeral and biceps tendon injections were not only more accurate but also more efficacious in providing relief.[2] Evidence on ultrasound-guided injection of other upper extremity joints is based on smaller studies. Current evidence is reviewed here and summa-

TABLE 1
Summary of Upper Extremity Studies[a]

Anatomic Feature Studied	Author	Type of Study	Sample Size	Accuracy, % USGI	Accuracy, % LMGI	Efficacy	Level of Evidence
Glenohumeral joint	Patel et al[29]	RCT	80	92.5	72.5	—	2
	Lee et al[24]	RCT	43	—	—	USGIs were more efficacious than LMGIs.	2
Acromioclavicular joint	Peck et al[31]	RCT	20	100	40	—	2
	Rho et al[36]	Cohort	24	—	16.7	—	4
	Sabeti-Aschraf et al[37]	RCT	120	95	72	—	2
	Sabeti-Aschraf et al[38]	RCT	20	—	—	No difference in efficacy was found between USGIs and LMGIs.	2
	Borbas et al[7]	RCT	80	90	70	—	2
	Aly et al[2]	SR	220	93.6	68.2	—	2
Subacromial space	Ucuncu et al[46]	RCT	60	—	—	USGIs were more efficacious than LMGIs.	2
	Chen et al[8]	RCT	40	—	—	USGIs were more efficacious than LMGIs.	2
Biceps tendon	Zhang et al[54]	RCT	98	—	—	USGIs were more efficacious than LMGIs.	2
	Hashiuchi et al[20]	RCT	30	86.7	26.7	—	1
Elbow joint	Lopes et al[26]	Cohort	31	—	100	—	1
	Cunnington et al[9]	RCT	22	91	64	—	1
Hand and wrist joints	Smith et al[43]	Cohort	10	100	—	—	2
	Smith et al[42]	RCT	20	100	80	—	2
	Umphrey et al[47]	Cohort	17	94	—	—	2
	Pollard et al[32]	Cohort	10	100	81.8	—	2
	Goncalves et al[18]	CS	27	—	—	USGIs were efficacious.	4
	Raza et al[34]	RCT	53	96	59	—	3

Patient Satisfaction

- Patient's tend to feel more confident with the procedure if a visual modality is used.
  - Fluoroscopy vs. Ultrasound
- The patient is an active participant in the procedure
- More efficient of an injection
  - No "hunting" for the proper spot to inject
- More willing to take part in more expensive procedures
- You and they gain invaluable knowledge concerning patient diagnosis

Drawbacks of Musculoskeletal Ultrasound

- May slow or alter the clinic flow
- Cost of the US unit/ disposables
- Training of staff

How Ultrasound changed my practice
A case based approch

Diagnosis

- Patient is a 57 y/o female with insideus onset of right shoulder pain. Patient has attended 2 PT sessions
- Subjective
  - Pain with overhead activity
  - Pain at the region of the lateral deltoid, not beyond the elbow
- Objective
  - Pain with empty can testing
  - No weakness with empty can testing, mild weakness with resisted external rotation

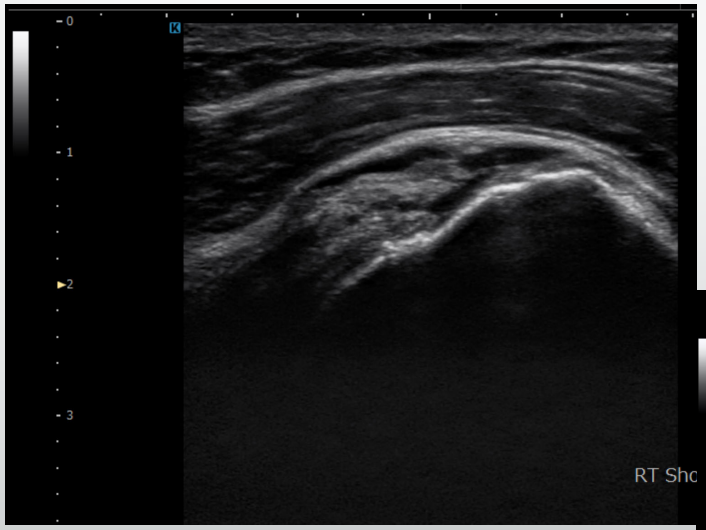
Differential diagnosis

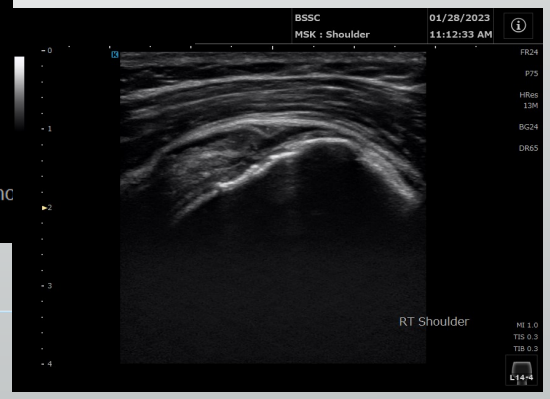
- Differential diagnosis
  - Rotator Cuff Impingement
  - Rotator cuff tear
  - Bicipital pathology
- Next step in the care of the patient?
  - MRI
  - Physical therapy
  - Injection therapy – Cortisone injection

Patient opted for a cortisone injection

Great opportunity to evaluate rotator cuff integrity

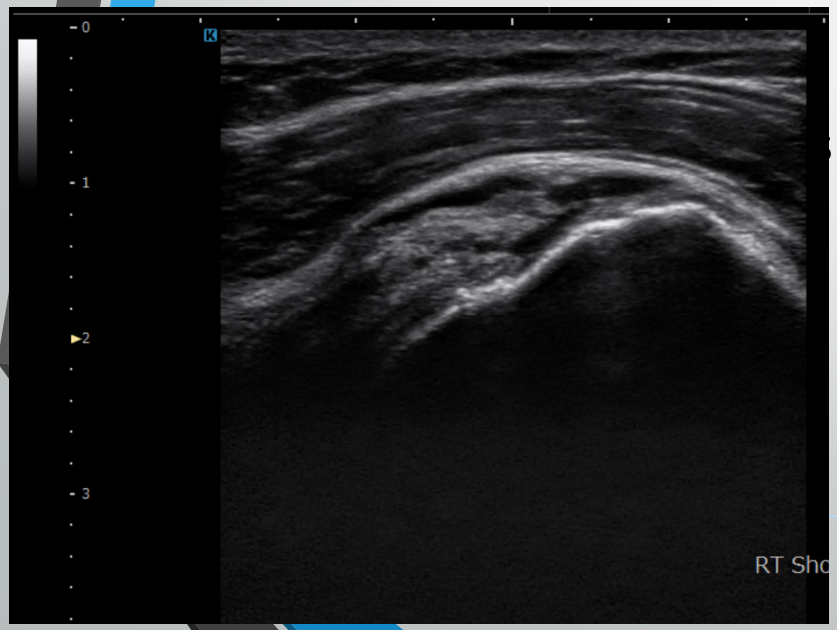
Evaluation of rotator cuff reveals a full thickness tear of the supraspinatus

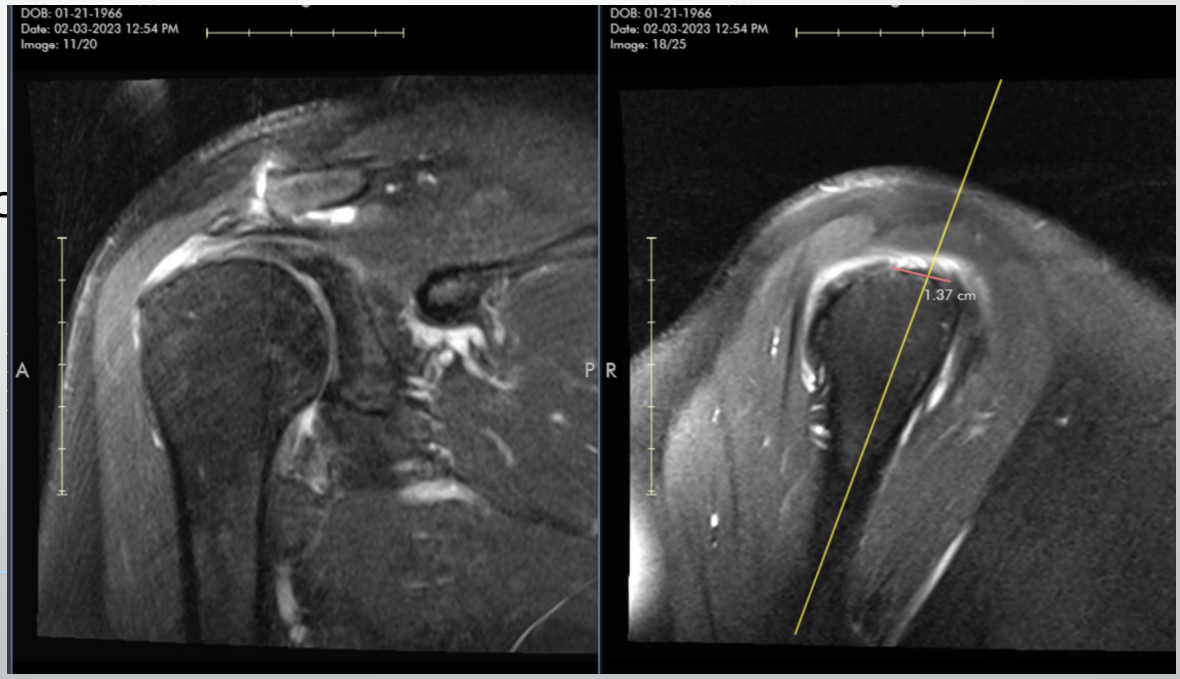




KONICA MINOLTA

Ultrasound demonstrates a full thickness tear of the supraspinatus





Arthroscopic Rotator Cuff Repair Surgery

Two Pathways

Initial Patient Evaluation

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Physical Therapy

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Corticosteroid Injection

↓

Physical Therapy

↓

MRI

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Surgery – Rotator Cuff Repair

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Successful Outcome

Initial Patient Evaluation

↓

Ultrasound

↓

MRI

↓

Surgery – Rotator Cuff Repair

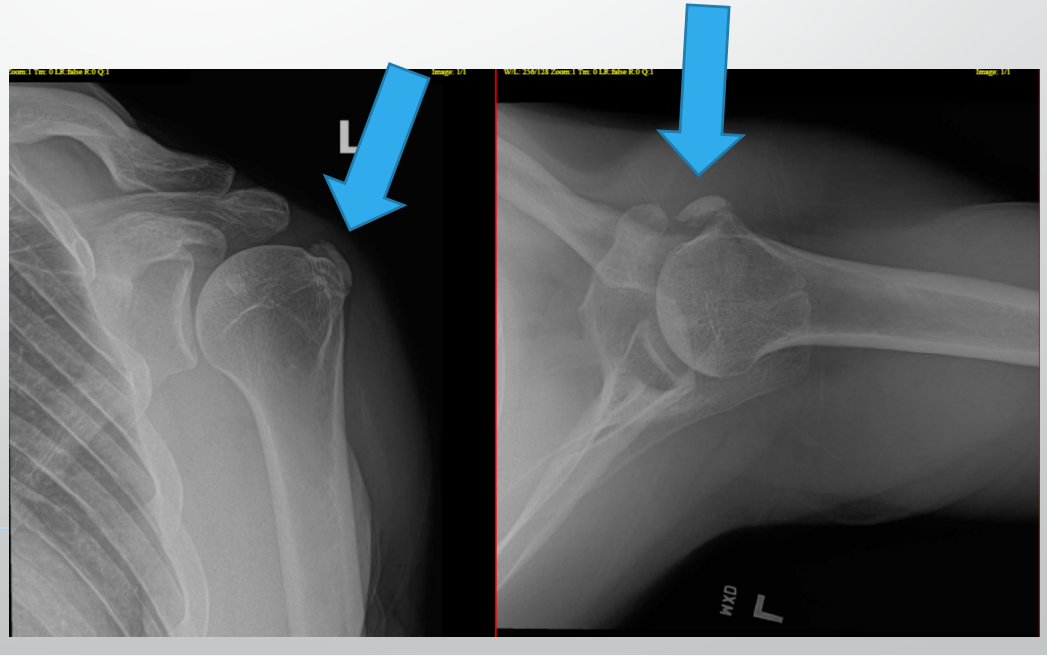
↓

Successful Outcome

46 y/o male with acute onset of non-traumatic lateral deltoid pain

Calcific Tendonitis

- Collection of calcium within a tendon
- Etiology
  - Degenerative
  - Ischemic
- Presentation
  - Severe disabling pain
  - F > M
  - Spontaneous onset

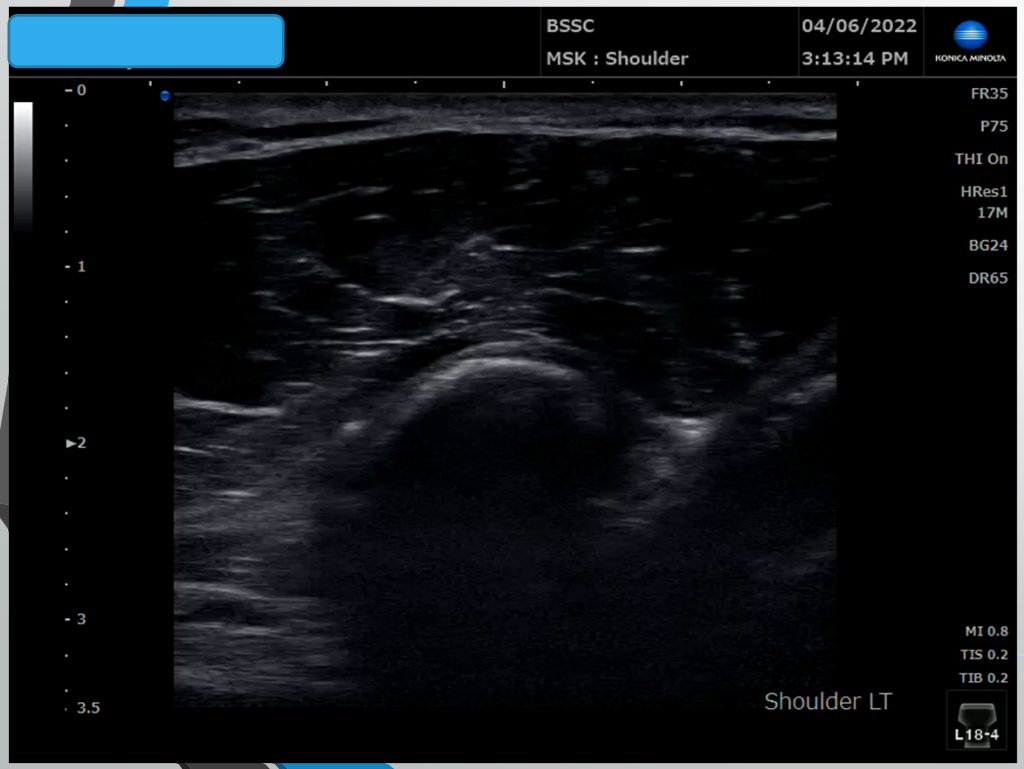


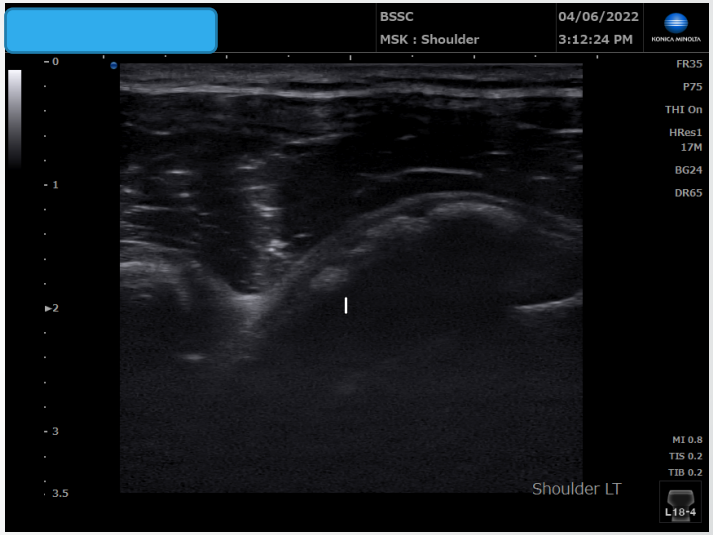
Options for treatment

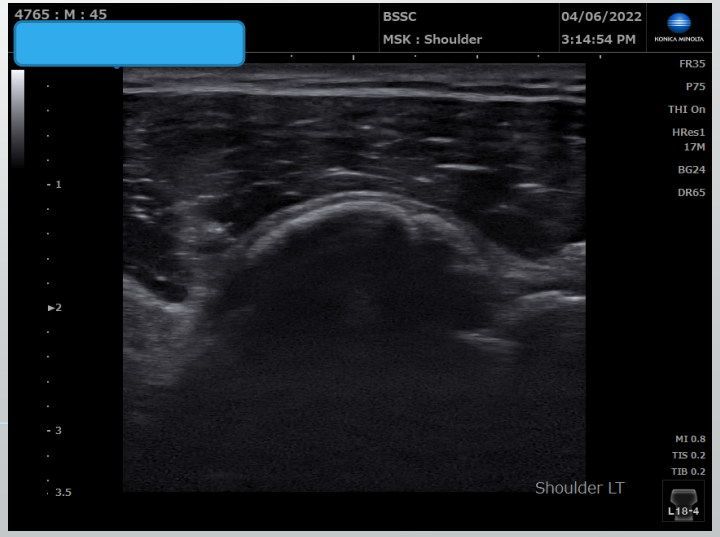
- Nothing
- MRI
- Refer to Interventionalist
- Cortisone injection
- Surgery
- Ultrasound guided Barbotage or lavage of calcium

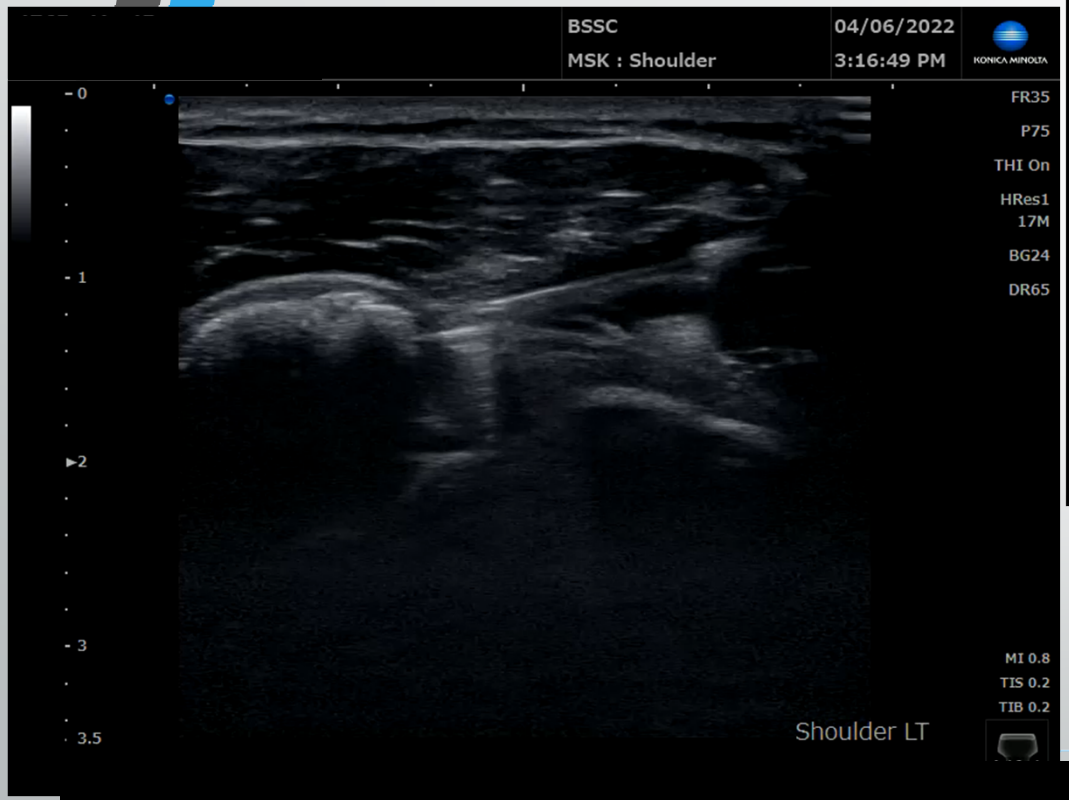
De Witte et al. described the differences observed between a group of patients treated with US-guided percutaneous needling and lavage and a group of patients treated with simple subacromial injection of corticosteroid; at one year after treatment the group of patients treated with needling showed better recovery of shoulder function (Constant score: 86/100) with respect to those treated with steroid injection; furthermore, complete resorption occurred more frequently in the patients treated with needling (13 out of 23 patients) than in those treated with corticosteroid injection (6 out of 25 patients). del Cura JL, Torre I, Zabala R, et al. Sonographically guided percutaneous needle lavage in calcific tendinitis of the shoulder: short- and long-term results. *AJR Am J Roentgenol.* 2007;189:W128–134.)

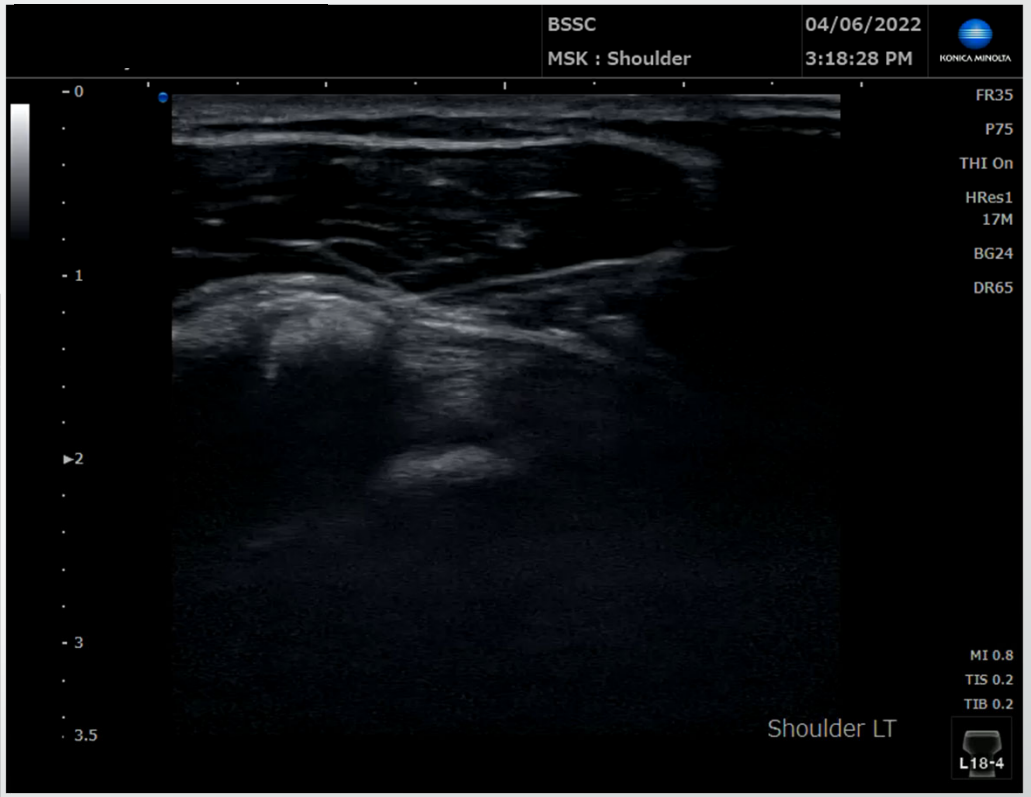
Initial Ultrasound assessment of calcium collection








BSSC
MSK : Shoulder
04/06/2022
3:16:49 PM
KONICA MINOLTA
FR35
P75
THI On
HRes1
17M
BG24
DR65
MI 0.8
TIS 0.2
TIB 0.2
Shoulder LT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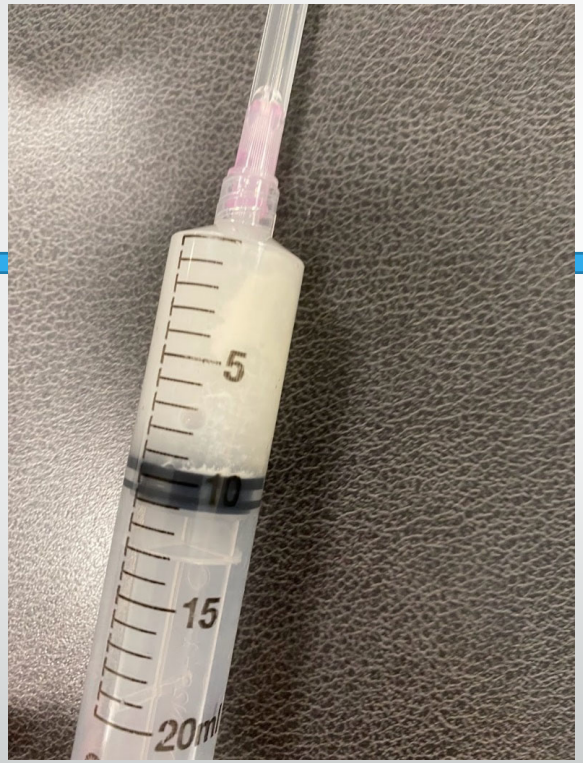
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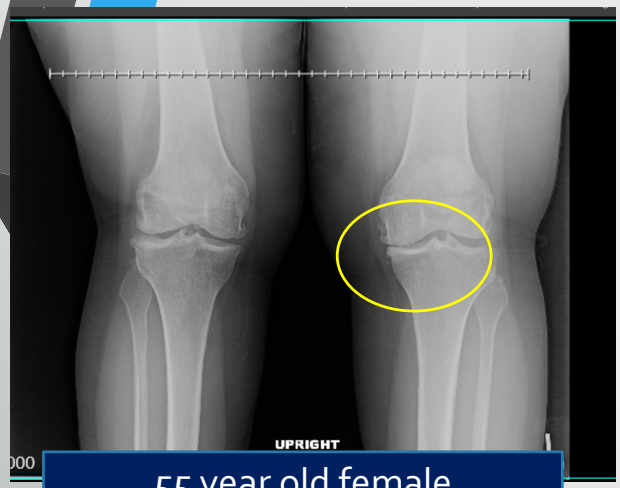
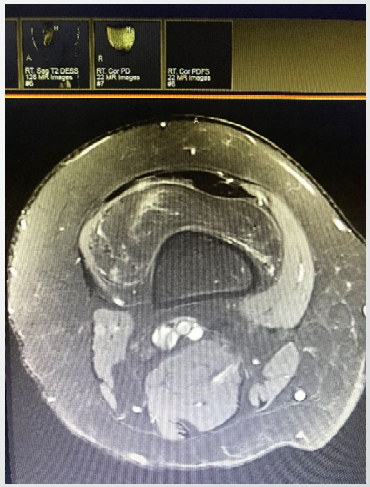
Knee Osteoarthritis



55 year old female

In-office ultrasound



MRI

Applications of MSK US

- Evaluation of a post-operative rotator cuff repair
- Is a mass cystic or solid?
- Assess positioning of an InSpace Balloon
- On and On….

Thank You

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