What does the shoulder examination tell you about treatment?

Suzanne L Miller MD
Boston Sports and Shoulder Center
April 30, 2018

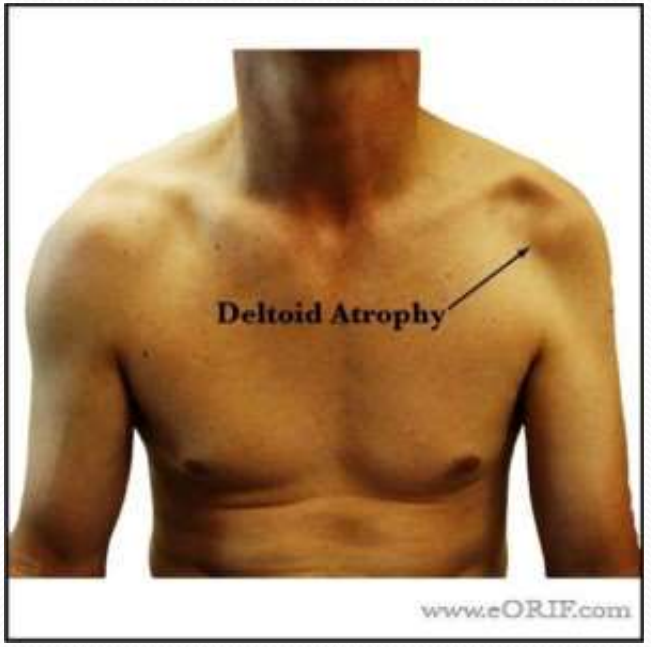
Work Related Injuries Workshop
April 30th & May 1st, 2018

Shoulder Physical Exam

- **Visual Inspection**
- Women should be in tank top/sports bra

  - Atrophy?
    - Nerve damage
    - Disuse
    - Tendon tear

Infraspinatus Atrophy

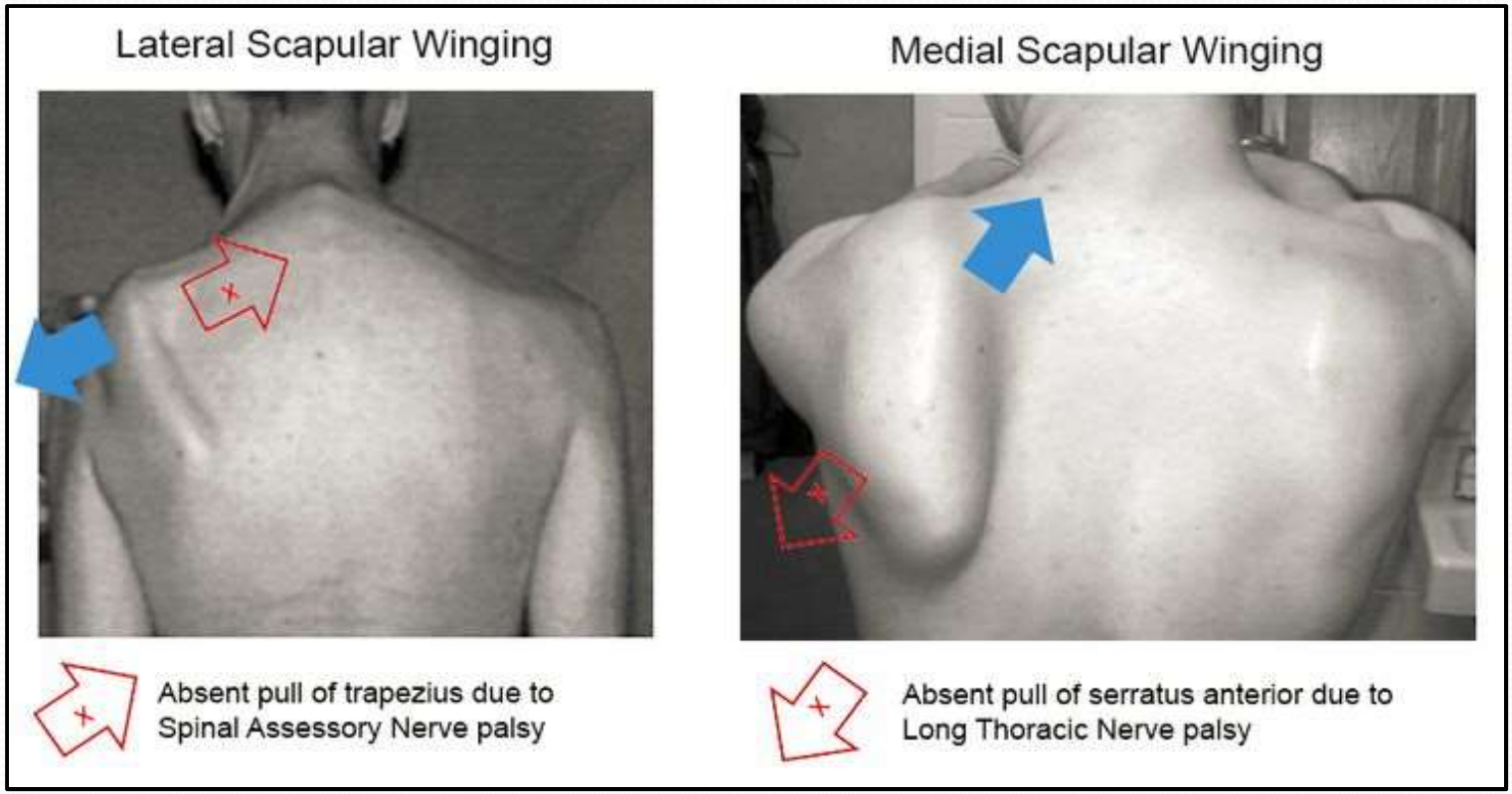


Shoulder Physical Exam

- Look for old scars ?
- Look for deformity?
  - AC joint
  - Pec Major tears

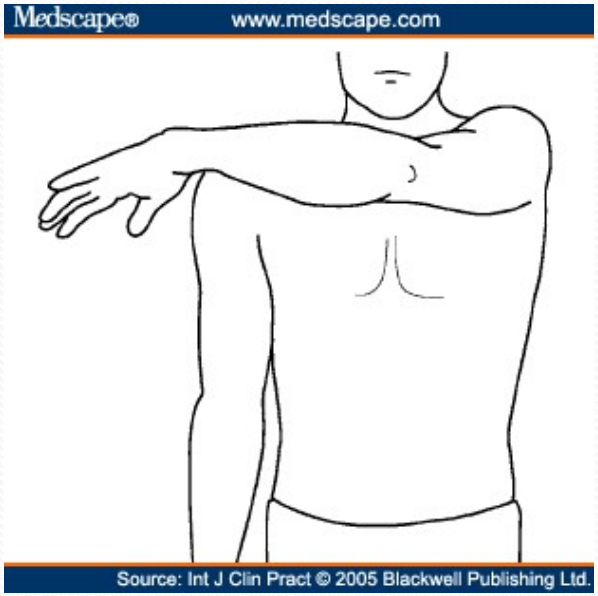
Shoulder Physical Exam

- Visual inspection for scapula winging?



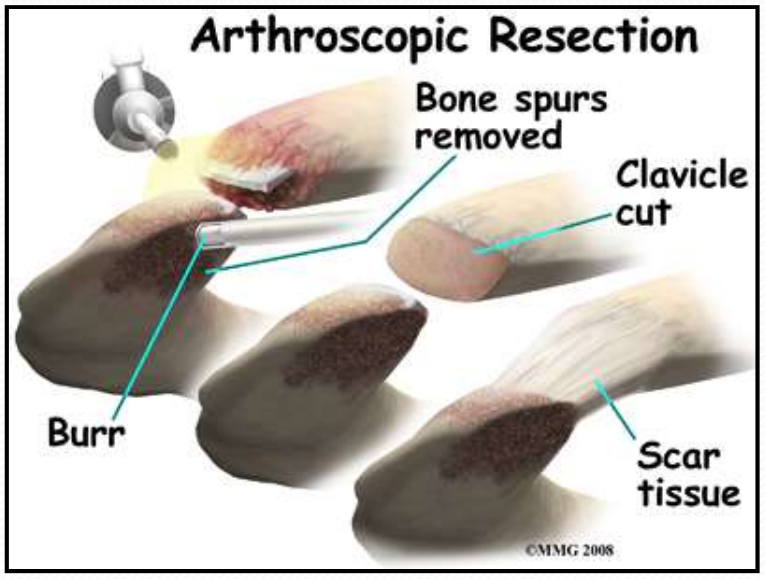
Shoulder Physical Exam

- Examine the **AC joint**
  - Palpation
  - Cross arm adduction
- Every MRI over age 40 will read AC joint arthritis
- Must see if clinically relevant
- Do not want to miss but don't over treat



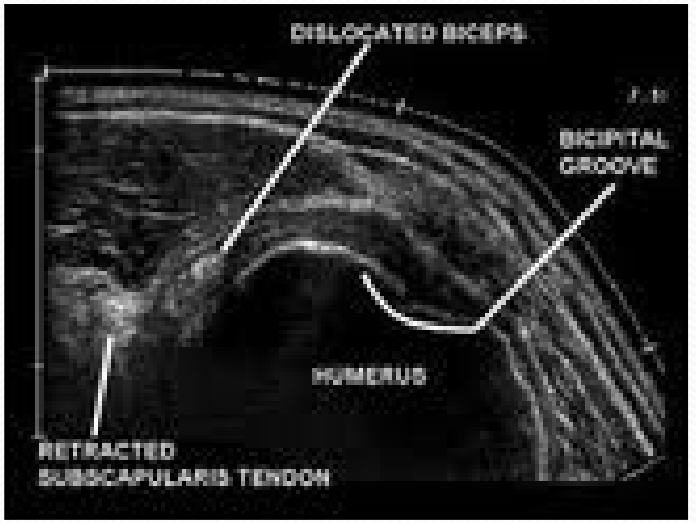
Shoulder Physical Exam

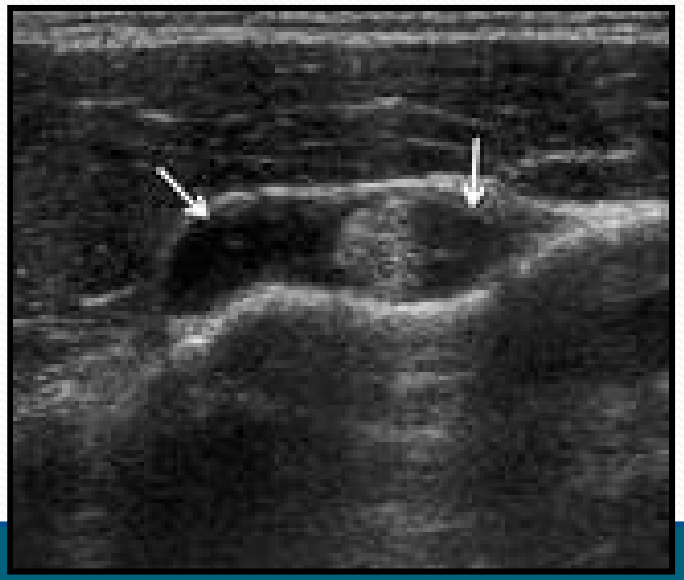
- If AC joint pain from OA
  - Injections
  - Surgery

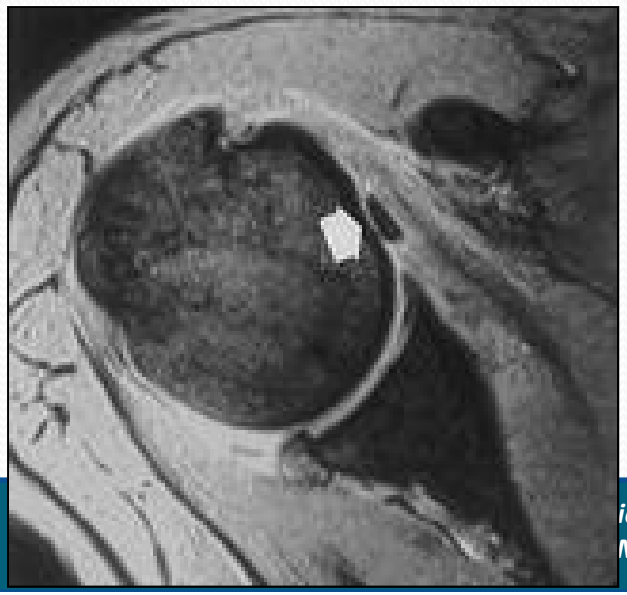


Shoulder Physical Exam

- Palpate biceps groove
- Can diagnose
  - Biceps tenosynovitis
  - Biceps tears
  - Biceps subluxation

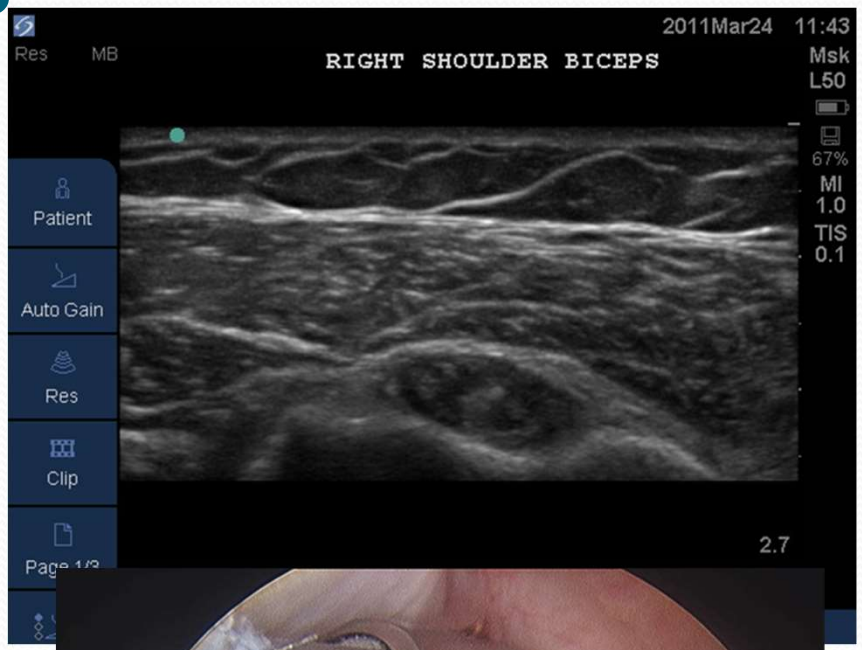






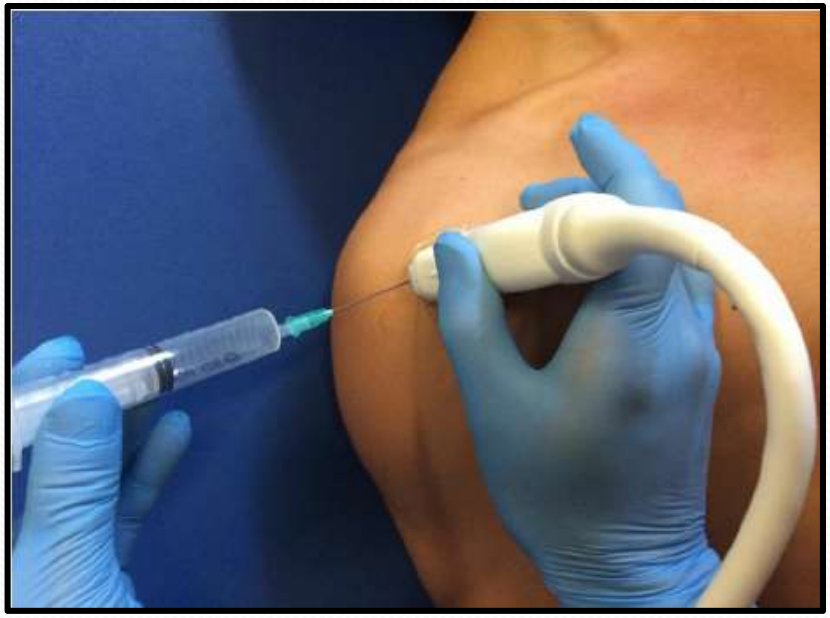
Long Head Biceps

- Significant partial tear



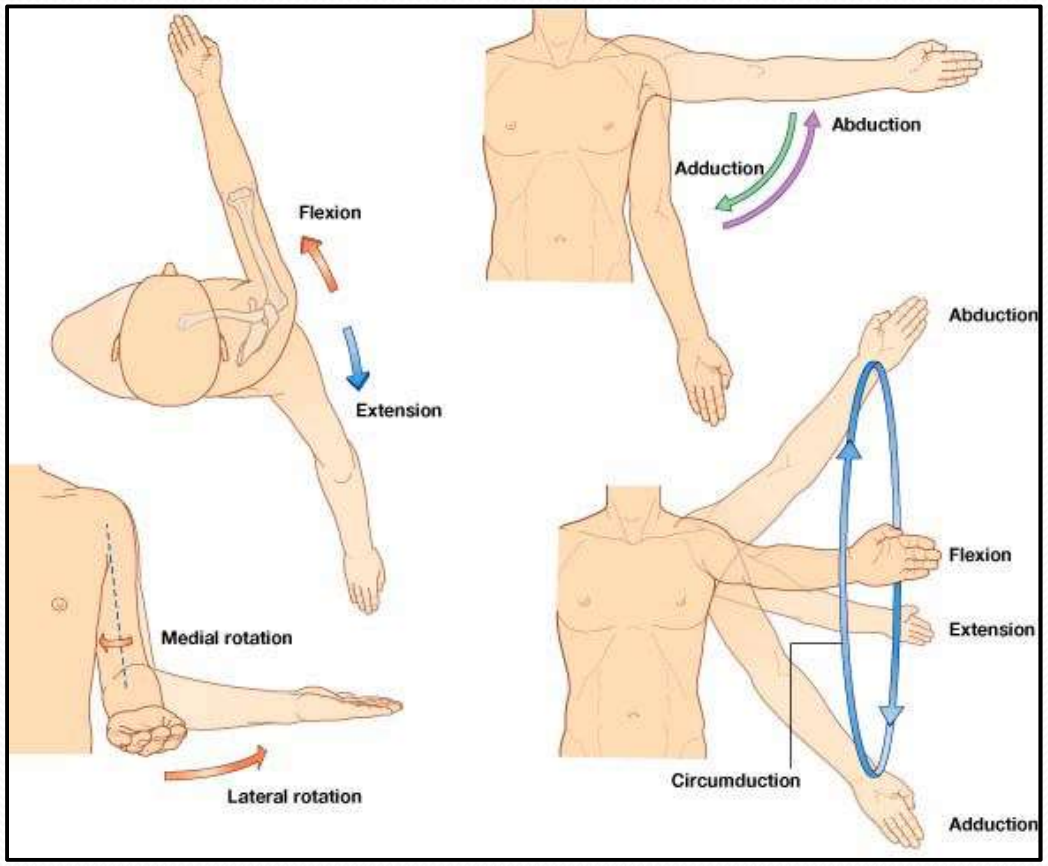
Shoulder Physical Exam

- Ultrasound Injections
- May consider surgery
  - Tenotomy
  - Tenodesis



Shoulder Physical Exam

- 1. ROM
- 2. ROM
- 3. ROM

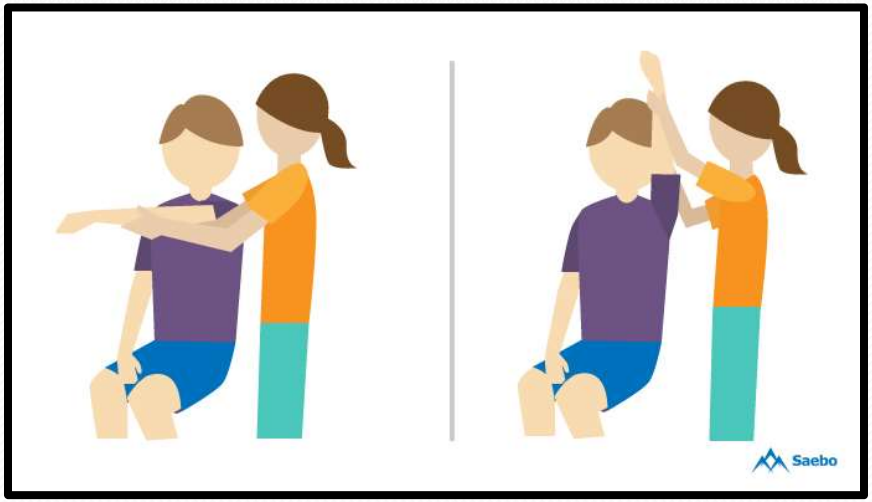


Shoulder Anatomy

- Greatest global motion of any joint
- Glenoid is 1/3 width humerus
- Relies on soft tissue stability
  - Labrum, ligaments, RC
- The shoulder hurts when it is stiff

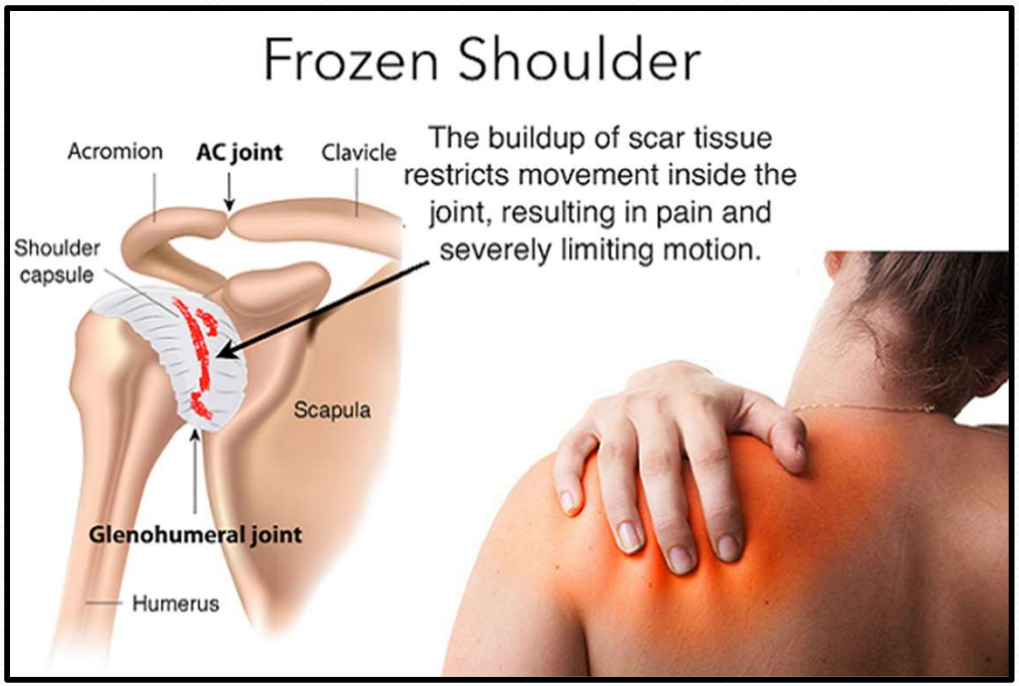
Shoulder Physical Exam

- Check ACTIVE and PASSIVE ROM !!
- **Active**- what the patient is willing to do
- **Passive**- what the provider can do
- If active = passive and stiff
  - Frozen shoulder
- If active >passive
  - Think rotator cuff tear



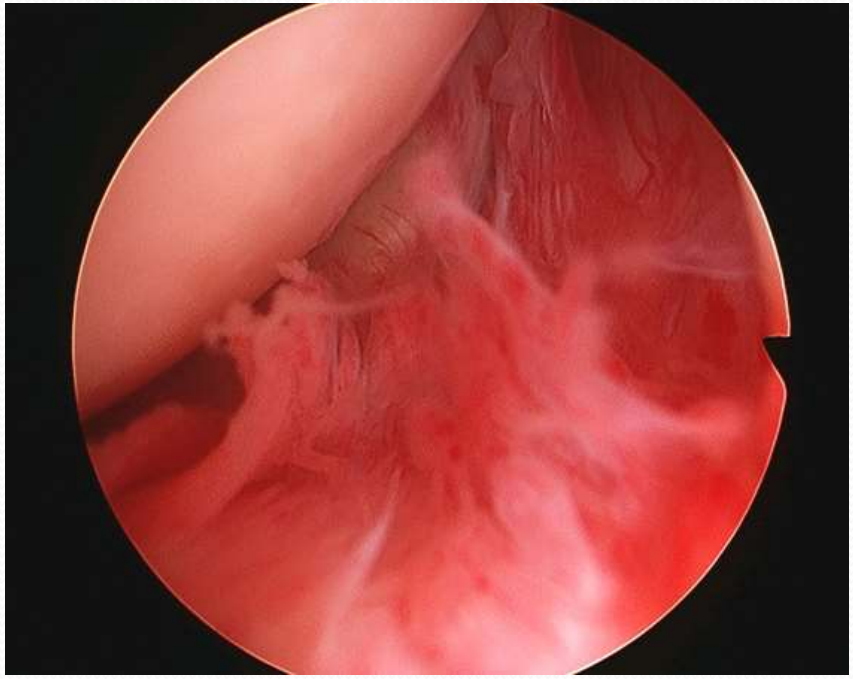
Shoulder Physical Exam

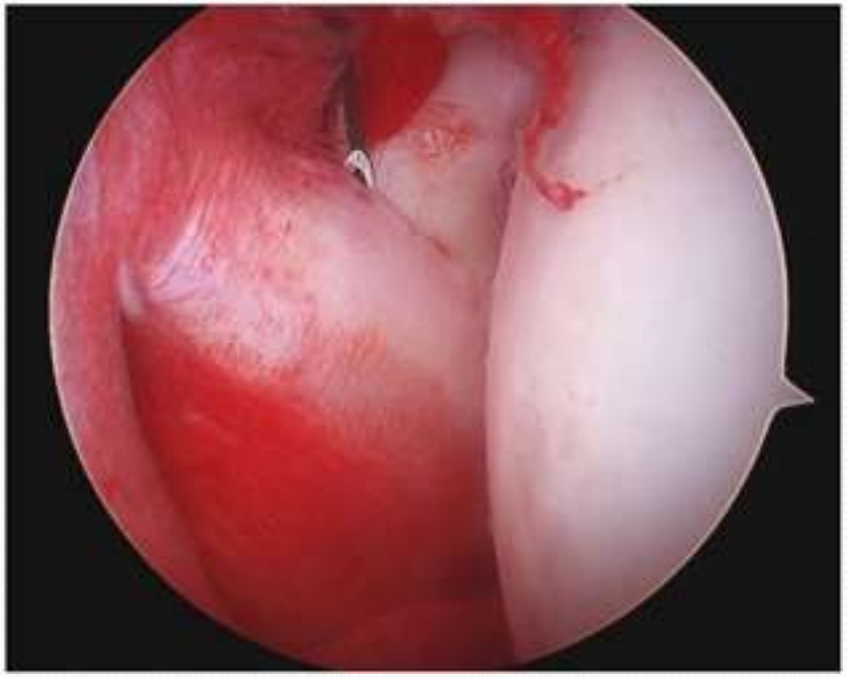
- Idiopathic
- Associated with-
  - Diabetes
  - Thyroid
  - Common middle age women
- Post Surgical
  - Post labral repair
  - Post rotator cuff repair



Shoulder Physical Exam

- Arthroscopic view
- Usually capsular inflammation





Shoulder Physical Exam

- MRI pathology is irrelevant if the shoulder is stiff !!!
  - Rotator cuff tears
  - Labral tears
  - Bicep tears

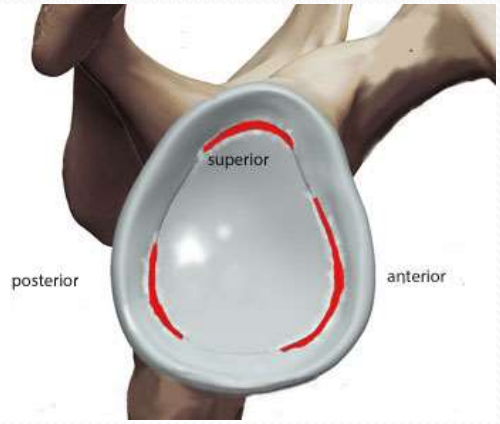
Findings:

- There is superior subluxation of the humeral head, with disruption of the supraspinatus and infraspinatus tendons; teres minor remains intact. There is prominent muscle atrophy of both teres minor and infraspinatus.
- There is near complete disruption of subscapularis.
- There is subluxation of the tendinopathic long head of biceps tendon.
- There is superior labral fraying; anterior labral tear with chondral loss in the anteroinferior glenoid.
- Moderate glenohumeral effusion, most of the fluid situated within the subscapular recess.

IMPRESSION: *Full thickness complete tears of supraspinatus and infraspinatus with as much as 3cm of medial retraction. The majority of subscapularis is also torn with long head of biceps tendon fraying. Chondral loss anteroinferior glenoid. Prominent atrophy of both teres minor and infraspinatus.*

Shoulder Physical Exam

- Usually No stiffness = No pain
- If still painful may need to treat underlying pathology
  - Rotator cuff
  - Calcium
  - Labral tears

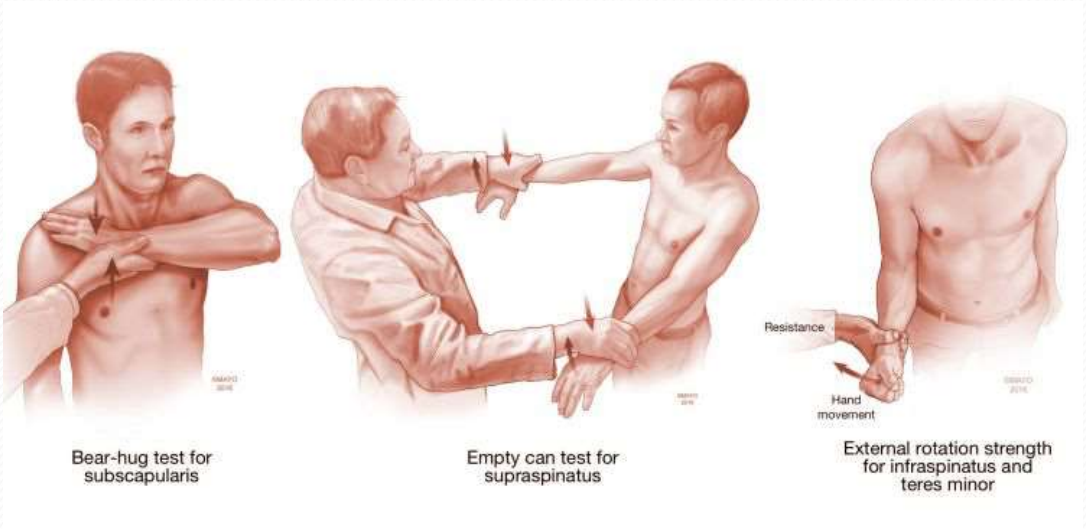


Shoulder Physical Exam

- Fix the stiff shoulder first !
  - Usually physical therapy
  - Injections
    - Intraarticular
      - fluoroscopic or US guided
  - Rarely surgery
    - Manipulation under anesthesia
    - Arthroscopic capsular release

Shoulder Physical Exam

- Strength (Grade 0-5)
  - Torn tendon or muscle?
    - Test each rotator cuff tendon/muscle
    - Can often tell if multiple or single tendon injury



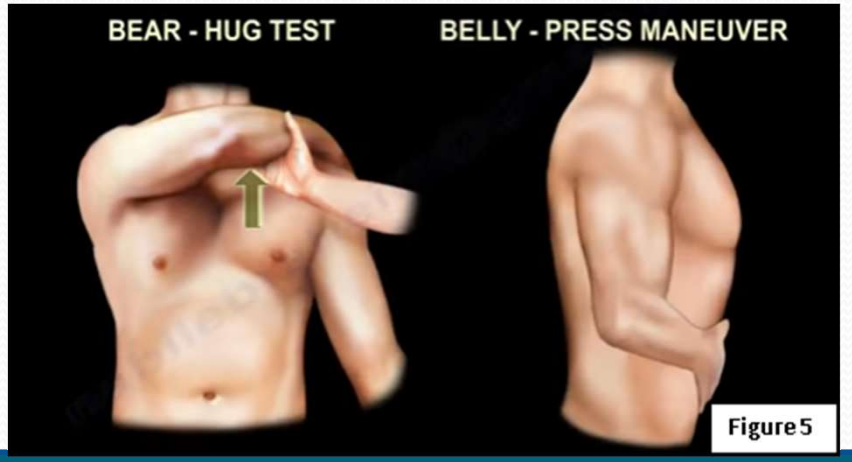
Bear-hug test for subscapularis

Empty can test for supraspinatus

External rotation strength for infraspinatus and teres minor

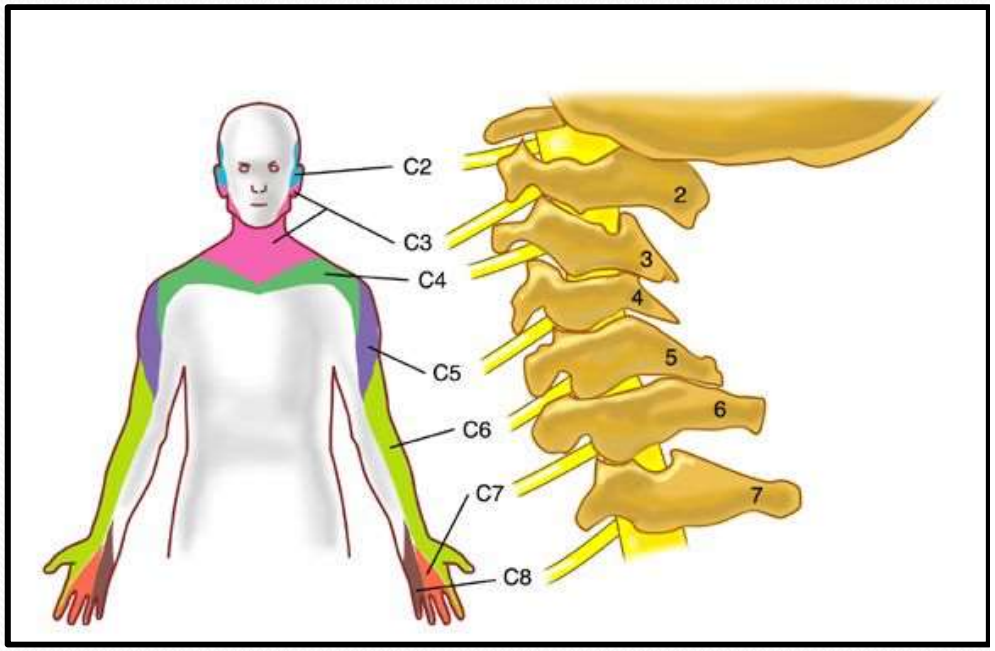
Shoulder Physical Exam

- Give way weakness in ER
  - Likely a bigger tear involving the supraspinatus and infraspinatus
  - Tear progression starts from supraspinatus
- Positive lift off or belly press test
  - Subscapularis involvement
- Consider getting earlier MRI
  - Especially if traumatic



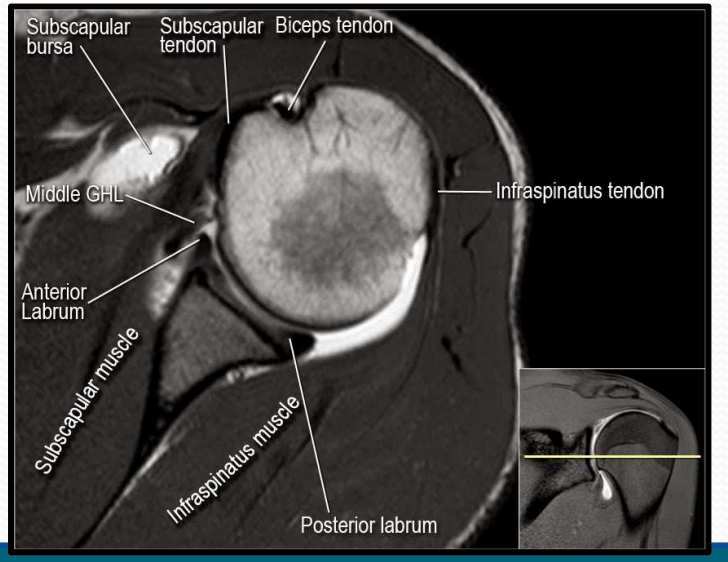
Shoulder Physical Exam

- Don't forget to examine the neck !
- Symptoms below the elbow are not from the shoulder
  - Numbness
  - weakness
- Neck problem can mask as a shoulder issue



Shoulder Physical exam

- Must examine the patient
- Don't treat the MRI !!!
- Common MRI findings over 40
  - AC arthritis
  - Partial RC tears
  - Labral tears
- Don't miss painful AC joint or bicep tendon



THANK YOU!!!

Work Related Injuries Workshop
April 30th & May 1st, 2018

Current Approaches to Rotator Cuff Surgeries:

When, What, How & How Much?

Xinning (Tiger) Li, M.D.
Associate Professor
Boston University School of Medicine
Boston Medical Center
Department of Orthopaedic Surgery

Work Related Injuries Workshop
April 30th & May 1st, 2018

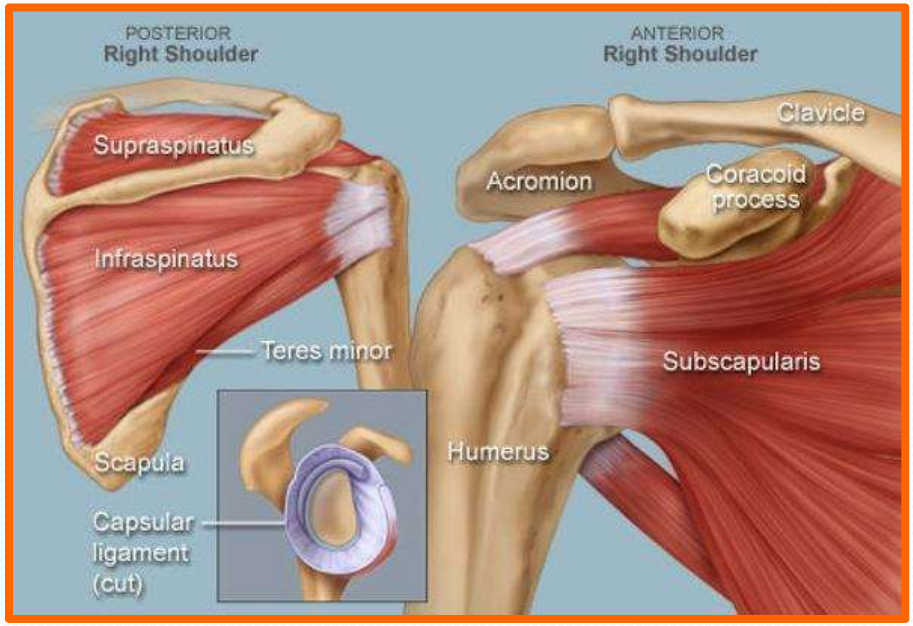
Disclosures

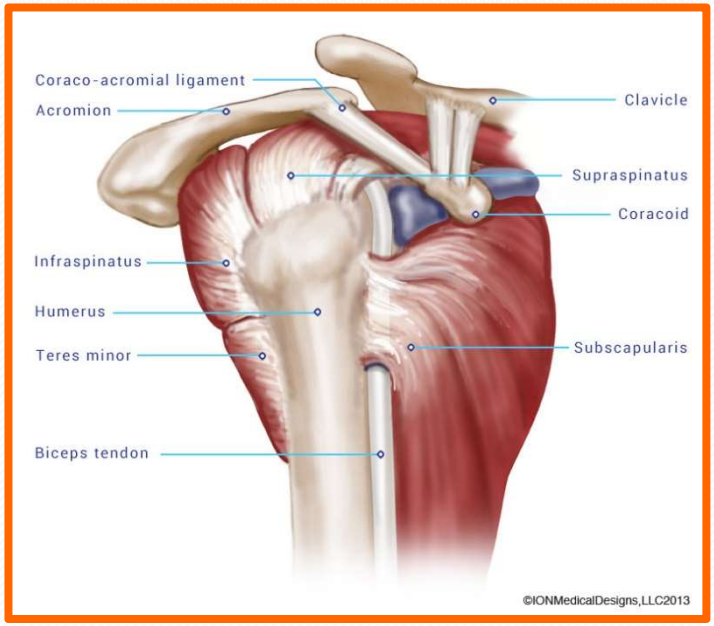
- **Scientific and Product Advisory Board**
  - DePuy Mitek Sports Medicine
- **Editorial Board Member**
  - American Journal of Sports Medicine
    - Electronic Media Board
  - Journal of Bone and Joint Surgery
    - CME Questions Board
  - Orthopedic Reviews
  - World Journal of Orthopaedic
  - Journal of Medical Insight (JOMI)
- **Equity**
  - Journal of Medical Insight (JOMI)
- Reviewer Panel
  - American Journal of Sports Medicine (AJSM)
  - Journal of Shoulder and Elbow Surgery (JSES)
  - OREF Grants Committee
  - Orthopedics
  - Journal of Orthopaedic Research (JOR)
  - Orthopedic Reviews
  - KSSTA
- AAOS Clinical Practice Committee
  - Rotator Cuff Management
- Research Funding
  - OREF

Outline

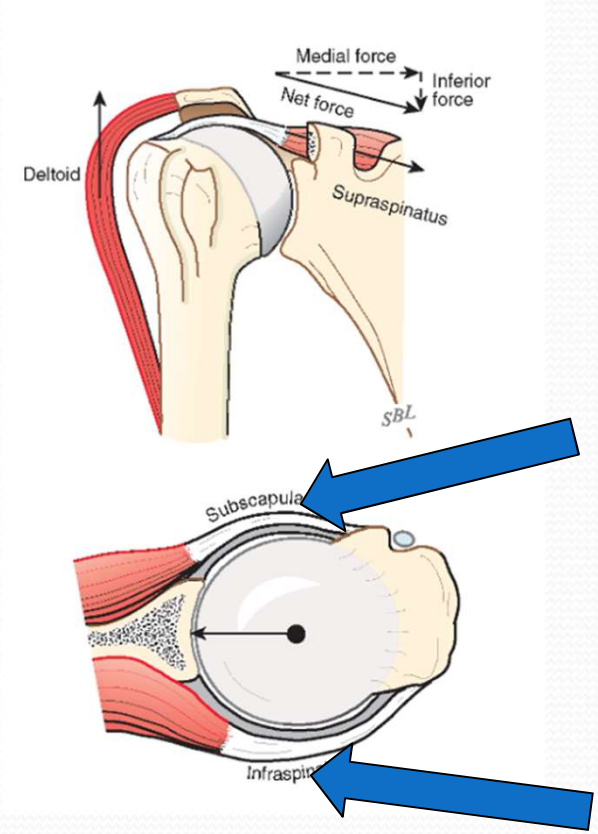
- Anatomy
- Conservative Management
- Surgical Indications
- Treatment Options

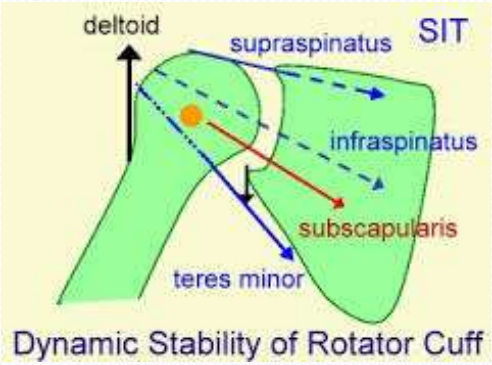
Anatomy

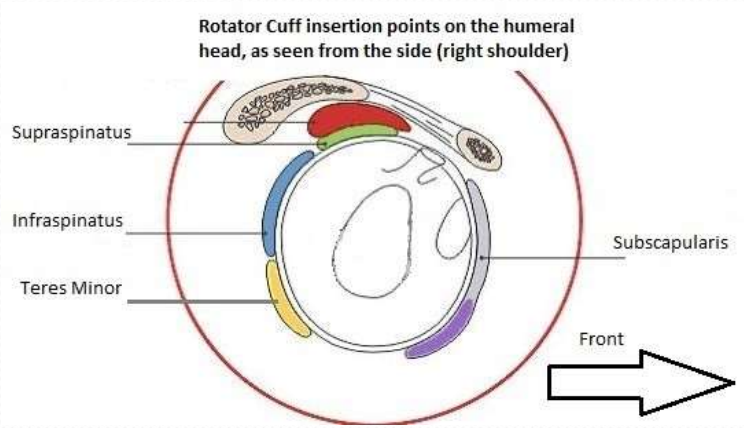

POSTERIOR
Right Shoulder
ANTERIOR
Right Shoulder
Supraspinatus
Infraspinatus
Teres minor
Scapula
Capsular ligament (cut)
Clavicle
Acromion
Coracoid process
Subscapularis
Humerus


Coraco-acromial ligament
Acromion
Clavicle
Supraspinatus
Coracoid
Infraspinatus
Humerus
Teres minor
Subscapularis
Biceps tendon
©IONMedicalDesigns,LLC2013

Mechanics
Cavity compression







Rotator Cuff Tears - Patterns

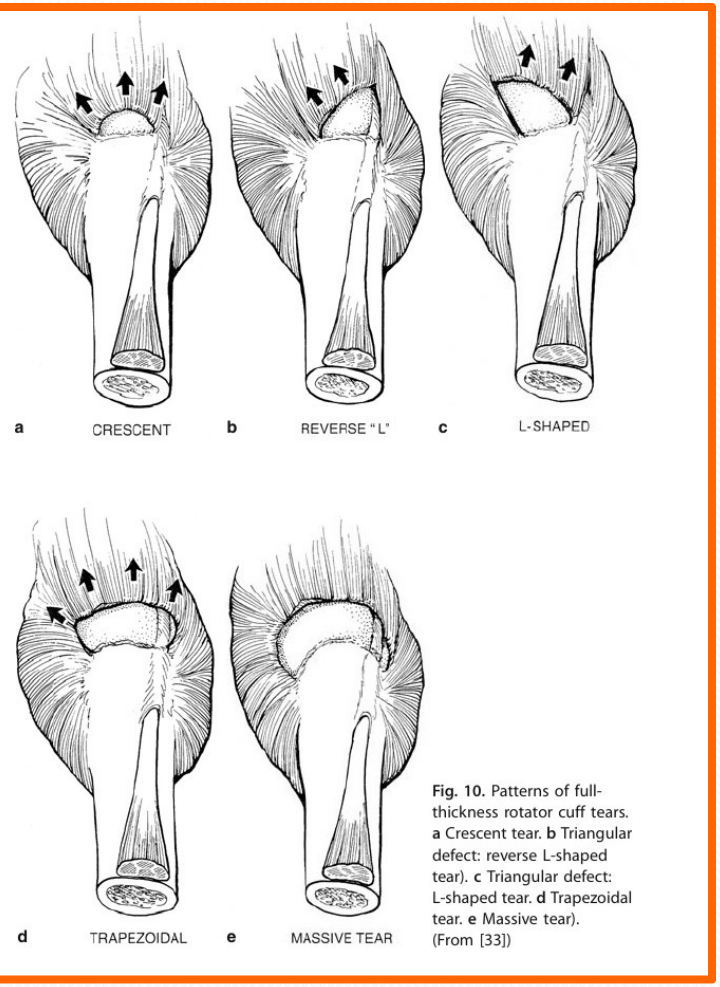
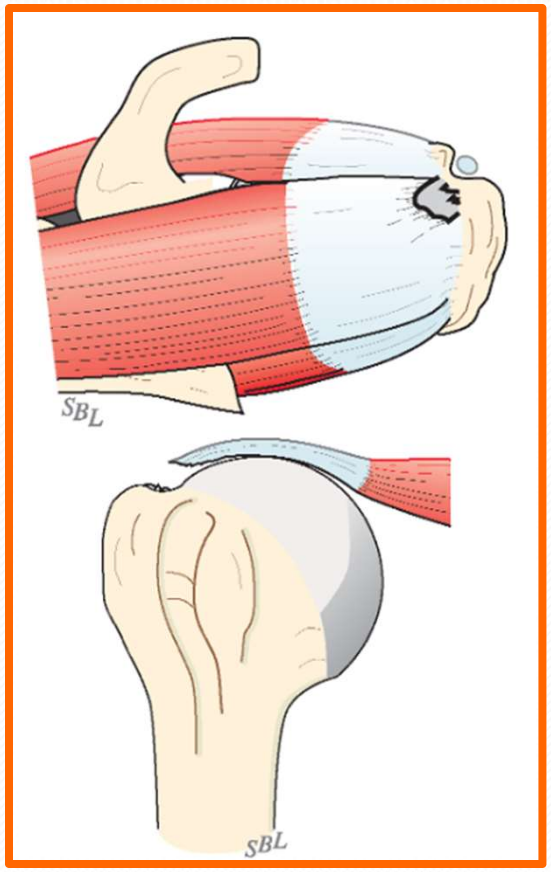
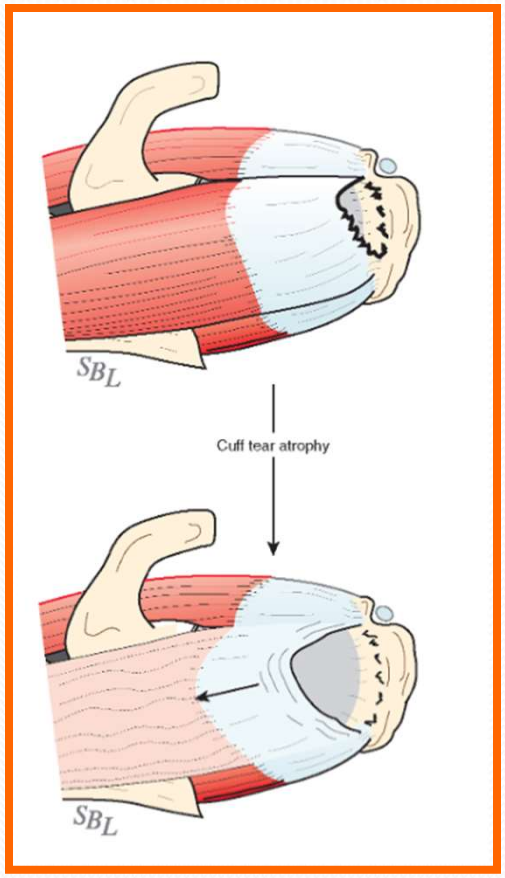


Fig. 10. Patterns of full-thickness rotator cuff tears. **a** Crescent tear. **b** Triangular defect: reverse L-shaped tear). **c** Triangular defect: L-shaped tear. **d** Trapezoidal tear. **e** Massive tear). (From [33])

Rotator Cuff Tears





Conservative Management

AAOS Clinical Practice Guideline Summary

- *Pedowitz et al. , JAAOS, 2010*:
  - "We cannot recommend **for or against** exercise programs (supervised or unsupervised) for patients with rotator cuff tears" – **inconclusive data**
  - "We cannot recommend **for or against** subacromial injections for patients with rotator cuff tears" – **inconclusive data**
  - "We cannot recommend **for or against** the use of NSAIDs, activity modification, ice, heat, iontophoresis, massage, TENS, PEMF, ultrasound for nonsurgical management of rotator cuff tears" **–inconclusive data**
  - According to these guidelines, don't know if conservative management is an option?

AAOS Clinical Practice Guideline Summary

- *Pedowitz et al. , JAAOS, 2010: continued:*
  - "We suggest that patients who have rotator cuff-related symptoms in the absence of a full-thickness tear be initially treated nonsurgically using exercise and/or NSAIDs"
    - Moderate evidence to support this
  - **Most surgeons would agree that there is a role for conservative management in the correct patient-patient-specific decision!**

Conservative Management with Full-Thickness Tears?

- *Ainsworth et al. Br. J Sports Med:*
  - Performed meta-analysis to look at evidence to support prescribing exercise therapy for the management of **full thickness rotator cuff tears**
  - MEDLINE, CINAHL, AMED, EMBASE, Cochrane
  - Included studies related to **full-thickness** RC tear and exercise
  - 8 observational case series, 2 case studies; **NO RCTs**
  - Unable to combine results due to heterogeneity of outcome measures and poor documentation of "exercise program"
  - **No conclusion- need better studies**

What this study adds

- The study highlights the paucity of published evidence concerning the use of specific exercises in the management of rotator cuff tears.
- Given that no randomised controlled trials were identified for inclusion in this study, the need is emphasised for quality trials to develop the evidence base as to the optimum exercise programme.

CONCLUSIONS:

- Data regarding the effectiveness of conservative management for rotator cuff tears is scarce
- Some studies demonstrate improvement, but no RCTs and mostly case series
- There is a role for conservative management, but is patient dependent (activity level, concomitant shoulder pathology, size of tear)

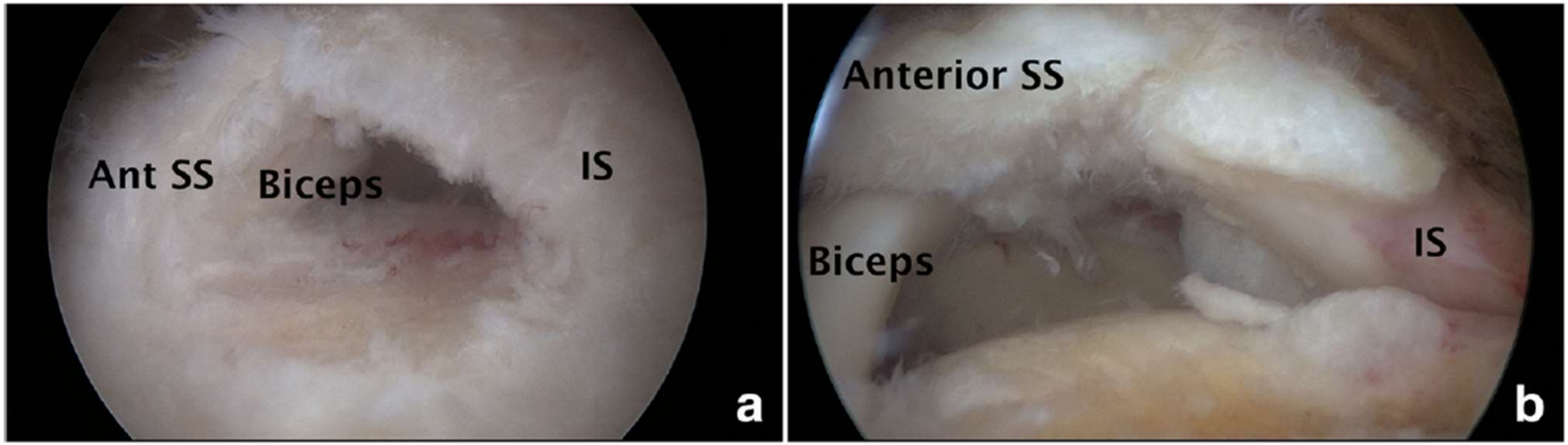
Natural History of Degenerative Rotator Cuff Tears

Jason L. Codding[1] · Jay D. Keener[1]

Current Reviews in Musculoskeletal Medicine (2018) 11:77–85
https://doi.org/10.1007/s12178-018-9461-8

ROTATOR CUFF REPAIR (M TAO AND M TEUSINK, SECTION EDITORS)

Published online: 6 February 2018



Progression over Time

Study	Study demographics	Length of follow-up	Imaging modality	Results
Keener et al., JBJS 2015	118 asymptomatic patients with full-thickness tears, 56 with partial tears, and 50 controls	Median 5.1 years	Ultrasound	-Tear enlargement occurred in 61% of full thickness, 44% of partial, and 14% of controls -2 and 5-year risk of enlargement in partial tears were 11 and 35% compared to 22 and 50% for full-thickness tears -Enlargement associated with hand dominance, pain development, and cuff muscle degeneration -Enlargement not correlated with size, age, or gender

				rotator cable integrity
Keener et al., JSES 2017	346 asymptomatic shoulders: 175 full-thickness tears, 103 partial tears, and 68 controls	Median 4.1 years	Ultrasound	-Tear enlargement occurs in 51% -Dominant shoulder had greater risk of enlargement -Shoulder activity level and occupational demand level were not predictive of tear enlargement
				fatty muscle infiltration
Mall et al., JBJS 2010	195 asymptomatic rotator cuff tears	2 years	Ultrasound	-Pain developed in 23% of patients -Pain associated with increase in tear size -With pain development, 18% of full-thickness tears increased > 5 mm, and 40% of partial tears progressed to full-thickness tears

IJSPT

CLINICAL COMMENTARY

EXERCISE REHABILITATION IN THE NON-OPERATIVE MANAGEMENT OF ROTATOR CUFF TEARS: A REVIEW OF THE LITERATURE

Peter Edwards, MSc[1]
Jay Ebert, PhD[1]
Brendan Joss, PhD[1]
Gev Bhabra, FRCS[3]
Tim Ackland, PhD[1]
Allan Wang, PhD, FRACS[1,2,3]

The International Journal of Sports Physical Therapy | Volume 11, Number 2 | April 2016 | Page 279

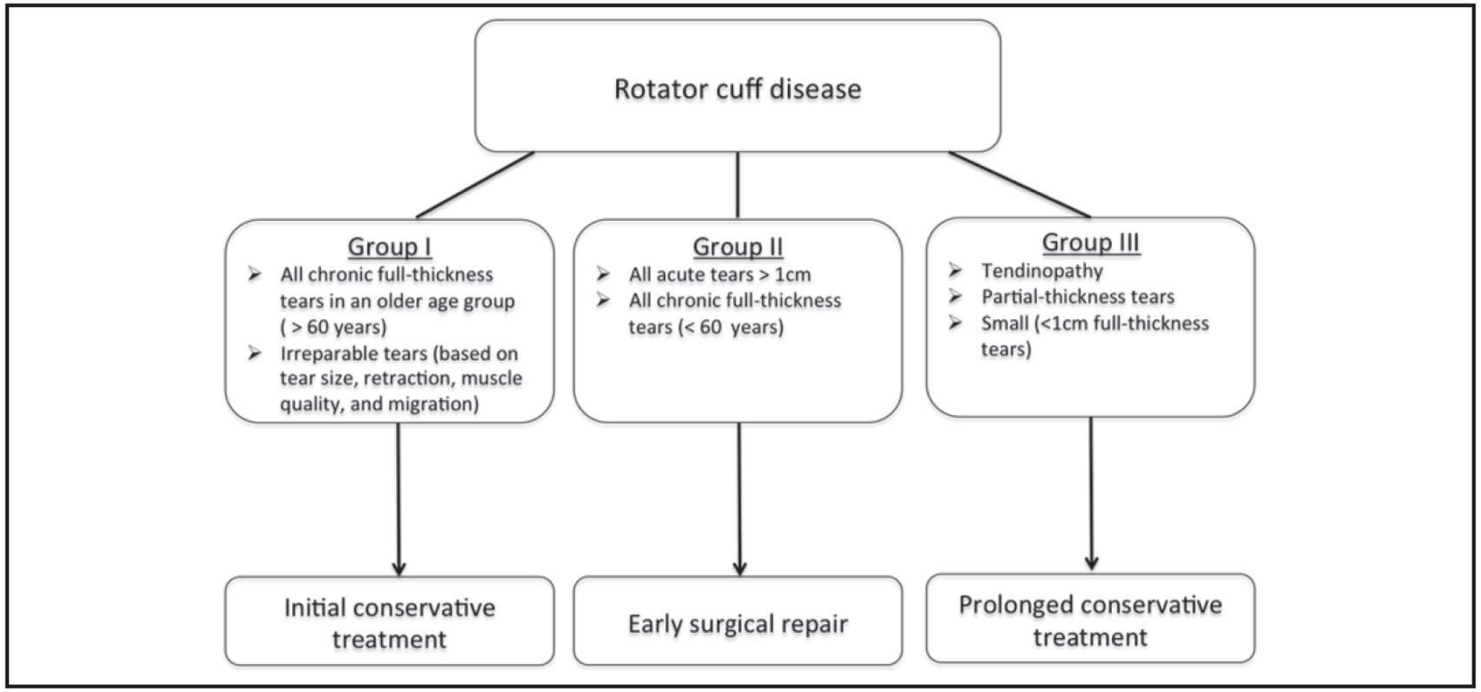


Figure 1. *Treatment algorithm for pathology of the rotator cuff. Information derived from Tashjian et al[66]*

Types of Cuff Repairs

- Single-Row
- Double-Row
- Transosseous Equivalent

Single-Row Repairs

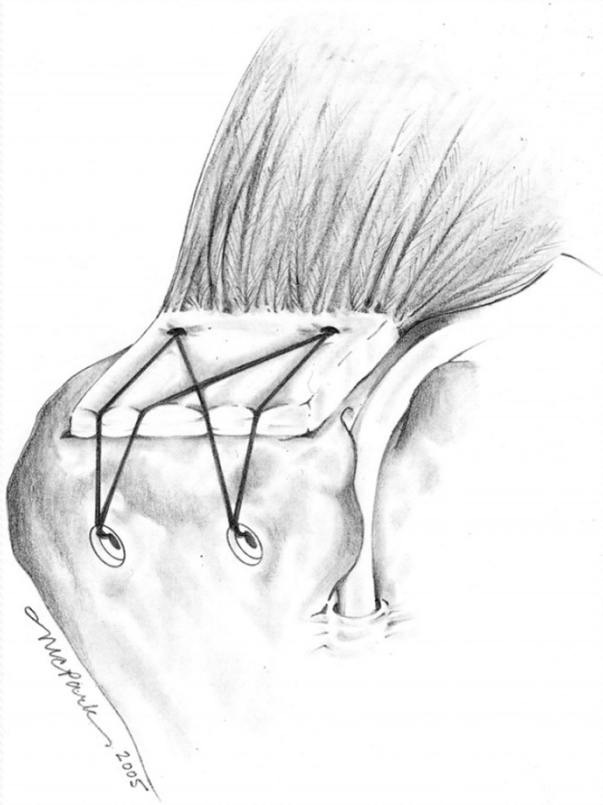
- Linear row of suture anchors that are usu placed along lateral edge of GT
- Pros:
  - Fewer Implants
  - Technically Easier
- Cons:
  - Less coverage
  - Weaker?

Double-Row Repairs

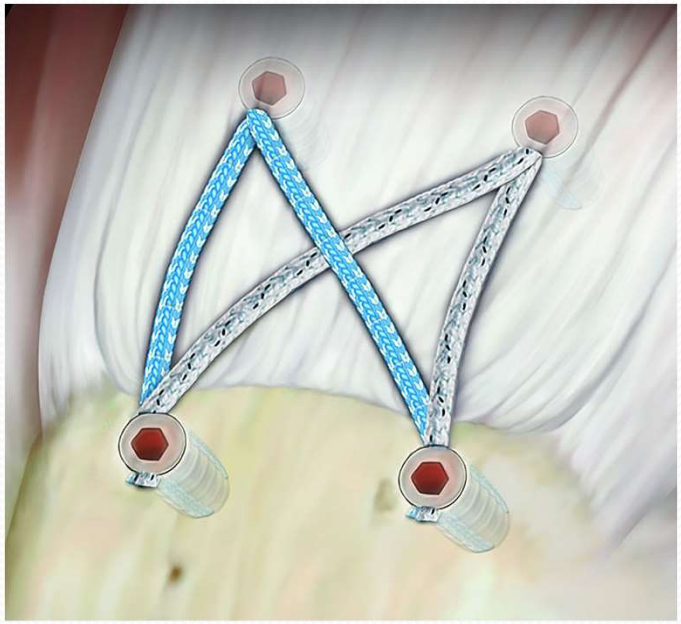
- Medial row of anchors is placed along the articular margin with a second row placed along lateral edge of tuberosity
- Pros:
  - Possibly stronger
  - Better reapproximation of tendon to footprint
- Cons:
  - More implants, time
  - Technically demanding

Transosseous-Equivalent Technique

- 2 rows of anchors: one along articular margin and the second ~10-15mm lateral to edge of tuberosity footprint. Sutures passed over bursal side and fixed to lateral row
- Pros:
  - Improved tendon-bone contact
- Cons:
  - More implants, time
  - Technically demanding



Suture Bridge Technique



Double-row vs single-row rotator cuff repair: A review of the biomechanical evidence

Lindley B. Wall, MD*, Jay D. Keener, MD, Robert H. Brophy, MD

J Shoulder Elbow Surg (2009) 18, 933-941

- Review of 15 studies
- 9 showed a statistically significant advantage to double-row repair in terms of
  - Biomechanical strength
  - Failure
  - Gap Formation

Footprint Restoration

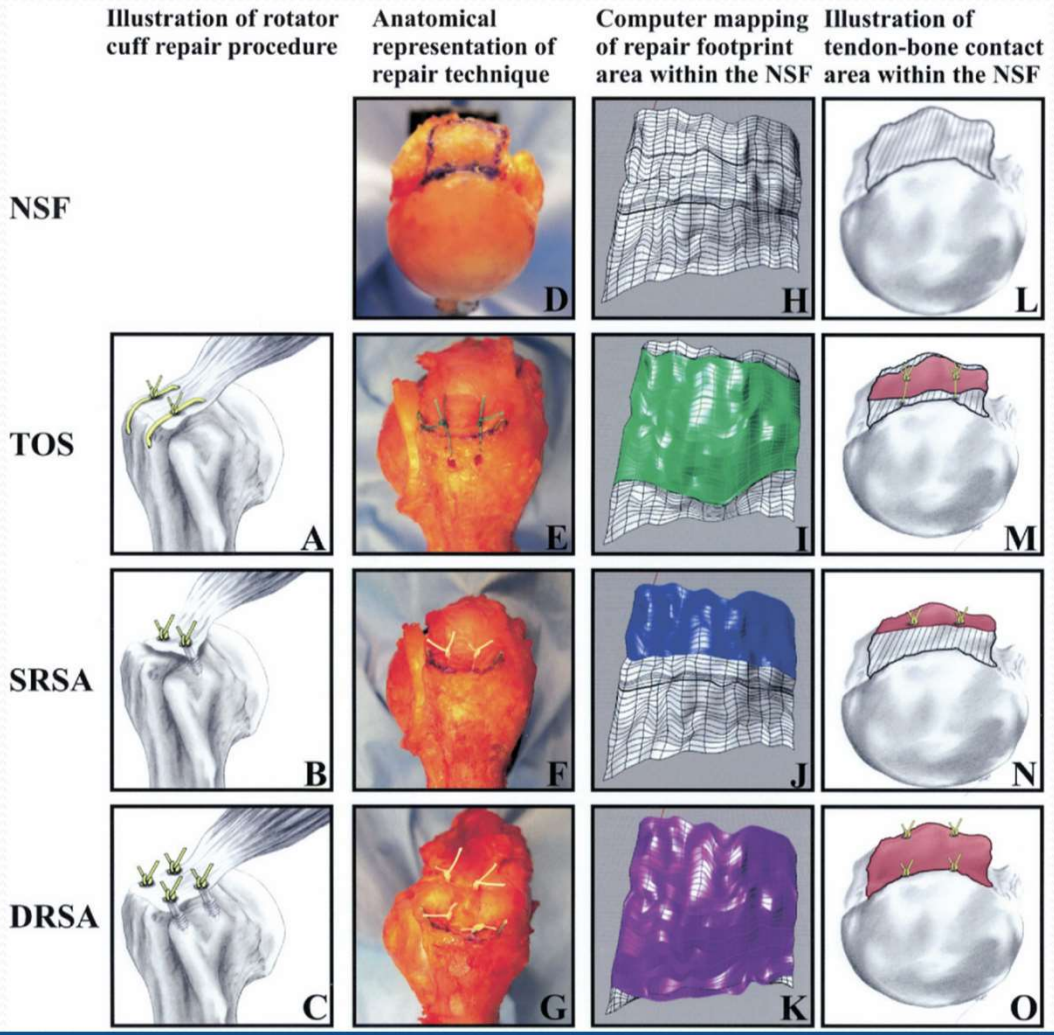


Figure 1 Surgical and digitization technique. Each specimen was repaired by all 3 techniques (**A-C**). The area of contact was digitized (**D-G**) and overlaid on the NSF (**H-K**). Anatomic illustrations show that whereas the SRSA and TOS methods fail to cover the native footprint, the DRSA fixation technique covers 100% of the NSF (**L-O**).

Table III Summary of footprint results

Study	Repair	Outcome variable	Footprint	Anatomic footprint coverage*
Brady[3]	Single vs Double	Medial-to-lateral coverage	SR 8.0±1.7 mm DR 17.0±1.9 mm	SR = 47% DR = 100%
Mazzocca[12]	Single vs Double	Mean area (mm^2)	SR 211 DR Diamond 416 DR MDA 354 MMDA 348	SR = 52% DR Diamond = 102% DR MDA = 81% DR MMDA = 89%
		Width of repair (mm) SR 8.34	SR 8.34 DR Diamond 16.2 DR MDA 14.8 MMDA 15.7	SR = 54% DR Diamond = 104% DR MDA = 96% DR MMDA = 104%
Meier[13]	Single vs Double (vs TOS)	Mean area (mm^2)	SR 123.6±41.5 DR 281.8±26.8	SR = 46% DR = 106%
Nelson[17]	Single vs Double	Mean area (mm^2)	SR 148.1 DR 258.2	DR 74% more than SR
Tuoheti[22]	Single vs Double (vs TOS)	NA	NA	DR 60% more than SR

TOS, transosseous suture; *MDA,* mattress double anchor; *MMDA,* modified MDA; *DR,* double-row repair; *SR,* single-row repair.

* The DR technique resulted in significantly more coverage of the footprint in all studies.

Outcome?
Single Row Vs. Double Row (TOE)

Outcomes of Single-Row and Double-Row Arthroscopic Rotator Cuff Repair: A Systematic Review

By Paul Saridakis, BS, and Grant Jones, MD

Investigation performed at the Department of Orthopaedics, The Ohio State University, Columbus, Ohio

Conclusion

TABLE I Experimental Design

Study	Level of Evidence	Randomization	Design
Burks et al.[17]	I	Yes	Prospective
Charousset et al.[24]	II	Incomplete*	Prospective
Franceschi et al.[1]	I	Yes	Prospective
Grasso et al.[25]	I	Yes	Prospective
Park et al.[16]	II	No†	Prospective
Sugaya et al.[15]	III	No	Retrospective

*Charousset et al. initially randomized patients but could not do so for all patients because of the fact that the production of the Cuff Tack (DePuy Mitek, Raynham, Massachusetts) was discontinued.
†Consecutive series.

Conclusions: There appears to be a benefit of structural healing when an arthroscopic rotator cuff repair is performed with double-row fixation as opposed to single-row fixation. However, there is little evidence to support any functional differences between the two techniques, except, possibly, for patients with large or massive rotator cuff tears (≥3 cm). A risk-reward analysis of a patient's age, functional demands, and other quality-of-life issues should be considered before deciding which surgical method to employ. Double-row fixation may result in improved structural healing at the site of rotator cuff repair in some patients, depending on the size of the tear.

Incidence of Retear?

- MRI Imaging post op
  - Significantly decreased retear in Double Row vs Single Row (Shen et al, Orthopedics, 2014)

Tudisco *et al. BMC Musculoskeletal Disorders* 2013, **14**:43
http://www.biomedcentral.com/1471-2474/14/43

BMC Musculoskeletal Disorders

RESEARCH ARTICLE Open Access

Single-row vs. double-row arthroscopic rotator cuff repair: clinical and 3 Tesla MR arthrography results

Cosimo Tudisco[1*], Salvatore Bisicchia[1], Eugenio Savarese[1], Roberto Fiori[2], Dario A Bartolucci[2], Salvatore Masala[2] and Giovanni Simonetti[2]

- 5 Years post op
  - 60% SR vs 25% DR
  - Clinical Outcome better with Double Row.

The Clinical Effect of a Rotator Cuff Retear

CME

A Meta-analysis of Arthroscopic Single-Row and Double-Row Repairs

Jeffrey Yang Jr,* MD, Matthew Robbins,† BS, Jordan Reilly,† MS,
Tristan Maerz,†‡§ PhD, and Kyle Anderson,*‡ MD
Investigation performed at the Beaumont Health System, Royal Oak, Michigan, USA

The American Journal of Sports Medicine, Vol. 45, No. 3
DOI: 10.1177/0363546516652900

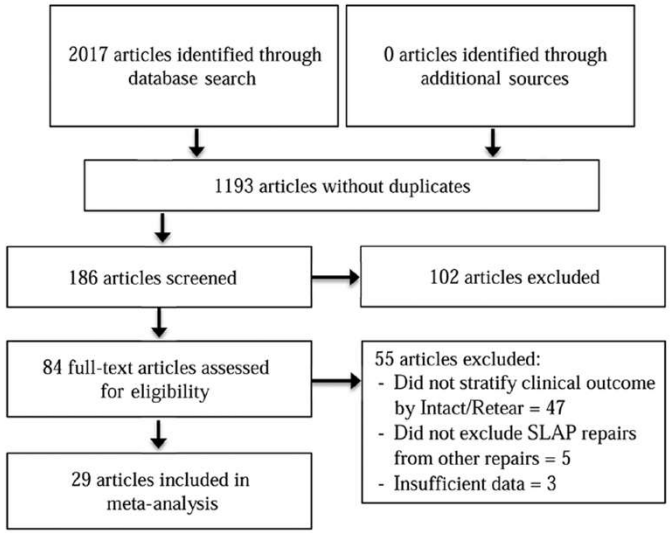


Figure 1. Schematic representation of literature search strategy. SLAP, superior labral anterior and posterior.

retears. Our results definitively demonstrate that a full-thickness rotator cuff retear has a detrimental effect on clinical outcomes. When grouping AAR, patients with a rotator cuff retear were found to have a lower ASES score by 10.1 points, a lower Constant score by 7.56 points, and a lower UCLA score by 3.00 points. These differences constitute a deficit of 7% to 10% of the scores' maximum, and in our opinion, these deficits should be considered clinically relevant. Abduction strength was found to be lower by 3.32 kg·f, and pain had a marginal, trending increase in this patient population, although it was not found to be statistically significant when grouping all repairs. On the basis of

Conclusion: Patients with a full-thickness rotator cuff retear exhibited significantly lower clinical outcome scores and strength compared with patients with an intact or partially torn rotator cuff.

Double-Row Arthroscopic Rotator Cuff Repair Is More Cost-Effective Than Single-Row Repair

Adrian L. Huang, MB, BCh, BAO, FRCSC, Kednapa Thavorn, PhD, Sasha van Katwyk, MSc, Peter MacDonald, MD, FRCSC, and Peter Lapner, MD, FRCSC

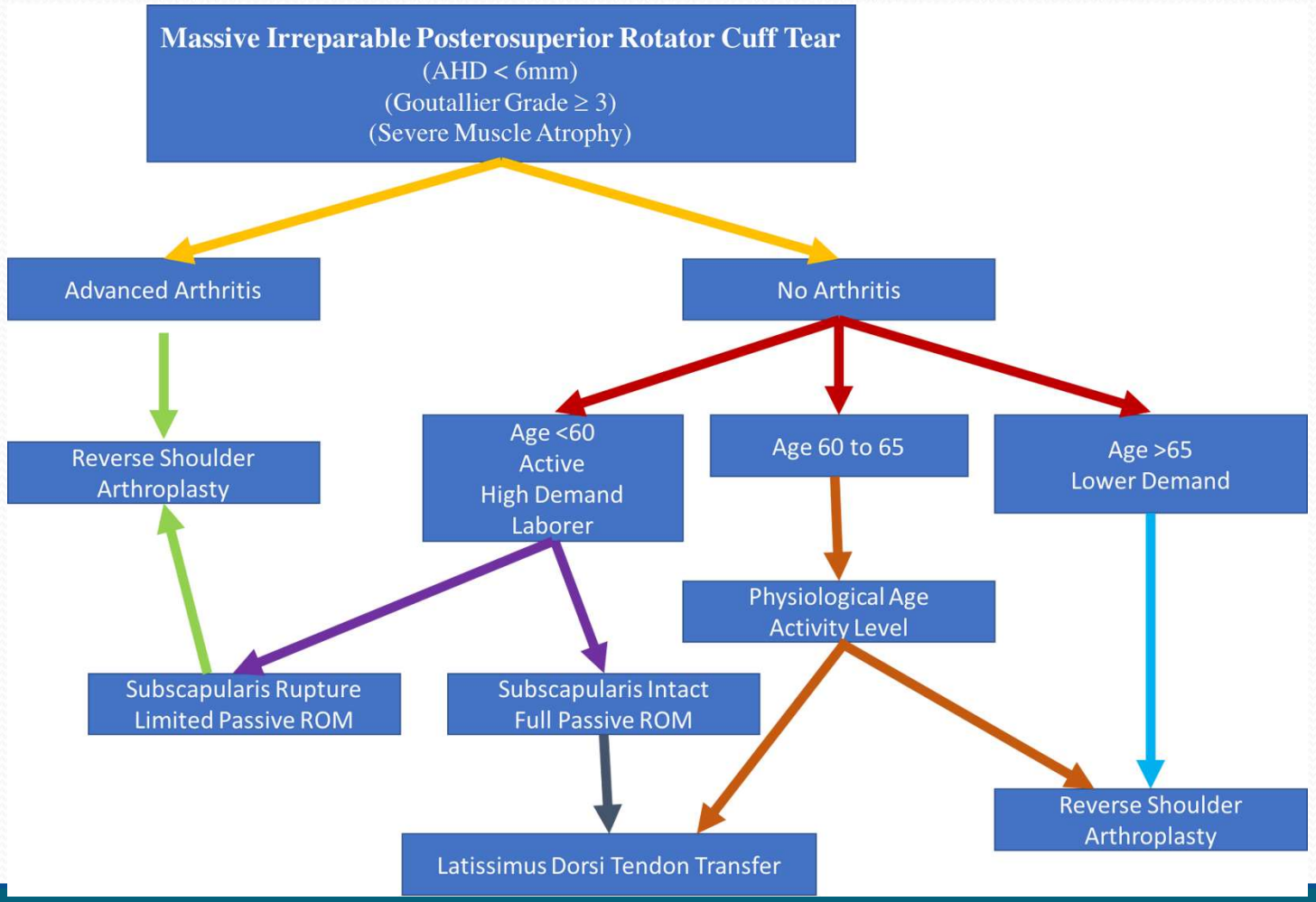
Investigation performed at The Ottawa Hospital, Ottawa, Ontario, Canada, and the Pan Am Clinic, Winnipeg, Manitoba, Canada

Conclusions: Based on the willingness-to-pay threshold of $50,000 per QALY gained, double-row fixation was found to be more cost-effective than single-row. Furthermore, a double-row reconstruction was found to be more economically attractive for larger rotator cuff tears (≥3 cm).

Technical Note

Latissimus Dorsi Tendon Transfer With Acromial Osteotomy for Massive Irreparable Rotator Cuff Tear

Nicholas R. Pagani, B.S., Antonio Cusano, B.S., and Xinning Li, M.D.

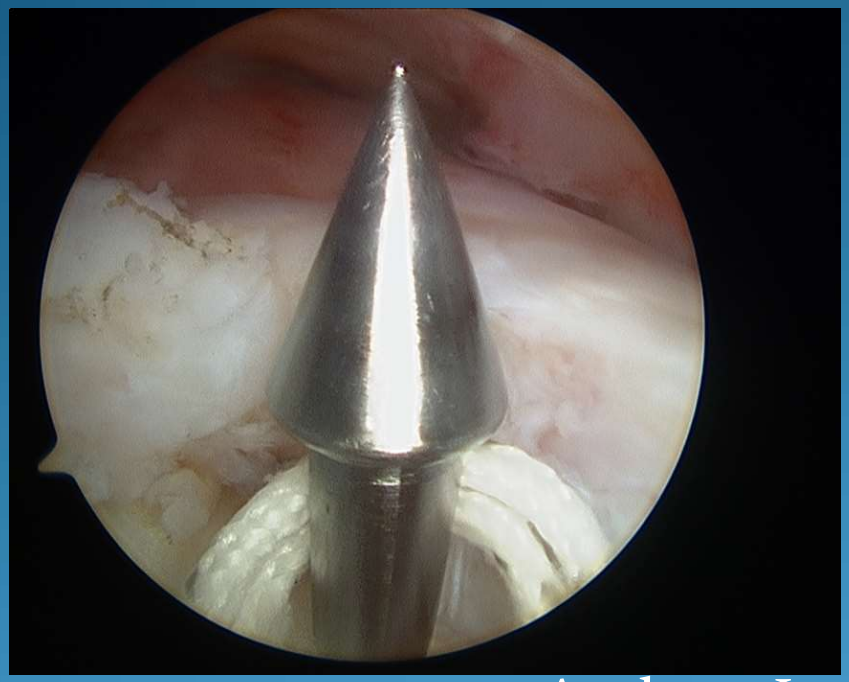


My Approach in 2018

- **Conservative Management**
  - Partial Cuff tears
  - Degenerative full thickness atraumatic tears in older patients with no weakness or pseudoparalysis
- **Surgery**
  - Refractory to conservative management (>6 months)
  - Full thickness tear in younger patients
    - Trauma
  - Full thickness tear with objective weakness or pseudoparalysis
  - Subscapularis Tear
- **Type of Surgery**
  - Smaller Tear <2 cm = Single Row
  - Larger Tear >2cm = Double Row (Modified TOE)

THANKS

Failed Rotator Cuff Repairs and Complications



Andrew Jawa, M.D.
New England Baptist Hospital
Boston Sports and Shoulder Center
ajawa@nebh.org

Work Related Injuries Workshop
April 30th & May 1st, 2018

Disclosures

Consultant/Instructor

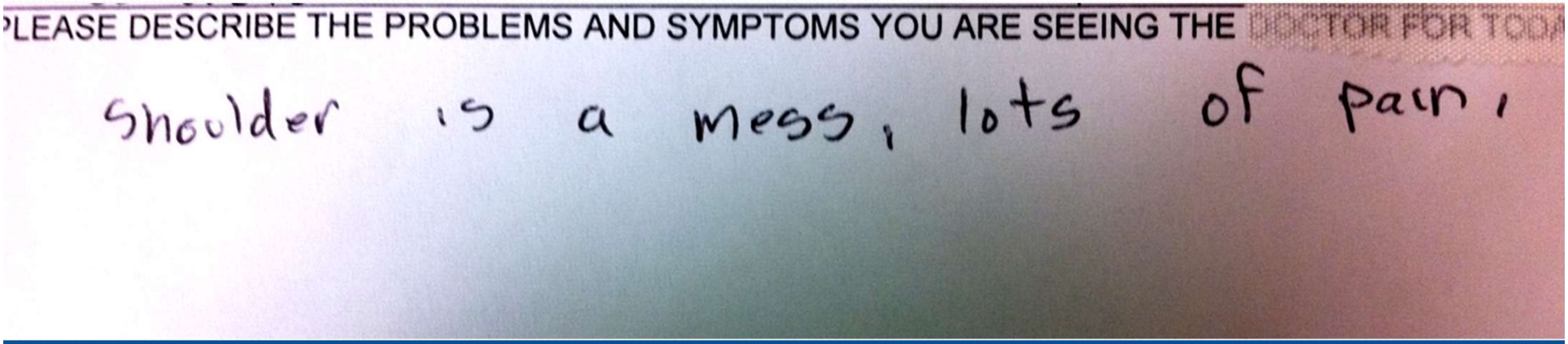
- DJO Global

Designer

- Ignite Orthopaedics

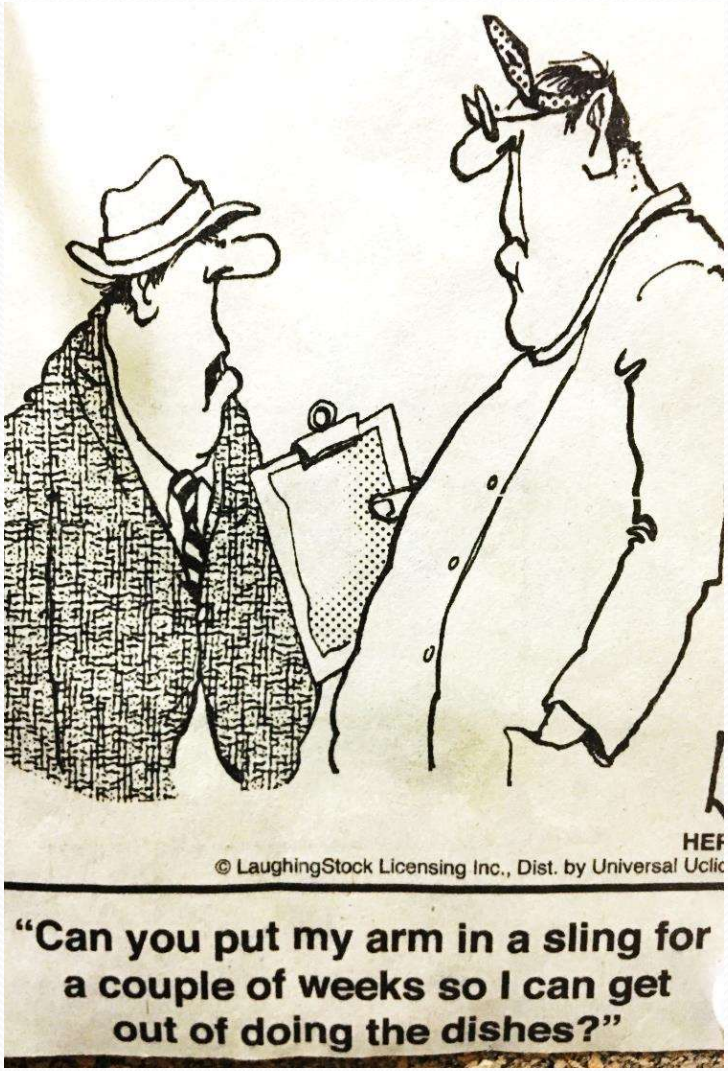
Patient Symptoms

- Pain
- Stiffness
- Weakness
- Loss of Function
- **NOT PROGRESSING**



Secondary Issues

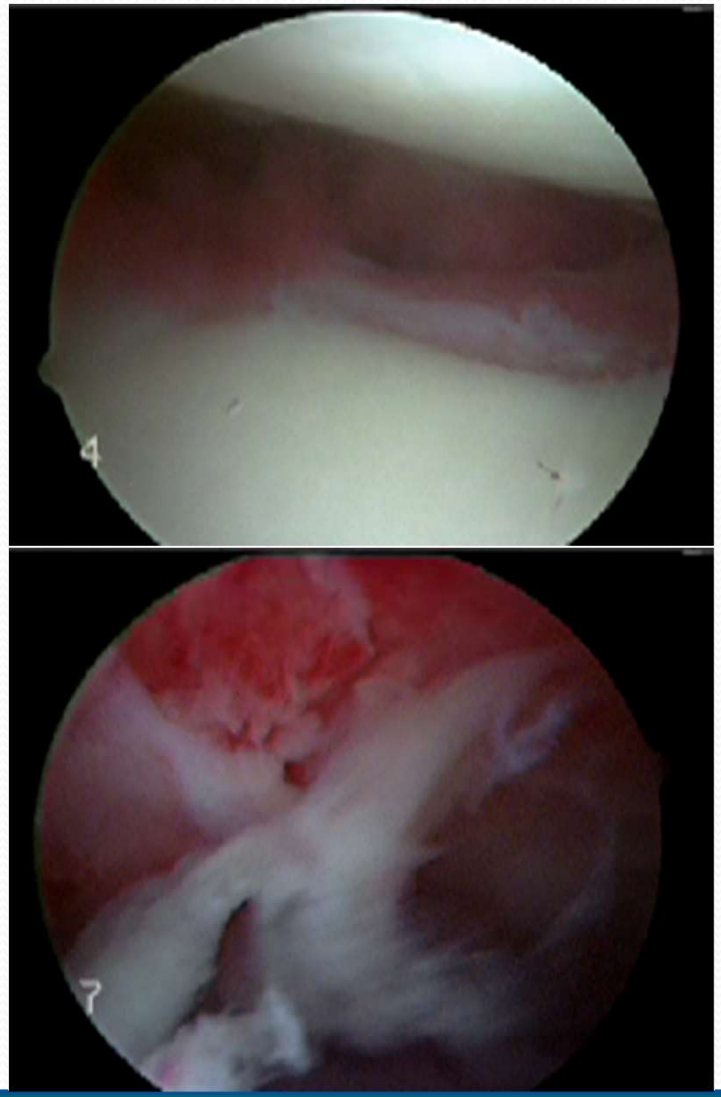
- **Anger**
- Depression
- Frustration
- Legal Issues
- Opoids/Drugs/ETOH
- Motivation



Reasons for Post-op Pain

Stiffness/Adhesion

- Early Bleeding
- Diabetic
- Pre-operative adhesive capsulitis
- **TOO MUCH DONE**



Too Much Done…

- RCR and…
  - SLAP/Labral Repairs
  - Coracoidplasty
  - Suprascapular nerve release
  - AC joint
  - Bicep Tenodesis

Work-up and Diagnosis

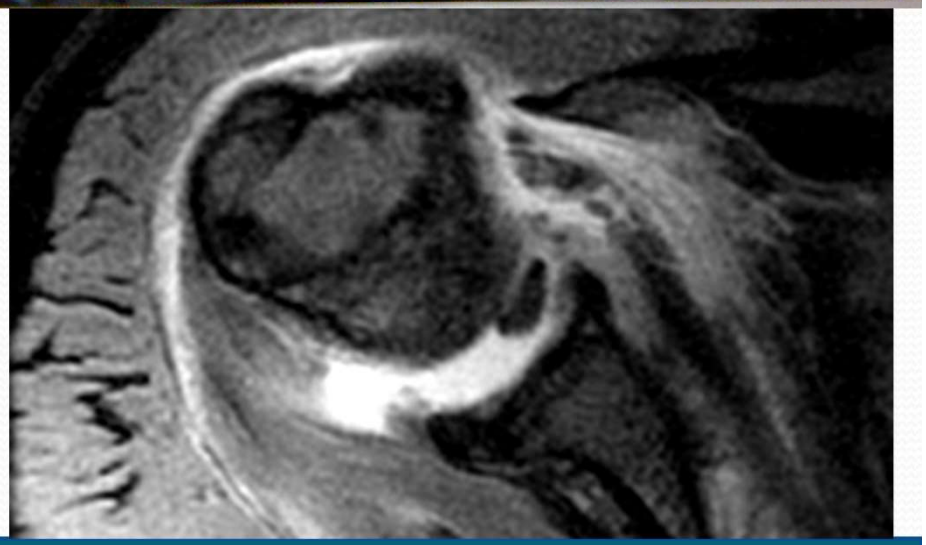
- Review prior OP + Office Notes
- Listen to the Patient!
  - **What Bothers them Most**

New X-rays

- DJD
- Hardware
- Incomplete Decompression
- Fractures
- AC Joint

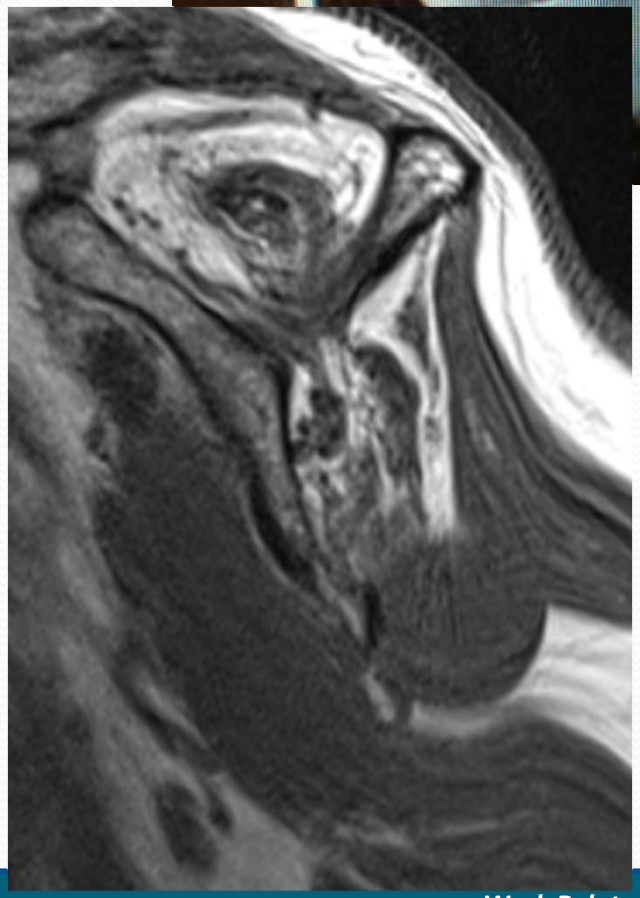
Physical Exam

- Focus on True Pain Points
- PROM vs. AROM Loss
  - *All Stiff!*
  - *Painful End Points*
- Strength
- Don't Forget the Subscap



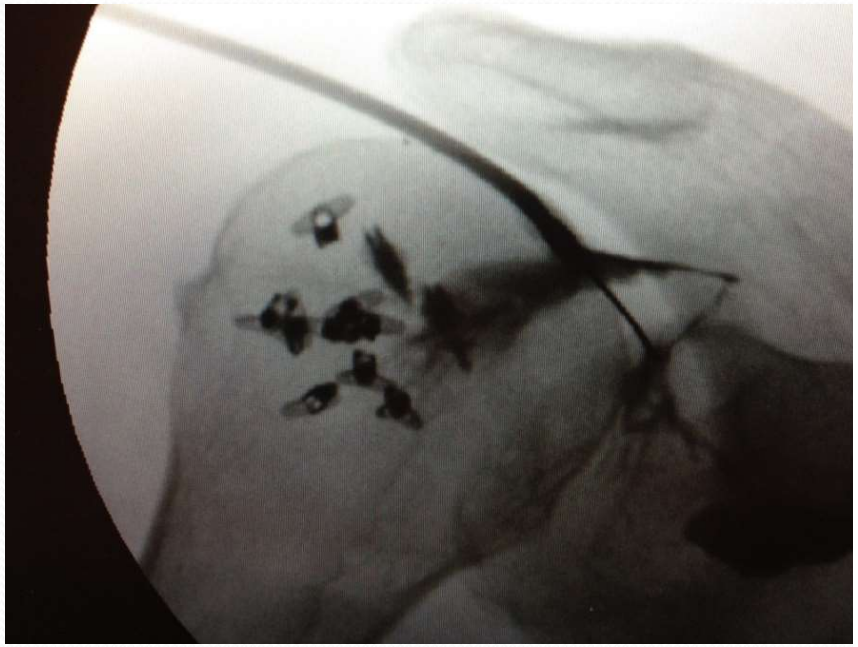
MRI

- No Gadolinium!!!
- ? Status of the Cuff
- ? Effusion
- Atrophy of the Cuff
- Look for 3D Image of Acromion



Non-Surgical Options

- Intra-Articular Cortisone Under Fluoro
  - With Arthrogram to check the cuff
  - Lidocaine alter pain?
  - Alter PT and Work Regimen

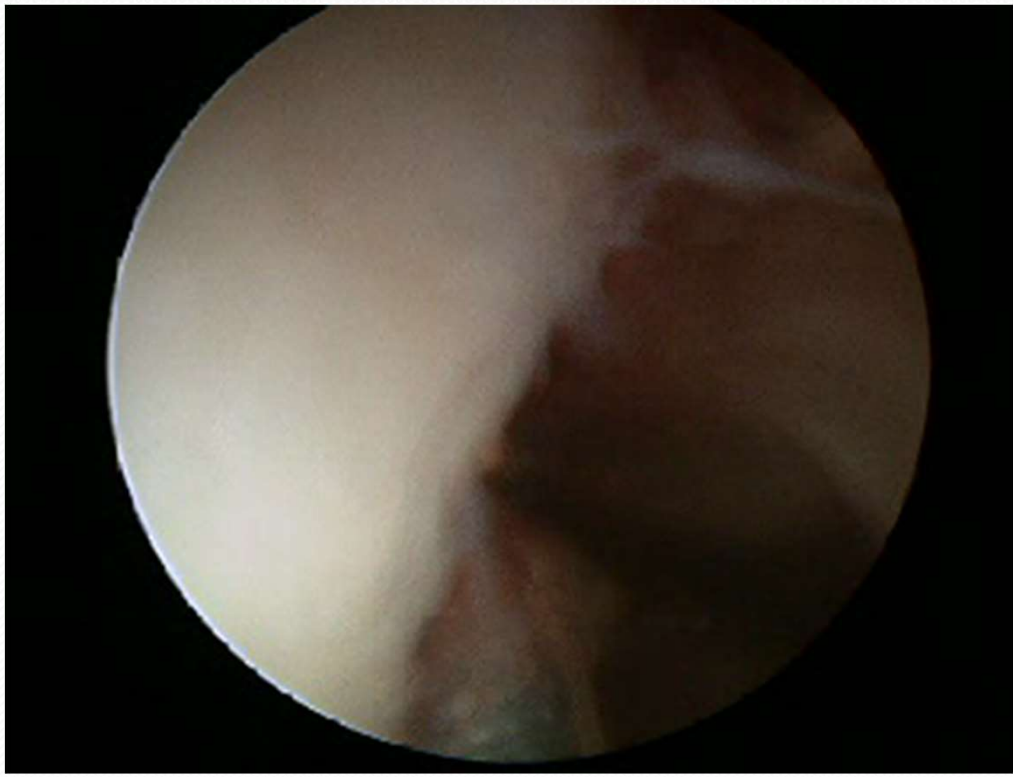


Surgical Options

- Don't Make a Bad Situation Worse
- Arthroscopic Approach – Avoid open at all times
- Salvage

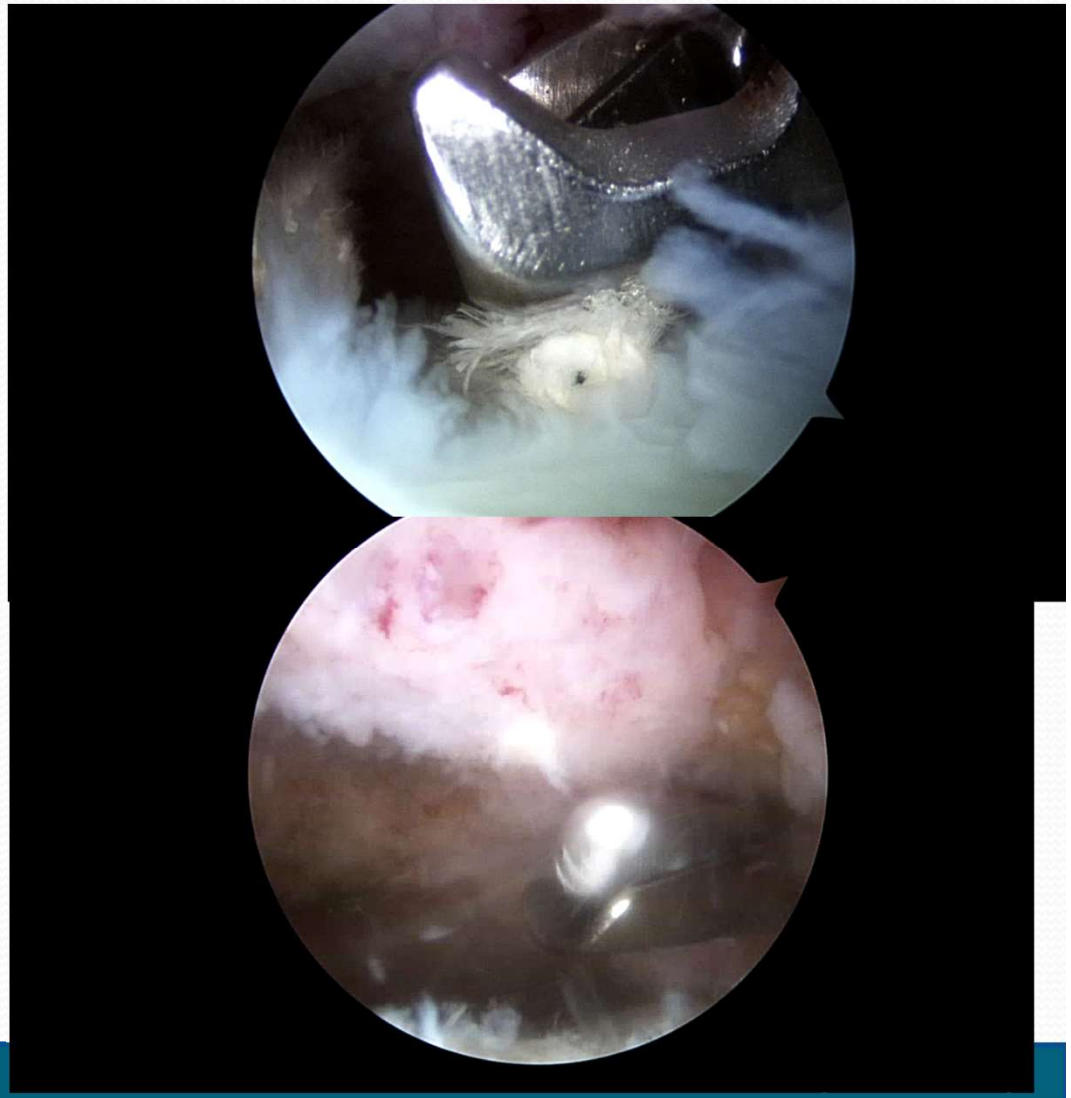
Arthroscopic Options: Glenohumeral Joint

- Glenohumeral
  - Remove Implants/Debris
  - Release Adhesions/Capsule
  - Tenodesis Biceps



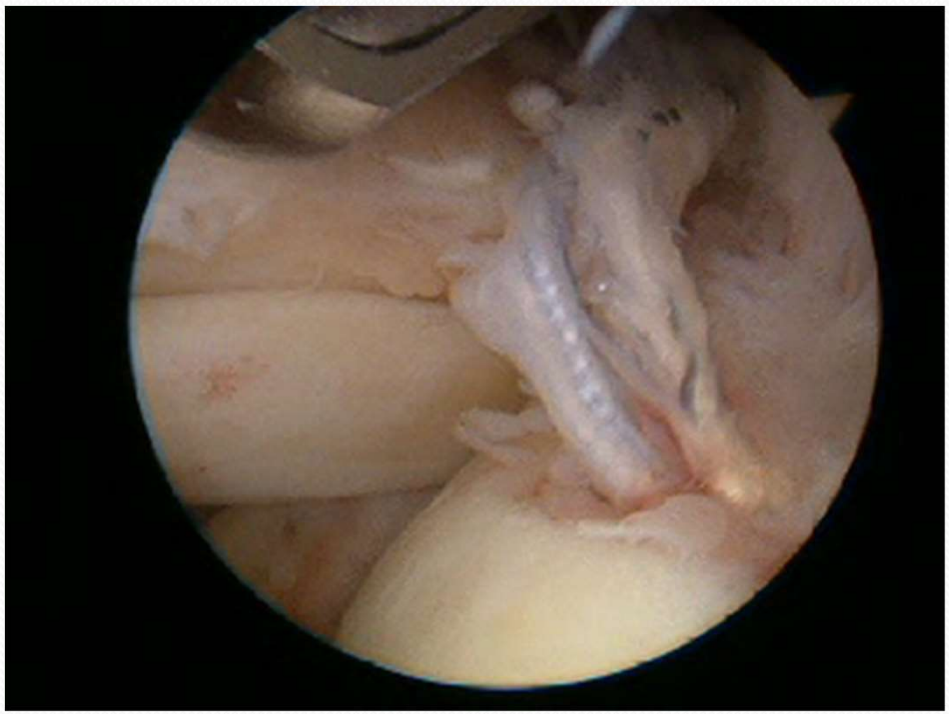
Subacromial Revisions

- Cuff can scar to acrominon
- Remove Debris
- Revision acromioplasty



Evaluate The Cuff

- Accept Partial or "Scar Repairs"
- Repair Full Thickness Tears
- Use the Biceps



Salvage

- High-Riding Heads
- Arthritic Changes
- Multiple failed repairs

- Superior Capsular Reconstruction
  - NOT HIGH-RIDING
- Reverse
  - Worse outcomes after multiple surgeries

Additional Thoughts

- Tension is the enemy
- Second (or more) time is much tougher
- Less is often better
- Stay positive
- 6 months to plateau
- Salvage Can Work