Rotator Cuff Tears, what we "Know".....<u>Think</u>

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Outline

- Anatomy
- Natural History
 - Acute vs Degenerative Tears
- Who Needs Surgery
 - Nonoperative Treatment & Predictors of Failure
 - Operative Treatment Indications
- Surgical Techniques
- Optimizing Outcomes
- Impact of Work-Related Compensation Claims on Surgical Outcomes
- PostOp Rehab Current Theories/Practice

Natural History

• RCT present in **10%** of population over age **60**

 40 % of asymptomatic rotator cuff tears became symptomatic and anatomically deteriorated.

• Increase in tear size and decrease in muscle quality correlated with the development of <u>symptoms</u>

• Moosmayer et al.

50 patients level 2 data

Natural History

• Pain development is associated with an increase in tear size and deterioration of shoulder function and active range of motion

• Mall NA, Kim HM et al (2010) Symptomatic progression of asymptomatic rotator cuff tears: a prospective study of clinical and sonographic variables. J Bone Joint Surg

• Level 3 Data

Natural History... Controversy

 Small isolated full-thickness tears of the supraspinatus in patients under the age of 65 do not necessarily progress over time

 Kuhn JE, Dunn WR et al (2013) Effectiveness of physical therapy in treating atraumatic full-thickness rotator cuff tears: a multi- center prospective cohort study. J Shoulder Elbow Surg

- Full-thickness rotator cuff tears tend to increase in size in about half of patients aged 60 years or younger
- Fucentese et al(2012) Evolution of nonoperatively treated symptomatic isolated full-thickness supraspinatus tears. J Bone Joint Surg Am

What We Think.....?

- Many patients have Asymptomatic Tears
- These Tears may progress over time <u>but</u> progression is most likely associated with symptoms.

Conservative vs Surgical treatment is patient depended and <u>follow up</u> is necessary

• <u>Non Operative Tx can be aggressive and productive in a patients</u> <u>treatment protocol</u>

So Treatment is Individualized This goes for <u>operative and nonoperative</u> treatment

<u>Operative Treatment</u>

<u>Non-Operative</u>

- "Young"... relative and physiologic
- Acute or acute on chronic
- Traumatic event
- Poor Function or recent decline in functional status
 - <u>Not just an MRI Finding!</u>

- Elderly (PPP)
- Poor quality tissue on MRI
- Good functional status
- May just need Debridement and biceps treatment ?

• MR Imaging of Rotator Cuff Tears: Correlation with Arthroscopy

• Gururaj Sharma Journal of Clinical and Diagnostic Research

n = 45	Sensitivity	Specificity	Positive predictive value	Negative predictive value	Accuracy	p- value	Kappa coefficient
Full thickness tears	89.6	100	100	83.3	93.1	<0.01	0.85
Partial thickness tears	100	86.6	78.9	100	91.1	<0.01	0.81



Comparisons of the Various Partial-Thickness Rotator Cuff Tears on MR Arthrography and Arthroscopic Correlation

Kyung Ah Chun, MD, Min Sung Kim, MD, and Young Joo Kim, MD May overestimate tears in tendinopathy – any fraying may "wick" fluid into the tendon

 ABER view increases sensitivity but 13% of patients couldn't hold this position

How Good Are we?

- Interobserver Agreement in the Classification of Rotator Cuff Tears Using Magnetic Resonance Imaging
 - Edwin E. Spencer Jr,

TABLE 1 MRI Features of Rotator Cuff Tears Ranked by Interobserver Agreement a

	Observed		
Variable	Agreement	Kappa	
Teres minor quantity	0.9	0	
Full thickness vs partial thickness	0.89	0.77	
AC joint signal change (increased)	0.78	0.33	
Subscapularis quantity	0.78	0.04	
Number of tendons involved	0.72	0.55	
Side of partial-thickness tear	0.72	0.44	
Infraspinatus quantity	0.72	0.22	
Biceps tear	0.68	0.19	
AC joint spur	0.66	0.32	
Degree of retraction	0.63	0.44	
Biceps signal change (increased)	0.6	0.2	
Supraspinatus quantity	0.59	0.25	
Acromiohumeral distance	0.52	0.26	
Acromial morphology (sagittal)	0.5	0.16	
Partial-thickness tear grade	0.46	-0.11	
Acromial morphology (coronal)	0.43	0.06	
Size of tear (sagittal)	0.42	0.26	
Size of tear (coronal)	0.42	0.24	
Muscle quality (Goutallier)	0.36	0.1	

^aMRI, magnetic resonance imaging; AC, acromioclavicular



A kappa of 1 indicates perfect agreement, whereas a kappa of 0 indicates agreement equivalent to chance

What do Patients Want?

- No disruption to their life and daily activities
- Fast Recovery
- To Return to Work....<u>Hopefully</u>

• Most of all a decrease in pain and ability to sleep at night

Individualized Treatment

- Characterize patient and needs
 - Age, onset, Functional Disability, Work, Athletics, Ext
- Correlate symptoms with their exam!
- Characterize their tear
- Explain the plan to the patient
 - Realistic rehab and outcome



Physical Exam

• ROM

- ACTIVE AND PASSIVE
 - Capsulitis

Strength

- All aspects of cuff
- Neurologic Etiology

• The forgotten bunch

- AC Joint
- Biceps



MRI Evaluations - Coronal



MRI Evaluations - Axial



MRI Evaluations – Axial – AC Joint



MRI Evaluations - Sagittal



MRI Evaluations – Sagittal T1 for Muscle Eval



Fatty Atrophy



Fatty Atrophy



Scott Van Pelt Sign





Arthroscopic Correlation



L Shaped Anterior





Arthroscopic Correlation



L Shaped Posterior



Delamination



Delamination ... Multiple Viewing Portals!!



<u>Delamination!</u>

• Is Posterior Delamination in Arthroscopic Rotator Cuff Repair Hidden to the Posterior Viewing Portal? Arthroscopy 2013

• Yung Han, M.D

- The overall incidence of delamination -92%.
- Posterior delamination <u>88%</u>

<u> Posterior portal - 11%</u>

Posterolateral portal - 70%

Lateral portal - 100%

Posterior Viewing Portal



Posterior Lateral Viewing Portal



Anterior Lateral Viewing Portal



Missed Delamination



Intratendinous Tear



Intratendinous Tear – Bubble Test



Partial Tears


Partial Tears



Subscapularis Tears – Coracoplasty



Subscap and Biceps... Comma and Coracoid



Subscap and Biceps 30 and 70 degree



Repair Challenges

- <u>Tension....</u>
- Tissue Quality
- Muscle Quality
- Cuff Mobilization
- Capsular Stiffness (Capsulitis)
- Anatomy
- Visualization
- Repair Technique ... Many options

The Biggest Debate<u>that doesn't matter!!</u>!

• Single Vs Double Row

How about an anatomic patient specific repair

Point Counterpoint

Single Row

- Not all Single Rows Created Equal!!!
- # of sutures passing the construct and configuration
- Anchor location
- RipStop or "Bridging...off loading Sutures"
- <u>No Medial Failure!</u>

Double Row

- Biomechanically Stronger?
- Coverage of footprint ...(Over tensioned?)
- Increased contact for healing
- Increased strength of fixation
- Dispersion of load through cuff?

Medial Sided Failure



Footprint



Tension!!!

• AJO 2016





Anatomic Repair

- Tear Pattern Recognition
- Anchor placement
- Fixation Strength
- Gap Formation reduction
- Off Loading or bridging techniques

- <u>Single Row-</u> Most Tears
- Double Row Avulsions or massive with excellent excursion
- ** <u>Rip Stop, Tipple Loaded,</u> <u>Anatomic tension</u>

To The OR

- EUA
- Beach Chair or Lateral
- Sequential approach
- Define pathology that matches your plan
- Keep Room aware of plan



OR Sequence

• EUA

- Define Anatomy and Portals Access
- Inject Joint
- Posterior Portal



Anterior Portal and Biceps – Subscap Complex

- Debridement and Visualization
- Eval Biceps and <u>CUT</u>

- Posterior Drawer
 - Eval Subscap



Posterior Pull



Articular or Subacromial Subscap repair



My Preferred Subscap repair

<u>Upper 3rd</u>

- 30 or 70 degree scope
- Clear bursal space
 - Possible Coracoplasty
- Anterior canula
- Define Footprint
- Bird beak / links / swivellock

<u>Full Thickness</u>

- Define Comma Tissue
- Possible Coracoplasty
- Subacromial view
- Rip Stop Repair

Move Subacromial

- Establish Flow anteriorly
- Remove all bursal leaders
- SAD... if needed!
- Need a <u>*Two View*</u> Rotator cuff Eval
- Use the Spine to define anatomy and plan repair



Delamination ... Multiple Viewing Portals!!



To *Decompress* or not?

• Arthroscopic rotator cuff repair with and without arthroscopic subacromial decompression: *J Shoulder Elb Surg 2004*

Gartsman et al

Arthroscopic rotator cuff repair with and without subacromial decompression Arthroscopy 2007

Milano et al

 Arthroscopic repair of full-thickness rotator cuff tears with and without acromioplasty: Am J Sports Med

Abrams et al

Plan your Repair and Possible Releases



Use your Anatomy and Bone Landmarks



Slides and releases

- All sides of the rotator cuff
- Undersurface (labral adhesions)
- Bursal
- Anterior interval
- Posterior interval



Under Surface Releases



Anterior Interval Slide is Very useful



Posterior Interval Slide



My Preferred Repair... Rip Stop



Knotless Rip Stop



Quadriga of the Rotator Cuff

Quadriga Effect

Quadrigia Effect

Tracy Jones

Over-advancement of the FDP during tendon repair

Flexion Lag of Adjacent Fingers uring tendon repair

Normal



BONE MARROW VENTS!



- MILANO et al
- Significant increase in healing rates for large tears
- 60% vs 12.5%
- Jo et al
- 35.5% vs 4% leakage

Patch Augmentation







Failure ... Why?

Biologic

Patient Comorbidities and Medications Infection

Mechanical

Poor Tissue Quality Patient Compliance Trauma



Fig 4. Prevalence of samples positive for *Cutibacterium acnes* in female (light gray) and male (dark gray) patients according to the timing of sample collection (A) and area of interest (B).

Infection



Infection


A Bad Day











Thank You....Questions?



Thank you!



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