Arthroscopic Management of Complex RCT



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Disclosures in AAOS Database www.AAOS.org

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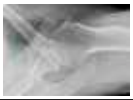
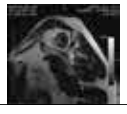
How they begin…

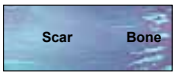
- 62 M fall onto shoulder 2/2012
- C/O weakness and pain
- Failed injections and PT




Goals of RCR

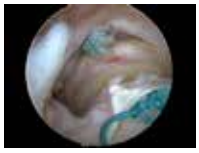
- Tendon must stay…
  - "Long enough"
  - "Good enough"
- Expectations
  - Reduced Pain
  - Improved Function



Anatomic Failure

- 10 – 90%
- Timing
- Associations
  #1 Size
  #2 Chronicity

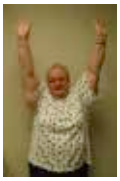
Arthroscopic rotator cuff repair: Prospective functional outcome and repair integrity at minimum 2-year follow-up



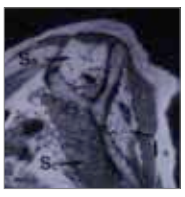
Failed Repair = Poor Biology

Does it really matter?

Re-tear?



1997



2010

Rotator Cuff Tear and Pain

HEALED vs FAILED CUFF REPAIRS

- Patient outcomes are identical

Strength is better if repair is Intact

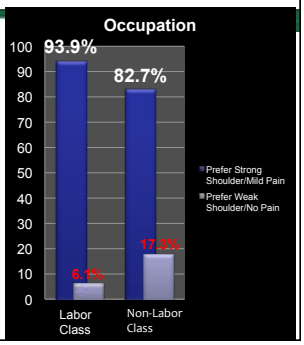

Structural Integrity After Rotator Cuff Repair Does Not Correlate with Patient Function and Pain

Russell et al. JBJS 96(4):265-71, 2014
Slabaugh et al Arthroscopy 26(3):393-403, 2010

Patients prefer a strong shoulder with minimal pain

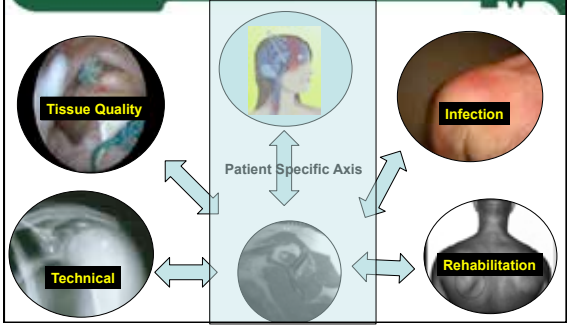
BJ Cole, AA Romeo, N Verma, S Burkhart, 2013

If you ask them…



Can we do better?

Independent Variables



Independent Variables

- Chronicity
- Number of tendons
- Age
- Smoking
- Diabetes
- Inflammatory Disease

Inferior Vascularity and Tissue Quality

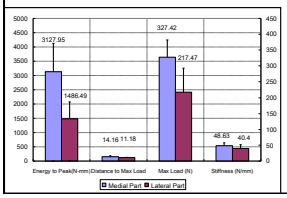
Tear Size

Size	Classification
< 1 cm	Small
1 – 3 cm	Medium
Two or More Tendons	
3 – 5 cm	Large
> 5 cm	Massive

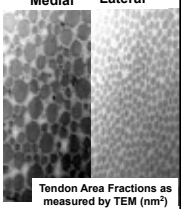
Tissue Quality

Medial Versus Lateral Supraspinatus Tendon Properties

Implications for Double-Row Rotator Cuff Repair



Medial Lateral



Tendon Area Fractions as measured by TEM (nm^2)

	Medial	Lateral
AVE	65.84	62.18
STD	6.49	6.07

MRI Considerations

Interobserver and Intraobserver Reliability of the Goutallier Classification Using Magnetic Resonance Imaging

Proposal of a Simplified Classification System to Increase Reliability

JSES, 2012

Correlation between fatty atrophy and…

1. Functional Outcome
2. Risk of Anatomic Failure
3. Reparability

Flurin et al., Rev Chir Orthop, 2005
Fuchs et al., JBJS 2006

Technical Considerations

Arthroscopic Rotator Cuff Repairs:
An Anatomic and Biomechanical Rationale for Different Suture-Anchor Repair Configurations

Single Row
- UTS 275N-300N
- No footprint
- Gap formation

Double Row
- UTS 300-350 N
- Better footprint
- Reduced "gap formation"

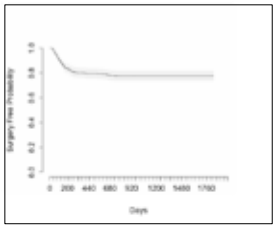
TOE with Anchors
- UTS 350-400 N
- Best footprint
- Least "gap formation"
- Resistance to shear

What are our options?

- Non-Surgical
- Repair
- Repair w ECM
- Superior Labral Reconstruction
- Tendon Transfer
- Reverse Arthroplasty




Non-Surgical
*Physical Therapy Works for RCT**



5 year outcomes

N=219, 85% follow up

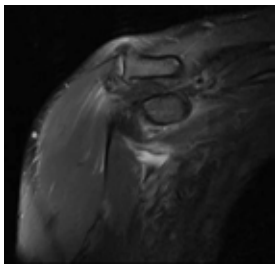
MOON DATA-450 Patients
Clinically Significant
Improvement in PRO Scores

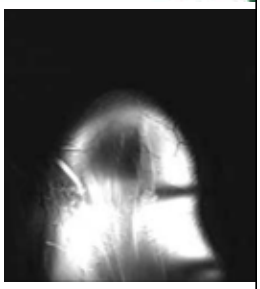
<80% had surgery and most did so in first 12 weeks
*A belief that PT would work was more important than tear size

Kuhn et al, 2013

Case Example 2 Tendon Tear

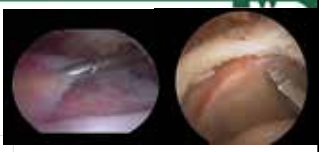
MRI





Repair of Massive RCT

1. View from lateral
2. Assess tear configuration
3. Soft tissue mobilization
4. Tenotomy/Tenodesis
5. IAD/SAD/DCE PRN
6. Light decortication
7. Repair anatomically



The Proximal Biceps as a Pain Generator and Results of Tenotomy

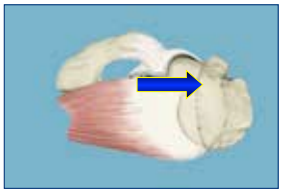
Glenohumeral Capsular Release

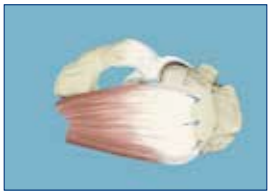
Supraspinatus
- Posterior-Superior
- At risk: SS Nerve

Infraspinatus
- Posterior

Subscapularis
- Anterior
- At risk: Axillary N

Anterior Interval Release

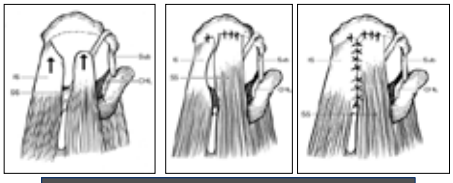




Contracture at RI
between Supraspinatus and Subscapularis
(Coracohumeral Ligament)

Posterior Interval Release

Rotator Interval Release
Supraspinatus – Infraspinatus Interval Release



AANA 2008: Lo et al. *50% Intact at 2 years*

Keys to Anatomic Repair

Anatomic Reduction and Next-Generation Fixation Constructs for Arthroscopic Repair of Crescent, L-Shaped, and U-Shaped Rotator Cuff Tears

1. **Repair subscapularis to lesser tuberosity**
2. **Repair infraspinatus to anatomic position at the upper border of the bare area**
3. **Repair supraspinatus according to tear pattern (crescent, L-shaped, or reverse L-shaped) with double row TOE**

Arthroscopy: The Journal of Arthroscopic and Related Surgery, Vol 25, No 5 (May), 2009: pp 553-559

Repair of Two-Tendon Tear

Follow-up

Results

Arthroscopic Repair of Massive Rotator Cuff Tears

Outcome and Analysis of Factors Associated With Healing Failure or Poor Postoperative Function

AJSM 2013

N=173
60% intact
Fatty Infiltration
Infraspinatus

Partial repair of irreparable supraspinatus tendon tears: clinical and radiographic evaluations at long-term follow-up

JSES, 2011

N=67
Posterior Repair
SST 4.6→9.0
Constant 44→73
Restored AHD

Revision RCR

Revision Rotator Cuff Repair: Factors Influencing Results

By Mladen Djurasovic, MD, Guido Marra, MD, Julian S. Arroyo, MD, Roger G. Pollock, MD, Evan L. Flatow, MD, and Louis U. Bigliani, MD

JBJS 2001

Excellent outcomes in those w intact deltoid, good quality tissue, 1 index surgery, good abduction

Revision RCR

Revision Arthroscopic Rotator Cuff Repair: Repair Integrity and Clinical Outcome

JBJS 2001

Single Tendon Young age

Clinical and radiographic factors influencing the results of revision rotator cuff repair

Hertzler RU, Sperling JW, Schleck CD, Cofield RH

Int J Shoul Surg 2013

Good Preop ROM Male Lack of GH OA Higher AHI

Outcomes After Arthroscopic Revision Rotator Cuff Repair

AJSM 2010

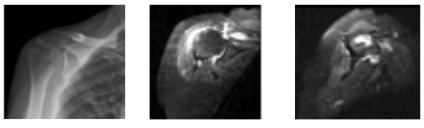
54 patients (59 yo) @ 31 mo Male Abduction > 90 Improved Function and Pain

Is RCR an option for more advanced RCA?

BRASS

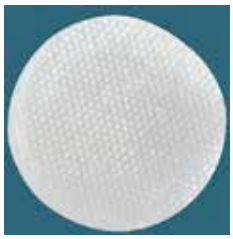
Burkhart Research Association of Shoulder Specialists (8 Surgeons)

- **56 patients w massive RCR**
- **8 AHI < 7 mm and > Grade 3**
- **Primary RCR: Reversed pseudoparalysis**
- **Revison RCR: 40% reduced psuedoparalysis**



ECM Augmentation
Indications

- Young
- Failure
- Chronic changes
- Massive
- Salvage



http://www.depuy.com

Outcomes
LOE 4 - Interposition

An assessment of porcine dermal xenograft as an augmentation graft in the treatment of extensive rotator cuff tears

N=10
80% intact

Long-term successful arthroscopic repair of large and massive rotator cuff tears with a fiberblend and degradable reinforcement device

N=18
83% intact

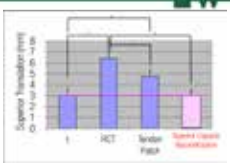
Rotator cuff repair augmentation using a novel polycarbonate polyurethane patch: Preliminary results at 12 months' follow-up

N=10
90% intact

Superior Capsule Reconstruction

Superior Capsule Reconstruction to Restore Superior Stability in Irreparable Rotator Cuff Tears

A Biomechanical Cadaveric Study



Clinical Results of Arthroscopic Superior Capsule Reconstruction for Irreparable Rotator Cuff Tears

25 patients at 2.8 years
Increased AHI
ASES 23→93

Reverse Arthroplasty
RCT w/o OA?

Reverse total shoulder arthroplasty after failed rotator cuff surgery

JSES 2009

42 RSA after Failed RCR w/o OA
12% Complication
5% reoperation

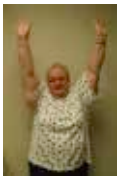
Reverse Shoulder Arthroplasty for the Treatment of Irreparable Rotator Cuff Tear without Glenohumeral Arthritis

JBJS 2010

60 RSA after Failed RCR w/o OA
20% Complication

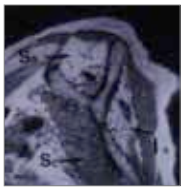
RSA reasonable option for irreparable Cuff tear w/o arthritis if AFE<90, physiologically "old", failed RCR and reduced AHI

How is She Doing Now?



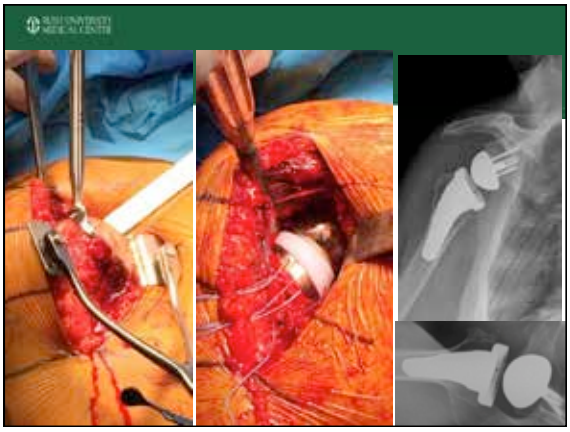
1997

Re-tear?



2010

18 Years Later…."Fall onto R Side"



Summary

- Figure out what they want
- Modify independent variables where possible
- Basic principles
- RSA who have all of the following:
  - > 70 w RCA
  - Anatomic/Physiologic Irreparable
  - Failed ARCR