

Best Practices in Shoulder Surgeries

Chairperson: Ibtehal Kimawi, MD

Monday, March 27th, 2023 2:45-3:30pm



SHOULDER PAIN EVALUATION & NON-OPERATIVE MANAGEMENT

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SHOULDER PAIN EVALUATION & NON-OPERATIVE MANAGEMENT

History

Physical exam

Conservative and Non-operative management

HISTORY OF PRESENT ILLNESS (HPI)

- \circ Hand dominance/occupation
- Location: top/AC joint, side/RC pathology, Front/biceps, Back/GH joint
- Age: >30 Female frozen shoulder, >40 impingement, >50 arthritis
- Mechanism of injury what happened immediately after the injury, prior hx shoulder pain before injury
- Aggravating and relieving factors
- Associated symptoms

PHYSICAL EXAM: Inspection

- Swelling
- Scars
- Ecchymosis
- Deformity
 - o AC joint
 - Squaring of shoulder
 - biceps tendon rupture
 - pec major
 tears/rupture











PHYSICAL EXAM: Inspection

- <u>Muscle atrophy</u>
 - \circ Nerve damage
 - o Disuse
 - $\circ~$ Rotator cuff tear
- <u>Scapular Winging</u>
 - Medial: serratus anterior weak , long thoracic nerve injury
 - Lateral: trapezius is weak, spinal accessory nerve injury





Scapular Winging



PHYSICAL EXAM: Palpation

- AC Joint
- Biceps groove

Examination of the AC Joint When pulling down of the shoulder, if there is a seperation of the AC joint the clavicle will rise and a bump will be seen in the area of the joint. Acromioclavicular Compression Test





PHYSICAL EXAM: Range Of Motion

- Active (AROM) what the patient can do
- Passive (PROM) what the provider can do
- <u>RANGES:</u> Flexion 180 degrees, Extension 60 deg, IR 90 deg w/arm abducted, ER 60-70 deg, Adduction 30 deg, Abduction 180 deg
- 2:1 glenohumeral to scapulothoracic motion in abduction



If active = passive and stiff \rightarrow frozen shoulder If active > passive \rightarrow rotator cuff tear





PHYSICAL EXAM: Strength testing

- Manual Muscle Testing (MMT): grade 0 5
 - TRUE WEAKNESS VS. WEAKNESS DUE TO PAIN
 - Test each rotator cuff tendon/ muscle



Empty can test for supraspinatus





External rotation strength for infraspinatus and teres minor



PHYSICAL EXAM: Special testing

Tests Used in Shoulder Evaluation and Significance of Positive Findings

Test	Maneuver	Diagnosis suggested by positive result
Apley scratch test	Patient touches superior and inferior aspects of opposite scapula	Loss of range of motion: rotator cuff problem
Neer's sign	Arm in full flexion	Subacromial impingement
Hawkins' test	Forward flexion of the shoulder to 90 degrees and internal rotation	Supraspinatus tendon impingement
Drop-arm test	Arm lowered slowly to waist	Rotator cuff tear
Cross-arm test	Forward elevation to 90 degrees and active adduction	Acromioclavicular joint arthritis
Spurling's test	Spine extended with head rotated to affected shoulder while axially loaded	Cervical nerve root disorder
Apprehension test	Anterior pressure on the humerus with external rotation	Anterior glenohumeral instability
Relocation test	Posterior force on humerus while externally rotating the arm	Anterior glenohumeral instability
Sulcus sign	Pulling downward on elbow or wrist	Inferior glenohumeral instability
Yergason test	Elbow flexed to 90 degrees with forearm pronated	Biceps tendon instability or tendonitis
Speed's maneuver	Elbow flexed 20 to 30 degrees and forearm supinated	Biceps tendon instability or tendonitis
"Clunk" sign	Rotation of loaded shoulder from extension to forward flexion	Labral disorder



PHYSICAL EXAM: Special testing

Bigger tears to consider MRI specially if young/traumatic:

- \circ Positive Belly press/lift off testing \rightarrow subscapularis involvement
- \circ ER weakness (compared to other side) \rightarrow supraspinatus/infraspinatus involvement



Bear Hug Test

Belly Press Test

Lift Off Test



PHYSICAL EXAM

DON'T FORGET NECK EXAM!

- Neck ROM
- \circ Spurling test
- MMT, DTR
- Symptoms below elbow Is not from the shoulder



Workshop

SHOULDER PAIN – IMAGING

- 1- X RAYS: to start does not show soft tissue
 - Rule out acute causes (fractures, dislocations)
 - Can show arthritis GH/AC joints
 - Usually negative in RCT , may show bone spurs/calcium deposits
- 2- MRI: superior for soft tissue
 - Not needed to diagnose frozen shoulder
 - $\circ~$ Rotator cuff tears
 - \circ Labral tears
 - Don't overtreat if no symptoms





SHOULDER PAIN – IMAGING

3- ULTRASOUND

- Cheap
- Provides dynamic evaluation
- No radiation risk
- Used for both diagnostic and treatment (US guided injection)
- o Difficult to assess labrum and GH ligaments





CONSERVATIVE MANAGEMENT

NON STERPOIDAL ANTI INFLAMMATORY (NSAIDS)

PHYSICAL THERAPY

- Relieves pain with techniques (heat/cold/TENS)
- \circ $\,$ Improves range of motion $\,$
- Strengthens shoulder muscles
- Corrects poor posture
- o Educates and prevents injuries

INJECTIONS

- Non-image guided
- Image guided (Fluoroscopy/Ultrasound)



TENS - Can be covered by insurance





IMAGE GUIDED INJECTION:

FLUOROSCOPY:

- \circ Radiation risk
- Most insurances require prior authorization
- o Contrast use
- $\circ~$ Does not show soft tissues
- Good for GH and AC joints injection, PNS stimulation and implantation





IMAGE GUIDED INJECTION:

ULTRASOUND

- o Cheap
- Provides dynamic evaluation
- \circ No radiation risk
- Used for both diagnostic and treatment (US guided injection)
- o Difficult to assess labrum and GH ligaments



What is a BURSA?

- Synovial space reducing local attrition and facilitate tendon movement under hard surface.
- o In normal condition, bursa is collapsed barely seen on US
- In acute inflammation, bursa becomes thickened with some effusion – US finding of hypoechoic lesion
- $\circ~$ Can also be seen on MRI



US- GUIDED PROCEDURES:

SUBACROMIAL SUBDELTOID (SASD) BURSA

INJECTION

 subacromial steroid injection is effective up to 9 months and is superior to oral nonsteroidal anti-inflammatory drugs (NSAIDs)*





LONG HEAD OF BICEPS TENDON INJECTION

- Small amount of fluid can be normal
- US can DDx tear/rupture/inflammation
- Can aspirate fluid if large amount •





*Arroll B, Goodyear-Smith F. Corticosteroid injections for painful shoulder: a meta-analysis. Br J Gen Pract 2005; 55: 224-8

US- GUIDED PROCEDURES:

INTRA-ARTICULAR (GH JOINT) INJECTION:

- o For arthritis, frozen shoulder
- Can obtain capsular distension with lidocaine and normal saline for frozen shoulder – better outcome while in PT
- Improves outcome in pain reduction and increases mobility
- Anterior vs posterior



ACROMION-CLAVICULAR JOINT INJECTION

- o Arthritis is the most common reason
- \circ Pain with adduction
- Can be done under fluoroscopy



(a)



(b)



US- GUIDED PROCEDURES:

CALCIFIC TENDINOPATHY

- o More in the supraspinatus tendon
- Can be seen on X-ray/MRI/US
- Cause sharp pain "like a glass."
- US finding well-circumscribed hyperechoic foci.
- o Can be asymptomatic
- Ultrasound-guided percutaneous irrigation (barbotage – lavage -Tenex)









US- GUIDED PROCEDURES:

SUPRA-SCAPULAR NERVE BLOCK:

- Mixed nerve 70% shoulder
- Posterior and superior capsule, AC joint, shoulder ligament
- Patients with degenerative changes, postoperative pain, prior manipulation
- US use decreases the incidence of pneumothorax, nerve damage
- Superior → supra and infra
- Posterior \rightarrow infra only









(b)

23

2023 Work Related Injuries Workshop

PRP (PLATELET RICH PLASMA)

- Inject patient's own plasma-containing platelets and associated growth factors
- Different studies not enough data
- Good for partial rotator cuff tears short term affect
- $\circ~$ (up to 1 year)
- For patients who failed conservative management or can't tolerate corticosteroid
- \circ Not covered by insurance

platelet-rich plasma





THANK YOU







Impingement Diagnosis & Treatment

Alan S. Curtis, MD Boston Sports & Shoulder Center



Impingement

Definition



ANATOMY OF IMPINGEMENT

CONTAINER

- ACROMION
- C.A.LIG.
- AC JOINT

CONTENTS

- ROT. CUFF
- BICEPS
- HUMERUS



CONTAINER

ACROMION

- 3 OSSIFICATION CENTERS
- OS-ACROMIALE
- AXILLARY VIEW

ACROMION SHAPE

- OUTLET VIEW
- BIGLIANI(1986)



ACROMION SLOPE





Hmm, I think I can see what the problem is Sir....

CAUSES OF IMPINGEMENT

• FUNCTIONAL

- LAXITY
- RC DYSFUNCTION
- SCAPULA PROTRACTION
- COMMON WITH POOR POSTURE AND REPETITION



CAUSES OF IMPINGEMENT

STRUCTURAL

- BONE SPURS
 - ACROMION
 - AC JOINT
 - HUMERAL HEAD
- ➤ THICK CA LIGAMENT
 - WITH DOWNSLOPE
- THICKENED RC TENDINOSISOVERHEAD REPITITION





CAUSES OF IMPINGEMENT

POST SURGICAL

- INADEQUATE OR UNEVEN ASD
- PROMINENT HARDWARE
- EXTENSIVE SCAR TISSUE



TREATMENT

STEP 1

- NSAIDS, AND PT
- JOB MODIFICATION

STEP 2

- CORTISONE
- ? REPEAT IF SUCCESSFUL

STEP 3, SURGERY

- EVALUATE CUFF
- DEBRIDE
- SUBACROMIAL "ADJUSTMENT"



SURGICAL TREATMENT

- FUNCTIONAL
- REHABILITATION PROGRAM !!!
 - DEBRIDE, DON'T OVER DO
 - BURSECTOMY
 - SUBACROMIAL ADJUSTMENT
 - POST-OP REHAB
 CRITICAL





SURGICAL TREATMENT

- STRUCTURAL
 - EVAL. ARCH AND RESTORE ANATOMY
 - REMOVE SPURS
 - DEBRIDE / REPAIR RC TEARS
- AVOID IN TRAUMATIC AND MASSIVE RC TEARS
- PRESERVE THE ARCH
- LESS IS BETTER!





2023 Work Related Injuries

Workshop

SUBACROMIAL ADJUSTMENT

- VISUALIZE CA LIG.
- ESTABLISH LATERAL PORTAL
 - SPINAL NEEDLE
 - OPP. POSTERIOR OF
 AC JOINT
 - PARALLEL TO UNDERSURFACE OF ACROMION


SUBACROMIAL DECOMPRESSION





SUBACROMIAL DECOMPRESSION







AC IMPINGEMENT









REVISION ISSUES

- PAIN
- STIFFNESS
- CREPITUS
- INADEQUATE
 DECOMPRESSION
- OVER ZEALOUS ASD
- TOO MUCH DONE ?
 - SLAP REPAIR
 - AC RESECTION
 - BICEPS



SUB ACROMIAL PAIN/STIFFNESS FACTORS

- CUFF-ACROMIAL
 SCAR FORMATION
 - EARLY BLEEDING
 - LACK OF MOTION
- IMPINGEMENT
 - ? ADEQUATE
- ? PROMINENT KNOTS OR HARDWARE
- PILLOW BRACE





REVISION CHALLENGE

IMAGES 1 VIDEOS 0 ARTHROSCOPY

0

-Ver

3000 R P M PORTA



0

<u>*</u>



REVISION CHALLENGE



WORK CAPACITY

- SHOULDER SCOPE
 - CUFF INTACT
- WEEKS 3-6
 - LIGHT USE
 - AVOID REPETITION
- WEEKS 6-12
 - 10 LBS, NO OVERHEAD
- WEEKS 12-16
 - 50 LBS, LIGHT OVERHEAD
 PROGRESS TO FULL DUTY



EDUCATION IS EVERYTHING !!!

Save The Deltoid!





Demographics

- Rotator cuff tears are a common source of shoulder pain and decreased motion
- Prevalence of rotator cuff disease increases with age
- Tears can be present in both <u>symptomatic and asymptomatic individuals</u>
- Possible reasons for the development of <u>symptoms</u> include:
 - Trauma
 - Increase in tear size
 - Conversion of partial tear to full thickness tear
 - Development of fatty infiltration or atrophy
 - New biceps pathology



Anterior view

- Prevalence Ranges
- 50's 13%
- 80's 50%
- The societal burden of rotator cuff disease can be substantial
- A rotator cuff repair procedure could result in a cost savings of up to \$78,000



Anatomy and Function

- Area of insertion of greater tuberosity is sizeable
- Supraspinatus footprint is smaller than the infraspinatus
- Medial to lateral distance is on average <u>14.7 mm</u> (Dugas et al.)
- Subscapularis footprint is largest/trapezoidal in shape with medial to lateral width of 17.9 mm on lesser tuberosity





Subscapularis insertion

2.45 cm

Diagnosis

- 1. History (trauma, chronicity, characteristics of pain)
- 2. Physical exam (ROM and strength) Provocative tests isolating each muscle tendon unit





Imaging: Xray

Looking for:

- Acromiohumeral distance
- Calcific tendonitis
- Acromion type/presence of os acromiale
- Other potential pain generators
 - Arthritis







Imaging: MRI

- Diagnostic standard to evaluate rotator cuff pathology
- Tear characteristics: size, shape, amount of tendon retraction
- Fatty infiltration and atrophy on T1 sagittal
- Medial subluxation of biceps tendon → subscapularis pathology
- Other potential pain generators





Ellman Classification for Partial Rotator Cuff Tears

- Grade 1 <25%
- Grade 2- 25-50%
- Grade 3- >50%



Ellman classifications for (A) grade 1 (<25%), (B) grade 2 (25%-50%), and (C) grade 3 (>50%) partial-thickness tears.

Full Tear Classification: Tear Size

Small	<1cm
Medium	1-3cm
Large	3-5cm
Massive	5cm+

Classification: Tear Shape

Fable 3							
Classification of Posterosuperior Cuff Tear Patterns ^{3,4}							
Tear Pattern	AP Length (cm)	Medial-lateral Length (cm)	Inherent Mobility	Repair Technique	Prognosis		
Crescent	<2	<2	Excellent (medial- lateral)	Repair directly to bone	Good to excellent		
U- or L-shaped	<2	>2	Excellent (AP)	Margin convergence	Good to excellent		
Massive, contracted, immobile	>2	>2	Minimal	Interval slide/partial repair	Fair to good		
Cuff arthropathy	NA	NA	NA	Reverse arthroplasty	Fair to good		

AP = anterior-posterior, NA = not available

Millett and Warth JAAOS 2014 from Burkhardt study published in Arthroscopy 2010

Classification: Tear Shape



Millett and Warth JAAOS 2014 from Burkhardt study Arthroscopy 2010

3D Tear Shape

- Tension free repair to anatomic footprint
 → restore normal force couples
- Techniques like margin convergence and interval slide to cover humeral head



Figure 8. U-shaped rotator cuff tear. A superior view of a U-shaped rotator cuff tear involving the suprespinatus (SS) and infraspinatus (S) tendons; B, U-shaped tears demonstrate excellent mobility from an anterior-to-posterior direction and are initially repaired with side-to-side sutures using the principle of margin convergence; C, the repaired margin is then repaired to bone in a templon-tee manner.



Figure 9. Acute L-shaped rotator cuff tear. A, superior view of an acute L-shaped rotator cuff tear involving the supraspinatus tendon (SS) and rotator interval (RI); B, the tears should be initially repaired along the longitudinal split; C, the converged margin is then repaired to bone. IS, infraspinatus; Sub, subscapularis tendon; CHL, coracohumeral ligament.

Classification: Cuff Atrophy (Goutallier)

Grade	Amount of Fat in Muscle		
Grade 0	Normal muscle		
Grade 1	Muscle contains some fatty streaks		
Grade 2	Fatty infiltration, but still more muscle than fat		
Grade 3	Equal amounts of fat and muscle		
Grade 4	More fat than muscle is present		

Classification system of fatty muscle atrophy as developed by Goutallier et al [14].

Classification: Cuff Atrophy (Goutallier)



Natural History- Tear Progression Keener, JAAOS 2019

Partial RC tears

- 2 year- 11%
- 5 year- 35%

Full thickness RC tears

- 2 year- 22%
- 5 year- 50%
- Tear Severity and Hand Dominance were greater risks tear progression





Goals of Treatment

- Reduce pain
- Increase strength and Range of Motion
- Restore normal force couples
- Biologic healing of tendon to bone
- Nonoperative Management with Physical Therapy
 - Low/mid grade partial tears
 - Chronic tears with atrophy
 - Medically ill
 - Unable to comply with post op restrictions and therapy



Treatment of Nontraumatic Rotator Cuff Tears

A Randomized Controlled Trial with Two Years of Clinical and Imaging Follow-up

Juha Kukkonen, MD, PhD, Antti Joukainen, MD, PhD, Janne Lehtinen, MD, PhD, Kimmo T. Mattila, MD, PhD, Esa K.J. Tuominen, MD, PhD, Tommi Kauko, MSc, and Ville Äärimaa, MD, PhD

Investigation performed at the Department of Orthopaedics and Traumatology, Turku University Hospital, Turku, Finland; the Department of Orthopaedics and Traumatology, Kuopio University Hospital, Kuopio, Finland; and the Department of Orthopaedics and Traumatology, Hatanpää Hospital, Tampere, Finland

- Purpose: Compare the effectiveness of physiotherapy, acromioplasty, and rotator cuff repair for this condition
- Methods: 180 symptomatic, non-traumatic supra tears randomized into three groups: physiotherapy, acromioplasty and physiotherapy, RCR, acromioplasty, and physiotherapy. ASES, VAS, satisfaction, RCR integrity, cost
- Results: 160 patients. No significant difference in Constant scores amongst groups
 - No significant differences in VAS, and patient satisfaction,
 - RCR more expensive

<u>Conclusion: Conservative treatment reasonable option for primary</u> <u>initial treatment of isolated, symptomatic, nontraumatic, ss tears in</u> <u>older patients.</u>

Small tears, non-op group progressed in size

Indications for Surgical Repair:

- Indications
 - Traumatic tears
 - Chronic or Partial tears that do not improve with PT
 - High demand work
 - Very high grade partial tears
 - *≫*75-80%



Tendon Healing:

- Repaired tendon initially forms fibrovascular scar with abundant type III collagen → weaker than type I collagen
- Repairs are more prone to failure than native tendon-bone insertion (Bedi et al)



Ideal Repair for Effective Tendon to Bone Healing:

- Restoration of footprint contact area
- Appropriate compression of the tendon on the footprint
- Minimal motion at bone-tendon interface (Ranalletta et al)





2023 Work Related Injuries

Arthroscopic Approach

Advantages

- Deltoid muscle sparing
- Less scar tissue
- Better visualization of tear patterns
- Can see biceps/labral pathology which can be pain generators







Full Tear Video



Single Row Technique

- Single row repair:
- Fewer anchors \rightarrow lower cost
- Anchors placed off the articular margin
- Does not fully re-produce the tendon insertion site (46 to 71% according to Meier et al.)
- Less pressurized contact area



Double Row Technique

- Wider footprint contact area
- Superior resistance to gap formation
- Improved time zero strength and stiffness compared to single row construct
- Questionable improvement in clinical outcomes compared to single row repairs, but lower retear rates (Millett et al.)



Single-Row or Double-Row Fixation Technique for Full-Thickness Rotator Cuff Tears: A Meta-Analysis

Qiang Zhang^{1,2}⁹, Heng'an Ge^{1,2}⁹, Jiaojiao Zhou^{1,2}, Chaoqun Yuan^{1,2}, Kai Chen^{1,2}, Biao Cheng¹*

1 Department of Orthopedics, Shanghai Tenth People's Hospital, Tongji University School of Medicine, Shanghai, China, 2 First Clinical Medical College, Nanjing Medical University, Nanjing, China

- Meta-analysis of level I and II studies
- Did subgroup analysis based on tear size
- No difference in clinical outcomes between SR and DR when tear size less than 3 cm
- ASES and UCLA scores markedly lower in SR repairs with tear size greater than 3 cm
- More partial thickness re-tears in SR repairs (full thickness re-tears no difference) again for tear size greater than 3 cm



How do I decide which technique?

- Tear Pattern
- Mobility
- Bone quality
- Size of the tear



Interpreter Tendon Louis (Interpreter Tendon Louis (Interpreter Tendon)

Rehabilitation

- Sling 4-6 weeks and physical therapy
 - Desk work only
 - Can use hand and wrist only
- 6 weeks begin active assist
 - Still light duty no lifting
- 8-10 weeks active motion
 - May lift very light 2-5 pounds no overheaed
 - 4-6 month recovery
- Improvements up to 1 year
 - May need to consider work conditioning at the end of PT




Things to Consider

- There are many variables at play when it comes to optimizing chances for successful healing (patient factors, tissue quality, tear characteristics)
- There is no one right answer. Must be flexible and know options available
- Goal should be to provide tension free mechanical stability. Attempt to restore native anatomy when possible
- Be mindful of ways to augment repair if warranted



THANK YOU





Surgical Options Following Failed Rotator Cuff Repair

Peter S. Vezeridis, MD Orthopaedic Surgeon Excel Orthopaedic Specialists Woburn, MA

Lissa & D

Introduction

Failed Rotator Cuff Repair

- Challenging problem
- Younger, active patient population
- High failure rates after repair of massive, retracted RCTs
- Multiple surgical treatment options
 - Advantages
 - Disadvantages
- No single treatment has been demonstrated to be an optimal solution



Patient Factors

- Age
- Activity level
- Profession
- Extent of disability
- Medical co-morbidities
- Degree of joint arthropathy





Presentation

Highly Variable

- Pain
- Weakness
- Motion loss
 - Active
 - Passive
- Patients may complain of one or more of these symptoms
 - Which symptom(s) are most limiting to the patient
 - What are the patient's needs, goals



Treatment Options

- Debridement / Partial Repair / Augmentation
- Superior Capsular Reconstruction
- Subacromial Balloon Spacer
- Tendon Transfer
- Reverse Shoulder Arthroplasty



Debridement / Partial Repair / Augmentation

- Low risk
- Good outcomes are possible
- Unpredictable
- Does not restore full strength



Partial Repair

Partial Repair of Irreparable Rotator Cuff Tears

Stephen S. Burkhart, M.D., Wesley M. Nottage, M.D., Darrell J. Ogilvie-Harris, M.D., Harvey S. Kohn, M.D., and Anthony Pachelli, M.D.

- 14 pts
- Forward elevation: 59.6° \rightarrow 150.4°
- Strength improved ave 2.3 grades
- UCLA: 9.8 → 27.6
- 13/14 "very satisfied"

Arthroscopy 1994

Partial Repair

Arthroscopic Partial Repair of Irreparable Rotator Cuff Tears: Factors Related to Greater Degree of Clinical Improvement at 2 Years of Follow-Up

Kun-Hui Chen, M.D., En-Rung Chiang, M.D., Ph.D., Hsin-Yi Wang, M.D., and Hsiao-Li Ma, M.D.

- 37 pts, mean f/u 29.6 mo
- VAS: 5.22 → 1.51, ASES: 46.0 → 78.6
- Incidence of night pain: 70.3% \rightarrow 8.1
- 41.6% rate of repair failure at mean 6.4 mo f/u
- Conclusion: Arthroscopic partial repair of irreparable RCTs is an effective treatment to improve the shoulder function and decrease the pain, despite the high repair failure rate. Pts with lower preop functional score, higher VAS score, or night pain experienced a greater degree of functional improvement.

evel of Evidence: Level IV, therapeutic case series

Work Related Injuries

Workshop

Partial Repair

- 31 patients at final follow-up (>2 years postoperatively)
- Outcomes deteriorated over time
- 48% dissatisfied
- Only preop affecting final patient-rated satisfaction was teres minor fatty infiltration
- Arthroscopic partial repair may produce initial improvement, but half of patients were dissatisfied at final f/u.

Shon AJSM 2015



Partial Repair

- Can be effective
- Results may deteriorate with time
- Reserve for older, lower demand patients

Superior Capsular Reconstruction

- Mihata 2012
- Reconstruct the superior GHJ capsule
- Prevent superior migration of the humerus
- Fascia lata autograft
 - Superior glenoid medially
 - Greater tuberosity laterally
- Suture any residual RC to the graft
- Optimize the force couples for arm elevation
- Acellular dermal allograft





Superior Capsular Reconstruction

- Advantages
 - Arthroscopic procedure
 - Limited/no donor site morbidity
- Disadvantages
 - Static
 - Does not improve RC muscle strength

Superior Capsular Reconstruction

- Described by Mihata in 2013 thick fascia lata autograft anchored to medial glenoid and lateral cuff footprint
- Side-to-side repair to infraspinatus and subscapularis
- Initial results were excellent with improvements in elevation and a 16.7% re-tear rate



Superior Capsular Reconstruction

- Advantages
 - Arthroscopic procedure
 - No donor site morbidity
- Disadvantages
 - Static
 - Does not improve RC muscle strength

Superior Capsular Reconstruction

- Reconstruct the superior GHJ capsule
- Prevent superior migration of the humerus
- Fascia lata autograft
 - Superior glenoid medially
 - Greater tuberosity laterally
- Suture any residual RC to the graft
- Optimize the force couples for arm elevation
- Biomechanically, superior humeral translation was restored fully after SCR

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

A Biomechanical Cadaveric Study

Teruhisa Mihata,^{*†‡§} MD, PhD, Michelle H. McGarry,^{†‡} MS, Joseph M. Pirolo,^{†‡} MD, Mitsuo Kinoshita,[§] MD, PhD, and Thay Q. Lee,^{†‡} PhD

AJSM 2012

Superior Capsular Reconstruction

Initial Results

- Excellent initial clinical results
- 24 shoulders (23 patients), 34.1-month follow-up (24 to 51 months)
- Active elevation: 84° to 148°
- ER: 26° to 40°
- AHI: 4.6 mm to 8.7 mm
- ASES score: 23.5 to 92.9
- 83.3% intact graft

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

Teruhisa Mihata, M.D., Ph.D., Thay Q. Lee, Ph.D., Chisato Watanabe, M.D., Ph.D., Kunimoto Fukunishi, M.D., Mutsumi Ohue, M.D., Tomoyuki Tsujimura, M.D., and Mitsuo Kinoshita, M.D., Ph.D.

Arthroscopy 2013



Superior Capsular Reconstruction

Initial Results

- 59 patients, ave 62 y/o, min 1 year follow-up
- ASES score 43.6 → 77.5
- VAS 5.8 → 1.7
- SSV 35.0 → 76.3
- FF 130° → 158°, ER 36 → 45, IR L3 → L1
- AHD 6.6 mm \rightarrow 7.6 mm at 2 weeks postop but was not maintained at >1-year follow-up,
- Postop MRI revealed only 45% graft healing rate at final follow-up
 - Healing correlated with better outcomes
- Significantly greater prevalence of preop subscapularis atrophy in the nonhealed group
- 74.6% "success"

Preliminary Results of Arthroscopic Superior Capsule Reconstruction with Dermal Allograft

Patrick J. Denard, M.D., Paul C. Brady, M.D., Christopher R. Adams, M.D., John M. Tokish, M.D., and Stephen S. Burkhart, M.D.

Arthroscopy 2018

Superior Capsular Reconstruction

- 54 patients, minimum 1-year f/u, mean 24 mo
- 20.4% clinical failure
- Higher failure rate: female sex, subscapularis tear
- Trend towards higher failure: elevated BMI, lower preop FF, lower preop AHI

Arthroscopy 2021

Patient Factors Associated With Clinical Failure Following Arthroscopic Superior Capsular Reconstruction

Ron Gilat, M.D., Eric D. Haunschild, B.S., Brady T. Williams, M.D., Michael C. Fu, M.D., Grant E. Garrigues, M.D., Anthony A. Romeo, M.D., Nikhil N. Verma, M.D., and Brian J. Cole, M.D., M.B.A.



Superior Capsular Reconstruction

- 35 shoulders
- Improvements in all outcomes scores
- 62% graft failure by MRI
- Graft healing did not effect outcome scores
- Clinical improvement may be secondary to partial repair, debridement, biceps management

JSES 2021

Evaluating the role of graft integrity on outcomes: clinical and imaging results following superior capsular reconstruction

Mark W. LaBelle, MD^{a,b}, Sunita Mengers, MD^{a,b},*, John Strony, MD^{a,b}, Matthew Peck, MD^c, Robert Flannery, MD^{a,b}, Sean Cupp, MD^{a,b}, Michael J. Salata, MD^{a,b}, Eric M. Parsons, MD^d, Robert J. Gillespie, MD^{a,b}



Subacromial Balloon Spacer

- Humeral head depressor
- Optimal indication: isolated, irreparable SS tear with superior migration and intact force couples
- CA arch should be intact
- Short procedure, low-risk
- Absorbs over 12 months, ? longevity



Lower Trapezius Tendon Transfer

- LT = ideal transfer option
 - Origin is cranial to the latissimus dorsi and medial to the infraspinatus fossa of the scapula
 - Nearly identical line of pull as the infraspinatus
 - Excursion and tension forces very similar to infraspinatus
 - EMG study showed synergistic ER activation (in-phase)



Lower Trapezius Tendon Transfer

- More anatomic tendon transfer option
- Arthroscopically-assisted technique
- Good short-term results
- Promising treatment option for younger patients with massive irreparable PS rotator cuff tears



Results

- 33 patients with massive irreparable PS tears
 - Final follow-up of almost 4 years
 - 97% of patients with significant improvement in pain, SSV, and DASH score
 - SSV: 54% to 78%
 - DASH: 52 to 18
 - Mean ROM improvements
 - Forward flexion 50°
 - Abduction 50°
 - ER 30°
 - More significant ROM gains in patients with > 60° of preoperative flexion

Elhassan BT et al. Outcome of lower trapezius transfer to reconstruct massive irreparable posterior-superior rotator cuff tear. J Shoulder Elb Surg. 2016;25(8):1346–53.

Results

- 14 patients (8 men, 6 women; mean age of 62 years, range: 50-70)
- Mean 24 months f/u
- ER gain
 - 24° with arm at side
 - 40° in 90° of abduction
- Constant-Murley score: 35 to 60 points
- SST: 3.5 to 7.5
- SSV: 30 to 60%
- VAS pain: 7 to 2
- Resolution of lag sign and hornblower sign
- Complications: 2 hematomas, 1 revision for infection

Valenti P, Werthel JD. Lower trapezius transfer with semitendinosus tendon augmentation: Indication, technique, results. Obere Extrem. 2018;13(4):261-268.

Reverse Shoulder Arthroplasty

- Typically restores a good amount of shoulder function
- Excellent pain relief
- Overall rapid recovery
- Irreversible step
- High early failure rate in younger patients



Thank You!



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