Management of Anterior shoulder Dislocation in an 18 year old contact athlete

- Russell Warren M.D.
- Professor of Orthopedics Weill Cornell Medical College
- Surgeon in chief emeritus Hospital for Special Surgery

Conflicts
- Biomet Royalty TSR
- Cayenne stock
- Ivy Sports Stock

Anterior Instability in Contact athletes
- When to perform open surgery???????
Arthroscopic stabilization in Contact Athlete: better results in NFL why?

- Age!!!!!! Mid 20's in NFL
- Why few recurrences pre op
- early treatment in most
- Subluxations in most
- Good labral tissue and capsule
- Not loose jointed or lax
- No significant bone loss

Contact athlete - Anterior stabilization

- Arthroscopic vs open
- Age of athlete < 20 recurrences increase
- Capsular laxity increase failure
- Bone loss increase failure
- Contact athlete—increased failure
- Multiple dislocation----Increased failure
- Thus in these players an open procedure is more predictable

Results by Age Voos J. et AJSM 2010

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<td>6.3*</td>
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* = p is 0.050 vs other age groups
** = p is 0.042 vs. other age groups
Results by Dislocation #

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<td>Tear Size</td>
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<td>1 of 22</td>
<td>6 of 26</td>
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<td>Post-op ASES</td>
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<td>84.3</td>
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<tr>
<td>Pt Satisfaction</td>
<td>9.1</td>
<td>7.43 (p=0.01)</td>
<td>6.74 (p=0.006)</td>
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Timing of Surgery

Porcellini, JBJS-A 2009

- 385 patients arthroscopic Bankart
- 31 pts (8.1%) had recurrence by 3 yrs
- Risks for recurrence:
  - Age < 22 at first dislocation.
  - Male
  - Injury-to-surgery >6 mo

Risk factors: failure of arthroscopic management

Recurrence following Shoulder Stabilization

- Open Stabilization
  - Pagnani and Dome --- 3.4%
  - Bigliani et al ------ 2.9%
  - Rowe et al ------- 3.5%
- Arthroscopic Stabilization
  - Speer et al --- 22%
  - Caspari et al ~ 20%
  - Oneill et al --- 12%
  - Bacilla et al ---- 7.5%
  - Burkhart et al --- 10.8% (6.5% nob)
  - Savoie et al ----- 3% (if < 23 = 7%)
Medial Longitudinal Capsulotomy Has Been Performed in Line With Glenohumeral Articulation – Pagnani M. JBJS failure rate in contact sports\(=2\%\)
3 Suture Anchors With Needles (BioRaptor - 2.3mm) Placed in Glenoid Rim At 45 Degree Angle

Sutures Have Been Passed Through Medial Edge of The Lateral Sided Capsule Which Is Now Being Reduced Back Towards Glenoid Rim
Capsule Split Longitudinally Adjacent to Insertion Into Humeral Head
Horizontal Component Approximately at Level of Rotator Interval

3 Suture Anchors Again Placed (BioRaptor -2.3mm) in Glenoid Rim At 45 Degree Angle

Sutures From Anchors on Glenoid Rim Passed Out Through Medial Capsulolabral Complex Which Is Then Tied Down At This Site

A Superolateral Capsular Shift is Then Performed With Excision of Any Redundant Capsule From the Lateral Edge Before Attaching It Back to The Humeral Side With 2.9mm BioRaptor Suture Anchors
Open Rx of Shoulder Instability

- Pagnani M. JBJS 2002 p. 711
- 58 football players open repair ave. age = 18, recurrent episodes = 3-25, follow up at >2yrs
- Bone lesion: HS=19 and boney Bankart = 5
- Repair Bankart = 46, capsular laxity = 16 Rx with T plasty

Open Rx of Shoulder Instability

- Pagnani M. JBJS 2002 p. 711
- Return to football 52/58
- Recurrence = 2 patients subluxation – no dislocations, neither had a Hill Sachs one had a boney Bankart
- Loss of motion = 8\(^\ast\) at 90 96vs 104

Scope vs open stabilization
A systemic review

- Chambers P. et al arthroscopy 2014
- 8 meta-analysis selected
- Studies 2004-2013 1=level1, 6=1-3, 1=1-4
- Studies report on 184-1781 pts at 24-136 mo
- 2 studies < 2007 favor open : 3 after are =
Anterior Shoulder Stabilization Open vs Scope

- Mohtadi, N et al JBJS Mar 2014
- Randomized controlled study With 98 patients in each group
- Scope vs open experience control
- 2 exp. surgeons vs 3 scope 2001-2008
- Exclude patients with glenoid fractures
- Contact athletes Scope=55% vs 44%

Anterior Stabilization Montadi N et al JBJS 2014

- Results open Scope
  - ASES 88------ 85
  - Rom no diff
  - Recurrence 11% 23%
  - Recurrence 26% 38%
  - Age<25 and Hill Sachs

Open vs arthroscopic anterior Stabilization in the contact athlete

- Open
- Young < 20
- Multiple dislocations
- Hyperlaxity
- Bone loss >5-10% graft if >25%
- Anterior capsular rupture
- You can perform scope repairs in those who are left
Questions for Open Anterior Stabilization in the contact Athlete

1. Which factors if present will have a negative affect on the outcome of an arthroscopic stabilization in a contact athlete with a history of Dislocation

- 1. Age <20
- 2. multiple recurrences
- 3. loose jointed
- 4. bone loss
- 5. all of the above

Humeral Head Defects

- Hill sachs
- Large defects (>40% humeral head diameter) and "engaging" Hill Sachs require reconstruction
Arciero, et al - Acute Dislocation

26 Cadets
19 at 1 yr - 18 - ex - g
49 shoulders
12% fail
poor capsule
2 + sulcus sign
bilateral
ARTHROSCOPIC RECONSTRUCTION OF THE CONTACT ATHLETE

Felix H. Savoie III, M.D.
Lee Schlesinger Professor
Shoulder Elbow Sports Surgery
Tulane University, New Orleans, LA
COI

- Royalties: none
- Stock: none
- Consultant: DePuy Mitek, Smith & Nephew, Exactech, Rotation Medical, Biomet sports
- Board: AANA EF and JBOT; J wrist surgery
HISTORY & PHYSICAL EXAMINATION

- HISTORY: GO BACK TO FIRST DISLOCATION:
  - Force to dislocate?
  - Laxity?
  - Time spent dislocated

Physical exam: apprehension, laxity,
DIAGNOSIS: IMAGING

- Plain radiographs
- Bernageau view
- CT scan +/- 3D reconstruction
- MRI/MRA
OPTIONS IN THE CONTACT ATHLETE

• Arthroscopic reconstruction: labral repair vs actual reconstruction?
• Open Bankart: split vs tenotomy
• Bone transfer: Bristow vs Latarjet with/without labral repair
ARTHROSCOPIC REPAIR: WHEN?

- Bone loss less than 20%
- Tissue available for reconstruction
- Where are your best technical skills?
- Arthroscopy allows more corrective surgery if you look for and repair all pathology
PRINCIPLES OF EFFECTIVE INSTABILITY SURGERY

- Instability is a **vertical** problem; Superior capsular shift essential
- Restoration of normal anatomy is the goal: find & repair the bone lesion
- Lateral position makes inferior work easier
ANTERIOR INSTABILITY: SURGICAL PRINCIPLES

1. Assess all pathology

2. Releases: capsule moves inferiorly and medially and is not the only problem
   - Free capsule off subscap & past 6 o’clock but preserve its attachments to bone fragments

3. Prepare healing bed
TECHNICAL GUIDELINES:

- Sutures always “1 hour” below anchor and start at bottom
- Inferior repair essential - sutures are @ 7,6 and 6,5
- 3 or more evenly spaced double loaded anchors: usually 5-3-1
- Anchors “Cornered” on glenoid neck-face junction: never on face or neck
Preserve & elevate bone lesion
  - Inferior / medial on glenoid neck
  - Elevate – best from ant / inferior
  - View from anterior – sup portal
BONE LESION: INFERIOR REPAIR

- 5 o’clock anchor
- Mattress stitch at 7/6:30
- mattress stitch at 6/5:30
- Should all be inferior to fragment & shift capsule
MANAGE THE HILL-SACHS DEFECT

- Small: Ignore it: A good repair will eliminate it from view
- Remplissage:
  - Transfer the Infraspinatus into the defect to make it extra-articular
  - Adds stability by also tightening posterior capsule
Remplissage for Hill-Sachs

- Overtap to place RC anchor
- Sutures penetrate IS tendon and capsule on a line straight back from medial defect
- Tighten after inferior anchors placed and tied
MIDDLE BIOFEEDBACK REPAIR

- Second (3 O’Clock) anchor
  - Into base of defect
  - Oblique mattress sutures in capsule and labrum
  - Bone fragment: “mattress” & circlage the fragment into place
SUPERIOR REPAIR

- Top (1 o’clock) anchor
  - Arthroscope moves back to posterior viewing portal
  - Repair SGHL and MGHL each with its own mattress sutures
INTERVAL CLOSURE?

- Rarely necessary in primary cases; can be helpful in truly lax or “high risk” individuals
- Keep arm at 90° ER while tying to prevent motion loss
- 2 layer closure: plicate SGHL to CHL (not MGHL to SGHL)
WHAT ABOUT “HIGH RISK” PATIENT AND ISIS Score?

MY EARLY SERIES

• 662 pts with traumatic instability
• 95% success rate
• 35 failures
  – No correlation to activity level or ISIS score

MCCABE ET AL

• Moderate bone loss patients (>10% < 25%) had 0% failures in primary cases with combined reconstruction/remplissage
  – Isn’t that this patient?
• Weber: 2014: no correlation
COMPLICATION OF OPEN BANKART: SUBSCAPULARIS INSUFFICIENCY!

Sachs et al AJSM 30 pts with primary open Bankart had subscapularis insufficiency
Scheibel (Habermyer) AJSM 2006 53% of primary and 91.6% revision instability cases had subscapularis insufficiency
Terrible complication in a young patient: Pec transfer only solution
CONCLUSION: ANTERIOR INSTABILITY WITH BONE LOSS

- Arthroscopic repair is successful. You must work inferiorly first (easier in lateral position).
- Open Bankart is a great operation BUT not easy and not without potential problems.
- Do your best surgery the first time-whatever technique-to get the best results.
THANK YOU
Dilemmas of the Throwing Shoulder – The Biceps

Tenodesis for Type II SLAP Tears

Disclosures:

1. Royalties: Arthrex, Elsevier
2. Consultant: Arthrex
3. Miscellaneous Support: Arthrex
4. Basic Science/Research Support: Arthrex, Smith and Nephew, Ossur, Miomed, DJOrtho, Conmed Linvatech, Athletico
5. Editorial Board: Orthopedics Today (Chief Medical Editor), Journal of Shoulder and Elbow Surgery, Techniques in Shoulder and Elbow Surgery, Techniques in Sports Medicine, Sports Health, Orthopedics
6. Publisher Support: Elsevier (Textbook), Orthopedics Today

Superior Labrum – Biceps Complex

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Chicago, Illinois
www.shoulderelbowsports.com
What is the precise biomechanical event leading to SLAP Lesion?

Type II SLAP

Type II with Posterior Extension
Failed SLAP Repair

Knotless Suture
Anchor Fixation

Evidence:
Arthroscopy 2010

Systematic Review
The Outcome of Type II SLAP Repair: A Systematic Review
Kalyan Gorantla, M.S., Casey Gill, M.D., and Rick W. Wright, M.D.

Baseball Players: RTP = 22% to 64%

Results of Type II SLAP repair: much less predictable in throwing and overhead athletes

Dilemmas of the Throwing Shoulder – The Biceps

Evidence: CORR 2012

Return to Play After Type II Superior Labral Anterior-Posterior Lesion Repairs in Athletes: A Systematic Review.
Sayde, Cohen, Cicotti, Dodson

Methods:
Type 2 SLAP Lesions
2 year follow-up
506 Patients, 14 studies
198 Overhead Athletes
81 Baseball Players
Repair:
Anchor: 327

Results:
Only 63% of Overhead athletes
83% “good-to-excellent”
73% Returned to previous level of play

Outcome of Type II Superior Labral Anterior Posterior Repairs in Elite Overhead Athletes

Effect of Concomitant Partial-Thickness Rotator Cuff Tears
Bryan H. Niel, MD, Neal S. Goldwasser, MD, Kevin C. Orseck, MD, Karen Math, MD, and Lewis A. Yoors, MD

• Level of Evidence: IV
• 23 Elite Pitchers, mean 38 month F/U
• 57% Returned to their pre-injury level of competition
• Return correlated with partial RCT
• KJOC Score – 9 excellent, 3 good, 4 fair, 7 poor
The American Journal of Sports Medicine
Vol. 35, No. 1, 2011

SLAP tears: Incidental in pitchers?

• 21 asymptomatic pitchers underwent MRI in preseason. 48% had SLAP “tears”

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<th>Innings Pitched, Median (Range)</th>
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MRI Findings
Correlation With Innings Pitched

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</table>


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Elite Overhead Athletes

• The concern of a “SLAP” has dramatic consequences
  – Continued symptoms
  – Return to play

Clinical Study
Retrospective Analysis of Arthroscopic Superior Labrum Anterior to Posterior Repair: Prognostic Factors Associated with Failure

Rachel M. Frank,1 Shane J. Nho,1 Kevin C. McGill,1 Robert C. Grunnet,1 Brian J. Cole,1 Nikhil N. Verma,1 and Anthony A. Romeo1

2 Division of Sports Medicine, Department of Orthopaedic Surgery, Rush University Medical Center, 3400 W Harrison Street, Suite 350, Chicago, IL 60618

Advances in Orthopedics  2013

Poor Prognostic Factors
(ASES < 50)

• Social Factors
  • Age > 40
  • Alcohol use
  • Tobacco use
  • Heavy lifting at Work

• Preoperative Tests
  • Pain in Bicipital groove
  • + O’Brien’s Test
  • + Speeds Test
  • + Yergason’s Test

Risk of revision surgery had a significant association with age less than 20 years and throwing activity

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37% Failure Rate

Outcomes: SLAP Repair

• Reason? Poor outcome is due to persistent pain
  – Too tight?
  – Loss of normal motion/function of superior labrum?
  – Poor Healing Capacity?
  – Hardware Complications?

Retained biceps a pain generator?

Debride? Revise Fixation?

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Biceps?

Pain Generator

Pathology

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FUNCTION?
EMG versus BIOMECHANICS

EMG suggests minimal role
Biomechanics suggest role as secondary stabilizer

Treatment: Biceps Tenotomy

Is anything else indicated?

Arthroscopic Release of the Long Head of the Biceps Tendon
Functional Outcome and Clinical Results

• 54 patients
• Scoring Scales: “70’s”
• 70% “popeye” sign
  – > 80% of men
  – 36% of women
• 38% - fatigue discomfort
Conclusions:

- Only major difference is cosmetic deformity with tenotomy alone
- No evidence that one is clinically superior
- "Patient factors should guide the surgeon"

PERSONALLY, I can not recommend Tenotomy for:

- Athletic population
- Workers compensation or legal patient
- Anyone concerned about cosmesis

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Proximal Biceps Tenodesis: Where?

- "Original" Interference screw Arthroscopic Technique
  Romeo AA, Mazzocca AD, Tauro JC. Arthroscopy 2004

- SubScapularis

- "New SupraPectoral Technique"

- SubPectoral Technique
  Mazzocca AD, Rios CG, Romeo AA, Arciero RA. Arthroscopy 2005

Subpectoral Tenodesis

Technical Note

Subpectoral Biceps Tenodesis With Interference Screw Fixation

Augustus D. Mazzocca, M.D., Clifford G. Rios, M.D., Anthony A. Romeo, M.D., and Robert A. Arciero, M.D.

Arthroscopy 2005

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Clinical Outcomes After Subpectoral Biceps Tenodesis With an Interference Screw

Augusta D. Mazzucco, MB, MD, Mark P. Cole, PT, Cristina L. Aronson, Anthony A. Romeo, MD, and Robert A. Aronson, MD.


Complications associated with subpectoral biceps tenodesis: Low rates of incidence following surgery

Shane J. Kho, MB, BS, Stefanie N. Reiff, MD, and Anthony A. Romeo, MD.

Complication Rate → 2% (7/353)

Mean age: 45 years (57% male)

Complications:
- Persistent pain (2)
- Failure of fixation (2)
- Infection (1)
- Musculocutaneous neuropathy (1)
- RSD (1)

How does this affect shoulder performance?

• Superior labrum tear and the impact of a subsequent biceps tenodesis?
Dilemmas of the Throwing Shoulder – The Biceps

The Role of the Superior Labrum Following Biceps Tenodesis in Glenohumeral Stability

Role of the superior labrum after biceps tenodesis in glenohumeral stability

Both anterior & posterior Type II SLAP lesions led to significant increases in glenohumeral translation

+ Increased Laxity, not “pseudo-laxity”

Bicep Tenodesis did not significantly impact glenohumeral translation compared to the lesion state

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Conclusions

- Biceps tenodesis was found to have no deleterious effects on glenohumeral stability in presence of SLAP

- Repair of anterior based SLAP lesion does not restore glenohumeral translation to baseline

- May be important to address the anterior capsuloligamentous complex with adjunctive measures during the surgical repair of anterior lesions

Postoperative Restoration of Upper Extremity Motion and Neuromuscular Control During the Overhand Pitch: Evaluation of Tenodesis and Repair for Superior Labral Anterior-Posterior Tears
*J Am Soc Shoulder Elbow Surg* 2014; 23(1): 17-29

Upper Extremity Motion In The Overhand Pitch: Evaluation Of Tenodesis And Repair For SLAP Tears
Rush University Medical Center, Chicago, IL
Both BT and SLAP repair can restore neuromuscular activation patterns.

BT may better restore physiologic biceps activation and normal kinematics.
Recommendations for 2015

Primary SLAP Lesion in the Overhead Athlete
- **Primary SLAP repair**
  - Tenodesis in older athletes
  - Tenodesis with clear biceps related symptoms
  - SLAP + Biceps Tenodesis? *(caution)*

Failed SLAP Lesion in the Overhead Athlete
- **Biceps Tenodesis + Debridement**
- **Other Pathology?** (Cuff, AC, Cartilage)

Case Presentation

Brian S

- 25 M professional baseball outfielder with R dominant shoulder pain with throwing
- Initial pain 2 years ago, MRI showed superior labral lesion
  - Able to rehab and return to play
- Shoulder pain worsened over past 6 months
- No significant past medical history

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Dilemmas of the Throwing Shoulder – The Biceps

Treatment

Biceps Split
Dilemmas of the Throwing Shoulder – The Biceps

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Chicago

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SLAP Lesions: Repair - Which Ones to Repair -

John Conway, MD
Ben Hogan Sports Medicine
Fort Worth, Texas

SLAP Repair Technique

I, John Conway MD, have relevant financial relationships to be discussed, directly or indirectly, referred to or illustrated with or without recognition within the presentation as follows:

Arthrex Inc. - Royalties

My full disclosure is in the AAOS Database.

SLAP Repair in Throwers

Poor Outcomes - in all 3 Systematic Review Articles

Gorantla  Arthroscopy 2010
Sayde  CORR 2012
Osti  Musc Lig Tend J 2013

Baseball Return to Play  22-64%
It's Not the Problem

48% Asymptomatic MLB pitchers had an SLAP lesion

Lesniak et al AJSM 2013

80% Asymptomatic mature pitchers had MRI changes

45% Labral tear

Mniaci et al AJSM 2001

Sometimes

Results of surgical repair of SLAP in throwers inferior to non-surgical care.

Lintner ICL 2013

The Kinetic Chain

[Diagram showing the kinetic chain with force vectors from legs to upper body]
If the labrum tear is treated as the problem but the real problem is neither recognized or corrected, how can conservative care, labrum repair or biceps tenodesis be expected to allow for the return to pain-free activity?

And if our repair method causes more problems than we would have seen with debridement alone, we must change our method and reconsider our fundamental understanding of the cause for shoulder pain.

Treatment Controversy

Anatomic SLAP Repair vs BT Tenodesis

Because it's important to both translational and rotational stability of the glenohumeral joint.
GOOD SLAP – BAD SLAP

GOOD - Purposeful, beneficial adaptation allowing greater labral mobility, Hor AB, ABER, velocity and performance and
BAD - Pathologic process causing translational and rotational micro-instability, pain and lost performance

Ignore or debride the Good SLAP
Fix or tenodesis the Bad SLAP
GOOD SLAP – BAD SLAP

GOOD - Purposeful, beneficial adaptation allowing greater labral mobility. Hor AB, ABER, velocity and performance and
BAD - Pathologic process causing translational and rotational micro-instability, pain and lost performance

How do you know GOOD or BAD?
Complete exam Neck Scapula Shoulder  
• Biceps Tunnel Tenderness  
  – Zone Specific (Zone 1,2,3)  
• GIRD, TRMD, Torsion  
• Jobe’s Relocation Test  
• O’Brien’s Test  
• Speed’s Test  
• O’Driscoll’s DLS Test  
• Kim’s Biceps Load II Test  
• Core and LE

Selectif Injections
• Subacromial  
• Biceps Tunnel  
• Biceps tunnel injection into Zone 2 under US direction

How do you know GOOD or BAD?
Complete exam Neck Scapula Shoulder  
• Biceps Tunnel Tenderness  
  – Zone Specific (Zone 1,2,3)  
• GIRD, TRMD, Torsion  
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• O’Driscoll’s DLS Test  
• Kim’s Biceps Load II Test  
• Core and LE

Selectif Injections
• Subacromial  
• Biceps Tunnel  
• Gleno-Humeral  
• Acromio-Clavicular
**Arthroscopy – 7 Questions**

- **SLAP vs Sulcus?**
- **SLAP Type?**
  - I, II, III, IV
- **Anterior or Posterior?**
- **Acute or Chronic?**
- **Tissue Quality, Compensated?**
- **BT Stability on ABER?**
- **RC Condition?**

**GOOD or BAD**

**GOOD**

- Pain relieved with SA Inj.
- No pain in Biceps Tunnel
- Pattern: Type I or Posterior Type II
- Good Tissue
  - Chronic, smooth, compensated margins
- Labrum Rolls Back on ABER but BT stable
- No Rotator Cuff Tear

**BAD**

- Pain NOT relieved SA Inj.
- Pain in Biceps Tunnel, relieved on BT Inj.
- Pattern: Anterior II or Type III, IV
- Bad Tissue
  - Acute, ragged, or disrupted margins
- Labrum Rolls Back with ABER but BT unstable
- Rotator Cuff Tear

**GOOD or BAD**

**GOOD**

- Chronic Posterior Type II
- Roll back
- Smooth margins
- Normal Rotator Cuff

**BAD**

- Combined SLAP
- Worn, Abraded Tissue, Torn Rotator Cuff
Healed and Still Hurts

First Surgery

Second Surgery

20 year old D1 College RHP

Surgical Options

What chance did they really have with these repairs?

Suture Knots BAD?

Superior and posterior suture knots cause rotator cuff injury following SLAP repair!

Byram et al JSES 2011
My Old SLAP Method

1. Trans-tendinous cannulas
2. Superior capsule injury
3. Anterior sutures
4. Biceps Tendon Strangulation
5. Hard prominent suture knots

19 year old RH pitcher

My Current SLAP Method

1. No superior cannulas
2. Meniscoid rim debridement
3. Glenoid prep
4. Anterior repair for instability only
5. No BT cross-over
6. Simple or mattress vertical sutures
7. No knots

20 year old LH pitcher

This is what we want
Modern Methods
Neri AJSM 2011
84% Returned (if RCTs are excluded)
Galono Orthop 2010
90% Returned (regardless of RCTs)

So … Still Evolving
SLAP is a chronic, possibly adaptive anatomic finding that may become painful through gradual decompensation
However … some SLAPs are GOOD
some SLAPs are BAD
Ignore or debride the GOOD SLAPs
Repair or tenodesis the BAD SLAPs

Thank you
April 28, 2015
Pardon the Interruption – Controversies in Shoulder Injuries in Athletes

Partial Thickness Cuff Tears - Debride vs. Fix

Christopher S. Ahmad, MD
Head Team Physician NY Yankees
Chief Sports Medicine
Professor Orthopaedic Surgery

Throwing Mechanics

Kinetic chain concept
- Sequence of body segment motions
- Legs and trunk act as force generation
- Shoulder is force regulation
- Arm is force delivery

Internal Impingement
Pathophysiology

Hyperangulation
Internal Impingement
Instability
Pathophysiology
• More likely to occur with anterior translation
• Normal posterior translation in ABD ER position

Jobe CM Arthroscopy '95

Partial Thickness RCT
Pathophysiology
Internal Impingement

Internal Impingement
Rotator Cuff Tears
Internal Impingement
SLAP Lesion

Hyperangulation

Internal Impingement Continuum

- Muscle weakness
- Scapular dyskinesis
- Kinetic chain problem
- Poor mechanics
- Instability
- Subluxation
- Impingement
- RTC tear/SLAP

Partial Thickness RCT
Pathophysiology

- Pitching Mechanics
- Fatigue
- Core/LE Strength
- Fatigue
Throwing Shoulder MRI

Which player has symptoms?
A. Player 1
B. Player 2
C. Player 3

NONE

Throwing Shoulder MRI

Literature

Connor et al AJSM 2003
- 20 subjects
- Dom - 40% partial or full-thick RCT
- Non dom - 0% RCT

5 yrs later no symptoms or treatment

Lesniak, Kaplan et al AJSM 2013

• 21 asymp MLB pitchers preseason MRI
• Mean age 29 yrs
• 11 of 21 had RCT
• 9 articular surface tear
• 2 had a full-thickness RCT
• 10 had SLAP tears
• 13 had either ant or post labral tears
**Throwing Shoulder MRI Literature**

- RCT correlate with innings pitched
- Career innings pitched
- positive RCT 1014
- negative RCT 729
- MRI did not correlate with DL time

Lesniak, Kaplan et al AJSM 2013

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**Partial Thickness RCT Adaptive**

PTRCT critical distinction
- Adaptive for repetitive throwing at a high level
- Pathologic developments lead to symptoms

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**Partial Thickness RCT Adaptive**

Adaptive Changes
- Increased external rotation
Partial Thickness RCT
Treatment

Surgical Indications
• Failure of non-op treatment
• Pathology
• Seasonal timing
• Career

Partial Thickness RCT
Guidelines
If 25% - 50% of tendon thickness
Debride

Throwing Shoulder MRI
Surgical Outcome
Reynolds… Andrews CORR 2008
• 82 pro pitchers underwent debridement PTRCT
• 76% able to return professional
• 55% able to return to the same or higher level
Throwing Shoulder MRI
Surgical Outcome

Repair of Full-Thickness Rotator Cuff Tears in Professional Baseball Players

Christopher G. MacIntosh, MD, and James R. Andrews, MD
From the Department of Orthopaedic Surgery, University of South Carolina School of Medicine, Columbia, South Carolina, and the Alabama Sports Medicine Institute, Birmingham, Alabama

AJSM 2006

- Mini-open repair of a full-thickness RCT
- 1 player (8%) able to return

Partial Thickness RCT
Case

CASE
- 24 yo pro RHD MLB pitcher
- 8 months post sup shoulder pain
- Failed non-op treatment
  - Cortisone injections
  - Rest, rehab, progressive throwing

Partial Thickness RCT
Case
Partial Thickness RCT Case

Partial Thickness RCT Case

Partial Thickness RCT Case

Partial Thickness RCT Case
Partial Thickness RCT

Treatment

Rehabilitation
- Motion restoration
- RC and periscapular muscle strengthening
- Core strengthening
- Throwing program

Partial Thickness RCT

Summary
- Overhead athletes
- Internal Impingement pathophysiology
  - Low percent thickness PTRCT
  - SLAP tear with stable biceps anchor

Treat with debridement

THANK YOU
Partial Thickness Rotator Cuff Tears in the Throwing Athlete: Fix It

Neal S. ElAttrache, M.D.

Partial Thickness Rotator Cuff Tears

- Significant source of pain
- Not a singular condition
- Results from variety of insults to cuff, producing different locations (intratendinous, bursal vs articular surface) and patterns of failure
- Most common on articular surface
- Different mechanisms can co-exist
- Do not heal spontaneously, may progress
  - Yamanaka
  - Weber
  - Fukuda
  - Mazocca

PASTA/PAINT Lesions

- Significant problem in throwers/overhead athletes
- Solution is uncertain
- Often associated with superior labral tears, but PTRCT may be the main source of pain
- In study of pro pitchers with sup labral repair:
  - Return to prior level of play 57%
  - If players had isolated sup labral repair, return to play 80%
  - In players w/PTRCT, return to play 12.5%

Neri, ElAttrache, et al, AJSM 2011
Physical Examination

- Impingement signs
- Tenderness at greater tuberosity
- Positive relocation test, O’Brien’s test, flexion/adduction/IR test
- Pain with resisted abd/ER and supraspinatus test
- Longitudinal exam findings very helpful
  - Frequently have ER weakness on dominant side
  - Of concern: new ABER weakness with pain

Imaging

- MR Arthrogram – best demonstrates lesion

Options

- Scope Debridement
- Scope AS / IT Repair
Debridement
Andrews, 1985
- Helpful for inspection and mechanical symptoms
- Decrease pain by resection of devitalized tissue

However, spontaneous healing unlikely:
- Separation of torn margins and shear
- Hypovascularity
- No synovial layer
- Continued impingement

Fukuda

Surgical Decision Making
- Loss of 50% of the footprint attachment for supraspinatus appears to be critical amount if the majority of the supraspinatus tendon is involved
- Articular sided tendon strain increases significantly with partial tears ≥ 50% of footprint
- Repairs of PASTA lesion ≥ 50% return strain to normal

Mazzocca, AJSM 2009

Surgical Decision Making
- In situ repairs of partial thickness RC tears of 50% thickness have greater strength than DR repair after tear completion
- Therefore unless remaining tendon fibers have significant pathology attempt should be made to repair the torn articular lamina and preserve the native intact portion of the tendon

Lomas, Ahmad, JSES 2008

Question: Can we apply these indications to throwers????
**Articular Surface Footprint Anatomy**

**Surgical Decision Making**

- Issue in question is what and how much of the articular surface should be repaired

**Rotator Cuff Cable**

- Study in progress – disruption of cable produces instability

*Elattrache, Pinkowsky, Lee*
Personal Guidelines for Treatment

Exhaust non-op treatment

- Posterior stretching
- Pec minor/major mobs
- Scapular mechanics
- Cuff strengthening
- Injections
  - Biologics
  - Corticosteroid

Articular Surface Intratendinous Repair

- If 25-50% of cuff is torn, debride + SA bursectomy; if delaminated - IT repair; acromioplasty only if abrasion
- If 75% of cuff is torn with ER/supra weakness and pain – AS repair to cable footprint; IT repair if delaminated
  - Leave rim rent open
- If ≥ 75% of cuff is torn and remaining tissue poor quality, complete and repair both laminae
JG - 1/10/2011

- 31 y.o. right hand dominant pitcher
- c/o posterior shoulder pain with throwing
- ROM: ER 100 deg, IR 35 deg
- Strength 5/5 except ER 4/5 with pain
- Neg Neer, Hawkins, Speeds, stability tests
- Pos O’Brien’s with posterior pain, relocation
- Injection resulted in complete pain relief

JG – 6/2/2011

- Increased post-sup shoulder pain at ball release during game
- Treated with repeat injection and PT
  - Post capsule stretching
  - Modalities
  - Scapular muscle and cuff strengthening

JG – 7/27/2011

- Continued pain on throwing program
Goals of Post-operative Rehab

- Protect integrity of repair while healing
- Restore capsular compliance and ROM
- Restore scapulo-humeral synchrony
- Restore optimal mechanics (total body)
- Restore proprioception
- Restore strength and endurance

Post-Operative Rehabilitation

- Shoulder protected in Ultra Sling for 4 weeks
- First day elbow and wrist AROM 3x day, hand exercises with ball
- Second week, Codman and Pendulum exercises started, up to 90° of passive elevation with neutral rotation

- Active elevation initiated at 6 weeks and progressed as tolerated
- Stretching of posterior capsule and pec minor
- Avoid internal impingement position (hyperangulation)
- Full activities range from 4 to 6 months, depending on activity
- Progressive throwing program at 6 months if reversible IRD corrected
Preliminary Results

Two Year Follow-up 2013
8/11 (73%) Play 1 Yr

2014 Follow-up
11/14 Play 1 year (79%)
Gathering KJOC scores

Summary

- Exhaust non-op management
- "career saving" procedure
- Repair cable attachment
- Avoid overtightening (overclosure)

Thank You
VuMedi Webinar
PTI: Pardon the Interruption
Controversies in Shoulder Injuries in Athletes

Patrick M. Connor, MD
Team Physician, Carolina Panthers
Team Physician, Charlotte Knights
Team Physician, Joe Gibbs Racing, Inc
Team Physician, Michael Waltrip Racing
Team Physician, Providence Day School

AC Joint:
“Leave it alone!”

Patrick M. Connor, MD
Team Physician, Carolina Panthers
Team Physician, Charlotte Knights
Team Physician, Joe Gibbs Racing, Inc
Team Physician, Michael Waltrip Racing
Team Physician, Providence Day School

No disclosures / conflicts of interest relative to this presentation
Consultation / design
•  Biomet Sports Medicine
•  Zimmer, Inc.
•  Lima Corporate Orthopaedics

CAROLINA PANTHERS
**AC Joint Injuries**

**Introduction**

Grade I, II

Grade III

Grade IV, V, VI

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Differentiation of Grade III vs IV and V?

- Grade III: AC joint can be reduced manually
- Grade IV and V: don’t reduce
  - Trapezius interposition

---

**Acute management . . .**

Grade I and II  Consensus: nonoperative

Grade III  Consensus? Controversial?
  - “Leave it alone!!”

Grade IV, V  Consensus: operative
Hippocrates: “no impediment, great or small, will result from such an injury”

Trend towards non-surgical management is well supported in the literature

Schlegel et al AJSM 2001
- Prospective study, type III AC injuries
- Average return to work / play: 9 days (1-24)
- 1 year follow-up: all had full, pain free, symmetric ROM
- Only 1/20 elected to have surgery

Spencer CORR 2007
- Treatment of Grade III AC joint injuries: a systematic review
  - Based on a review of all English literature, nonoperative treatment was deemed more appropriate than operative management
  - Surgical results were not clearly better and were associated with higher complication rates, longer convalescence, and longer time away from work and sport

AC Joint Injuries in the NFL (Lynch, Bowen, Nuber et al AJSM 2013)
- All AC injuries in the NFL from 2000 – 2011 (12 seasons)
- 727 injuries
- Incidence greatest in QB > special teams > wide receivers

- 98.3% treated nonoperatively
  - Mean time lost (all players): 9.8 days
  - Mean time lost (QB’s): 17.3 days

- 1.7% treated operatively
Acute management of Grade III AC Separation

Literature

- Phillips et al CORR 1998 Meta-analysis Type III AC injury

<table>
<thead>
<tr>
<th></th>
<th>OP</th>
<th>vs</th>
<th>NONOP</th>
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<tbody>
<tr>
<td>Pain absent or minimal</td>
<td>93%</td>
<td></td>
<td>95%</td>
</tr>
<tr>
<td>ROM normal / near normal</td>
<td>86%</td>
<td></td>
<td>95%</td>
</tr>
<tr>
<td>Strength normal / near normal</td>
<td>87%</td>
<td></td>
<td>91%</td>
</tr>
<tr>
<td>Subsequent surgery</td>
<td>59%</td>
<td></td>
<td>6%</td>
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59% vs 6%?!

Leave it alone!!

Surgical management of AC separations

Complications?

Surgical management of AC separations

Complications?
Surgical management of AC separations
Complications?

Acute management of Grade III AC Injury
Leave it alone!!

Nonoperative...

Weight of the literature supports nonoperative management.
Benign natural history.
Return to sport in ~ 9 days.
Rarely require late surgery.

Surgery...
Not supported in literature.
Worse outcome vs nonop.
Return to sport in ~ 3-4 months.
Troubling complications often require reoperation.
Thank you!
AC Joint
When to Fix It!

“AC Joint Injuries in Throwers”

James R. Andrews, M.D.

Disclosures
James R. Andrews, MD
The following relationships with commercial interests existed during the past 12 months:

- Bauerfiend Consultant
- Therakos Consultant
- MiMedx Consultant
- Physiotherapy Associates Medical Director
- Patient Connection Stockholder
- Connective Orthopaedics Stockholder
- FastHealth Corporation Board Member

Biomechanics & Function of the Clavicle & AC Joint in the Overhead Athlete

- It can be likened to a crank because of its double curve
- My perception is that it functions as a strut to stabilize the scapula posteriorly during retraction
- This is a super important function in the overhead throwing athlete during the cocking phase
- If any instability of the AC joint occurs that allows the distal clavicle to migrate posteriorly during cocking, then throwing function is impaired
- It can be associated with a so-called “posterior angle pain” which occurs with contact between the posterior flare of the distal clavicle and the spine of the scapula!
Controversy surrounds this treatment!

Non-Operative Management
What is the Natural History of the Unoperated Type III AC Joint Injury, in the overhead athlete?

Some do well, some don’t.

Non-op Tx in Athletes?
- Concerns about shoulder girdle strength in Grade III’s left “unreduced”
- Involved shoulder strength equivalent to uninjured arm
  - MacDonald, AJSM 1988
  - Tibone et al AJSM 1992
  - Walsh AJSM 1985
  - Wojyts CORR 1991
What about in Athletes?

- Tibone et al. AJSM 1992
  20 athletes w/ Grade III tx’d non-op @ 4.5yrs f/u
- Objective outcome satisfactory
  - Displacement evident in 90%
    - No difference in isokinetic strength testing
    - 30% reported pain with sport
    - 31% mild pain with throwing
  - No pitchers / high level throwers

Few studies have examined throwing athletes

- Galpin et al (CORR 1985) 33% tx’d non-op had “less than normal throwing ability”
- Wojtys and Nelson (CORR 1991) 42% of throwers had “incomplete recovery”
- “Prognosis for a baseball pitcher or quarterback who injures his AC jt is not always good!”

“We are not convinced, even considering much of the recent data, that conservative therapy should categorically be the treatment of choice … about half of the throwers seen in our practice have surgery; particularly the QB or pitcher with a long career ahead of them.”

Andrews 1997 OTSM
My Indications for Repair/Reconstruction
Grade III AC Separation in Throwers
1. Case by case decision on overhead athletes and manual laborers
2. A bad type III especially with posterior displacement; probably needs repair/reconstruction!
3. Also, those who remain chronically symptomatic

My Preferred Technique for Acute AC Separation - “up to 6-8 weeks post injury”
• Multiple 9 strand braided #2 PDS looped around the clavicle and coracoid
• Backed up by a double loop #5 Tycron through a drill hole in the clavicle and around the coracoid
• Direct repair of the AC and CC ligaments
• + distal clavicle resection
AC Joint - When to Fix It!

**AC Joint Stabilization using braided PDS Construct**

- My Preferred Technique for Chronic AC Separation
  - Autogenous semitendinosus loop around the clavicle and the coracoid
  - Backed up by a double loop of #5 Tycron through a drill hole in the clavicle then around the coracoid
  - + minimal distal clavicle resection

**Summary of Grade III AC Separations**

- So, what patients should we operate on?
  - Some overhead athletes
  - Some throwers (dominant arm)
  - Some heavy laborers
- What surgery should we do?
  - Primary repair when possible + augmentation
  - If late my choice is reconstruction of CC ligis. with autograft and initial fixation with permanent suture!

Dr. Jim Andrews