THE MANAGEMENT of SLAP INJURIES in the OVERHEAD ATHLETE

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- Consultant – Stryker Endoscopy
- Consultant – Venture MD
- Research Support – Arthrex
- Board/Committee Membership –
  - Orthopaedic Learning Center BOD
  - MLB Medical Advisory Committee
  - MLB Elbow Research Study Group
  - AOSSM Fellowship Committee
History

- 27 y.o. RHD MLB pitcher
- Chronic, progressive right shoulder pain while throwing
- Worsened acutely
- Pain is deep and post
- Unable to throw

Exam

- 30 deg. less ABD, FF
- 25 deg. less INT ROT
- + Hawkin’s Test
- + O’ Brien’s & DLS Tests
- + mild-mod supraspinatus weakness
Diagnosis: SLAP Tear

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Superior Labrum is Important for the Overhead Athlete!

- Biceps attachment site
- Deepens glenoid
- Distributes contact pressure between humerus & glenoid – Washer Effect
- Attachment site for glenohumeral ligaments & capsule
- Pressure sensor for proprioception

Harryman, 1992
Pagnani, 1995
Lee, 2005
Veeger, 2007
Lee, 2008
Kibler, 2011
Predictable Series of Events in Throwers

- Progressive Osseous changes
- Scapular and Cuff weakness
- Post. Soft Tissue contracture
- Post-sup. Instability in ABD and EXT ROT.
- Peel-back mechanism occurs
- **SLAP** injury occurs with post-sup cuff injury

General population is not routinely exposed to this “cascade of events”

... but throwers are!

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HOW DO WE TREAT IT?
SLAP Tear in the Overhead Athlete

Treatment Options

- Nonoperative
- SLAP Repair
- Biceps Tenodesis
- SLAP Repair + Biceps Tenodesis
General Principles of SLAP Repair

- Implant Selection
- Arthroscopic Approach
- Implant Location
- Concomitant Pathology
SLAP Repair in the Overhead Athlete

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Can the Biceps/Superior Labrum be torn TOO much to repair? 

... should we tenodese?

... for just failed SLAP Repair or as primary treatment for SLAP Tear?

(Walch, 2010; Hawkins, 2011; Romeo, 2014)
SLAP Tear in the Overhead Athlete

Research Data

- Biomechanical
- Electromyographic
18 pitchers:
- 6 S/P successful SLAP Repair
- 5 S/P successful Subpect Biceps Tenodesis
- 7 controls

Surface EMG & Motion Analysis while pitching

No differences in majority of pitching kinematics

**SLAP Repairs had altered thoracic rotation and lead knee flexion at front foot contact**
Role of the Superior Labrum After Biceps Tenodesis in Glenohumeral Stability
(Strauss, Provencher, Bush-Joseph, Romeo et al, JSES, 2014)

- 20 cadaveric shoulders tested for translations:
  - At baseline
  - After creating Ant SLAP(10) and Post SLAP(10)
  - After Biceps Tenodesis (20) and SLAP Repair (20)

- Biceps Tenodesis showed no significant improvement in stability compared to SLAP Tear
- SLAP Repair restored Posterior and ABD/Max ER translations, but not Ant translation

- Authors recommend biceps tenodesis for tx of SLAP Tear, but caution in throwers because of its inability to restore translational stability
SLAP Tear in the Overhead Athlete

Research Data

- Biomechanical
- Electromyographic
- Clinical
25 patients surgically treated for an isolated Type II SLAP tear

Group 1: 10 pts with SLAP repair (avg age=37)
Group 2: 15 pts with Tenodesis (avg age=52)

Outcome: Repair – 40% satisfied
Tenodesis – 93% satisfied

Return to Play: Repair – 20%
Tenodesis – 87%
25 patients surgically treated for an isolated Type II SLAP tear

Group 1: 10 pts with SLAP repair (avg age=31)
Group 2: 15 pts with Tenodesis (avg age=47)

Outcome: Repair – Postop ASES Score 93.5
Tenodesis – Postop ASES Score 93

Return to Prior Level: Repair – 60%
Tenodesis – 73%
Fix it if...

- Clinically straightforward
- Traumatic/repetitive micro-traumatic history
- Positive exam and imaging
- Clear-cut Indications
- Biceps ok by exam, imaging and arthroscopy
- High level overhead/throwing athlete
- Failed nonop tx

... SLAP Repair should **not** be abandoned in this population...

... but this may very well be a small % of SLAP tears overall!
THANK YOU.
REBUTTAL
THE MANAGEMENT of SLAP INJURIES in the OVERHEAD ATHLETE

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SLAP Tear in the Overhead Athlete . . .

. . . a need to repair!

Early reports suggested high % of G/E results

(Yoneda, 1991; Savioe, 1993; Pagnani, 1995; Snyder, 2003; Cole, 2010; Brox, 2012)

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Look more closely at existing data . . .

- Small study populations
- Heterogeneous groups
- Inconsistent follow up
- Minimal assessment of Return to Pre-injury Level of Play
More recent data is less optimistic . . .

- Persistent pain and stiffness (Weber, 2007; Franceschi, 2008)
- Difficulty returning to preinjury level (Cohen, 2012)
“Leave it alone?”
Less optimistic results due to . . .

- Diagnostic Uncertainty
  Is it what we think?
- Equivocal Indications
  Should we fix it?
- Early Surgical Techniques
  How do we fix it?
- Narrow Postop Rehab
  How do we rehab it?
- Imprecise Scoring Assessment
  How do we determine success?
IS IT WHAT WE THINK?

...Diagnostic Uncertainty
Clinical Evaluation

- **Physical Exam**
  - No single test or series of tests reliably predicts a SLAP tear
    (McFarland, AJSM 2002; Stetson, AJSM 2002; Parentis, AJSM 2006)

- **Imaging**
  - Asymptomatic changes exist in the superior labrum with age and in certain populations like overhead athletes
    (Richetti, JSES 2013; Connolly, JBJS 2013)

- **Arthroscopy**
  - Meniscoid/Hypermobile/Peel-Back Variants
    (Davidson, JSES 2004; Burkhart, JSES, 2006)
Inter and Intraobserver Variability in Diagnosis and Treatment of SLAP Tears
(Gobezie et al, AJSM, 2008)

73 EXPERT surgeons queried with video clips on diagnosis and proposed treatment of SLAP:

- Normal labrum – 66.7% correct
- Type I – 60.3% correct
- **Type II – 51.9% correct**
- Type III – 23.3% correct
- Type IV – 60.3% correct
SHOULD WE FIX IT?

. . . Equivocal Indications
IS THE SLAP SYMPTOMATIC?
Nonoperative Treatment is an appropriate option . . .

“A trial of nonoperative treatment should be considered in patients with a SLAP tear”

Edwards, Ahmad, Levine et al  AJSM, 2010
Fedoriw, Ramkumar, Lintner et al  AJSM, 2014
SLAP Tear in the Overhead Athlete

HOW DO WE FIX THAT?

... Early operative techniques may have been too constraining

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Overconstraining the biceps!

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General Principles of SLAP Repair

- Implant Selection
- Arthroscopic Approach
- Implant Location
- Concomitant Pathology
IMPLANT SELECTION

- Material (metallic vs bioabsorbable vs biocomposite)
- Load to Failure
- Fatigue Properties
- Creep of Bioabsorbables
- Incidence of Inflammatory Response
- Size of Drill Hole
- Ease of Insertion
- Ease of Suture Sliding
- Suture Type (braided vs enhanced; permanent vs absorbable)

Barber, JAANA, 2003
Gerber, JAANA, 2003
Arthroscopic fixation of SLAP Lesions through the Mid-Lateral Trans-Muscular Portal: An Anatomic Study
Ciccotti, Kuri, Leland et al, Arthroscopy, 2010
DiRiamondo et al, AJSM, 2004
Morgan et al, Arthroscopy, 2008
Yoo et al, JSES, 2008
CONCOMITANT PATHOLOGY

- Snyder – 43% with rotator cuff tearing
  - 15% with instability
- Maffet – 48% with rotator cuff tearing
  - 20% with instability
- Pagnani – 18% with rotator cuff tearing

. . . . Especially the biceps!
DEBATE CONTINUES

- Type of implants
  - suture vs. knotless
- Number of implants
  - 1 vs. 2 vs. 3/more
- Location of implants
  - ant + post vs. only post to biceps
- Suture type
  - absorbable/nonabsorbable/enhanced
- Suture placement
  - simple vs. mattress
- Concomitant Pathology . . . especially the biceps
  - method of treatment

...there’s no final word yet!

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SLAP Tear in the Overhead Athlete

HOW DO WE REHAB IT POSTOP?

... Previously, narrow postop rehab focused primarily on glenohumeral joint
Return to Play After Type II SLAP Lesion Repairs in Athletes
(Sayde, Cohen, Ciccotti et al, CORR, 2012)

- Systematic Review – 1950 to 2010
- 506 patients with Type II SLAP Repair
- 83% G/E subjectively
- 63% overhead athletes return to prior level
- Tremendous variation in postop rehab
Deficiencies in Pitching Biomechanics in Baseball Players with History of SLAP Repair
(Loughlin, Fleisig, Cain, Dugas et al, AJSM, 2014)

- 65 pitchers:
  - 13 collegiate and pro after successful SLAP Repair
  - 52 healthy controls
- 3-D Motion Analysis while throwing fastballs
- SLAP Repair with less shoulder horizontal abd, shoulder ext rot, and forward trunk tilt
- **Authors recommend postop rehab focused on correcting above noted deficiencies**
SLAP Tear in the Overhead Athlete

SCAPULA

Shoulder ROM

CORE

Hip and Legs

...Kinetic Chain...

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Kibler et al, AJSM 2003
SLAP Tear in the Overhead Athlete

HOW DO WE DETERMINE SUCCESS?

... Previously, our postop scoring assessment has been imprecise...
SLAP Tear in the Overhead Athlete

Outcome of Type II SLAP Repairs in Elite Overhead Athletes

Brian Neri MD, Neal ElAttrache MD, K Owsley MD, Karen Mohr PhD, Lewis Yocum MD

- 23 overhead athletes with Type II SLAP tears
- 57% (13/23) returned to pain-free pre-injury level at final follow-up
- ASES Scoring: 96% G/E
- KJOC Scoring: 52% G/E

AJSM, 2011
Results of Arthroscopic Repair of Type II SLAP Lesions in Overhead Athletes Return to Preinjury Playing Level

Brian Neuman MD, Brittany Boisvert MD, Brian Reiter MD, Kevin Lawson BS, Michael Ciccotti MD, Steven Cohen MD

- 30 overhead athletes with isolated Type II SLAP
- Avg ASES Score (0-100): 87.1
- Avg KJOC Score (0-100): 71.6
- ASES focuses on ADL’s and may give a falsely elevated success rate
- The KJOC score better examines the demands of elite overhead athletes
- The outcome measures that we use impact our perception of success

AJSM, 2011
SLAP Tear in the Overhead Athlete

. . . should we leave it alone?
. . . or fix it?
. . . or consider tenodesis?
Leave it alone if . . .

- Clinically ambiguous
- Soft Indications
- Older patient
- Non-athlete
- Non-throwing, recreational athlete
- Some throwing athletes
Fix it if . . .

- Clinically straightforward
- Traumatic/repetitive micro-traumatic history
- Positive exam and imaging
- Clear-cut Indications
- Biceps ok by exam, imaging and arthroscopy
- High level overhead/throwing athlete
- Failed nonop tx

. . . SLAP Repair should **not** be abandoned in this population . . .

. . . but this may very well be a small % of SLAP tears **overall**!
Tenodese it if . . .

- Clinically significant biceps tendon symptoms
- Positive biceps tendon findings on exam
- Significant biceps tendon damage on imaging and arthroscopy
- Complex, degenerative superior labral tear
- Failed nonop tx
- ? Recurrent SLAP Tear in overhead athlete

. . . but this may very well be a small percentage of SLAP tears in throwers!
“Success is going from failure to failure without a loss of enthusiasm”

Winston Churchill
Optimize results by . . .

- Diagnostic Precision
- Specific Indications
- Nonconstraining Surgical Techniques
- Broad Postop Rehab
- Precise Outcome Assessment

...continued research...
THANK YOU.
Efficacy of Biceps Tenodesis in the Treatment of Failed SLAP Repairs
McCormick, Nwachukwu, Provencher et al, AJSM 2014

- 42 active military patients with failed SLAP Repair
- Minimum 2 yr follow-up
- ASES, SANE, WOSI all increased postop
- 34 pts (81%) returned to active duty
- Recommended for failed SLAP Repair, not primary treatment

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