SLAP Tears
Are we fixing too many?

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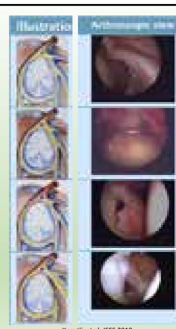
SLAP Anatomy

- Normal Anatomy
  - Articular cartilage extends over glenoid rim superiorly
  - Superior labrum may attach to glenoid rim or medial to it
  - Biceps tendon: 40-60% of fibers attach to superior glenoid tubercle with remaining fibers attaching directly to superior labrum
    - Most have entirely posterior or posterior-dominant insertion
  - Some normal physiologic movement/lift-off
- Variant Anatomy
  - Misrecognition can cause post-operative stiffness/poor results

Cooper, et al. JBJS 1992

Variant Anatomy

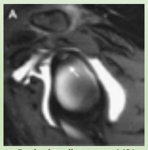
- Sublabral foramen
  - Occurs in 3-21%
  - Also can be associated with cord-like middle glenohumeral ligament (9%)
  - Can be long (length 3-11mm, mean 7mm)
  - May increase in prevalence with age
- Absent anterosuperolabrum
  - Often cord-like MGHL (2-7%)
    - Rao, et al. JBJS 2003
    - Pappas, et al. JSES 2012
    - Zhang, et al. AJSM 2012
- Meniscoid superior labrum (overhangs articular cartilage)
  - Can give appearance of a Type II SLAP tear
  - Medial attachment is intact



Kanatli, et al. JSES 2010

Pathologic Anatomy

- 4 initially described types
  - Type I: labral fraying with localized degeneration – typically asymptomatic
  - Type II: most common, hypermobility of biceps/labral anchor
  - Type III: buckethandle tear with intact biceps
  - Type IV: buckethandle with extension into biceps



Buckethandle tear on MRI.

- Expanded classification
  - Type IIa: anterior extension
  - Type IIb: posterior extension
  - Type IIc: anterior and posterior extension
  - Type V: Type II + bankart
  - Type VI: Type II + unstable flap tear of labrum
  - Type VII: Type II + extension into MGHL insertion

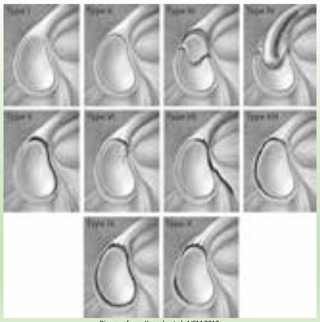
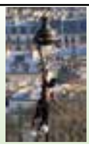
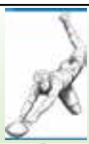


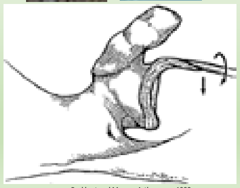
Diagram from: Knesek, et al. AJSM 2012

Mechanism of Injury





- Forceful traction
- Forceful compression
- Repetitive overhead activity
  - Throwing
    - SLAP may have less ultimate strength in late cocking position
      - Kuhn, et al Arthroscopy 2003
      - Shepard, et al. AJSM 2004
    - High stress during deceleration as well
      - Yeh, et al. AJSM 2005
    - ↑ER causes ↑ torsion on biceps anchor
    - Can cause peel-back lesion
  - Manual labor

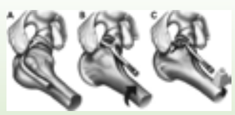


Burkhart and Morgan Arthroscopy 1998

Incidence

- Depends on population
  - Higher in overhead athletes
  - Manual laborers (especially overhead work)
  - Motor vehicle accidents
  - In elderly (age 57-96, mean 80.6) ~ 10%
    - Type I – 9%
    - Type II – 1%
      - Pappas, et al. JSES 2012
  - 6% in those undergoing shoulder arthroscopy
    - Snyder et al. JSES 1995
  - Males > FM
    - Zhang, et al. AJSM 2012
- Associated Pathology
  - Commonly seen with rotator cuff tears
  - Other labral injury (anterior/inferior) or (posterior/inferior)

Clinical Diagnosis



O'Brien, et al. AJSM 1998

- O'Brien's Test (aka Active compression)
- Dynamic Labral Shear/Compression Test
- Others:
  - Biceps load I and II
  - Anterior slide
  - Pain provocation
  - Crank
  - Resisted supination-external rotation
  - Forced shoulder abduction and elbow flexion
  - Jobe relocation

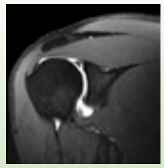

Biceps Load Test from Cook, et al JSES 2012

Clinical Diagnosis

- No one test has been shown to have adequate sensitivity/specificity
- Use combination of tests
- Increases pre-MRI probability
- Diagnostic injection

Cook et al JSES 2012

MRI Diagnosis


- Conventional MRI
  - Sensitivity: 63-91%
  - Specificity: 84-98%
  - Accuracy: 74-96%
- MR Arthrography
  - Sensitivity:82-100%
  - Specificity: 69-98%
  - Accuracy: 74-94%
- Paralabral cyst
  - Spinoglenoid notch
    - Can produce weakness in the infraspinatus (ER)

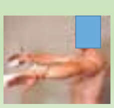
Treatment options



- Non-operative Treatment
  - RC strengthening
  - Scapular stabilization
  - +/- glenohumeral injection
  - Posterior capsular stretching
  - Rest
  - Return to throwing program
- SLAP repair
  - Overtension
  - Incomplete healing
  - Bicipital groove pain
- Biceps Tenodesis/Tenotomy
  - Biceps cramping/groove pain
  - Fracture risk
  - Neurovascular risk

Conservative Treatment

- Responders have correctable deficiency/pathologic motion
  - Limited passive ROM (painful arc)
  - Anterior scapular position/posture
    - Moore-Reed, et al. Arthroscopy 2014
  - Rotator cuff weakness



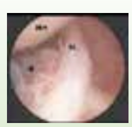

Surgical Outcomes

- SLAP repair using anchors – 97% G/E results; 84% return to sport
  - Morgan, et al. Arthroscopy 1998
- 94% G/E results; 91% returned to normal function, but only 22% returned to same level of sports
  - Kim, et al. JBJS 2002

Are we fixing too many?

- High inter-observer reliability
  - 73 surgeons, 51% with >10 years of experience
  - 64% fellowship trained
  - 63% do more than 100 arthroscopies per year
  - Gobezie AJSM 2008

Are we fixing too many?



- ABOS step II
  - Increase in SLAP repairs 9.4% to 10.1% (p =0.0163) 2003-2008
    - Weber, SC AJSM 2010
- 2004-2009, 25,500 patients
  - 17 per 10k in 2004 to 28 per 10k in 2009
  - Highest incidence in age 20-29 (29.1 per 10k) and 40-49 (27.8 per 10K)
    - Zhang A, et al AJSM 2012
- SLAP repair over 40 may lead to poorer results
  - Incomplete healing
  - Stiffness
    - Erickson, et al. AJSM 2015

SLAP vs Tenodesis

- Age > 40
  - Second highest population
  - High risk of failure
    - Tenodesis may be better
      - Erickson, et al. AJSM 2015 SR
- Worker's compensation
  - Common injury in overhead laborers
    - Poor outcomes with SLAP repair
      - Verma et al. HSSJ 2007
    - Tenodesis – 75% RTW full-duty following tenodesis
      - Gupta, et al Orthopedics 2015
- Prior SLAP repair
  - Athletes
  - Overtensioning
  - Prominent knot stacks
  - Incomplete healing
  - Re-tears

NEW Concepts in SLAP management

- Chalmers et al AJSM 2014
  - 7 control, 6 SLAP repair, 5 biceps tenodesis
- NO EMG difference between SLAP and biceps tenodesis
- Pitchers after SLAP repair had abnormal thoracic rotation
  - Other alterations in mechanics

Are we fixing too many?

- SLAP tears can be asymptomatic
- Clinically determine if SLAP is part of symptom complex
  - Diagnostic glenohumeral injection
  - Clinical examination
- Fix only those that are symptomatic
  - Only after failed conservative treatment
- Be familiar with variant anatomy
  - Avoid "unplanned" SLAP repairs
- Beware of populations that have shown poor outcomes with repair
  - Consider tenodesis primarily