Rotator Cuff & SLAP Lesions

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Orthopaedic Sports Medicine
Arthroscopic Surgery

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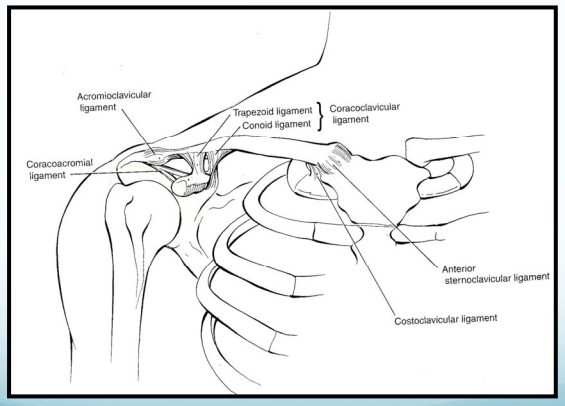
Anatomy

- Shoulder is really 4 articulations



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Anatomy

- Dynamic Stabilizers
  - Rotator cuff
  - Scapulothoracic muscles
  - Long Head Biceps
- Static Stabilizers
  - Glenohumeral articulation
  - Labrum
  - Joint capsule (Glenohumeral Ligaments)

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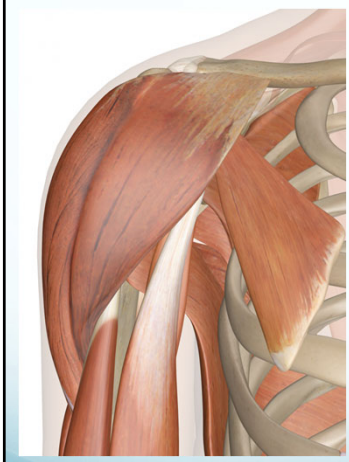

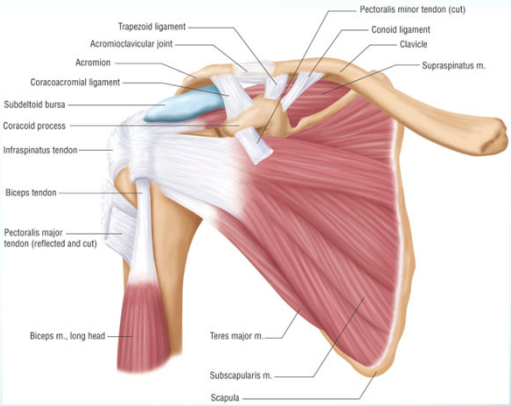

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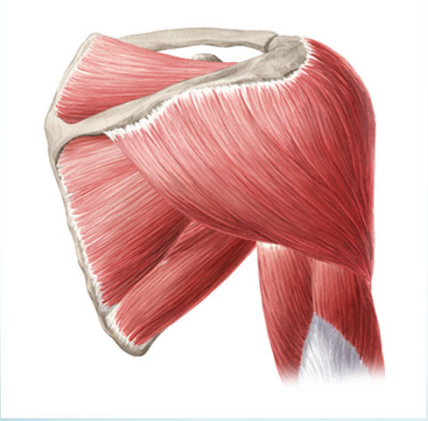

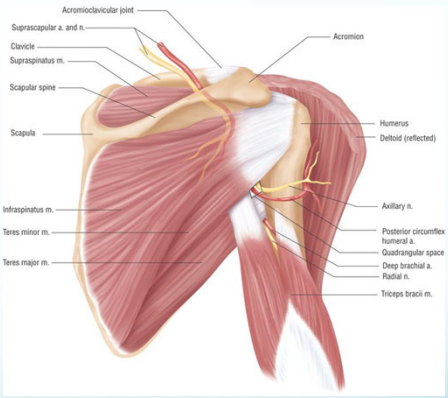

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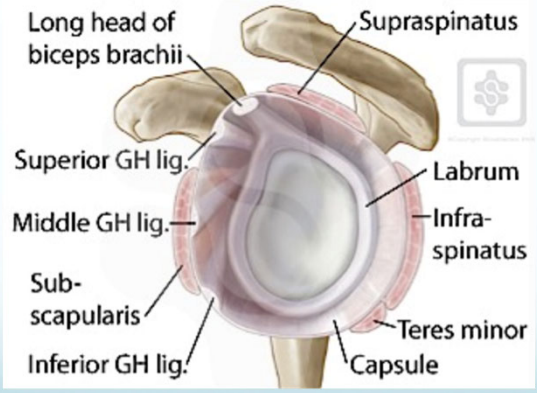

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History of Rotator Cuff Injury

- Typically repetitive microtrauma
  - Repetitive nature of throwing
  - High velocity/large forces
  - Extremes of motion
  - Year round participation
- Occasionally single event

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History

- Pain
  - Posterior (impingement)
  - Anterior (biceps)
- Weakness
- Loss of velocity
- Subjective Instability

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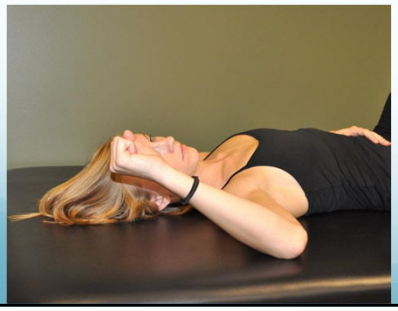
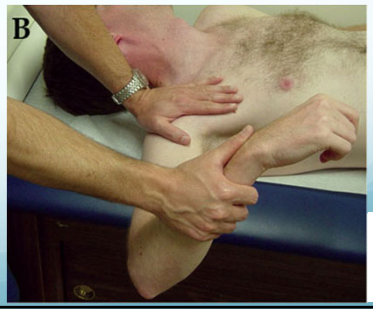
Exam of Throwing Athlete

- Visual : atrophy/asymmetry
  - Winging/scapular dyskinesis
- Range of Motion
  - Supine
  - MUST compare to contralateral shoulder





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Exam

- Strength
  - Empty can
  - Subscap Tests
- Stability
  - Apprehension
  - Multidirectional Instability
  - COMPARE!
- Special Tests
  - Impingement
  - Internal Impingement (Jobe)
  - Obrien's Test

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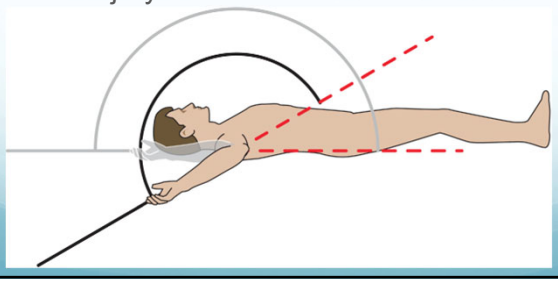
Anatomical Adaptations

- GIRD (**G**lenohumeral **I**nternal **R**otation **D**eficit)
  - 180deg normal arc of motion
    - Shifted posteriorly in throwing arm
      - Due to osseous and soft tissue adaptations
      - More external rotation/Less internal rotation
  - Puts posterosuperior labrum and articular rotator cuff at risk for injury



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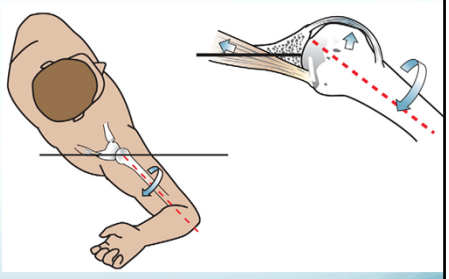
Internal Impingement

- In maximum ER and Abduction
  - Posterosuperior labrum contacts articular cuff
- Can occur in absence of symptoms
- Recurrent microtrauma
  - Shoulder girdle muscle fatigue
  - Scapular dyskinesis
  - Over-throwing
- High association with GIRD
- Leads to SLAP & articular cuff tears



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Nonoperative Treatment

- First Line management for Throwers Shoulder
- Typically 3-6 months
- Rest
  - Pitch count
  - Year round schedule
  - Compliance
- Thower's 12 program

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Nonoperative Management

- Rehabilitation
  - Phase I
    - Decrease inflammation
      - RICE
      - Restore ROM
  - Phase II
    - When ROM normalizes
    - Sleeper Stretch
    - Strengthening
      - Scapula/Cuff/Core

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Nonoperative Management

- Rehabilitation
  - Phase III
    - No pain, minimal ROM deficits, adequate cuff/scapular strength
    - Intense strengthening
    - Plyometrics
    - Interval Throwing Program
  - Phase IV
    - Continue strengthening & neuromuscular training
    - Advanced position-specific throwing program

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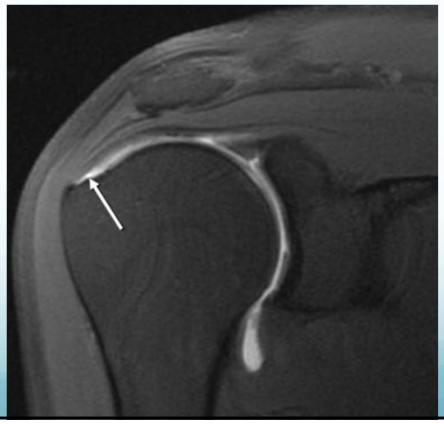
MRI

- Andrews “if you want to find something wrong with a thrower’s shoulder, order an MRI”
- Evaluate rotator cuff and labrum
- Arthrogram



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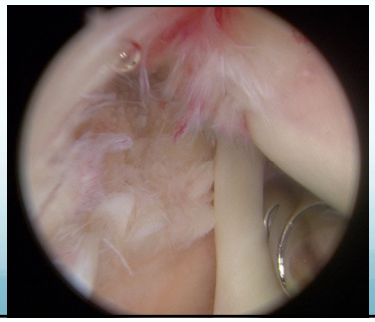
PASTA

- **P**artial **A**rticular-**S**ided **T**endon **A**vulsion
  - Most common lesions with internal impingement
  - Full thickness tears are uncommon
- Isolated cuff tears are rare in in thowers
  - Typically have concomitant lesions (SLAP)



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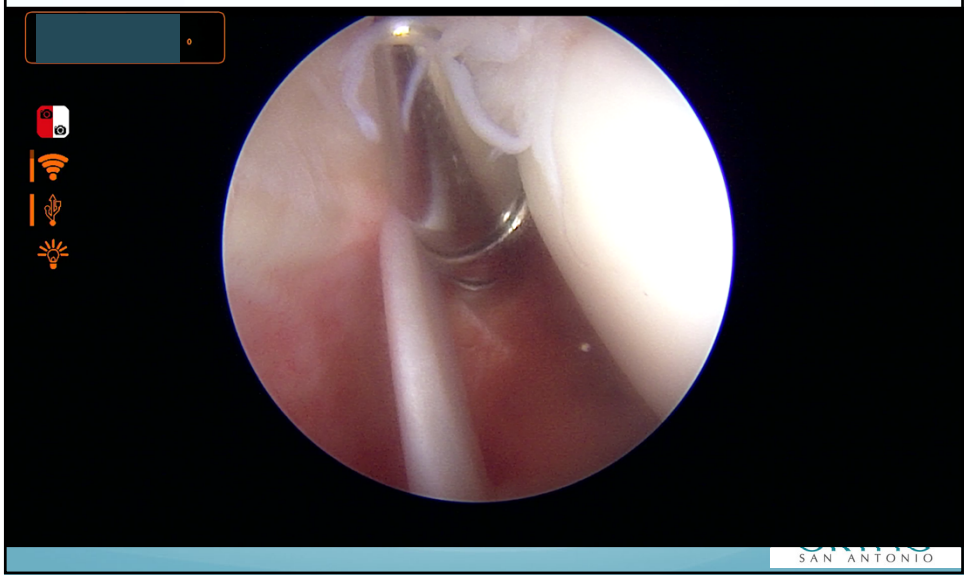

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Surgery

Rotator Cuff Surgery in the Throwing Athlete

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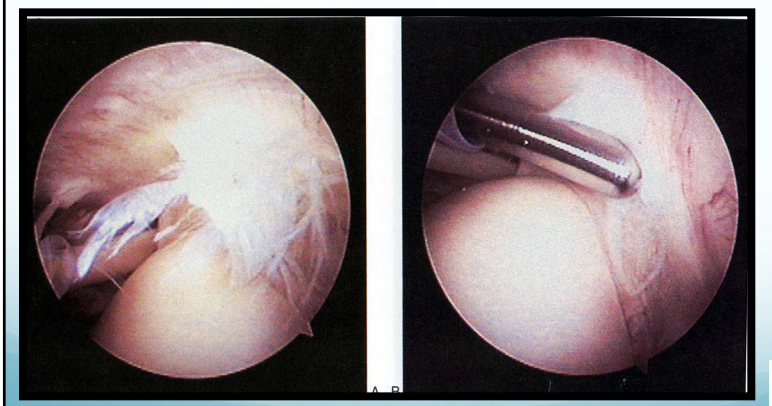
Surgery

- Cuff Debridement
  - Partial tear < 50%



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Surgery

- Rotator Cuff Debridement
  - 65-75% return to sport
  - But only 55% return to previous level

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Surgery

- Rotator Cuff Repair > 50% thickness
  - Most recreational athletes are able to return
  - 12% of athletes return after mini-open repair
  - Even with advanced arthroscopic techniques
    - Only 50% competitive athletes return to prior level of play
    - Worse prognosis for professional athletes and pitchers

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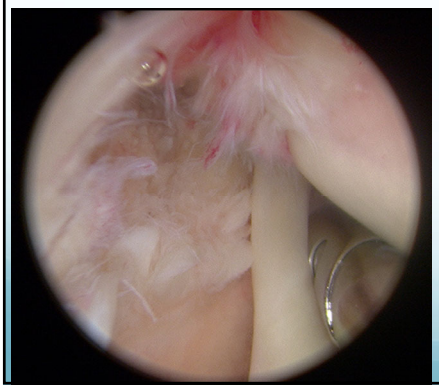
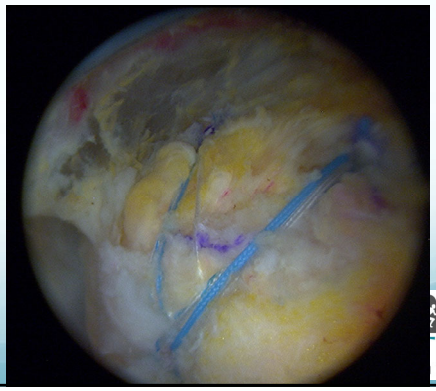
Surgery

- Cuff Repair > 50%
  - Take down and repair





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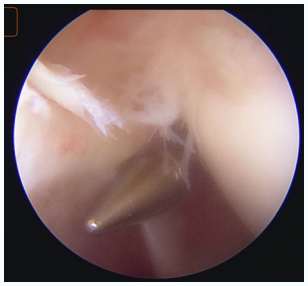
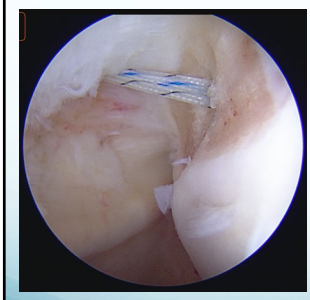
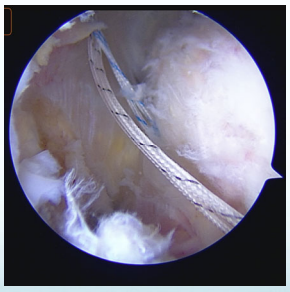
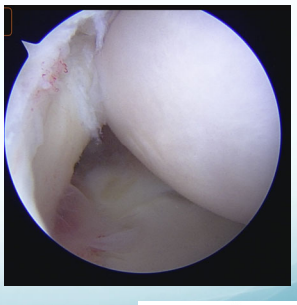
Surgery

- PASTA Repair









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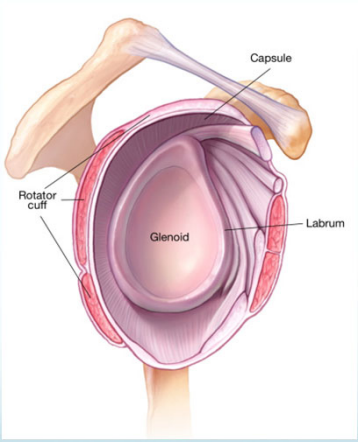
Biceps Anchor/Superior Labrum



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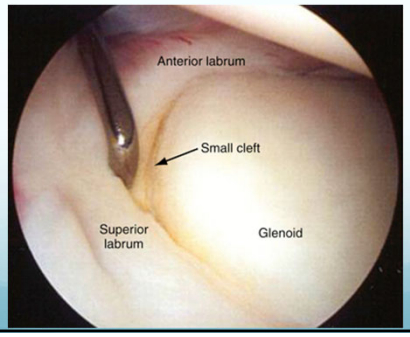
Anatomy

- Superior portion of the labrum inserts directly into the biceps tendon distal to its insertion on the supraglenoid tubercle
- More meniscal in nature and mobile than inferior labrum



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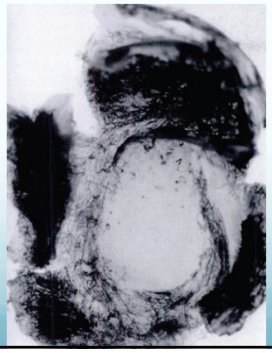
Vascular anatomy

- Similar to knee meniscus, vascularity is limited to peripheral margin
  - Limited vascularity of anterosuperior region
    - Renders superior labrum susceptible to injury
    - Impaired healing ability after repair



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Anatomy

- Considerable variability in superior labrum and LHB (about 10-15%)
  - Sublabral recess
  - Sublabral foramen
  - Buford complex – thick MGHL and absence of AS labrum

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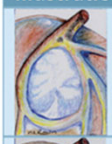
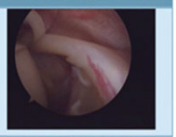
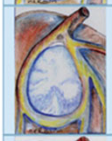
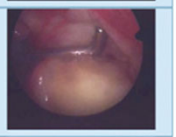
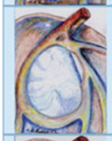
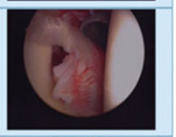
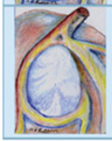
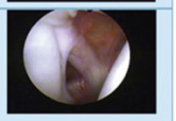
Illustration	Labrum anatomy	Description	Prevalence	Arthroscopic view
	**Normal**	Intact labrum attached to anterosuperior glenoid rim	593 patients 85.82%	
	**Superior sublabral recess**	Sulcus located under the bicipitolabral junction	17 patients 2.46%	
	**Sublabral foramen**	Orifice between anterosuperior labrum and the anterior glenoid	53 patients 7.67%	
	**Buford complex**	Absent labrum + thick, cord-like MGHL	28 patients 4.05%	

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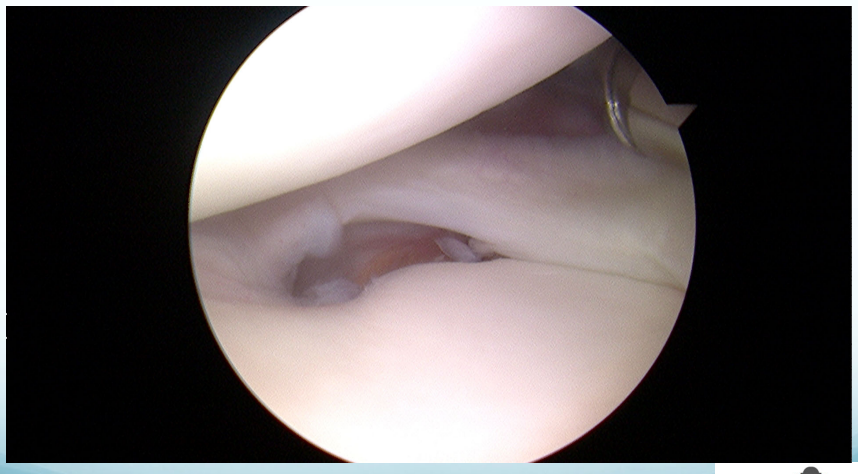

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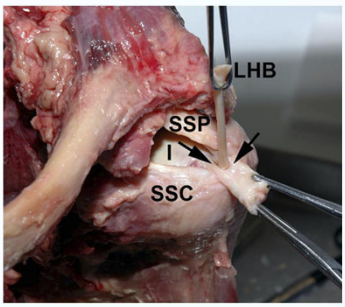
Biceps tendon



- Pathology
  - Rupture
  - Subluxation/Instability
  - SLAP Lesions
  - Tendontitis
- Most LHB pathology is secondary
  - Associated degenerative or traumatic injuries
- Definite pain generator
  - Impingement
  - Rotator cuff pathology
- Exact role in biomechanics not clearly understood

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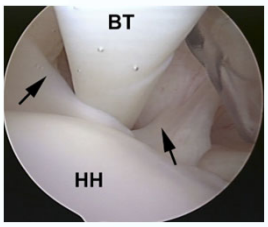
Biomechanics



- Cadaveric biomechanical studies
  - LHB has stabilizing effects on the glenohumeral joint in all directions.
- In vivo studies have yet to establish this stabilizing effect.
- LHB **does NOT serve** as a humeral head depressor
- EMG studies show little or no activation to the LHB when the elbow is immobilized.

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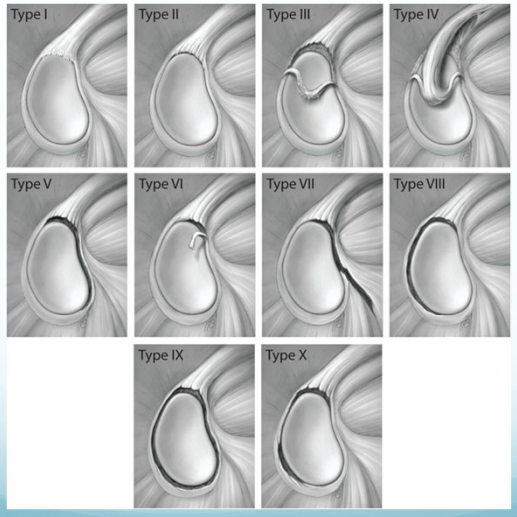
SLAP TEARS



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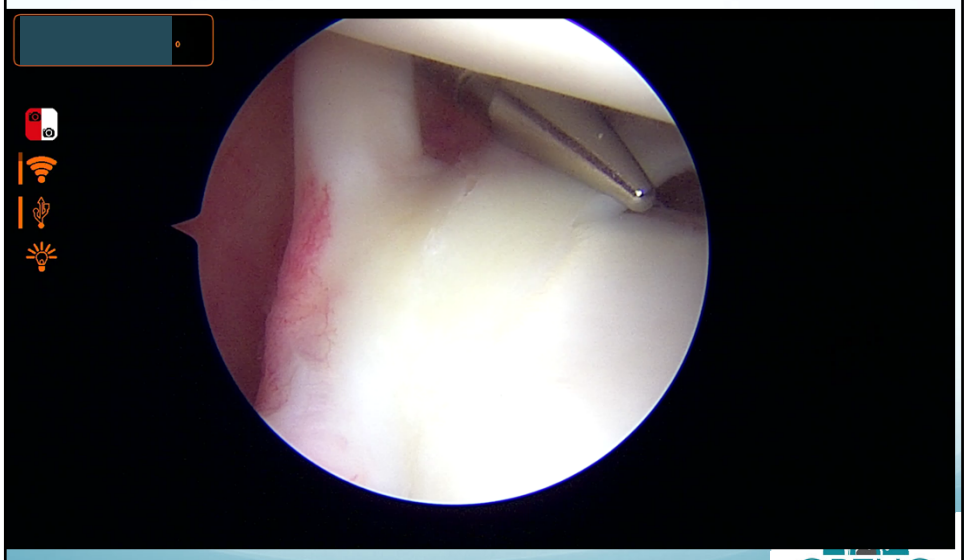
SLAP



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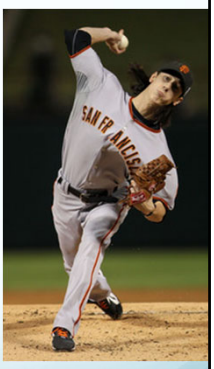
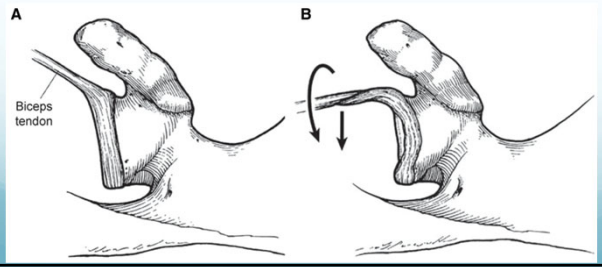
SLAP TEAR

- Injury mechanism
  - Direct Contact – Hyperangulation (Jobe)
    - Fall on oustretched upper extremity
  - Torsional – “Peel-Back” (Andrews, Burkhart)
    - Twisting of biceps
    - Repetitive pull on posterosuperior labrum





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History & Exam

- Diagnosis
  - Difficult with nonspecific history and exam findings
  - High incidence of false-positive findings on imaging
  - Multiple co-existing injuries
    - 29% with partial thickness RCTs
    - 22% with Bankart lesions
  - Exam
    - Assess ROM (GIRD)
    - Assess stability/hyperlaxity
    - Obrien’s Active Compression test

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History and Exam

- Several Special Tests

TABLE 2
Summary of Clinical Tests to Diagnose SLAP Lesions With Reported Test Performance[a]

Test	Sensitivity, %	Specificity, %	PPV, %	NPV, %
Active compression test	47-100	11.1-98.5	10-94.6	14.3-100
Anterior slide test	8-78.4	81.5-91.5	5-66.7	67.6-90
Biceps load test I	90.9	96.9	83	98
Biceps load test II	89.7	96.9	92.1	95.5
Crank test	12.5-91	56-100	41-100	29-90
Pain provocation test	15-100	90-90.2	40-95	70.9-100
Resisted supination external rotation test	82.8	81.8	92.3	64.3
Rotation compression test	24-25	76-100	9-100	58-90
Forced abduction test	67	67	62	71

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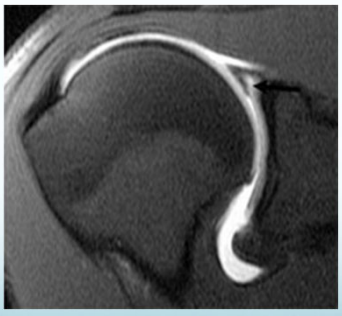
- Imaging
  - Andrews “if you want to find something wrong with a throwers shoulder, order an MRI”



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Nonoperative Management

- Rest
- NSAIDS
- Cuff/Scapula Strengthening
- Injections

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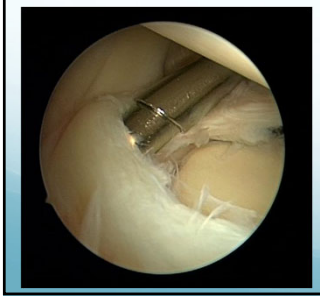
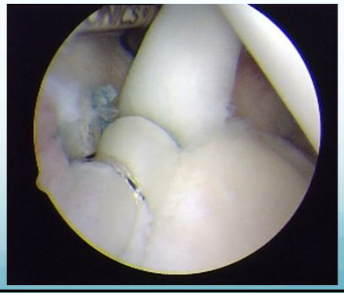
Operative Management

- SLAP Repair
  - Previously reported successful outcomes
  - BUT…Only 22-64% return to play
  - 62% of baseball players RTP
  - 43% of pitchers feel the same or better after repair
  - No difference between HS, collegiate, professional





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Operative Management

- Biceps Tenodesis
  - 2009 France
    - Improved satisfaction, scores, and RTP
  - US
    - Preferred management for failed SLAP lesions
  - Growing trend for primary management of SLAP lesions
    - Fewer SLAP repairs
    - Lower age threshold
    - Throwing athletes?

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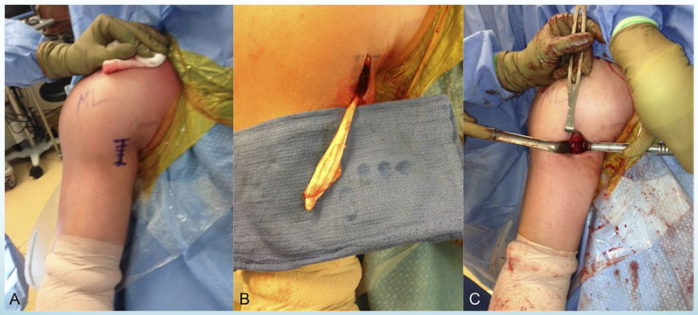
Operative Management

- Mini-open Subpectoral Biceps Tenodesis
  - Higher risk of neurovascular injury
  - Open procedure



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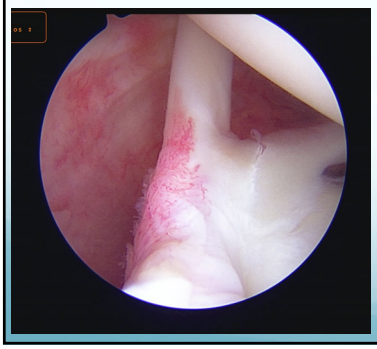
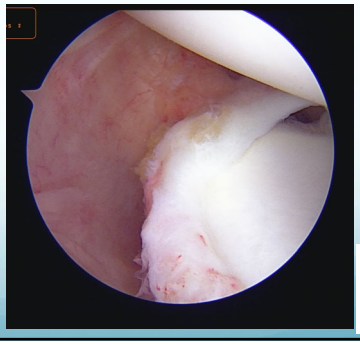
Operative Management

- Arthroscopic Biceps Tenodesis
  - More technically demanding
  - Possibility of persistent biciptial groove pain





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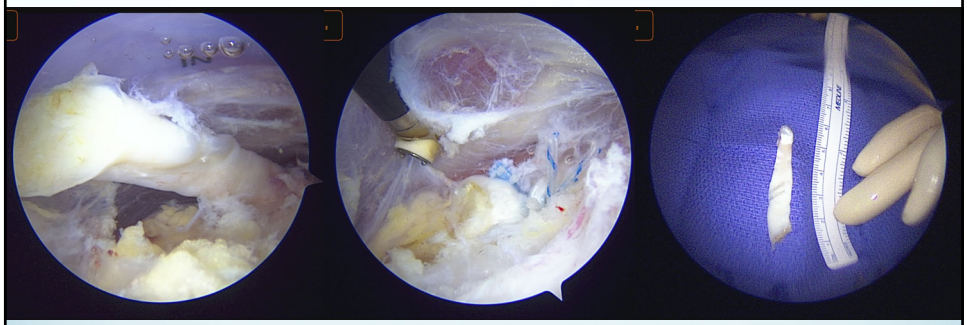
Operative Management

- Arthroscopic Tenodesis



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Postoperative Management

- SLAP repair
  - Sling 4 weeks
  - Immediate
    - Elbow and wrist rom
    - Scapula stabilizer exercise
  - 1 week - Controlled ROM in scapular plane
  - 6 weeks – Cuff strengthening
  - 12 weeks - AVOID extreme ABD & Ext Rot
    - Weight training
  - 16 weeks – throwing program for overhead athletes
  - 6 months – full release

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Postoperative Management

- Biceps Tenodesis
  - Accelerated
  - Sling for 2 weeks
  - Active ROM as tolerated immediately
  - No real shoulder limitations
  - **No isometric biceps for 4-6 weeks**
  - Cuff strengthening at 2-3 weeks
  - Throwing program at 10-12 weeks
  - Release at 3-4 months

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Conclusions

- Adaptive Changes in the thrower's shoulder leave it susceptible to injury
- Rotator Cuff Pathology
  - Rest and Therapy is 1st line management
  - After debridement or repair, return to play rates are about 50%
- SLAP Lesions
  - Less responsive to therapy
  - Biceps Tendodesis allows accelerated Rehabilitation versus SLAP repair
  - Biceps Tenodesis yields higher return to play and satisfaction rates than SLAP repair

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- Thank you

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