Shoulder and Elbow Injuries in the Athlete

Encore Sports Medicine Symposium

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July 13, 2018

- I have no Financial Disclosures

Background

- Undergraduate at Auburn University
- Medical school University of Arkansas for Medical Sciences
- Residency Oklahoma University Health Science Center
- Fellowship Andrews Sports Medicine in Birmingham
- Practice
  - Assistant Professor sports medicine University of Arkansas
  - Currently in practice at Southern Bone and Joint Specialists in Dothan, AL

The Overhead Thrower: Introduction

- Extraordinary demands on shoulder & elbow joint
- Fastest human movement
  - 7,230 o/s
  - Late cocking to ball release 0.03sec
- • Tremendous forces generated
  - Anterior displacement 0.5 x BW
  - Distraction forces 1 x BW at ball release
  - Fleisig et al: Am J Spts Med '95

- At maximum external rotation:
- Elbow Varus Torque = 64 Nm (40#)
  - Fleisig GS: AJSM '07

The Overhead Thrower: Introduction

- Highly skilled athlete
- Requires flexibility, muscle strength, coordination, synchronicity & NM efficiency
- Proper throwing mechanics
- Proper training program
  - Injuries Are Common to the Throwers Shoulder & Elbow
  - Tremendous stresses & velocities

The Overhead Thrower: Introduction

- Overhead throwing motion
  - Moderate to high levels of muscular activity
  - » 80-120 % of MVIC during acceleration phase of pitch
  - DiGiovine et al: JSES'92
- • Effective transfer of kinetic energy
  - » Over 60% of kinetic energy during pitch generated by legs
  - Toyoshima et al: Biomech '86

The Overhead Thrower: Introduction

- Pitchers sustain injuries at the highest rate
  - 61% of all team injuries pitchers compared position players
  - 72% of all pitchers injuries are to their shoulder/elbow
- Specific risk factors increases injuries
  - Pitching when fatigued, or pitch too much (volume), improper throwing mechanics, or max effort - all increase injury risk
- GIRD & GERI is predominantly due to boney adaptations
  - ~83% boney & ~17% due to soft tissue
- Maintaining motion in throwing shoulder when healthy isn't difficult
- Specific exercises & stretches are important

The Overhead Thrower Introduction - Injuries

- Shoulder & elbow injuries are common in baseball – and appear to be increasing
- In professional baseball:
  - 28 % of all injuries occur to the shoulder joint
  - 22 % of all injuries occur to elbow joint
- Length of injury time is increasing – days on the disabled list days
  - Conte et al: Am J Spts Med '01
- In youth baseball – 50 % of players (9-14) complained of elbow or shoulder pain
  - Lyman et al: Am J Spts Med '02
- UE 75% time lost college baseball players
  - McFarland et al: Clin J Spts Med '98

The Overhead Thrower Introduction - Injuries

- Why the increase in injuries at all levels of baseball???
- Factors that influence injury rates:
  - Number of innings per year*
  - Pitching while you are fatigued*
  - Pitching year round
  - Type of pitches
  - Improper mechanics
  - Pitcher – catcher combination
  - Technique & Skill level
    - Lyman, Fleisig, et al: AJSM '02
    - Lyman, Fleisig, et al: Med Sci Spts Ex '01
    - Olsen, Fleisig, et al: AJSM '06
    - Fleisig et al: AJSM '11

Risk Factors for Injuries Overview

Youth Baseball Pitchers

Pro Baseball Pitchers

Youth Baseball Player: Introduction

- Over 17 million kids play youth baseball in USA
- Injuries appear to be increasing
- 50% of 9-14 yr old players have responded they have experienced elbow &/or shoulder pain during play
  - Lyman et al: AJSM '12
- Surgeries appear to be increasing in young baseball players
  - Fleisig et al: J Sports Health '12

Youth Baseball Player: Risk Factors

- Pitching when fatigued
- Pitching too many innings/year
- Not enough rest from throwing at end season
- Too many pitches in game, week, year
- Pitching consecutive days
- Poor pitching or throwing mechanics
- Playing on multiple teams, leagues

Types of Elbow Pathology

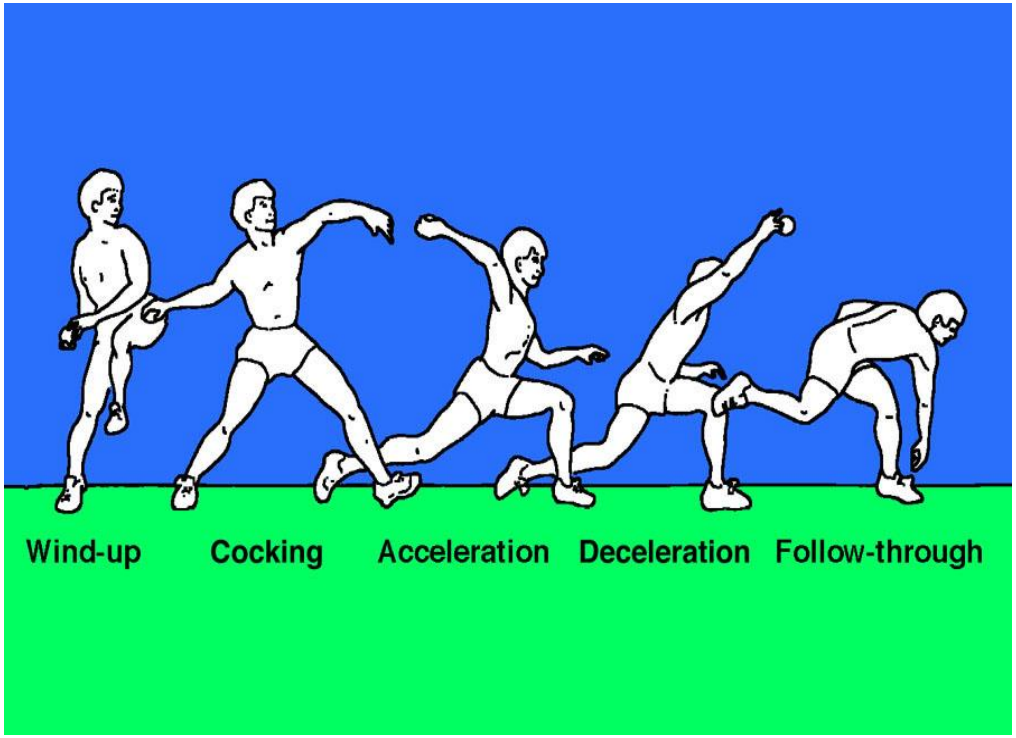
- Valgus Extension Overload (VEO)
- Medial Instability (UCL injury)
- Olecranon Stress Fractures
- Adolescent Injuries
- Ulnar Nerve Pathology
  - Neuritis, Instability
- Tendinopathies
  - Golfer's elbow

First Get a Thrower's History

- What do you feel?
  - Pain, neurologic symptoms, instability, popping, fatigue
- Where do you feel it?
  - Medial elbow, lateral elbow, posterior elbow
- When do you feel it?
  - Top of throwing motion vs Ball Release?
- Timeline
  - First symptoms, most recent
    - Throwing history

Introduction
Elbow Injuries in Throwing

Baseball pitching phases



Important to know when in the throwing motion symptoms occur

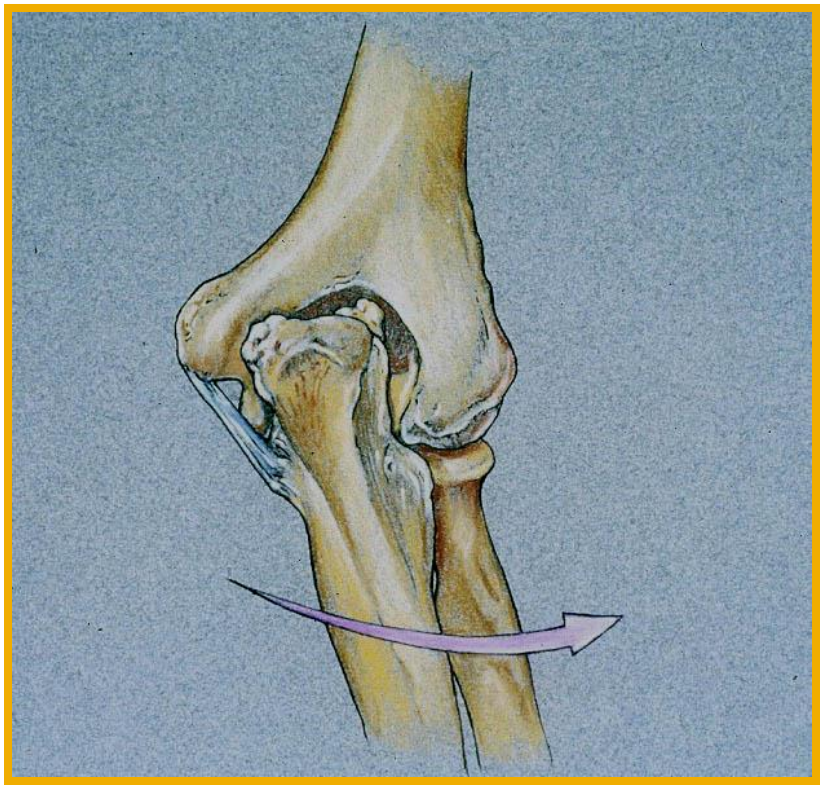
Introduction

Mechanism of Injury
"Valgus Extension Overload"

- Medial stress
- Lateral compression
- Forced extension

Valgus Extension Overload Syndrome

- Symptomatic lesion in overhead throwing and hitting athletes
- Posteromedial osteophyte abuts against the medial olecranon fossa
- Results in pain and loss of control and velocity
- Typical pain at ball-release



Valgus Extension Overload Syndrome

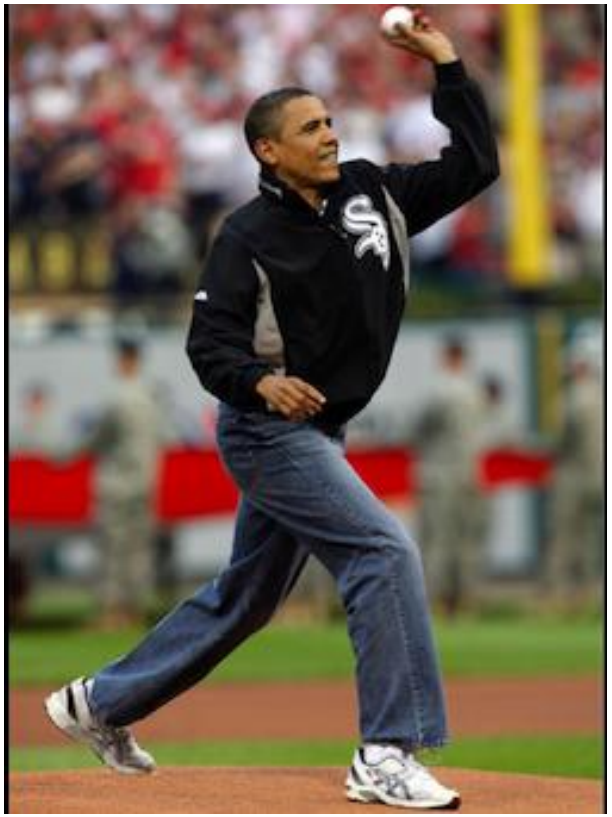
- Physical exam:
  - Posterior elbow tenderness
  - Positive VEO test
- VEO Test
  - Repeated forced extension with valgus stress
  - Pain at posteromedial aspect of elbow
    - Not at UCL

Valgus Extension Overload Syndrome
Radiographs

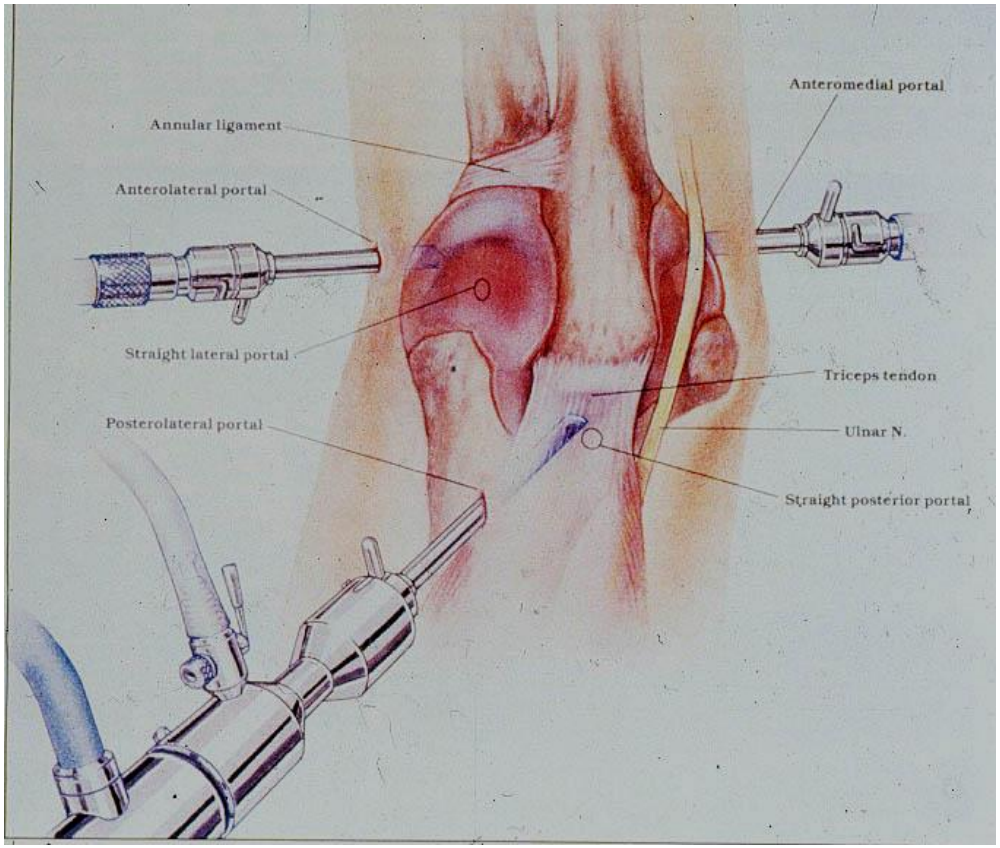
- AP
- Lateral
- Obliques
- Axial
  - Taken with forearm flexed so fingertips are on shoulder, arm externally rotated ~ 15°, beam perpendicular to table

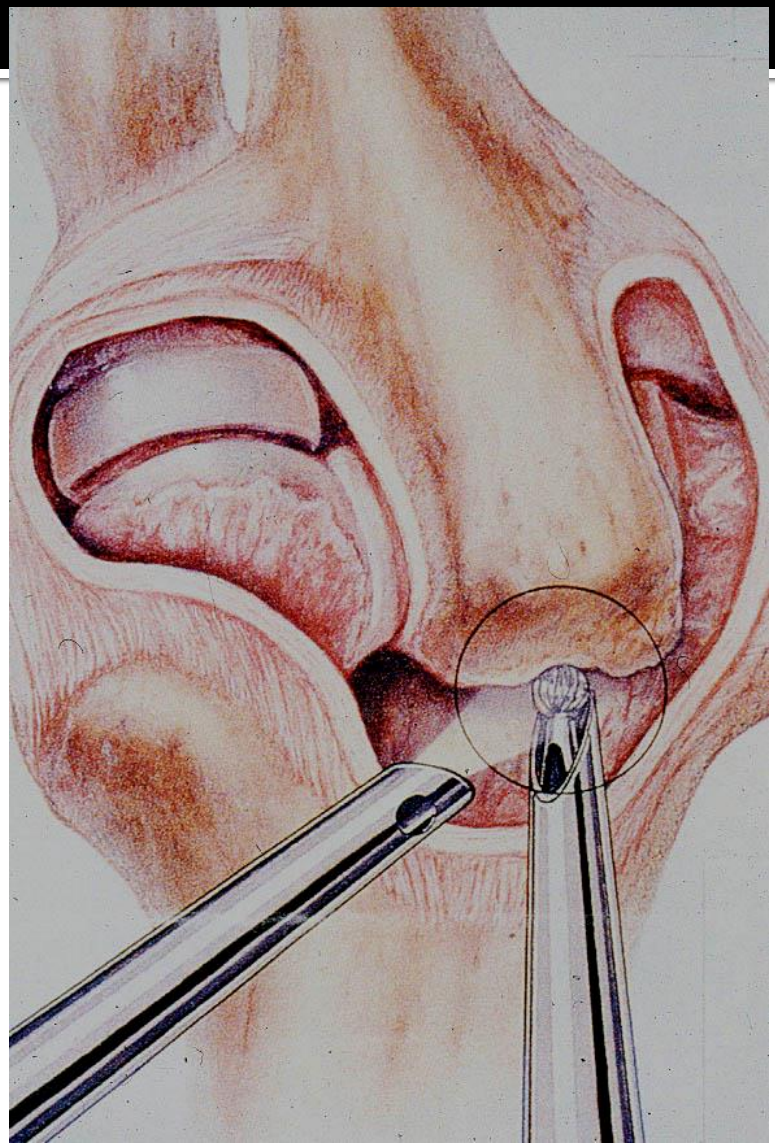
Conservative Treatment

- Active rest
  - First option. Spurs are not new, symptoms are.
  - "Fill the tank"
  - Elbow and shoulder exercises
  - Correct mechanics
  - NSAIDS
- Interval throwing program to return to throwing competitively



Arthroscopic Technique





Return to Play

- Portals healed in 7-10 days
- Work toward full range of motion by 3-4 weeks
- Start plyometrics when range full
- Start interval throwing program at 10-12 weeks
- Competition at 4-6 months

Valgus Extension Overload Syndrome
Summary

- Common
- High suspicion
- Impingement occurs from acceleration through deceleration
  - Pain at ball release
- Careful analysis to distinguish from UCL
- Conservative treatment
- Surgical Mgmt if conservative failure

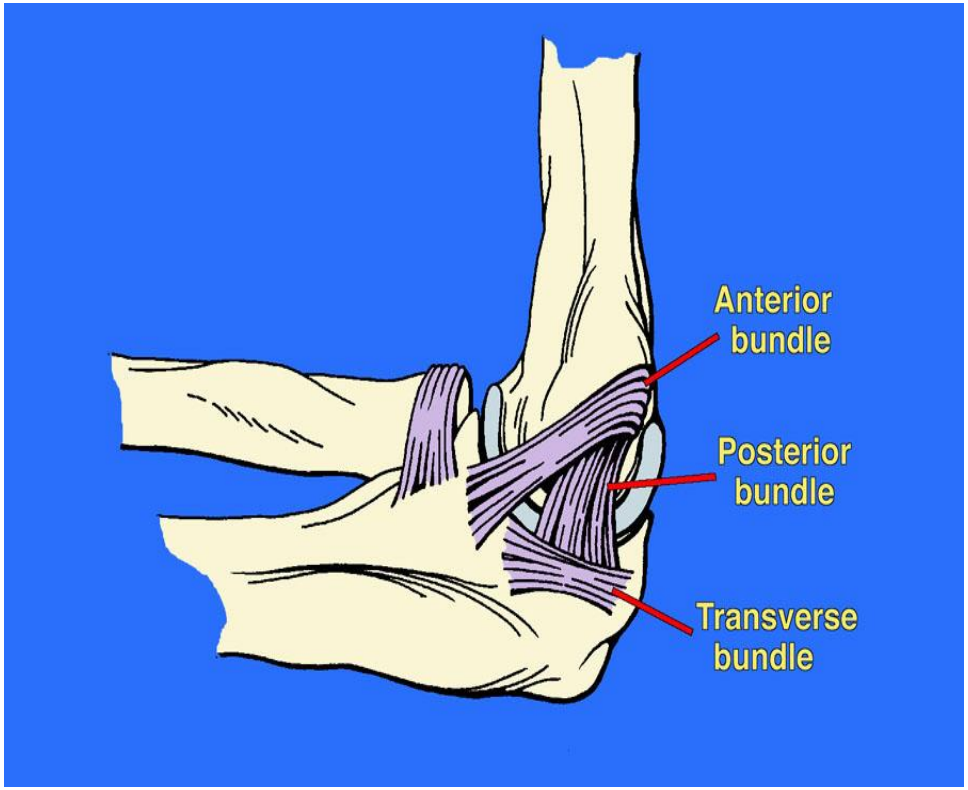
Elbow Injuries in Sports
UCL Injuries

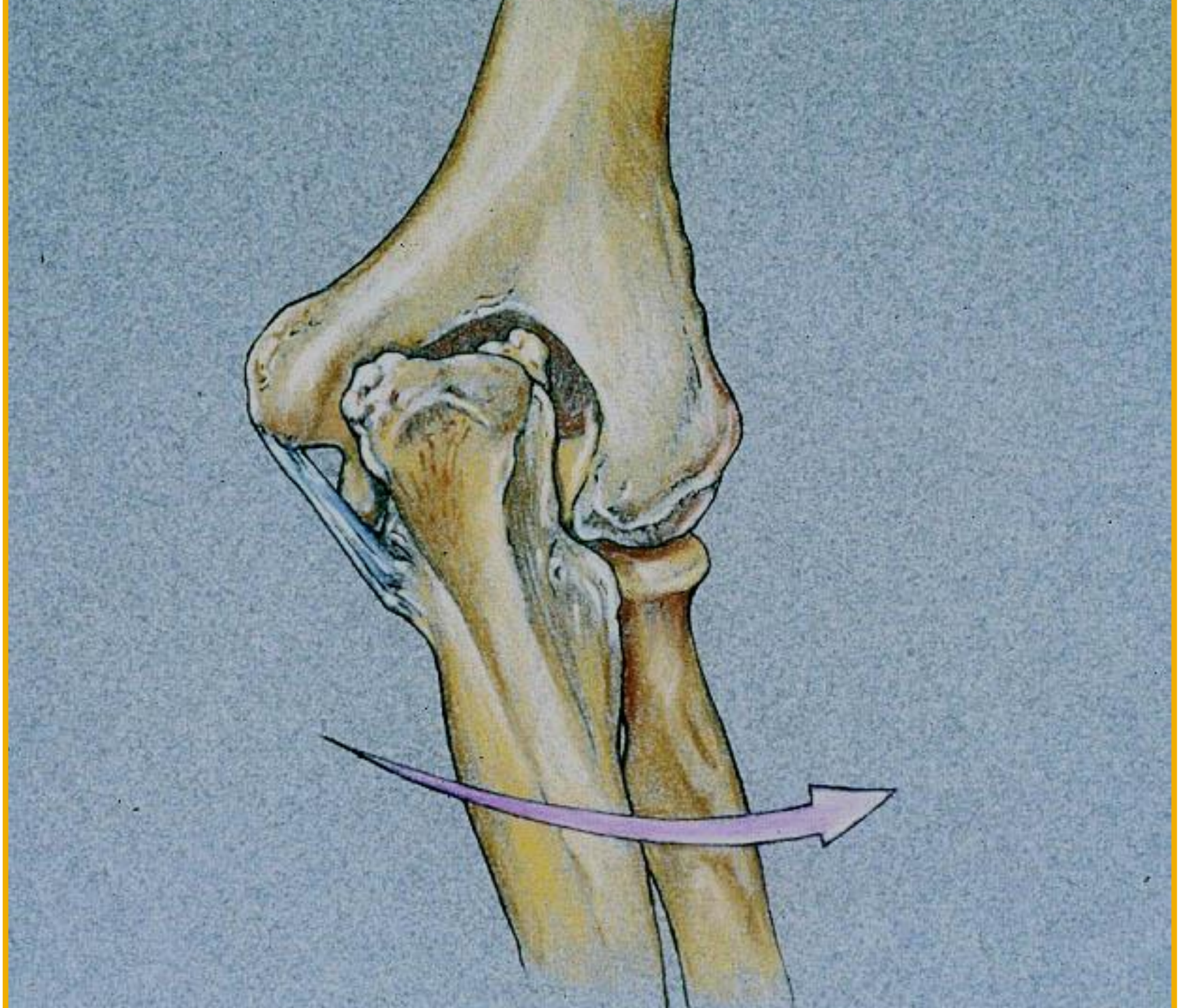
- Traumatic UCL Injury

- Repetitive Overhead Stress

Ulnar Collateral Ligament Injury

- UCL is the main medial stabilizer of the elbow
- Anterior bundle is the primary structure involved in throwing





UCL Injury (non-contact)

- History:
  - Acute medial pain
  - Onset during throwing, warm-up
    - Not enough warm-up
  - "Pop" felt or heard
    - May be insidious onset
  - Previous Hx of pain, steroid injection

UCL Injury (non-contact)

Physical exam:

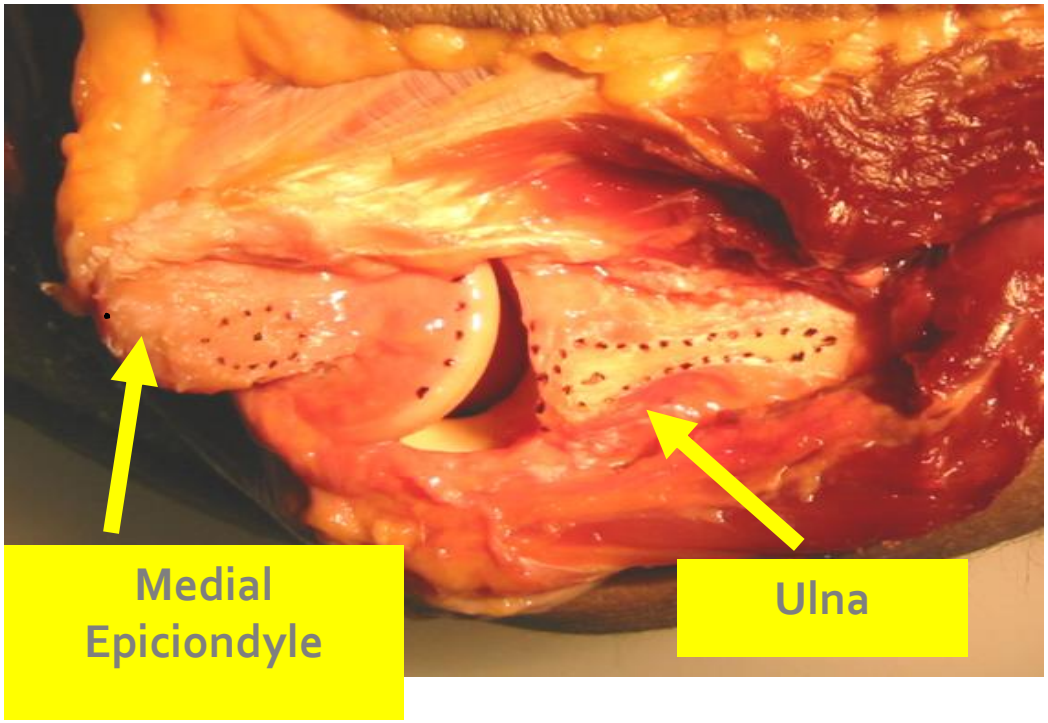
- Medial elbow ecchymosis (rare)
- Ulnar nerve symptoms
- Tender at anterior bundle/sublime tubercule
- Difficult exam:
  - +/- instability, dynamic???
  - Only about 40% have laxity on exam
- Imaging: MRI arthrogram, stress xray

UCL Stress Test - Seated

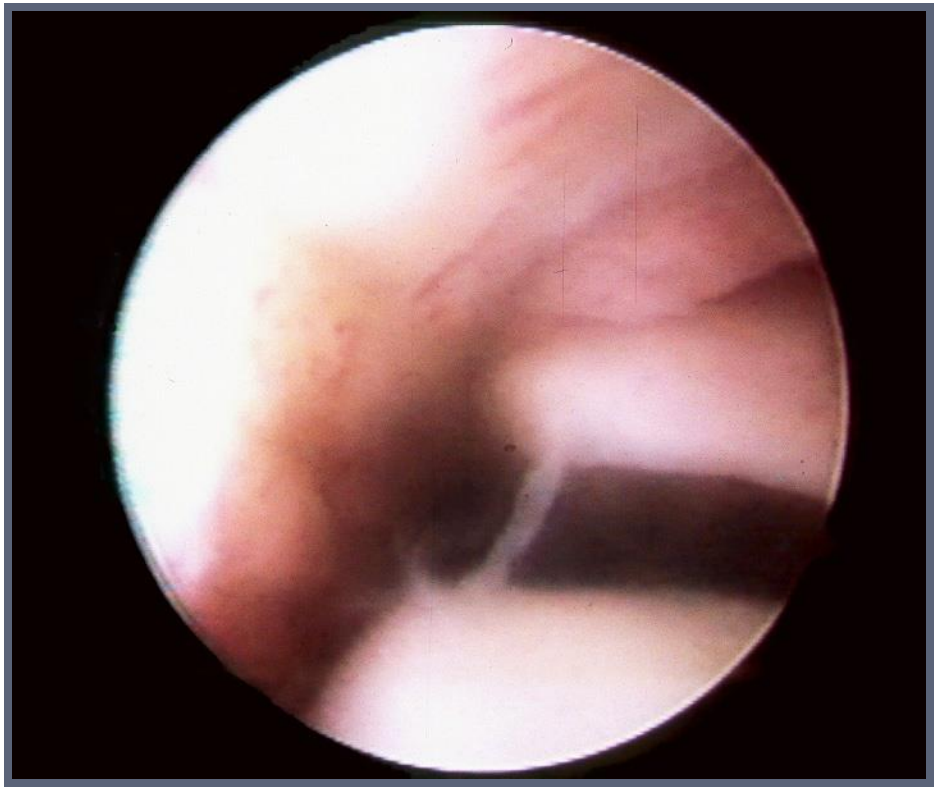
UCL Stress Test - Supine

Milking Maneuver

UCL Insertional Anatomy



Arthroscopic Stress Test



Non-Operative Rehab UCL Sprains Typical Program - Literature

- No throwing for 8 weeks to 4 months (severity)
- • Restricted motion; caution with valgus stress
- • Progressive strengthening
  - Esp. of wrist flexors/pronators
  - Emphasize shoulder program
- Initiate throwing program at timeframe: 6-8 weeks to 3-4 months from time of initial injury ?
- Mixed clinical results – how many return to play

Rettig, Sherill, et al: AJSM '01

- 31 overhead athletes suspected UCL sprains
  - (20 pitchers, 2 javelin throwers)
- Some had MRI or stress views
- Treated non-operatively
  - No throwing 2-3 months
  - ROM exercise & ice
  - Strengthening program
  - Begin throwing at 2-3 months
- 42% were able to return to play
  - *Average time to return 24.5 weeks (13-54 weeks)

Podesta, Best, Yocum: AJSM '13

- 34 overhead athletes with confirmed (MRI)partial thickness UCL tear
- All players failed non-op Rx previously
- All Rx with 1 injection IA PRP injection & specific rehabilitation program
- 30/34 (88%) returned to same level of play without any complications (1 had UCLr)
- Average return to play 12 weeks
- Joint opening reduced from 7 to 2.5 mm

Rehab UCL Sprains in Throwers

- Immediate restricted motion
  - Non-painful ROM*
  - Usually almost full ROM*
  - Gradually establish full ROM
- Consider ROM brace ??
  - Control valgus stress
  - Brace for 3-4 weeks
- Muscle training
  - Isometric for UE/ shoulder
  - Emphasize flexor/pronators
- Control applied forces
  - No throwing 2-3 months
- Throwing mound (12-16 wks)

UCL Injuries
Dislocated Elbow

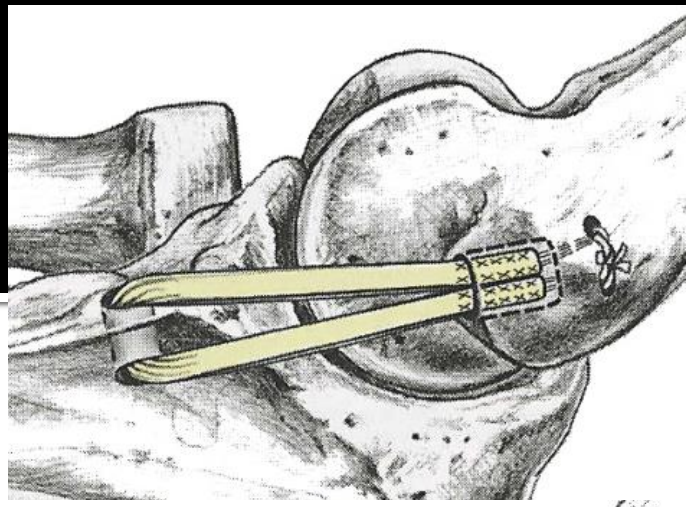
- Hyperextended elbow- often
- UCL injury & capsular tear
- Immobilize in posterior splint for 1-2 weeks
- Begin easy ROM program
- Control elbow extension
- Gradual restore ROM
- Strengthening program
- Functional brace

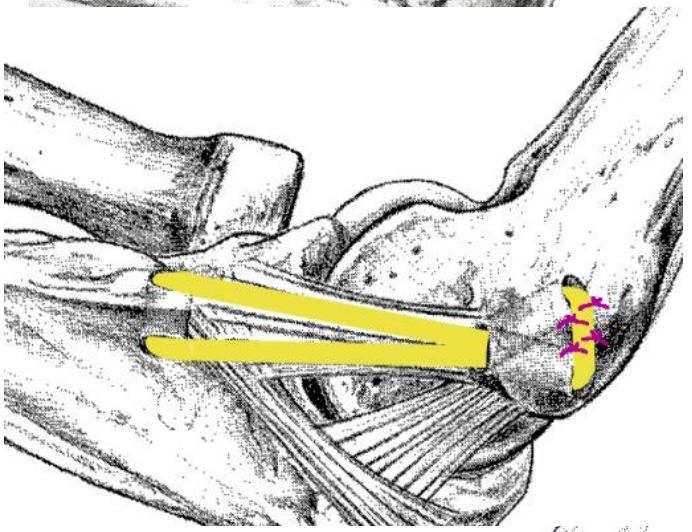
Operative Management

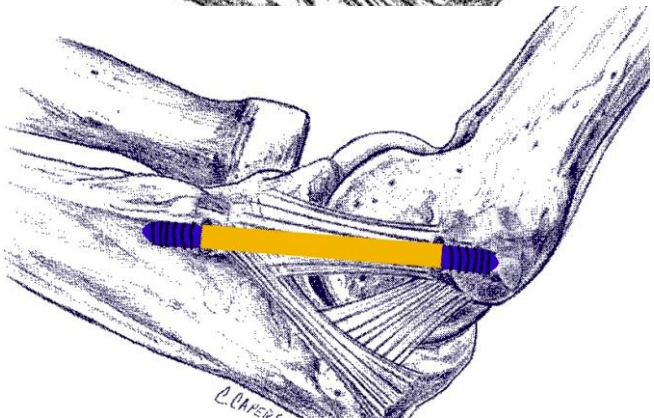
- Only after conservative failure
  - May operate acutely if completely ruptured or avulsed (more common in gymnasts)
- Repair is also an option in some patients
- Consider goals of patient
  - If patient does not plan to throw, may not need to be fixed

UCL Reconstruction

- Free autogenous tendon graft
  - Palmaris Longus
  - Gracilis
- Bone tunnels
- Different fixation techniques







MATERIALS & METHODS

Post-operative Rehabilitation

- Posterior splint (90 deg) for 1 week
- 20-105 deg ROM by week 2
- Full ROM by week 6
- Thrower's Ten strength program- wk 6
- Plyometrics - week 12
- Interval throwing program – week 16

RESULTS

Return to Sport

- 4.3 month average time to throwing
- 11.3 month average time to competitive throwing
- Approximately one year for professional athletes

Outcome of Ulnar Collateral Ligament Reconstruction of the Elbow in 1281 Athletes

Results in 743 Athletes With Minimum 2-Year Follow-Up

E. Lyle Cain Jr,*† MD, James R. Andrews,† MD, Jeffrey R. Dugas,† MD, Kevin E. Wilk,‡ PT, DPT, Christopher S. McMichael,† James C. Walter II,§ MD, Reneé S. Riley,‖ MD, and Scott T. Arthur,* MD

Investigation performed at the American Sports Medicine Institute, Birmingham, Alabama

- 84% of reconstructions able to return to same level of competition or higher
- 89 % of major league professional baseball players were able to return to pro level
- 72% back to major leagues

COMPLICATIONS

- 10 % incidence of post-operative ulnar nerve paresthesias (usually resolved at < 4 weeks)
- 1 post-operative ulnar neuropathy (motor and sensory loss) which resolved at 10 months
- 4 % had graft sight morbidity
  - superficial infections
  - tightness/tenderness at wrist (palmaris harvest)
- 5 late medial epicondyle avulsion fractures (6 – 18 months post-op)

Conclusions

- The diagnosis of UCL injury is clinical
- Arthro MRIs and stress x-rays are confirmatory
- Attention to surgical details is paramount
- Careful post-op rehabilitation is essential
- Recovery takes 9 – 12 months for reconstructions
- *"Don't rush it!"*

Thrower's Stress Fracture of the Olecranon

Diagnosis

- X-ray (negative early, sclerosis later)
- Bone scan (frequently hot in thrower's anyway)
- CT, MRI, definitive

Thrower's Stress Fracture of the Olecranon

- Gradual onset
- Ill-defined pain
- Pain may be at proximal ulnar shaft
  - Medial or lateral
- Diagnosis by exclusion and suspicion

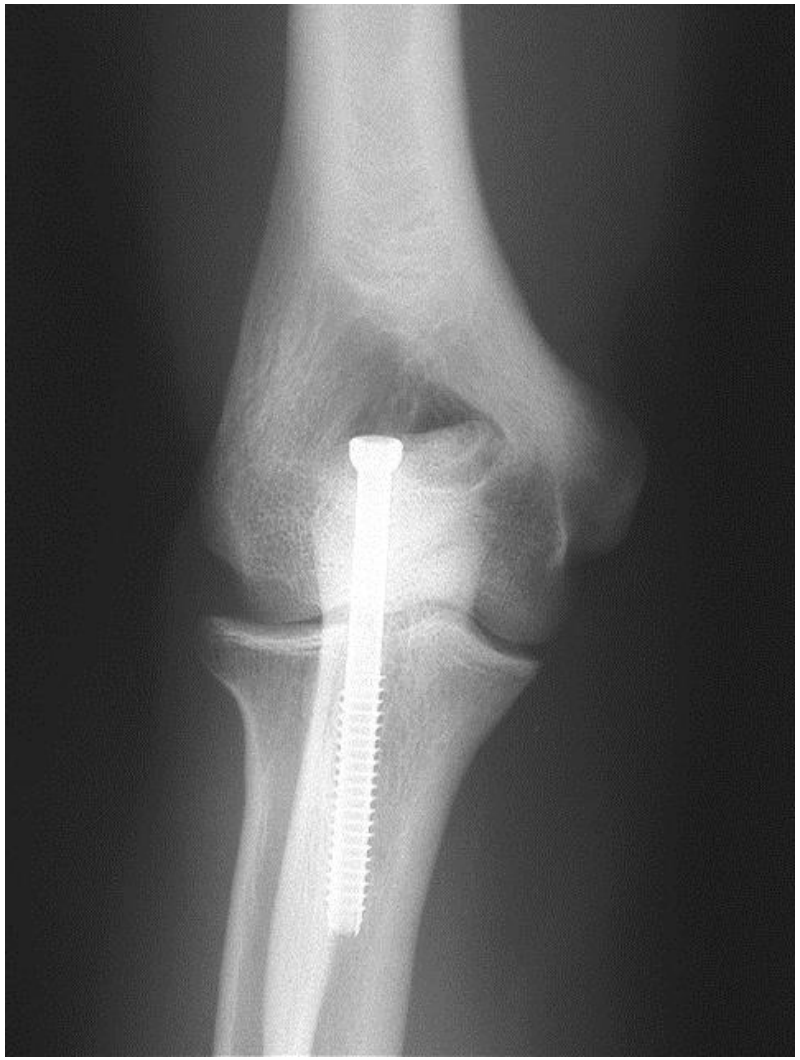

RT

Thrower's Stress Fracture of the Olecranon

Treatment

- Conservative
  - Active rest
  - Gradual return when symptoms abate
  - Bone Stimulator
  - Prevention of terminal extension
- Surgical
  - Drilling and internal fixation

Olecranon Stress Fractures



Delayed Union Olecranon Apophysitis

Etiology

- Early and continued stress from throwing from a young age
- Apophysitis that doesn't close
- Normally begins closing around age 14, often delayed in throwing athletes


R
SEH

Delayed Union
Olecranon Apophysitis

Treatment

- Conservative
  - Active rest
  - Gradual return when symptoms abate
- Surgical
  - Internal fixation


0:00 PM

Other Adolescent Elbow Injuries

- Olecranon avulsion fracture
- Medial epicondyle apophysitis (little leaguer's elbow)
- Medial epicondyle fracture
- UCL injury
- OCD capitellum

OCD capitellum

- Can present with pain, swelling, +/- mechanical symptoms
- Most heal with rest over 6-18 months
- If progressive pain or fragmentation of lesion then can scope and debride

Ulnar Neuritis

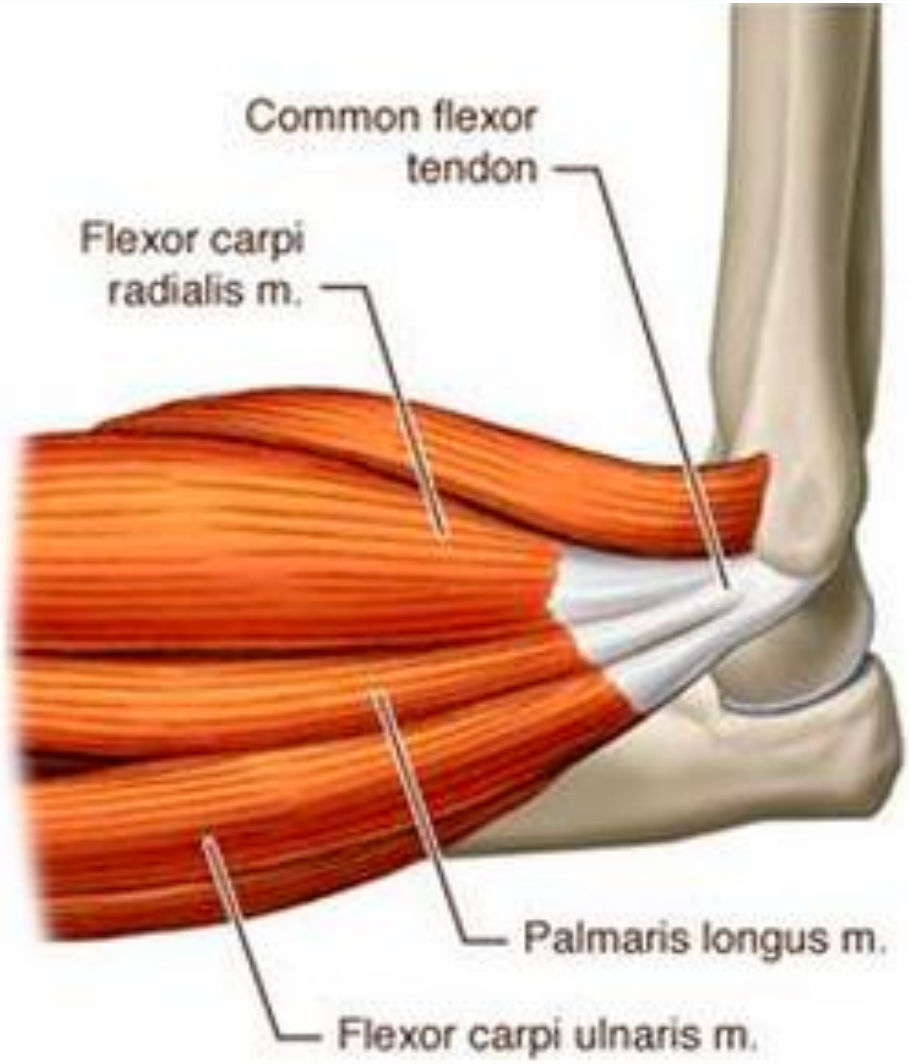
- Common in overhead athletes
- Must distinguish primary ulnar nerve symptoms from those secondary to medial instability
  - EMG rarely positive in throwers
- PE shows irritability (Tinel's sign), nerve may be unstable

Ulnar Neuritis

- Conservative management first option
  - NSAIDS, rest, night splint
  - Return to throwing gradually as symptoms allow after 3-4 weeks of active rest
- If conservative mgmt fails, UNT is considered
  - Generally curative
  - Return to play in 3-4 months

Flexor-Pronator Injuries

- Acute tear vs. chronic tendinosis
  - Bony or soft tissue avulsion from ME
  - Intrasubstance injury



Flexor-Pronator Injuries

- Active Rest
  - More shoulder than elbow exercise to avoid continuation of symptoms
  - Corticosteroid/PRP injection
  - Gradual return to elbow exercise
- Interval throwing program
- Mild - 3-6 weeks
- Severe - 4-6 months

Flexor-Pronator Injuries

- Failure of conservative measures is indication for surgical management
- Small medial incision to inspect flexor fascia
  - Open fascia in line with fibers
- Inspect insertion onto ME
  - If tear is present, direct repair
    - Tissue to bone if avulsed, tissue to tissue if intrasubstance
- If degenerative, debride diseased tissue, abraid bone to create bed for healing
  - Anchor to bone?

Conclusions

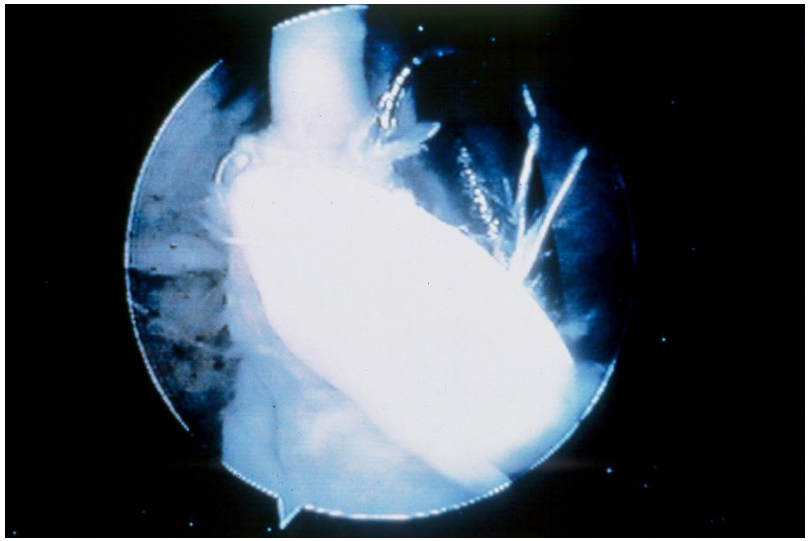
- Many types of Elbow Pathology
- Some very serious, some relatively minor
- Early diagnosis and management often keys to success
- Range of motion is one of the keys to success
  - Early management of pain, swelling
  - Physical Therapy is key

Shoulder Injuries in the Athlete

- Labral Tears
- Rotator Cuff Tear
- Internal impingment
- Spinoglenoid notch cyst

4 Main Areas of Pathology

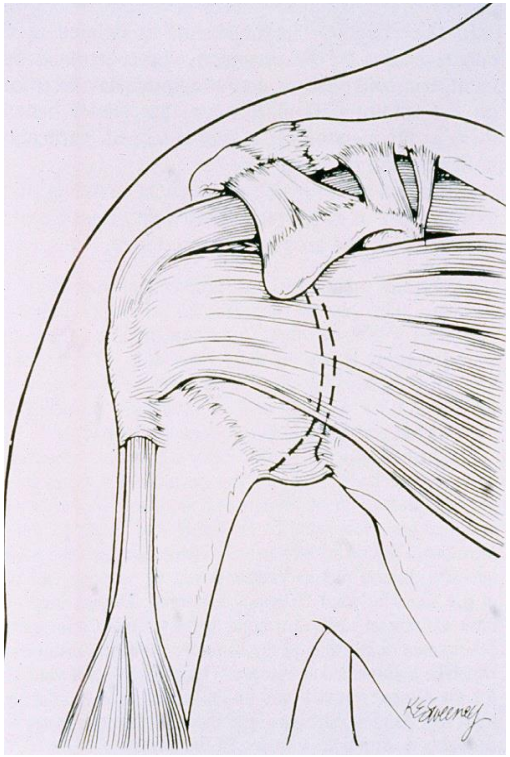
- Rotator Cuff/Impingement
- Biceps/Labrum
- Instability
- AC Joint



SHOULDER BIOMECHANICS

Dynamic stabilizers

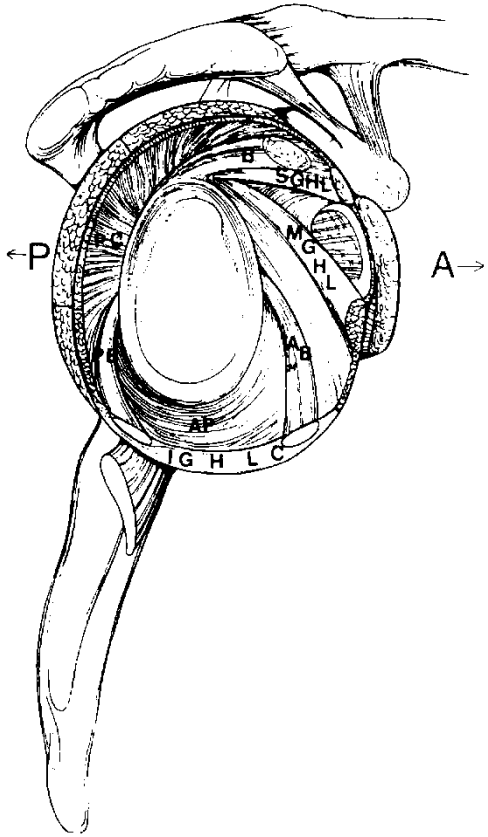
- Rotator cuff
  - Primary stabilizer by eccentric contraction
  - Humeral head depressor and prevents superior migration of humeral head
  - Provide a fulcrum for the deltoid
- Biceps tendon: humeral head depressor
- Scapulothoracic musculature



SHOULDER BIOMECHANICS

Static Stabilizers

- Glenohumeral ligaments are important stabilizers
- Inferior GH ligament is most important in anterior stability
- Lax structures may lead to secondary impingement



History

- Chief complaint
- Mechanism of injury
- Sport involved & position
- Prior treatment

History

Symptoms

- Pain: duration, location, throwing
- Weakness
- Instability
- Mechanical symptoms
- Loss of motion
- Neurosensory changes

Throwers' Shoulder Injuries: Fatigue

- Effects of shoulder fatigue:
  - Leads to injuries – little league pitchers
    - Lyman, Fleisig, Andrews: AJSM '02
    - Olsen, Fleisig, Andrews: AJSM '06
  - Increase superior migration humeral head
    - Wickiewicz, Otis, Warren: JSES '91
  - Fatigue effects performance & mechanics
    - Murray, Cook, Werner, Hawkins: AJSM '01
  - Proprioception diminishes by 78%
    - Carpenter : AJSM '98
  - Scapular position changes
    - Macrina, Wilk, Reinold: APTA CSM '06

Imaging

- Xrays
  - Minimum 3 views
  - Bone Lesions:
    - Bennett's Lesion, Apophysitis, OS Acromial
- MRI
  - Gold standard
- Ultrasound
  - Highly user dependent
  - Difficult to visualize the entire Rotator Cuff

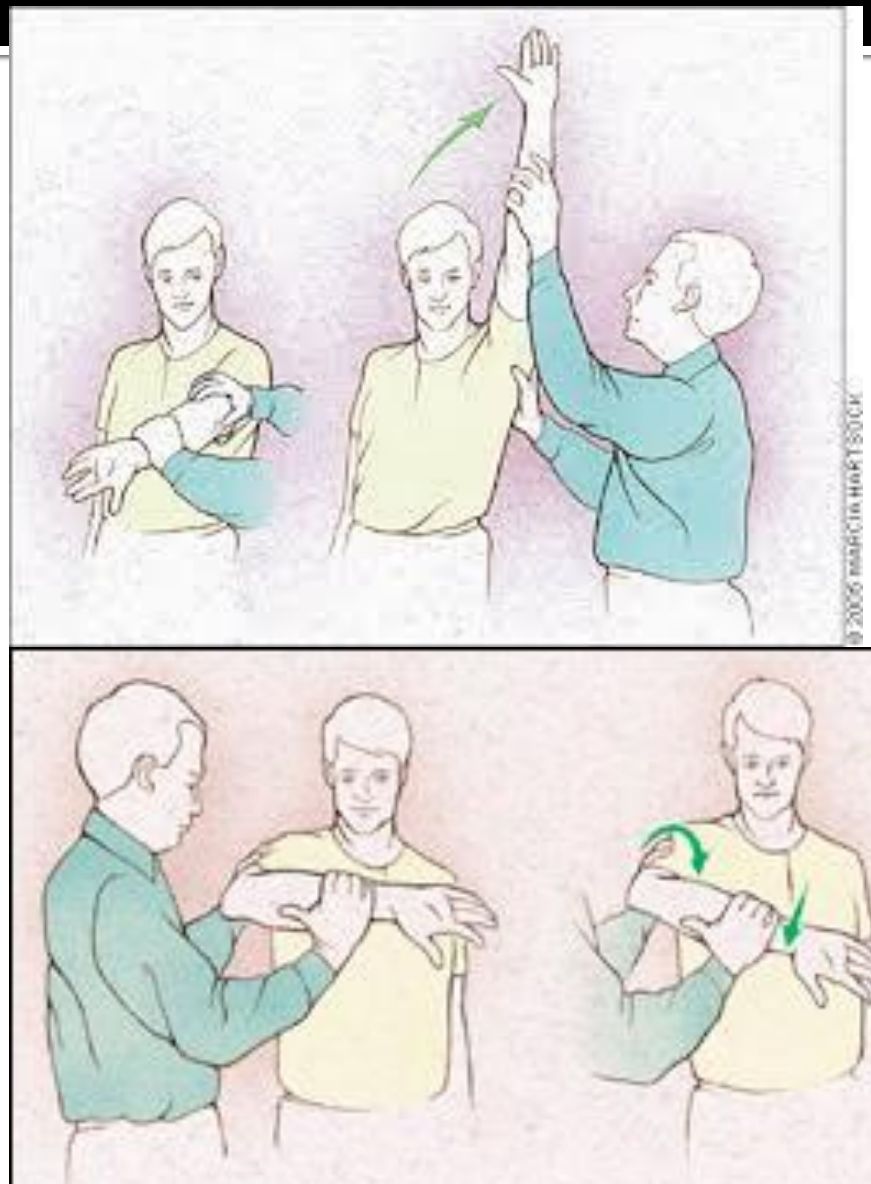
Physical Examination

- Inspection
- Palpation
- Range of motion
- Neurovascular exam
- Strength testing
- Special tests
- Cervical spine
- Stability testing

Many different tests, Pick a sequence of tests that work for you and do it the same way every time

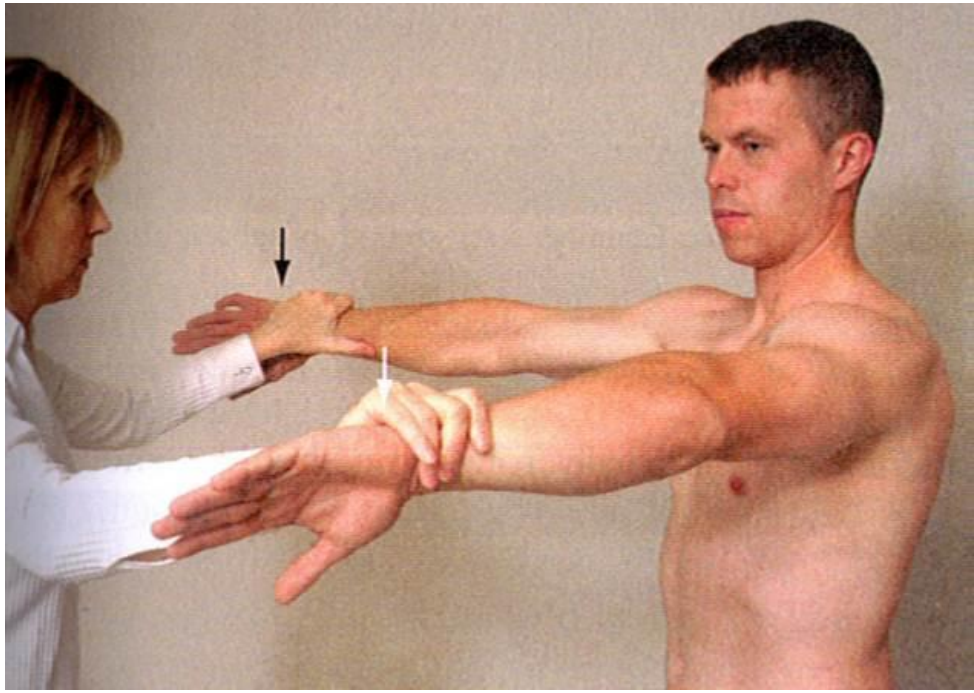
Rotator Cuff Testing

- Neer
  - + if painful
- Hawkins
  - + if painful



Rotator Cuff Testing

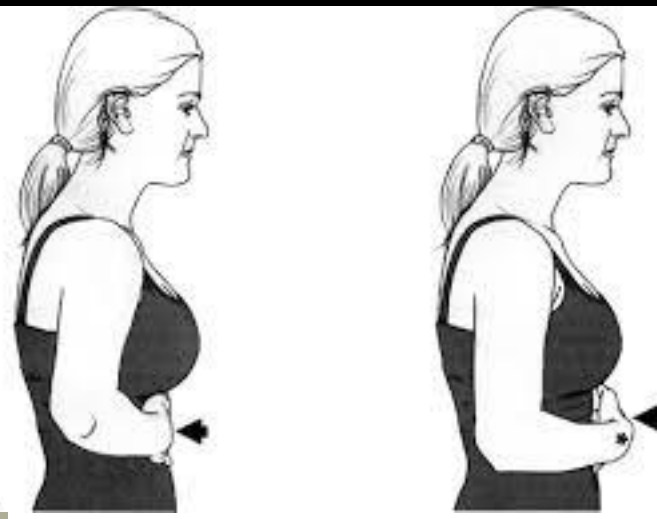
- Jobe's Test
  - Supraspinatus Test
  - Scaption
  - Empty Can Test
  - + if pain or weakness



Rotator Cuff Testing

- External Rotation Test
  - Infraspinatus Muscle
  - + if pain or weakness

Subscapularis Tests



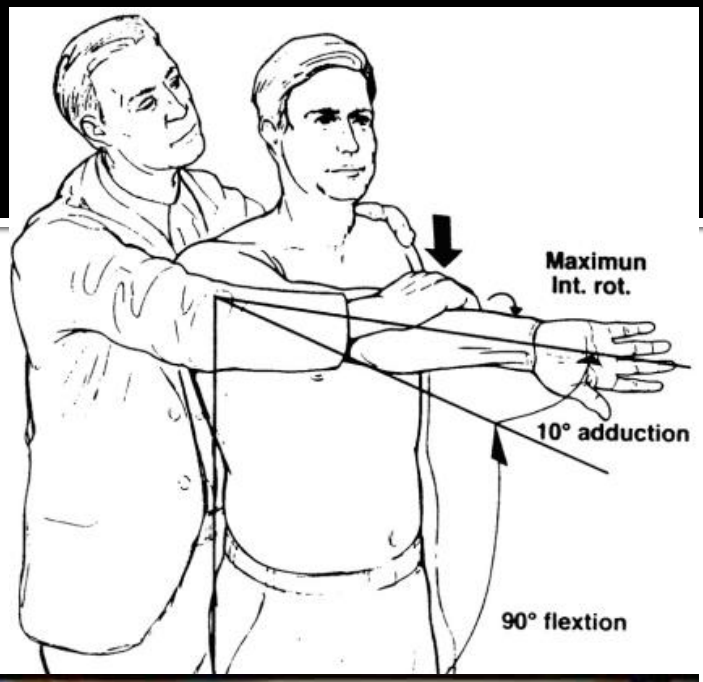
- Belly Press
  - + if wrist flexion

- Lift Off
  - + if weakness

- Bear Hug
  - + if weakness
  - Best for upper 1/3 tears

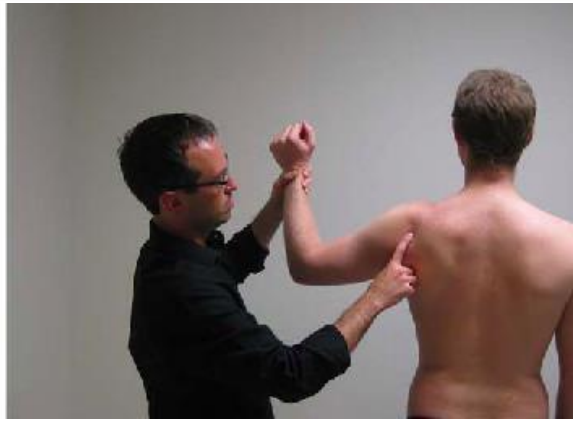
Labrum/Biceps

- O'Briens
  - SLAP, AC joint
  - + if pain, improved with supination
- Speeds
  - + if pain at bicipital groove



Labrum/Biceps

- DLS
  - SLAP lesions

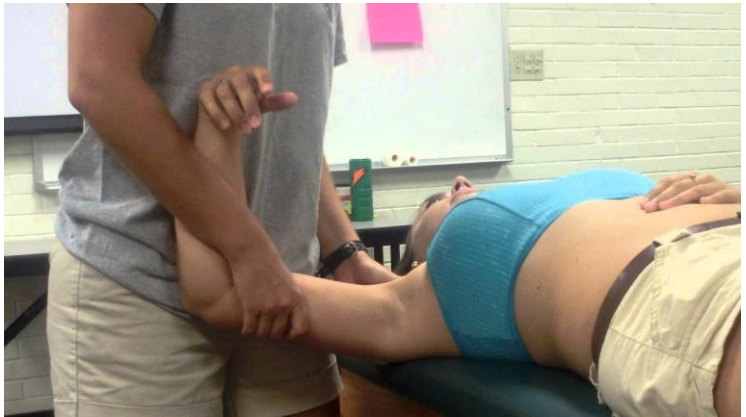


- Biceps Load II
  - Resist elbow flexion
  - + = pain with flexion

Instability

- Apprehension

- Relocation



- Ant/Post Drawer

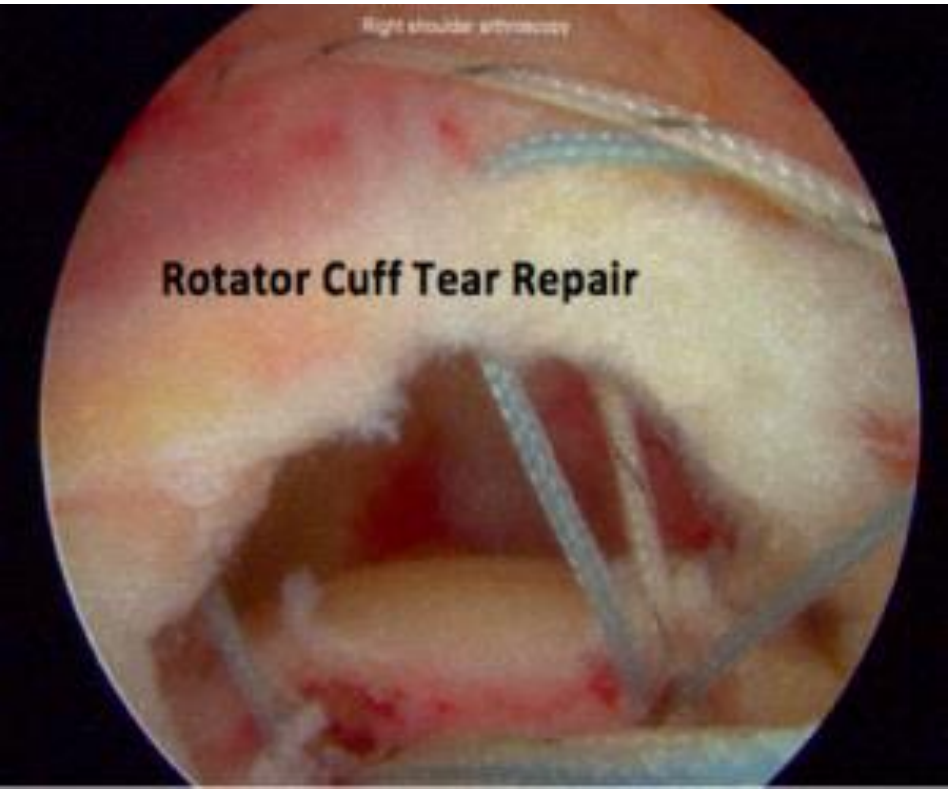
AC Joint

- Palpation

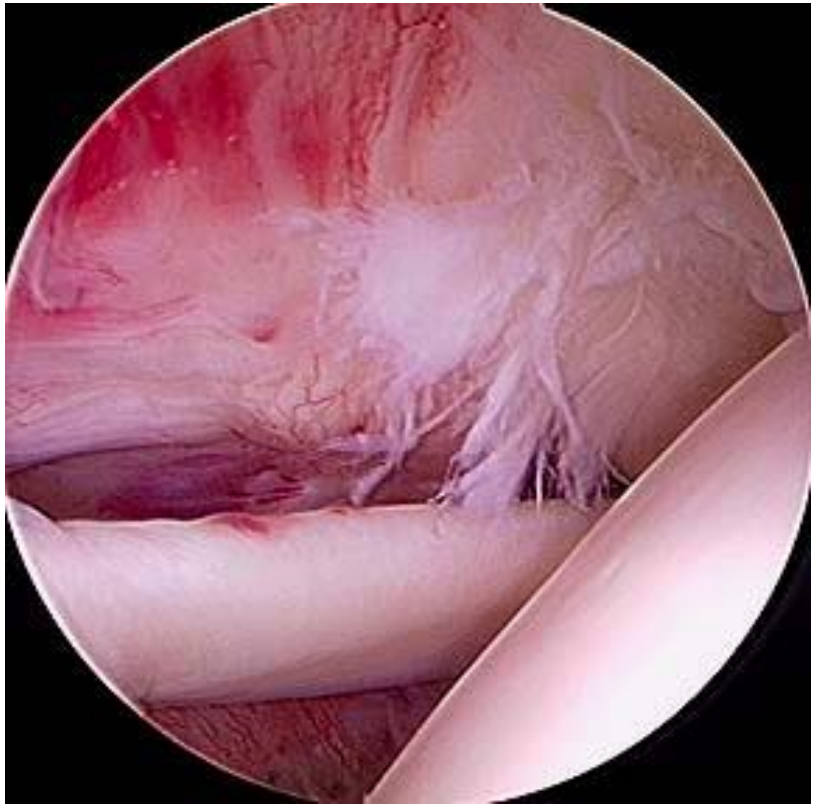
- Crossover Test

Rotator Cuff Tears

- Full Thickness



- Partial tears



Rotator Cuff Tears

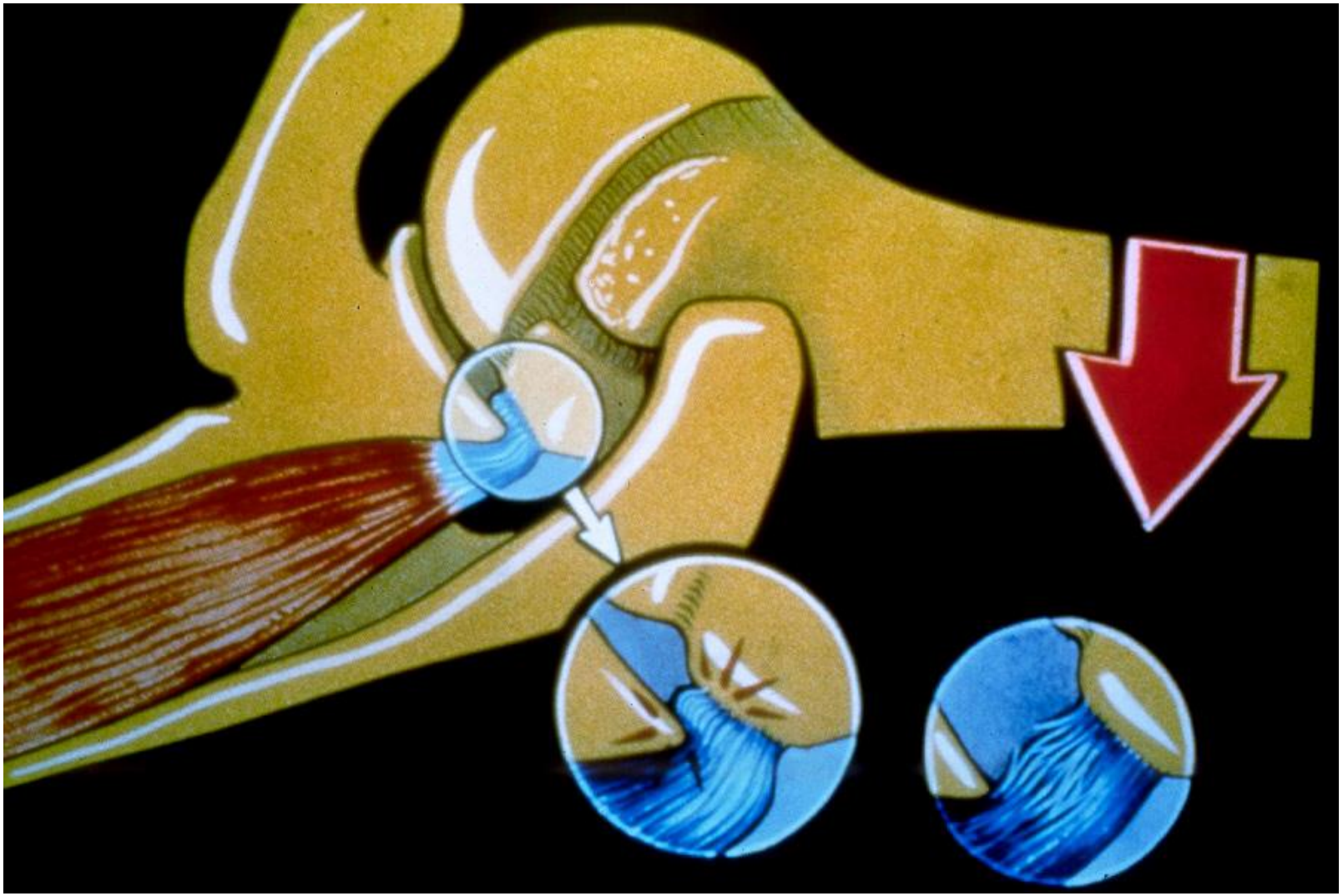
- Partial articular sided tears typically seen in throwers
- Typically debride if <50%, repair if greater
  - Trans-tendon repair
- Repair full thickness RCT

Internal Impingement: Introduction

- Occurs during abduction & excessive external rotation
- Late cocking during pitching
- Supraspinatus / Infraspinatus rubs on the posterosuperior glenoid rim &labrum
- Results in fraying of cuff and glenoid labrum – inflammation
  - Andrews: Tech Orthop'88
  - Walch: JSES '91
  - Jobe et al: JSES '93

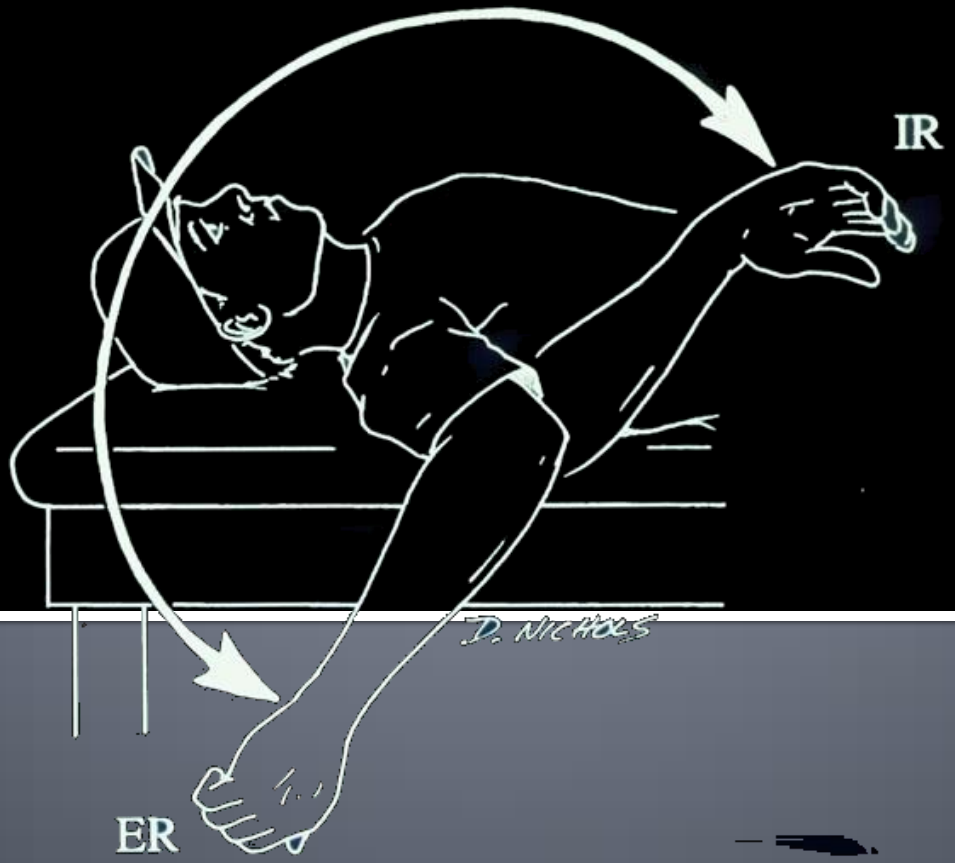
The Pathophysiology of Internal Impingement

Rotational Instability



"Total Motion" Concept

Wilk & Andrews



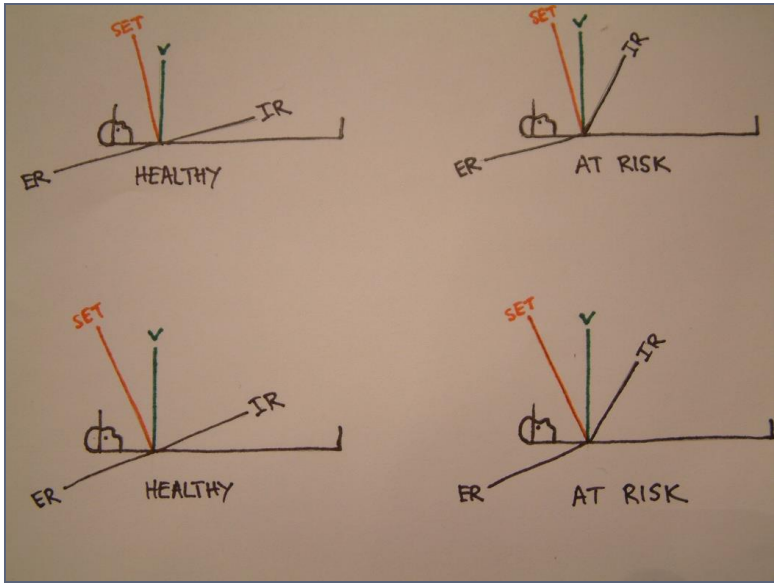
Thrower's Shoulder Definitions

- GIRD: Glenohumeral joint internal rotation deficit
- GERI: Glenohumeral joint external rotation increase
- TROM: total rotational range of motion
  - ER + IR + TROM

- GIRD: GH Internal Rotation Deficit
- Loss of IR compared to non-throwing shoulder
- Shoulder at risk = GIRD >20 degrees
- Treatment: stretching posterior capsule
  - Non-responders – capsular release
  - Posterior Inferior Capsulotomy
    - Morgan CD: Unpub '05

The Thrower's Shoulder Loss of Internal Rotation

- The gain in ER & loss of IR:
  - an adaptation seen in proficient overhead throwers – that is necessary, essential & beneficial
- * We are not sure how much of this adaptation is beneficial &when becomes problematic



Range of Motion in Professional Baseball Players

- Analyzed 372 baseball players
- ER on throwing side averaged 8º greater
- IR on throwing side averaged 9º less
- "Total motion concept" (ER + IR)
- No difference side-to-side for total motion

- Total Rotational Motion is equal bilaterally (within 5 degrees)
  - Wilk AJSM '02

C. Morgan – "Dead Arm"

- Is in the Posterior Capsule, not Anterior
- Posterior capsular repetitive microtrauma during the deceleration phase of throwing
- Creates Posterior Inferior Capsular Contracture
- Presents as lack of GH Internal Rotation - GIRD

- **Posterior Capsular Tightness Does Not Account for Increases in External Rotation**

Is the increase in ER, loss of IR due to Bone or Soft Tissue changes ?

Capsular contracture

Bone remodeling

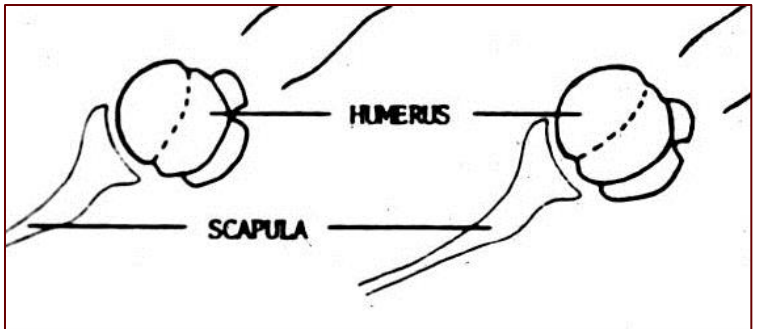
Humeral Retroversion

Crockett et al, AJSM, 2002

- CT Scans bilateral shoulders
- Humeral retroversion
  - Dom = 40 deg
  - Ndom = 23 deg.

> **17 deg**

- Mean Diff between ER & IR Dom and N dom, 7 & 9 deg



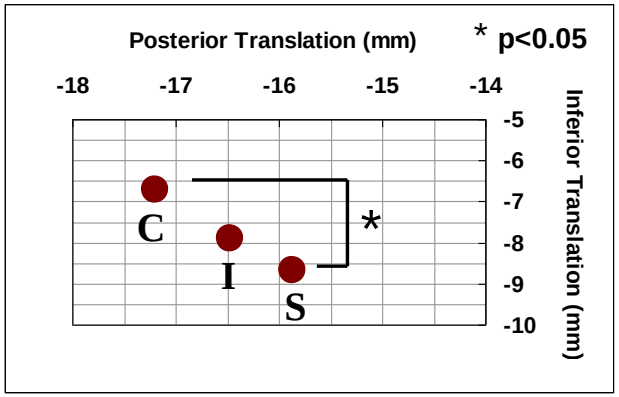
Humeral Head Position with Respect to the Glenoid Following Maximum External Rotation

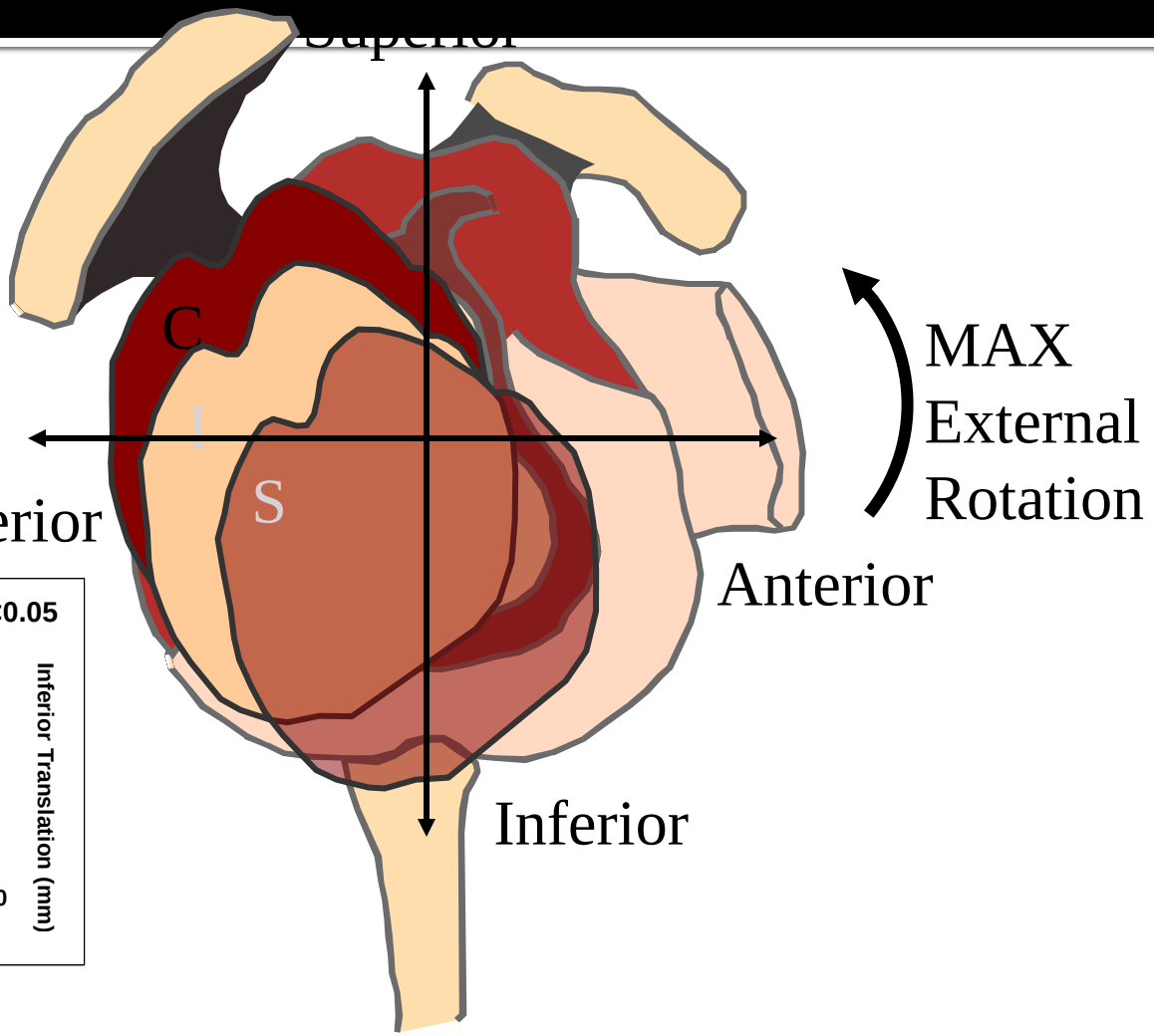
C. Morgan

I: Intact

S: Stretched

C: Simulated Posterior Contracture



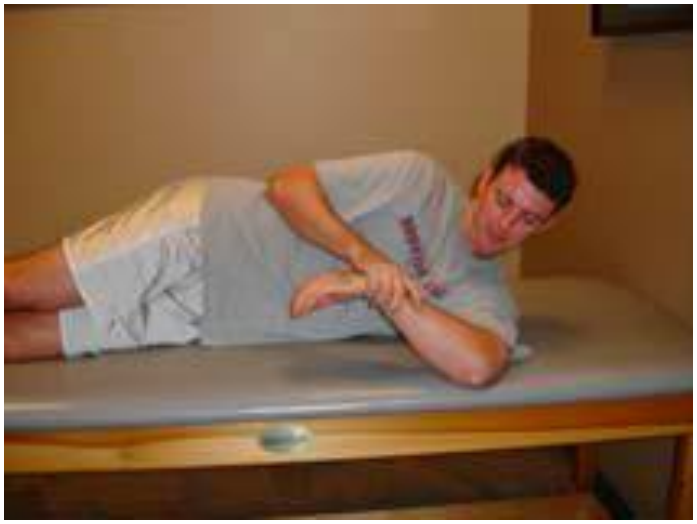


Wilk, Macrina, Fleisig, et al: AJSM '11

- 3 year GIRD study – 1 professional team
  - 33 injuries (30 players)
  - Missed games: 1529
- Significantly higher number of players on DL with GIRD (1.9x higher rate) p=0.17
- Significant ROM loss was 12.9degrees
- Total motion concept (ER + IR) : 5deg >
  - 2.5x higher rate of injury outside TRM
  - GIRD & TRROM – 3.5 x greater risk of injury
  - GIRD is a risk factor – TRROM also risk factor

The Thrower's Shoulder Treatment

- Non-operative rehabilitation is the first line of treatment
  - Mainstay of treatment !!
- Plays a key role in outcome
- Failed non-op treatment
  - adjust your rehab program
- Common diagnosis:
  - Tendonitis
  - Dead arm syndrome
  - Internal impingement
  - Instability – SLAP lesions
- Evaluate – Strategize – Implement – Assess – Adjustments



Rehabilitation of the Thrower's Shoulder Exercise & Training Programs

- Thrower's ten Program
  - 2% increase in throwing velocity in adolescent baseball players (11-15 yrs) isotonic program for 4 weeks
  - Escamilla:J Strength Cond '10
- Plyometrics:
  - 2% increase (PLY), Throwers 10 (1.7%) in throwing velocity in adolescent baseball players (14-17 yrs) plyometric program 6 wk
  - Escamilla: J Strength Cond Res '12

SLAP: Superior Labrum Anterior Posterior

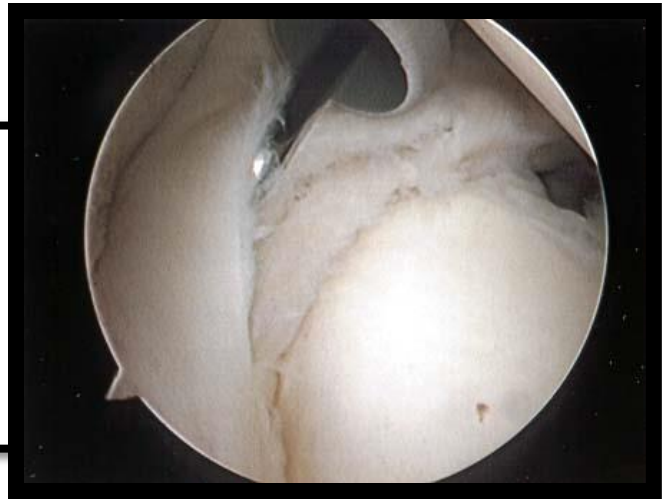
- Glenoid labral tears near biceps tendon origin noted in 73 throwing athletes

(60% anterosuperior, 23% antero- and posterosuperior, 10% anterior, 6%posterosuperior)

Glenoid labrum tears related to the long head of the biceps*

JAMES R. ANDREWS,† MD WILLIAM G. CARSON, JR.,‡ MD, AND WILLIAM D. MCLEOD, PHD

From the Hughston Orthopaedic Clinic, PC, Columbus, Georgia, and Tulane University School of Medicine, Division of Orthopaedics, Sports Medicine Section, New Orleans, Louisiana



SLAP Tear Etiology

- Single traumatic event
  - Compression injury
  - Traction injury
- Repetitive overhead activity
  - Traction/avulsion
  - Peelback
  - Internal impingment

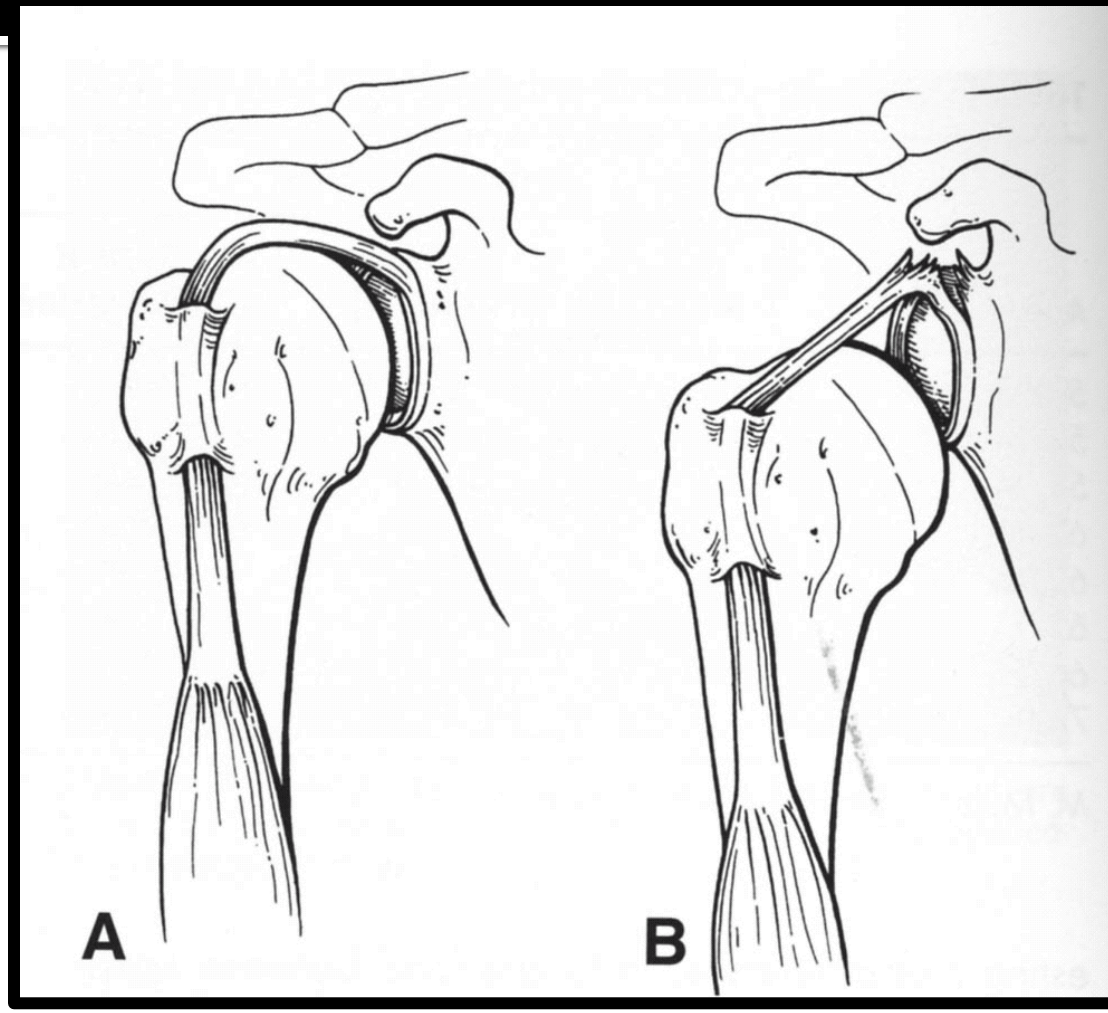
Etiology: Single Traumatic Event

Journal of Shoulder and Elbow Surgery

- Compression injury
  - Fall on outstretched, abducted, forward-flexed arm →
  - Compression on superior joint surface with proximal subluxation of humeral head →
  - "Pinching" mechanism
  - 65% recall a distinct traumatic event

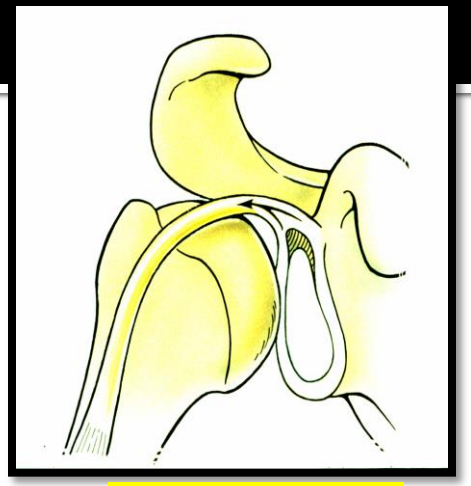
Etiology: Single Traumatic Event

- Traction injury
  - Sudden pull with subluxation and injury of the biceps anchor

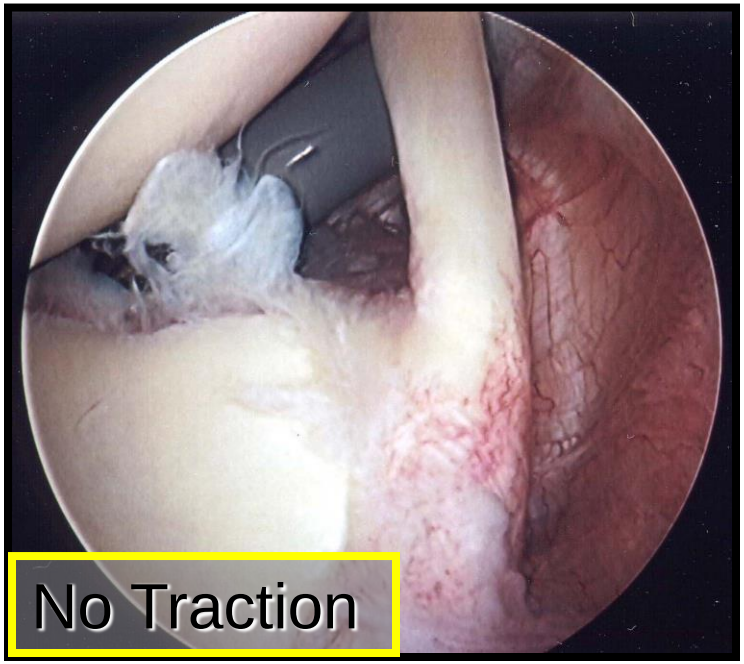


Etiology: Repetitive event

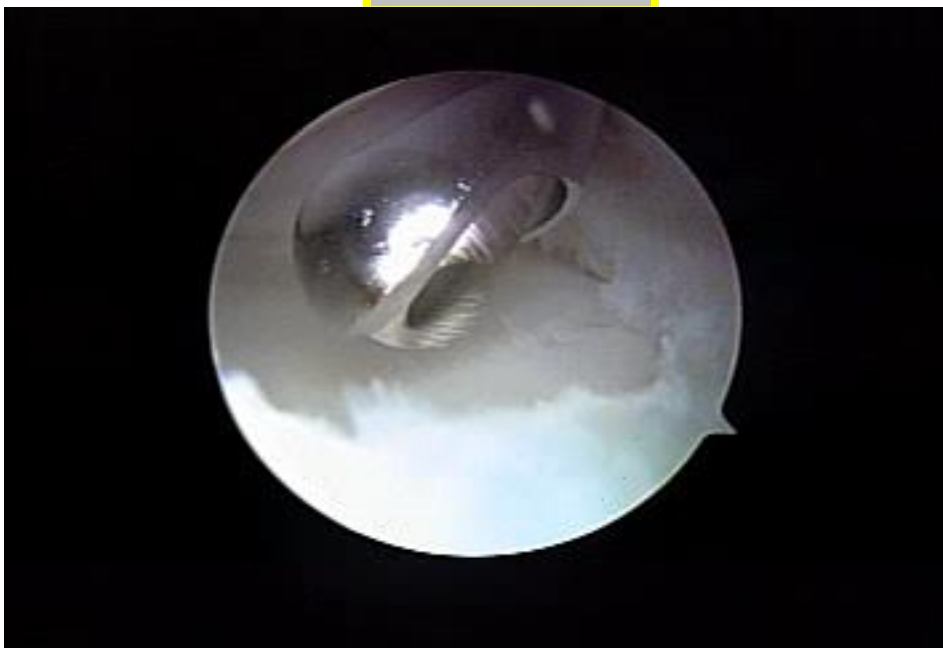
- Repetitive overhead activity (Andrews, et al., 1985)
- Tensile force in bicep during decel phase of pitch → SLAP
- Failure in TENSION



Traction



No Traction



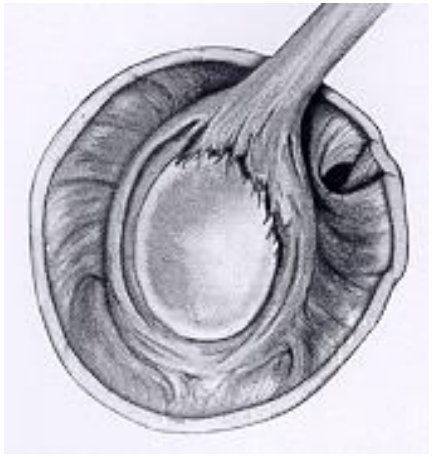
Classification

Type I: fraying of superior labrum, firm attachment of biceps anchor

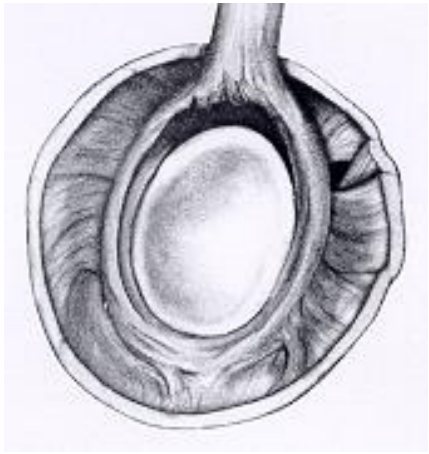
Type II: detachment of biceps anchor from superior glenoid; complex lifts away from glenoid neck

Type III: bucket-handle tear of superior labrum

Type IV: bucket-handle tear of superior labrum with extension into biceps tendon



I

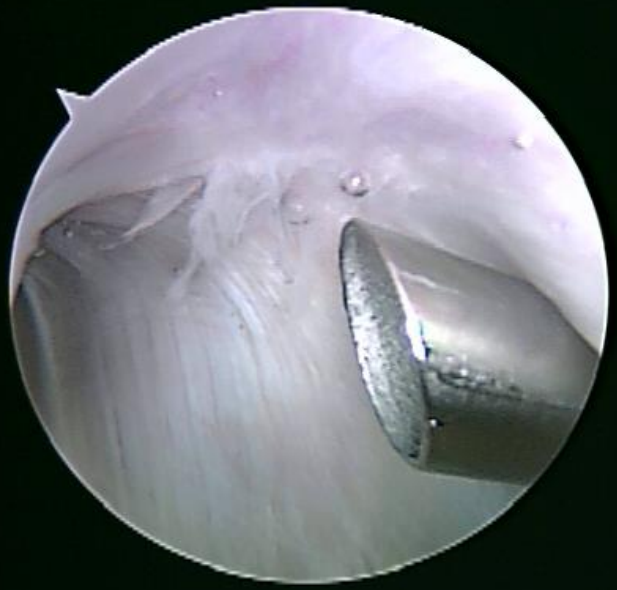


II

III

IV

Partial RTC tear



Type II SLAP tear

Posterior Superior Labrum

History

General Population

- Pain
  - Most common
- Mechanical
  - catching, popping, grinding, locking
- Pain lying on side
- Loss of strength
- Loss of motion

Throwers

- Sense of arm "going out"
- Loss of velocity
- "Dead Arm"

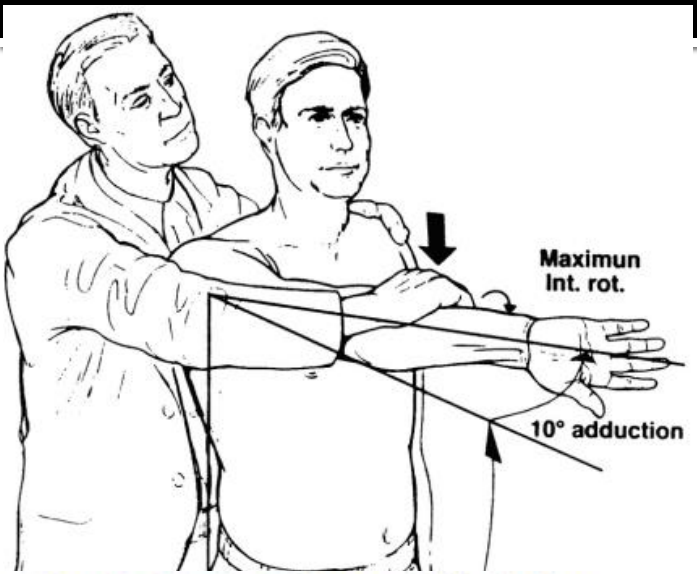
Differential Diagnosis

- Difficult and challenging
- Relatively low incidence (Snyder 140 of 2300)
- Symptoms similar to other shoulder problems
  - RTC tears, instability, impingement
- Associated pathology
  - partial RTC tears 29-40%
  - Bankart – 22%
  - AC arthrosis – 16%
  - GH chondromalacia – 10%
  - ONLY 28% ISOLATED SLAP

SLAP Physical Exam

- Subtle
- Provocative tests
  - O'Brien
  - Crank
  - Pain Provocation Test
  - Biceps Load Test
- Beware of concomitant associated pathology
  - impingement, instability, RTC tears

Exam



Crank Test - Internal Rotation$_n$

B

An Evaluation of the Provocative Tests for Superior Labral Anterior Posterior Lesions

Michael Andrew Parentis,*† MD, Ronald E. Glousman,‡ MD, Karen S. Mohr,‡ PT, SCS, and Lewis A. Yocum,‡ MD
From †The Knee Center of Western New York, Amherst, New York, and the ‡Kerlan-Jobe Orthopaedic Clinic, Los Angeles, California

Sensitive: O'Brien's, Hawkins's, Speed's, Neer's, Jobe's

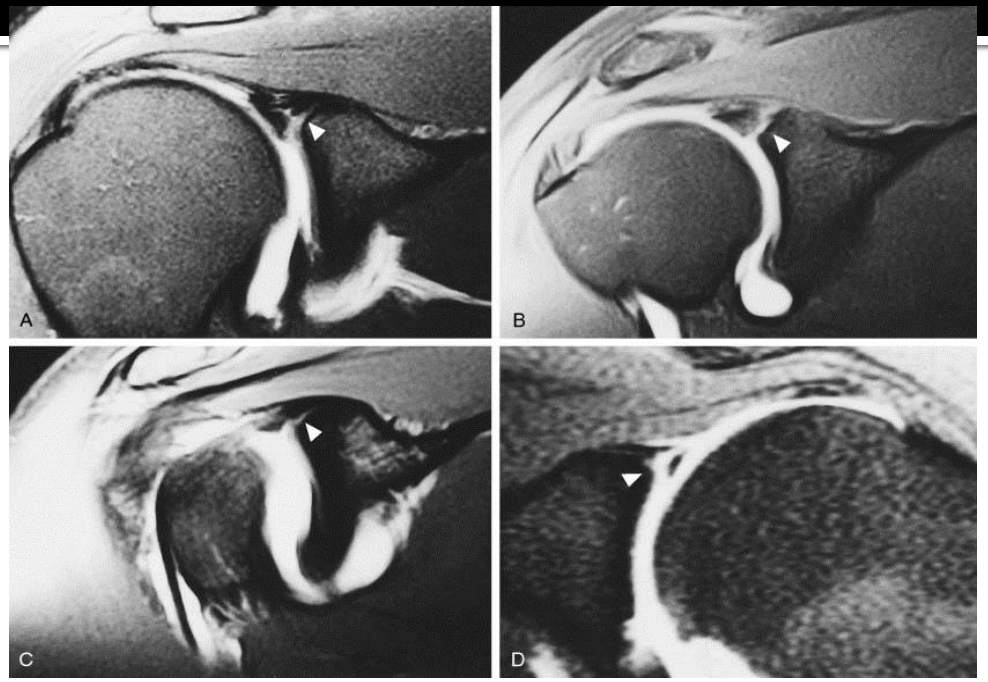
Specific: Pain provocation, Yergason

- No single maneuver
- Need to use combination of tests with history and radiographs
- Arthroscopy remains the standard by which to diagnose such lesions

AJSM, 2006

Imaging: MRI Arthrogram

Enhanced accuracy in detecting SLAP lesions



	Sensitivity	Specificity	PPV	NPV
Bencardino	92	84		
Kim JBJS 2007	96	50		
Iqbal Surg 2010	95.6	85.7	84.6	96
Amin EJR 2011	90	50	81.8	66.6

Treatment Options

Initial Non-operative

- Rest 4-6 weeks
- NSAIDs
- Physical Therapy/ Modalities
- Throwing mechanics

~ 50% successful return to sports
Edwards, et al, AJSM July 2010

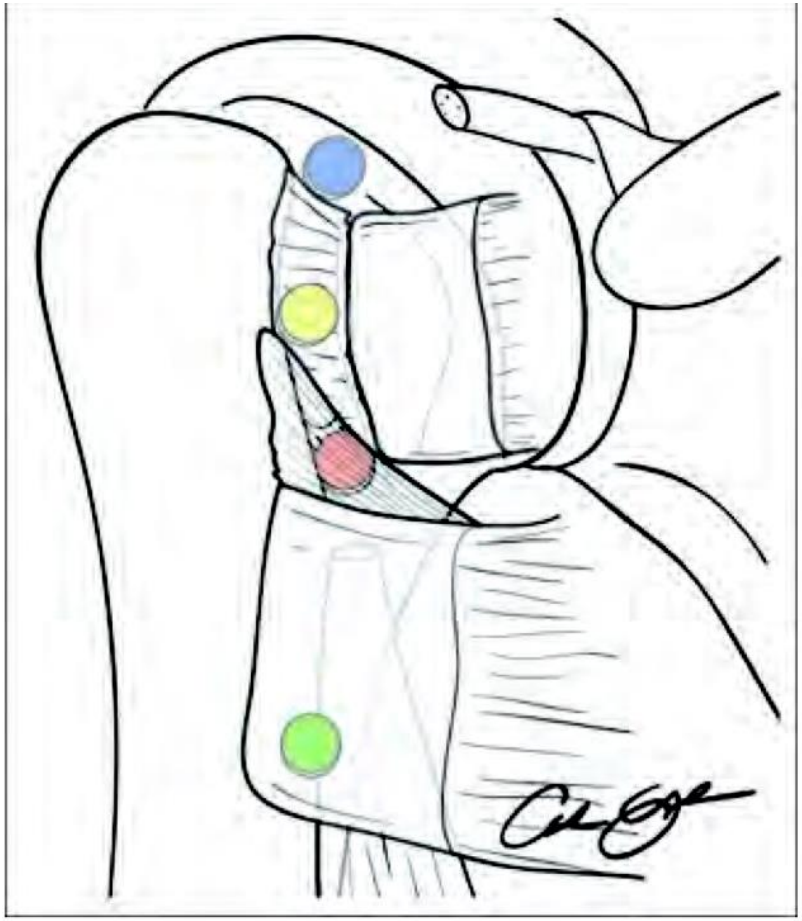
History of acute SLAP event more frequently non-responders

Non-surgical Treatment

- Conservative
  - Focus on associated pathology and exam findings
  - Goals or rehab
    - Capsular stretching – restore TAM
    - RTC strengthening
    - Scapular stabilization
- 50% return to sport (Edwards et al *AJSM* 2010)

SLAP/Proximal Biceps Pathology: Surgical Options

1. SLAP Repair - Anatomic
2. Biceps Tenotomy – Let it Fly
3. Biceps Tenodesis – Move it Over

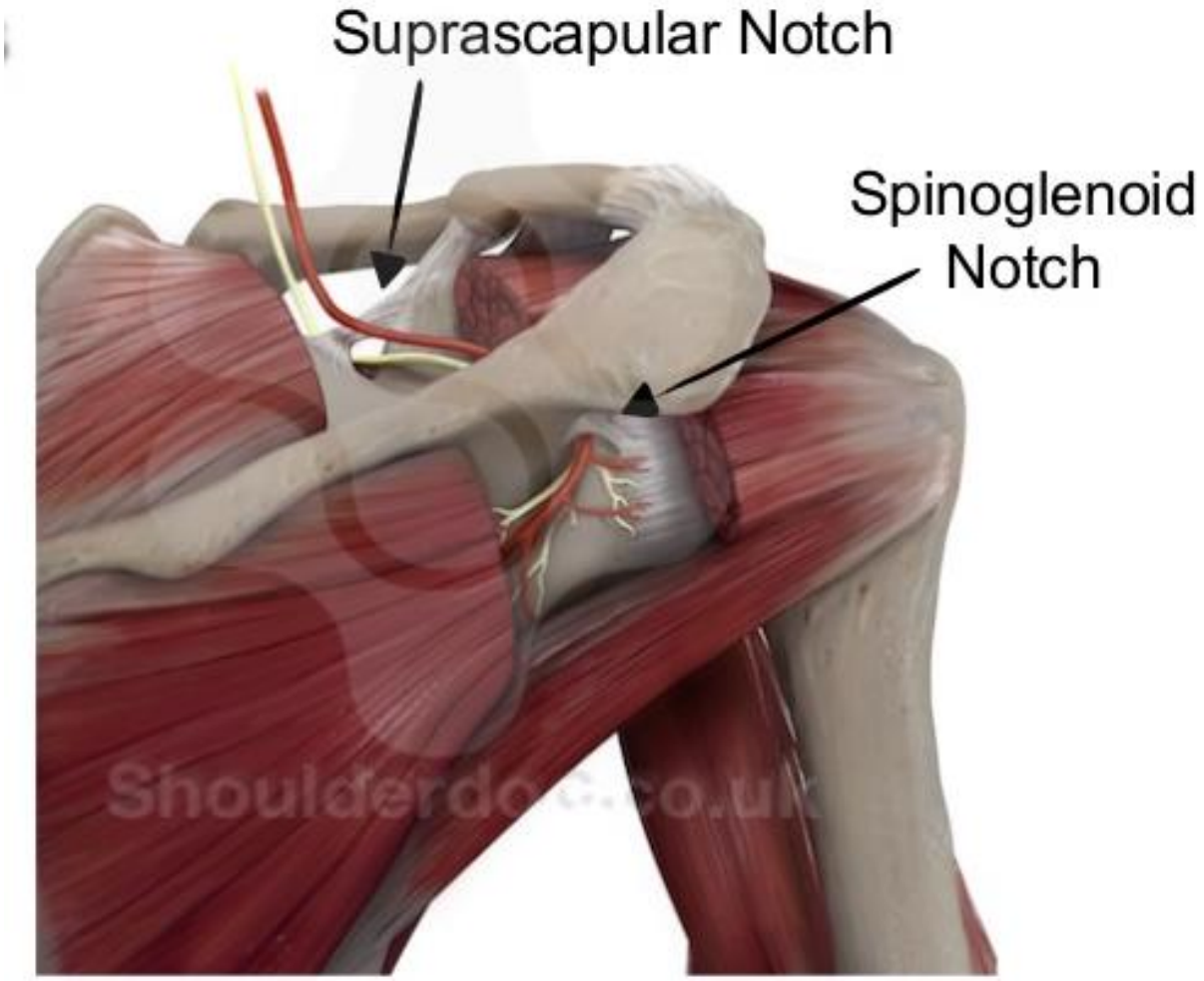


SLAP: Summary

- High index of suspicion in throwers with shoulder pain
- Clinical exam, history generally provides diagnosis
- MRI arthrogram to confirm
- Rest/NSAID/Rehab is first option (throwers?)
- Surgical management when conservative measures fail

Summary – Labral Pathology

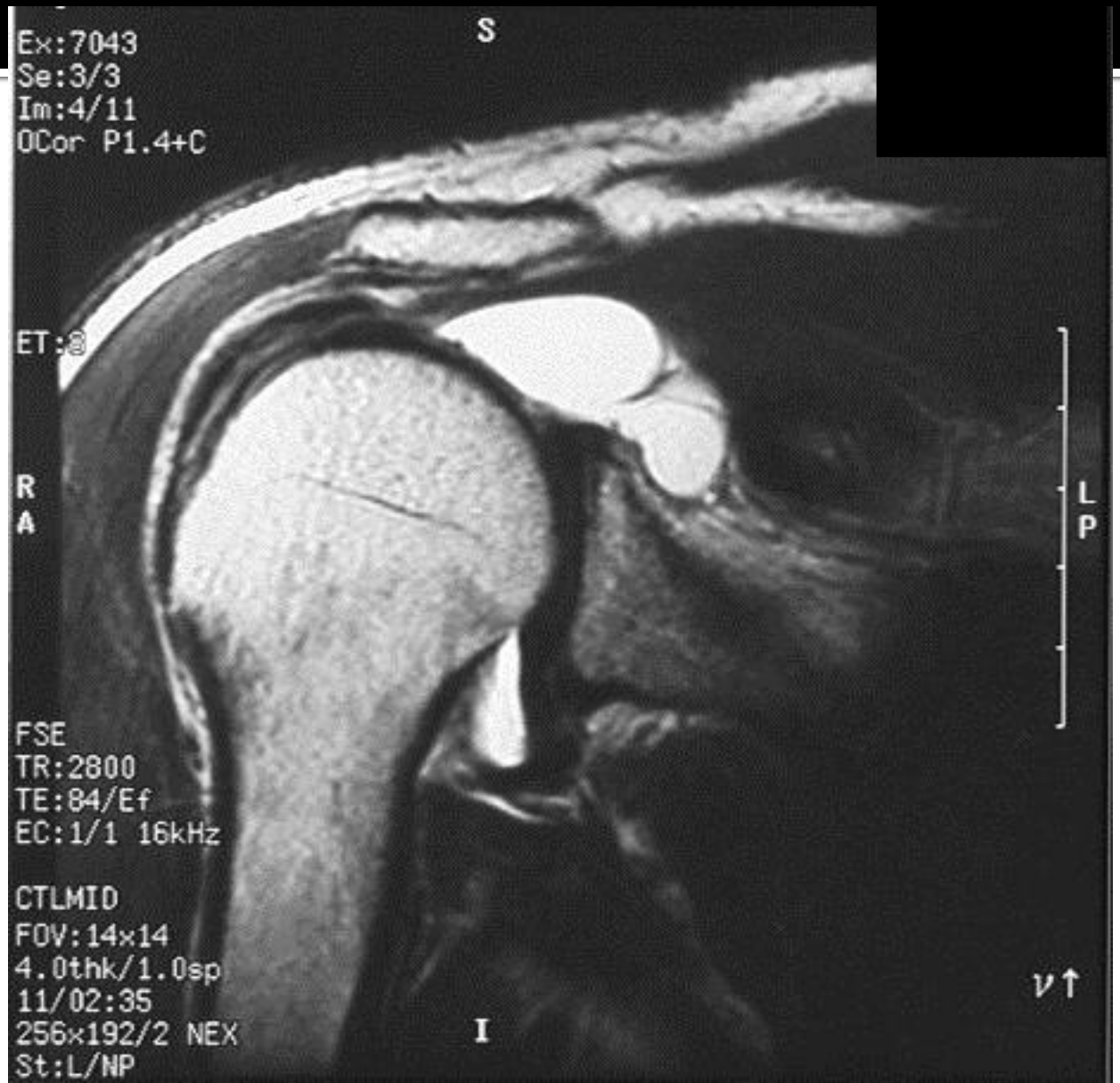
- Treatment based on classification
- Repair unstable lesions
  -
- Suture anchors preferred
  - ?Knotless to avoid knot irritation?
- Avoid repair of isolated SLAP lesion in patients over 50


Suprascapular Notch
Spinoglenoid
Notch

Spinoglenoid Notch Paralabral Cyst

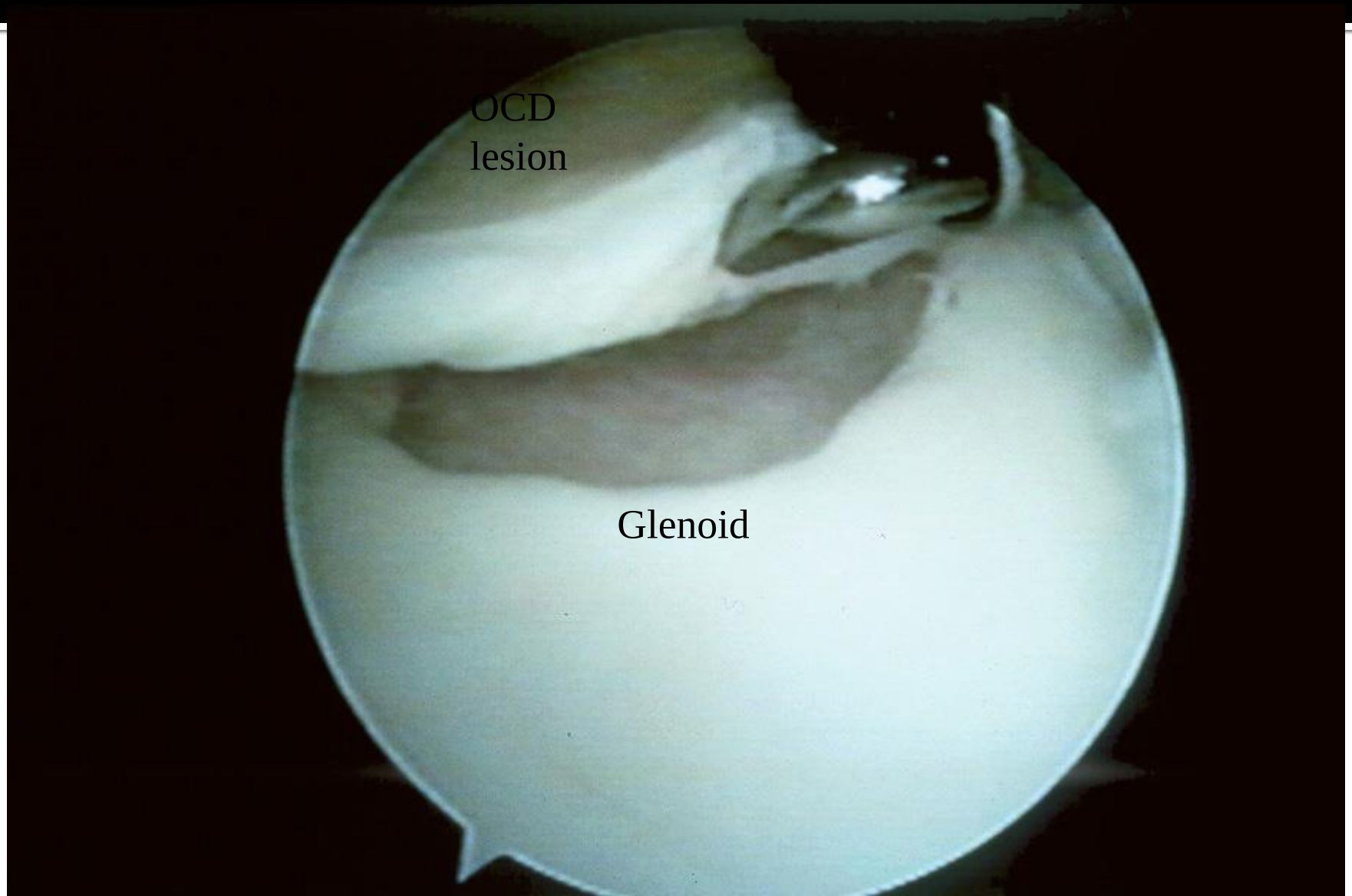
Spinoglenoid cyst.

One month after aspiration and cortisone injection



Spinoglenoid Cyst

OCD leson of the Glenoid



Operative Technique

Excision

Abrasion

2nd look Arthroscopy

12 mo.

Posterior Glenoid Exostosis

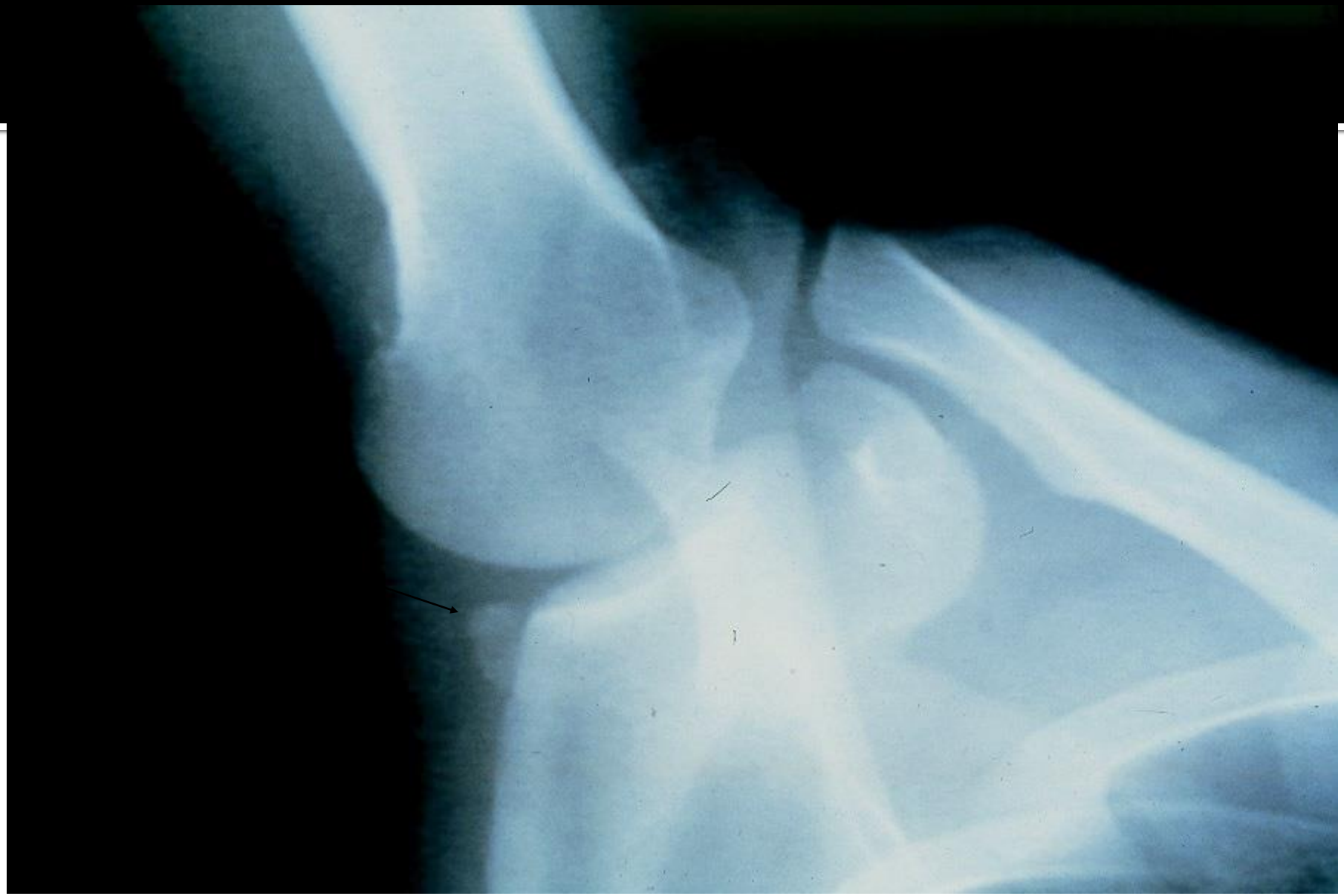
(Meister & Andrews)

"Throwers Exostosis"

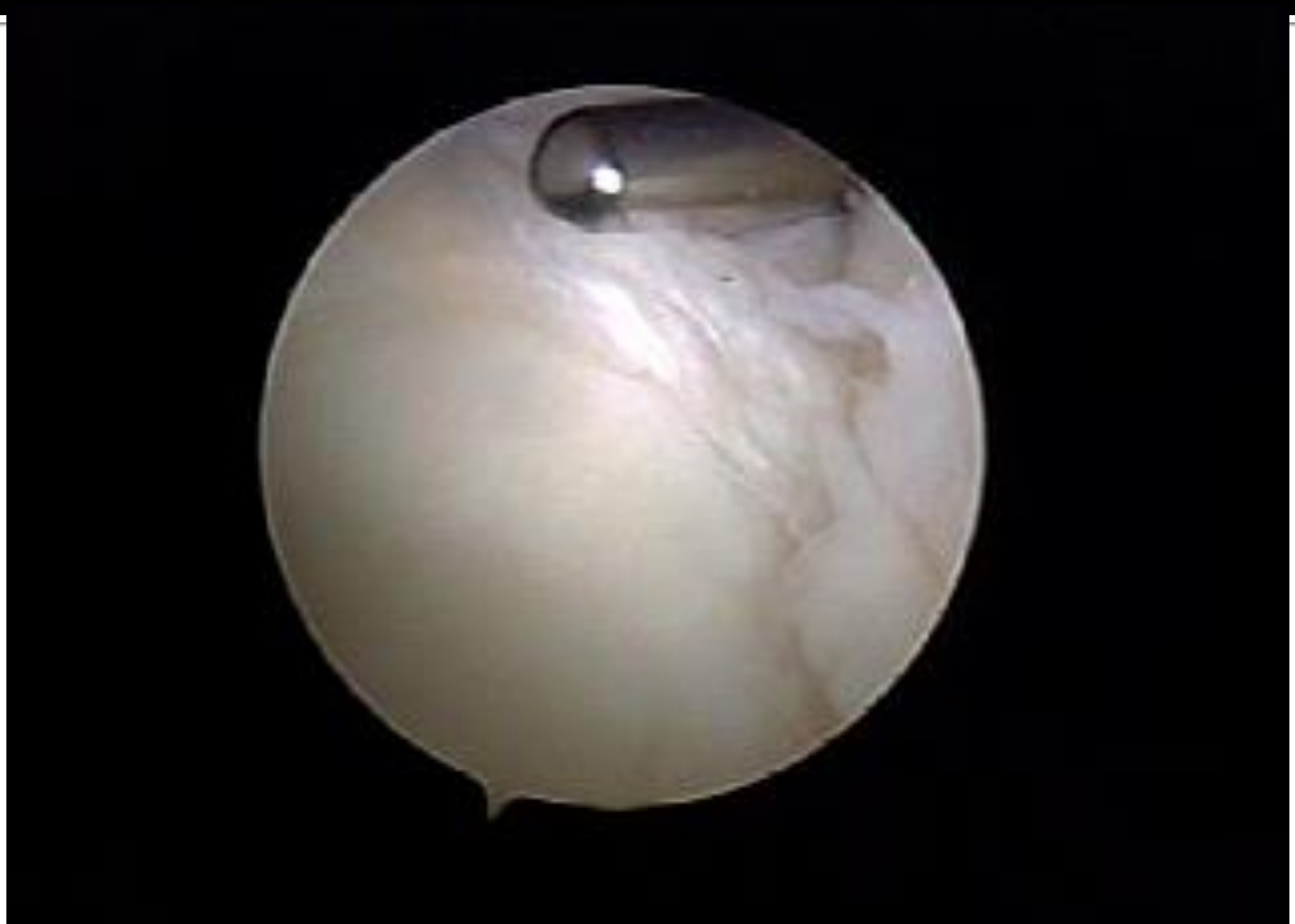
(Bennett's Lesion)

Pathophysiology of "Throwers Exostosis"

- Traction spur on posterior-inferior glenoid
- Associated with pull of posterior band of the inferior glenoid ligament
- During the deceleration phase of throwing
- May or may not be symptomatic



Arthroscopic Excision



SUMMARY & CONCLUSIONS

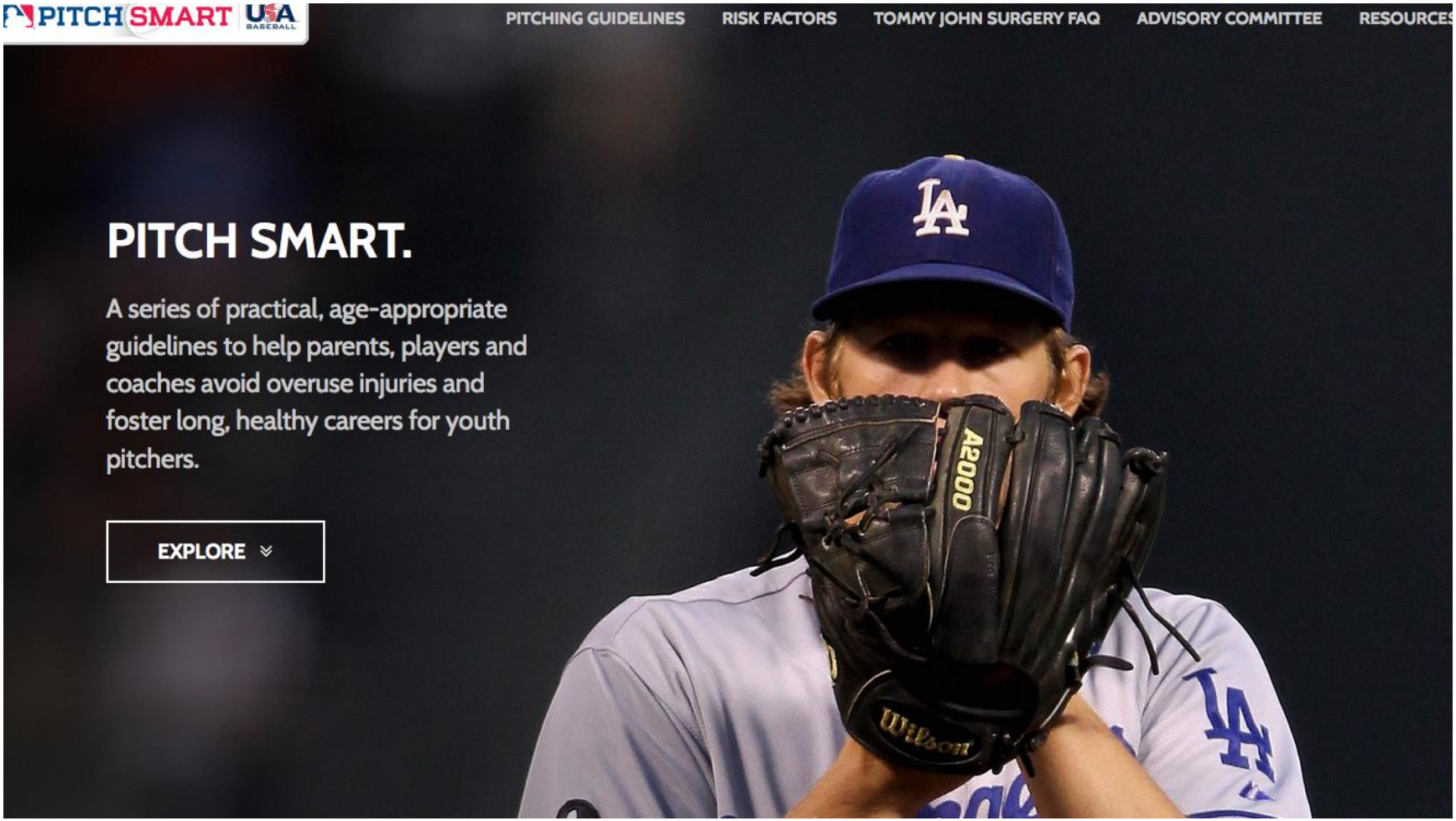
- Understanding the biomechanics of throwers and the associated pathophysiology is paramount to assessment
- A detailed "history" of throwers will usually give you the diagnosis
- Correlation of a thorough "physical exam with necessary "ancillary tests" will confirm your diagnosis

SUMMARY & CONCLUSIONS

- Remember that many of the "tests and signs" related to the physical exam are very Sensitive but Not Specific
- Try to differentiate clinical laxity from clinical instability
- Good luck!

CONCLUSIONS

- Surgical treatment in the throwers shoulder is focused on the rotator cuff, labrum, and capsular laxity
- Be aware of some less common causes of shoulder pain in the thrower (exostosis, spinoglenoid cyst, OCD)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USA BASEBALL
PITCHING GUIDELINES
RISK FACTORS
TOMMY JOHN SURGERY FAQ
ADVISORY COMMITTEE
RESOURCES
PITCH SMART.
A series of practical, age-appropriate guidelines to help parents, players and coaches avoid overuse injuries and foster long, healthy careers for youth pitchers.
EXPLORE
A2000
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Questions?