Internal Impingement and Posterior Shoulder Tightness
Cuff or Capsule?

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Cuff or Capsule?
• Determination of capsule or cuff?
• How does it alter treatment approach?
• Does it matter?

SLAP Lesion Instability
• Arthroscopic surgery = identified SLAP lesions –
• Prior to repair techniques, labral tear surgical tx = debridement
• Altchek AJSM '92 – 72% relief at 1 yr. = deterioration over time 2 yrs.
• May lead to instability due to incr. strain IGHL complex
• Current tx = repair SLAP = better long term results…
• Short term = ?

MRI findings
Overhead Athlete
• Miniaci '02 AJSM
• Plain MRI = 79% of asymptomatic baseball players displayed abnormal signal
• May be normal finding, but arthrogram MRI contrast is more definitive
• Most thrower’s w/SLAP have no pain unless throwing

SLAP Repair Trends
• Zhang 2012
AJSM increase in SLAP repairs 2004-2009 (105%)
• 2013 Clinically see decrease in repairs increase in conservative management

Texas Medical Center
Houston
• 21 academic institutions
14 hospitals
• 33.8 million sq. ft.
patient care
• 20K MD’s, scientist, advanced degreed
• 14 billion annual economic impact
• 93,500 employees
• 6.0 million patient visits
SLAP & RC Tear
- Klunen, Savoie AJSM 2012
- Return to high level throwing
- SLAP, RC, Posterior Capsular Release (GIRD)
- 35% Returned to previous level

Concomitant SLAP Repairs
- AJSM 07 Voos, Warren, MD
- Repair of both RC & SLAP = ROM = WNL
- Must monitor ROM with concomitant SLAP Repairs
- 6 Mos. Bankhart/SLAP
- Don’t forget about Hori ABD Extension
- AJSM 2011 Neri, ElAttrace – 24 Throwers 52% return to play without pain
- Inability to play = correlation to partial RCT or SLAP

Type II SLAP
Return to previous level of Throwing
- ADL's excellent results – 90%
- Neuman AJSM 2011
- Jobe FW '91 instability = posterior pain relocation
- Jobe CM Arthroscopy '95 Posterior pain = impingement of RC-Greater Tub./Post.Sup. Glenoid & Labrum
- Davidson, Elattrache, Jobe '95 JSES Internal Impingement
- Grossman JRJS '95 cadaveric replication of PCC

Cohen Sports Health 2011
- 28 players underwent shoulder surgery
- 21 labral repairs
- Results: 9 returned to pre-op level, 2 advanced to higher level, 5 returned at lower level, 11 retired from professional baseball

Posterior Shoulder Pain With Extreme ER/ABD
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Internal Impingement
- Davidson, Jobe, Elattrache '95 JSES
- ER/ABD with PST causes impingement of RC via Labrum

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Importance of Restoring Normal IR/Horizontal ADD

• Normal Humeral Head Position with ER is Postero-inferior position
• Tight posterior cuff/capsule = Postero-superior position
• Progression with lifting and strengthening combined with GIRD = loading of labral tear/repair

Common Clinical Natural History Posterior Cuff Shortening “Silent” Stiff Shoulder

• 12-14 y/o throwers
• Initial symptom = loss of power
• Progression = pain and loss of power
• Medical referral = no power severe pain
• MDI? Symptoms PST restriction
• Reinold AJSM Loss or IR 24 Hrs.

Determination of Hhead Translation

• Non-scientific
• Posterior Glide Assessment
• Lack of glide may be capsular restriction

Measurement of Horizontal Adduction

• Laudner JATA 2006, Myers AJSM 2007
• Supine assessment more reliable method
• Laudner AJSM 2010 = correlation between LOM Horiz. ADD & forward scapular posture

Soft Tissue Heating, Release

• Apply US, manual release to teres minor, infraspinatus tendons
• Release along muscle belly
• Palpate below posterior deltoid to “find” teres minor tendon

Stretching Techniques Posterior Cuff Tightness

• Sleeper Stretch
• “Genie” Stretch cross body ADD Allows control of IR
• Sidelying Genie
• Moore JOSPT 2011 MET (muscle energy techniques) immediate incr. IR/ADD
Additional Posterior Cuff Stretching Techniques

- Table Stretch
- Hold table, rotate trunk under arm
- Use body weight to mobilize posterior soft tissue restriction

Distraction Technique:
Frisbee release

- Allows full muscle relaxation
- Quick efficient treatment

Posterior Cuff Tightness
Internal Impingement/GIRD

- Tyler AJSM 2010
- Mobilization & Posterior Cuff stretching effective in resolving Sx’s
- Aleviated PST(HLADD), IR, Sx’s correlated to PST improvement not GIRD

- Manske SportsHealth 2010 Cross Body Stretching/Mobs = increase IR

Shoulder Health

- Maintain flexibility of posterior cuff & Symmetrical Total Shoulder Rotation Meister AJSM’05 = humeral retrotorsion = ER
- Wilk AJSM ’11: 5 deg. Or more of TRM (total rotation motion) 27% >5 TRM injured 2.5x inj
- Total Rotation = IR + ER: 136 + 48 = 184NT, 129 + 59 = 188
- 28% GIRD (13d) = injured 17% (0d) GIRD injured. 78% of injured = outside the 176 TRM. Measure?

Posterior Shoulder Tightness
Anterior Instability

- Laudner/Meister AJSM 2012
- Increased G-H laxity = Decreased PST/IR
- “Partial Predictor” Increased Laxity in Normal Throwers

How does pain/stiffness effect Rotator cuff strength

- Determined RC strength before and after lidocaine/cortisone injection in shoulder
- Measured strength using hand-held dynamometer
Testing – Rotator Cuff and Pain

- Testing procedure: Subjects were tested prior to injection of cortisone and xylocaine, then 5 minutes after injection.
- Results: % Deficit:
  - Pre Injection:
    - ABD Scaption: 35% ER: 12% IR: 12%
  - Post Injection:
    - ABD Scaption: 19% ER: 8% IR: 8%
  - Difference:
    - ABD Scaption: 16% ER: 4% IR: 4%

Posterior Cuff = Greatest Inhibition

Emg of Rotator Cuff

- Jobe ’82 AJSM
- Supraspinatus testing position
- Scapular Plane
- “Empty Can”
- Full/Empty can
- Itoi AJSM ’99
- Thrower ’96 AJSM
- Scapular tipping w/empty can
- compromises SA Space

Posterior Cuff – Weakened with Injury

- Jobe 1983
  - Stage IV – deceleration stage
- Muscles firing intensely = most active stage

Rehab Focus Shifts from Supraspinatus to Compressors of Humeral Head

- Supraspinatus less significant than IR/ER forces
- Compression = Goal of Shoulder Strengthening
- IR/ER forces much better at compression of hhead

Function of RC

- Normal position
  - humeral head center varies only 0.3mm
- 0-135 ABD Normal
- Fatigue of RC = 2.5mm superior migration of hhead.
- Chen JSES ’99

Improving Dynamic Compression

- Effective use of RC forces
- “Power Up” RC engine
- Begin lifting light weight proper technique
  - 2 sec. hold “up fast, down slow”
- Avoid Shrug sign
Good HEP for ER Eccentrics

- Quite Deltoid

Avoiding Shrug Sign
Slow Down Deltoid to Isolate RC

Kibler AJSM 2008
EMG Early Phase Exercises

- Robbery – scapular retraction move elbows toward back pockets
- Lawnmower – Lower trap, Serratus Anterior

RC Function – Arm Elevation
Post. cuff

- Colachis – APMR – selected nn.
- Blocks – Suprascapular nn.
- SS & IS provide:
  - 45% ABD
  - 90% ER
  - RC tear/SLAP avoid sup. migration

Top Exercises for Posterior Cuff
Strengthening

- Reinold/Wilk JOSPT ’04
- ER EMG analysis
- Sidelying ER = 62%/67% MVIC

Subscapularis Firing

- Subscapularis testing, exercise
- Manual resisted belly off for subscapularis weakness. Scheibel JORS ’05
- Belly Press = Gerber JBJS ’96, Burkhart Arthroscopy ’02, Tokish JSES ’03
- Best Subscap exercise: Belly Press Manual Eccentrics
- DiGiovine = 90d During throwing Upper subsc JSES ’92
Advanced/Combo RC Strengthening

- Combination deceleration
- 90/90 good if no shrug
- Isokinetics still work

Closed Chain
DS2 Gradual Progression

- Roland Ramirez
  Houston Texans
  PT/ATC
- Allows external compression to facilitate joint compression
- Stimulates co-contraction and endurance of UE.

Shoulder Instability
Weight Lifting Guidelines

- Exercise can be helpful or harmful
- Pt./personal trainer education following shoulder pathology part of rehab. process

Anterior shoulder instability in weight lifters

- 13 shoulders responded well to conservative measures
- 10 shoulders underwent stabilization procedures
- All were able to resume lifting

Bench Modifications

- Keep elbows to side, less than 45 deg ABD
- Maintain extension less than 15 deg.
- Excessive bench = A/C DJD
- Fees AJSM ‘98

Push-ups

- No different than bench press
- O.K. if keep 45d. ABD and limit shoulder extension to 15d
- Be careful during rehab process w/closed chain exercises
**Conclusion RC Strengthening**

- Base RC program on Emg data
- Avoid “Shrug Sign” – adequate IR/ER strength
- Don’t push through pain with strengthening = 25% inhibition of RC
- Guide athlete on precautions after shoulder injury

**MR Systems Computerized Muscle Control**

- Provides RC recruitment, proprioceptive input, endurance
- Allows specific positioning of arm/shoulder

**Strengthening Techniques**

- Dynamic Hug: Serratus, Subscapularis Sobush JOSPT
- Rhomboids: Seated Rows, Cable Column Cocking, Manual Resisted Sideling

**Conclusion Posterior Shoulder Tightness**

- Evidence supports stretching when unilaterally decreased
- Cuff or Capsule – rehab – mobs. or not
- Reduction of PST improves internal impingement symptoms, may help instability symptoms
- Associated with decreased RC strength – focus on posterior cuff/scapula for improved head position
- Hands-on treatment approach
- Often alleviates posterior pain but biceps tendon pain with throwing persists

**Strengthening Techniques**

- Dynamic Hug: Serratus, Subscapularis Sobush JOSPT

**Advanced Stabilization Routine**

- OTIS 3 sets of 30 sec.
Strengthening Techniques

• D2 CColumn
• Standing ABD/ADD

Super 6 Tubing Routine

• Allows most specific form of training to mimic throwing motion
• 2 sets of 30 sec. each position

Difficult Cases

• Techniques, Tricks

Scapular Strengthening Safe

• Try single arm rowing isolated rhomboids
• Trunk/Serratus row with metal bar

Advanced Closed Chain Routine – be aware of direction of applied external force

• Bear crawl swiss ball
• Standing plyoball stabs – Wilk