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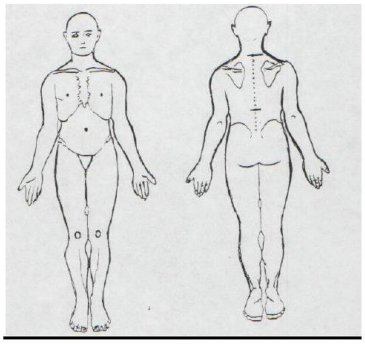
SHOULDER CASE 3

Eric Magrum PT, DPT, OCS, FAAOMPT

Orthopaedic Manual Physical Therapy Series
Charlottesville 2017-2018



Body Chart – Initial Hypothesis:
RTC tendonitis, RTC tear; AC sprain; Impingement; SLAP lesion; Bankart lesion; Biceps tendinosis/partial tear.

SUBJECTIVE EXAM

Subjective *Asterisks* Signs/Symptoms: (Aggravating/Easing factors, Description/location of symptoms, Behavior, Mechanism of injury):

- 28 yo male insurance salesman
- 3 weeks ago sliding into second base (head first), hit ® shoulder awkwardly outstretched
- Pain deep non specific anterior>posterior shoulder pain
- Unable to throw; unable to return to swimming/training for Triathlon season
- Slight/intermittent "clicking/popping", worse since injury
- Painful when reaching overhead.

STRUCTURE at Fault:

Joints in/refer to the painful region	Myofascial tissue in/refer to the painful region	Non Contractile tissue in/refer to the painful region	Neural tissue in/refer to the painful region	Other structures that must be examined – non MSK
GH AC SC Scapulothoracic Cervical referred (C4-6)	RTC – Supraspinatus, Infraspinatus, Teres, Subscap. Biceps Pecs	Labrum- Superior (SLAP), Inferior (Bankart); SA bursa; Capsular laxity; GHL-inferior, medial, superior bands; AC ligts	Suprascapular n.; Cervical radiculopathy (C5)	

Primary HYPOTHESIS after Subjective Examination: Primary IMP with RTC tendonopathy following trauma

Differential List (Rank/List in order to rule out): Bankart lesion, Labral pathology, RTC tear, Biceps pathology/tear; MDI/laxity; AC sprain; Cervical referred/radic

Instability - Sulcus Sign

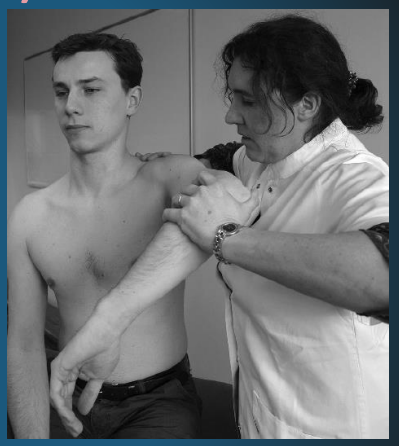
- Multidirectional instability
- Sitting: Arm in Neutral
- Inferior Traction on humerus at elbow
- Test – Distance between inferior acromium, superior aspect humeral head
- Graded: 1+ - 3+ (cm displacement)

Instability - Load and Shift

- Pt: Seated/Supine
- Test : Humeral head is "loaded" to centre it congruently within the glenoid fossa; then manually shifted anteriorly and posteriorly , relative to the glenoid fossa.
- (+) Laxity/Subluxation over glenoid rim

Instability (Posterior)- Posterior Subluxation (Jerk) Test

- Posterior instability
- Pt: Sitting
- Test: Scapular plane, IR, 70 -90 Flexion; Posteriorly directed force. Bring humerus into Horizontal ADD (+/-) ER
- (+) Test : "Clunk" as posterior subluxation is reproduced



Instability - Apprehension

- Pt: Supine – 90 ABD, Maximal ER
- Contact: Posterior aspect GH
- Test : Anterior force at end ROM ER
- (+) Apprehension > Pain

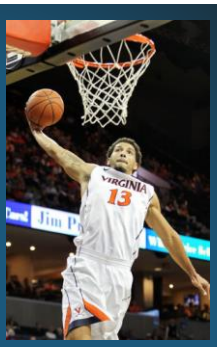
Instability - Relocation

- Pt: Supine 90 ABD, maximal ER
- Contact: Anterior aspect GH
- Test: Posterior force to humeral head at end ROM ER
- (+) Reduction in Pain/Apprehension; Increased ER

Glenohumeral Instability

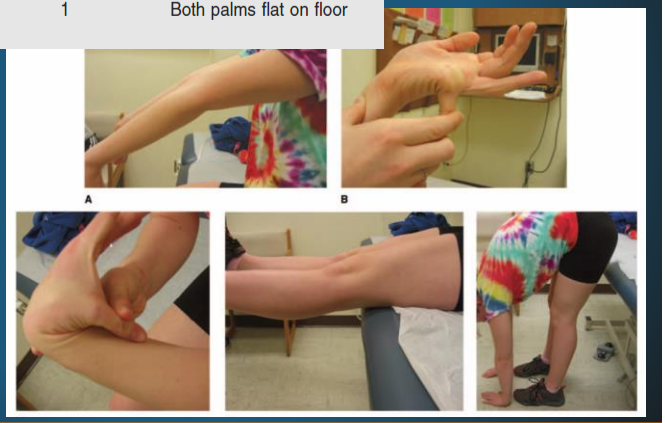
- TUBS:
  - Traumatic - Significant traumatic event
  - Unilateral / Unidirectional instability
  - Bankart lesion – Anterior Inferior Labrum
  - Surgery required to stabilize the GH joint
- AMBRI
  - A traumatic
  - Multidirectional Instability
  - Bilateral
  - Rehabilitation
  - Inferior Capsular Shift, Rotator Interval closure

- **MDI – Etiology : Multifactorial**
  - **Anatomic**
    - Distended inferior pouch and a wide rotator interval
    - Global increase in capsular volume, resulting in overall laxity
    - Pathologic changes with degenerative Labrum and Bankart lesions
  - **Biochemical**
    - Capsule has alterations in type and quantity of collagen
    - Collagen Disorders (Ehlers-Danlos)
  - **Neuromuscular**
    - Repeated micro trauma (athletes) - Repetitive overhead use
    - Cumulative into global laxity → Labral pathology
    - Laxity ⇔ Instability
      - Adaptive for Sport, ? pathological
      - Strength
      - Neuromuscular control
        - » Rotator cuff
        - » Scapular stabilizers

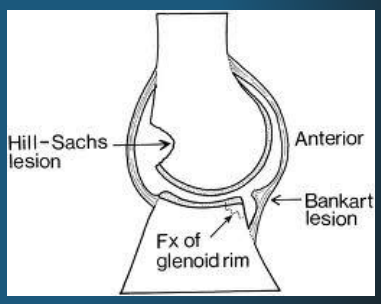


The Beighton-Horan Criteria for Generalized Hypermobility

Joint Examination	Points	Criteria for Positive Sign
Passive hyperextension of the small finger (measured bilaterally)	2	>90°
Passive thumb apposition to the forearm (measured bilaterally)	2	Thumb touches forearm
Elbow hyperextension (each elbow)	2	>10°
Knee hyperextension (each knee)	2	>10°
Standing trunk flexion with knees fully extended	1	Both palms flat on floor



- **Traumatic Anterior Dislocation**
  - Anteroinferiorly displaced humeral head stretches the capsuloligamentous components
  - Detachment of the anterior-inferior labrum - Bankart
  - Hill–Sachs lesions
  - (SLAP) lesions
  - Capsular tears
  - Rotator cuff tears
  - Glenoid rim fractures



Boone JL BJSM 2010

Acute Dislocation

- Young patients (<24 years)
  - 97% : Bankart lesions
  - 89% : Hill–Sachs lesions
  - 10% incidence of SLAP lesions
  - No rotator cuff tears

- Progressive labral-ligamentous injury and degeneration with increasing episodes of dislocation
- Postoperative arthritis correlated with an increased number of dislocations
- Reoccurrence rates:
  - 72–95% < 20 yo
  - 70–82% 20- 30 yo
  - 14–22% >50 yo

Boone JL BJSM 2010

Acute Dislocation - Recommendations

- Young patients (15–25 years)
  - Early Surgical Repair
  - Shown to reduce their recurrence rate from 80–90% to 3–15% and improve overall quality of life
- Patients aged 25–40 years
  - Initial trial of non-operative management
  - Risk of re-dislocation is much lower at 20–30%
- Patients >40 yo
  - Typically manage them non-operatively
  - Low recurrence rate of 10–15%
  - Address associated injuries
    - RTC tears
    - Bone defects
    - Neurological injury

Handoll HH *Cochrane Database Syst Rev 2004*

Risk factors which predispose first-time traumatic anterior shoulder dislocations to recurrent instability in adults: a systematic review and meta-analysis

M Olds,[1] R Ellis,[2] K Donaldson,[1] P Parmar,[1] P Kersten[3]

- **Recurrent Instability**
  - **Males**
    - **3.2 x > likely**
  - **< 40 year olds**
    - **13.5 x > likely**
  - **Greater Tuberosity Fx**
    - **7 x < likely**
  - **Hyperlaxity (Beighton)**
    - **2.7 x > likely**

Br J Sports Med 2015;**49**:913–922.

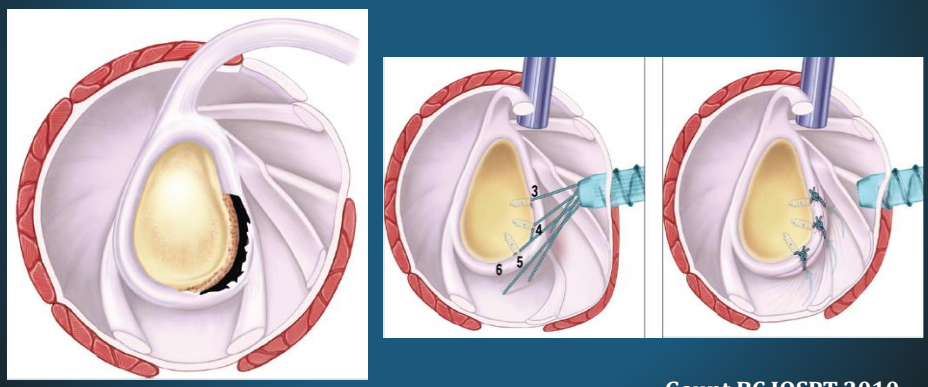
Position and Duration of Immobilization After Primary Anterior Shoulder Dislocation

A Systematic Review and Meta-Analysis of the Literature

Conclusions: Analysis of the best available evidence indicates there is no benefit of conventional sling immobilization for longer than one week for the treatment of primary anterior shoulder dislocation in younger patients. An age of less than thirty years at the time of injury is significantly predictive of recurrence. Bracing in external rotation may provide a clinically important benefit over traditional sling immobilization, but the difference in recurrence rates did not achieve significance with the numbers available.

Patterson WH JBJS 2010

The American Society of Shoulder and Elbow Therapists' Consensus Rehabilitation Guideline for Arthroscopic Anterior Capsulolabral Repair of the Shoulder



Gaunt BC JOSPT 2010

THE AMERICAN SOCIETY OF SHOULDER AND ELBOW THERAPISTS' CONSENSUS REHABILITATION GUIDELINE FOR ARTHROSCOPIC ANTERIOR CAPSULOLABRAL REPAIR OF THE SHOULDER

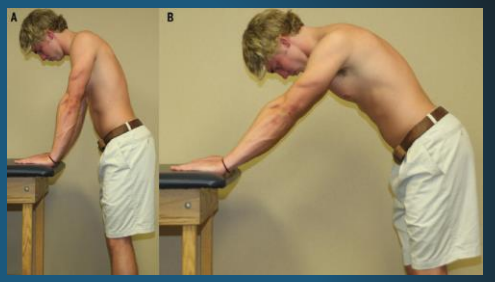
Guiding Principles for the Rehabilitation Specialist

1. A thorough understanding of the surgical procedure
2. A thorough understanding of the anatomic structures that must be protected, how they are stressed, and the rate at which they heal
3. Appropriate selection and skilled application techniques to impart varying levels of stress to the healing tissues
4. Appropriate management of the initial immobilization period and the rate of range-of-motion progression

Gaunt BC JOSPT 2010

Post OP Guidelines: Bankart

- Phase 1 : Healing
- (0-6 weeks)
  - Education
  - Immobilization 0-4 weeks
  - Strict ROM Guidelines
  - Scapular stabilization
  - Submax RTC isometrics
  - AAROM
    - Wand, Pulley, Table step back



Staged Range-of-Motion Goals Following Arthroscopic Anterior Capsulolabral Repair

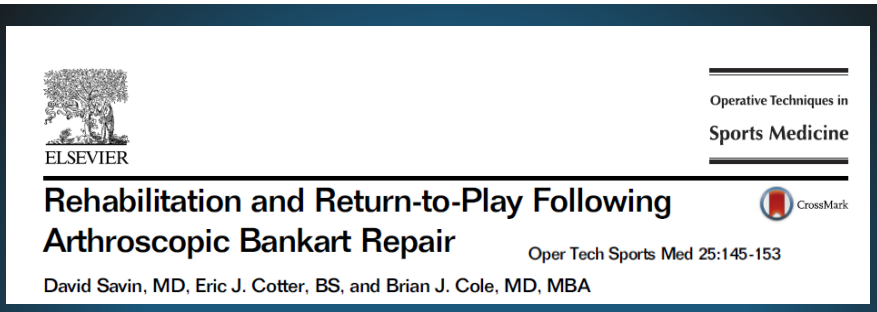
Post OP Guidelines: Bankart

- Phase 2 : Controlled Loading
- (6-12 weeks)
  - Education
  - Progress ROM to Full gradually - Guidelines
  - Scapular Stabilization
  - Post Capsule mobility - prn
  - RTC NM control
  - Low weight/High Reps
  - Avoid compensations

Staged Range-of-Motion Goals Following Arthroscopic Anterior Capsulolabral Repair

Post OP Guidelines: Bankart

- Phase 3 : Normalize
  Strength, Power,
  Endurance → Function
- (12-24 weeks)
  - Full ROM all planes
  - Gradual stresses to ant capsule
  - Multiplanar mvts
  - Progressive weight bearing
  - Plyometrics
  - Sport/Work specific strengthening



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Operative Techniques in Sports Medicine

Rehabilitation and Return-to-Play Following Arthroscopic Bankart Repair

Oper Tech Sports Med 25:145-153

David Savin, MD, Eric J. Cotter, BS, and Brian J. Cole, MD, MBA

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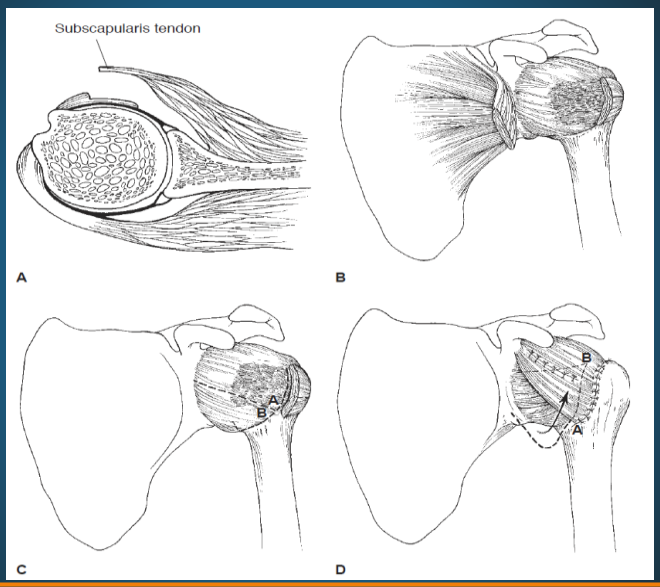
Operative Techniques in Sports Medicine

Rehabilitation and Return to Play Following Superior Labral Anterior to Posterior Repair

Zachary R. Christopherson, PT, DPT,*,‡ June Kennedy, PT, MS,*
David Roskin, PT,* and Claude T. Moorman, MD†

Oper Tech Sports Med 25:132-144

Inferior Capsular Shift

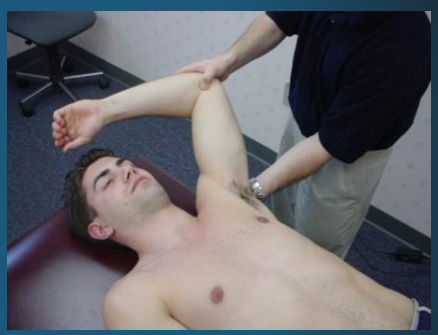


AMBRI

SLAP - Crank Test

- Pt : Sitting or Supine
- Scaption 160 degrees
- Axial load with humeral internal <-> external rotation
- (+) pain with external rotation
- (+) mechanical signs/sx

- Bucket-handle tear of from a Type III or Type IV SLAP lesion



(+) LR : 2.44
(-) LR : 0.51

Labral: Compression-Rotation Test

- Glenohumeral joint long axis compression with rotation
- (+) Provocation: Grind the labrum between the glenoid and the humeral head
- 90 – 160 degrees
- Variations
  - Horizontal ABD with an anterosuperior directed force (anterosuperior labral lesions)
  - Horizontal ADD with a posterosuperior directed force (posterior labral)

SLAP - Anterior Slide Test

- Pt stand/sit – Hands on hips, thumbs pointing posteriorly
- PT: Stabilize scapula posteriorly, over anterior acromium. Opposite hand posterior aspect elbow.
- Anterior, superior force through elbow.
- (+) Test: mechanical signs/sxs ("clicking"); reproduction of sxs
- Anterior, superior humeral head translation stress superior labrum; traction biceps tendon

SLAP – Biceps Load II

- Pt – Supine arm ABD to 120 degrees, maximal ER, elbow flexed to 90, supination
- Test – Resist elbow flexion
- (+) Pain/mechanical signs as superior labrum "peeled" off glenoid

SLAP – Biceps involvement – Speed's Test

- Pt : Seated – Elbow extended, full supination
- Test : Resist flexion 0-60 degrees
- (+): P! bicepital groove

SLAP – Passive Distraction Test

- Shoulder Flexed to 150 degrees
- Elbow extended, Forearm supinated
- Test: Forearm pronation
- (+) reproduce Pain

(+) LR : 8.83

(-) LR : 0.50

SLAP - Dynamic Labral Shear Test

- Passive ABD to 120 degrees
- Full ER at 90 degrees
- Shoulder lowered 120 to 60 degrees
- (+) mechanical symptoms, posterior joint pain

(+) LR : 31.57

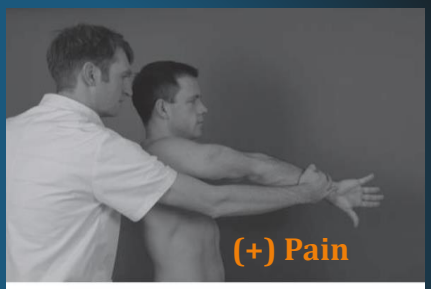
(-) LR : 0.29

AC/Labral - O'Brien Test/Active Compression

- Pt : Standing – flexed to 90 degrees, 15 degrees Horiz ADD, full IR (pronation)
- Resist flexion pronated
- Repeat in full supination
- (+) AC - Incr superior P!
- (+) Labral – Incr "deep non specific" shoulder pain

(+) LR (SLAP) : 1.06

(-) LR : (SLAP) : 0.89



Test Cluster Labral Tear

- (+) Relocation Test
- (+) Active Compression Test

(+) LR : 4.56

(-) LR 0.65

- (+) Relocation Test
- (+) Apprehension Test

(+) LR : 5.43

(-) LR : 0.67

AC – Posterior Shear – Compression Paxinos Test

- Pt: Seated, UE neutral
- PT: Standing perpendicular to shoulder
  - Anterior hand contact distal Clavicle
  - Posterior hand stabilize posterior Acromium
- Assess: Posterior glide Clavicle on Acromium – Shear/Compression; Provoke Sxs

Diagnostic Values of Tests for Acromioclavicular Joint Pain

	Sensitivity (%)	Specificity (%)
Paxinos test	79	50
Acromioclavicular joint tenderness	96	10
O'Brien test	16	90

The Journal of Bone & Joint Surgery · jbjs.org
Volume 86-A · Number 4 · April 2004

Diagnostic accuracy of five orthopedic clinical tests for diagnosis of superior labrum anterior posterior (SLAP) lesions

J Shoulder Elbow Surg (2012) 21, 13-22

Chad Cook, PT, PhD, MBA[a,*], Stacy Beaty, MD[b], Michael J. Kissenberth, MD[c], Paul Siffri, MD[c], Stephan G. Pill, MD[c], Richard J. Hawkins, MD[c]

- 5 SLAP tests
  - O'Brien's
  - Dynamic Labral Shear Test
  - Speed's
  - Biceps Load II
  - Labral Tension
- MRI
- Confirmed Arthroscopically
- None provided diagnostic utility
  - Stand alone
  - Clustered
- 56% Concomitant findings
- Biceps Load II test demonstrated utility in identifying patients with a SLAP-only lesion, with a PPV = 26

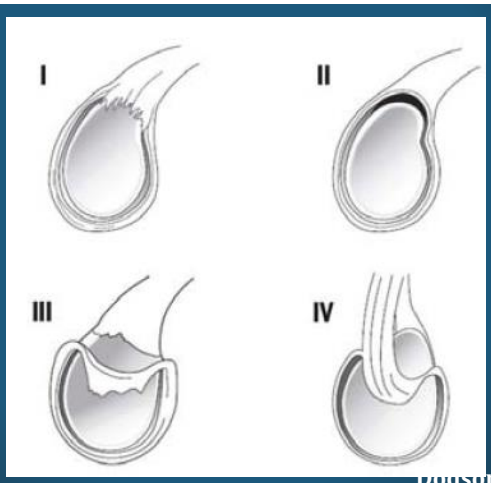
Choosing which SLAP test

Subjective Exam should guide your Objective Exam

- (1) Overhead Athletes that present with peel-back lesions
- (2) Compression injuries from someone that falls onto an outstretched arm or on the side of the shoulder. This will compress and sheer the labrum, similar to a meniscus tear
- (3) Traction injuries from a sudden eccentric biceps contraction (least common)

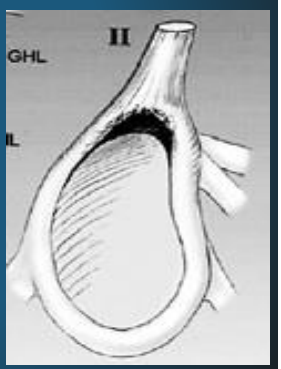
- Peel-Back Injury:
  - Biceps Load II
  - Crank
- Compression Injury:
  - Active Compression
  - Compression Rotation
  - Passive Distraction
  - Dynamic Labral Shear
- Traction Injury:
  - Speed's
  - Active Compression

SLAP Lesions: An Update on Recognition and Treatment

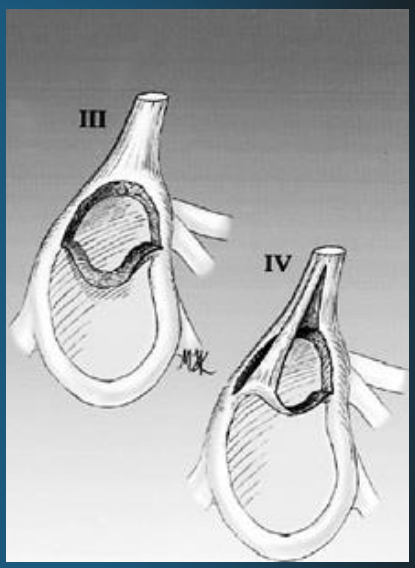


Dodson CC JOSPT 2009

- **Type I SLAP lesions**
  - Isolated fraying of the superior labrum with a firm attachment of the labrum to the glenoid
  - Degenerative
  - ? Normal finding
- **Type II SLAP lesions**
  - Detachment of the superior labrum and the origin of the tendon of the long head of the biceps brachii from the glenoid resulting in labral anchor
  - Most common
  - Three distinct sub-categories of type II SLAP lesions
    - 37% presented with an anterosuperior lesion(traumatic)
    - 31% with a posterosuperior lesion (overhead athletes)
    - 31% exhibited a combined anterior and superior lesion



- Type III SLAP lesions
  - Bucket-handle tear of the labrum with an biceps insertion
  - The labrum tears and flips into the joint similar to a meniscal tear
- Type IV SLAP lesions
  - Bucket-handle tear of the labrum involving the biceps tendon
  - Instability of the biceps-labrum anchor is also present

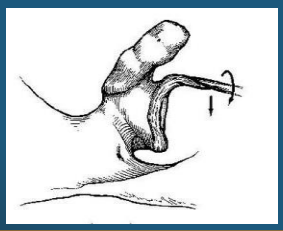


Mechanism - SLAP

- Traumatic
- Compression of the superior joint surfaces superimposed with subluxation of the humeral head
  - FOOSH
  - Bracing oneself during a motor vehicle accident
  - Direct blows
  - Falling onto the point of the shoulder
  - Forceful traction injuries of the upper extremity
- Repetitive Overhead Use
  - Throwing Athletes
  - High Eccentric activity of the biceps brachii during the arm deceleration and follow-through phases of the overhead throw

Peel back" mechanism

- Shoulder in a position of ABD and maximal EXT ROT
- Rotation produces a twist at the base of the biceps
- Torsional force to the anchor



"Peel Back"

- SLAP lesions
  - Combination biceps activity during deceleration may serve to weaken the biceps-labrum complex
  - Torsional peel back force may result in the posterosuperior detachment of the labral anchor

- Concomitant Injuries

SLAP

- 45% (73% pitchers) Partial thickness RTC tear (supraspinatus)
- 11% Complete RTC tear
- 22% Bankart lesion
- Type I – RTC pathology
- Type III/IV – Instability
- Type II
  - Older Patients = RTC pathology
  - Younger = Anterior instability

Glenoid Labral Tears: Presentation

- Hx repetitive overhead / long head biceps eccentrics
- Sx ↑ with arm in overhead position
- Deep, Non-specific post shoulder ache
- Mechanical signs/sxs: painful or non-painful pop/catch/click
- Hx of dislocation / subluxation
- C/o instability
- Click/catch may be reproduced w/ special tests
- Additional Dx?: Impingement, GH instability, RTC tear

CHRISTOPHER C. DODSON, MD[1] • DAVID W. ALTCHEK, MD[2]

JOURNAL OF ORTHOPAEDIC & SPORTS PHYSICAL THERAPY | VOLUME 39 | NUMBER 2 | FEBRUARY 2009 |

SLAP Lesions: An Update on Recognition and Treatment

SLAP REPAIR POSTOPERATIVE REHABILITATION GUIDELINES

Dodson CC JOSPT 2009

Patient begins program, as directed by physician, on first postoperative day

Phase 1 (0-3 wk)
Sling immobilization, as directed by physician
Codman's/pendulum exercises
Hand/wrist/elbow ROM exercises
Gripping exercises
FF plane of scapula PROM/AAROM (supine), limit to 90°
Passive ER to neutral
Passive elbow abduction to 30°
Cryotherapy/modalities PRN

Phase 2 (3-6 wk)
Discontinue sling, physician directed
Continue FF plane of scapula PROM/AAROM (wand/pulleys), rate of progression based on patient's tolerance
ER PROM/AAROM to 30°
Manual scapular stabilization exercise, side lying
Begin pain-free IR/ER isometrics in modified neutral
No biceps strengthening
Cryotherapy/modalities PRN

Phase 3 (6-8 wk)
Progress PROM/AAROM
- FF plane of scapula and abduction to 180°
- ER to 90°

Begin isotonic IR/ER strengthening in modified neutral
Begin latissimus strengthening, below 90° elevation
Begin upper body ergometer, below 90° elevation
Begin humeral head stabilization exercises, if adequate strength and ROM exists

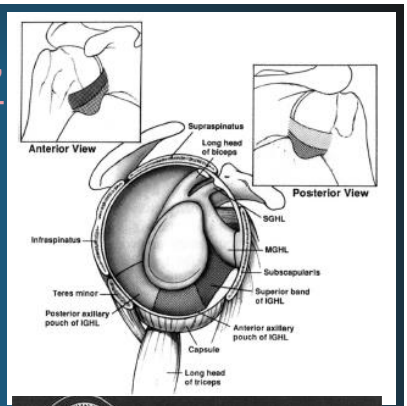
Phase 4 (8-10 wk)
Continue aggressive scapula strengthening
Advance strengthening for deltoid, biceps, triceps, and latissimus, as tolerated
Begin PNF patterns
Continue humeral head stabilization exercises
Advance IR/ER to elevated position in overhead athletes (must be pain free and have good proximal strength)
Continue UBE for endurance training
Begin general flexibility exercises

Phase 5 (10-14 wk)
Continue full upper extremity strengthening
Restore normal shoulder flexibility
Begin activity-specific plyometric program
Continue endurance training
Type II repairs, begin gentle resisted biceps isotonic strengthening

Phase 6 (14-24 wk)
Continue flexibility exercises
Continue full strengthening program
Begin return to interval throwing, physician-directed
Type IV repairs, progress to isotonic biceps strengthening
Continue endurance training

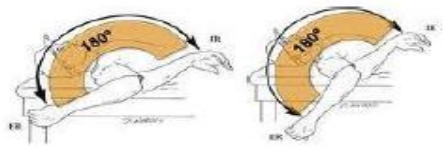
"Circle Concept of Stability"

- Balance of Passive/Dynamic Restraints
  - Ligamentous lesion on one side of the joint capsule may result in shifting loads to the *opposite* side of the capsule permitting the humeral head to subluxate or dislocate



Throwers Total Motion Concept

- Normal total arc of motion for thrower is 180 degrees



Wilk K, Meister K, Andrews JR. Current concepts in the rehabilitation of the overhead throwing athlete. *Am J Sports Med* 2002;30:136-151.

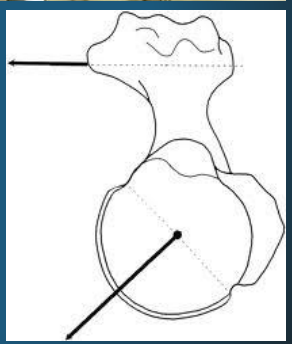
- Loss of IR of the throwing shoulder of 20° or more as compared with the non throwing shoulder = GIRD
- TRM in the throwing shoulders of professional baseball pitchers is within 5° of the non throwing shoulder

Assessment of GIRD: Glenohumeral internal rotation is measured with the patient in supine position, the shoulder abducted 90°, and the scapula stabilised against the table

Cools A M BJSM 2008

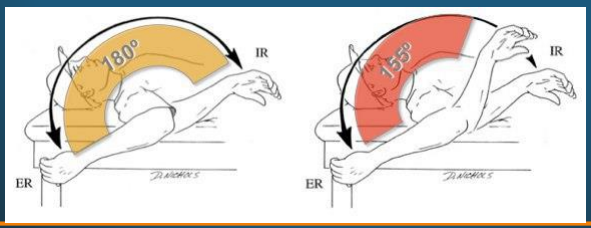
Causes of GIRD

- Osseous
- Capsular contracture
- Muscular (ER) tightness
- Scapular positioning
- Posture



GIRD is a loss of IR ROM in the presence of a loss of TRM

- Loss of side-to-side IR is actually a normal anatomical variation in overhead athletes and should not be considered pathological GIRD unless there is a subsequent loss of total rotational motion in the dominant arm as well.



GIRD = (Side-to-side difference in ER) + (Side-to-side difference in IR)

- Player 1 = (D ER 120 deg – ND ER 100 deg = +20 deg ER) + (D IR 60 deg – ND IR 80 deg = -20 deg IR) = 0 deg
- Loss of 20 degrees this is not pathological GIRD because total motion is the same bilaterally
- Player 2 = (D ER 120 deg – ND ER 100 deg = +20 deg ER) + (D IR 35 deg – ND IR 80 deg = -45 deg IR) = -25 deg GIRD
- This represents a pathological GIRD because both IR and total rotational motion are limited

The Association of Scapular Kinematics and Glenohumeral Joint Pathologies

TABLE 3 PROPOSED BIOMECHANICAL MECHANISMS OF SCAPULAR KINEMATIC DEVIATIONS

Mechanism	Associated Effects
Inadequate serratus activation	Lesser scapular upward rotation and posterior tilt
Excess upper trapezius activation	Greater clavicular elevation
Pectoralis minor tightness	Greater scapular internal rotation and anterior tilt
Posterior glenohumeral joint soft tissue tightness	Greater scapular anterior tilt
Thoracic kyphosis or flexed posture	Greater scapular internal rotation and anterior tilt, lesser scapular upward rotation

FEBRUARY 2009 | VOLUME 39 | NUMBER 2 | JOURNAL OF ORTHOPAEDIC & SPORTS PHYSICAL THERAPY

Physical Exam *Asterisks* Signs/Symptoms (Special tests, Movement/Joint Dysfunction, Posture, Palpation, etc)

- **AROM – limited elevation ® - stiff > pain, limited ER @ 90 (pain); significantly Limited IR - stiff/painful**
- **(-) Cervical – cleared**
- **(-) Lag sign, (-) Drop arm, (-) Painful arc; (-) Biceps Load II, (-) Speeds, (-) HK, (-) Neers**
- **(+2) Sulcus bilaterally @ 0; (+) Load/shift; (+) Relocation; (+) Ant slide; (+) Compression rotation – Incr with Horiz ABD**
- **Decr strength with pain resisted ER, Scaption**
- **Limited Inferior>posterior GH mobility**
- **Scapular dyskinesia with all elevation – Inferior angle prominence with incr upward rotation.**

➢ Are the relationships between the areas on the body chart, the interview, and physical exam consistent? "Do the features fit" a recognizable clinical pattern? **Yes** **No**

If NO, Please explain areas that may need clarification, if YES what:
Ant instability, possible SLAP tear, GIRD + Scapular dyskinesia with RTC tendonitis/bursitis (compression)/IMP

Rate your assessment of Severity & Irritability
Justify your assessment with examples from the Subjective Exam &/or Objective Exam

- Severity: Non | **Min** | Mod | Max

  Unable to swim, stiff/painful with overhead use, Incr mechanical signs/sxs

- Irritability: Non | Min | Mod | Max

  Instability tests (+), RTC tests (+); Able to use pain free with the exception of overhead – throwing/swimming, reaching with load

Stage & Stability?

- **Acute** | Subacute | Chronic | Acute on chronic
- **Stable** | Improving | Worsening | Fluctuating | Red Flags

Identify any potential risk factors (Yellow, Red flags, non MSK involvement, biopsychosocial)

Anxious to begin Triathlon training – increased swimming volume; not interested in surgical consult; coaching daughter's softball team – needs to throw.

Identify "gap" in knowledge.

Patient or Problem	Intervention	Comparison Intervention	Outcomes
Patient with GIRD	Best stretch to improve IR ROM, capsular mobility		Increased ROM, Improved function – swim (overhead sports).

Article Reviewed:

McClure P, Balaicuis J, Heiland D, Broersma ME, Thorndike CK, Wood A.A randomized controlled comparison of stretching procedures for posterior shoulder tightness. J Orthop Sports Phys Ther. 2007 Mar;37(3):108-14.

What did you learn from article to apply to clinical case?

The cross-body stretch in individuals with limited shoulder internal rotation ROM appears to be more effective than no stretching in controls without internal rotation asymmetry to improve shoulder internal rotation ROM.

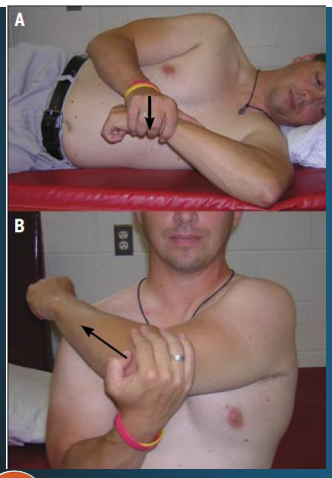
Effectiveness of Stretching on Posterior Shoulder Tightness and Glenohumeral Internal-Rotation Deficit: A Systematic Review of Randomized Controlled Trials

This review suggests that there is moderate evidence to support the immediate and short-term effects of active, passive, and MET forms of cross-body stretch to resolve PST and GIRD among asymptomatic young subjects. On the other hand, moderate evidence was found to suggest that active sleeper stretch might not be more effective than no intervention to improve PST and GIRD in the short term.

Journal of Sport Rehabilitation, 2017, 26, 294-305

A Randomized Controlled Comparison of Stretching Procedures for Posterior Shoulder Tightness

McClure JOSPT 2007



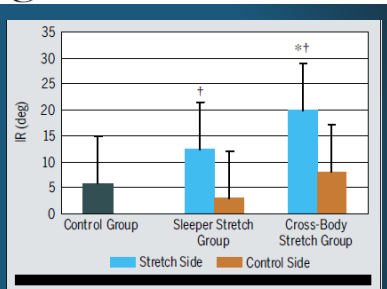


FIGURE 4. Changes in IR90 over the 4-week stretching period for all groups. Positive changes represent increased motion. Control group values represent the average of both right and left sides. Error bars represent standard deviation. *Significant change on stretch side compared to control group ($P<.01$); †Significant change compared to control side ($P<.001$).

The Immediate Effects of Muscle Energy Technique on Posterior Shoulder Tightness: A Randomized Controlled Trial

J Orthop Sports Phys Ther 2011;41(6):400-407,

FIGURE 2. Muscle energy technique for the glenohumeral joint horizontal abductors.

JOURNAL OF ORTHOPAEDIC & SPORTS PHYSICAL THERAPY | VOLUME 43 | NUMBER 12 | DECEMBER 2013

KEVIN E. WILK, PT, DPT, FAPTA[1,3] • TODD R. HOOKS, PT, OCS, SCS, ATC, MOMT, MTC, CSCS, FAAOMPT[4]
LEONARD C. MACRINA, MSPT, SCS, CSCS[1]

The Modified Sleeper Stretch and Modified Cross-body Stretch to Increase Shoulder Internal Rotation Range of Motion in the Overhead Throwing Athlete

¼ Rotation back
Contract relax

Elbow up on towel to increase post capsule stretch

Performing the Sleeper Stretch Correctly

- Scapula position
  - Roll onto your side and make sure that your scapula is retracted; lie mostly on your rib cage and the outside border of your scapula
- Shoulder position
  - Roll backwards so you body is facing upward at close to a 45 degree angle - into the scapular plane that stretches more of the posterior musculature.
- Intensity
  - Gently push down until you feel a MILD stretch and hold for 30 seconds. The goal is to feel a mild stretch in the back of your shoulder. Do this gently for a few reps

MikeReinold.com

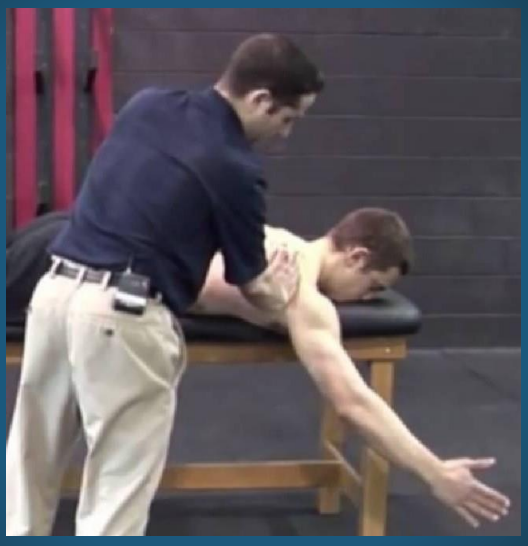
Performing the Cross Body Horiz ADD Stretch Correctly

- ¼ Rotation back to stabilize scapula
- Pull into Horizontal ADD
- Restrict ER
- Contract Relax
  - Horiz ABD
  - EXT ROT

JOURNAL OF ORTHOPAEDIC & SPORTS PHYSICAL THERAPY | VOLUME 43 | NUMBER 12 | DECEMBER 2013

STM to Posterior RTC

Teres STM with active elevation



http://www.youtube.com/watch?feature=player_embedded&v=V0IAE-NXSjI

LAB

- Cross Body stretch
- MET
- Sleeper stretch
- STM post RTC
- Self STM – post RTC

Treatment planning

Impairments	Functional limitations	Goals
ROM loss (IR, elevation) Anterior instability/laxity Scap Dyskinesia Decr ER strength Pain, intermittent mechanical sxs	Overhead use Unable to swim	Full painfree ROM Begin swim training Eliminate mechanical sxs

What is your primary treatment Objective after initial evaluation?

- **Education:** Posture - Scapular position at work, relative rest (overhead)
- **Manual Therapy:** (Specific Technique) Post RTC mobilization (STM), Inferior GH mobilization
- **Exercise Prescription:** (Specific)
  Squat-reach (high/low row) – Eccentric serratus, Mid/low trap activation; Cross body stretching
- **Other:** Self mobilization to post RTC

Key Factors in the Rehabilitation of Shoulder Instability

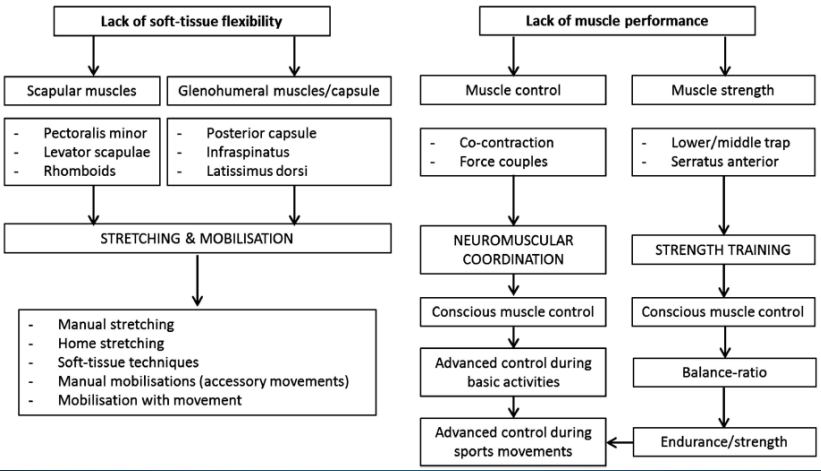
- Chronicity of Shoulder Instability
- Degree of Shoulder Instability
- Concomitant Pathology
- Direction of Shoulder Instability
- Neuromuscular Control
- Pre-Injury Activity Level

www.mikereinold.com

Rehabilitation of scapular dyskinesis: from the office worker to the elite overhead athlete

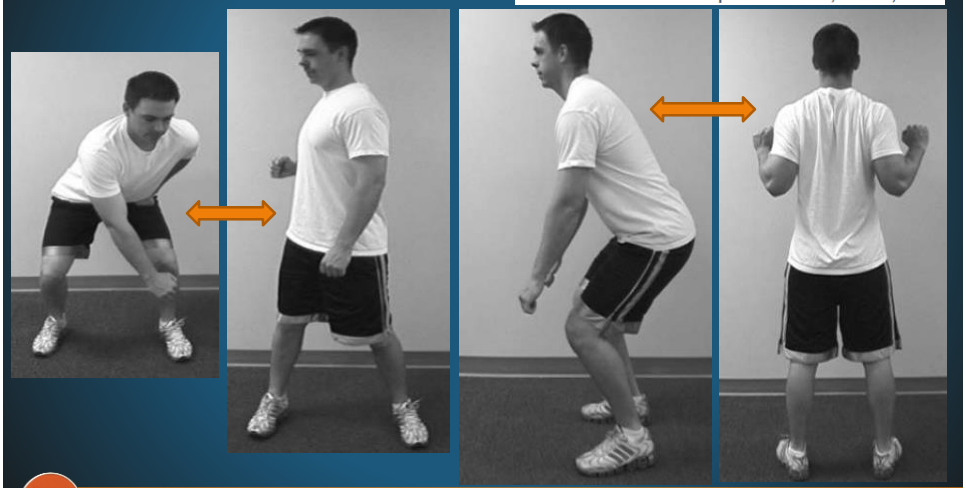
Cools AMJ, *et al. Br J Sports Med* 2014

Scapular Rehabilitation Algorithm

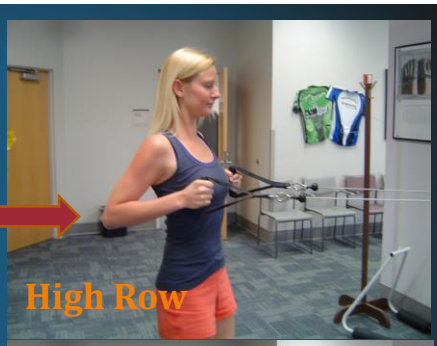


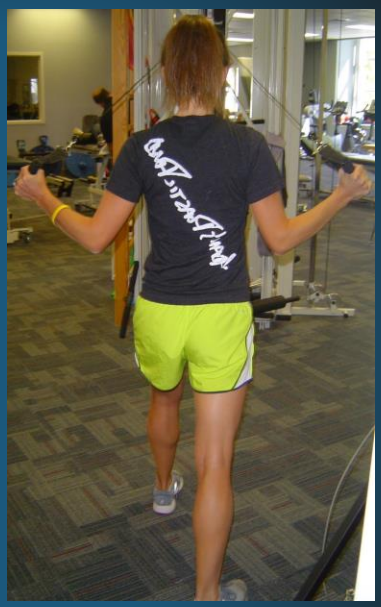
Electromyographic Analysis of Specific Exercises for Scapular Control in Early Phases of Shoulder Rehabilitation

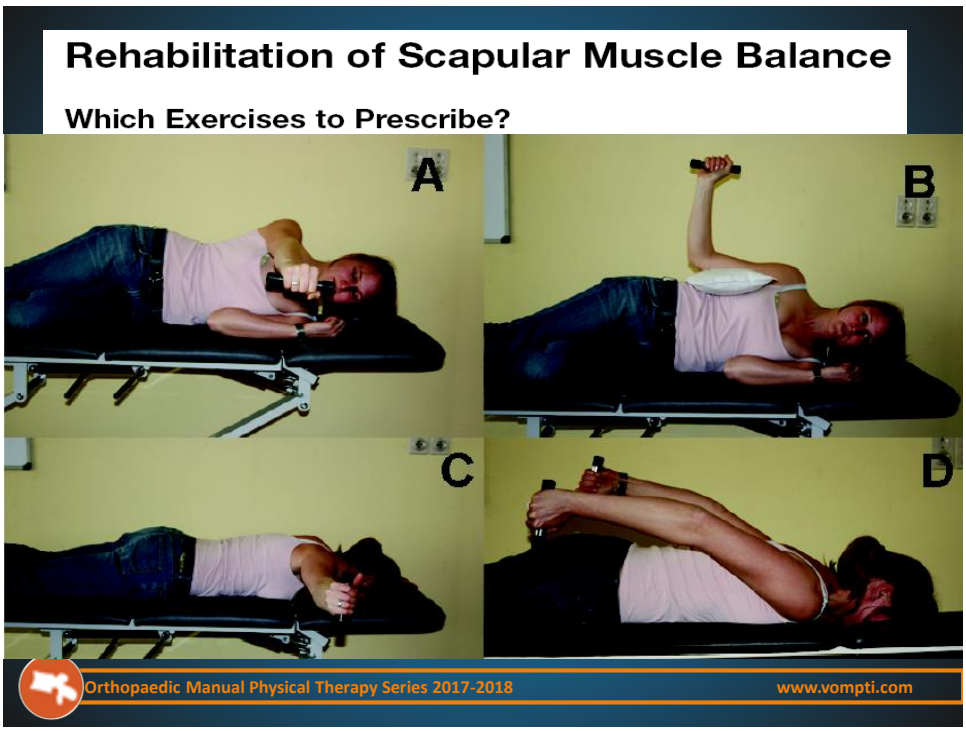
The American Journal of Sports Medicine, Vol. 36, No. 9



"Squat and Reach"







Treatment Principles

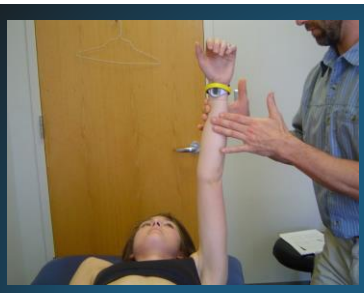
Proprioception

- Kinesthesia
- Joint reposition sense
- Progress to fatigued proprioception training

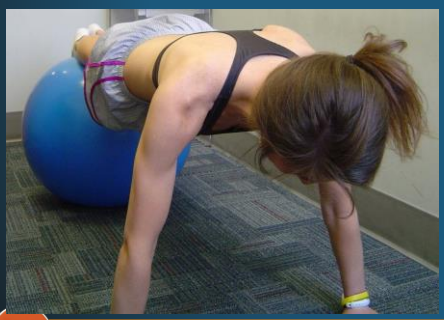
Sensorimotor contribution to shoulder stability: Effect of injury and rehabilitation ☆

- **Injury to static restraints alters sensorimotor response → Functional Instability**
- **Altered Proprioception/Kinesthesia – Patients with instability**
- **CNS processing alterations – Bilateral deficit**
- **Pain affects proprioception**
- **Muscle activation dysfunction (RTC co contraction)**
- **Rehab:**
  - **Restore RTC co contraction**
  - **Perturbations**
  - **Plyometrics**
  - **CKC**

Myers JB Man Ther 2006

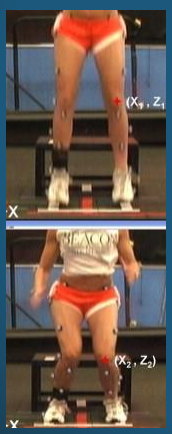


Proprioception Ther Ex



Sport Specific Training

Neuromuscular Re-Education



Unconscious Incompetence

↓

Conscious Incompetence

↓

Conscious Competence

↓

Unconscious Competence

Prevalence of Freestyle Biomechanical Errors in Elite Competitive Swimmers

Bonnie Virag, MA, ATC,[†] Elizabeth E. Hibberd, MA, ATC,[‡*] Sakiko Oyama, PhD, ATC,[§] Darin A. Padua, PhD, ATC,[‖] and Joseph B. Myers, PhD, ATC[‖]

Hand Entry | Pull-through | Recovery

Sports Health 2014 Virag B

Hand Entry

- Resist upward force of water
- Max elevation angle
- Scapular dyskinesia = IMP
- Peak Serratus activity
- Upward Scapular rotation

Stroke Phase	Correct Freestyle Biomechanics	Incorrect Freestyle Biomechanics	Relevance of Incorrect Biomechanics to Shoulder Pain
Hand entry	Hand enters water forward and lateral to the head, medial to the shoulder.[6] Figure 2a	Hand enters further away from or crosses the midline of the long axis of the body.[4,8,14] Figure 2b	Increases impingement to the anterior shoulder.[4] Mimics Neer impingement testing position.[14]
	Little finger– or fingers-first hand entry.[4] Figure 3a	Thumb-first hand entry.[4] Figure 3b	Stresses the biceps attachment to the anterior labrum.[4]

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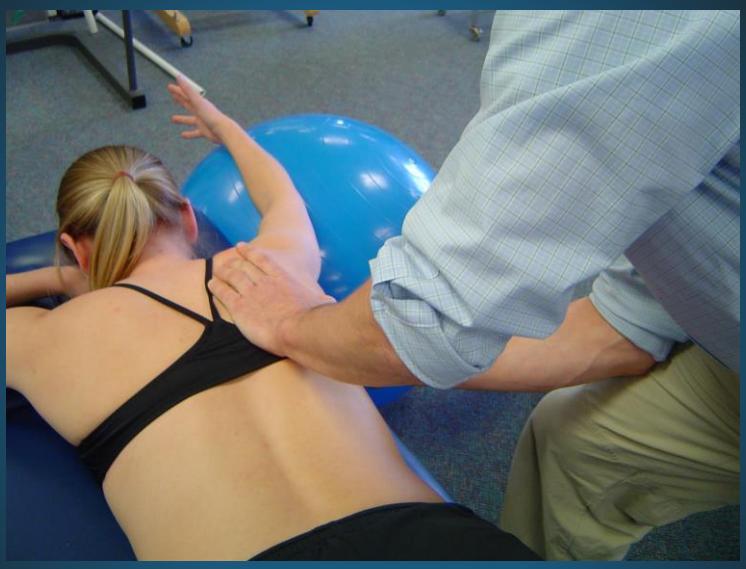

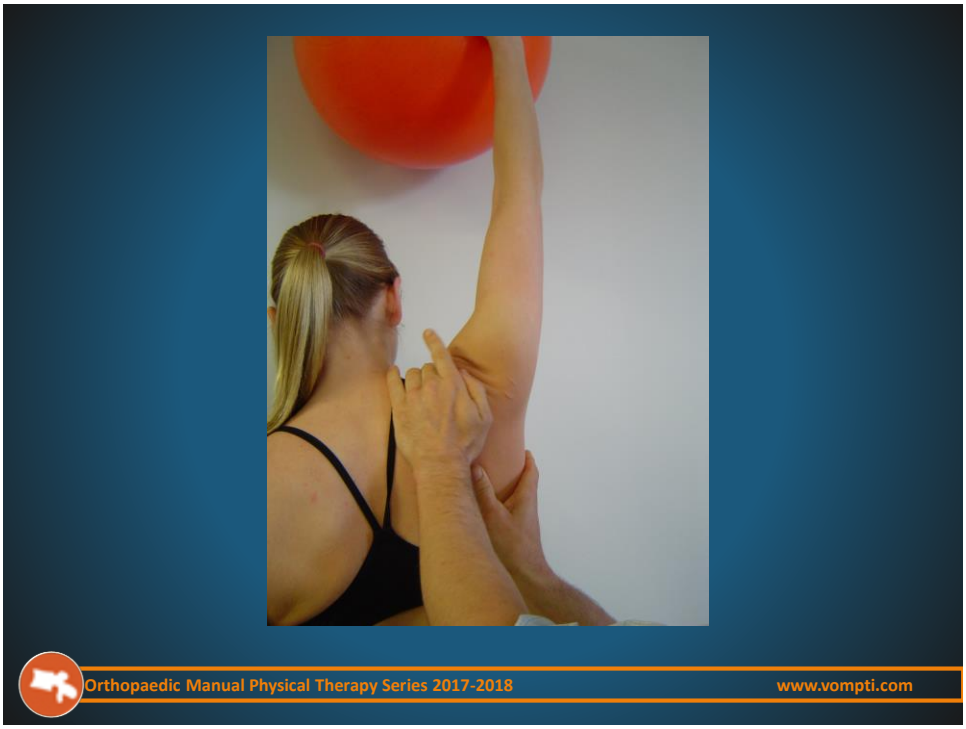

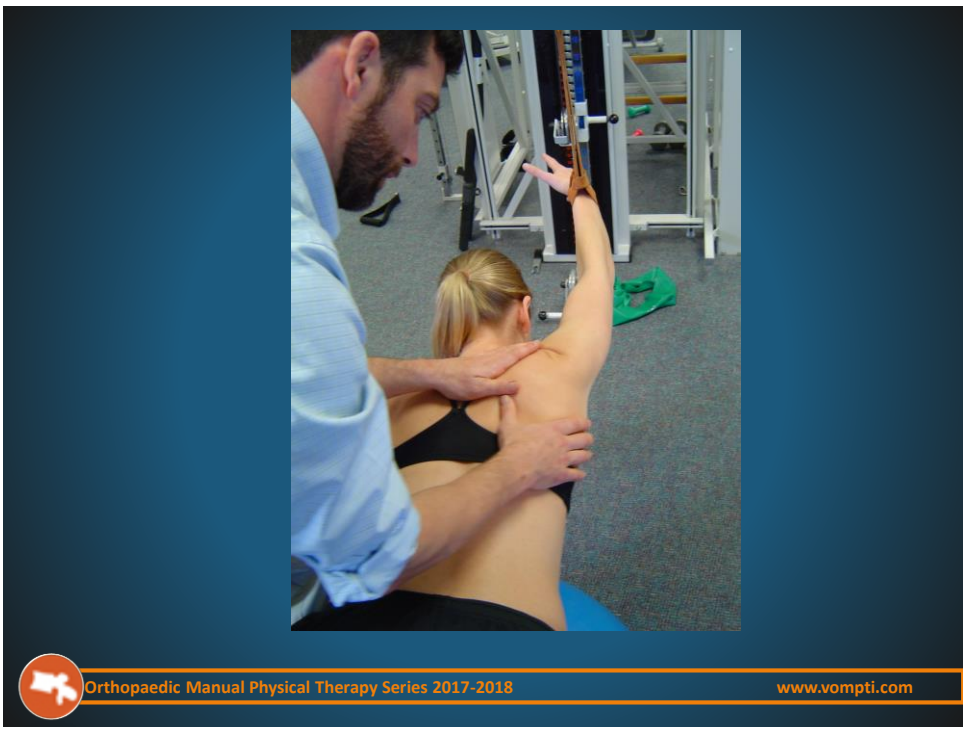

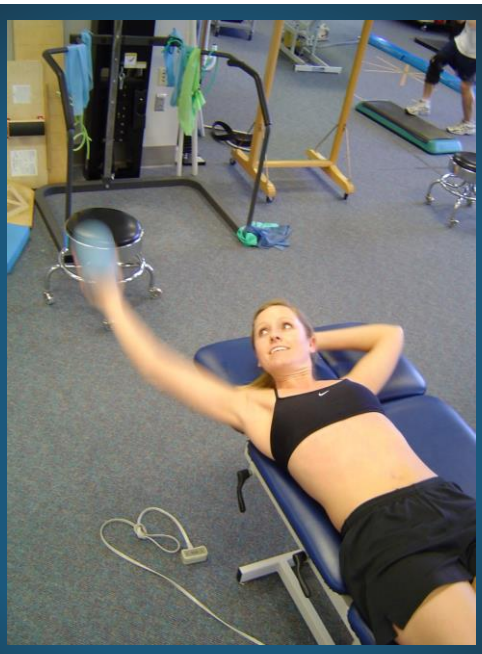

Mid Pull through

- Pull body over stable UE
- Scapular dyskinesia = IMP
- "High Elbow" increased surface area
- INT ROT GH; not Scapula
- Stable Scapula

Stroke Phase	Correct Freestyle Biomechanics	Incorrect Freestyle Biomechanics	Relevance of Incorrect Biomechanics to Shoulder Pain
Pull-through	Elbow kept higher than hand and points laterally throughout pull.[2] Figure 4a	Dropped elbow during pull-through.[15] Figure 4b	Increases external rotation, placing muscles of propulsion at mechanical disadvantage.[7]
	Swimmer should use a straight back pull-through.[2] Figure 5a	S-shaped pull through or excessive horizontal adduction past body midline during pulling.[4] Figure 5b	Increases time spent in the impingement position.[4] Mimics Hawkins Kennedy impingement testing position of horizontal adduction, flexion, and internal rotation.

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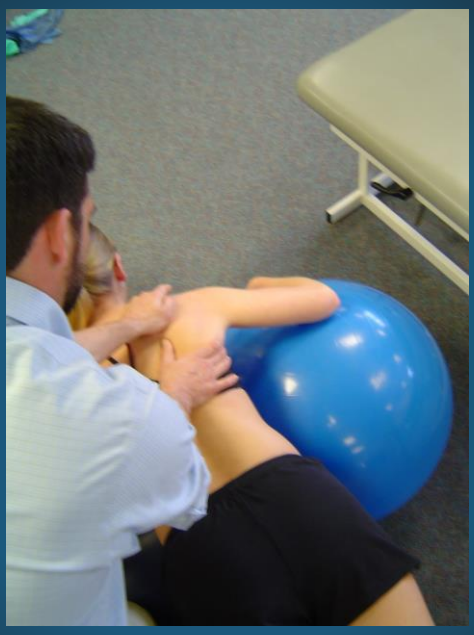

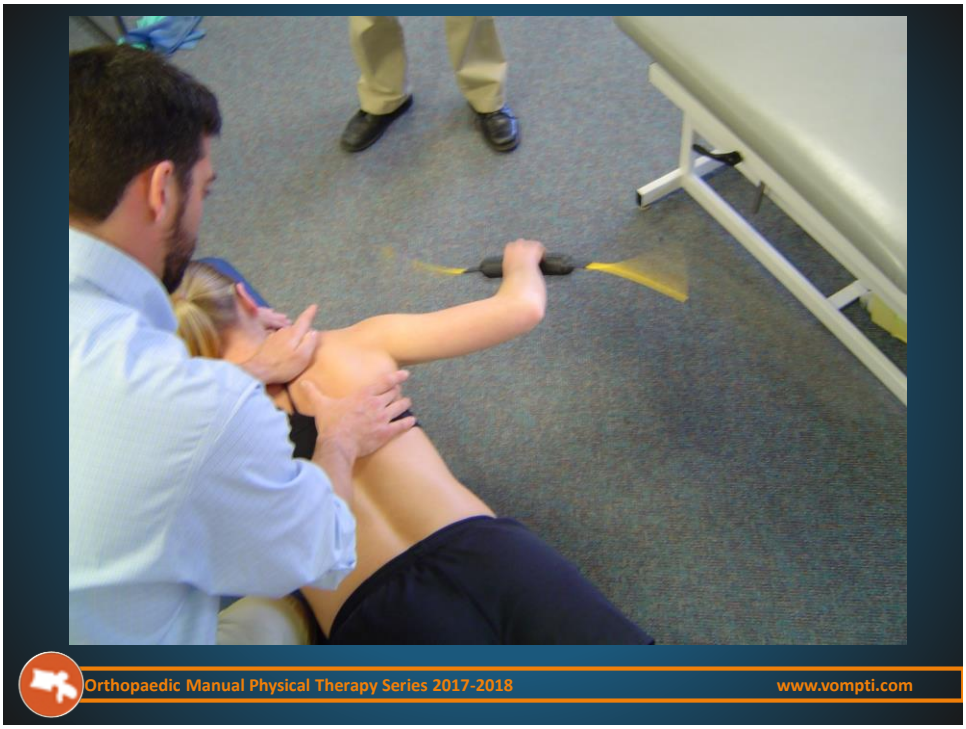

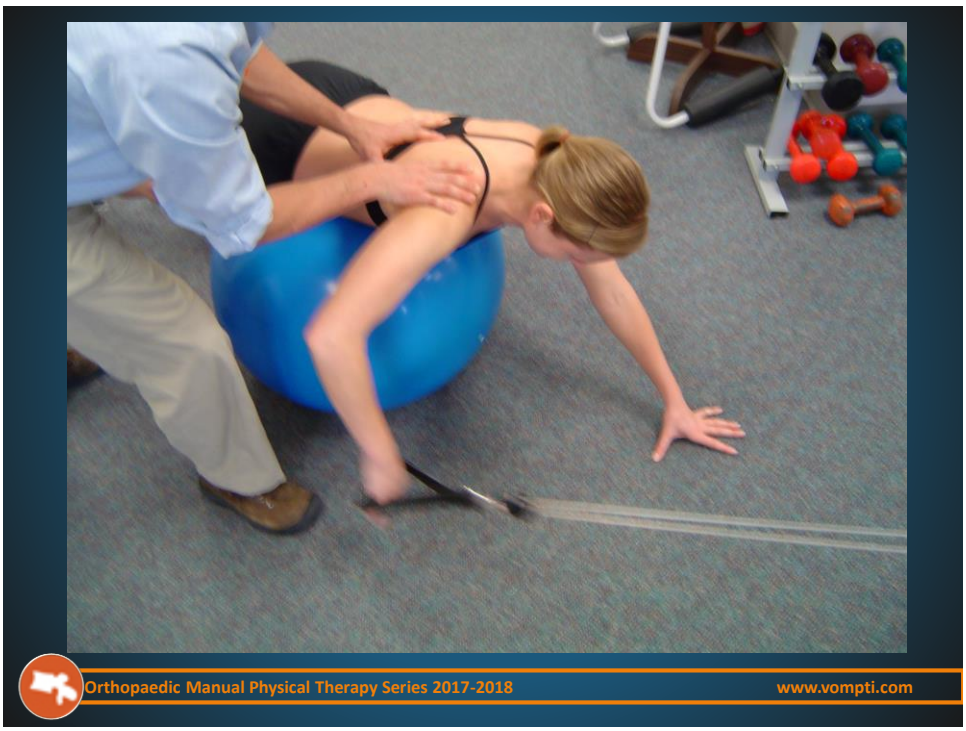

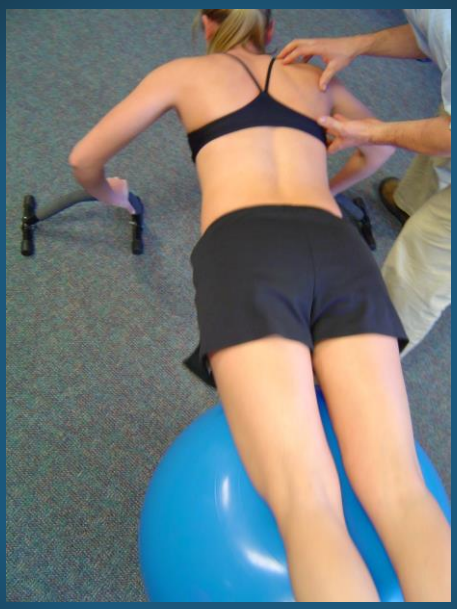

Recovery

- Primary Ant IMP
- Secondary Post IMP – laxity
- ER strength
- ER Endurance
- Scapular retraction/posterior tilt

Stroke Phase	Correct Freestyle Biomechanics	Incorrect Freestyle Biomechanics	Relevance of Incorrect Biomechanics to Shoulder Pain
Recovery	Elbow kept higher than the wrist throughout the recovery phase.[4,15] Figure 6a	Dropped elbow during recovery phase.[14] Figure 6b	Leads to an improper entry position with the elbow entering the water before the hand. The water will cause an upward force on the dropped humerus, leading to its superior translation and subacromial impingement in the shoulder.[14]
	Body roll of ~45° along the longitudinal axis of the body.[2,4] Figure 7a	Body roll that is greater or less than 45°.[4] Figure 7b	Excessive roll can lead to crossover entry position during the hand entry and/or pull-through phase. A lack of roll during recovery can increase mechanical stress on the shoulder and lead to improper hand entry position.[4]

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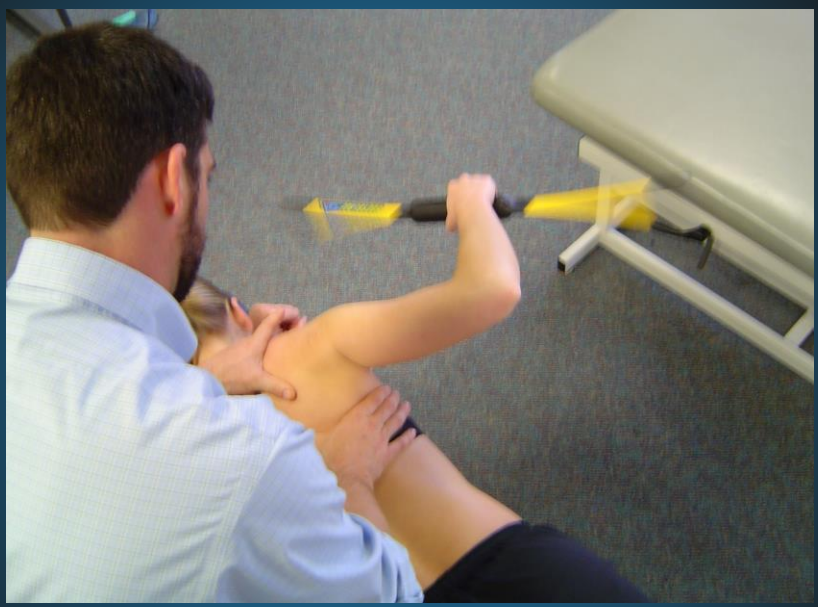

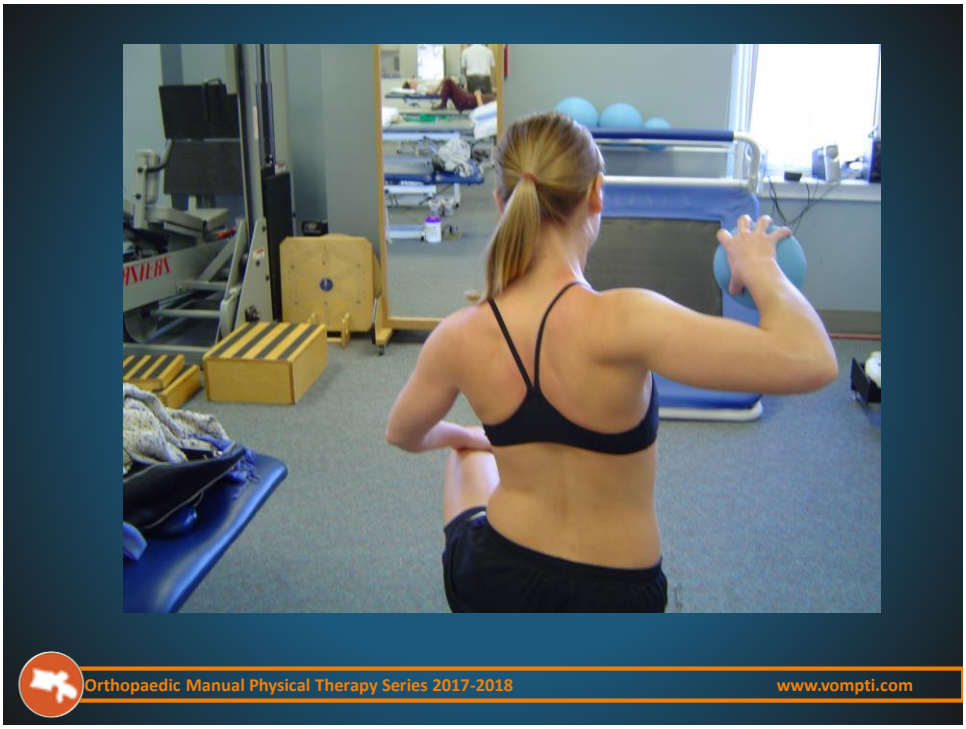

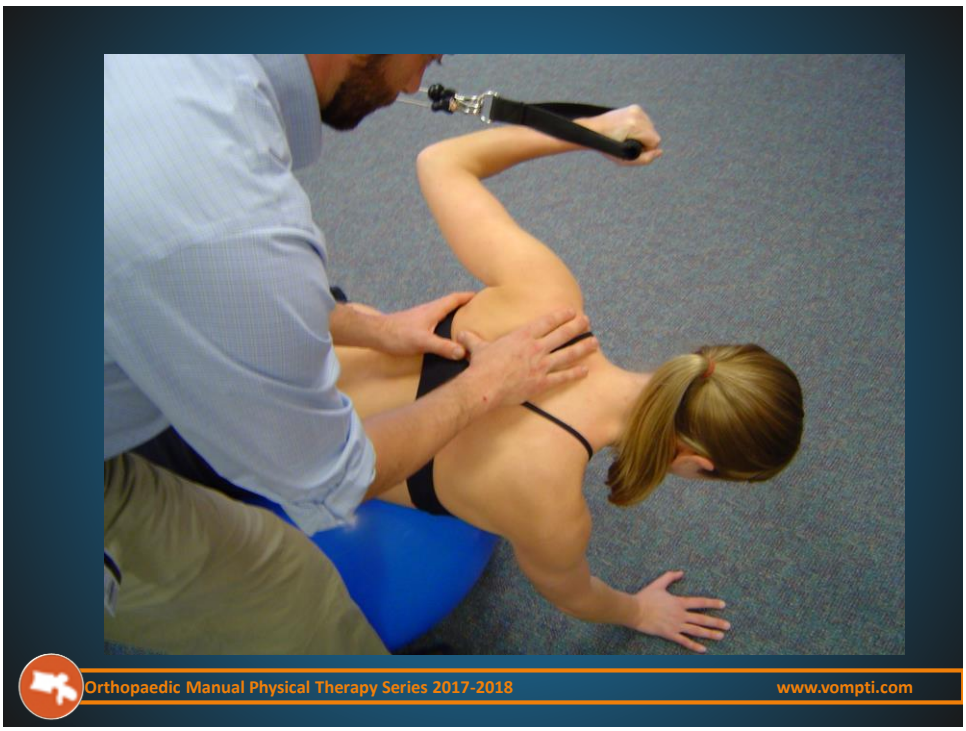

The Advanced Throwers Ten Exercise Program: A New Exercise Series for Enhanced Dynamic Shoulder Control in the Overhead Throwing Athlete

- IR/ER tubing at 0° of abduction seated on stability ball
- Full can seated on stability ball
- Lateral raise to 90° of abduction seated on stability ball
- Side-lying external rotation (plank)
- T raises prone on stability ball
- Y raises prone on stability ball

Phys Sp Med 2011_Wilk KE

The Advanced Throwers Ten Exercise Program: A New Exercise Series for Enhanced Dynamic Shoulder Control in the Overhead Throwing Athlete

Phys Sp Med 2011_Wilk KE

- Prone row into ER on stability ball
- Lower Trapezius 5 Series
  - Shoulder extension in ER seated on stability ball
  - Shoulder extension at 45° in ER seated on stability ball
  - Standing wall circle slides
  - Standing low row
  - Standing table press-downs with scapular depression
- Biceps curls/triceps extensions seated on stability ball
- Wrist flexion/extension and supination/pronation

What are you going to re assess at subsequent visit? IR ROM, RTC resisted tests (? Irritability)

Prognosis/Expectations:

- How do you expect to progress your treatment program over subsequent visits?

  Decr RTC irritability; improved GIRD, Improved scapular dyskinesis with elevation, Improved proprioception

Associated Factors for expected outcome

Favorable	Unfavorable
Min irritable **No prior hx macro trauma**	**Mechanical sxs - slight** **Concomitant pathology - Laxity/(+) Labral tests/RTC (+), GIRD/Scap dyskinesia** **Micro traumas – overhead use (swim/throw)**

If referral to other providers is indicated, Identify: Specific Recommendations.
Advanced Imaging – Contrast MRI (? Labral pathology)

Identify the key subjective and physical features (i.e. **clinical pattern)** that would help you recognize this disorder in the future.

Subjective	Physical
- Trauma – FOOSH - Location deep non specific ant-post Gh region pain - Overhead athlete - Slight mechanical sxs	- (+) Ant laxity tests - (+) SLAP tests – compressive - GIRD - Scap dyskinesia