Disclosures

- No financial disclosures to note.
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Objectives

- Formulate appropriate rehabilitation plans for overhead shoulder injuries
- Select appropriate exercises based on overhead shoulder diagnoses for return to functional status
- Improve skills for the management and rehabilitation of overhead shoulder injuries
Common Overhead Injuries

- Subacromial Impingement
- Overuse Syndrome Tendinitis
- SLAP Lesions
Principles of Overhead Rehabilitation

1. Never overstress healing tissue
2. Prevent negative effects of immobilization
3. Emphasize ER muscular strength
4. Establish muscular balance
5. Emphasize scapular muscle strength
6. Improve posterior shoulder flexibility
7. Enhance proprioception and neuromuscular control
8. Establish biomechanically efficient movements
9. Gradual return to activity
10. Use established criteria to progress
Subacromial Impingement Rehabilitation
**Objective Findings:**
- Painful arc 70-120°
- Muscle weakness: abduction, ER, Scaption
- (+) Impingement Tests: Neer, Hawkins-Kennedy, Crossover, Yocum
- Point tenderness over supraspinatus, biceps LH
- Biomechanical dysfunction of scapulo-humeral rhythm
- Malposture (rounded shoulders, forward head)
- Altered JPA (decreased inferior glide/posterior glide)
Impingement Rehabilitation

- Decrease inflammation:
  - Ice massage
  - Phonophoresis
  - Iontophoresis
Impingement Rehabilitation

- Restore glenohumeral motion and capsular mobility
  - Decreased inferior glide for abduction
  - Posterior capsular tightness
    - Posterior glides more effective than anterior for improving ER ROM.
![IR Stretch](image)

**FIGURE 1.** Modified sleeper stretch. (A) The athlete is slightly rotated posteriorly (20°-30° posterior to the coronal plane of the body) to place the shoulder in the scapular plane as passive internal rotation is performed. (B) This position stabilizes the scapula without causing subacromial impingement complaints.
FIGURE 4. Modified cross-body stretch. (A and B) The athlete stabilizes the scapula against the table as the shoulder is horizontally adducted, while external rotation is restricted via counterpressure of the opposite forearm.
Horizontal Adduction with IR

Figure 8. Horizontal adduction with internal rotation stretch. The patient flexes the arm to 90°. The rehabilitation specialist applies a stabilizing force to the lateral border of the scapula while the arm is horizontally adducted and then applies a gentle force into internal rotation.
Impingement Rehabilitation

- Increase dynamic stability of glenohumeral and scapulothoracic joint
  - RTC muscles to compress and stabilize humeral head in glenoid
  - Scapular Strength
    - Scapula during arm elevation = upwardly rotates, retracts, and posteriorly tilts
<table>
<thead>
<tr>
<th>Muscle</th>
<th>Exercise</th>
<th>Anatomical Implications</th>
<th>Biomechanical Implications</th>
<th>Clinical Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supraspinatus and lats</td>
<td>1. Full can</td>
<td>Enhances scapular position and subacromial space</td>
<td>Decreased deltoid involvement compared to empty can</td>
<td>Minimizes chance of superior humeral head migration by</td>
</tr>
<tr>
<td></td>
<td>2. Phone full can</td>
<td>Enhances scapular position and subacromial space</td>
<td>High posterior deltoid activity with similar supraspinatus function</td>
<td>High supraspinatus activity and also good exercise for lower trapezius</td>
</tr>
<tr>
<td>Infraspinatus and lats</td>
<td>1. Side-lying ER</td>
<td>Position of shoulder stability</td>
<td>Increased movement arm of muscle at 90° abduction,</td>
<td>Good when cautious with static stability</td>
</tr>
<tr>
<td></td>
<td>2. Phone ER at 90° abduction</td>
<td>Challenging position for stability, higher capsular strain</td>
<td>High EMG activity</td>
<td>High EMG activity</td>
</tr>
<tr>
<td></td>
<td>3. ER with towel roll</td>
<td>Aims for proper tension without compensation</td>
<td>Increased EMG activity with addition of towel, also incorporates adductors</td>
<td>Strengthens in a challenging position for shoulder stability, good exercise for lower trapezius</td>
</tr>
<tr>
<td>Subscapularis</td>
<td>1. IR at 0° abduction</td>
<td>Position of shoulder stability</td>
<td>Similar subscapular activity between 0° and 90° abduction</td>
<td>Enhances muscle recruitment and synergy with adductors</td>
</tr>
<tr>
<td></td>
<td>2. IR at 90° abduction</td>
<td>Position of shoulder instability</td>
<td>Enhances scapular position and subacromial space, less pectoralis activity</td>
<td>Effective exercise, good when cautious with static stability</td>
</tr>
<tr>
<td></td>
<td>3. IR diagonal exercise</td>
<td>Replicates more functional activity</td>
<td>High EMG activity</td>
<td>Effective strengthening in functional movement pattern</td>
</tr>
<tr>
<td>Serratus anterior</td>
<td>1. Push-up with plus</td>
<td>Easy position to produce resistance against pull</td>
<td>High EMG activity</td>
<td>Effective exercise to provide resistance against pull, also good exercise for subscapularis</td>
</tr>
<tr>
<td></td>
<td>2. Dynamic hag</td>
<td>Performed below 90° abduction</td>
<td>High EMG activity</td>
<td>Easily perform in patients with difficulty elevating arms or performing push-ups, also good exercise for subscapularis</td>
</tr>
<tr>
<td></td>
<td>3. Serratus punch L2O</td>
<td>Combines protrusion with upward rotation</td>
<td>High EMG activity</td>
<td>Good dynamic activity to combine upward rotation and adduction function</td>
</tr>
<tr>
<td>Lower trapezius</td>
<td>1. Phone full can</td>
<td>Can properly align exercise with muscle fibers</td>
<td>High EMG activity</td>
<td>Effective exercise, also good exercise for supraspinatus</td>
</tr>
<tr>
<td></td>
<td>2. Phone ER at 90° abduction</td>
<td>Phone exercise below 90° abduction</td>
<td>High EMG activity</td>
<td>Effective exercise, also good for infraspinatus and lats minor</td>
</tr>
<tr>
<td></td>
<td>3. Phone horizontal abduction at 90° abduction with ER</td>
<td>Phone exercise below 90° abduction</td>
<td>High EMG activity</td>
<td>Effective exercise, also good for infraspinatus and lats minor</td>
</tr>
<tr>
<td>Middle trapezius</td>
<td>4. Bilateral ER</td>
<td>Scapular control without arm elevation</td>
<td>Good ratio of lower to upper trapezius activity</td>
<td>Effective exercise, also good for infraspinatus and lats minor</td>
</tr>
<tr>
<td></td>
<td>1. Phone row</td>
<td>Phone exercise below 90° abduction</td>
<td>High EMG activity</td>
<td>Effective exercise, good ratios of upper, middle, and lower trapezius activity</td>
</tr>
<tr>
<td></td>
<td>2. Phone horizontal abduction at 90° abduction with ER</td>
<td>Phone exercise below 90° abduction</td>
<td>High EMG activity</td>
<td>Effective exercise, also good for lower trapezius</td>
</tr>
<tr>
<td>Upper trapezius</td>
<td>5. Shrugs</td>
<td>Scapular control without arm elevation</td>
<td>High EMG activity</td>
<td>Effective exercise</td>
</tr>
<tr>
<td></td>
<td>2. Phone row</td>
<td>Phone exercise below 90° abduction</td>
<td>High EMG activity</td>
<td>Good ratios of upper, middle, and lower trapezius activity</td>
</tr>
<tr>
<td></td>
<td>3. Phone horizontal abduction</td>
<td>Phone exercise below 90° abduction</td>
<td>High EMG activity</td>
<td>Effective exercise, also good for lower trapezius</td>
</tr>
<tr>
<td>Rhomboids and levator scapula</td>
<td>1. Phone row</td>
<td>Phone exercise below 90° abduction</td>
<td>High EMG activity</td>
<td>Effective exercise, good ratios of upper, middle, and lower trapezius activity</td>
</tr>
<tr>
<td></td>
<td>2. Phone horizontal abduction at 90° abduction with ER</td>
<td>Phone exercise below 90° abduction</td>
<td>High EMG activity</td>
<td>Effective exercise, also good for lower and middle trapezius</td>
</tr>
<tr>
<td></td>
<td>3. Phone extension ER</td>
<td>Phone exercise below 90° abduction</td>
<td>High EMG activity</td>
<td>Effective exercise, unique movement to enhance scapular control</td>
</tr>
</tbody>
</table>

*Abbreviations: EMG, Electromyography; ER, external rotation; IR, internal rotation.*
Impingement Rehabilitation

- Improve and correct postural awareness
  - Forward head, rounded shoulders
    - Emphasize scapular retractors
    - Rows, scapular squeezes, w’s etc.

- Gradual return to activity
Overuse Syndrome Tendonitis Rehabilitation

- RTC or Long Head of Biceps or both
- Often related to fatigue from overuse
- Discontinue aggravating activity to reduce inflammation and restore strength/ROM
Overuse Injury Rehab

- Increase endurance of scapular muscles and RTC musculature for repetitive activities

- Strengthening exercises RTC
  - Full Can vs. Empty can
    - Increased supraspinatus activity in conjunction with middle deltoid and subscapularis with empty can
    - Full Can = least amount of surrounding activity for supraspinatus
Strengthening Exercises RTC
- Reinold et al. *JOSPT*. 2004
- Greatest EMG activity of infraspinatus and teres minor = Sidelying ER
- Prone horizontal abduction at 100° with full ER = maximum supraspinatus, middle, and posterior deltoid activation

Eccentrics biceps and RTC
Overuse Injury Rehab

- Scapular Muscles

A, B, and C = optimal for restoration of UT/LT imbalances

A, B, and D = optimal for UT/MT imbalances
Overuse Injury Rehab

- Restore flexibility of shoulder complex
  - Sleeper stretches, cross-body, horizontal adduction
  - Joint mobilizations

- Short Pectoralis Minor = stretch it
  - Borstad and Ludewig. *JOSPT* 2005
  - Shortened pec minor subjects displayed reduced scapular kinematics.
Overuse Injury Rehab

- Dynamic stabilization exercises for the shoulder
  - Plyometrics
  - Bodyblade
  - Rhythmic stabilization with perturbations
  - Stability ball exercises
  - UE CKC BOSU exercises
  - Mini trampoline, etc…
Overuse Injury Rehab
Rehabilitation of SLAP Lesions

- Superior Labrum, Anterior and Posterior lesion
  - Involves attachment of biceps LH
  - Fall on an extended arm, repetitive traction with overhead activities
  - High incidence of concurrent rotator cuff tears if $>40$
**Rehabilitation Guidelines For SLAP Lesion repair**

**PHASE I (Surgery to 4-6 weeks after surgery)**

<table>
<thead>
<tr>
<th>Appointments</th>
<th>• Rehabilitation appointments begin within 7 days of surgery, continue 1-2 times per week</th>
</tr>
</thead>
</table>
| Rehabilitation Goals                                                        | • Protection of the post-surgical shoulder  
|                                                                              | • Activation of the stabilizing muscles of the glenohumeral and scapulo-thoracic joints |
| Precautions                                                                  | • Sling immobilization required for soft tissue healing  
|                                                                              | • Hypersensitivity in axillary nerve distribution is a common occurrence  
|                                                                              | • No long head biceps tension for 6 weeks to protect repaired tissues - this includes avoiding range of motion with long lever arm shoulder flexion, as well as resisted supination or elbow flexion  
|                                                                              | • Limit external rotation to 40° in neutral for the first 4 weeks. Avoid abduction and external rotation for 6 weeks  
|                                                                              | • No extension or horizontal abduction past body for 4 weeks  
|                                                                              | • Dr. Scerpella’s patients should also avoid forward flexion past 130° for 6 weeks. |
| Range of Motion Exercises (Please do not exceed the range of motion specified for each exercise and time period) | • Gentle active/active assistive range of motion for elbow and wrist  
|                                                                              | • Pain free, gentle passive range of motion for shoulder flexion, abduction, internal rotation and external rotation within the limits of the precautions. |
| Suggested Therapeutic Exercise                                               | • Begin week 3, sub-maximal shoulder isometrics for internal rotation, external rotation, abduction and adduction within the limits of the precautions  
|                                                                              | • Hand gripping  
|                                                                              | • Cervical spine and scapular active range of motion  
|                                                                              | • Desensitization techniques for axillary nerve distribution |
| Cardiovascular Fitness                                                       | • Walking, stationary bike - sling on  
|                                                                              | • No treadmill (Avoid running and jumping due to the distractive forces that can occur at landing) |
**PHASE II (begin after meeting Phase I criteria, usually 6 to 12 weeks after surgery)**

<table>
<thead>
<tr>
<th>Appointments</th>
<th>• Rehabilitation appointments are once every 1-2 weeks</th>
</tr>
</thead>
</table>
| Rehabilitation Goals | • Full active range of motion  
• Full rotator cuff strength in a neutral position |
| Precautions | • Gradual initiation of biceps tension from weeks 6-8 to protect repaired tissues  
• No passive range of motion for abduction with external rotation or extension |

| Range of Motion Exercises (Please do not exceed the range of motion specified for each exercise and time period) |  
• • Active range of motion for shoulder flexion inside lying to lessen biceps tension  
• • Active range of motion for shoulder abduction in supine or prone to lessen biceps tension  
• • Active range of motion for shoulder internal rotation – avoid internal rotation up the back type stretching since internal rotation and extension may place too much stress on the healing superior labrum |

| Suggested Therapeutic Exercise | • Scapular squeezes  
• Internal and external rotation in neutral with exercise band resistance to neutral – make sure patient is not supinating with external rotation movement |
| Cardiovascular Fitness | • Walking, stationary bike without using arms (No Airdyne)  
• No treadmill, swimming or running |
## PHASE III (begin after meeting Phase II criteria, usually 10 weeks after surgery)

<table>
<thead>
<tr>
<th>Appointments</th>
<th>Rehabilitation appointments are 1-2 times per week</th>
</tr>
</thead>
</table>
| Phase III Goals | • Full active range of motion in all cardinal planes with normal scapulo-humeral movement  
|               | • Normal (rated 5/5) rotator cuff strength at 90° of shoulder abduction in the scapular plane  
|               | • Normal (rated 5/5) peri-scapular strength |
| Precautions | • All exercises and activities to remain non-provocative and low to medium velocity  
|              | • Avoid activities where there is a higher risk for falling or outside forces to be applied to the arm  
|              | • No swimming, throwing or overhead sports  
|              | • Patients can develop posterior capsule tightness that inhibits rehabilitation progress; continue to evaluate for this and treat if necessary |
| Suggested Therapeutic Exercise | Mobilization and motion  
|                              | • Posterior glides and sleeper stretch if posterior capsule tightness is present upon assessment  
|                              | Strength and Stabilization  
|                              | • Flexion in prone, horizontal abduction in prone, full can exercise, D1 and D2 diagonals in standing  
|                              | • Theraband/cable column/dumbbell (light resistance/high repetition) internal rotation and external rotation in 90° of abduction  
|                              | • Rowing with Theraband or resistance machines  
|                              | • Balance board in push-up position (with rhythmic stabilization), prone Swiss ball walk-outs, rapid alternating movements in supine, and D2 diagonal closed kinetic chair stabilization with narrow base of support |
| Cardiovascular Fitness | • Walking, biking, stairmaster and running (if Phase II criteria are met)  
|                          | • No swimming |
| Progression Criteria | • Patient may progress to Phase IV if they have met the above stated goals and have no apprehension, internal impingement or active irritation/inflammation of the long head of the biceps |
## SLAP Rehab

### PHASE IV (begin after meeting Phase III criteria, usually 16 weeks after surgery)

<table>
<thead>
<tr>
<th>Appointments</th>
<th>• Rehabilitation appointments are 1 time every 3 weeks</th>
</tr>
</thead>
</table>
| Phase IV Goals | • Patient to demonstrate stability with higher velocity movements and change of direction movements  
| | • Normal (rated 5/5) rotator cuff strength with multiple repetition testing at 90° of shoulder abduction in the scapular plane  
| | • Full multi-plane active shoulder range of motion |
| Precautions | • Progress gradually into provocative exercises by beginning with low velocity, known movement patterns |
| Suggested Therapeutic Exercise | Mobilization and motion  
| | • Posterior glides and sleeper stretch if posterior capsule tightness is present upon assessment  
| | Strength and Stabilization  
| | • Dumbbell and medicine ball exercises that incorporate trunk rotation and control with rotator cuff strengthening at 90° of shoulder abduction; begin working towards more functional activities by emphasizing core and hip strength and control with shoulder exercises  
| | • Theraband/cable column/dumbbell internal rotation and external rotation in 90° of abduction  
| | • Rowing with Theraband or resistance machines  
| | • Higher velocity strengthening and control, such as inertial, plyometrics and rapid exercise band drills. Plyometrics should start with 2 hands below shoulder height and progress to overhead, then back to below shoulder with one hand, progressing again to overhead  
| | • Begin education in sport specific biomechanics with very initial program for throwing, swimming or overhead racquet sports |
| Cardiovascular Fitness | • Walking, biking, stairmaster and running (if Phase III criteria are met)  
| | • No swimming |
| Progression Criteria | • Patient may progress to Phase V if they have met the above stated goals and have no apprehension or internal impingement signs |
# SLAP Rehab

## PHASE V (begin after meeting Phase IV criteria, usually 22 weeks after surgery)

<table>
<thead>
<tr>
<th>Appointments</th>
<th>• Rehabilitation appointments are 1 time every 2-3 weeks</th>
</tr>
</thead>
</table>
| Phase V Goals      | • Patient to demonstrate stability with higher velocity movements and change of direction movements that replicate sport specific patterns (including swimming, throwing, etc.)  
|                    | • No apprehension or instability with high velocity overhead movements  
|                    | • Improve core and hip strength and mobility to eliminate any compensatory stresses to the shoulder  
|                    | • Work capacity cardiovascular endurance for specific sport or work demands |

<table>
<thead>
<tr>
<th>Precautions</th>
<th>• Progress gradually into sport specific movement patterns</th>
</tr>
</thead>
</table>
| Suggested Therapeutic Exercise | Mobilization and motion  
|                     | • Posterior glides and sleeper stretch if posterior capsule tightness is present upon assessment  
|                     | Strength and Stabilization  
|                     | • Dumbbell and medicine ball exercises that incorporate trunk rotation and control with rotator cuff strengthening at 90° of shoulder abduction and higher velocities; begin working towards more sport specific activities  
|                     | • Initiate throwing program, overhead racquet program or return to swimming program depending on the athlete’s sport  
|                     | • High velocity strengthening and dynamic control, such as plyometrics and rapid exercise band drills |

<table>
<thead>
<tr>
<th>Cardiovascular Fitness</th>
<th>• Design to use sport specific energy systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Progression Criteria</td>
<td>• Patient may return to sport after receiving clearance from the Orthopedic surgeon and the physical therapist/athletic trainer</td>
</tr>
</tbody>
</table>

These rehabilitation guidelines were developed collaboratively by Marc Sherry, PT, DPT, LAT, CSCS (msherry@uwhealth.org) and the UW Health Sports Medicine physician group.  
Updated 03/2011
References


