6-2006

Scapula Stabilization Rehab Exercise Prescription

Jason Brumitt
George Fox University, jbrumitt@georgefox.edu

Erik Meira

Follow this and additional works at: http://digitalcommons.georgefox.edu/pt_fac

Recommended Citation
Rehab Tips

Scapula Stabilization Rehab Exercise Prescription

Jason Brumitt, MSPT, SCS, ATC, CSCS,*D
Willamette Falls Hospital, Oregon City, Oregon
Erik Meira, PT, CSCS
Elite Physical Therapy and Sports Medicine, Portland, Oregon

Summary

The athletic shoulder is susceptible to repetitive overuse injuries in sports. No shoulder rehabilitation program is complete without the prescription of exercises to enhance scapular function. An athlete should progress from basic rehabilitation exercises identified by electromyographic studies to dynamic, sport-specific positions before returning to sport.

The athletic shoulder is susceptible to repetitive overuse injuries in such sports as baseball, golf, and tennis (1, 5, 6). Athletes who have sustained shoulder injuries present to rehabilitation professionals with such diagnoses as rotator cuff strain, impingement, labral tears, and instability (6). Although many of these diagnoses require rotator cuff strengthening, a comprehensive rehabilitation program must also include the prescription of scapular stabilization exercises.

Kibler (3) has identified several roles of the scapula for athletic performance (Table 1). The glenoid fossa of the scapula articulates with the humeral head, providing a stable base for normal upper-extremity movement. For an athlete to achieve full shoulder elevation, normal scapulohumeral rhythm must occur. For every 2° of elevation motion contributed by the glenohumeral joint, 1° of motion must occur from the scapulothoracic articulation. The scapular muscles facilitate upper-extremity movement via the scapular motions of protraction, retraction, upward (lateral) rotation, and downward (medial) rotation.

The main muscles providing scapular stabilization are the rhomboids, trapezius, and serratus anterior. Weakness of the scapular muscles will lead to dysfunction of the scapulohumeral rhythm, which may cause or lead to shoulder injury. Scapular dysfunction is found in as many as 68% of rotator cuff problems and 100% of glenohumeral instability diagnoses (4, 6, 8).

Sports medicine researchers have identified the best exercises to train or rehabilitate the muscles of the scapula. Table 2 lists the top exercises for some key scapula muscles as determined from electromyographic research (2, 7).

Elevation of Scapula

The combined action of the upper and lower fibers of the trapezius and the serratus anterior elevate and laterally rotate the scapula. This action helps to position the upper extremity for motions required during overhead throwing or tennis ball serving. We typically find that the injured athlete does not present with upper trapezius weakness. If deemed necessary, the top exercise for the upper trapezius is rowing (Figure 1) or a unilateral shoulder shrug (2, 7). On the other hand, the lower trapezius does often present with weakness. Shoulder
abduction and rowing (Figure 1) are the top exercises identified by Moseley et al. (7). Ekstrom's electromyographic study found the overhead arm raise in line with the lower trapezius to be the best exercise (Figure 2) (2).

**Retraction and Protraction**

Scapular retraction provides a stable base from which the arm elevates and externally rotates during the cocking phases of overhead throwing and during the takeaway phase of the golf swing. The rhomboids and middle trapezius are the main scapular retractors. From our clinical experience, these muscle groups are grossly weak. We recommend an immediate correction of any compensation patterns when instructing horizontal abduction (neutral) or horizontal extension with external rotation (Figure 3). (Note, although Ekstrom et al. [2] and Moseley et al. [7] use different terms for their respective horizontal exercises, the exercises in fact are performed in the same prone position, with the exception of Ekstrom's performed with gleno-humeral external rotation.)

The serratus anterior protracts the scapula along the thorax to provide a stable base as the shoulder transitions from a cocked position to either throw or strike a ball. Dysfunctional scapular protraction leads to increased deceleration forces on the shoulder during throwing (3). A patient with a dysfunc-

---

**Table 1: Roles of the Scapula in Throwing and Serving**

<table>
<thead>
<tr>
<th>Role</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Stable part of glenohumeral articulation</td>
<td></td>
</tr>
<tr>
<td>2. Retraction and protraction to facilitate cocking, throwing, and serving motions</td>
<td></td>
</tr>
<tr>
<td>3. Elevation of the acromion</td>
<td></td>
</tr>
<tr>
<td>4. Base for muscle attachment</td>
<td></td>
</tr>
<tr>
<td>5. Link in proximal to distal sequencing</td>
<td></td>
</tr>
</tbody>
</table>

---

**Table 2: Top Exercises for Scapular Stabilization**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper trapezius</td>
<td>Rowing</td>
<td>Unilateral shoulder shrug</td>
</tr>
<tr>
<td>Middle trapezius</td>
<td>Horizontal abduction (neutral)</td>
<td>Shoulder horizontal extension with external rotation and overhead arm raise in line with lower trapezius (prone position)</td>
</tr>
<tr>
<td>Lower trapezius</td>
<td>Abduction or rowing</td>
<td>Overhead arm raise in line with lower trapezius (prone position)</td>
</tr>
<tr>
<td>Rhomboids</td>
<td>Horizontal abduction (neutral)</td>
<td>Not tested</td>
</tr>
<tr>
<td>Serratus anterior</td>
<td>Push up with a plus</td>
<td>Shoulder abduction plane of scapula above 120°</td>
</tr>
</tbody>
</table>

---

**Figure 1.** Prone row exercise.

**Figure 2.** Overhead arm raise in line with lower trapezius exercise.
Tensional serratus anterior muscle may present to the clinician with winging of the medial scapular border (3). To strengthen the serratus anterior, we recommend beginning with a push-up and a plus exercise. Most patients can safely perform this exercise during the initial phase of rehabilitation. As symptoms improve, the athlete may progress to a scaption above 120° (2).

**Sport-Specific Training**

As an athlete’s symptoms improve with the aforementioned exercises, we recommend that exercises that reproduce or mimic functional positions be performed. Examples of sport-specific training include plyometric ball throws against a rebounder, alternating serratus anterior punches (Figure 4), and proprioceptive neuromuscular facilitation diagonal 2 patterns (Figure 5).

**Exercise Dosing**

The athlete should initially perform each exercise with low weight, performing 1 to 3 sets of 25 to 30 repetitions. When the athlete can successfully complete 25 to 30 repetitions at a weight with no joint pain, he or she should gradually increase the weight by 1-lb increments.

**Conclusion**

A comprehensive shoulder rehabilitation program should include exercises...
for the scapular muscles. We recommend that exercises identified by either Moseley or Ekstrom be prescribed initially. As the athlete's condition improves, we suggest a progression to dynamic exercise positions.

References

Jason Brumitt is an APTA board-certified sports clinical specialist. He is employed at Willamette Falls Hospital.

Erik Meira is the director and lead physical therapist for Elite Physical Therapy and Sports Medicine.