

6-2006

# Scapula Stabilization Rehab Exercise Prescription

Jason Brumitt

*George Fox University*, [jbrumitt@georgefox.edu](mailto:jbrumitt@georgefox.edu)

Erik Meira

Follow this and additional works at: [http://digitalcommons.georgefox.edu/pt\\_fac](http://digitalcommons.georgefox.edu/pt_fac)



Part of the [Physical Therapy Commons](#)

---

## Recommended Citation

Published in *Strength and Conditioning Journal*, 2006; 28(3): 62-65 <http://journals.lww.com/nsca-scj/Pages/collectiondetails.aspx?TopicalCollectionId=17>

This Article is brought to you for free and open access by the School of Physical Therapy at Digital Commons @ George Fox University. It has been accepted for inclusion in Faculty Publications - School of Physical Therapy by an authorized administrator of Digital Commons @ George Fox University. For more information, please contact [arolfe@georgefox.edu](mailto:arolfe@georgefox.edu).

# 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.

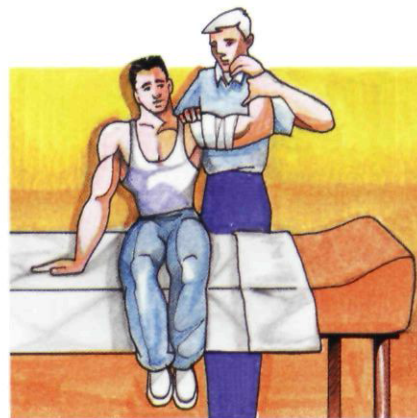
**T**he athletic shoulder is susceptible to repetitive overuse injuries in such sports as baseball, golf, and tennis (1, 5, 6). Athletes who have sustained shoulder injuries present to rehabilitation professionals with such diagnoses as rotator cuff strain, impingement, labral tears, and instability (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 mo-

tions 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



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

1. Stable part of glenohumeral articulation
2. Retraction and protraction to facilitate cocking, throwing, and serving motions
3. Elevation of the acromion
4. Base for muscle attachment
5. Link in proximal to distal sequencing

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).

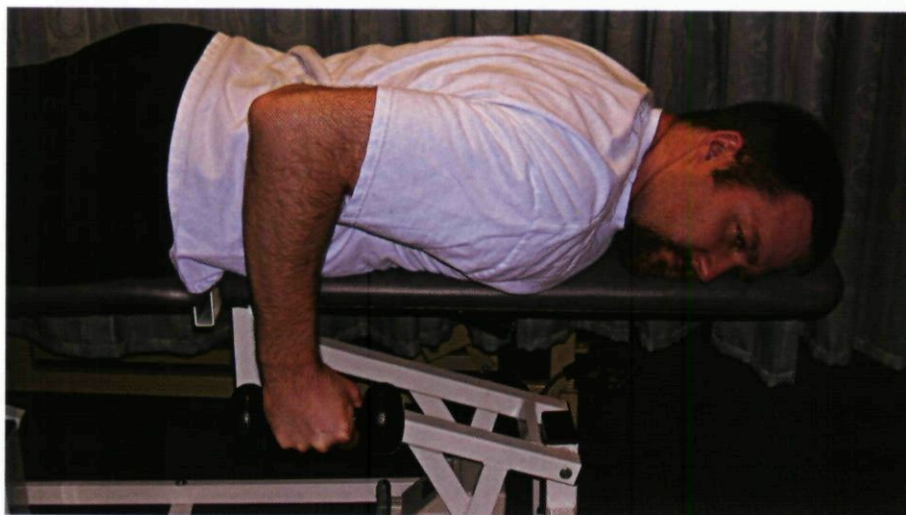
### Retraction and Protraction

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 glenohumeral external rotation.)

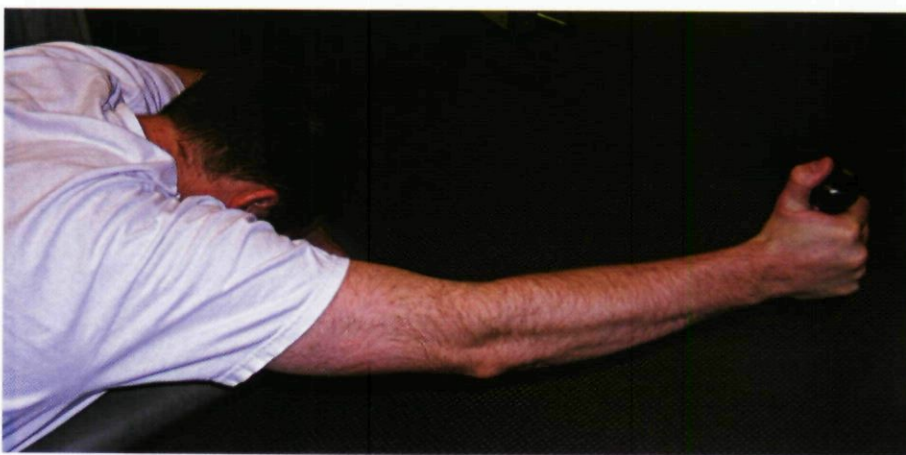
The serratus anterior protracts the scapula along the thorax to provide a stable base as the shoulder transitions from a cocked position to either throw or strike a ball. Dysfunctional scapular protraction leads to increased deceleration forces on the shoulder during throwing (3). A patient with a dysfunc-

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

	Moseley (1992)	Ekstrom (2003)
Upper trapezius	Rowing	Unilateral shoulder shrug
Middle trapezius	Horizontal abduction (neutral)	Shoulder horizontal extension with external rotation and overhead arm raise in line with lower trapezius (prone position)
Lower trapezius	Abduction or rowing	Overhead arm raise in line with lower trapezius (prone position)
Rhomboids	Horizontal abduction (neutral)	Not tested
Serratus anterior	Push up with a plus	Shoulder abduction plane of scapula above 120°

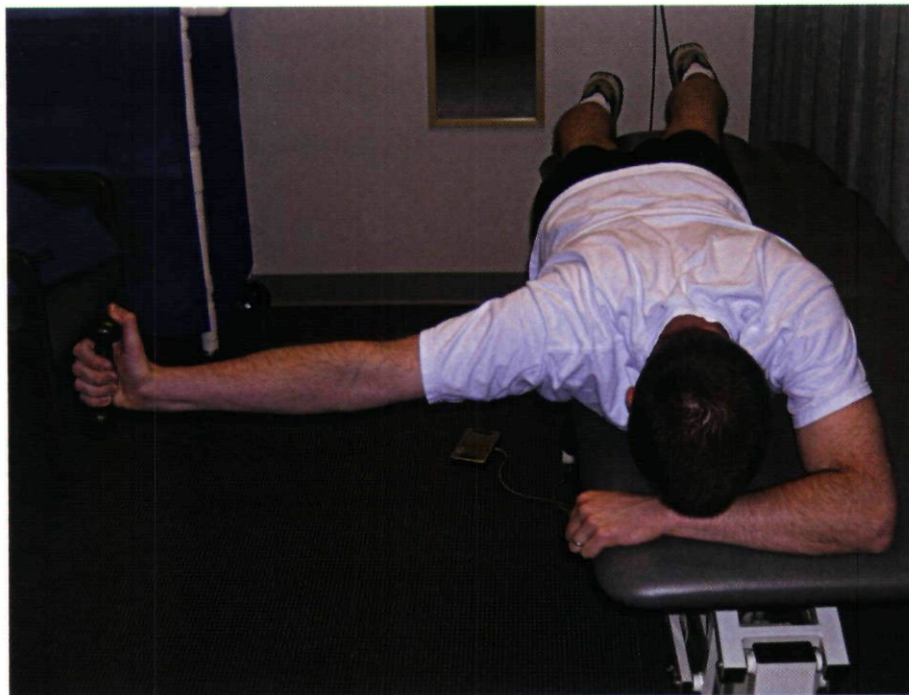


**Figure 1.** Prone row exercise.



**Figure 2.** Overhead arm raise in line with lower trapezius exercise.





**Figure 3.** Shoulder horizontal extension with external rotation.



**Figure 4.** Stepping alternating punch exercise.

tional 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 ex-

ercise. 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).



**Figure 5.** Proprioceptive neuromuscular facilitation diagonal 2 pattern exercise with pulley.

### 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

1. BYLAK, J., AND M.R. HUTCHINSON. Common sports injuries in young tennis players. *Sports Med.* 26(2):119–132. 1998.
2. EKSTROM, R.A., R.A. DONATELLI, AND G.L. SODERBERG. Surface electromyographic analysis of exercises for the trapezius and serratus anterior muscles. *J. Orthop. Sports Phys. Ther.* 33(5): 247–258. 2003.
3. KIBLER, W.B. The role of the scapula in athletic shoulder function. *Am. J. Sports Med.* 26(2):325–337. 1998.
4. KUHN, J.E., K.D. PLANCHER, AND R.J. HAWKINS. Scapular winging. *J. Am. Acad. Orthop. Surg.* 3:319–325. 1995.
5. MCCARROLL, J.R. The frequency of golf injuries. *Clin. Sports Med.* 15(1): 1–7. 1996.
6. MEISTER, K. Injuries to the shoulder in the throwing athlete. Part one: Biomechanics/pathophysiology/classification. *Am. J. Sports Med.* 28(2):265–275. 2000.
7. MOSELEY, J.B., Jr., F.W. JOBE, M. PINK, AND J. TIBONE. EMG analysis of the scapular muscles during a shoulder rehabilitation program. *Am J. Sports Med.* 20(2):128–134, 1992.
8. WARNER, J.J., L.J. MICHELI, L.E. ARSLANIAN, J. KENNEDY, AND R. KENNEDY. Scapulothoracic motion in normal shoulders and shoulders with glenohumeral instability and impingement syndrome: A study using moire topographic analysis. *Clin. Orthop. Relat. Res.* 285:191–199. 1992.

**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.

Reach prospective students with the...



**T**he NSCA is continually contacted by individuals looking for a school with a strength and conditioning curriculum! Having your educational program recognized by the NSCA is a valuable marketing tool for your school. If you work in an educational institution offering a program in strength and conditioning, please contact the NSCA to receive your application. If you think your alma mater should be listed, please contact them and let them know about the ERP program.

To become recognized, a school must be regionally accredited. The program must be a formalized area of study, which offers at least a bachelor's degree. The program needs to teach the required content areas, and the school must have at least one full time faculty member who is a Certified Strength and Conditioning Specialist® (CSCS®).

Applications can be found online at [www.nsca-lift.org/ERP/](http://www.nsca-lift.org/ERP/), by contacting the NSCA National Headquarters at 800-815-6826, or by sending email to [kcinea@nsca-lift.org](mailto:kcinea@nsca-lift.org). For more information on the electronic format, contact Keith Cinea at the NSCA National Headquarters by the toll-free phone number or email address below.

*"The ERP has allowed us to demonstrate our commitment to providing and continuing to develop formalized educational opportunities to prospective strength and conditioning professionals. As the field continues to evolve, we are convinced that our status as one of NSCA recognized schools will uniquely position us to stay ahead of the curve and alter our program as necessary. It is a powerful recruiting tool to be able to say that your institution is recognized by the NSCA."*

Toby J. Brooks, PhD, ATC/L, CSCS  
University of Texas at El Paso

**800-815-6826 • [kcinea@nsca-lift.org](mailto:kcinea@nsca-lift.org)**



**NSCA™ National Strength and Conditioning Association**

800-815-6826 • [www.nsca-lift.org](http://www.nsca-lift.org)

Copyright of Strength & Conditioning Journal is the property of Alliance Communications Group and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.