

9-2006

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## Recommended Citation

Brumitt J. Scapular-stabilization exercises: early-intervention prescription. *Athletic Therapy Today*. 2006; 11(5): 15-18.

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**Description**

This article highlights exercise prescription to enhance scapular stabilization during the initial phase of rehabilitation, with additional tips for subsequent progression to exercises incorporating the kinetic chain.

**Disciplines**

Physical Therapy

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# Scapular-Stabilization Exercises: Early-Intervention Prescription

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Athletes who compete in sports with repetitive overhead motions are at risk of sustaining shoulder injuries. The scapula plays several vital roles in normal athletic shoulder function.<sup>1</sup> It serves as a link from the power-generating lower extremities, transferring forces through to the upper extremity.<sup>1</sup> Dysfunction in the kinetic chain caused by

poor scapula stabilization can contribute to shoulder injuries.<sup>1-3</sup>

Scapular dysfunction might occur in response to inappropriate or deficient training habits, traumatic injury, microtrauma-induced muscle strains that affect normal scapulohumeral rhythm, or inhibition caused by shoulder pathology.<sup>1</sup> Evaluating the scapula for dysfunction will enable the athletic trainer or therapist to prescribe a functional rehabilitation program.

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## KEY POINTS

- ▶ The scapula plays vital roles in athletic shoulder function.
- ▶ Sports-medicine researchers have identified the most effective rehabilitation strategies to enhance scapula stabilization.
- ▶ Scapula exercises should be included in a comprehensive shoulder-rehabilitation program.
- ▶ Key Words: shoulder, rehabilitation, closed chain

## Therapeutic Exercise Prescription

Rehabilitation success depends on implementation of a safe and progressive therapeutic exercise program. The patient's medical diagnosis, along with the findings from the physical examination, will dictate the starting point for exercise prescription. The patient's baseline status will serve as a means to track improvement with selected interventions.

This article highlights exercise prescription to enhance scapular stabilization during the initial phase of rehabilitation, with additional tips for subsequent progression to exercises incorporating the kinetic chain.

Exercise prescription during the initial phase of a shoulder-rehabilitation program should include flexibility and scapular-stabilization exercises. Flexibility exercises are routinely performed to restore range of motion and allow for the advancement of exercises during the later phases of rehabilitation. Common areas in which athletes present with inflexibility include the thoracic spine (lack of thoracic extension), the pectorals (contributing to forward shoulder posture), and the posterior shoulder<sup>1</sup> (limited shoulder internal rotation).

To improve thoracic extension, have the athlete lie supine on a small rolled towel placed across the midback. If multiple segments of the thoracic spine present with limited range of motion, repeat the stretch at those areas. The athlete should hold each stretch for 30 s. The classic doorway stretch will improve flexibility in the pectorals. Care must be taken if the athlete has a diagnosis of anterior shoulder instability. To improve shoulder internal rotation, have the athlete lie on the involved side with the shoulder positioned in approximately 90° of abduction. The opposite arm creates the stretch by internally rotating the involved shoulder and extremity toward the surface.

Scapular-stabilization prescription should begin with isometric or closed-chain exercises.<sup>1,4</sup> Prescribing closed-chain

exercises for the scapula is recommended early in rehabilitation as the best exercise mode to improve scapular motor patterns.<sup>1,4,5</sup> Exercise selection ultimately depends on the athlete's diagnosis and functional level. Range-of-motion restrictions or immobilization after surgery or traumatic injury might initially contraindicate some exercises. Isometric exercises such as scapular retraction allow for early neuromuscular reeducation of dysfunctional rhomboids and the middle trapezius. Manually assisted or resisted proprioceptive neuromuscular-facilitation patterns with the athlete side-lying on the uninjured extremity will allow for initial neuromuscular activation of the scapular muscles while avoiding glenohumeral movement.<sup>6</sup> Closed-chain scapular exercises may be initiated early in rehabilitation, allowing for the protection of healing tendons. The scapular clock, the low row exercise, and the push-up with a plus are examples of closed-chain exercises for the scapula.<sup>4</sup> The scapular-clock exercise facilitates the scapular motions of elevation (Figure 1), depression, protraction, and retraction<sup>1,7</sup> (Figure 2). The low row exercise activates the lower trapezius. The arm, placed on the Fitter, creates scapular retraction and arm extension through combined hip and trunk extension<sup>7</sup> (Figure 3). Based on clinical experience, the push-up with a plus might be too stressful on the healing shoulder if performed early in rehabilitation.<sup>8</sup> Instead, the athlete might tolerate performing the push-up with a plus against a wall or against a physioball on the wall to promote scapular protraction.

As the athlete's scapular neuromuscular control improves, open-chain exercises may be initiated. Adding open-chain exercises can increase the endurance capacity of selected muscles, and they can be performed incorporating the entire kinetic chain. The shoulder-dump exercise should be prescribed to facilitate scapular retraction as part of kinetic-chain sequencing.<sup>5</sup> This exercise can be performed with the athlete's arm at various abduction angles depending on rehabilitation phase and sport demands. The exercise is performed with the athlete standing with the contralateral foot forward, the trunk flexed and rotated toward the uninjured side, and the contralateral hip flexed<sup>5</sup> (Figure 4[a]). Scapular retraction occurs in sequence as the athlete uncoils, shifting weight toward the ipsilateral foot and extending and rotating the spine toward the involved side<sup>5</sup> (Figure 4[b]). Performing many of the common open-chain scapular exercises provides the additional benefit of activating the rotator-cuff muscles.<sup>9,10</sup>



**Figure 1** Scapular clock emphasizing scapular elevation.



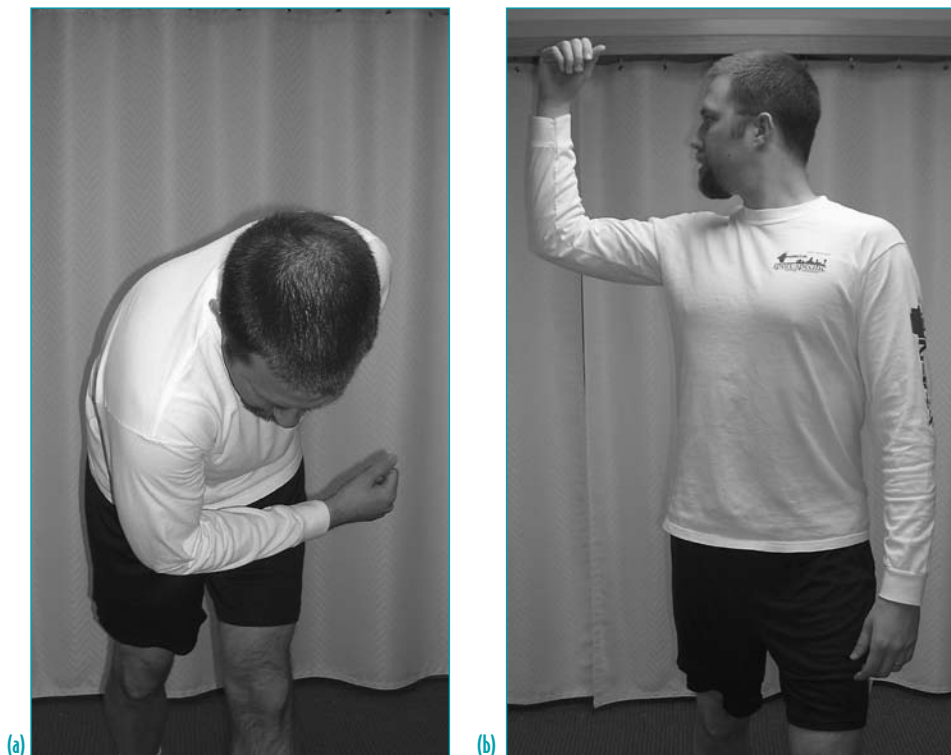
**Figure 2** Scapular clock emphasizing scapular retraction.



**Figure 3** Low row exercise (start position).

Additional open-chain exercises that have been found to activate scapular and rotator-cuff muscles<sup>9-12</sup> include the prone row, prone shoulder extension, horizontal abduction in neutral or in external rotation, and the dynamic hug. To perform the dynamic hug, the athlete is positioned with arms abducted to 60°, shoulders internally rotated 45°, and elbows flexed to 45° (Figure

5[a]). The exercise is performed by horizontally flexing the humerus (as if performing a hugging motion) against the resistance of an elastic band or pulleys<sup>11</sup> (Figure 5[b]). As the athlete demonstrates good neuromuscular control of the scapula and arm, prescribe the prone overhead arm raise in line with the lower fibers of the trapezius (Figure 6) to increase lower trapezius strength.<sup>12</sup>



**Figure 4** Shoulder-dump exercise (a) start position and (b) end position.



**Figure 5** Dynamic hug (a) start position and (b) bilateral humeral horizontal flexion.



**Figure 6** Prone overhead arm raise in line with the trapezius.

## Principles of Exercise Progression

Proper technique instruction is critical with these exercises, especially if the athlete is unfamiliar with them. Constant supervision is required to ensure that the athlete is not performing the exercises with compensation patterns.

The initial phase of rehabilitation should focus on building the endurance capacity of the scapular muscles while avoiding overstressing the healing tissue.<sup>6</sup> Endurance capacity is improved as the athlete performs low-intensity exercises of 20 or more repetitions per set.<sup>15</sup> My preferred method of exercise progression starts with the athlete performing one to three sets of 25–30 repetitions. When open-chain exercises are included in the rehabilitation program, a gradual increase in resistance is achieved by increasing weights in 0.5-kg (1-lb) increments as the athlete successfully completes 25–30 repetitions.

## Sport-Specific Training

As the athlete's condition improves, he or she should be progressed from the aforementioned exercises to those that reproduce or mimic functional movement patterns. The advanced strengthening phases of rehabilitation might include training the athlete for strength and power.<sup>6</sup> As previously mentioned, the scapula is one link in the kinetic chain, playing the role

of transferring forces through to the upper extremity. For example, a baseball pitcher generates power from his legs and transfers that force through the trunk to the upper extremity to maximize the velocity of each pitch. Integrating scapular stabilization with sport-specific exercises that promote multijoint movements, including plyometric training, will prepare the athlete to return to sport.

## Conclusion

The scapula plays a vital role in athletes' shoulder function. A thorough rehabilitation program for shoulder injuries should include the prescription of flexibility or range-of-motion exercises, scapular-stabilization exercises, rotator-cuff exercises, and sport-specific training including plyometrics. ■

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