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# The Importance of the Posterior Capsule of the Shoulder in Overhead Athletes

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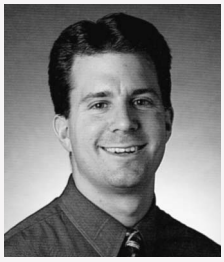

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Column Editor

**summary**

Overhead athletes often have differences in their dominant and nondominant arms in regards to internal and external rotation. Restoration of internal rotation with stretching of the posterior shoulder may help avoid shoulder pathologies.

Because of the repetitive nature of overhead and throwing sports, a range of pathologies can cause shoulder pain in the athlete. Overuse, repetitive microtrauma, and global hypermobility can lead to impingement syndrome, rotator cuff strains and tendonitis, subacromial bursitis, and multi-directional instability (MDI). The overhead athlete's shoulder is unique because, while the shoulder is an inherently unstable joint, it must be stable enough to allow proper mechanics to occur in the execution of the overhead movement. This has been termed the "thrower's paradox."

One area that has received particular attention is the flexibility of the posterior shoulder joint capsule and musculature. There are volumes of literature indicating that flexibility training should be part of a comprehensive strength and conditioning or rehabilitation program. This is of particular importance in the shoulder, based on its numerous contractile and noncontractile components. The purpose of this article is to discuss the importance of recognizing a difference in shoulder range of motion (ROM), especially internal rotation (IR), and then to provide an effective stretch for the posterior shoulder.

Posterior capsule tightness develops from repetitive throwing. Kibler (6) proposed the idea that posterior shoulder inflexibility affects smooth motion of the shoulder, causing the scapula to get pulled forward and inferior prematurely. Tyler et al. (9) reported that posterior tightness causes anterior and superior migration of the humeral head. They also reported that for every 4° of IR loss, a 1-centimeter loss of posterior capsule extensibility is present.

Due to the extremes of external rotation (ER) required, the anterior shoulder is often excessively lax. Concurrently, the posterior capsule and musculature (i.e., infraspinatus, teres minor) develops tightness due to repeated overload in the eccentric portion of arm deceleration. It has also been proposed that an osseous physiologic adaptation occurs, whereby the humeral head rests more posteriorly on the glenoid, termed humeral head retroversion. The retroverted position allows more external rotation to occur before the humeral head reaches the limits of the anterior joint capsule (1). Because of the excess ER, a concomitant decrease in IR results, possibly due to tightness of the posterior shoulder.

Reagan and colleagues found in 54 asymptomatic pitchers that a mean difference in ER/IR in the dominant versus nondominant arm was 9.7°, and humeral head retroversion was 10° more (8). Herrington studied the ER/IR in 10 javelin throwers

and found that both arms had increased ER relative to IR, especially in the dominant arm (4). Miniaci et al. found that 28 pitchers had, on average, IR of 75° in the throwing arm compared to 90° in the nondominant arm at 90° of abduction (7). Finally, Ellenbecker and colleagues studied elite tennis and baseball players in 2 different studies. In 1 study, they measured ROM in 163 tennis athletes and baseball pitchers. They found that there was a statistically significant loss in total rotational motion (TRM) in the tennis players but not in the baseball pitchers (2). Total rotational motion is the sum total of internal and external rotation in the shoulder. It is important to note that both groups had decreased IR in the dominant arm. In an earlier study, Ellenbecker et al. measured 203 elite male and female tennis athletes and found no significant differences in ER in dominant versus nondominant arm, but there was less IR in the dominant arm for both men and women (3).

All of these studies show that a loss of IR in the overhead athlete's shoulder is often present. While the athlete may be asymptomatic, potential problems can be avoided if the posterior capsule is properly stretched. The debate lies in determining whether it is in fact posterior capsule and rotator cuff tightness or just a shift in motion. In other words, it is not known if it is problematic to have asymmetries in TRM in each arm provided the TRM is the same. Regardless, athletes need to stretch this part of the shoulder.

Some stretches for the posterior shoulder have been proposed. Johansen and colleagues described a prone position stretch with the elbow flexed to 90°, the shoulder in 90° of abduction, and the shoulder internally rotated (5). The clinician then manually holds the inferior angle of the scapula along the thoracic wall in a retracted position (Figure 1). In effect, by holding the scapula in a retracted position, the musculature could be stretched at both ends. While this is an excellent stretch, it requires assistance. Another common stretch is a horizontal adduction stretch of the shoulder (Figure 2). The concern with this stretch is that the scapula is abducted. In order to truly stretch the posterior shoulder, the scapula must be retracted, as described in the first stretch. Kibler (6) originally proposed the stretch described here. Clinically, the author of this article has found it to be

**Figure 1.** Prone posterior capsule stretch.

**Figure 2.** Horizontal adduction stretch.

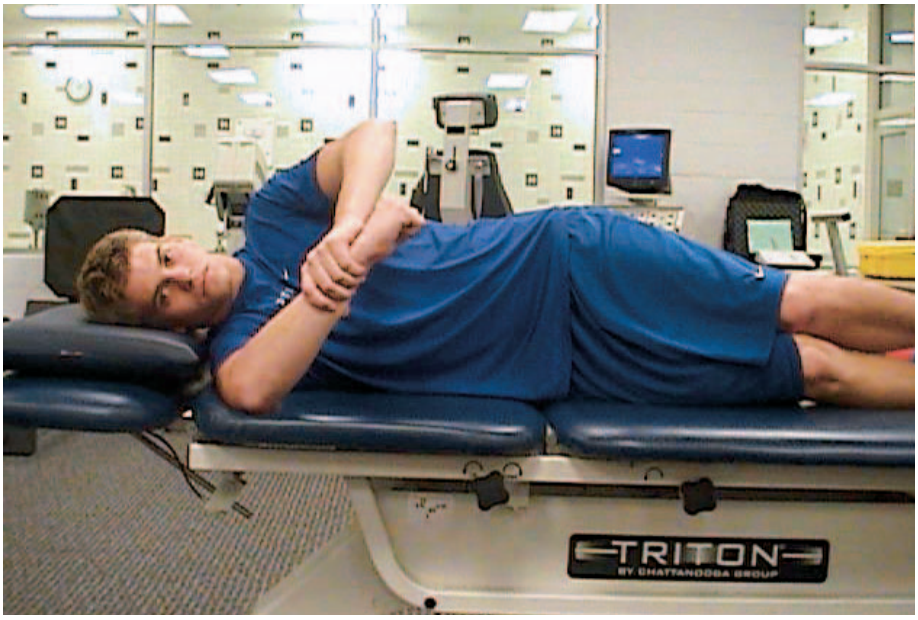


**Figure 3.** Side-lying posterior shoulder stretch.

very effective for a host of shoulder pathologies, and it can be done independently. The athlete lies on the side of the shoulder to be stretched. The shoulder is flexed to 90° and the elbow flexed to 90°. The opposite arm then passively pushes the shoulder into IR until a stretch is felt in the back of the shoulder (Figure 3). The side-lying position is ideal because the table helps keep the scapula retracted. To progress this stretch, a towel can be placed under the humerus to add a horizontal adduction component to further stretch the region, or the athlete can roll further on to his or her side. If the athlete is suffering from impingement and this position is painful, the clinician can either do the prone stretch described earlier or the athlete can perform the side-lying stretch with the arm flexed to 45°.

Implementation of a posterior capsule stretch should be an integral part of flexibility programs for the overhead athlete and should be integrated for both strength training and rehabilitation programs. With consistent use of this stretch, TRM will become more symmetrical and mechanics of the shoulder are likely to improve, thereby making the overhead maneuver a more efficient movement and ultimately less painful with repetitive motions. ♦

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