

Tidbits About Shoulder Injuries in Golfers

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It's golf time again and if there ever were an overuse injury possibility, it's in golf. Injuries to golfers occur more often in the lumbar spine, elbow, wrist and hand than in the shoulders. The shoulder is the third most common location in the professional and the fourth in the amateur.¹ Tiger Woods' ACL injury is a rare occurrence in the golf world, and it is doubtful playing golf was the cause.

Swinging up to 2,000 times per week is common for the professional² and many amateurs are also overdoing it. The golf shoulder is at less risk than in sports such as tennis or baseball, as the golf swing is not considered an overhead sport that requires elevation of greater than 90 degrees. However, many golfers swing with an elevation of the shoulder up to 120-130 degrees above shoulder height. Over time, shoulder microtrauma is common. "The golf swing is a complex movement not requiring maximum muscle activity, but a delicate synchronous muscle balance. Injury to any of the muscles could easily throw off this balance, promoting complete disruption of the normal swing."³

Pink, et al., performed a landmark study analyzing the activities of the shoulder muscles during the golf swing using fine-wire electromyography (EMG).⁴ The shoulder muscles have very specific roles during the swing. While a functional shoulder examination should reveal the involved muscle or location of instability, being able to relate when the muscle is most active during the golf swing and the location of pain during the swing helps in the diagnosis. For the purpose of this article, let's consider a right-handed golfer with the left shoulder as the designated lead shoulder. More than 90 percent of golf shoulder problems occur in the lead shoulder⁵ and most symptoms occur at the end ranges, i.e., the top of the backswing or the end of the follow-through. Partial tears of the cuff and associated impingement have been found to cause pain at the extreme end ranges of the swing.

If the cuff muscles are weak, poor swing mechanics may occur. The infraspinatus and supraspinatus are most active at both end ranges of the swing. They work at a low level during the swing but peak as the takeaway ends at the backswing and at the end of the swing (follow-through). In particular, the rotator cuff muscles are strained during the eccentrically loaded stage when they work during the deceleration of the body and swing in the acceleration and follow-through stages of the swing. As expected, greater muscle forces are created during the eccentric phase than the concentric phase. It is also very important to evaluate the strength of the cuff muscles since they function as glenohumeral stabilizers. Centering the humeral head in the glenoid is very important for maintaining shoulder stability. The subscapularis provides anterior stability while the infraspinatus provides posterior stability. Both of these muscles counter the superior pull on the humerus from the deltoid and supraspinatus muscles.

The subscapularis in both shoulders are the most active of the cuff muscles in golf and are especially active with the pectoralis major and latissimus dorsi - the most active of all the shoulder muscles in the downswing and acceleration phases. (The pectoralis major is more active later in the downswing.) These three muscles are particularly important for exerting the downward force

necessary to hit the golf ball a greater distance. Neither the right nor the left shoulder provides more "drive." For greater distance, exercises should concentrate on bilaterally strengthening the rotator cuff, latissimus dorsi and pectoralis major.

According to Hovis, et al., most golf injuries occur in the lead arm at the top of the backswing and less at the end of the follow-through stage.⁶ At the end range of the backswing, the left shoulder is internally rotated and forward flexed with cross-body adduction. This repetitive position could overload the acromioclavicular joint (ACJ) and create subacromial impingement by forcing the greater tuberosity under the anterior acromion. Acromioclavicular joint disease is a major cause of pain in golfers.

Cross-body adduction is a common functional test used to reveal an ACJ problem. The modern golf swing emphasizes turning the upper body relative to the lower body to generate power. This effort may create repetitive microtrauma and overstretching to the capsular and labral structures.¹ Hovis, et al., make note of this backswing resulting in posterior shoulder instability.⁶ They hypothesize that in the lead arm during the backswing, the serratus anterior muscle (which protracts the scapular) is very active and may fatigue, causing the scapula to become less stable. The unopposed internal shoulder rotation caused by the subscapularis may contribute to posterior shoulder instability.

The subscapularis muscle is more active at the top of the backswing in the lead arm than the supraspinatus, infraspinatus and deltoid muscles. These patients may complain of an audible "clunk" at the top of the backswing or at the beginning of the forward swing.

A posterior apprehension test may be performed by flexing the shoulder to 90 degrees and adducting it across the body. A posterior force is then exerted on the elbow to test the posterior capsule. A load-and-shift test may be positive - the examiner is seated behind the patient, grasps the humeral head, loads it into the glenoid and applies a force anteriorly, posteriorly and inferiorly to determine the degree of translation. Nonoperative treatment for posterior shoulder instability includes strengthening the cuff muscles and scapular stabilizers (rhomboid, trapezius and serratus anterior muscles).

Anterior shoulder instability also could occur in the lead arm at the end of the follow-through phase, when the arm is in maximal abduction and external rotation. Patients should demonstrate a full swing to determine the pain location and phase of the swing. Patients with posterior instability should strengthen the scapular stabilizers, especially the serratus anterior and rotator cuff. Golfers with anterior instability should strengthen the anterior deltoid and rotator cuff and stretch the posterior capsule.¹ A lesion of the superior labrum/biceps may be alleviated by a shorter backswing.

References

1. Kim DH, Millett PJ, Warner JJP, Jobe FEW. Shoulder injuries in golf. *Am J Sports Med*, 2004;32(5):1324-30.
2. Jobe FEW, Pink MM. Shoulder pain in golf. *Clin Sports Med*, 1996;15:55-63.
3. Kao JT, Pink M, Jobe FEW, Perry J. Electromyographic analysis of the scapular muscles during a golf swing. *Am J Sports Med*, 1995;23(1):19-23.
4. Pink M, Jobe FEW, Perry J. Electromyographic analysis of the shoulder during the golf swing. *Am J Sports Med*, 1990;18(2):137-40.
5. Mallon WJ. Golf. In: *Shoulder Injuries in the Athlete: Surgical Repair and Rehabilitation*. Hawkins RJ, Misamore GW, eds. New York: Churchill Livingstone, 1996.

6. Hovis WD, Dean MT, Mallon WJ, Hawkins RJ. Posterior instability of the shoulder with secondary impingement in elite golfers. *Am J Sports Med*, 2002;30:886-90.

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