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Lisa was introduced to the science of Postural Restoration as a patient under the care of Ron Hruska. She had suffered from long-standing injuries sustained during her collegiate volleyball career and found success with the treatment techniques she learned at the Hruska Clinic and later received from the Postural Restoration Institute. Lisa returned to practice physical therapy at the Hruska Clinic Restorative Physical Therapy Services in Lincoln, Nebraska after completing her Doctorate of Physical Therapy from the University of Nebraska Medical Center in Omaha. Lisa is a member of the American Physical Therapy Association.

In our last article we introduced you to the Bermuda Triangle of the pecs, lats and biceps that form a triangle of "mirror muscles" which when improperly developed and integrated into overhead shoulder movement can lead to chronic shoulder and elbow pain. Net Link: Click HERE to read the this article. In this issue we expand on the triangle and take a detailed look inside the triangle. This article presents shoulder movement exercises that need to be incorporated into a healthy shoulder elbow program so that doing exercises such as the bench press, lat pull and push ups, etc. do not add to the problem. These exercises are not bad in themselves but create shoulder dysfunction that, if not corrected, will lead to eventual breakdown and injury. - Ken Kontor, Publisher

Re popular upper body exercise techniques over training some muscles while inadvertently avoiding key stabilizing muscles? Many sports conditioning professionals emphasize strengthening of the pectorals, latissimus, and biceps brachii, as part of their training programs for overhead sports. But what about the role these muscles play, positive or negative, in the resting position and alignment of shoulder complex. Many of the athletes I work with initially present with severe discord at the shoulder complex, and upon subjective review of their training programs, they are overusing activities such as push-ups, bench press, dips, latissimus pull downs, burpees etc. Rather, training activities that isolate the triceps, posterior deltoid, subscapularis, lower trap, and serratus are minimal or totally lacking. The purpose of this discussion is to introduce corrective exercise that will help restore a functional shoulder/elbow complex. Specifically we will break down the anatomy and function of the subscapularis, the posterior deltoid, and their synergistic function during throwing activity.

Subscapularis is one of four rotator cuff muscles; supraspinatus, infraspinatus, and teres minor are the other three. (Figure 1)
Subscapularis is the only cuff muscle that contributes to the front of the shoulder joint. Supraspinatus forms the roof. Infraspinatus and teres minor form the back wall. Forces produced by the rotator cuff stabilize and centralize the humeral head against the glenoid fossa; supraspinatus compresses the head to the glenoid, while subscapularis, infraspinatus and teres minor produce an inferior depression force on the humeral head during abduction. In other words the front and back walls of the rotator cuff prevent impingement with overhead activity. But what happens if the front of the rotator cuff, subscapularis, can’t work properly?

The other function of subscapularis is to internally rotate the shoulder. There are several shoulder internal rotators; pec major, latissimus dorsi, teres major, and anterior deltoid. But the only one that maintains healthy flexibility of the posterior/inferior gleno-humeral capsule is subscapularis. When subscapularis contracts, the humeral head glides inferior and posterior as the shaft of humerus spins anteriorly. Ironically, if subscapularis loses its rotation function its only a matter of time before it loses its rotator cuff function.

Anterior chest wall tightness is a significant factor that predisposes subscapularis dysfunction. Pec major inserts onto the anterior aspect of the humerus so it can cause translation of the humeral head forward. If the translation is significant enough, the length tension relationship of subscapularis is changed. If subscapularis position is altered the muscle can lose correct mechanical advantage. The infraspinatus and teres minor continue to work as the back wall of the rotator cuff, but they have a tendency to become very short and tight because they are never opposed by subscapularis, the front wall of the cuff. The external rotators restriction pushes the humeral head further forward and the posterior gleno-humeral capsule will shorten and tighten. Frequently in this scenario that athlete will have a rounded/protracted shoulder appearance.

How do you turn on and retrain subscapularis without turning on the other internal rotators that have a tendency to take over and hog the responsibility; pec major and latissimus? I suggest a back lying gravity-eliminated position. You can trick the lat and pec major if you position the shoulder so these muscles and their tendons are on slack. Both the lat and pec major are powerful shoulder adductors and extensors so position the shoulder in about 45-60 degrees of abduction and 30-40 degrees of flexion. Gravity will assist. You will cue your athlete to suction the neck of the humerus down without moving the shoulder blade. They will be very inclined to overdo this motion and pull the shoulder blade down and back. The actual motion is very small, roughly
1/8th inch, and it will not produce a muscular sensation. Many athletes find it helpful when learning this subtle motion, if they place the index finger on the front of the arm about 1-2 inches below the seam of their t-shirt. This is roughly where the tendon of subscapularis inserts and it gives them a reference point from which to pull from. Some athletes master the “ball pull down” quickly, while others need a few days to practice. Some athletes however are very restricted in the posterior shoulder capsule and will need manual assistance to provide enough PROM to enable corrective exercise. I do not recommend the “sleeper stretch” for this scenario.

Once they have mastered this technique you can move right into combining shoulder external and internal rotation. In other words the athlete must learn how to hold the ball in the socket while they spin the arm. I usually begin with external rotation before internal rotation. Now the athlete learns how to co-activate the subscapularis with the posterior deltoid. Posterior deltoid is a powerful external rotator and horizontal extender of the shoulder, thus a cock phase muscle when discussing throwing mechanics. When the shoulder externally rotates the humeral ball glides forward in the socket. Subscapularis makes sure the ball doesn’t glide too far forward.

Stay in the same gravity-eliminated position. Initially this will be very difficult and you will have to keep your athlete in a small range, 0-30 degrees, without resistance (Figure 4). The shoulder should not appear to pop up as the arm spins backwards. As the athlete gains more control and proprioceptive awareness of true shoulder rotation, increase their training range to 60 degrees. Later you can introduce tubing which is very beneficial because of the resisted eccentric component. But be careful, start with very light tubing. If you overload your athlete they will probably recruit pec major. Pec major is not a true external rotator, but it is a shoulder extensor. Athletes can accomplish fake ER with shoulder extension. Watch your athletes carefully; the motion will not look right and you should see pec major contracting.

You can begin to introduce internal rotation with the ball drop technique after your athlete has awareness and facilitation of the posterior deltoid. You will cue your athlete to keep the ball dropped as they spin the arm/hand toward their body (Figure 5). This can also be done with the pecs so watch the athlete closely and do not add resistance too early. Pec compensation will cause the shoulder to pop up/forward. As the athlete regains strength in the subscapularis and flexibility in the glenohumeral capsule they should achieve 60-70 degrees of pure internal rotation. This can sometimes take several weeks depending on how frequently the athlete performs activity and how tight and dysfunctional they initially presented. I have had some athletes start with as little as 15 degrees of internal rotation.

In summary an athlete must restore/preserve true internal and external rotation of the shoulder- meaning the resting position of the ball and socket is congruent and the athlete has good flexibility of he gleno-humeral capsule. Now the athlete can be progressed to more sport specific shoulder activities, but it would always be beneficial to use the discussed corrective exercises as a warm-up cool down technique. As a follow-up to this article there will be a discussion with similar format about correct serratus and triceps function.

**References**

**Figure 1 and 2:** *Kinesiology of the Musculoskeletal System - Foundations for Physical Rehabilitation,* Donald A. Neumann

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