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Scapular Dyskineses and The SICK Scapula

Introduction The importance of the scapula in maintaining adequate shoulder and upper extremity function has been recognized for many years. Recently, increased attention has been given to inadequate or dysfunctional scapular control as a primary cause of shoulder pain and arm weakness not only in the throwing or overhead athlete (dead arm syndrome), but in the general population of individuals using their arm frequently overhead. To understand the balance that exists between the rotator cuff and the scapula, it is necessary to begin with some idea of the anatomy and kinesiology (movement patterns) of the shoulder complex.

Anatomy The shoulder is comprised primarily of three joints and two interfaces **(Figure 1).**

The sternoclavicular joint attaches the entire complex to the skeleton. The scapular attachments exist only through a complex system of eighteen muscles that control scapular position and motion. **Table 1** details these muscles.

Kinesiology Dysfunction in the movement of the scapula on the thorax has been termed "scapular dyskinesis". Kibler defines this as "asymmetrical scapular motion as compared with the contralateral scapula seen with symmetrical arm motion." In throwing athletes, scapular dyskinesis usually involves the loss of lower scapular retraction (External rotation ER on the trunk) in combination with scapular anterior tilting and a loss of scapular elevation. This abnormal motion is caused primarily by muscle fatigue weakness in one or a combination of the muscles surrounding the scapula. **Table 2** details the more prominent muscles that are weak and their resultant positional dysfunctions. It is important to note, that the muscles, ligaments and capsular attachments of the humerus to the scapula at the glenohumeral joint, and the clavicle to the scapula at the acromioclavicular joint are affected by this scapular dysfunction and are involved in many of the pathologies we commonly consider to be "rotator cuff problems."

Figure 1 Shoulder Articulations

Joints	Interfaces
Sternoclavicular joint	Subacromial interface
Acromioclavicular	Scapulothoracic interface
Glenohumeral joint	

Table 1 Muscles of the Shoulder Girdle

- Supraspinatus
- Infraspinatus
- Subscapularis
- Teres Minor
- Deltoid
- Biceps
- Triceps
- Pectoralis Major/Minor
- Coracobrachialis
- Levator Scapula
- Rhomboid Major/Minor
- Omohyoid
- Trapezius
- Serratus Anterior
- Latisimus Dorsi
- Sternocleidomastoid

The SICK Scapula and Shoulder Pathology To fully understand how these "pseudo cuff pathologies" develop, it is important to look at how the muscle imbalances around the shoulder affect both the static position of the scapula as well as its dynamic function. Kibler, et. al. identified a descriptor for static scapular malalignment, which they believed was an indicator for potentially pathologic alterations in scapular dynamics. They coined the acronym **S.I.C.K.** scapula after the positional faults they observed; **S** = scapula infera, **I** = infer medial border, **C** = coracoids pain and malposition and **K** = scapular dyskinesis **(Figure 2).**

In the resting position, the scapula is examined purely for location. The **SICK** scapula has a clinical appearance of being lower on the symptomatic side, with prominence of the inferior-medial border from behind and an inferior tilted position of the clavicle from the front (**Figure 2**). The scapula may also be displaced laterally on the trunk, ER, and Abducted (ABD). When this malaligned shoulder blade is moved, three discernable pathologic movements can be observed. Burkhart classifies these into three types. Type I is where only the inferior border is prominent. Type I dysfunctions are associated with primarily labral pathology. Type II dysfunctions demonstrate complete medial border prominence and are also primarily associated with labral pathology. Type III dysfunctions involve primarily superior medial border prominence and are associated primarily with impingement and rotator cuff pathology.

Static and dynamic scapular malpositioning can produce one or any combination of the following clinical problems that comprise the "SICK Scapular Syndrome":

- Coracoid pain
- Superomedial, medial scapular angle pain
- AC joint pain
- Subacromial pain
- Sternoclavicular pain
- TOS symptoms and
- Subclavian vein thrombosis.

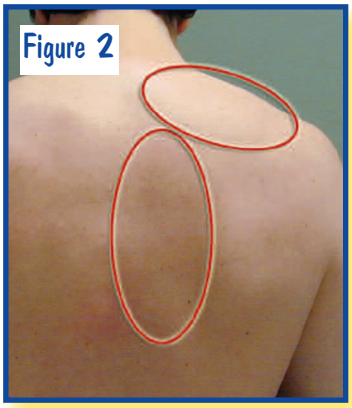


Figure 2

Coracoid pain is the result of a traction tendinopathy of the pectoralis minor as the coracoid moves laterally in response to scapular ante-tilting and protraction. Superior medial scapular border pain is also a traction tendinopathy of the levator scapula as the scapula depresses and rotates. AC joint pain is caused by clavicular compression against the acromion as the scapula protracts, abducts and anteriorly tilts. Subacromial pain is due simply to space restrictions. Subclavian vein compression have similar causes, and the neural symptoms are a consequence of lower trunk compression against the first rib as the scapula "drags" the clavicle inferiorly thus decreasing the subclavicular space.

Table 2

Weak Muscle Group	Result
Lower Trapezius Lower Rhomboid	Loss of retraction control with scapula protractions and abduction
Lower Serratus Anterior	Scapular ante-tilt
Upper Trapezius Upper Rhomboid Levator Scapulae	Scapula infera and Scapular ante-tilt

Evaluation In addition to evaluating the scapula in the static position and identifying the movement dyskinesis at the scapular border, we can also evaluate the dysfunctional position of the scapula's impact on the remaining joints of the upper extremity kinetic chain. Starting with the SC joint and moving through the AC and GH joints, we can assess secondary pathologies as they develop from the primary scapular pathology and we can also determine if primary problems at those joints may be contributing to scapular dysfunction. Two of the most useful tests clinically are the Scapular Repositioning Test (SRT) and the Scapular Assist Test (SAT) (**Figure 3**). If these tests significantly alter the pain or strength at the shoulder the most likely pathology is scapular. This allows the clinician to direct the intervention towards weak scapular stabilizers over weak and/or dysfunctional rotator cuff muscles (RTC). Protocols which provide only a cursory pass at the scapular stabilizers, and focus on the RTC will ultimately fail and may in fact cause more harm to the cuff muscles by forcing them to work in an inefficient position about the poorly positioned glenoid. This is especially true as scapular pathology progresses and secondary problems at the GH joint begin to appear. Additionally, a thorough evaluation of shoulder flexibility especially at the posterior GH joint is important when a SICK scapula has been identified. In the presence of a repetitively overused deconditioned shoulder, fibroblastic responses in the posterior capsule occurs when the throwing shoulder decelerates results in reduction of shoulder internal rotation (GIRD- Glenohumeral Internal Rotation Deficit) which ultimately leads to labral pathology. This squeal will follow a "pathologic cascade" (Morgan et al) resulting ultimately in anterior shoulder instability and increasing medial scapular and thoracic spine pain as the scapula slides laterally when the UE functions in reverse form, and the scapula is too tightly bound to the humerus via the tight posterior capsule.

Intervention

Now that the mechanics have been evaluated and the source of the pathology identified, what can be done to intervene in the "pathologic cascade" to prevent further shoulder deterioration? Many protocols have been identified for progressing with the rehabilitation of the scapula and once specific joint and muscle testing has identified the weak and dysfunctional components, programs tailored to the specific client can be developed. There are however some aspects which need to be addressed in all clients with a SICK scapula.

Figure 3

Scapular Reposition Test

Grasp Scapula with fingers contacting coracoid and/or AC joint and apply a posterior and external rotary and mild retraction force with forearm obliquely contacting scapula at inferior angle as a counter pressure.

- Re-perform painful movements or actions such as:

1. Arm elevation 2. Neer's test 3. Hawkin's test 4. Jobe's test (empty can)

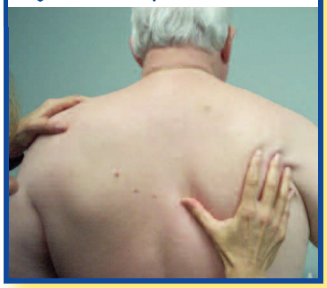
Scapular Assist Test

Stabilize the upper scapular border into mild retraction and assist upward rotation of the inferomedial border with the thumb until further manual contact is not possible.

Re-perform arm elevation and look to eliminate painful arc

Figure 3 Scapular Repositing Test

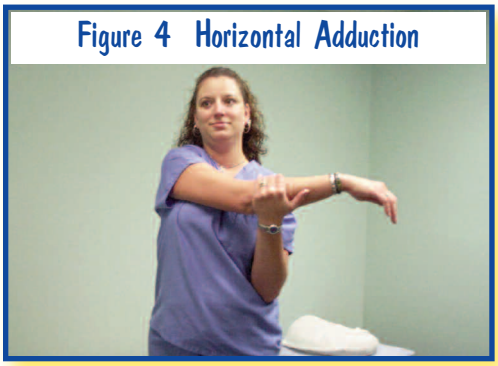
Figure 3 Scapular Assist Test



It is imperative to remember that there are two fundamental function of the scapula. First, it must move in harmony with the GH joint to maintain a congruous relationship with the glenoid and the humeral head. Second, it must serve as a stable base for the glenohumeral muscles. According to Donley, "these muscles must be balanced in strength and flexibility so their vector forces cross at a common point within the glenohumeral joint" thus reducing glide and maximizing rotation on the center of rotation within the glenoid. Using the SAT and SRT tests as instructional tools, you can assist a patient's awareness of the scapular malpositioning and the effectiveness of scapular repositioning exercises. Once the patient can identify their own poor positioning, scapular stabilization exercises can be initiated. Flexibility exercises including the pectoralis minor (decrease anterior tilting of the coracoid) and the posterior capsule of the GH joint (Sleeper stretch, Cross body abduction with the scapula stabilized) (**Figure 4**) are effective repositioners of the scapula.

Figure 4 Sleeper Stretch

Figure 4 Horizontal Adduction



As with all progressive exercise programs, once adequate position sense has been restored and normalized flexibility achieved, OKC and CKC activities can begin .

Applying Kinetic Chain

Scapular protraction weak in patients with impingement

- Scapular protraction activates Serratus Anterior
- Functional rehabilitation replicate normal neuromotor pattern
- Legs drive arm in diagonal

Shoulder strengthening 3x10 daily improves strength and function in patients with impingement.

Conclusion

It is very important especially with the overhead throwing athlete to address all aspects of total body flexibility including hips and spinal flexibility as these are frequent contributors to shoulder posterior stain especially if these restrictions are on the stride leg. It is also imperative to address strength issues in the core to reduce stress from an unstable trunk improperly positioning the scapula. By designing a comprehensive, efficient program addressing multiple needs with reasonable repetitions, you can achieve that harmony between strength and flexibility which will guarantee efficient and effective function

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NEWS briefs

OSPTA would like to thank Ms. Judy Meyers, PT for her contribution to this newsletter. OSPTA would like to congratulate Ms. Diane Lofink, PTA and Ms. Jenette Augustine on passing their state boards, and Mr. Dan Higgins, PT on successfully becoming an Orthopedic Clinical Specialist.

For the 1st quarter of 2007, OSPTA's patient satisfaction rating was 99%. Clinical pathways were met 65% of the time with an average of 10 visits/diagnosis. Pain was reduced by 71%, function improved by 73% for an overall improvement of 83%.

Please call any of the locations listed to the right to schedule an appointment that is convenient for you. OSPTA and VOR provide day and evening hours.

In addition, OSPTA@Home provides home health services consisting of nursing, physical therapy, occupational therapy, and speech therapy.

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