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PRINCIPLES OF FUNCTIONAL REHABILITATION OF THE SHOULDER

INTRODUCTION

The shoulder functions within the context of a kinetic chain (a series of links activated sequentially in a coordinated fashion to generate and transmit forces). Any break in the chain affects the energy, force and velocity generated. The scapula is the link that connects the torso with the arm, and thus is critical to normal shoulder function. Abnormal scapular function, known as scapular dyskinesis, can be caused by a dysfunction anywhere along the kinetic chain. Proximally derived scapular dyskinesis occurs when there is a dysfunction proximal to the glenohumeral, AC or SC joints. The problem may be scapulothoracic or lumbopelvic, or as proximal as the foot, ankle, knee or hip, with resultant distal manifestations. Distally derived dyskinesis is far more common, and is the result of pathology or dysfunction at the glenohumeral, AC or SC joints with ensuing abnormal scapular control as a result of inhibition or fatigue of the scapular stabilizers, primarily the serratus anterior and lower trapezius. In some cases, there is significant overlap and it is virtually impossible to determine the primary cause of the scapular dysfunction.
In all cases, scapular control must be addressed to successfully rehabilitate the shoulder, especially in the overhead athlete. In distally derived scapular dyskinesis, the pathology is usually addressed first, followed by rehabilitation. In proximally derived dyskinesis, correction of the scapular dysfunction will frequently obviate the need for surgical intervention as the shoulder problem will frequently be corrected.

PRINCIPLES AND RATIONALE

1. Core stabilization. The transverses abdominis is the first muscle to fire before either the arm or leg is moved, as it increases the intraabdominal pressure to stabilize the torso for the anticipated action. Therefore, strengthening of the abdominal musculature and the other core muscles is done

early in the rehabilitation process.

2. Postural alignment. In order for the body to function properly, it must be in proper alignment. Rehabilitation should be carried out with a neutral spine, appropriate pelvic position, etc. Shoulder protraction, excessive cervical lordosis and thoracic kyphosis are frequent causes of scapular dysfunction and must be corrected. Address thoracic hypomobility issues early in the rehabilitation. Exercises should be performed in the erect position as much as possible in order to replicate function.

3. Kinetic chain. Proximal stability must be regained (or obtained) before distal mobility; otherwise there can be an exacerbation of the distal problem, especially
in subacromial impingement. Proper activation of trunk musculature and normal trunk and leg strength and flexibility will facilitate scapular position. Therefore, rehabilitation progresses from proximal to distal. When possible, correct proximal weaknesses first; then add the upper extremity. During this time, scapular and upper extremity exercises can be done in the seated position to separate the dysfunctional segments. The rehabilitation program should integrate functional movement patterns as soon as possible. Trunk stabilization exercises (balance work) enhance return to function.

4. Scapular position. Ability to position the scapula properly by retraction and depression is critical to the success of any shoulder rehabilitation program. The scapular stabilizing muscles control protraction when functioning in an eccentric mode. Patients should be taught very early in the process (preoperatively if surgery is contemplated) how to “find” their scapula and position it properly in order to enhance humeral head compression by the rotator cuff and decrease subacromial impingement due to antetilting of the acromion.

5. Range of motion. In order to achieve normal scapular position, soft tissue restrictions must be addressed. Areas of particular concern in scapular dyskinesis include pec minor (which causes antetilting), upper trapezius and levator scapulae (which causes elevation), infraspinatus and teres minor (which prevent normal protraction), and the posterior capsule of the glenohumeral joint. Posterior glenohumeral capsular contractures should be corrected early. Postoperatively, range of motion is usually initiated in the scapular plane, but all planes must be included as the patient progresses. Specific surgical procedures must be taken into account during the period of healing.

6. Pain. A painful joint will not progress. During rehabilitation, pain is a sign that the wrong exercise is being done for that phase of the patient's recovery, the exercise is being done incorrectly, or the muscles are showing fatigue. Do not try to push the patient through the pain. Lack of pain is a major criterion for advancement.

7. Functional Progression. Progression is based on acquisition of function rather than time; therefore, the phases of the program are based on obtaining normal proximal control and proceeding distally. Learning speed and neuromuscular control differ among patients as result of different learning abilities, intelligence, age, ability to focus, complicating medical issues, etc. Monitor progress by the overall trend of improvement rather than by chronological landmarks.

8. Therapeutic exercise. Strengthening exercises should incorporate whole body movements whenever possible. Teach patients to isolate muscles, then train muscle groups in a coordinated, synchronous pattern to reestablish force couples, and thus functional patterns and proprioception. Muscles should be strengthened in concentric and eccentric patterns, with emphasis on control of eccentric movements. Closed chain exercises facilitate GH compression, proprioceptive

feedback and cuff coactivation in physiologic patterns to reestablish normal scapulohumeral rhythm. This allows for increasing strength while minimizing the stress on the glenohumeral joint capsule and the rotator cuff. This is particularly important in the postoperative patient. In general, progression is from closed chain to open chain exercises as strength and control improve. Incorporation of motor patterns which include the legs and trunk should be done as soon as the patient can tolerate these activities.

9. Quality vs. Quantity. Quality is more important than quantity. Focus on control rather than the number of repetitions. Strengthening exercises should never be performed past the point of fatigue, which is frequently manifested by pain or “loss of form” in doing the exercise.

10. Cardiovascular training. Aerobic activity is encouraged early in the rehabilitation process to enhance blood flow and healing, as well as encouraging a feeling of control and well being for the patient. Postoperative patients can utilize a stationary bike, Stairmaster, treadmill for walking, or elliptical trainer while still in a sling as long as they are comfortable and there is no impact or downward traction such as with running.