



Rehabilitation of Impingement and Rotator Cuff Pathology Using Surface EMG

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Introduction

- Shoulder injuries to the rotator cuff affect 10% of the general population.
 - 15-20% of swimmers
 - 50% of professional pitchers
- PTs have used the standard Jobe rotator cuff stretching and strengthening exercises focused on the:
 - Supraspinatus, Infraspinatus, teres minor, and subscapularis

Why Doesn't Exercise Alone Work for All Patients

- Many patients respond well to these “empty can” exercises, while others are aggravated by them.
- These exercises include performing:
 - Internal rotation
 - External Rotation
 - “Empty Can” Exercises

“Why do some Patients Fail?”

- To answer this question, several clinical observations are common to those with shoulder pathology:
 - Movement patterns typically involve excessive upper trap and levator scapulae activity with overhead maneuvers.
 - The shoulders posterior capsule is too tight.
 - This movement pattern persists even when symptom-free unless specifically retrained.
 - A “scapular squeeze” (lower trapezius isometric) often eliminates painful overhead flexion.

Electromyography is Beneficial

- Jobe's analysis is not practical for the use of invasive needle EMG.
- In these situations, EMG is used predominantly as a diagnostic tool versus a rehabilitative one.
- EMG provides tremendous benefits to the clinician and patient in rehabilitation.
- It's cost effective, objective, functional, non-invasive, painless, and a great patient training tool.

EMGs Limitations

- In surface EMG limitations to shoulder applications are due to the many layers of small muscles that make isolation next to impossible.
- This complication has slowed the development of new rehab approaches.
- Much of the McConnell approach has eliminated uses of some exercises.
- This protocol challenges traditional shoulder rehab concepts, and suggests a creative alternative for examining muscle balance of shoulder musculature using surface EMG.

Anatomy

- The soft tissue structures involved with impingement are the supraspinatus, subacromial bursa, and/or biceps tendon.
- The roof of the subacromial space is created by the coracoid and coracoacromial ligament. The space varies from 7-14 mm in normals, but is sometimes compromised by narrowing, inflammation, degenerative joint disease, or lack of humeral head depression.

Anatomy

- The force couple of the scapula occurs between the upper and lower trapezius and the serratus anterior.
- The force couple allows for proper elevation of the acromion, clearing the greater tuberosity and humeral head, and proper function of cuff muscles.

Avoiding Impingement is Important

- While rotator cuff strengthening is important, proper scapular position and mechanics are essential to rotator cuff function despite cuff strength.
- To avoid impingement, the scapular force couple and humeral head depression are essential.

Avoiding Impingement is Important

- Without these, further impingement and rotator cuff pathology continue.
- For instance, if the scapula is in a downwardly rotated position, the cuff cannot work efficiently to depress the head of the humerus.
- This occurs secondary to the alteration in the vectors of pull of these muscles.

Avoiding Impingement is Important

- When this force couple is disturbed, it affects scapular position and ultimately rotator cuff function, therefore, a critical balance is necessary.
- If any component becomes dominant or insufficient, the force couple is altered.

Treatment Approaches

- Traditional rehab exercises for impingement and rotator cuff pathology include:
 - Isokinetics, PNF, manual resisted exercises, and Jobe's exercises
- If the latter program is not successful, surgical options are often pursued to enlarge subacromial space.

Treatment Approaches

- Unfortunately, many patients fail both of these efforts, because muscle balance between VMO and VL was more important than pure quad strength.
- The knee and shoulder are remarkably similar in that the muscles of both take the path of least resistance.
- The dominant muscle will contract first and stronger when demand is placed on the joints.
- The weaker muscles are not activated readily, so the body utilizes the muscles most capable.

Treatment Approaches

- The dominant muscles of the subscapular region act similarly to the vastus lateralis in the knee and the infrascapular muscles act similarly to the often insufficient vastus medialis obliquus.
- the imbalance causes disturbances in the surrounding joints.

Summary

- Muscular imbalances can result in common shoulder conditions that often result in surgery.
- Muscular imbalances can be isolated and rectified with conservative measures that can be enhanced with EMG.
- Muscle imbalances directly result from or cause joint movement impairments characterized by capsular restrictions. These capsular restrictions need skilled manipulation to rectify.