

Effect of Rotator Cuff Muscle Imbalance on Internal Impingement and Peel-back of Superior Labrum: A Cadaveric Study

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Purpose

Shoulder internal impingement and peel-back mechanism during late cocking phase of throwing motion are thought to cause rotator cuff injury and type II SLAP lesion. The objective of this study was to assess the effect of rotator cuff muscle imbalance on internal impingement and peel-back of superior labrum.

Materials and Methods

Eight fresh frozen cadaveric shoulders were tested at simulated late cocking position. Location of the cuff insertion relative to the glenoid (Microscribe), glenohumeral contact pressure (Tekscan), and maximal humeral external rotation angle were measured. Increased contact pressure may cause forceful internal impingement. Increased external rotation may lead to peel-back of superior labrum. Force of supraspinatus, subscapularis, and infraspinatus were determined based on a clinical electromyographic data. To assess the effect of rotator cuff muscle imbalance, each muscle force was varied.

Results

In all rotator cuff muscle conditions, the footprint was overlapped with the posterior-superior glenoid at maximal external rotation. A decreased subscapularis strength resulted in an increased glenohumeral contact pressure ($P < 0.01$). A decrease in subscapularis strength caused a significant ($P < 0.001$) increase in maximal external rotation angle with the same external torque.

Conclusion

Throwing with decreased subscapularis muscle strength may cause forceful internal impingement and peel-back of the superior labrum.