GLENOHUMERAL STABILITY AFTER TWO DIFFERENT ROTATOR INTERVAL REPAIR PROCEDURES
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INTRODUCTION
The integrity of the rotator interval is one of the important factors determining glenohumeral instability. Clinical success has been reported with both open and arthroscopic repair of rotator interval defects in treating recurrent shoulder instability. In open surgery the rotator interval is closed by suturing the leading edge of the supraspinatus to the upper edge of the subscapularis muscle. Arthroscopic repair typically involves closure of the rotator interval by suturing the superior glenohumeral ligament to the middle glenohumeral ligament. Proponents of the open technique suggest that closure of the supraspinatus-subscapularis interval increases the stability of the glenohumeral articulation. Arthroscopic access to the leading edge of the supraspinatus is often difficult. Further, the potential biomechanical advantage has not been documented experimentally. A cadaver study was therefore designed to measure the effects of glenohumeral ligament closure and supraspinatus-subscapularis interval closure on glenohumeral stability.

METHODS
Ten fresh-frozen cadaveric shoulders free from arthritis or visible anatomic defects were selected. The capsule was incised at the rotator interval to simulate anterior shoulder instability. Sutures were placed arthroscopically to repair the interval between the glenohumeral ligaments (GHL) and to repair the interval between the supraspinatus and subscapularis tendons (SSP). These shoulders were mounted on a multiaxial testing rig (Force 5, AMTI, Watertown, MA) using custom clamps to hold the humerus and scapula. After 10 cycles of preconditioning under low loads, anteroposterior force (10N, 15N, 20N) was applied to the humeral head with the shoulder in 0° abduction and 60° abduction (with maximum external rotation). The displacement of the humeral head under anteroposterior force was measured in the intact condition, after cutting the rotator interval capsule, and after sequential GHL and SSP repair. The axial torque required to rotate the humerus 30° internally and externally was also measured at 0° and 60° abduction for the above conditions. The statistical significance of differences between conditions was tested using paired t-tests.

RESULTS

![Fig 1: Anterior Translation (mm) under 15N Force](image)

![Fig 2: Anterior Translation (mm) under 15 N Force](image)

DISCUSSION
Loads in the range of 10 to 20 N were chosen because these have been shown to simulate the normal ranges of translation during anterior and posterior drawer testing of the shoulder. The increase in anteroposterior translations after incising the capsule at the rotator interval served to validate the model. A similar model of glenohumeral instability has been previously described. In that study, thermal capsulorrhaphy reduced anterior and posterior humeral translations. However, the effect of rotator interval repair was not studied. The 60° abduction position was chosen to simulate a combined 90° glenohumeral and scapulothoracic abduction similar to that seen during at the start of throwing.

While both forms of RI closure reduced anterior and posterior translation, SSP closure reduced anterior translation by a greater percentage than GHL closure. The fact that SSP repair significantly reduced anterior translations suggested that this increased the stability of the shoulder. Including SSP closure in the repair may increase the stability of the shoulder especially if the glenohumeral ligaments are hypoplast or difficult to repair. Rotational stability was restored with either GHL or SSH repair (Fig 3). No further restriction in humeral rotation occurred after SSG repair which reduces some of the concern that this type of repair might have on postoperative range of motion.

The specimens tested in our study were from older subjects without obvious laxity, which is a potential limitation of this study, since the biomechanical behavior of pathologically lax tissue may be different from normal tissue. In addition, our results can only be applied to the immediate postoperative stability. The process of biological repair may increase or decrease the differences in biomechanical stability attributed to each type of repair. Clinical follow up is therefore necessary to confirm these cadaveric results.

REFERENCE:

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