GLENOHUMERAL TRANSLATION AFTER THERMAL CAPSULORRHAPHY OF THE POSTERIOR CAPSULE

*,**Selecky, M.T., **Tibone, J.E., Yang, B.Y., McMahon, P.J., +Lee, T.Q.
Orthopaedic Biomechanics Laboratory, Long Beach Veterans Affairs Medical Center, and University of California at Irvine
+VA Medical Center (151), 5901 East 7th Street, Long Beach, CA 90822 Phone: (562) 494-2611x5344 Fax: (562) 494-5675 E-Mail: tqlee@pop.long-beach.va.gov

Relevance to Musculoskeletal Condition

Treatment of recurrent posterior or multidirectional glenohumeral instability in athletes with traditional operative management has produced variable results at long term follow up. [(1)] This study addresses the possibility of using thermal capsulorrhaphy on the posterior capsule as a method of decreasing glenohumeral joint laxity.

Introduction

In patients with recurrent glenohumeral instability, redundancy of the capsulo-ligamentous structures commonly exists as a result of either trauma, underlying joint laxity or a combination of the two. Studies have demonstrated thermal capsulorrhaphy can be used to contract soft tissue[(2)], and arthroscopic thermal capsulorrhaphy is currently being performed on the anterior capsulo-ligamentous structures of the shoulder as a means of treating anterior inferior instability of the shoulder. Some have postulated that its use may be expanded to shrink the posterior glenohumeral capsulo-ligamentous structures as a means of treating posterior or multidirectional instability. The purpose of this study was to determine whether arthroscopic thermal capsulorrhaphy of the posterior glenohumeral capsulo-ligamentous structures with the radiofrequency probe significantly decreases anterior-posterior glenohumeral translation in comparison to suture plication of the posterior capsule.

Materials and Methods

Eight fresh frozen human cadaveric shoulders were thawed 24 hours prior to study. All soft tissue was removed except for the glenohumeral capsule, long head of the biceps, and the coracoacromial arch. The insertions of the rotator cuff tendons where they became confluent with the capsule, were amputated. The scapula and the shaft of the humerus were each rigidly fixed in custom aluminum specimen holders and then mounted on a translation testing apparatus. The humeral shaft was positioned in 60 degrees of forward flexion which corresponds to 90 degrees of shoulder flexion. The humerus was then internally rotated until the posterior aspect of the bicipital groove was aligned with the anterior margin of the acromion. This position of forward flexion/internal rotation was chosen to best assess the restraints to posterior translation encountered during standard posterior glenohumeral instability testing. With the joint vented to the atmosphere, a joint compressive force of 22N was applied to center the humeral head in the glenoid. A posteriorly directed load of 10 N was then applied to the humerus and a magnetic tracking device (Ascension Technology Co., Colchester VT) was used to measure the resulting translation of the humeral head upon the glenoid. After an appropriate rest period, anterior translation was measured with a 10 N anteriorly directed load. Posterior and anterior translations were then sequentially measured with 15 N and 20 N loads as well. Using an arthroscopic technique, a thermal capsulorrhaphy of the posterior capsular structures was preformed with a radiofrequency (RF) emitting device. The shoulders then underwent the identical loading protocol with the 10N, 15N and 20N loads, and the posterior and anterior translations were recorded. Finally, a 1 cm suture plication of the posterior capsule was performed, and the specimens were again tested with the identical loading protocol. A two tailed paired t-test was used to compare the translations before and after capsulorrhaphy with the RF emitting device, and then following suture plication. A p value of 0.05 was used as the level of significance.

Results

The differences in the mean posterior translation measurements before and after arthroscopic thermal capsulorrhaphy of the posterior capsule were not found to be statistically significant for the 10N (+4.6%), 15N (-4.4%) or 20N(-3.7%) loads ($p>0.05$) (Figure 1). Slightly greater change occurred in anterior translation following posterior capsulorrhaphy at 10N (-3.5%), 15N (-11.2%) and 20N (-9.9%) (Figure 2). However these changes were not found to be significant either ($p>0.05$). Suture plication of the posterior capsule provided the greatest decrease in posterior translation at 10N(-11.2%), 15N(-24.9%) and 20N(-16.0%) loads, but these differences were not found to be significant (p . 0.05).

Discussion

The results of this study demonstrate that posterior glenohumeral translation was not significantly decreased by thermal capsulorrhaphy of the posterior capsule, and in some cases an increase in translation was suggested. Suture plication of the posterior capsule appeared more effective at decreasing the posterior translation although these findings failed to show statistical significance as well. Perhaps the lack of substantial collagenous material in the thin posterior capsule accounts for the inability of thermal capsulorrhaphy to be effective in this region. In fact, results of previous studies in this lab[(3)] suggest that thermal capsulorrhaphy of the more substantial anterior capsulo-ligamentous structures would decrease the amount of posterior glenohumeral translation more effectively than direct shrinkage of the posterior glenohumeral capsule. These results demonstrate that arthroscopic thermal capsulorrhaphy of the posterior capsule would likely be unsuccessful in the treatment of posterior or multidirectional glenohumeral instability.

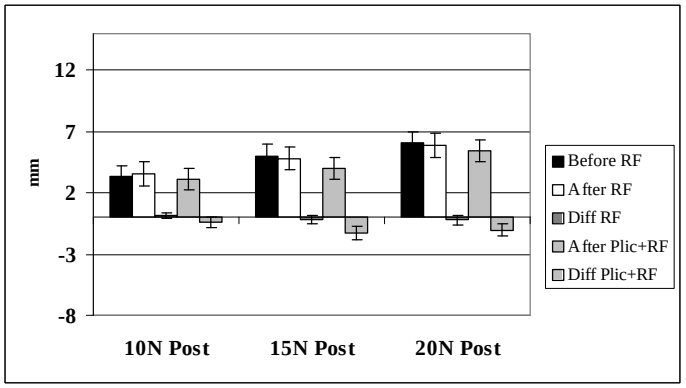

Figure 1: Posterior Translation after RF Capsulorrhaphy and Plication of the Posterior Capsule

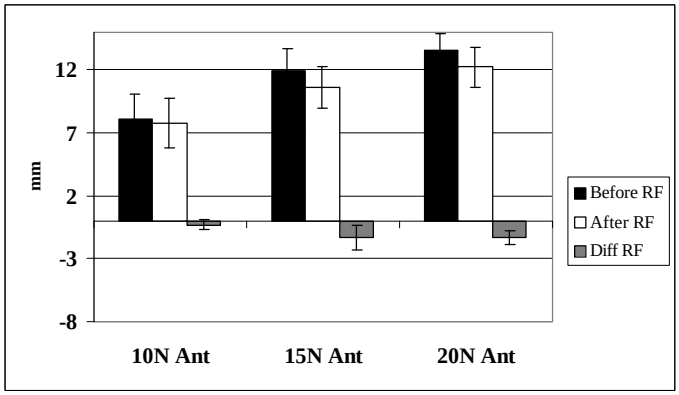

Figure 2: Anterior Translation after RF Capsulorrhaphy of the Posterior Capsule

References

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**Kerlan-Jobe Orthopaedic Clinic, Los Angeles, CA

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