INTRODUCTION:

Commonly performed arthroscopic rotator interval (RI) closure techniques which imbricate the RI in a superior-inferior direction have been unable to reproduce the stabilizing effects reported when the RI is closed with an open medial-lateral imbrication technique. The purpose of this study was to investigate and compare the effect of superior-inferior and medial-lateral RI closure technique on glenohumeral range of motion and translation.

METHODS:

Eight match-paired cadaveric shoulders (mean age, 58.1 years) were stretched to 10% beyond the maximum range of motion in 0° and 60° of glenohumeral abduction to simulate a multidirectional instability model (Figure 1). Shoulders were then repaired using the superior-inferior RI closure technique or the medial-lateral RI closure technique. The superior-inferior closure technique performed is similar to the cephalad arthroscopic shifts commonly performed; the medial-lateral technique is a novel arthroscopically performed capsular shift that attempts to replicate an open medial-lateral RI imbrication using a 4.5 mm Bio-Corkscrew FT suture anchor double-loaded with #2 Fiberwire suture (Arthex Inc; Naples, FL) (Figure 2).

Anterior, posterior, inferior, and superior glenohumeral translations were measured along with humeral head apex position and rotational range of motion for intact, stretched, and repaired conditions in both 0° and 60° of glenohumeral abduction. For comparison between the three testing conditions, intact, stretched and rotator interval closure, a multivariate repeated measures analysis of variance with a Tukey post hoc test for individual comparisons was used for statistical analysis. For direct comparison between the medial-lateral RI closure and the superior-inferior RI closure, the changes in glenohumeral translation were calculated between each condition. These differences were then compared across closure techniques using a paired t-test. The significance level was set to 0.05.

RESULTS:

Stretching significantly increased internal rotation, external rotation, and the total rotational range of motion in both 0° and 60° of abduction. In 0° of abduction, after both closure techniques external rotation decreased significantly (p < 0.05) relative to the stretched state, and was restored to the intact state. In 60° of abduction, after both closure techniques internal rotation, external rotation, and total rotation decreased significantly (p < 0.05), but only the medial-lateral closure technique restored each to the intact state. In 0° of abduction, the medial-lateral closure was more effective in reducing anterior and inferior translation compared to the superior-inferior closure, but these results were not statistically significant (p = 0.11 for anterior translation and p = 0.12 for inferior translation) (Figure 2). In 60° of abduction, the medial-lateral closure was more effective in reducing posterior translation compared to the superior-inferior closure (p = 0.03) (Figure 3). In 0° abduction and maximum external rotation, the superior-inferior closure significantly shifted the position of the humeral head in an inferior direction (p < 0.05). In 60° abduction and maximum internal rotation, the medial-lateral closure significantly shifted the position of the humeral head in a posterior direction (p < 0.05), whereas in 60° abduction and maximum external rotation, the medial-lateral closure significantly shifted the position of the humeral head in an anterior direction (p < 0.05).

DISCUSSION:

The medial-lateral RI closure technique restored range of motion to the intact state and decreased posterior translation in abduction better than the superior-inferior rotator interval closure technique. Medial-lateral RI closure with a suture anchor in the humeral head can be considered in the surgical treatment of patients with multidirectional instability, especially those with a component of posterior instability, without concern for excessive loss of range of motion.

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