

CHANGES TO ROTATOR CUFF MUSCLE LENGTH DURING ABDUCTION AFTER SUPERIOR CAPSULAR RECONSTRUCTION (SCR) AND REVERSE TOTAL SHOULDER ARTHROPLASTY (RTSA)

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ABSTRACT

The rotator cuff (RC) is a group of four muscles that helps maintain dynamic stability of the glenohumeral joint and provides force rotation of the shoulder [1]. Rotator cuff tears are a common injury that may result in pain and limited joint stability [1]. Superior capsular reconstruction (SCR) and reverse total shoulder arthroplasty (rTSA) are two popular treatment options for complete RC tears that can improve abduction strength and mobility [2,3]. During joint rotation, the change in muscle length, or excursion, can be used to assess muscle function [4]. This study aims to measure muscle excursion during shoulder abduction in SCR/rTSA repaired shoulders to demonstrate their biomechanical contributions during limb movement after surgery. The experiment was performed using an apparatus to abduct six cadaveric shoulders under three conditions: intact, SCR, and rTSA. Digital points were tracked at muscle origin and insertion to calculate muscle length. While the supraspinatus no longer contributes to abduction after rTSA, our results showed significantly greater values of theoretical excursion compared to the intact shoulder, which is in line with the inferior-medial shift of the glenohumeral joint center of rotation produced after rTSA ($p<0.05$). Teres minor showed no significant differences in excursion between conditions, while subscapularis excursion was significantly smaller after SCR ($p<0.05$). For infraspinatus, rTSA and SCR produced significantly smaller excursions ($p<0.05$). Significantly lower excursion values could suggest that the muscle was utilized more as a stabilizer. These results may be necessary for evaluating RC performance after surgical repair.

Keywords: rotator cuff, superior capsular reconstruction, reverse total shoulder arthroplasty

INTRODUCTION

The rotator cuff is a collection of muscles that aid in dynamic stability of the glenohumeral joint and force production for abduction and rotation of the arm. It consists of the supraspinatus, infraspinatus, teres minor, and subscapularis. Abduction of the arm is primarily initiated with the supraspinatus (0-15 degrees) and mainly mediated by the deltoid (0-90 degrees). While the infraspinatus and subscapularis muscles