Title:
The anterior deltoid’s necessity for reverse shoulder arthroplasty: a cadaveric biomechanical study

Abstract: (Your abstract must use 11pt Arial font and must not be longer than this box)

Introduction: Not infrequently, patients who are candidates for reverse shoulder arthroplasty have had prior surgery that may compromise the anterior deltoid muscle. Recent literature provides diverging accounts of the importance of the anterior deltoid in this population. The purpose of this study was to determine the 3-D moment arms for all deltoid segments, and determine the biomechanical significance of the anterior deltoid before and after reverse shoulder arthroplasty.

Methods: Eight cadaveric shoulders were evaluated with a 6-axis force/torque sensor to assess the direction of rotation and 3-D moment arms for all six segments of the deltoid both before and after placement of a reverse shoulder prosthesis. The two segments of anterior deltoid were sequentially unloaded to determine their functional role.

Results: The 3-D moment arms of each segment of the deltoid were significantly altered by placement of the reverse shoulder prosthesis. The anterior and middle deltoid abduction moment arms significantly increased after placement of the reverse prosthesis (p<0.05 for both). Furthermore, the loss of the anterior deltoid resulted in a significant decrease in both abduction and flexion moment arms (p<0.05). When only the inferior portion of anterior deltoid was lost, the remaining deltoid pulled the arm 8.7 degrees into extension. In contrast, when both portions of anterior deltoid were lost, the arm was pulled 20 degrees into extension. The prosthesis did not dislocate even when both anterior deltoid segments were unloaded.

Conclusion: The abduction moment arms of the anterior and middle deltoid significantly increased after reverse shoulder arthroplasty placement. The anterior deltoid is important biomechanically for balanced function after a reverse total shoulder arthroplasty. Losing one portion of the anterior deltoid may still allow arm abduction, however, losing both portions of the anterior deltoid may disrupt balanced arm abduction. Surgeons should be cautious about placing reverse shoulder arthroplasty in patients who do not have a functioning anterior deltoid muscle.

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