surgery was 59.9±10.8 years with a mean follow-up of 7.3±1.4 years. The population was mostly male (70.5%). Pre-operatively, seven patients had mild rotator cuff arthropathy with Hamada grade 2-3, and one patient had Hamada grade 4B. The rest of the patients had Hamada grade one preoperatively. At a minimum five-year postoperative follow-up, only one patient had a rTSA, resulting in a survivorship rate of 98%. Two patients (4.6%) had post-operative Hamada grade 4. One patient had progression of cuff arthropathy from pre-operative Hamada 3 to post-operative Hamada 4A. The other patient maintained Hamada grade 4B from pre-operative to post-operative. Patients with progression of cuff arthropathy (i.e., higher post-operative Hamada grade) appear to have a higher possibility of complete post-operative graft tears. There were no correlations between progression of cuff arthropathy and WORC score at five years. Conclusion: At a minimum 5-year with a mean follow-up of 7.3 years, bridging reconstruction showed 98% survivorship rate with a low rate of conversion to rTSA and a low progression of cuff.

Category: Shoulder - Rotator Cuff

Superior Capsular Reconstruction Only Partially Restores Native Glenohumeral Joint Loads In A Dynamic Biomechanical Shoulder Model

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Summary:
In this dynamic shoulder model, superior capsular reconstruction only partially restored native glenohumeral joint loads. However, glenohumeral contact pressure, compensatory deltoid forces and superior migration were significantly reduced, while increasing abduction motion, when compared to the posterosuperior rotator cuff tear.

Data:
Background: Although clinical and biomechanical evidence suggests that superior capsular reconstruction (SCR) for irreparable posterosuperior rotator cuff tears (PSRCT) holds considerable joint preserving potential, its true effect on glenohumeral contact mechanics during dynamic abduction motion remains largely unknown. The purpose of the study was to evaluate the effect of an irreparable PSRCT on glenohumeral joint loads and to quantify improvement following SCR using an acellular dermal allograft. It was hypothesized that performing an SCR would reverse increased glenohumeral joint loads caused by an irreparable PSRCT. Methods: Ten fresh-frozen cadaveric shoulders were tested using a valid. A pressure mapping sensor was placed between the humeral head and glenoid surface. Each specimen underwent the following conditions: (1) native, (2) irreparable PSRCT, (3) SCR using an acellular dermal allograft. Glenohumeral abduction angle (gAA) and superior humeral head migration (SM) were measured using 3D motion tracking software. Cumulative deltoid force (cDF) and glenohumeral contact mechanics, including contact area (gCA) and contact pressure (gCP), were assessed at rest, 15°, 30°, 45°, and maximum angle of glenohumeral abduction.

Results: The PSRCT resulted in a significant decrease of gAA along with an increase in SM, cDF, and gCP (P <.001, respectively). SCR did not restore native gAA (P>.001), however, SM was significantly reduced (P<.001). Further, SCR significantly reduced deltoid forces at 30° (P=.007) and 45° of abduction (P=.007) when compared to the PSRCT. SCR did not restore native cDF at 30° (P=.015), 45° (P<.001), and maximum angle (P=.001) of glenohumeral abduction. Compared to the PSRCT, SCR resulted in a significant decrease of gCP at 15° (P=.008), 30° (P=.002), and 45° (P=.006). However, SCR did not completely restore native gCP at 45° (P=.038) and maximum abduction angle (P=.041). Conclusion: In this dynamic shoulder model, performing an SCR only partially restored native glenohumeral joint loads. However, SCR significantly decreased gCP, cDF and SM, while increasing abduction motion, when compared to the PSRCT. These observations raise concerns regarding the true joint preserving potential of SCR for an irreparable PSRCT, along with its ability to delay progression of cuff tear arthropathy and eventual conversion to reverse shoulder arthroplasty.

Category: Shoulder - Rotator Cuff

Physiologic Tensioning During Lower Trapezius Transfer For Irreparable Posterosuperior Rotator Cuff Tears Is Important For Improvement Of Shoulder Kinematics

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Summary:
Lower trapezius transfer was most effective in improving glenohumeral kinematics following an irreparable posterosuperior rotator cuff tear when maintaining the physiologic tension of the lower trapezius muscle. However, the lower trapezius transfer did not completely restore native kinematics, regardless of tensioning.

Data:
Background: Lower trapezius transfer (LTT) has been proposed for restoring the anteroposterior muscular force couple in the setting of an irreparable posterosuperior rotator cuff tear (PSRCT). Adequate graft tensioning during surgery may be a factor critical for sufficient restoration of shoulder kinematics and functional improvement. The purpose of this study was to evaluate the effect of tensioning during LTT on glenohumeral kinematics using a dynamic shoulder model. It was hypothesized that an LTT, maintaining the physiologic tension of the lower trapezius muscle, would improve glenohumeral kinematics more effectively than an under-tensioned or over-tensioned LTT. Methods: Ten fresh-frozen cadaveric shoulders were tested using a validated shoulder simulator. Glenohumeral abduction angle (gAA), superior migration of the humeral head (SM) and cumulative deltoid forces (cDF) were compared across five conditions: (1) native; (2) irreparable PSRCT; (3) LTT with 12N load (under-tensioned); (4) LTT with 24N load (physiologic cross-sectional area ratio); (5) LTT with 36N load (over-tensioned). gAA and SM were measured using 3-dimensional motion tracking. cDF was recorded in real time throughout dynamic abduction motion by load cells connected to actuators. Results: The physiologically tensioned (Delta 13.1°), under-tensioned (Delta 7.3°), and over-tensioned LTT (Delta 9.9°) each significantly increased gAA compared to the PSRCT (P<.001, respectively). The physiologically tensioned LTT achieved a significantly greater gAA than the under-tensioned (Delta 5.9°, P<.001) or over-tensioned LTT (Delta 3.2°, P=.038). SM was significantly decreased in LTT compared to the PSRCT, regardless of tensioning. The physiologically tensioned LTT resulted in a significantly lower SM compared to the under-tensioned LTT (Delta 5.3mm, P=.004). A significant decrease in cDF compared to the PSRCT was only observed in the physiologically tensioned LTT (Delta -19.2N, P=.044). However, compared to the native state, LTT did not completely restore native glenohumeral kinematics, regardless of tensioning. Conclusion: LTT was most effective in improving glenohumeral kinematics following an irreparable PSRCT when maintaining the physiologic tension of the lower trapezius muscle. However, the LTT did not completely restore native kinematics, regardless of tensioning. Tensioning during LTT for an irreparable PSRCT is important to sufficiently improve glenohumeral kinematics and may be an intraoperatively modifiable key variable to ensure postoperative functional success.

Category: Shoulder - Rotator Cuff

Three-Dimensional Scapular Kinematics in Patients with Rotator Cuff Tears before Arthroscopic Repair

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