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

Abstract ID# 21736
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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 allottr. 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 validated dynamic shoulder simulator. Glenohumeral abduction angle (gAA), superior migration of the humeral head (SM) and cumulative deltoid forces (cDF) were measured throughout dynamic abduction motion. Results: The physiologically tensioned LTT did not completely restore native glenohumeral kinematics, 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 -19.2 N; 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 lower trapezius transfer did not completely restore native kinematics, regardless of tensioning.

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 measured in 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) 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 LTT (Delta 13.1°), under-tensioned LTT (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 LTT (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 -19.2 N; 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 glenohumeral 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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A study was performed for monitoring scapular kinematics in patients with rotator cuff tears (RCT) and scheduled for arthroscopic repair. The 3D scapular kinematics was measured by using an acromion marker cluster both on the healthy and pathologic side during arm elevation. Patients with RCT exhibit scapular dyskinesis with decreased humeral elevation and increased scapular internal rotation.

**Data:**

BACKGROUND Monitoring scapular movements is valuable in managing patients with abnormal scapular motion patterns, such as those suffering from rotator cuff tears (RCT). Measuring scapular kinematics is challenging due to the sliding nature of the scapula over the thorax and the complex variation in its orientation during movements. Among the methods proposed in the literature for monitoring scapular kinematics is the acromion marker cluster (AMC) method. The AMC overcomes the high level of invasiveness of the method using bone pin insertion, considered the gold standard. AIMS To compare the scapular kinematics of the pathologic side of patients with RCT and scheduled for arthroscopic repair vs. the healthy side before surgery. METHODS An L-shaped AMC consisting of three photo-reflective markers was placed on the flat portion of the acromion, with the long side along the scapular spine and the short side pointing anteriorly to the scapular plane. Through a static calibration procedure, a relationship is defined between the anatomical scapular landmarks and the markers on the cluster to follow dynamically scapular kinematics. Enrolled patients were asked to perform bilateral elevations and lowerings in the frontal, scapular, and sagittal planes at a self-selected speed. Patients repeated the movements five times in each trial, but only the central three repetitions were selected for subsequent analysis. Kinematic analysis was performed in Visual 3D software after pre-processing markers trajectories acquired with the Qualisys™ stereophotogrammetric system. The following kinematic variables were calculated: humerothoracic elevations, scapular internal-external rotation, mediolateral rotation, and anterior-posterior tilt at 30°, 45°, 60°, and 90° of humeral elevation. Statistical analysis was executed in SPSS v.28. The nonparametric Wilcoxon rank-sum test was applied as a statistical method (p-value < 0.05). RESULTS: In the sagittal plane flexion, the maximum mean arm elevation was 112.04° (range: 76.42°–143.29°) for the healthy side and 98.56° (range: 20.89°–133.66°) for the pathologic side. In the scapular plane, the maximum mean arm elevation was 93.94° (range: 77.96°–113.20°) for the healthy side and 87.48° (range: 8.92°–114.17°) for the pathologic side. In the frontal plane, the maximum mean arm elevation was 102.14° (range: 89.10°–117.00°) for the healthy side and 86.07° (range: 21.86°–112.61°) for the pathologic side. At the maximum humeral elevation in the sagittal plane, the mean scapular upward rotation, internal rotation, and posterior tilting were 32.58°±8.60°, 13.50°±8.46°, and 10.92°±1.96° for the healthy side, and 32.63°±11.63°, 17.05°±11.01°, and 9.46°±10.23° for the pathologic side. No significant differences were observed in scapular kinematics at 30°, 45°, 60°, and 90° of humeral elevation. DISCUSSION In this study, the 3D scapular kinematics was evaluated between shoulders with RCT and the contralateral healthy shoulders. According to our study, before treatment, comparable or increased scapular motions in the affected shoulders with respect to the contralateral healthy side may result from adaptive movements of the pathologic side to maintain humeral elevation. Patients with RCT exhibit scapular dyskinesis with decreased humeral elevation and increased scapular internal rotation.

Category: Shoulder - Rotator Cuff

**Impact of Rotator Cuff Tendon Thickness on Functional Outcomes after Arthroscopic Repair - A 2-Year Follow-Up Study on Small-Medium Sized Tears in Elderly Patients**

Abstract ID# 22636
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Summary:

Arthroscopic repair results in excellent clinical outcomes for small to medium sized tears in elderly patients aged 65 and above, with clinically important improvements inVAS, CMS, UCLA and OSS scores seen at 1 year post-operatively. Contrary to our hypothesis, tendon thickness did not appear to have any effect on clinical outcomes at 2 years post-operatively.

Data:

Introduction Previous studies on rotator cuff tears have examined both clinical and radiographic parameters which may influence post-operative clinical outcomes. While rotator cuff tears are frequently classified by size (small, medium, large or massive) or depth (partial or full-thickness cuff tears), there is currently no literature available examining the objective thickness of the rotator cuff.