Abstracts

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Summary:
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. AIMTo 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 lowering movements 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, medial-lateral rotation, and anterior-posterior tilt at 30°, 45°, 60°, and 90° of humeral elevation. Statistical analysis was executed in SPSS v28. 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 ± 9.16° 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

Histopathological and Biomechanical Comparison of Patellar Tendon and Tensor Fascia Lata Autografts in Superior Capsular Reconstruction Surgery

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Summary:
Based on the histopathological and biomechanical results in our controlled experimental study, it has been shown that the patellar tendon autograft applied in superior capsular reconstruction surgery is as successful as the tensor fascia lata autograft.

Data:
Patients with irreparable rotator cuff tears today constitute one of the challenging patient groups encountered in the outpatient clinic for shoulder surgery. Superior capsular reconstruction (SCR), defined by Mikata in 2012, is a surgical procedure to restore shoulder stability in irreparable rotator cuff tears. According to the common view in the literature, the most important reason for graft rupture, which is the most important complication of SCR surgery, is insufficient integration of the graft to the bone attachment sites. There are studies in the literature on appropriate graft selection. Dermal allografts, synthetic grafts and fascia lata autografts can be used. Patellar tendon graft (PT) is one of the most commonly used grafts in anterior cruciate ligament reconstruction surgery. Our aim of the study is to compare PT autograft and Fascia lata autograft (FL) histopathologically and biomechanically in SCR surgery. Our hypothesis is that PT graft is as effective a graft choice as FL. Our study is the first in the literature to show that the patellar tendon is an option that can be applied in SCR surgery.

Method: Twelve rabbits with irreparable retracted rotator cuff tears in both shoulders and 4 rabbits without surgical intervention were included in the study as a control group. First, a 11 cm rotator cuff defect was created on both shoulders of 12 rabbits. Six weeks after the first surgery, the SCR procedure was applied to the right shoulders of 12 rabbits with PT taken from the same side and to the left shoulder with PT autograft taken from the same side. No surgical intervention was applied to 4 rabbits in the control group. Following sacrifice, the PT was harvested on 6 weeks' follow-up. All shoulders were investigated for histopathological (4 control, 4 TFL-4 PT) recovery and tested for biomechanical (4 control, 8 TFL, 8 PT) evaluation. Watkins scoring for macroscopic recovery and H-SCORE scoring for immunohistochemical evaluation were used. Results: In the histopathological evaluation, the PT group showed higher cellularity (P = 0.02), vascularity (P = 0.01), and total Watkins score (P = 0.001) compared to the TFL group. Immunohistochemical analysis of tissues for CD31 showed that PT had significantly higher reactivity compared to other groups (P = 0.014). Immunohistochemical analysis of tissues for collagen types showed that PT tendons had significantly higher reactivity to collagen type I and type III than other groups (P = 0.019 and 0.015). In the biomechanical evaluation, although the mean tensile strength (138.13 ± 19.38) in the PT group was higher than the mean tensile strength (136.56 ± 23.34) in the TFL group, no statistical difference was found (P = 0.05). Conclusion: Based on the histopathological and biomechanical results in our controlled experimental study, it has been shown that the PT autograft applied in SCR surgery is as successful as the TFL autograft. The SCR treatment method with PT was described in the literature for the first time in a controlled study.

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 cuff repairs result in excellent clinical outcomes for small to medium sized tears in elderly patients aged 65 and above, with clinically important improvements in VAS, 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.
itself, and its impact on post-operative outcomes. We hypothesize that cuff thickness will be associated with clinical outcomes after arthroscopic rotator cuff repair in patients with full-thickness rotator cuff tears, especially in the elderly (aged ≥ 65 years). Methods We prospectively recruited all patients aged 65 years and above who underwent arthroscopic repair of small to medium full-thickness rotator cuff tears at our institution. These patients were followed up for a minimum of 2 years post-operatively. Basic biodata, as well as Visual Analog Scale (VAS) for pain, Constant-Murley Score (CMS), UCLA Shoulder Score (USS), and Oxford Shoulder Score (OSS) at 3 different time points (preoperatively, 1 year post-operatively, and 2 year post-operatively) were collected. Cuff thickness was measured by independent blinded radiologist on pre-operative ultrasonographic images. Repeated measures ANOVA was performed to determine differences in clinical scores between each time period. Multiple linear regression was used to examine the effect of tendon thickness, as well as other variables such as age and gender, on VAS, CMS, USS, and OSS at 2 years post-operatively. Results A total of 42 patients with minimum 2 year follow up were included in this study. There were 12 male and 30 female patients, and the cohort had a mean age of 74 (4) years. Mean tendon thickness measured was 5.3 (1.7) mm, and mean tear size was 1.5 (0.7) cm. Regression analysis revealed that tendon thickness had no effect on VAS, CMS, UCLA, and OSS scores at 2 years post-operatively. All clinical scores (VAS, CMS, USS, and OSS) improved significantly at 1 year post-operatively (p < 0.05) when compared to pre-operative values, and all improvement in scores met the minimal clinically important differences (MCID) established in previous studies. While these scores continued to improve from 1 to 2 years post-operatively, the differences detected were no longer statistically significant (p > 0.05). Discussion Arthroscopic cuff repairs result in excellent clinical outcomes for small to medium sized tears in elderly patients aged 65 and above, with clinically important improvements in VAS, 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. However, post-operative sonographic evaluation may shed further light on whether cuff thickness plays a role in tendon healing and retear rates, which are known to have poor correlation with clinical outcomes as well.

Category: Shoulder - Rotator Cuff

Arthroscopic Single-Stage Capsular Release and Rotator Cuff Repair for Cuff Tears With Concomitant Stiffness. A Comparative Analysis of Functional and Radiological Outcomes

Abstract ID# 22914

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Summary:
Single-STAGE ARTHROSCOPIC REPAIR AND CAPSULAR RELEASE FOR ROTATOR CUFF TEARS WITH STIFFNESS RESULTS IN A GOOD CLINICAL AND RADIOLOGICAL OUTCOME WITH COMPARABLE RETEARS IN BOTH GROUPS

Data:
Introduction There has been limited literature comparing the outcomes of concomitant treatment of rotator cuff tears with stiffness using a single-stage operative procedure. Our study aimed to analyse the functional outcomes & retear rates after a single-stage arthroscopic capsular release (ACR) & cuff repair for patients with cuff tear & stiffness by conducting a matched cohort analysis with cuff repairs without stiffness. Materials and Methods Patients who presented with full-thickness rotator cuff tears & concomitant stiffness were included in the study (Group I)(n = 19). Clinical assessment was done in terms of range of motion (ROM), Visual analogue score (VAS), Constant score & American Shoulder Elbow Surgeons (ASES) scores. Group I was compared to a matched cohort of patients undergoing cuff repair without stiffness during the same study period (Group II)(n = 38). MRI analysis was done at one year postoperatively to assess healing of the cuff. Results: 19/41 patients in group I with a mean follow-up of 27.3 ± 1.4 months were compared to 38/420 in group II patients at a mean follow-up of 35 ± 8.1 months. All parameters improved significantly postoperatively & were comparable in both groups though recovery was slower in Group I. We had 3/19(15.8%) & 8/41(21%) retears in Group I & II respectively, however this difference was not statistically significant. Conclusion: Single-stage arthroscopic repair and capsular release for rotator cuff tears with stiffness results in a good clinical and radiological outcome. Retear rates are comparable to cuff tears without stiffness.

Category: Shoulder - Rotator Cuff

Does Allogenous Dermal Scaffold Augmentation Improve Rotator Cuff Healing and Clinical Outcomes in Large to Massive Rotator Cuff Tear? A Retrospective Case-Controlled Study With Arthroscopic Partial Repair On Clinical and Radiologic Evaluation

Abstract ID# 23035

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Summary:
In large to massive rotator cuff tears, arthroscopic partial repair with allogenous dermal scaffold augmentation yielded superior tendon thickness and increased acromio-humeral distance postoperatively compared to partial repair only.

Data:
Background: Treatment of large to massive rotator cuff tears is challenging and has led to use of scaffold augmentation for better healing. Although poor tendon quality and vascularity are known for failure of rotator cuff healing, biological and mechanical repair with allogenous augmentation has shown a promising outcome as a viable treatment option Objectives: We hypothesized that incorporation of allogenous dermal scaffold augmentation in addition to large to massive rotator cuff repair would result in improved clinical outcomes and mechanical strength supported by radiologic evidence of superior tendon integrity and less postoperative retears. Study Design & Methods: The study was composed of a total of 55 patients with large to massive rotator cuff tears. The patients were divided into two groups; Group A (28 patients) underwent arthroscopic partial repair, and Group B (27 patients) had allogenous dermal scaffold graft augmentation after partial repair. Clinical assessment included University of California-Los Angeles, Constant-Murley score, and visual analogue scale at preoperative, postoperative 3rd, 6th, and 12th month periods. Radiologic assessment, including magnetic resonance imaging, was performed preoperatively and postoperatively to assess repaired tendon integrity, based on Sugaya classification. Results: The mean follow-up period for Group A and B were 14.5 months and 16.3 months, respectively. In both groups, all clinical functional scores improved at the final follow-up. Postoperative magnetic resonance imaging revealed 4 retears and 2 retears in group A and B, respectively, and superior postoperative repaired tendon thickness in Group B to Group A with statistical significance (p-value 0.00). In addition, acromio-humeral distance was significantly improved postoperatively in both groups, from 7.25 mm to 9.44 mm in Group A and from 7.41 mm to 10.99 mm in Group B, but the group B showed superior improvement in acromio-humeral distance than group A. (p-value 0.05)

Category: Shoulder - Rotator Cuff

Effect Of Bone Marrow Aspirate Concentrate With Different Carriers For The Regeneration Of Tendon In A Chronic Rotator Cuff Tear Model Of Rabbit

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Summary:
BMAC with two different carriers could effectively achieve the multi-lineage differentiations and gene expressions, compared to those without carrier, at the early phase. However, the combination of BMAC and atelocollagen finally had more superior tendon-to-bone healing effects in a RCT model of rabbit.

Data:
Background: Even though bone marrow aspirate concentrates (BMAC) was investigated to promote tendon-to-bone healing in animal and human study, it is still debatable whether stem/progenitor cells could maintain the biological stability without any carrier environment. This study was designed to evaluate the effect of bone marrow aspirate concentrate with different carriers for the