

B0773

Effect of prior rotator cuff repair on clinical outcomes following reverse shoulder arthroplasty

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Background: Reverse shoulder arthroplasty (RSA) has been reported to improve pain and function in patients with cuff tear arthroplasty (CTA); massive rotator cuff tear and associated glenohumeral arthritis.^{1,2} For the potential complication or unclear long-term outcomes, however, surgeons might consider traditional rotator cuff repair as a salvage procedure. There has been limited information regarding the effect of prior rotator cuff repair on clinical outcomes after subsequent RSA in CTA patients. Therefore, the purpose of this study was to assess the outcomes of RSA in patients who had undergone previous rotator cuff repair compared with those who had not.

Methods: Using a single institution's total joint registry, 1082 shoulders that underwent RSA were reviewed. We identified 68 shoulders with CTA (67 patients) that had undergone open or arthroscopic rotator cuff repair prior to RSA and had >2-year follow-up. We matched a 1:1 cohort of control patients without prior rotator cuff surgeries for age, sex, body mass index, and radiologic CTA classification (Hamada classification) at the prosthetic surgery. These two groups were compared for pre- and postoperative outcomes including pain score, active range of motion, manual muscle testing (MMT) for abduction, and ASES score. As a subgroup analysis for repairing procedures, clinical outcomes of RSA with open cuff repair (44 shoulders) were also compared to those with arthroscopic repair (24 shoulders).

Results: There were no significant differences in preoperative measurements between groups. Both groups showed improvement of pain score and active range of motion after performed RSA; whereas, active forward elevation at the final follow-up were significantly inferior in shoulders with prior rotator cuff repair (mean, 144° vs 155°, $P = 0.04$). No differences were shown in active external rotation or MMT for abduction between groups. Postoperative ASES score showed significant differences between patients with prior rotator cuff repair and patients in the control group (mean, 65.6 vs 73.8, $P = 0.01$). In patients with prior rotator cuff repair, there were no significant differences in RSA outcomes between open cuff repair and arthroscopic repair.

Discussion: This study demonstrates that RSA for CTA patients who have undergone prior rotator cuff repair provides a significant improvement of their symptoms and shoulder function at >2-year follow-up. These results might support the rotator cuff repair as a surgical option for advanced tears. On the other hand, surgeons should be aware that expected outcomes of RSA in patients who had undergone previous rotator cuff repair might be lower than outcomes of those who had not.

Conclusion: RSA could be a successful surgical option in patients with CTA who have undergone arthroscopic or open rotator cuff repair in terms of improved symptoms and shoulder function with greater than 2-year follow-up.

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B0776

Isolated anterior horn tears of medial menisci in soccer players

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Background: The middle portion and posterior horn are common site for meniscus tears. Although isolated anterior horn (AH) tear is rarely, the isolated anterior horn tears of lateral meniscus (LM) in soccer players has been reported and its arthroscopic findings of the multiple longitudinal tears within the white zone of the anterior horn were shown. Because the posterior horn of the medial meniscus (MM) is received the repetitive load during the knee flexion, the medial meniscus tears are commonly occurred at the posterior horn. Therefore, the isolated AH tears of MM are also rarely reported. The purpose of this study was to examine the clinical and arthroscopic characteristics of a series of the isolated AH tears of the MM.

Materials: From Jun. 2000 to Dec. 2015, 740 patients have undergone meniscal surgery. Patients who had any concomitant lesion of the middle portion or posterior horn of the MM, or a lesion of the LM were excluded. Thus, 17 of the 234 patients who had the isolated LM tears in the stable knee were included into this study.

Methods: Patients' charts and arthroscopic images were reviewed. Among these patients, the age-categorized distribution data, their mechanism of injury and symptoms, and the tear site were evaluated. Tear site was classified as 3 zones; red/red zone, outer third; red/white zone, middle third; and white/white zone, inner third. Furthermore, patients who could be followed more than 6 months were examined about a re-tear rate, return to sports, and degenerative

changes on plain radiographs. Pearson's chi-square test was used for comparison of tear site between generations, and $p < 0.05$ was considered statistically significant.

Results: The incidence of the isolated AH tear of the MM was 7.3 %. The average age at the time of surgery was 19.2 ± 5.7 years old (15 men and 2 women). According to the age-categorized distribution, 9 patients were in their teens, 6 patients were in their 20s, 1 patient was in his 30s, and no patient was in his 40s or more. Twenty-nine years and younger patients were significantly more, compared to 30 years and older ($p < 0.05$).

Fifteen patients (94%) were injured in playing soccer or futsal, and 1 patient was injured in playing tennis. Twelve patients were in locked knee at the first time of our clinic. Two patients experienced a severe pain at the instance of kicking the ball, and 2 patients occasionally felt a catching sensation of their knees.

The average period from injury to surgery was 42.6 ± 57.0 weeks. All patients had the longitudinal tear at red/red zone, which was close to the meniscocapsular junction. Thirteen patients were performed meniscal repair using inside-out technique with the average 9.9 ± 3.3 sutures. Of 11 patients who were followed more than 6 months (average follow-up period was 75.5 ± 75.6 weeks), 8 patients were undergone meniscal repair and 3 patients were undergone meniscectomy. All patients who were undergone meniscal repair could be returned to sports at the previous activity level. No patient experienced a re-tear and no degenerative change was found on plain radiographs at the final follow-up.

Discussion: According to the previous anatomical study of the MM, the meniscus of anterior portion attaches to the tibia by inferior periphery only with the coronary ligament. On the other hand, superior periphery of the MM in anterior portion shows no attachment. Hence, the mechanical strength of the MM in anterior portion might be weaker than other portion. Furthermore, during kicking the ball, the knee joint has been reported to be extended from 90 degrees of flexion and external rotation, and the AH of the MM has been reported to move by 10 mm. At the moment of kicking the ball, this fragile site squeezes between the femur and the tibia, and the periphery tear of AH might be occurred.

Conclusions: The AH tear of the MM was found in 7.3 % of patients with the isolated MM tears in the stable knee. The patients in their teens and 20s were significant more, compared to the patients in their 30s and older. Ninety-four percent of them were injured in playing soccer. All tears were located at close to meniscocapsular junction, and the outcome of meniscus repair was very satisfied.

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Risk factors affecting the outcome of the revision anterior cruciate ligament reconstruction

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Background: Revision anterior cruciate ligament (ACL) reconstruction is said to technically challenging. There are difficulties in tunnel placement, a limited choice of available grafts, and complexity in acquiring stable graft fixation. To solve these problems we have selected the anatomical rectangular tunnel ACL reconstruction with a bone-patellar-bone graft (ART-BTB) reported by Shino. ART-BTB technique can mimic the natural fiber arrangement inside the native ACL and minimize tunnel size.

The objective of this study was to estimate risk factors that influence postoperative instability after revision ACL reconstruction with ART-BTB technique using multivariate logistic regression analysis.

Material: The records of all patients undergoing revision ACL reconstruction with ART-BTB technique from May 2009 to October 2014 was retrospectively reviewed. Operation was done by same surgeon. Patients have been follow-up more than one year. Data collected included patient demographics (age, sex, BMI, time from the initial surgery, time from re-injury, early graft failure), operative findings (meniscal tear, cartilage loss, tear form of graft, overlapping tunnels), postoperative physical examination findings (Lachman test, Pivot shift test), Tegner, Lysholm, and International Knee Documentation Committee (IKDC) score.

Method: A total of 42 patients (42 knees) were identified. Patients were sorted into two groups between A and B. It is included in the A group that meets all these, negative Lachman test, negative Pivot shift test, same tegner score between pre-injury and post-operation, IKDC score grade A, Lysholm score more than 94 points. And B group set non-group A.

Statistical analysis was performed using SPSS software (IBM-SPSS, New York, USA). After univariate analysis using Mann-Whitney U test, Fisher exact test, x square test, multivariate logistic regression analysis was done. A nominal p value of <0.05 was considered to indicate statistical significance.

Results: The results of univariate analysis for each examination item, the presence or absence of the influence factor early graft failure ($p < 0.01$), high BMI ($p < 0.01$), time from re-injury ($p < 0.05$), severe medial meniscus injury ($p < 0.05$) met. In multiple logistic regression analysis, the presence or early graft failure (Odds ratio 28, $p < 0.01$), BMI (Odds ratio 58, $p < 0.01$), severe medial meniscus injury (Odds ratio 20, $p < 0.05$) is significantly inferior outcome It had increased the risk.

Discussion: With respect to the clinical results of the re-ACL reconstruction using ART-BTB, the presence of early graft failure, high BMI, severe medial meniscus damage was affected significantly. Tunnel expansion and overlap did not have a significant effect on clinical outcomes. This is considered to be due to the fact that was exactly transplanted secure initial fixation to the anatomy attachment part by using a bone-patellar tendon. In addition, it has been found that involved strongly in performance at the time of re-ACL reconstruction not only the performance

improvement of the initial reconstruction to preserve the medial meniscus at the time of the first surgery.

Conclusion: High BMI, early graft failure, severe medial meniscus injury is a cause of inferior outcome of the clinical results of re-ACL reconstruction using ART-BTB technique.

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Clinical comparison of physeal sparing double bundle anterior cruciate ligament reconstruction and delayed reconstruction in patients with open physes

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Background: Tears of anterior cruciate ligament (ACL) were considered a rare injury in children and adolescents, but a number of recent studies suggest that their incidence is increasing. Treatment strategies for ACL tears in patients with open physes have evolved, however, there are still no clear management guidelines. It used to be thought that surgery should be delayed until skeletal maturity to prevent violation of the physes and consequent disturbance of growth. It is now generally accepted that operative intervention gives a better functional outcome. The purpose of this study is to compare the outcomes of physeal sparing ACL reconstruction and delayed reconstruction in patients with open physes.

Material & Method: We evaluated 12 patients (7 men and 5 women), who were treated for ACL tears either by physeal sparing reconstruction (PS group, n=6) or delayed reconstruction (D group, n=6) between 2009 and 2014. The mean age at the time of injury was 12.1 years for the PS group and 13.7 years for the D group. The physeal sparing reconstruction we performed was as follows. An incision was made to the distal portion of lateral femur and epiphyseal line was identified. Thereafter, the femoral double round tunnels were created distal to epiphyseal line by using outside-in guide. The tibial double round sockets were drilled by using retrodrill system. The results of both groups were compared postoperative Tegner activity score, Lysholm score, International Knee Documentation Committee (IKDC) grade and physical examination findings (Lachman test, Pivot shift test). Statistical analysis was performed using SPSS software (IBM-SPSS, New York, USA). A nominal p value of <0.05 was considered to indicate statistical significance.

Results: The average postoperative Tegner and Lysholm score was 6.8, 98.7 in PS group and 7.0, 99.0 in D group, respectively. There was no significant difference in both score (p=0.87, p=0.75). One patient in both groups was IKDC grade B, but all other patients were grade A. The results of the Lachman test were all normal, and the results of the pivot shift test were glide for one patient in both group and normal for all other patients. At the time of operation, two patients in D group were noted meniscus tear, which were not found at the time of injury. No patient had a re-rupture or a discrepancy in the length of the lower extremities measured clinically.

Discussion: ACL reconstruction in patients with open physes is a controversial topic. This is the first report of the physeal sparing and anatomic double bundle reconstruction for skeletally immature patients. Our ACL reconstruction technique yields satisfactory clinical results. In this study, two patients were noted meniscus tear in D group, therefore conservative treatment of ACL injuries often leads to poor and unacceptable results.

Conclusion: This case series indicates good results of double bundle ACL reconstruction with use of physeal sparing technique in patients with open physes.

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B0780

Arthroscopic treatment of multidirectional shoulder instability with capsular narrowing and shortening of the anterior, inferior and posterior ligaments: Minimum 2-year follow-up

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Background: Shoulder stabilization for symptomatic multi-directional instability can be performed with open or arthroscopic surgery, but arthroscopy has become the preferred method. There are differences in different arthroscopic capsule narrowing techniques. The aim of this study was to present the clinical outcomes of arthroscopic all round capsular narrowing applied along the axes of the glenohumeral ligaments (GHL) in 2-4-year follow-up period.

Materials: The study included 75 patients who underwent surgery because of symptomatic multi-directional shoulder instability. The diagnosis was made on the basis of patient history, physical examination and arthroscopic findings. Functional outcomes of the all patients were evaluated with the American Shoulder and Elbow Surgeons (ASES) score, Rowe instability score and visual analog pain scale. Stability, strength, degree of pain and range of motion were also evaluated with patient-reported scales.

Methods: The technique applied was arthroscopic shortening of the inferior capsule then the inferior GHL anterior and posterior sections, the medial GHL, and superior GHL. In each case, 3 absorbable screws were used. An arm sling was applied for 3 weeks postoperatively. After 3 weeks, ROM exercises were started without forcing internal and external rotation. At the end of one week, all ROM exercises and strengthening exercises were started. Sporting activities were permitted after 16 weeks.

Results: In the follow-up period of 2-4 years, all postoperative functional scores were rated good to excellent except three cases. There were 2 (2.66%) cases of recurrent dislocation and 1(1.33%) case of symptomatic instability. In the cases of recurrent dislocation, revision was applied with the Latarjet procedure. There were no differences in range of motion compared with the opposite extremity in 72 (96%) cases.

Discussion and Conclusion: The good results obtained with open capsule narrowing have been obtained in recent years with arthroscopic techniques in multi-directional shoulder instability. The results of this study demonstrated that in multi-directional instability, capsular narrowing applied with the arthroscopic technique in the form of all round shortening along the axes of the glenohumeral ligaments is an effective technique which is compatible with the biomechanics of the glenohumeral joint and provides good results in terms of pain relief and clinical stability at a minimum 2-year follow-up.

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B0784

Preoperative evaluation of spinoglenoid ganglion cyst with MRI, EMG and isokinetic muscle test – Does size matter?

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Background: There are few studies correlating the size of ganglion cyst at the spinoglenoid notch with electrophysiological alterations, muscle power or pain severity.

Materials and Methods: Between June 2010 and November 2014, 30 patients (24 males and 6 females) who diagnosed with a ganglion cyst at the spinoglenoid notch on MRI were evaluated by EMG/NCV test and isokinetic muscle test. Maximum cyst diameter was measured on MRI and used for comparison. Pain severity was estimated by visual analogue scale (VAS). And, pooled sensitivity and specificity analysis was conducted, with an assessment of the summary receiver operating characteristic (ROC) curve.

Results: EMG/NCV test were examined in 27 out of 30 patients. Eight out of 27 patients were diagnosed with suprascapular neuropathy. The overall mean cyst size was 2.1cm. The cyst size of EMG positive group was 2.7cm, and size of EMG negative group was 1.8cm. When the size of ganglion cysts was increased 1cm, probability of an abnormal EMG/NCV test were increased 4.32 times (odds ratio: 4.32, p = 0.023). Area under the ROC curve (AUC) was 0.822, and set point 2.2cm had most sensitivity (87.5%), specificity (73.7%), positive likelihood ratio (3.3). However, there was no significant difference in the peak torque deficit on external rotation (mean: 30.2 (> 2.2 cm) vs. 20.7 (< 2.2 cm); p = 0.156) and abduction (mean: 28.6 (> 2.2 cm) vs. 18.4 (< 2.2 cm), respectively; p = 0.28) according to the size of ganglion cyst. The mean pain VAS of all 30 patients was 6.22 (range: 3–9), and there was no statistical difference in pain VAS according to the cyst size (mean: 6.06 (> 2.2 cm) vs. 6.50 (< 2.2 cm), respectively; p = 0.841). Twenty eight out of 30 patients had a labral lesion associated with spinoglenoid notch cyst on MRI. We performed SLAP repair in 19 cases, biceps tenodesis in 6 cases, biceps tenotomy in 3 cases, and cyst decompression only in 2 cases.

Discussion: Large spinoglenoid notch cysts may compress the suprascapular nerve. Tung et al [1] reported that average maximum diameter of cysts associated with muscle denervation was 3.1cm. However, this study diagnosed muscle denervation on MRI, not the EMG/NCV study. The strengths of this study were as follows; 1) The current study used needle EMG for the diagnosis of suprascapular neuropathy. 2) This is the first study regarding the correlation with cyst size and suprascapular neuropathy. 3) All patients in the present study have taken EMG/NCV test, isokinetic muscle performance test and MRI evaluation. The limitation of study was 1) small number for subgroup analysis, 2) postoperative external rotation power and EMG follow up were not analyzed.

Conclusion: The current data suggested that cyst size reflect the compressive suprascapular neuropathy. Therefore, the decompression surgery would be justified in patients with cyst size greater than 2.2 cm.

References:

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B0788

Safe needle insertion points of FAST-FIX 360

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Background: FAST-FIX (FF) 360 is an implant developed with consideration for mechanical performance, safety and handiness among a number of implants. However, it has a demerit of a needle of the implant inserting blindly over the meniscus, and consequently, the installation site of the implant cannot be confirmed. Therefore, it is important to understand the anatomy around the insertion site and meniscus to prevent such a shortcoming.