Summary: Similar functional outcome but impaired health related quality of life with bilateral ACL surgery.

Introdction: A patient with an ACL-reconstructed knee (ACLR), has a great risk of sustaining a new ACL injury in either knee. Paterno et al. reported that in an active, young population who returned to pivoting activities that 25.4% sustained a new ACL injury. 75% of these injuries were to the contralateral knee. Data from the Swedish Knee Ligament Registry report a contralateral ACLR rate of close to 5% at a 5-year follow-up after primary ACLR. The purpose of this study was to 1, identify pre-, intra- and postoperative risk factors associated with contralateral ACLR 2, compare knee laxity and functional knee outcome between primary and contralateral ACLR and 3, compare activity level, patient-reported knee function at a minimum of 5 years follow-up. Methods: 1, Primary ACLR, 2005-2014 (n = 5393) and occurrence of a contralateral ACLR within 5 years. Regression analysis [age, gender, body mass index, time from injury to surgery, pre-injury Tegner], intraoperative [graft type, meniscus injury, cartilage injury] and postoperative [limb symmetry index (LSI)] for quadriceps and hamstring strength and single-leg-hop test performance as risk factors for a contralateral ACLR. 2, Same patients who underwent primary and contralateral ACLR (n = 326). The KT-1000 for knee laxity and KOOS for subjective outcome. 3, Bilateral strength and single-leg-hop test performance as risk factors for a contralateral ACLR.

Regression analysis [age, gender, body mass index, time from injury to surgery, pre-injury Tegner], intraoperative [graft type, meniscus injury, cartilage injury] and postoperative [limb symmetry index (LSI)] for quadriceps and hamstring strength and single-leg-hop test performance as risk factors for a contralateral ACLR. 2, Same patients who underwent primary and contralateral ACLR (n = 326). The KT-1000 for knee laxity and KOOS for subjective outcome. 3, Bilateral strength and single-leg-hop test performance as risk factors for a contralateral ACLR.

Results: 1, The overall incidence of a contralateral ACLR within 5 years was 4.7%. Multivariable analysis revealed that the risk of contralateral ACLR was significantly affected by age (OR 0.40; 95% CI 0.28-0.58; P < 0.001), time from injury to surgery (OR 0.48; 95% CI 0.30-0.75; P = 0.001) and single-leg-hop test (OR 1.56; 95% CI 1.04-2.34; P = 0.03). 2, The mean preoperative and postoperative anterior tibial translation (ATT) and ATT reduction were not different between primary and contralateral ACLR. No significant differences were found for any of the five KOOS subscales at 2 years. 3, A total of 98 patients (mean age 2 SD, 33.3 ± 7.73) with a bilateral ACLR and 98 patients with unilateral ACLR (mean age 2 SD, 33.3 ± 7.7) were included. The mean postoperative follow-up was 7.6 ± 1.8 years. Patients with a bilateral ACLR reported lower scores on all KOOS subscales, the EQ-SD and the EQ-VAS at follow-up (P < 0.05). There was no difference in activity level between the groups at the follow-up, but patients with a bilateral ACLR were less satisfied with their activity level and knee function (P < 0.05). Conclusion: The 5-year incidence of contralateral ACLR was 4.7%. Most important risk factors were good functional outcome at 6 months follow-up. Knee laxity and functional knee outcome after contralateral ACLR are comparable to those after primary ACLR but long term patient-reported knee function and health-related quality of life were inferior in patients with a bilateral ACLR compared to patients with a unilateral ACLR.

Category: Knee - Other

Qualitative Evaluation Of Reconstructed Anterior Cruciate Ligament Maturation after Anterior Cruciate Ligament Reconstruction Using Magnetic Resonance Imaging-Ultrashort Echo Time T2* Mapping

Abstract ID# 22107
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Summary:

The healing process of the reconstructed anterior cruciate ligament (ACL) after anterior cruciate ligament reconstruction (ACLR) is one of the important factors for return to sports. Magnetic resonance imaging-ultrashort echo time (MRI-UTE) T2* mapping can quantify T2* values in tissues with short T2 relaxation times, such as tendons and ligaments, which cannot be evaluated with conventional MRI. T2* values reflect the amount and arrangement of collagen in the tissue, with lower values in tissues containing dense collagen, and higher values in tissues with sparse collagen. This study aimed to observe the healing process of the reconstructed ACL after ACLR using MRI-UTE T2* mapping and compare its quality in each healing phase to that of a normal ACL. Method Ten patients (10 females; mean ± SD age 18.4 ± 4.3 years) who underwent initial ACLR with autogenous hamstring tendon from 2018-2020 and 12 volunteers (6 males, 6 females; mean ± SD age, 30.8 ± 9.6 years) without any history of knee diseases or surgeries were recruited. Patients who underwent ACLR had MRI-UTE T2* mapping of the operated knee at 6, 9, and 12 months postoperatively, and volunteers underwent MRI-UTE T2* mapping of the right knee joint only once. T2* values of the reconstructed and normal ACLs were measured at the distal, middle, and proximal sites. The regions of interest of each site were measured at the areas unaffected by artifacts using a 10-mm circle. The mean T2* values measured at the three sites were defined as the T2* values of the entire tissue. The T2* values of the reconstructed ACL at 6, 9, and 12 months postoperatively and the normal ACL were compared using a one-way analysis of variance. Result The UTE-T2* values of the reconstructed ACLs were 13.1 ± 1.9 ms, 11.7 ± 1.5 ms, and 11.1 ± 1.3 ms, respectively, at 6, 9, and 12 months postoperatively, and the UTE-T2* value at 6 months postoperatively was significantly higher than those at 9 and 12 months (P < 0.01 vs. 9 months; P < 0.01 vs. 12 months). The UTE-T2* value of the normal ACL was 11.9 ± 2.4 ms, which differed significantly from the value obtained 6 months postoperatively of the reconstructed ACL (P < 0.01). Conclusion The T2* value of the entire reconstructed ACL at 6 months postoperatively was significantly higher than that of the entire reconstructed ACL at 9 and 12 months and the normal ACL. This indicates that the quality of the reconstructed ACL 6 months after ACLR did not reach that of the normal ACL.

Category: Knee - Other

ACL Repair Versus Reconstruction- A Clinical, MRI and Patient-Reported Outcome Comparison

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Summary:

Proximal tears of the ACL offer the possibility of direct repair, with the benefit of maintaining native tissue and anatomy. There has been a recent resurgence in this approach using modern surgical techniques and technology. Existing literature is promising but relatively limited.

Data:

Background: Tears of the anterior cruciate ligament (ACL) offer the possibility of direct repair, with the benefit of maintaining native tissue and anatomy. There has been a recent resurgence in this approach in select patients with Sherman Type I and II proximal tears (Sherman et al, 1991) using modern surgical techniques and technology. Existing literature is promising but relatively limited (Achtnich et al, 2016; Murray et al, 2020). Aim: To report the patient-reported outcome measures (PROMs), clinician-measured outcomes and MRI signal noise quotient (SNQ) (Oshima et al, 2020) of a primary ACL repair cohort and compare this with a matched cohort of ACL reconstructions by the same surgeon. Methods: A post-hoc analysis was performed on prospectively collected data from 20 consecutive patients who underwent primary ACL repair by the senior author from 2017 to 2020. This was compared to an age and sex-matched cohort of ACL reconstruction by the same surgeon, using PROMs, objective return to sport (RTS) testing, and MRI analysis. Results: ACL repairs demonstrated equivalent post-operative PROMs to reconstructions as measured by IKDC subjective score (78.5 ± 17.1 versus 83.7 ± 13.3, P = 0.333), Tegner Activity Scale (5.9 ± 1.8 versus 6.1 ± 2.6, P = 0.646) and Lysholm score (89.8 ± 10.0 versus 89.6 ± 10.4, P = 0.762). RTS assessment of repairs was conducted earlier than reconstructions (8.2 ± 2.8 months versus 10.6 ± 1.4 months, P = 0.020). There was no difference between groups in proportion passing quadriceps strength criteria (50% repairs versus 53% reconstructions, P = 0.097), hop testing and Y-balance testing. There was a significant difference in proportion passing hamstrings strength criteria (86% repairs passed versus 60% reconstructions, P = 0.023) and hamstrings to quadriceps ratio (71%
repari versus 20% reconstructions, p = 0.003). There was no difference between repair and reconstruction cohorts for post-op stability as measured with side-side laxity on KT-1000 (1.8mm ± 1.4mm versus 1.5mm ± 2.0mm, p = 0.905) or GNRB (1.6mm ± 1.8mm versus 1.5mm ± 2.0mm, p = 0.850). Differences were seen on 12-month MRI analysis with repairs showing higher SNQ at both femoral (8.8 ± 5.7 versus 4.6 ± 2.9, p = 0.009) and tibial sites (10.0 ± 5.7 versus 4.3 ± 4.2, p = 0.001), with no difference seen at the mid-substance between the groups (12.3 ± 8.5 versus 7.6 ± 5.2, p = 0.074). Repairs demonstrated higher values on average (10.0 ± 5.7 versus 4.3 ± 4.2, p = 0.001). There were no graft failures on MRI in either group. Conclusions: When patient selection is optimised for Sherman Type I or II tears, ACL repairs demonstrate equivalent patient-reported outcomes and better objective outcomes (hamstrings strength) to reconstructions at an earlier time point post-surgery. Tissue quality as assessed on MRI shows higher signal at tibial and femoral attachment sites.

Category: Knee - Other

Lateral Tibial Plateau Translation on MRI is Associated with Measured Laxity at One Year Following ACLR

Abstract ID# 22667
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Summary:
Lateral tibial plateau translation on MRI is associated with measured laxity at one year following ACLR.

Data:
Introduction Anterior lateral tibial plateau translation (ATT) as measured on MRI has been shown to be predictive of anterior cruciate ligament (ACL) rupture and is correlated with high grade rotatory laxity in ACL deficient knees. Post operative laxity following ACL reconstruction (ACLR) has also been shown to predict re-rupture and return to sports rates, and can be assessed objectively using the GNRB® arthrometer. To date, the relationship between ATT and postoperative laxity has not been established, and this study therefore investigated the relationship between laxity as measured on GNRB® and ATT at 1 year post ACLR. Methods A retrospective analysis was conducted of 172 patients who had undergone both high resolution standardised protocol 3T MRI scan and completed GNRB® laxity testing at 1 year following ACLR. The measured variables were ATT in millimetres (mm) on MRI, and maximum anterior displacement of the tibia (TD, also in mm) at 200N of force using the GNRB® machine. Analysis was carried out with SPSS version 28 with descriptive statistics to calculate means, standard deviations (SD) and range. Independent samples t-test was used to compare means between two cohorts of ATT determined by the post hoc cut off, and linear regression to investigate correlation between ATT and TD. Significance was set at p<0.05. Results Mean ATT was 3.9mm (SD 2.4, range 0 - 12), and mean TD was 8.5mm (SD 2.2, range 4 - 15). To allow comparison between two cohorts of ATT, a cut off was set at 4mm which was in keeping with both median and mean values for our cohort and available literature on ATT. There was a significant difference (p<0.001) when comparing TD between the cohort with ATT less than 4mm and those greater or equal to 4mm (n=85 vs n=87, mean TD 7.9mm vs 9.1mm respectively). ATT and TD were found to be weakly correlated (r = 0.4, p<0.01). Discussion and Conclusion ATT of greater than 4mm measured on MRI scan at 1 year post ACLR was predictive of increased laxity. Our findings support the use of this measure as a generalisable and easily accessible tool to identify patients with residual laxity post ACLR who may be at increased risk of re-rupture and poorer outcomes. This is the first study to investigate ATT as a surrogate measure of objective laxity following ACLR.

Category: Knee - Other

Does The Soaking Of Hamstrings Tendon Autograft With Vancomycin Reduce The Contamination During Harvesting and Manipulation? A Prospective Randomized Clinical Trial

Abstract ID# 23156
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Summary:
We propose soaking the graft in vancomycin in order to prevent the patients from septic arthritis after ACL reconstruction.

Data:
Purpose: Septic arthritis after ACL reconstruction is a devastating complication. In recent years graft soaking with Vancomycin has been proposed as a solution to eliminate this complication. The purpose of the present study is to access how the vancomycin solution protects the Hamstrings autograft during harvesting and preparation. Material and Methods: The study material consisted of 40 patients operated on for ACL reconstruction with a Hamstring tendons autograft. In 20 patients the graft was soaked in vancomycin (Group A) while in 20 (Group B) the graft was not soaked in vancomycin. We used strict criteria for this study; all patients were operated from the same surgeon, with the same technique, the same way of tendon harvesting and preparation. Only patient with isolated ACL reconstruction were included in this study. In all the patients we calculated the time of graft harvesting, and the total time of surgery. In all patients we used the same antibiotic for infection prevention (1 dose prior and two doses after the operation). After fixation of the graft to the tibia with an interference screw and a staple, the rest of the tissue was send for culture. All the cultures were incubated in 37° C with 5% CO2 in agar plates for 5 days and inspected daily for microbial growth. Any bacterial growth and the number of colony forming were reported. Results: There was no statistical difference in harvesting time and total operation time between the 2 groups. On the other hand 11 patients (60%) in group B were positive while no patient in Group A was positive. This difference was statistically significant (p<0.01). All cultures were positive for the same microorganism, coagulase-negative staphylococcus (CNS). Thus soaking the graft with vancomycin protects the infection during harvesting and preparation of the graft. Conclusions: In this series Hamstring tendons autograft harvesting and preparation leads to bacterial contamination in 60% of the cases. On the other hand there is no contamination after soaking the graft with vancomycin. On the basis of this study we propose soaking the graft in vancomycin in order to prevent the patients from septic arthritis after ACL reconstruction.

Category: Knee - Other

Rates of Septic Arthritis after ACL Reconstruction: A Large Single System Analysis

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Summary:
In a large cohort of 6,741 patients, ACL reconstruction with quadriceps tendon yielded a significantly lower rate of septic arthritis than hamstring tendon (0.10% vs 0.72%, respectively, providing useful information for patients and surgeons when counseling on infection risk during ACL reconstruction.

Data:
Introduction: Septic arthritis is a rare but catastrophic complication after anterior cruciate ligament reconstruction (ACLR). Although the infection rates for bone-patella tendon-bone autograft (BTB), hamstring tendon autograft (HT) and allograft have been reported previously, there is limited data available for large cohorts of quadriceps tendon autograft (QT). The aim of this study is to compare rates of septic arthritis after primary and revision ACLR with QT, BTB, HT, and allograft. Methods: All ACLR cases performed by 10 high-volume sports medicine fellowship-trained ACL surgeons between January 2000 and January 2022 were retrospectively analyzed. Minimum follow-up was 90 days after ACLR, and all multi-ligament reconstructions were excluded. Demographic information,