including age, sex, time from injury-to-surgery, a history of previous knee surgery, graft type, concomitant meniscal injury and femoral tunnel drilling technique were analyzed as recorded in the New Zealand ACL Registry. The ACC database was used to identify patients who underwent a subsequent reoperation with review of operation notes to identify those who had a reoperation for “arthrofibrosis” or “stiffness”. The rates of arthrofibrosis were calculated for each patient and surgical factor and compared via Chi-Square test. A multivariate Cox regression survival analysis was performed to identify the risk factors for reoperation for arthrofibrosis. Hazard ratios (HR) with 95% confidence intervals (CI) were computed. Results: Of 9617 primary ACL reconstructions analyzed, 215 patients underwent a subsequent reoperation for arthrofibrosis (2.2%). A higher risk of arthrofibrosis was observed in female patients (adjusted HR = 1.67, 95% CI 1.22 – 2.27, p = 0.001), patients with a history of previous knee surgery (adjusted HR = 1.97, 95% CI 1.11 – 3.50, p = 0.021) and when a transtibial femoral tunnel drilling technique was used (adjusted HR = 1.55, 95% CI 1.06 – 2.28, p = 0.024). Patients who underwent early ACL reconstruction within 6 weeks of their injury did not have a higher risk of arthrofibrosis when compared to patients who underwent surgery more than 6 weeks after their injury (3.5% versus 2.1%, adjusted HR = 1.56, 95% CI 0.97 – 2.50, p = 0.07). Age, graft type and concomitant meniscal injury did not influence the rate of arthrofibrosis.

Discussion and Conclusion: Female sex, a history of previous knee surgery and a transtibial femoral tunnel drilling technique are risk factors for arthrofibrosis after primary ACL reconstruction. Undergoing early ACL reconstruction within 6 weeks of ACL rupture does not increase the risk of arthrofibrosis.

Category: Knee - ACL

The Impact of Prior Tibial Slope on Meniscal Injury in Acute ACL Ruptures: A Large, Retrospective Registry Study

Abstract ID# 22759

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Summary:
This large registry study illustrates that increased lateral posterior tibial slope is associated with higher rates of meniscus injury in acute ACL ruptures.

Data:
Background: Increased posterior tibial slope has previously been associated with an elevated risk of anterior cruciate ligament (ACL) rupture. Recent studies have suggested there may be a relationship between posterior slope and meniscal tears in ACL ruptures; however, these studies have either included chronic ACL injuries, revision ACL reconstructions or an overall low number of study participants. The goal of this study is to leverage a large ACL registry to assess the impact of posterior tibial slope on meniscal tears in acute ACL ruptures. Methods: Our institution’s ACL Registry was consulted to identify all patients between the age of 18 and 45 who underwent primary ACL reconstruction between January 2019 and July 2022 for acute, noncontact ACL rupture, defined as undergoing surgery within 90 days of injury. Patients with pre-existing meniscal pathology, chronic ACL reconstructions, revisions, multi-ligament knee injuries and nonoperatively managed ACL injuries were excluded. Preoperative MRIs were used to measure lateral and medial posterior tibial slope for all patients. Meniscal pathology seen in-situ during arthroscopy was recorded based on operative reports. Demographics data, including age, sex, and body mass index, were also recorded. Independent cohorts were created for our three main analyses based on the presence or absence of, firstly, any meniscal tear, secondly, any lateral meniscal tear and, thirdly, any medial meniscal tear. Two-tailed student’s t-tests were used to compare average medial and lateral posterior tibial slopes between groups. Multiple regression was carried out to determine other risk factors for meniscal injury in this population. Results: 1058 patients ultimately met inclusion criteria. The average age was 29.5 and there were 532 (50%) women. There were 346 (33%) patients with lateral meniscus tears, 245 (23%) patients with medial meniscus tears and 498 (47%) patients with any meniscal tear. The average lateral posterior tibial slope was 5.54 (-4.2 to 13.4) and 5.67 (0 to 15.7), respectively. Increased lateral tibial slope was associated with a statistically significant increase in rate of any meniscal tear (p<.005) and lateral meniscal tear, specifically (p<.005). Multiple regression identified elevated BMI and male sex as independent risk factors for meniscal injury in this population. Conclusion: Increased lateral posterior tibial slope is associated with a higher rate of meniscus injury in acute ACL ruptures. This knowledge adds to the growing literature surrounding the impact of posterior tibial slope on ACL and meniscal injuries.

Category: Knee - ACL

Combined Anterior Cruciate and Anterolateral Ligament Reconstruction Decreases Passive Anterior Tibial Subluxation and Provides Better Rotational Stability Compared to Isolated Anterior Cruciate Ligament Reconstruction: A Propensity Score-Matched Analysis

Abstract ID# 23545

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Summary:
Combined ACL and ALLR significantly reduces PATS and improves rotational stability compared to isolated ACLR, despite similar functional scales between patients in the two groups. Our findings are expected to aid clinical decision-making regarding ALLR as a treatment option in patients undergoing ACLR to improve knee stability.

Data:
Background: Passive anterior tibial subluxation (PATS) is encountered in patients with anterior cruciate ligament (ACL) injuries. Rotational instability of the knee following ACL reconstruction (ACLR) remains a concern post-surgery. An anatomic approach to the anterolateral ligament (ALL) has, therefore, garnered increased interest in orthopaedic sports medicine because of its potential role in knee stability. Purpose/Hypothesis: To compare the extent of PATS on magnetic resonance imaging and clinical outcomes between ACL + ALL reconstruction (ALLR) versus isolated ACLR. We hypothesized that patients who underwent combined procedures would show reduced PATS and superior knee stability compared to patients who underwent ACLR. Methods: We enrolled 252 patients who underwent primary ACLR between March 2014 and February 2020 at our center, with a minimum follow-up of 2 years (48.4 ± 16.6 months). Patients who underwent combined procedures (ACL + ALLR) were matched in a 1:1 propensity ratio to patients who underwent ACLR only. Anterior tibial subluxation was measured using magnetic resonance imaging (MRI). We evaluated PATS, knee stability (side-to-side laxity difference, pivot-shift test), and mobility after the procedure and documented complications. Thirty-four patients underwent second-look arthroscopy for evaluation of the graft status, with results compared between the groups. Results: Thirty-five matched pairs were included, with no significant differences in preoperative PATS values of the medial and lateral compartments between the groups (ACL + ALLR vs isolated ACLR: lateral compartmental, 5.6 ± 2.2 vs 5.8 ± 2.2 mm; medial compartment, 2.7 ± 1.5 vs 3.3 ± 1.5 mm; P > .05). However, postoperative average PATS values of the ACL + ALLR group showed significant improvement than in the isolated ACLR group (ACL + ALLR vs isolated ACLR: lateral compartmental, 0.5 ± 1.5 vs 2.1 ± 2.0 mm; medial compartment, -0.2 ± 1.3 vs 0.5 ± 1.3 mm; P < .05). The ACL + ALLR group showed significantly better knee stability results in pivot-shift grade (P = .037), although there were no significant differences between groups regarding clinically important measures, complications, and second-look arthroscopic findings (all P > .05). Conclusion: Patients who underwent combined ACL + ALLR demonstrated significantly reduced anterior tibial subluxation and better rotational stability than patients who underwent isolated ACLR, despite similar functional scores between the 2 groups, suggesting that ALLR could be a safe and effective procedure that leads to better outcomes with respect to knee stability.

Category: Knee - ACL

Increased Knee Valgus and Hip Adduction Moments After Hamstring Autograft Compared to Quadriceps Autograft in Adolescents 6 Months After Anterior Cruciate Ligament Reconstruction

Abstract ID# 21371

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Hamstring Autografts are significantly associated with larger knee valgus moments at initial contact and hip adduction moments compared to Quadriceps Autografts whereas Quadriceps Autografts with and without bone block have significantly decreased knee extension moment averages compared to Hamstring Autografts during DVJ. Data: Objective: There is limited evidence related to the effects of autograft type on functional performance after anterior cruciate ligament (ACL) reconstruction (ACLR). This study compared biomechanical outcomes during the drop vertical jump test (DVJ) between patients with a hamstring autograft (HS), quadriceps autograft with bone block (QB), quadriceps autograft without bone block (Q), and bone-patellar tendon-bone autograft (BTB) six-months postoperatively in an adolescent population. The authors hypothesized that there would be differences in biomechanical profiles between athletes depending on autograft type used. Methods: Patients aged 8 to 18 years who underwent primary ACLR were included for analysis. Kinematic and kinetic data collected during a DVJ using a 3D computerized marker system (Motion Analysis Corp. CORTEX software) was assessed six-months after ACLR and compared to the uninjured contralateral limb. Outcomes evaluated included hip internal rotation, hip adduction, knee valgus, and knee extensor moments between the graft types. Results: One hundred fifty-five subjects were included for review. There were no significant differences in terms of age, sex, or affected leg (p > 0.1973) between the groups. The HS group was significantly associated with larger knee valgus moments at initial contact as compared to the Q group (28 x 10^-2 N*m/kg vs. -3.5 x 10^-2 N*m/kg, p = 0.0254) and significantly larger hip adduction moments compared to the QB group (30 x 10^-2 N*m/kg vs. -4.0 x 10^-2 N*m/kg, p = 0.0426). Both the QB (-12 x 10^-2 N*m/kg vs. -3.0 x 10^-2 N*m/kg, p = 0.0628) and Q group (-13 x 10^-2 N*m/kg vs. -3.0 x 10^-2 N*m/kg, p = 0.459) demonstrated significantly decreased knee extension moment averages as compared to a hamstrings autograft. Conclusions: The findings of this study suggest that the quadriceps autograft may confer improved knee coronal plane biomechanics with regard to ACL re-injury mechanics but decreased extensor mechanism function when compared to a hamstrings autograft at six-months after ACLR in adolescent patients performing a drop vertical jump. Category: Knee - ACL Quadriceps Autograft Is A Viable Graft Choice For Both Primary and Revision ACL Reconstruction: A Matched Control Cohort Study Abstract ID# 21443 All Authors: Amit Meena MBBS, MS, DNB INDIA Luca Farinelli MD ITALY Christian Hoser MD AUSTRIA Elisabeth Averbamm MD AUSTRIA Caroline Hepperger PhD AUSTRIA Mohit Kumar Patralekh MBBS, MS(Orthopaedics), DNB(Orthopaedics), MNAMS INDIA Mirco Herbdot MD, Prof. GERMANY Christian Fink MD, Prof. AUSTRIA Summary: Primary and revision ACL reconstruction with QT autografts had acceptable functional outcomes Data: Background: The incidence of ACL reconstruction is increasing and quadriceps tendon (QT) autograft is gaining popularity for both primary and revision ACL reconstruction. Better patient-reported functional outcomes and a lesser graft failure rate are seen in primary ACL surgery as compared to revision surgery with the hamstring graft. No study compared primary and revision ACL surgery using QT autograft. Purpose: The purpose of this study was to evaluate the differences in the patient-reported functional outcomes, concomitant injuries and graft failure in primary and revision ACL surgery using the autologous QT graft. The hypothesis was that better functional outcomes, lesser concurrent injuries and lesser graft failure would be associated with primary ACL reconstruction compared to revision reconstruction. Methods: 376 patients with primary ACL reconstruction and 138 patients with revision ACL reconstruction were retrospectively retrieved from a prospectively collected ACL registry. A minimally invasive technique was used for QT autograft harvesting. The surgical procedure and rehabilitation protocol were identical in both groups. To maintain a homogeneous cohort for the study, the groups were matched for age, gender, and pre-injury outcome scores (Lysholm knee score, Tegner activity level and visual analogue scale for pain). Initial baseline assessments of outcome scores were compared to scores collected at the 2-year postoperative mark. Results: The mean age of the primary group and revision group was 32.9 ± 10.2 (range, 18-55) and 32.3 ± 9.9 (range, 19-55) respectively. Significant improvements were noted in Lysholm (p=0.007) andVAS (p=0.001) scores in primary ACL reconstruction compared to revision construction. However, no significant difference was found in Tegner activity level (p>0.05). Primary ACL injuries were associated with significantly higher MCL injuries (p=0.019), while, the revision group was associated with significantly higher cartilage (p=0.001) and meniscal injuries (p=0.003). A significantly higher graft failure rate was noted in the revision group compared to the primary ACL reconstruction group (p=0.005). Conclusion: Both primary and revision ACL reconstruction with QT autografts had acceptable functional outcomes. The primary group had better outcomes than the revision group. The lower prevalence of meniscal and cartilage injuries in the primary group compared to the revision group may be responsible for better outcomes. The revision group was associated with higher graft failure than the primary group. QT autograft is a viable graft choice for both primary and revision ACL reconstruction. Level of evidence: Level III Cohort Study Category: Knee - ACL Patient Reported Outcomes And Revision Rates After Primary Anterior Cruciate Ligament Reconstruction Without Concomitant Knee Injury: A Comparison Of Quadriceps, Hamstring, And Bone-Patella-Tendon-Bone Autografts With Minimum 2 Year Follow-Up Abstract ID# 21506 All Authors: Yuxuan (Yushy) Zhou MBChB, PDipSurgeonANZ NEW ZEALAND Atua Fuimaono-Aaso MBChB NEW ZEALAND Michael Van Niekerk MB, ChB, FRACS NEW ZEALAND Chris Frampton PhD NEW ZEALAND Marc Hirner MBChB, Msc, FCS, FRACS NEW ZEALAND Summary: This study compares patient reported outcome measures and revision rates for different autograft options in patients with primary anterior cruciate ligament reconstruction without concomitant knee injury. Data: Background: The quadriceps tendon is emerging as a popular autograft option for primary anterior cruciate ligament reconstruction. Limited studies have investigated the functional outcomes and survivorship of quadriceps tendon with variable results. Furthermore, most previous studies are confounded with the inclusion of patients with concomitant knee injuries alongside anterior cruciate ligament reconstruction. This study aims to investigate the differences in patient reported outcome measure scores and revision rates for quadriceps tendon in comparison with hamstring tendon and bone-patella-tendon-bone autografts. We use a cohort of patients who have had primary anterior cruciate ligament reconstruction without concomitant knee injuries. Methods: Prospectively collected data linked to the New Zealand Anterior Cruciate Ligament Registry was used for the study. All patients who underwent a primary arthroscopic anterior cruciate ligament reconstruction with a valid 2 year patient reported outcome measure score were considered for the study. Patients who had associated knee injuries, previous knee surgery, or open procedures were excluded. The primary outcome was Knee Injury and Osteoarthritis Outcome Score (KOOS) and MARX scores at 2 years post-surgery. Secondary outcomes were all-cause revision and time to revision with a follow-up period of 8 years (time since inception of the Registry). Results: 2581 patients were included in the study; 1917 hamstring tendon, 557 bone-patella-tendon-bone, and 107 quadriceps tendon. All groups had comparable baseline characteristics. At 2 years, no significant difference in MARX score was found between the three groups (2y mean score; 7.36 hamstring, 7.85 bone-patella-tendon-bone, 8.05 quadriceps, p = 0.195). Further, no significant difference in KOOS scores were found between the three groups, with the exception of hamstring performing better than bone-patella-tendon-bone in the KOOS sports and recreation sub-score (2y mean score;