weeks are at significantly increased rate of observed concurrent chondral and medial meniscal injuries. While time to surgery significantly correlated with rates of observed concurrent pathology, after approximately 8 weeks, the rates of articular chondral injury increase proportionately with time from injury in both the skeletally mature and skeletally immature populations.

Category: Knee - ACL

Patients with Bilateral ACL Reconstruction (ACLR) Have 3x the Rate of Posterior Tibial Slope Greater than 12-Degrees Compared to Unilateral ACLR: MRI and Radiographic Evaluation

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Summary:
The purpose of this study is to compare PTS angles measured on x-ray and MRI between patients who had bilateral ACL tears compared to those who had only sustained a unilateral ACL tear.

Data:
Purpose: Increased posterior tibial slope (PTS) is a risk factor for primary anterior cruciate ligament (ACL) tear, as well as subsequent ACL graft tear. Prior literature has shown conflicting relationships between an increased PTS and bilateral ACL tears. We aimed to compare PTS angles, as well as the rate of markedly increased PTS (>12° on lateral radiograph; >7° on MRI), between patients who underwent bilateral ACL reconstruction (ACLR) vs unilateral ACLR. A secondary purpose was to examine whether these associations remained consistent on both plain radiographs and MRIs. Methods: We retrospectively identified patients who underwent primary ACLR at our institution from the years 2012 to 2020. Patients with non-simultaneous bilateral ACLR (n=53) were matched to those with unilateral ACLR (n=53) by age, sex, and BMI. Exclusion criteria were: rotated lateral radiographs, inadequate quality MRI, concomitant ligament injury or fracture. Unilateral ACLRs with less than 5-year follow-up or revision were further excluded. Three blinded readers measured PTS on lateral radiographs, while medial (MPTS) and lateral (LPTS) were measured on MRI. Bivariate regression was performed to determine correlation between radiograph and MRI measurements. Results: PTS in the bilateral ACLR cohort was significantly greater than the unilateral ACLR cohort on radiographs (11.26° vs 10.13°, p=0.044) and LPTS (7.32° vs 6.08°, p=0.012), but not MPTS (4.55° vs 4.17°, p=0.467). The percentage of bilateral patients with radiograph PTS >12° was 41.0%, compared to 13.2% in unilateral cohort (p=0.012). The bilateral cohort had a significantly greater rate of LPTS >7° compared to unilateral patients (53.8% vs 32.1%, p=0.016), but not MPTS (p=0.467). On MRI, LPTS (5.93° ± 3.20°) was significantly greater than MPTS (5.12° ± 2.78°; p<0.001). There was weak correlation between MPTS-radiograph (R=0.24, p=0.02) and LPTS-radiograph was not significantly correlated (R=0.03, p=0.810). Conclusion: Patients who underwent bilateral ACLR had significantly greater PTS on radiographs and LPTS on MRI compared to those with unilateral ACLR. The rate of PTS >12° was 3.1x greater among bilateral ACLR compared to unilateral ACLR. PTS measurements on radiographs demonstrated weak-to-negligible correlation with MRI measurements, suggesting future normative PTS values should be reported specific to the imaging modality.

Category: Knee - ACL

The Covid 19-Related Lockdown Increased The Rate of Cyclops Syndrome After ACL Reconstruction for Patients With Unexpected Home-based Self-Guided Rehabilitation

Abstract ID# 21374
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Summary:
Exceptional measures related to the COVID-19 led to the stop of rehabilitation with physiotherapist after ACLR changing the postoperative social habits and leading to self-guided rehabilitation with a significant increase of the rate of cyclops syndrome.

Data:
Introduction After Anterior Cruciate Ligament Reconstruction (ACLR), complete extension should be recovered before the 6th week otherwise the risk of cyclops syndrome is significantly increased. The COVID 19 pandemic has led to a lockdown and to the absence of supervised rehabilitation with physiotherapist for several weeks, requiring self-made rehabilitation for patients operated just before this lockdown. The hypothesis was that the rate of cyclops syndrome increased during the lockdown with self-guided rehabilitation with a significant increase of the anterior arthrolysis rate. Methods A COVID series cohort of 72 patients operated with hamstrings graft for ACLR between February 10 and March 16, 2020 had a part of the rehabilitation of the first 6 postoperative weeks done during the lockdown with videos on a dedicated website. A clinical examination was performed at a minimum follow-up of 1 year with analysis of the range of motion, IKDC, Lysholm, Tegner and ACL-RSI scores. This series was compared to a matched-paired control cohort of 72 patients operated in 2019 with a complete classical postoperative supervised-rehabilitation with a physiotherapist. Results In the COVID series, mean follow-up was 14.5 months, rate of second surgery for clinical cyclops syndrome was 11.1% (8 patients). The rate was 1.4% in the control series with a statistical difference (p=0.01). In the COVID series, anterior arthrolysis was done with a mean delay of 8.6 months after the primary surgery, four patients had another surgery (3 for meniscal procedure, one for device removal). Mean Lysholm was 86.6 ± 14.1 (range, 38-100); Tegner was 5.6 ± 2.3 (range 1-10); Subjective IKDC was 80.3 ± 14.7 (range 33-100) and RSI-scale was 77.3 ± 19.4 (range 33-100) in the COVID series. Conclusion Exceptional measures related to the COVID-19 led to the stop of rehabilitation with physiotherapist after ACLR changing the postoperative social habits and leading to self-guided rehabilitation with a significant increase of the rate of cyclops syndrome. The dedicated website wasn’t enough efficient to support unexpected self-guided rehabilitation. Self-guided rehabilitation could benefit of improvement of interactive that must be at least as effective as supervised-rehabilitation methods.

Category: Knee - ACL

Mid-Term Outcomes Of Repeated Revision Anterior Cruciate Ligament (Acl) Reconstructions With Allografts In Isolate And Complex Cases Of Multiple Failures

Abstract ID# 21982
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Summary:
Good mid-term clinical results can be obtained after repeated ACL revision with allograft in patients that experienced multiple failures, however, who need additional procedure due to malalignment or post-meniscectomy syndrome report lower objective and subjective results.

Data:
Background: Anterior Cruciate Ligament (ACL) revision reconstruction are always complex scenarios due to eventual associated meniscal and cartilage lesion or degeneration. Nevertheless, these procedures have reached a satisfactory return to impact activity rate, and so the occurrence of an ACL revision reconstruction failures is destined to increase. Only few studies with a limited number of patients focused on clinical outcomes of multiple ACL revision reconstruction reporting contrasting results. Purpose: To evaluate the mid-term clinical outcomes of a cohort of patients who underwent multiple ACL revision reconstruction. The hypothesis was that patients with pre-existing meniscal deficiency conditions, malalignment and cartilage degeneration would have obtained lower results. Study Design: retrospective cohort study Methods: All cases of Multiple ACL Revisions performed with Allograft tissue at one single sport-medicine institution were extracted and patient's whith a minimum 2 years of follow-up included. WOMAC, Lysholm, IKDC, Tegner activity level before injury and at last follow-up was collected and laxity evaluated with KT-1000 arthrometer and KIRA triaxal accelerometer. Results: From a cohort of 241 ACL revision, 28 patients (12%) with Repeated ACL Revision reconstructions were included. Fourteen cases (50%) were...
considered “Complex” due to the addition of Meniscal Allograft Transplantation (8) or Meniscal Scaffold (3) or High Tibial Osteotomy (3). The remaining 14 cases (50%) were considered as “Isolate”. Mean WOMAC score was 84.6±11.4, Lysholm 81.7±12.3, subjective IKDC 77.2±12.1, median Tegner score (IQR 6–8) at pre-op and at final follow-up. Statistically significant inferior values of WOMAC (p<0.0079), Lysholm (p=0.0185) and Subjective IKDC (p=0.0193) was detected between “Complex” and “Isolate” revision groups. Higher average value of anterior translation at KT-1000 at both 125 N (p=0.0346) and manual maximum displacement test (p=0.0299) were reported in “Complex” respect to “Isolate” revisions. Four patients were considered as failures and occurred in patients with “Complex” revisions, none occurred in the “Isolate” (30/100 vs 0%; p=0.0407). Conclusion: Good mid-term clinical results can be obtained after repeated ACL revision with allograft in patients that experienced multiple failures, however, who need additional procedure due to malalignment or post-meniscectomy syndrome reported lower objective and subjective results.

Category: Knee - ACL

Autograft Demonstrates Superior Outcomes For Revision Anterior Cruciate Ligament Reconstruction When Compared to Allograft: A Systematic Review

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Summary:
Patients undergoing revision ACLR with autograft can be expected to experience lower rates of graft retear, higher rates of return to sport, and less postoperative anteroposterior knee laxity when compared to patients undergoing revision ACLR with allograft.

Data:
Background Multiple studies have compared outcomes between patients undergoing revision anterior cruciate ligament reconstruction (ACLR) with autograft versus allograft. Purpose To perform a systematic review of clinical outcomes following revision anterior cruciate ligament reconstruction (rACLR) with autograft versus allograft. Study Design: Systematic Review of Level I-IV comparative studies Methods A systematic review of the literature was performed by searching PubMed, the Cochrane Library, and Embase to identify studies that compared outcomes between patients undergoing rACLR with autograft versus allograft. The search phrase used was: autograft allograft revision anterior cruciate ligament reconstruction. Graft re-rupture rates, return to sport rates, anteroposterior laxity, and patient-reported outcome scores (PROs) (Subjective International Knee Documentation Score, Tegner Score, Lysholm Score, and Knee Injury and Osteoarthritis Outcome Score) were evaluated. Results Twelve studies met inclusion criteria, including 3,011 patients undergoing rACLR with autograft (mean age 28.9 years) and 1,238 patients undergoing rACLR with allograft (mean age 28.0 years). Mean follow-up was 57.3 months. The most common autograft and allograft types used were bone-patellar tendon-bone grafts. Overall, 6.2% of patients undergoing rACLR experienced graft retear, including 4.7% in the autograft group and 10.2% in the allograft group (p<0.0001). Among studies that reported return to sport rates, 66.2% of autograft patients returned to sport compared to 45.5% of allograft patients (p=0.01). Two studies found significantly greater postoperative knee laxity in allograft patients compared with autograft patients (p<0.05). Among all PROs, only one study found one significant difference between groups, in which autograft patients had a significantly higher postoperative Lysholm score when compared to allograft patients. Conclusion Patients undergoing revision ACLR with autograft can be expected to experience lower rates of graft retear, higher rates of return to sport, and less postoperative anteroposterior knee laxity when compared to patients undergoing revision ACLR with allograft.

Category: Knee - ACL

Higher Risk of Medial Meniscal Repair Failure Following Concurrent Anterior Cruciate Ligament Reconstruction with a Hamstring Tendon Autograft: Results from the New Zealand ACL Registry

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Summary:
The use of a hamstring tendon autograft increases the risk of medial meniscal repair failure following concurrent ACL reconstruction.

Data:
Introduction: Anterior cruciate ligament (ACL) reconstruction with concomitant meniscal injury occurs in up to 80% of cases. Meniscal repair is associated with improved long-term outcomes compared to resection, but is also associated with a higher reoperation rate. Knowledge of the risk factors for repair failure may be important in optimizing patient outcomes. The aim of this study was to identify the patient and surgical risk factors for meniscal repair failure following concurrent primary ACL reconstruction. Methods: Prospective data recorded by the New Zealand ACL Registry were reviewed. Primary ACL reconstructions with a concurrent repair of either a medial or lateral meniscal tear recorded between April 2014 and December 2018 were analyzed, allowing for a minimum follow-up of two years. Meniscal repair failure was defined as a patient who underwent subsequent meniscectomy, and was identified after cross-referencing data from the ACL Registry with the national database of the Accident Compensation Corporation (ACC), which is the New Zealand Government’s sole funder of ACL reconstructions and any subsequent surgery. The predictor variables of interest included age, gender, time from injury-to-surgery, graft type, femoral tunnel drilling technique, surgeon case volume and concomitant cartilage injury as recorded in the New Zealand ACL Registry. Failure rates were compared via Chi-square test. Multivariate regression was performed to produce hazard ratios (HR) with 95% confidence intervals (CI) to identify the risk factors for meniscal repair failure.

Results: A total of 2041 meniscal repairs were performed during concurrent primary ACL reconstruction (medial repair = 1235 and lateral repair = 806). The overall failure rate was 9.4% (n = 192). Failure occurred in 11.1% of medial (137/1235) and 6.8% of lateral (55/806) meniscal repairs. The risk of meniscal failure was higher with hamstring tendon autografts (adjusted HR = 2.00, 95% CI 1.23 – 3.26, p = 0.006) and in those with cartilage injury in the medial compartment (adjusted HR = 1.56, 95% CI 1.09 – 2.23, p = 0.015). The risk of lateral failure was higher when the procedure was performed by a surgeon with an annual case volume of less than 30 ACL reconstructions (adjusted HR = 1.92, 95% CI 1.10 – 3.33, p = 0.021). Age, gender, time from injury-to-surgery and femoral tunnel drilling technique did not influence the risk of meniscal repair failure. Discussion and Conclusion: When repairing a meniscal tear during primary ACL reconstruction, the use of a hamstring tendon autograft and the presence of cartilage injury in the medial compartment are factors that increase the risk of medial meniscal repair failure. Lower surgeon case volume was associated with an increased risk of lateral meniscal repair failure.

Category: Knee - ACL

Clinical Application of Machine Learning Models on Risk Analysis for Ramp Lesions in Anterior Cruciate Ligament Injuries

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Summary:
The prediction model of this study showed the feasibility of using machine learning models as a supplementary diagnostic tool for ramp lesions in ACL-injured knees.

Data:
Background: Peripheral tears of the posterior horn medial meniscus, known as “ramp lesions,” are commonly found in anterior cruciate ligament (ACL)-deficient knees, but frequently missed on routine evaluation. Purpose: To predict the presence of ramp lesions in ACL-deficient knees using machine learning methods