with associated risk factors. Methods: This study included 362 patients who underwrote ACL reconstruction between June 2013 and March 2019. The exclusion criteria were combined fractures and multiple ligament injuries, except for medial collateral ligament injury. Patients were grouped according to the presence of ramp lesions by arthroscopy. Binary logistic regression was used to analyze risk factors including age, sex, body mass index, time from injury (<3 or <3 months), mechanism of injury (contact or non-contact), side-to-side laxity, grade of pivot shift, medial and lateral tibial/meniscal slope, location of bone contusion, mechanical axis angle, and lateral femoral condylar (LFC) ratio. Receiver-operating characteristic (ROC) curves and area under the curve (AUC) were also evaluated.

Results: Ramp lesions were identified in 112 patients (30.9%). The risk for ramp lesions increased with a steeper medial tibial and meniscal slope, higher knee laxity, and increased LFC ratio. Comparing the final performance of all prediction models, the random forest model yielded the best performance (AUC=0.944), although there were no significant differences among the models (p=0.05). The cut-off values for ramp lesions in ROC analysis were as follows: medial tibial slope >5.5° (p<0.001); medial meniscal slope >5.0° (p<0.001); and LFC ratio >71.1% (p=0.033). Conclusion: A steep medial tibial and meniscal slope, an increased LFC depth and a higher knee rotational laxity were observed risk factors for ramp lesions in patients with an ACL injury. 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. In general, care should be taken in patients with ramp lesions and risk factors during ACL reconstruction.

Category: Knee - ACL

The Significance of Posterior Tibial Slope and Rate of Concomitant Pathology in Pediatric Tibia Spine Avulsion and Anterior Cruciate Ligament Injuries

Abstract ID#: 23152
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Summary:
Pediatric tibial spine fractures appear to have similar posterior tibial slope to pediatric ACL injuries on both radiographs and MRI compared to age/gender matched controls.

Data:
Background: Fractures of the tibial spine (TSF) occur as a result of an anterior cruciate ligament (ACL) avulsion fracture from the proximal tibia. Both TSF and ACL injuries are associated with concomitant intraarticular pathology seen on Magnetic Resonance Imaging (MRI) and intraoperatively. In addition, posterior tibial slope (PTS) has been identified as a potential risk factor for ACL injury. Hypothesis/Purpose: The purpose of this study is to describe concomitant injuries seen on MRI and at time of surgery for TSF and ACL patients, and to characterize posterior tibial slope in patients who sustain these injuries. Our hypothesis is that posterior tibial slope is increased in patients with TSF and ACL injuries compared to matched controls. Methods: Utilizing an institutional review board approved retrospective study, we identified patients under 18 years of age who underwent arthroscopic management of a TSF from December 31st 2008 to December 31st 2021. Exclusion criteria were patients with a concomitant lower extremity fracture or posterior cruciate ligament injuries, poor imaging quality, and incomplete medical records. TSF patients were compared to an age and gender matched cohort of patients who underwent surgery for a mid-substance ACL rupture, and a control group. We evaluated concomitant injuries based on radiologic and operative reports and measured PTS on radiographs as well as medial (MTS) and lateral (LTS) posterior slope on MRI for all groups.

Results: 85 TSF patients met inclusion criteria, of which 44 had an MRI. There were 41 patients in the ACL group and 44 in the control group. The average age was 11.8 years. Concomitant injuries were identified on MRI in 59.1% of TSF and 51.2% of ACL patients, and intraoperatively in 36.5% of TSF and 37% of ACL patients. The most common concomitant injury was lateral meniscus tears. There was significantly increased radiographic PTS and MTS in the TSF and ACL groups (Radiographs 8.9°+/−2.7° TSF vs 9.5°+/−3.3° ACL vs 6.6°+/−2.3° Control, MTS 5.4°+/−3.1° TSF vs 4.9°+/−2.7° ACL vs 3.7°+/−2.3° Control). There was no significant difference in LTS between TSF and Controls, but there was between ACL and Controls (LTS 4.1°+/−2.8° TSF vs 6.8°+/−3.9° ACL vs 4.3°+/−2.3° Control). Conclusion: Posterior tibial slope is significantly increased in patients who sustain a TSF or ACL injury, suggesting that it may be a risk factor for injury. Concomitant intraarticular pathology can be seen in both TSF and ACL injured patients, care must be taken to evaluate for additional pathology when treating these injuries.

Category: Knee - ACL

Almost Four Times Lower Failure Rate When Adding a Lateral Extra Articular Tenodesis in the Setting of Revision ACL-R after 4 A Mean of Years Follow-Up

Abstract ID#: 23324
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Summary:
Failure rate was almost 4 times lower for patients treated with a lateral augmentation alongside the revision ACL-R in comparison to isolated revision ACL-R. Although all patients returned to some sports practice, only almost 60% were able to maintain the same level according to the Tegner score at the last follow-up, whether with or without a lateral tenodesis.

Data:
Introduction After several years of disagreement about lateral extra-articular plasty (LEAP), we know that one of the main goals in the setting of Revision ACL-R is to reduce the failure rate. Therefore, the purpose of this study was to compare the failure rate, clinical outcomes and return to sports of a consecutive series of patients operated on for Revision ACL-R with and without a LEAP. Materials and Methods Patients treated with an isolated revision ACL-R between 2010 and 2015 (group 1) were compared to those treated with revision ACL-R associated with a Modified Lemaire LEAP between 2015 and 2019 (group 2). Surgical technique and graft used in primary ACL-R, revision ACL-R and lateral tenodesis were analyzed. Failure rate, determined as recurrent instability that required re-revision surgery was recorded. Subjective scores were calculated for Lysholm and International Knee Documentation Committee (IKDC) forms. Sport activity was evaluated through the Tegner Score. Results A total of 122 patients were included. Sixteen were lost in follow-up. Therefore, 42 patients in group 1 and 64 in group 2 were evaluated with a mean follow-up of 4.1 years (SD 2.1 years), 6.1 years (SD 2.2) for group 1 and 3.2 years (SD 0.9) for group 2. Mean age was 34 years (SD 8.9 years) for Group 1 and 29 years (SD 7.6 years) for Group 2. Failure rate was 23% (n=10) for Group 1 and 6.25% (n=4) for Group 2 (p 0.009) at a mean of 2.9 years. Mean pre and postoperative Lysholm score was 58 (SD 19) and 87 (SD 8.8) in Group 1 and 59 (SD 15) and 88 (SD 8.3) in Group 2 (p<0.01). Mean pre and postoperative IKDC scores were 51 (SD 13) and 81 (SD 10) in Group 1 and 54 (SD 14) and 82 (SD 9.4) in Group 2 (p<0.01). When comparing sport activity previous to the to the ACL-R and at final follow up, Tegner score decreased in 40.5% (43/106) of patients (43% in group 1 and 39% in group 2, p=0.1). Conclusion After a mean of 4 years follow-up, the failure rate after revision ACL-R was almost 4 times less when adding a LEAP. Although all patients returned to some sports practice, only almost 60% were able to maintain the same level according to the Tegner score at the last follow-up, whether with or without a LEAP.

Category: Knee - ACL

Evaluation of Extension Deficit, Anterior Fibrosis and Return to Sports Using Five Different Techniques for Tissue Preservation in ACL-R

Abstract ID#: 23384
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Summary:
We found no difference in terms of anterior fibrosis, extension deficit, subjective scores, return to sports and failure rates. We believe there is an important role for tissue preservation.

Data:
Introduction In the past decade, several authors discussed the presence of
mechanoreceptors and vascularization of the Anterior Cruciate Ligament (ACL). As a result of this concept, an attempt is made to preserve as much tissue as possible in ACL surgery. But, potential complications such as extension deficit, anterior fibrosis (cyclops) and the bad location of the tunnels have been described. The objective of our work was to evaluate a series of patients treated for an ACL-R with different tissue preservation techniques and compare it with the standard technique. Materials and methods We included patients operated between 2015 and 2019 for ACL-R with a minimum follow-up of 2 years. According to the preservation technique, we divided the series into 5 groups. Group A: less than 50% distal remnant; Group B: threaded inside the ACL; Group C: preserves a complete band; Group D: re-tensioning of remaining fibers; Group E: control group, no fiber preservation. We included those with autologous hamstring technique and minimum follow-up of 2 years. All patients complied with the same postoperative rehabilitation protocol. Clinical examination, the time of return to sport and subjective Lysholm and IKDC scores and failure rates were recorded. The presence of cyclops (anterior fibrosis) was evaluated with magnetic resonance (MR). Results We included 250 patients; 63 from Group A, 14 from Group B, 92 from Group C, 38 from Group D and 42 from Group E. The mean follow up was 38.7 months (SD 9.9), 42 months (SD 8.6) in group A, 25.5 months (SD 1.4) in group B, 39.4 months (SD 8.8) in group C, 31.2 months (SD 3.1) in group D and 42.6 (SD 12.8) in group E. Two patients, both from group A, presented loss of 3° and 5° of extension at last follow-up. Mean return to sports time was 9.1 months (SD 3.1) in group A, 9.1 months (SD 1.6) in group B, 8.9 months (SD 2.9) in group C, 8.8 months (SD 1.5) in group D and 9.2 months (SD 3.4) in group E. Seven (11%) patients in group A, 0 in group B, 3 (3%) in group C, 4 (11%) in group D and 2 (5%) in group E decreased the Tegner score. No differences were found for Lysholm and IKDC scores between groups. 30% of the population underwent MRI. In 16 patients cyclops was observed on MRI. Eleven were asymptomatic. Five required a second surgical procedure for anterior fibrosis resection: 2 from group A, 2 from group C and 2 from group E. Four patients presented ACL failure that required revision surgery, 2 in group A and 2 in group C. Conclusion The most important finding of this work is that we found no difference in terms of anterior fibrosis, extension deficit, subjective scores, return to sports and failure rates. We believe there is an important role for tissue preservation.