the subjective IKDC and Lysholm were statistically lower in patients with greater hyperextension. When a meniscus injury was present, in patients with greater hyperextension, the frequency of medial meniscus injury was statistically higher than in patients with less hyperextension. Only hyperextension showed a statistically significant association with re-rupture when evaluated alone (p < 0.001). Regardless of the other characteristics evaluated, only hyperextension statistically influenced the re-tear of patients (p < 0.001), and the chance of re-tear in patients with hyperextension greater than 6.5 was 14.65 times the chance of patients with hyperextension less than 6.5. Conclusion: The cut-off point established to discriminate an ACL re-tear was 6.5 degrees of hyperextension. Only hyperextension statistically influenced a re-tear and the chance of re-tear in patients with hyperextension more than 6.5 degrees was 14.65 times the chance of patients with hyperextension less than 6.5.

Category: Knee - ACL

Risk Factors For Anterior Cruciate Ligament Graft Failure In Elite Athletes: An Analysis Of 342 Professional Athletes With A Mean Follow-Up Of 100 Months From The Santi Study Group

Abstract ID# 22036
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Summary:
Professional athletes undergoing isolated ACLR and aged 21 or younger are at >2-fold risk of graft failure. Orthopedic surgeons treating elite athletes should combine an ACLR with a LEAP to improve ACL graft survivorship

Data:
Anterior cruciate ligament (ACL) injuries are amongst the most common knee injuries sustained in elite sport and athletes generally undergo ACL reconstruction (ACLR) to facilitate their return to sport. Multiple studies have reported predictors for ACL failure, including age, activity level, graft size, graft choice, increased posterior tibial slope and meniscal deficiency. However, no studies are specific to professional athletes and include the addition of a lateral extra-articular procedures (LEAP). The purpose of this study was to determine the risk factors for graft failure in professional athletes undergoing ACLR. It was hypothesized that athletes who underwent combined ACLR with a LEAP would experience significantly lower rates of graft rupture in comparison to those who underwent isolated ACLR. Professional athletes who underwent primary ACLR using autograft by the senior author (BSC) between January 2003 and January 2020 with a minimum follow-up of 2 years were considered for study inclusion. Patients were excluded if they underwent major concomitant procedures, including multiligament reconstruction surgery or osteotomy. Patient notes were reviewed by an investigator, independent of the primary surgeons, to determine if they had sustained a further ipsilateral knee injury, sustained a contralateral knee injury or had undergone any reoperations or complications after the index procedure. Key demographics and additional secondary surgery were also documented. A total of 420 professional athletes underwent ACLR during the study eligibility period. After application of the exclusion criteria, 342 athletes were identified as eligible for final inclusion with a mean follow-up of 100.2 +/- 51.9 months (range, 24 - 215 months). 31 graft failures (9.1%) were reported, all graft failures during the study period with the key independent variable being graft type, patellar or hamstring tendon autograft. This is the first study to specifically analyze risk factors for ACL graft failure in elite athletes of all sports including the addition of a LEAP. Orthopedic surgeons treating elite athletes should combine an ACLR with a LEAP to improve ACL graft survivorship

Category: Knee - ACL

ACL Reconstruction With Hamstring Tendon Is Associated With A Sixfold Increase In Failure Rates Compared With Patella Tendon Grafts In Young Females - A Cohort Study From The New Zealand ACL Registry

Abstract ID# 22817
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Summary:
ACL reconstruction with hamstring tendon is associated with a sixfold increase in failure rates in young females when compared with patella tendon graft.

Data:
Introduction: Young female athletes are a specific population group that is at high risk of primary ACL rupture and subsequent graft failure. Despite large numbers of ACL reconstructions being carried out in young females, there is limited analysis of outcomes in this group, leading to low levels of evidence for graft choice. This study utilizes ACL Registry data to analyze the effects of graft choice on graft survival and PROMs in females aged 15-20 years old. Methodic Prospective data captured by the New Zealand ACL Registry between April 2014 and March 2022 were reviewed. Females aged between 15-20 were included with a minimum follow up of 1 year. The primary outcome measure is ACL graft failure during the study period with the key independent variable being graft type, patellar or hamstring tendon autograft. This is summarised as the rate per 100 patient years and is compared between the two groups using the hazards ratio generated from a Cox-proportional hazards regression. Secondary outcome measures were Marx activity scores, and the Knee Osteoarthritis and Outcome Score (KOOS) patient reported outcome measure. Results: A total of 1261 primary ACL reconstructions in females aged 15-20 were reviewed. Hamstring grafts were used in 797 reconstructions (63%), and patella tendon graft used in 464 reconstructions (37%). There was no difference between the groups in terms of age, time to surgery, pre-injury Marx or KOOS scores. Patella tendon grafts were a larger diameter, 9.5mm vs 8.1mm on average (p<0.001). Patients with a hamstring tendon graft had a graft revision rate of 7.6% compared with 1.1% in patients with a patella tendon graft (hazard ratio 6.1; 95% CI, 2.4-15.1; P<0.001). No differences were noted when comparing KOOS subscales between hamstring and patella tendon groups at 1,2 and 5 years follow up. The patella tendon group had higher Marx scores at 12 months 8.6 vs 7.3 (P<0.001). This difference did not persist at 2 and 5 years follow up. Conclusion: This New Zealand ACL Registry study on graft failure rates in females aged 15-20 years old demonstrates a 6.1 times higher ACL graft failure rate with hamstring grafts compared to patella tendon grafts.

Category: Knee - ACL

Outcomes Of Arthroscopic Posterior Capsular Release for Loss Of Knee Extension after Anterior Cruciate Ligament Reconstruction: Minimum 2-Year Follow Up

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Summary:
In our series, arthroscopic posterior capsular release resulted in significant improvement of knee extension and patient reported outcome scores at 6 month and 2 years postoperatively with a low rate of recurrent stiffness.
Data: PURPOSE To describe outcomes of posterior capsular release to treat knee extension loss after anterior cruciate ligament (ACL) reconstruction in athletes.

METHODS A retrospective review was performed between January 2014 and December 2019 for patients undergoing arthroscopic posterior capsular release for knee extension loss after ACL reconstruction. Patients were indicated for the procedure if they had greater than 10 degrees of extension loss at least three months after ACL reconstruction that was refractory to physical therapy. Patients were included in the study if they were involved in either high school or college athletics, had complete outcomes of interest, and had at least 2 years of follow up. Collected outcomes included preoperative and postoperative measurement of knee extension, international knee documentation committee (IKDC) score, Lysholm score, return to sport data, and complications. RESULTS Over the study period a total of 38 arthroscopic posterior capsular releases were performed. Of these, 20 were high school or college athletes. Two of these patients did not have 2-year follow up, leaving a total of 18 patients included in the analysis. Patients underwent surgery at an average of 16 weeks after ACL reconstruction. Knee extension improved an average of 13.8 degrees at 2-years follow up (pre-extension loss 15.1, post-extension loss 1.3, p < 0.005). At 2 years, there was no significant difference in knee extension when compared to the contralateral knee (p = 0.0151). Improvements in the IKDC score averaged 21.7 at 6 months and 35.0 at 24 months, both of which were statistically significant (p < 0.005). Similarly, differences in Lysholm included an improvement of 23.0 and 34.2 at 6 months and 2 years, respectively (p < 0.005). In total, 77.8% returned to sport at an average of 9.8 months from surgery. Complications included one patient that required revision capsular release for persistent extension loss, one ACL tear of the ipsilateral knee, and two ACL tears of the contralateral knee. No infections or neurovascular injuries occurred. CONCLUSION Knee extension loss after surgery can have significant consequences including reduced patient satisfaction and reduced return to sport. Although arthroscopic posterior capsular release is a recognized treatment for knee extension loss, outcomes have not been reported in athletes. In our series, arthroscopic posterior capsular release resulted in significant improvement of knee extension and patient reported outcome scores at 6 month and 2 years postoperatively. On average, patients had comparable range of motion to the contralateral knee postoperatively. Additionally, the procedure appears to be safe with few complications, including 5.6% need for repeat arthroscopy for knee extension loss. Posterior capsular release appears to be a reliable and safe treatment for athletes with persistent knee extension loss after ACL reconstruction.

Category: Knee · ACL

Greater Knee Stability is Associated with Improved Return to High-Risk Sport Post ACL Reconstruction

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Summary: Quadriceps strength, better patient-reported functional outcomes, and a stable knee all demonstrated a positive association with return to increasingly demanding sports postoperative in patients from the STABILITY 1 Study

Data: Background: In the Stability randomized clinical trial (RCT) comparing ACL reconstruction with or without Lateral Extra-articular Tenodesis (LET) in young active patients, the addition of a LET resulted in reduced graft failure and graft rupture. The purpose of this study was to investigate the association of knee stability to rate of return to sport. Methods: The Stability RCT compared hamstring tendon autograft ACLR with or without a Modified Lemaire LET. Patients aged 25 years or less with an ACL deficient knee were included. They also had to have two of the following criteria: 1) Grade 2 pivot shift or greater; 2) Participation in a high risk/pivoting sport; 3) Generalized ligamentous laxity. Return to sport type and level was determined via administration of a questionnaire at 24 months post-operative. High-risk (HR) sport was defined as sports that required sudden change of direction, cutting, or landing from a jump, while low-risk (LR) sport did not require these movements. Low-level (LL) sport was defined as recreational, while high-level (HL) sport was competitive. Secondary outcomes included the 4-Item Pain Intensity Measure (P4), Lower Extremity Functional Score (LEFS), Quadriceps and Hamstrings strength indices, a single-leg hop test, and postoperative knee stability. In this exploratory analysis, we reported the proportion of patients that RTS in each group, along with reasons for not returning. We identified a subgroup of patients that participated in high-risk sports preoperatively and report trends in outcomes by group (ACLR vs ACLR + LET) and postoperative sport demand (NR, LRLL, HRLL, HRLH, HRHL). Results: We randomized 618 patients with a mean age of 18.8 years (range: 14-25), 293 males. Information on return to sport was available for 603 patients at final analysis. The proportion of patients who did not return to sport was similar between the ACLR (11%) and ACLR + LET (14%) groups. For those not returning to sport, lack of confidence and fear of re-injury was the most common cited reason. 553 patients participated in high-risk sports preoperatively. Within this subgroup, there was a trend towards increasing quadriceps strength, LEFS score, and decreasing pain scores, as patients returned to increasingly more demanding levels of sport. Hamstring strength and the hop test limb symmetry index were not associated with the level and type of sport to which patients returned. A stable knee was associated with nearly two times greater odds of return to high-level, high-risk sport postoperative compared to those with persistent rotatory laxity. Conclusions: At 24 months postoperative, patients who underwent ACLR + LET had a similar return to sport rate as those who underwent ACLR alone. Quadriceps strength, better patient-reported functional outcomes, and a stable knee all demonstrated a positive association with return to increasingly demanding sports postoperative. While the subgroup analysis did not show a statistically significant increase in return to sport with the addition of LET, on returning, the addition of LET kept subjects playing longer by reducing graft failure rates.

Category: Knee · ACL

Improved Subjective Knee Function if Primary Anterior Cruciate Ligament Reconstruction Is Conducted by Experienced Surgeons: A Study from the Swedish National Knee Ligament Registry

Abstract ID# 21612
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Summary: Patients operated by surgeons with high total caseload and annual volume have better subjective knee function two years after primary ACL reconstruction, but there is no difference in subsequent revision rates.

Data: Background Primary anterior cruciate ligament (ACL) reconstruction (ACLR) performed by high volume surgeons and/or clinics has been associated with increased treatment individualization, shorter operating time, decreased complication rates and lower total costs. However, the influence of surgeon/clinic volume on subjective knee function and risk of revision surgery following primary ACLR is still unclear. Purpose To investigate if surgeon and/or clinic volume affects the Knee Injury and Osteoarthritis Score (KOOS) in patients with primary ACLR and to compare the occurrence and risk of subsequent ACL revision surgery between higher and lower volume surgeons/clinics. Methods Data from the Swedish National Knee Ligament Registry (SNKLRI) were used to retrospectively study patients >15 years with ACL injury that underwent primary ACLR with autograft in 2008-2019. Patients completing the two-year KOOS without undergoing subsequent surgery two years postoperatively were included. Patients undergoing subsequent revision ACLR within two years were analyzed separately. Surgeons and clinics were categorized into four groups respectively, based on a combination of total caseload volume (<30 ACLRs/year for surgeons, <500 ACLRs/year for clinics) and annual volume (<29 ACLRs/year for surgeons, <56 ACLRs/year for clinics). Thresholds of Minimal Important Change (MIC), Patient Acceptable Symptom State (PASS) and Treatment Failure (TF) were applied to determine if the results were of clinical meaningful importance. An adjusted multivariable logistic regression was performed to assess variables influencing MIC, PASS and TF of the KOOS (average score of