fold more likely to experience graft failure than those in the ACLR + ALLR group (Hazard Ratio (HR) = 3.554 [1.744;7.243], p = 0.0005). Patients aged less than 20 years were at particularly high risk of graft rupture (HR = 5.65 [1.834;17.241], p = 0.0002) and further analysis of this subgroup demonstrated that isolated ACLR with BPTB also conferred a > 3 fold increased risk of graft rupture in young patients when compared to ACLR + ALLR. Multivariate analysis did not identify any other significant risk factors for graft rupture. Overall, there was a significantly higher reoperation rate following isolated ACLR (BPTB group 20.5%, ACLR + ALLR group 8.9%, p < 0.0001). This finding was accounted for by significantly higher rates of graft rupture (9.9% vs 3.5%, p < 0.0001), cyclops syndrome (3.3% vs 1.5%, p < 0.0001), and secondary meniscectomy (5% vs 2.9%) in the BPTB group. Discussion and Conclusion: Patients who underwent isolated ACLR with BPTB autografts experienced significantly worse ACL graft survivorship and overall re-operation free survivorship when compared to those who underwent combined ACLR + ALLR with hamstring autografts. The risk of graft rupture was more than 3-fold higher in patients who underwent isolated ACLR using BPTB.

Category: Knee - Lateral Extraarticular Tenodesis

The Addition Of Either An Anterolateral Ligament Reconstruction or an Iliotibial Band Tenodesis Is Associated With A Lower Failure Rate After Revision Anterior Cruciate Ligament Reconstruction: A Retrospective Comparative Trial

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All Authors:
Camilo P. Helito MD, PhD, Prof BRAZIL
Marcel F. Sobrado MD BRAZIL
Vitor Barion Castro De Padua MD BRAZIL
Tales Mollica Guimaraes MD BRAZIL
Andre Giardino Moreira Da Silva MD BRAZIL
Marcelo B. Bonadio MD BRAZIL
José R. Pecora Prof. BRAZIL
Riccardo Gomes Gobbi MD, PhD BRAZIL
Gilberto L. Camanho MD BRAZIL

Summary:
Patients who underwent revision ACL reconstruction with a laterally based augmentation procedure had a lower failure rate than patients who underwent isolated revision ACL reconstruction

Data:
Purpose: To compare the failure rate in patients who underwent revision anterior cruciate ligament (ACL) reconstruction alone or associated with an extra-articular procedure. Secondary objectives were to compare ACL laxity, patient-reported outcome measures, and complication rates in these patients and, subsequently, to compare the outcomes of patients who underwent revision ACL reconstruction associated with anatomical anterolateral ligament (ALL) reconstruction or lateral extra-articular tenodesis (LET). Methods: This was a retrospective comparative study. Patients were classified into two groups, according to whether (Group 2) or not (Group 1) an extra-articular reconstruction was performed. Patients who underwent an extra-articular procedure were further divided into ALL reconstruction (Group 2A) and LET (Group 2B). Baseline demographic variables, operative data and post-operative data were evaluated. Results: The groups with (86 patients) and without (88 patients) an associated extra-articular reconstruction had similar preoperative data. Group 2 had a lower failure rate (4.6% vs 14.7%), p = 0.038, better KT-1000, better pivot shift, and better Lysholm. There was no difference regarding complications, except more lateral pain in Group 2. Regarding the groups who underwent ALL reconstruction (41 patients) and LET (46 patients), Group 2A showed better Lysholm scores. Both groups had similar failure rates and complications. Conclusion: Patients who underwent revision ACL reconstruction with a laterally based augmentation procedure had a lower failure rate than patients who underwent isolated revision ACL reconstruction. KT-1000 and pivot shift examination were also significantly better when a lateral augmentation was performed. Complications were similar except for an increase in lateral pain in the augmented group. No clinically important differences were found when comparing the LET group to the ALL group other than a statistical improvement in the Lysholm functional scale, likely not clinically meaningful, favoring the ALL group and an increased duration of post-operative lateral pain in the LET group.

Category: Knee - Lateral Extraarticular Tenodesis

Repair Of the ACL and Anterolateral Structures Versus Reconstruction and Lateral Extra-Articular Tenodesis: A Prospective Comparative Study of Acute ACL-Injured Knees

Abstract ID# 22218

All Authors:
Andrea Ferretti Prof. ITALY
Adnan Saithna Prof., MD, FRCS UNITED STATES
Alessandro Carrozzo MD ITALY
Fabio Marzilli M.D. ITALY
Daniele Mazza MD ITALY
Alessandro Annibaldi MD ITALY
Francesca Latini MD ITALY
Eduardo Monaco MD ITALY

Summary:
the results of our study show that in selected patients, superimposable results can be obtained between repair of ACL and anterolateral structures and reconstruction of ACL and LET.

Data:
Background: Lateral extra-articular procedures (LEAPs) have been effective in reducing graft rupture rates in ACL reconstruction but the evidence supporting their role in ACL repair is sparse Purpose: To compare clinical and radiological outcomes of ACL reconstruction and lateral extra-articular tenodesis (ACLR + LET) against combined repair of the ACL and anterolateral structures (ACLR + AL repair). The hypothesis was that patients undergoing ACL + AL repair would have non-inferior clinical and radiological outcomes with respect to IKDC scores, knee laxity parameters, and MRI characteristics. Furthermore, it was hypothesized that patients undergoing repair would have significantly better FJS-12 scores and shorter times to return to the pre-injury level of sport, without any increase in the rate of ipsilateral second ACL injury. Study Design: Prospective comparative non-randomized study Methods: Consecutive patients presenting with acute ACL tear were considered for study eligibility. ACLR + LET was only performed when intra-operative tear characteristics contra-indicated ACL repair. Patient reported outcome measures (PROMS), re-injury rates, anteroposterior side-to-side laxity difference and MRI characteristics were reported at a minimum follow up of two years Results: One hundred patients (47 ACLR + LET, 53 ACLR + AL Repair) with a mean follow-up of 25.2 months (range, 24-31) were enrolled and underwent surgery within 15 days of injury. At final follow up differences between groups with respect to the IKDC Score, anteroposterior side-to-side laxity difference, and signal-to-noise quotient (SNQ) did not exceed non-inferiority thresholds. ACL + AL repair was associated with shorter time to return to the pre-injury level of sport (ACLR + LET, mean, 9.5 months; ACL + AL repair, mean, 6.4 months; p:.001), better FJS-12 scores (ACLR + LET, mean, 97.4; ACL + AL repair, mean, 91.4 months; p:.04), and a higher proportion of patients achieving PASS for KOOS subdomains (symptoms, 88.2% vs 67.4%, p:.005; sport and recreational function, 94.1% vs 67.4%, p:.001; quality of life, 92.2% vs 73.9%, p:.01). There were no significant differences between groups with respect to ipsilateral second ACL injury rates (ACLR + AL repair group 3.8% and ACLR + LET group, 2.1% (n=1), p:.63). Conclusion: ACL + AL repair yielded clinical outcomes that were non-inferior (or not significantly different) to ACLR + LET with respect to IKDC Subjective, ACL RSI, Tegner and Lysholm scores, knee laxity parameters, graft maturity and rates of failure and re-operation. However, there were significant advantages of ACL + AL repair including shorter duration of time to return to the pre-injury level of sport, better FJS-12 scores, and a higher proportion of patients achieving PASS for KOOS subdomains (symptoms, sport and recreational function, quality of life).

Category: Knee - Lateral Extraarticular Tenodesis

Combined Lateral Extra-Articular Tenodesis or Combined Anterolateral Ligament Reconstruction and Anterior Cruciate Ligament Reconstruction Improves Outcomes Compared to Isolated Reconstruction for Anterior Cruciate Ligament Tear: A Network Meta-Analysis

Abstract ID# 22401

All Authors:
Seong-Hwan Kim MD,Ph,D, MStat KOREA, REPUBLIC OF
Yong-Beom Park MD, PhD KOREA, REPUBLIC OF
Summary:
ACL + ALLR were found to have significantly better outcomes in terms of knee rotational stability and graft failure rate than isolated ACL reconstructions, but the clinical outcomes were unlikely uncertain after a minimum 12 months follow up.

Data:
Purpose: To conduct a network meta-analysis (NMA) comparing the results of randomized controlled trials (RCTs) among patients who underwent either isolated ACL reconstruction or combined lateral extra-articular tenodesis (LET) or anterolateral ligament reconstruction (ALLR). Methods: RCTs that compared isolated ACL reconstruction and combined LET or ALLR were included with minimum 12 months follow-up. Studies that used the double-bundle technique were excluded. Outcome assessment included the number of positive pivot shifts, amount of anterior tibial translation, and IKDC subjective, Tegner, and Lysholm scores. Bayesian NMA and the surface under the cumulative ranking area (SUCRA) were evaluated. Results: A total of 1,077 patients from 11 RCTs were enrolled in this study. In NMA, the odds ratios (ORs) of positive pivot shift were significantly lower in ACL + ALLR (OR, 0.17; 95% CI, 0.027–0.67) than isolated ACL reconstruction, but no difference between ACL + ALLR and ACL + LET. There were no significant differences in anterior tibial translation between the techniques, but the IKDC subjective and Lysholm scores of ACL + ALLR and ACL + LET were significantly higher than isolated ACL reconstruction. ACL + ALLR was the most preferred in terms of residual pivot shift, anterior tibial translation, and IKDC subjective scores (SUCRA = 88.2%; 86.4%; 93.1%, respectively). Additional lateral procedures resulted in significantly lower risk of graft failure (OR, 0.27; 95% CI, 0.1–0.71) than isolated ACL reconstruction. Conclusion: ACL + ALLR were found to have significantly better outcomes in terms of knee rotational stability and graft failure rate than isolated ACL reconstructions, but the clinical outcomes were uncertain after a minimum 12 months follow up. Considering the greatest probability of obtaining better knee rotational stability in this NMA, ACL + ALLR was found to be the most preferred technique for patients with ACL injury.

Category: Knee - Lateral Extraarticular Tenodesis

More Severe Adverse Events are Associated with Worse Patient Reported Outcome Measures Following Anterior Cruciate Ligament Reconstruction with and Without Lateral Extra-articular Tenodesis Augmentation - Results from the Stability Randomized Trial

Abstract ID#: 22594

All Authors:
S. Mark A. Heard MD, FRCS CANADA
Alex Rezansoff MD, FRCS CANADA
Alan Getgood MD, FRCS(Tr&Orth), DipSEM CANADA
Stability Study Group CANADA
Hana Marmura BSc CANADA
Dianne M. Bryant PhD CANADA
Robert G. McCormack MD CANADA
Peter B. MacDonald MD, FRCS, Dip Sport Med CANADA
Tim Spalding FRCS(Orth) UNITED KINGDOM
Peter Verdonk MD, PhD BELGIUM
Devin Clarke Peterson MD, FRGCSC, Dip Sport Med CANADA
Davide Bardana MD CANADA

Summary:
In the Stability Study, worsening severity of adverse events were associated with lower patient reported outcome measures at 2 years post-operative following anterior cruciate ligament reconstruction with or without lateral extra-articular tenodesis augmentation.

Data:
Background: The results of the Stability Study suggest that the addition of lateral extra-articular tenodesis (LET) to a hamstring tendon autograft reduces the rate of anterior cruciate ligament reconstruction (ACLr) failure in high-risk patients. However, there was a higher proportion of patients who experienced hardware irritation and removal following ACLr + LET. It is unclear whether these and other adverse events are similarly associated with changes in patient reported outcome measures (PROMs) and how this should be accounted for in the surgical decision making process. Objective: Investigate how the severity of adverse events encountered during the follow up period of the Stability Study were associated with patient reported outcomes at two years post-operative. Methods: Stability is a pragmatic, multicenter, randomized clinical trial comparing single-bundle hamstring tendon ACLr with combined ACLr + LET. Patients aged 14-25 years with an ACL deficient knee were included (n = 618). Participants completed PROMs (KOOS, IKDC, ACL-QOL), and adverse events were documented pre-operatively and at 3, 6, 12 and 24 months postoperatively. Adverse events were categorized into four groups: none (no adverse event), minor medical (resolved spontaneously or with minimal medical management), minor surgical event such as meniscus tear or stiffness that required surgical intervention but not a graft rupture), contralateral ACL rupture, and graft rupture. A generalized linear model was used to compare mean PROM scores with the different levels of adverse events. Results: The rate of minor medical adverse events (11.2%), minor surgical adverse events (7.4%), and ipsilateral (7%) or contralateral (3%) ACL tears at 24 months post-operative were low considering the high-risk patient profile. There was no difference in the proportion of minor medical events, minor surgical events, or contralateral ACL ruptures between the ACLr only and ACLr + LET groups (p > 0.05). The ACLr only group had a significantly higher rate of graft rupture (11 vs 4%, p < 0.01). Increasing severity of adverse events were associated with lower PROM scores at 24 months post-operative. Patients who experienced any adverse event within the two-year follow up had significantly lower outcome scores than those with no events. When only adverse events in the first year post-operative were included, the influence of minor medical and minor surgical events was largely washed out suggesting the effect on outcomes may be due to recency rather than severity. However, graft tears and contralateral ACL tears within the first year led to significantly lower scores at two-years post-operative in all outcomes (p < 0.01). Conclusions: Increasing severity of adverse events were associated with lower patient reported outcome measures at 2 years post-operative. Recent minor medical and minor surgical events worsened PROM scores, but this effect was largely eliminated within a year of the event. Patients who experience a graft rupture or contralateral ACL tear appear to have a significantly lower PROMs at 2 years post-operative, regardless of the time at which the tear occurs. Therefore, the benefit of the LET procedure reducing graft rupture outweighs the potential for less severe events such as hardware irritation/removal which will likely be less detrimental to patient-important outcomes.

Category: Knee - Lateral Extraarticular Tenodesis

Adolescent Patients Experience Significantly Lower ACL Graft Rupture Rates When ACL Reconstruction is Combined with Lateral Extra-articular Tenodesis: A Comparison Against Outcomes of Isolated ACL Reconstruction

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All Authors:
Alessandro Carrozzo MD ITALY
Adnan Saithna Prof., MD, FRCS UNITED STATES
Edoardo Monaco MD ITALY
Alessandro Annibaldi MD ITALY
Bertrand Sonnery-Cottet MD, PhD FRANCE
Andrea Ferretti Prof. ITALY

Summary:
The addition of an LET to ACLr was associated with a significantly lower graft rupture rate when compared to isolated ACLr in pediatric patients.

Data:
INTRODUCTION: Young patients undergoing anterior cruciate ligament reconstruction (ACLr) are at particularly high risk of graft rupture when compared to adults. Recent studies have demonstrated significant reductions in Anterior cruciate ligament (ACL) graft rupture rates in high-risk adult populations when a lateral extra-articular procedure is performed, but comparative studies in pediatric and adolescent populations are currently lacking in the literature. Purpose: The purpose of this study was to compare the clinical outcomes of isolated ACLr versus combined ACLr+ lateral extraarticular tenodesis (LET) when using the Arnold-Coker modification of the MacIntosh procedure in early adolescent patients. The hypothesis was that combined procedures would be associated with a significantly reduced risk of graft rupture. METHODS: A retrospective analysis of consecutive early adolescent patients who underwent ACLr by hamstrings tendon autograft with or without the Arnold Coker modification of the MacIntosh procedure was conducted. Patients with the presence of one or more specific additional risk factors for graft rupture were offered a LET in addition to ACLr. Clinical outcomes including graft rupture rates, patient reported outcome measures (KOOS and subjective IKDC), knee stability, return to sport rates, re-operation rates and complications were assessed. Comparisons between variables were assessed with Chi-square or the Fisher exact test for categorical variables.