Knee Re-injury and Contralateral Knee Injury Rates Post-ACL Reconstruction: 2022 Update

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Summary:
Supplementing primary ACL reconstruction and standard physical therapy with a return to sports bridge program prior to release to unrestricted sports performance was effective at improving patient QWoutcomes and decreasing ipsilateral knee re-injury and contralateral knee injury rates.

Data:
Purpose To present the results of a return to sports bridge program designed to reduce knee injuries following ACL reconstruction and physical therapy. Methods Two hundred and twelve (male = 111, female = 101) patients participated in an 8-week duration whole body neuromuscular control, progressive resistance strength and agility training program. Post-program testing included functional movement form, dynamic knee stability, lower extremity power, agility, and sports skill assessments. Participants completed the Knee Outcome Survey–Sports Activity Scale (KOS-SAS) before and after program initiation. Subjects re-estimated their pre-participation scores following program completion. Results Global KOS-SAS scores at program entry were 75.8 ± 14. Post-program global rating and calculated KOS-SAS scores were 91.0 ± 9.8 and 90.9 ± 9.7, respectively (p < 0.0001). Pre-participation KOS-SAS score re-estimates at program completion were 54.8 ± 23 (global) and 58.2 ± 20 (calculated). The approximately 30% lower pre-program global KOS-SAS score re-estimate (46.7 ± 32 vs. 75.8 ± 14), and 20% calculated KOS-SAS score re-estimate (56.2 ± 27 vs. 75.0 ± 15) (p = 0.04) observed at program completion suggests that subjects had inaccurately high sports readiness perceptions at program entry. Perceived overall sports activity knee function ratings improved from 2.9 ± 0.6 (abnormal) at program entry to 1.2 ± 0.5 (normal) at completion (p < 0.001). Most subjects returned back to sports at or above their pre-injury performance skill/performance level (84%, 179/212). By 7.7 ± 4.0 years (range = 2-15 years) post-surgery, 14 subjects had sustained an ipsilateral knee re-injury or contralateral knee injury (6.6%). The 2.8% non-contact contralateral and 1.9% non-contact ipsilateral knee injury rates observed were significantly lower than those cited in previous reports. Conclusion Supplementing primary ACL reconstruction and standard physical therapy with a return to sports bridge program prior to release to unrestricted sports performance was effective at improving patient outcomes and decreasing ipsilateral knee re-injury and contralateral knee injury rates.

Category: Knee - ACL Post-Surgery

Early Use of Blood Flow Restriction Training with Low-Intensity Exercises following Anterior Cruciate Ligament Reconstruction Improves Quadriceps Strength and Post-Operative Pain: A Randomized Controlled Trial

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Summary:
Compared to a traditional rehabilitation program, early use of blood flow restriction training coupled with low intensity exercises improves knee extension strength, range of motion, and pain in the acute post-operative phase (weeks 0-12) following ACL reconstruction.

Data:
Background: Blood flow restriction therapy (BFRT) has been proposed as a way to enhance rehabilitation following anterior cruciate ligament reconstruction (ACL-R). However, a paucity of data exists to support the use of BFRT in clinical practice. The purpose of this study is to determine if early application of BFRT, used with low-load (LL) therapy exercises, increases quadriceps strength, and functional outcomes following ACLR compared to a traditional rehabilitation protocol without BFRT. Methods: Forty-five patients undergoing ACLR were randomized to receive either: (1) a traditional rehabilitation program (n = 23), or (2) a modified program using BFRT with LL (20-50% of 1-repetition maximum) exercises (n = 22). Two patients crossed over from the control to BFRT groups at postoperative weeks 2 and 4, respectively. An as-treated analysis was performed for biweekly measurements in the early postoperative period of range of motion (ROM), thigh circumference, and terminal knee extension (TKE) strength. Circumference and TKE strength were analyzed as a percentage of the contralateral side.VAS and IKDC scores were assessed preoperatively and during the first 12 weeks postoperatively. Results: Compared to the control group, the BFRT patients demonstrated significantly greater TKE strength at week 8 (72.9% vs. 79.4%, p = 0.043) and week 12 (73.0% vs. 85.5%, p = 0.030), as well as greater overall change in TKE strength from week 3 to 12 (9.2% vs. 24.2%, p = 0.011). The BFRT group reported significantly lower VAS values at week 12 (1.2 vs. 0.3, p = 0.013) and significantly higher IKDC scores at week 12 (52.9 vs 61.8, p = 0.027). The BFRT group also reported significantly greater flexion than control for week 4 (91.8 vs 102.0, p = 0.025), week 6 (112.7 vs 121.1, p = 0.036), and week 12 (130.5 vs 137.2, p = 0.028). Conclusions: In comparison to a traditional rehabilitation protocol following ACLR, BFRT used in conjunction with LL exercises during the early postoperative period was associated with significantly lower VAS scores as well as significantly greater quadriceps strength and knee flexion. These results suggest that BFRT may help resist muscle atrophy and/or promote muscle hypertrophy during rehabilitation after ACLR, though future studies are needed to assess long-term outcomes.

Category: Knee - ACL Post-Surgery

Short Forms of the Knee injury and Osteoarthritis Outcome Score (KOOS) Following Anterior Cruciate Ligament Reconstruction: Are They of Use and Which Short Form to Choose?

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Background: The Knee injury and Osteoarthritis Outcome Score (KOOS) is a commonly used patient reported outcome measure following anterior cruciate ligament (ACL) reconstruction surgery. To minimize responder burden various short forms of the KOOS are now available, however they have not been extensively used following ACL reconstruction. Purpose: To compare a variety of short forms with each other and determine their responsiveness in patients who have undergone ACL reconstruction surgery. Methods: In part A, the KOOS was administered between 2 and 6 years (mean 3 years) following ACL reconstruction surgery to a cohort of 832 (489M, 343F) patients. From the full KOOS, the following three short form versions were calculated: KOOS-12 Short form, KOOS-Global and KOOS-ACL. Descriptive statistics were calculated for all three measures and associations between them were explored using nonparametric (Spearman rho) correlations. Floor or ceiling effects were considered present if >15% of patients reported the worst (floor effect) or best (ceiling effect) possible score. In part B, the KOOS and a measure of overall knee function were administered at both 2- and 5-years following ACL reconstruction surgery to a cohort of 276 (149M, 127F) patients. The same 3 short forms were derived, and responsiveness was assessed using several distribution and anchor-based methods. From distribution statistics, the standardized response mean (SRM) and smallest detectable change (SDC) score was calculated. Using the anchor-based method, the minimally important change (MIC) score was estimated using Knee injury and Osteoarthritis Outcome Score (KOOS) scores. Improvement in knee function was determined using receiver operating characteristic (ROC) analysis. Results: Ceiling effects were present for all KOOS short form versions. They were only marginally above threshold for the KOOS-12 and KOOS-Global (both 16%) but clearly above for the KOOS-ACL (26%). KOOS-12 and KOOS-Global were very highly correlated (rho = 0.98). The correlation between both these short forms and KOOS-ACL was also substantial (rho = 0.9). Only KOOS-Global scores significantly increased over time, whereas KOOS-12 and KOOS-ACL did not change. The increase in KOOS-Global was associated with a small (0.2–0.3) SRM. MIC scores ranged from 3.2 to 5.2 points, and for all measures MIC scores were larger than the SDC score at a group level. KOOS-Global was the only measure for which the mean difference between the two assessments exceeded both the SDC (group level) and MIC. Conclusion: Of the three short form versions of the KOOS that are currently available there was little to differentiate between KOOS-Global and KOOS-12, and both had superior psychometric properties compared to KOOS-ACL when used at a single timepoint. However, KOOS-Global had the greatest responsiveness to change between 2- and 5-years post ACL reconstruction surgery. It would therefore be the preferred measure to detect changes beyond the initial return to sport phase following ACL reconstruction.

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A Matched-Pair Analysis Evaluating Clinically Meaningful Outcome Improvement and Return to Sport After Anterior Cruciate Ligament Reconstruction With Quadriceps Versus Hamstring Tendon Autograft

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Summary: This study investigates the performance of QT vs HT autografts with respect to achieving clinically meaningful outcomes and return to sport.

Data: Purpose: To investigate the potential association between performing ACL reconstruction with HT or QT autograft, propensity for achievement of clinically meaningful outcomes, and return to sport (RTS). Methods: Thirty patients undergoing ACL reconstruction with QT autograft were matched by age, sex and body mass index to 62 patients undergoing ACL reconstruction with HT autograft. Clinical outcomes including the International Knee Documentation Committee (IKDC) score, Marx scale, Single Assessment Numeric Evaluation (SANE), and Patient-Reported Outcomes Measurement Information System (PROMIS) Pain Interference (PI) and Mobility scores, and metrics concerning RTS were collected. The minimal clinically important difference was calculated for each outcome measure using the distribution-based method equivalent to one-half the standard deviation of the change in outcome score at a minimum of one-year follow-up. Appropriate parametric or non-parametric testing was applied to compare the outcome measures, MCID rates and RTS metrics between the two cohorts. Results: Fifty-four patients (60.0%) were male and the mean age was 22.4 ± 6.8 years. No statistically significant differences were observed between the cohorts in preoperative or postoperative clinical outcome scores, nor the net change in these scores. Furthermore, no significant differences were observed in rates of MCID achievement for the IKDC (QT:90%, HT:93.5%), SANE (QT:90%, HT:98.7%), Marx (QT:93.3%, HT:90.3%), PROMIS PI (QT:96.6%, HT:95.2%), and PROMIS Mobility (QT:79.3%, HT:90.3%). The mean time to RTS was 9.1 ± 2.2 months. Mean time to RTS did not significantly differ between cohorts (QT:9.2 ± 2.4, HT:9.0 ± 2.9, p=0.75). The most common reason for failing to RTS in the HT cohort was not being given clearance (34.5%), while the most common reason in the QT cohort was other reasons outside of their health not related to their knee (38.5%). Notably, satisfaction with overall outcome (QT:96.6%, HT:95.1%, p=0.59) and kinesiophobia RTS after injury scores (QT:64.2 ± 27.6 vs. HT:59.4 ± 24.6, p=0.40) did not differ between the cohorts. Conclusion: The use of QT autograft in ACL reconstruction is a reasonable alternative to HT autograft as it confers similar rates of clinically meaningful improvement and RTS at short-term follow-up.

Category: Knee - ACL Post-Surgery

Blood Flow Restriction After ACL Reconstruction Does Not Accelerate Quadriceps Strengthening

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Summary: Blood Flow Restriction after ACL Reconstruction Does Not Accelerate Quadriceps Strengthening

Data: INTRODUCTION: The use of blood flow restriction (BFR) therapy has gained popularity as an adjunct rehabilitation technique following anterior cruciate ligament reconstruction (ACLR). The purpose of this study was to longitudinally evaluate the impact that BFR has on quadriceps strength following ACLR with quadriceps tendon (QT) autograft in comparison to traditional rehabilitation protocols. METHODS: Patients undergoing primary ACLR with QT autograft at a single institution were retrospectively reviewed. Included patients had a minimum of two isometric strength testing sessions via electromechanical dynamometer (Biodyex). Obtained strength measures included peak knee extension torque of the operative extremity and knee extension ratio of the nonoperative extremity. Two group comparisons of continuous and categorical variables were analyzed by using Mann-Whitney U and chi-squared test, respectively. Statistical significance was set at 0.05. RESULTS: A total of 45 patients (26 female) in the BFR group and 36 patients (13 female) in the traditional rehabilitation group met inclusion criteria. Mean age of the entire cohort was 19.5 years. There were no statistically significant differences among demographic or surgical factors between BFR and traditional cohorts. Of patients receiving BFR therapy, the mean number of BFR treatments was 18 from surgery to first strength