

Factors Associated with Return of Quadriceps Strength Following Anterior Cruciate Ligament Reconstruction using Quadriceps Tendon Autograft

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INTRODUCTION:

Quadriceps tendon (QT) autograft has become a popular graft option for anterior cruciate ligament reconstruction (ACLR) given low retear rates and favorable morbidity profile. However, diminished postoperative knee extension strength can occur with QT autograft. Persistent knee extensor strength deficit following ACLR is concerning as it is associated with retears, diminished patient reported outcomes, lower return to sport, altered knee joint kinematics, and increased risk of osteoarthritis. Factors influencing the restoration of knee extensor strength following ACLR with QT autograft remain undefined. The purpose of this study was to identify factors that influence the return of knee extensor strength following ACLR with QT autograft.

METHODS:

A retrospective cohort study of patients who underwent primary ACL with QT autograft within a single health system was performed. Patients were included if measurements from isometric strength testing (Biodex) sessions conducted via electromechanical dynamometer at a minimum of six months postoperatively were performed. Ratios of knee extensor torques between the operative and nonoperative knee were calculated for peak torque and mean torque during standardized testing sessions. Evaluated factors included patient demographics, anesthesia used, graft harvest characteristics, operative technique, patient reported outcome measures, concomitant cartilage pathology, and concomitant meniscal surgery. Pearson correlation coefficient was used for continuous variables while independent samples t-test and Wilcoxon rank sum test were used for categorical variables.

RESULTS:

173 patients were included in the study with a mean age of 21.7 years (range 12-43 years old) at the time of surgery. Factors associated with diminished knee extensor peak torque ratios ratio included larger tibial tunnel diameter ($p=0.04$), lower preoperative MARX ($p=0.04$), female sex ($p=0.001$), and the use of blood flow restriction (BFR) postoperatively ($p=0.004$). Factors associated with diminished mean knee extensor torque included higher preoperative visual analog score for pain ($p=0.04$), lower preoperative PROMIS physical function ($p=0.03$), lower preoperative IKDC ($p=0.04$), female sex ($p=0.001$), and the use of BFR postoperatively ($p=0.01$). The remaining factors did not have a statistically significant association with knee extensor strength symmetry.

DISCUSSION AND CONCLUSION:

Return of knee extensor strength symmetry following ACLR with QT autograft between the operative and nonoperative knee are influenced by several factors. Lower preoperative patient reported clinical scores, female sex, and the use of BFR postoperatively consistently was associated with a lower likelihood of achieving postoperative knee extensor strength symmetry in QT autograft ACLR. These factors should be considered when performing ACLR with QT autograft. Extra attention and modification of rehabilitation protocols following ACLR with QT autograft may be warranted in individuals with risk factors for persistent postoperative knee extensor weakness.