

Increased postoperative tibiofemoral rotation angle resulted in a higher risk of graft re-rupture for primary anterior cruciate ligament reconstruction in male patients

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INTRODUCTION: Anterior cruciate ligament (ACL) rupture results in rotational and anterior instability, and thus ACL reconstruction is conducted to restore the function. One of the complications after ACL reconstruction includes graft re-rupture, which is not uncommon. To overcome such detrimental consequences, various risk factors have been identified by previous studies. However, there has been paucity of studies regarding the effect of postoperative rotation of femur and tibia. Therefore, our study aimed to analyze the effects of postoperative tibiofemoral rotation angle (TFRA) on the graft re-rupture.

METHODS: Male patients who had primary arthroscopic ACL reconstruction between March 2010 to December 2022 with a minimum 2-year follow-up were retrospectively reviewed. Patients were classified into 2 groups based on whether revision ACL reconstruction was conducted during the follow-up period (Group 1 : patients without revision ACL reconstruction, Group 2 : patients who had undergone revision ACL reconstruction). After propensity score matching of the demographic data and the degree of preoperative instability, postoperative TFRA, roof inclination angle, intercondylar notch index and lateral femoral condyle index was measured. Postoperative TFRA was measured as an angle between a posterior condylar axis of the femur and a line tangential to the posterior border of medial and lateral tibia plateau on a 3D reconstructed CT image which was conducted in a full extension position. Receiver operating characteristic (ROC) curves were analyzed for the variables resulting in significant difference between the 2 groups to identify a cut-off value.

RESULTS: 21 patients for each group were included. There were no significant differences in demographic, preoperative pivot shift and Lachman grade. Postoperative TFRA for group 1 and 2 were 0.9 ± 6.7 and 3.8 ± 4.6 for group 1 and 2 respectively where positive value indicates internal rotation of the tibia. Other anatomical factors showed no significant difference between the 2 groups. 3.7 was identified as a cutoff value of postoperative TFRA which resulted in a sensitivity of 0.524 and specificity of 0.762.

DISCUSSION AND CONCLUSION: Postoperative TFRA was significantly higher in the male patients who resulted in a graft re-rupture after primary ACL reconstruction. Less than 3.7-degree internal rotation of the tibia resulted in a decreased risk of graft re-rupture and further studies regarding the methods for reducing the internal rotation of the tibia intraoperatively could benefit the result of primary ACL reconstruction.