

Graft fixation for medial patellofemoral complex reconstruction at 60 degrees knee flexion yields the least risk for overtightening

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INTRODUCTION:

Overtightening of the graft during medial patellofemoral complex (MPFC) reconstruction remains a common complication and places the knee at risk for stiffness or increased degenerative changes. Multiple techniques have been described to set the length of the graft during MPFC reconstruction using various knee flexion angles. However, the flexion angle that yields the lowest risk of overtightening is not yet known. This study aimed to evaluate the risk of overtightening of the MPFC graft at various knee flexion angles and identify morphologic risk factors that may predispose to placing abnormal graft tension.

METHODS:

Patients undergoing isolated MPFC reconstruction were included in this study. Intraoperatively, after identifying the anatomic anterior and femoral fixation points, the graft position was assessed at resting length (with slack removed from the graft), as well as with maximal manual tension by a blinded observer. Overtightening of the graft was measured as the change in length between the resting and maximally tensioned position (millimeters), which was recorded at 0°, 30°, 60°, and 90° of knee flexion. Demographic data and morphologic risk factors including preoperative tibial tubercle–trochlear groove (TTTG) distance, bony sulcus angle, and Caton–Deschamps Index (CDI), were collected. Differences in graft overtightening across flexion angles were compared, and associations between morphologic parameters and length change at each angle were analyzed.

RESULTS: Fifteen patients were included in the analysis. Graft overtightening with maximal tension varied significantly by flexion angle ($p < 0.0001$), with the smallest amount of overtightening observed at 60° (8.9 ± 2.8 mm). Post hoc comparisons confirmed that overtightening at 60° was significantly less than at 0°, 30°, and 90° (Figure 1). Regression analysis revealed that a greater CDI (indicating more severe patella alta) was significantly associated with a smaller difference in graft length changes at both 0° (-1.7 mm per 0.1-unit increase, $p = 0.034$) and 60° (-1.0 mm per 0.1-unit increase, $p = 0.007$), indicating less overtightening in patients with patella alta. No associations were identified for TTTG, sulcus angle, height, or age at any flexion angle.

DISCUSSION AND CONCLUSION: The risk of graft overtightening was found to be lowest with the knee at 60 degrees of knee flexion. Patellar height, as measured by CDI, was associated with less graft overtightening, defined as the difference in graft length between the resting state and when tension was applied, particularly at lower flexion angles. These findings suggest that setting the length of the graft should be performed at 60 degrees to minimize the risk of overtightening, and that individualized graft length setting strategies may be needed based on patellofemoral anatomy.

