Smaller Width Quadriceps Tendon Grafts Maintain Advantageous Biomechanical Properties

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INTRODUCTION: The quadriceps tendon (QT) autograft has recently gained popularity for anterior cruciate ligament reconstruction (ACLR). However, despite clinical evidence of risks in knee arthrofibrosis and graft impingement with larger grafts, the optimal QT graft size has not been established. The purpose of this study was to evaluate the mechanical properties of full thickness QT grafts 6 mm and 8 mm in width. We hypothesized that both the 6 mm and 8 mm QT grafts would exhibit similar or superior ultimate tensile strength compared to the 10 mm patellar tendon (PT) graft.

METHODS: 18 matched pairs of cadaveric knees were used in this study. From each pair, a 10 mm-width full thickness QT was harvested from one knee. Based on randomization, an 8 mm- or 6 mm-width full thickness QT along with a 10 mm-width PT were harvested from the contralateral knee. Each tendon was clamped, tensioned, and cycled on a servohydraulic testing machine before final loading to failure.

RESULTS: The mean ultimate failure load ± SD was 1286 ± 237.3 N for 10 mm QT, 1056 ± 226.7 N for 8 mm QT, 935.1 ± 283.8 N for 6 mm QT, and 816.0 ± 192.7 N for 10 mm PT. Ultimate tensile strength significantly differed between 10 mm QT vs. 8 mm QT ($p = 0.004$), 10 mm QT vs. 6 mm QT ($p < 0.001$), 10 mm QT vs. 10 mm PT ($p < 0.001$), and 8 mm QT vs. 10 mm PT ($p < 0.001$), but not between 6 mm QT vs. 10 mm PT ($p = 0.152$).

DISCUSSION AND CONCLUSION: The 8 mm QT has higher ultimate tensile strength than the 10 mm PT, and the 6 mm QT is non-inferior to the 10 mm PT. Smaller QT graft sizes may be advantageous in minimizing arthrofibrosis risk while maintaining graft strength.