ISAKOS

International Society of Arthroscopy, Knee Surgery and Orthopaedic Sports Medicine

11th Biennial ISAKOS Congress • June 4-8, 2017 • Shanghai, China

Paper #210

ACL Reconstruction with a Novel Transtibial Guide System Provides the Benefits of the Anteromedial Portal Technique: A Cadaveric Study

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Summary:
Application of the novel Pathfinder ACL-R technique may provide the benefits of independent drilling techniques while obviating the risks previously associated with the standard transtibial or anteromedial techniques.

Abstract:
Objectives: Transtibial (TT) anterior cruciate ligament reconstruction (ACL-R) has come under increasing scrutiny due concerns over non-anatomic placement of the femoral tunnel. Modifications to the originally described TT ACL-R technique have attempted to obviate the restrictions of dependent drilling of the femoral tunnel; however, despite these modifications the TT technique has increasingly been replaced with independent drilling techniques such as the anteromedial (AM) portal approach. No study has compared the novel hybrid technique guide system (Pathfinder) to the AM technique. The purpose of this study was to compare the femoral tunnel area, length, and percentage of native femoral ACL footprint covered between the Pathfinder technique and the AM technique.

Methods: Seven matched pairs of cadaver knees with no prior history of knee surgery were used for this study. Each matched pair had one knee randomly assigned to the Pathfinder technique and the corresponding knee assigned to the AM technique. Each cadaveric knee had the extensor mechanism removed and was loaded into a custom-designed clamp with the cruciates, collaterals, and posterior capsule intact. Each knee was rigidly fixed in the flexion angle used for ACL-R (90° Pathfinder vs.120° AM) and the native ACL was removed. The ACL femoral footprint was digitized and the area calculated with the MicroScribe. Next, 10 mm tibial and femoral tunnels were drilled in accordance with each technique. The femoral tunnel area and length were digitized with the MicroScribe. The center of the native femoral footprint, femoral tunnel center, and percentage overlap of tunnel and footprint were calculated for each specimen using three-dimensional data acquisition software (Rhinoceros v5.0).

Results: The average native ACL femoral footprint area was 109.5 ± 11.5 mm2, with no difference in average area between knees assigned to Pathfinder or AM techniques (112.8 ± 11.3 mm2 vs. 106.1 ± 11.6 mm2, p = 0.29). There was no difference in average femoral tunnel area between Pathfinder and AM techniques (98.5 ± 11.8 mm2 vs. 96.5 ± 7.8 mm2, p = 0.72). The Pathfinder technique generated significantly longer femoral tunnels (46.0 ± 2.3 mm vs. 39.9 ± 5.2 mm, p = 0.02). The center of the femoral tunnel was closer to the center of the native ACL footprint for the AM technique as compared to the Pathfinder technique (1.3 ± 0.5 mm vs. 2.23 ± 0.7 mm, p = 0.01); however, the percentage of the native ACL footprint covered by the femoral tunnel was not significantly different between the techniques (Pathfinder 73.4 ± 10.2% vs. AM 81.7 ± 11.5%, p = 0.18). Furthermore, there was no significant difference between the two techniques as far as percentage of femoral tunnel outside native ACL footprint (Pathfinder 15.9 ± 10.8% vs. AM 10.7 ± 9.0%, p = 0.35). There were no back wall breaches with either technique.

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Conclusion: The novel Pathfinder hybrid guide system creates femoral tunnels of comparable area and native ACL footprint overlap as compared to the AM technique. In addition, the Pathfinder technique created significantly longer femoral tunnels. Application of the Pathfinder ACL-R technique may provide the benefits of independent drilling techniques while obviating the risks previously associated with the standard TT technique.