

Biomechanical Comparison of Soft Tissue Femoral Fixation Devices in Arthroscopic Anterior Cruciate Ligament (ACL) Reconstruction

Purpose: To evaluate and compare new femoral fixation technologies in soft tissue anterior cruciate ligament reconstruction and compare them to those currently used in such reconstructions.

Hypothesis: Femoral fixation devices have different ultimate failure loads that are not statistically significant, and new age technologies will be similar in load to failure and stiffness to those already marketed for soft tissue ACL reconstructions.

Study Design: Controlled laboratory biomechanical study.

Methods: Forty (40) bovine femur were used in this study to determine ultimate load to failure, stiffness, and mode of implant failure for four different femoral fixation devices in soft tissue ACL reconstruction. Each of the four implants: Biotransfix™ (Arthrex), Biointerference Screw™ (Arthrex), Endobutton™ (Smith and Nephew), and Aperfix™ (Cayenne Medical) was tested on a calibrated Instron materials testing machine after femoral reconstruction using human allograft hamstring tendons. Ultimate load to failure, stiffness, and mode of implant failure were determined as a 25 mm/min load was applied along the axis of the femoral tunnel. Reconstructions were performed in accordance with the respective manufacturer's technique guide and in the presence of each company's local sales representative.

Conclusions: The Aperfix and Biotransfix implants demonstrated superior fixation biomechanics compared to the Biointerference screw and Endobutton. Ultimate Load to Failures were 1479 +/- 261 N for the Aperfix, 1472 +/- 244 N for the Biotransfix, 1311 +/- 178 for the Endobutton, and 935 +/- 147 for the Bio-Interference screw. The Aperfix and Bio-Transfix also demonstrated superior stiffness.

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