

## Comparison of different femoral fixation devices for ACL reconstruction with Hamstring tendon grafts. A biomechanical study on porcine knees.

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**Objective.** The aim of this study was to evaluate the strength of different femoral fixation devices used for ACL reconstruction with doubled hamstring tendon graft.

**Materials and Methods.** An ACL reconstruction was performed on 35 cadaver porcine knees. The graft used for the reconstruction was the doubled extensor lateralis capri (ELC). It was 8 mm in diameter and 12 cm in length. Seven different fixation devices were used for femoral fixation of the graft: Transfix, Linx-HT, Absorbable interference screw (8mm), RCI screw (8mm), Endobutton CL, Rigid-fix and Bio-Transfix). After femoral fixation of the graft, tibias were removed and the specimens were subjected to a biomechanical analysis. Each specimen was mounted on a mechanical testing machine (Galdabini Sun 1000). The femur was mounted on the crosshead clamp and the free ends of the graft were blocked in a cryo-clamp. A preload of 10 N was applied, then a cyclic loading test was performed between 10 and 150 N at a strain rate of 200 mm/min (frequency: 60 cycles/min). Slippage of the graft was calculated after 100, 500 and 1000 cycles. After 1000 cycles, a failure load test was performed on each specimen. The load was applied along the axis of the tunnel at a strain rate of 200 mm/min and were evaluated the following parameters: failure load, stiffness, yield load and elongation.

**Results.** Biomechanical tests on porcine knees showed the following results for the normal Femur-ACL-tibia complex: Failure load: 1200.7 N; Stiffness: 170.4 N/mm; Yield load: 727.6 N; and Elongation: 7.5 mm.

The biomechanical analysis on the fixation devices showed the following results:

	Failure load (N)	Stiffness (N/mm)	Yield load (N)	Elongation (mm)	Slippage (mm)
Transfix	1234.7	180.6	812.7	7.5	3.4
Linx-HT	522.6	107.4	435.8	7.3	6.2
Absorbable screw	488.3	88.2	421.4	14.9	8.9
RCI screw	362.9	51.3	292.2	16.4	6.4
Endobutton CL	744.0	105.7	574.1	7.5	5.4
Rigid-fix	830.8	91.7	741.8	8.5	8.3
Bio-Transfix	1391.8	176.1	876.5	6.7	3.1

**Conclusions.** On the femur, transcondylar screws showed to have higher failure load and stiffness than the other devices. Transcondylar fixation devices also showed lowest values of slippage.