

# Advantage of the “Locking S” Construction using a Tibial RetroScrew for Soft Tissue ACL Fixation: A Biomechanical Study

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## Objective

The objective of this study was to evaluate the biomechanical properties of a “Locking S” soft tissue graft construct, comprised of a Tibial RetroScrew combined with a distal titanium interference screw. This fixation technique was compared to distal titanium interference screw fixation. Cyclic displacement, stiffness, yield load and ultimate load to failure were compared between the two techniques.

## Methods and Materials

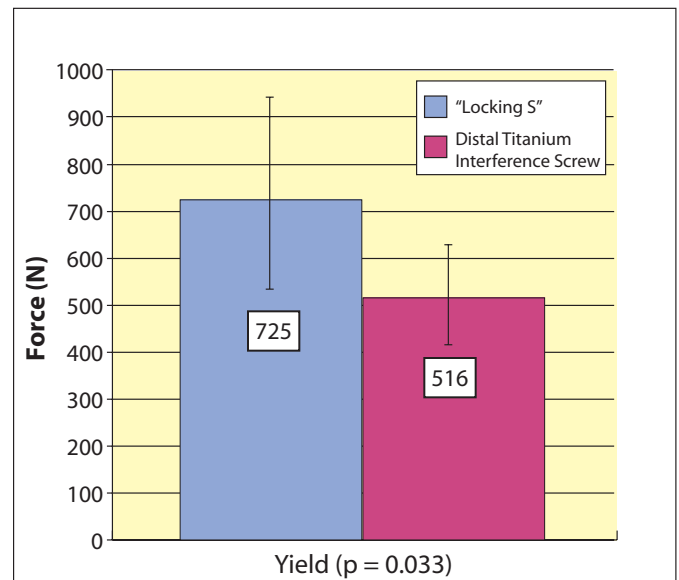
Sixteen double bundle whipstitched bovine extensor tendons were fixed in porcine tibial models using two fixation methods. Group one consisted of a bioabsorbable RetroScrew inserted anteromedial to the graft with a backup titanium interference screw inserted distally and posterior to the graft.

Group two consisted of a titanium interference screw inserted distally and anterior to the graft. The RetroScrew diameter used was equivalent to the tendon diameter while the distal titanium screw used was sized 1 mm larger than the graft. The constructs were precycled then cycled from 50 to 250 N at 1 Hz for 500 cycles. Single cycle pull-to-failure at 20 mm/min was conducted post cycling. Direction of loading was in line with the tibial tunnel, in order to test “worst case”.

## Results

Insertion torque between the two groups was statistically equivalent. The average yield load of the “Locking S” RetroScrew construct was significantly greater than the distal only screw group ( $725 \pm 221$  vs.  $516 \pm 117$ N,  $p=.033$ ). There was no significant difference between the average cyclic displacement or stiffness of the two groups. Graft slippage past the screw was the mode of failure for both groups. The yield load can be seen graphically in Figure 1.

**Figure 1:** Yield load of “Locking S” vs. distal titanium interference screw fixation for soft tissue.



## Conclusion

Addition of a Tibial RetroScrew to a distal titanium screw to create a “Locking S” construct significantly enhances the strength of a soft tissue ACL graft construct, while providing the benefit of aperture fixation.