

Fatigue Testing of the ACL TightRope

Arthrex Research and Development

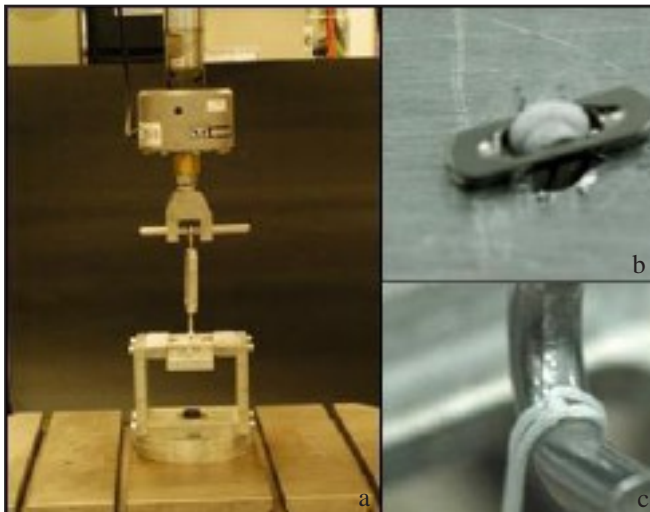
Objective

The purpose of this testing is to determine the fatigue displacement of the ACL TightRope, due to creep during high-cycle loading,

Methods and Materials

The ACL TightRope samples were loaded into an INSTRON 8871 with a 5kN load cell attached to the cross-head. The testing set-up is shown in Figure 1. The suture tails were used to apply pretensioning to the suture construct. The INSTRON was calibrated and controlled using SAX software. The sample was cycled between 50 and 250N, at 5 Hz, for 500,000 cycles. Load and displacement data were collected in a logarithmic pattern at 500 Hz. The creep displacement was measured from two locations. The total displacement between the first and last cycles at the maximum load was measured as the creep at 250N.

Figure 1: The ACL TightRope sample loaded into the fixtures of the INSTRON machine (a). The button resting properly on the bottom surface of the metal plate (b). The intersecting suture loops positioned above the hook fixture (c).



Results

The total creep displacement over 500,000 cycles was $0.78 \pm .10$ mm at 250N. All three of the samples survived cycling without breaking or showing visible signs of damage. The results of the plastic creep displacement, for each sample, are listed in Table 1.

Table 1: Results for each sample from cycle 1 to cycle 500,000, at 250N.

Creep Displacement (mm)	
Sample	Creep @ 250N
1	0.68
2	0.80
3	0.87
Average	0.78
St Dev	0.10

Conclusion

Three samples of the ACL TightRope tested for 500,000 cycles each and had an average creep displacement under 1.0 mm.