

Ultimate Load and Cyclic Displacement of PEEK Knotless 3 mm SutureTak[®] Anchor

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Objective:

Determine the ultimate load of the PEEK Knotless 3 mm SutureTak[®] (AR-1938PS). Also, subject the Knotless SutureTak to cyclic loading to analyze potential suture slippage or displacement.

Methods and Materials:

20 lbf/ft³ foam block with a 3 mm thick 40 lbf/ft³ laminate layer was used for testing. Pilot holes in the test blocks were created using the AR-1250LT drill and AR-1949 spear. A single anchor was inserted into each foam block sample with a mallet. Mechanical testing was performed using an E10000 Electropulse INSTRON Materials Testing System with a 10 kN load cell. The foam block was held securely to the testing surface with a metal block fixture and a 5 mm diameter metal hook fixture was suspended from the cross-head. With the hook in contact with the foam block surface, the tensioning suture was pulled to secure the knotless suture anchor construct within the testing apparatus with the smallest gauge length possible to properly engage the locking splice.

Each sample was cycled between 10 and 60 N for 500 cycles, at 1 Hz. Following cyclic loading, a pull-to-failure was conducted at 12 in/min. Load and displacement data were recorded at 500 Hz and the mode of failure was noted for each sample. The ultimate load and plastic cyclic displacement were determined with load-displacement curves using OriginPro 9.1 software.

Results:

The ultimate load of the PEEK Knotless SutureTak was **62.6 ± 2.7 lbf (278.5 ± 12.0 N)**, and the plastic cyclic displacement over 500 cycles was **1.4 ± 0.4 mm**. The mode of failure for all samples (n = 6), was the sutures pulling out of the anchor. For comparison, recent testing of the 3.0 mm BioComposite[™] SutureTak, in the same type of foam block had an ultimate load of **45.6 ± 2.8 lbf (203.8 ± 12.5 N)**. A student's t-test was performed to compare these two results, and the greater ultimate load of the Knotless SutureTak was significantly different from that of the BioComposite[™] SutureTak (p < 0.001). These results are shown graphically in Figure 1.

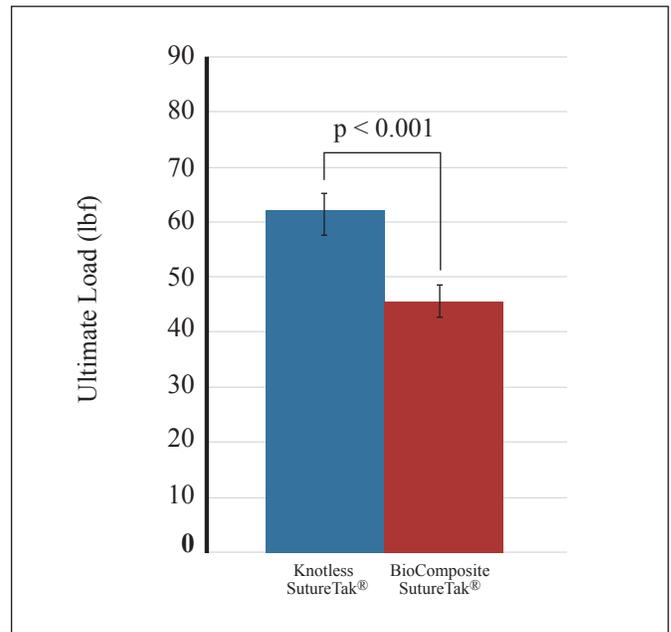


Figure 1: Ultimate load comparison between the Knotless SutureTak and the BioComposite[™] SutureTak[®] anchors

Conclusion:

The PEEK Knotless 3 mm SutureTak[®] provides a strong and secure repair option for soft tissue fixation.