Biomechanical Evaluation of Arthroscopic Rotator Cuff Stitches: A Cadaver Study in Subscapularis Tendon

Arthrex Research and Development

Objective

The objective of this study is to compare the ultimate suture tear-through load of FiberChain, in a simple stitch configuration, to ArthroCare's Opus inclined mattress stitch, as well as to two simple stitches and a horizontal mattress stitch constructed with #2 FiberWire. This study only tested the strength of the tendon-suture interface. This study found that the FiberChain suture tear-through load was not statistically different from that of the other three stitch configurations.

Methods and Materials

Four stitch configurations were tested in subscapularis tendon:

1. FiberChain stitch
2. Opus Magnum repair's inclined mattress stitch using the SmartStitch device
3. Two simple stitches
4. One horizontal mattress stitch

Matched pairs of tendons were used, and each tendon was cut in half prior to stitching so that four samples (one of each stitch configuration) came from each donor. Six donors were used for a total of 24 samples. Specimens were preloaded to 10 N and cycled from 10 N to 60 N at 1 Hz for 100 cycles. Following cycling, specimens were pulled to failure at 33 mm/s.

Results

Ultimate suture tear-through loads were found and statistics were run on the results using a One-Way ANOVA. Stitch configurations were matched by donor during analysis. The results of the testing can be seen in Figure 2.

The FiberChain stitch had an ultimate suture tear-through load of 158 ± 34 N; the Opus incline mattress stitch had an ultimate suture tear-through load of 172 ± 57 N; the two simple stitches had an ultimate suture tear-through load of 181 ± 30 N; and the horizontal mattress stitch had an ultimate suture tear-through load of 179 ± 62 N. No statistically significant difference exists between the groups ($p = 0.858$).

Figure 1.

FiberChain Stitch in Subscapularis Tendon

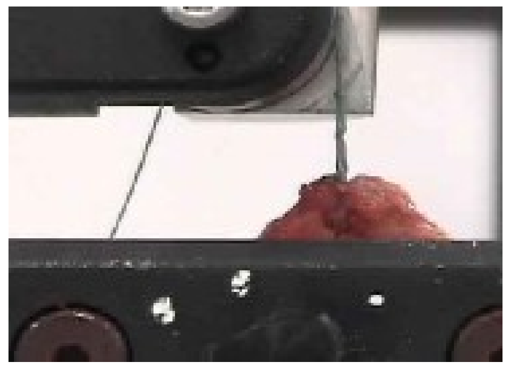
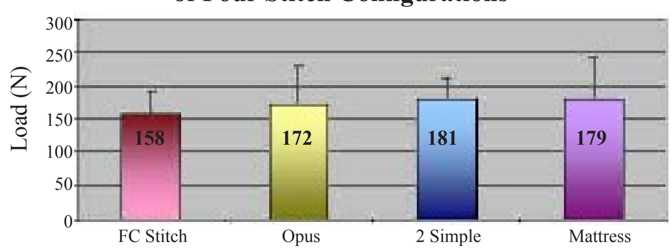


Figure 2.

Ultimate Suture Tear-Through Load of Four Stitch Configurations



Conclusion

The Opus incline mattress stitch, with two passes of suture through the tendon, does not provide an advantage in suture retention over the single-pass FiberChain stitch. Unlike the OPUS inclined mattress stitch, standard arthroscopic suture passing instruments can be used to create the FiberChain stitch. In addition, the suture tear-through loads of the FiberChain stitch are comparable to 2 simple stitches or one mattress stitch.