Biomechanical Rotator Cuff Testing:
Double Row vs. SwiveLock and FiberChain
Knotless Double Row Repair

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Objective

The objective of this study is to compare the biomechanical fixation of two different double row rotator cuff repairs. Repair group one consisted of a standard double row repair and group two consisted of a knotless double row repair using SwiveLock and FiberChain.

Methods and Materials

Seven matched pair of human cadaver humeri were used for testing (Avg age = 48 ± 10.3 years). The supraspinatus was fully transected from the humerus to simulate a full thickness tear. A humerus from each matched pair was randomly selected to receive a standard double row repair. The contralateral specimens received a knotless transosseous equivalent repair using SwiveLock and FiberChain.

Group one: double row repair, two single-loaded 5.5 mm Bio-Corkscrew FT's were inserted in the medial row. The suture strands from each medial anchor were passed through the cuff in a mattress fashion. The lateral row consisted of two single-loaded 5.5 mm Bio-Corkscrew FT's with the suture passed through the cuff in a simple stitch manner. All stitches were completed using a static Surgeon's Knot. The completed repair can be seen in Figure 1.

Figure 1: Double Row Repair

Group two: SwiveLock & FiberChain knotless double row repair, two 5.5 mm Bio-Corkscrew FT's loaded with FiberChain were inserted in the medial row. The FiberChain suture from each anchor was passed through the tendon and the FiberChain was fixated laterally using SwiveLocks. The completed repair can be seen in Figure 2.

The repaired constructs were fixated in a material testing machine so that the direction of the load applied to the repaired tendon was at a physiological angle. The construct was cycled from 10 to 100 N for 500 cycles followed by pull-to-failure at 33 mm/sec.

Figure 2: SwiveLock and FiberChain Double Row Repair

Results

The cyclic displacement, yield load, and ultimate load of the double row repair were 2.1 ± 0.9 mm, 411 ± 135 N, and 511 ± 132 N respectively. The cyclic displacement, yield load, and ultimate load of the SwiveLock & FiberChain double row repair were 3.2 ±1.1 mm, 487 ± 80 N, and 539 ± 80 N respectively. The yield and ultimate load for both groups can be seen graphically in Table 1. The cyclic displacement, yield load, and ultimate load were not statistically different between the two groups ($p = 0.247$, $p = 0.192$, and $p = 0.297$ respectively).

Conclusion

The knotless SwiveLock & FiberChain double row construct is a rotator cuff repair with the statistically equivalent strength of a standard double row repair that requires six suture passes through tendon and four knots. In addition, the SwiveLock and FiberChain construct can provide time savings through its requirement for only two suture passes through tendon, simplification of suture management, and the elimination of knot tying.

Table 1: Mean yield and ultimate data for both groups.