# Load-Sharing Rip-Stop Repair for Rotator Cuff Tears

Arthrex Research and Development

## Objective

Compare the biomechanical strength of a novel load-sharing rip-stop rotator cuff repair to that of a traditional single row repair.

## Methods and Materials

Six matched pairs of cadaver humeri and supraspinatus tendons were used for this study (58 ± 8 year, all male). The distal ends of the bones were potted in fiberglass resin. Pilot holes were created using an AR-1927PB Punch for all anchors used to repair the samples.

*Single Row Samples*: Two 5.5 mm BioComposite Corkscrew FT Suture Anchors were inserted and all four strands of #2 FiberWire were passed through the tendon using a Scorpion Suture Passer. Simple stitches were tied using SMC knots with five half-hitches (last three alternating).

*Load-sharing Rip-stop Samples*: Two strands of FiberTape were passed through the cuff tissue in inverted mattress stitches. The Corkscrews were inserted as before, and the FiberWire strands were passed medial of the FiberTape mattress stitches, and tied using simple stitches. The tails of the FiberTape strands were secured to the humerus using 4.75 mm BioComposite SwiveLock Anchors. A load-sharing rip-stop sample is pictured in Figure 1. A side-by-side comparison of the constructs is shown in Figure 2.

**Figure 1:** Load-sharing rip-stop construct

Mechanical testing was performed using an INSTRON 8871, with a 5kN load cell secured to the crosshead. The humerus was fixated to the testing surface using a fixed angle clamp, oriented such that the direction of pull would be 45° to the bone's long axis. The tendon was secured to the crosshead using a custom interdigitizing freeze clamp and dry ice. Specimens were loaded to a 10N preload, followed by cyclic loading between 10N and 100N, at 1 Hz, for 200 cycles. Following cyclic loading, a pull-to-failure was conducted at 33 mm/sec. Load and displacement data were recorded at 500 Hz. Additionally, a digital video camera and tracking software were used to measure the plastic cyclic displacement of the repairs during cyclic loading. Differences between the groups were analyzed using paired t-tests ($\alpha = 0.05$).

**Figure 2:** The single row repair construct (top) and the rip-stop construct (bottom)

## Results

The ultimate load of the samples with the FiberTape rip-stop was 616N ± 185N, and was significantly greater than the 371N ± 102N ultimate load of the single row samples ($p = 0.031$). The ultimate load results are shown graphically in Figure 3. There was no difference found in the video tracking displacement of the two groups ($p = 0.561$).

**Figure 3:** The ultimate load of the load-sharing rip-stop construct was 66% greater than that of the single row samples.