# Biomechanical Testing of Meniscal Repairs Using the FiberStitch™, Smith & Nephew FAST-FIX™ 360, and Zimmer Biomet JuggerStitch™ Implants

Arthrex Orthopedic Research and Development

## Objective

The purpose of this study is to evaluate the relative strength of the meniscal repair using the FiberStitch implant and the competitor products, JuggerStitch and FAST-FIX 360 implants.

## Materials and Methods

Eight fresh-frozen cadaveric knees were dissected to reveal the tibial plateau and meniscus tissues.
A 20 mm bucket handle tear was created in the midbody viable menisci with a scalpel. Figure 1 shows the repairs corresponding to each implant.

**Figure 1.** Meniscal repair using the **(a)** FiberStitch, **(b)** FAST-FIX 360, and **(c)** JuggerStitch implants

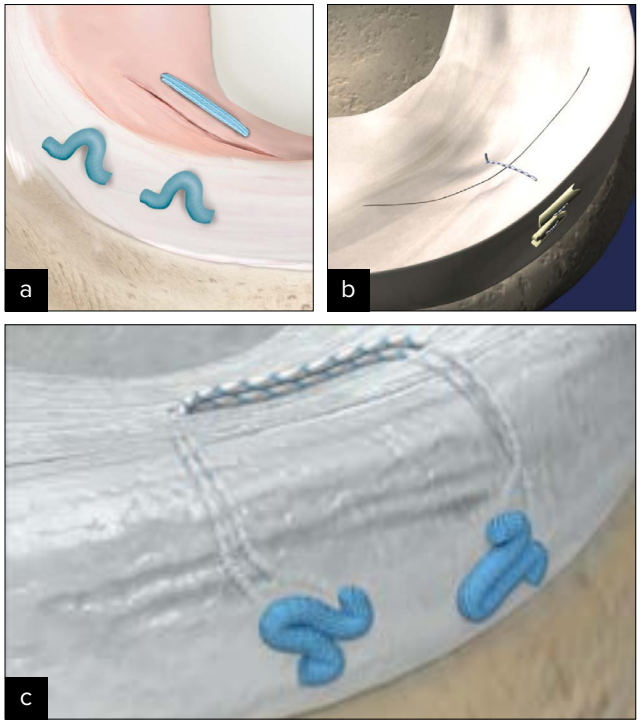



**Image Links:**
**(b)** Smith & Nephew FAST-FIX 360 Implant.
**(c)** Zimmer Biomet JuggerStitch Implant.

After the repairs, the bucket handle tear was continued to the ends of the meniscus, such that only the repair was holding the two halves of the tissue together. This was completed on all samples. Biomechanical testing was performed using a servohydraulic materials testing machine with a 5 kN load cell. Clevis and dowel fixtures allowed for hemostats to be clamped on each end of the meniscus, as shown in Figure 2.

**Figure 2.** Sample Orientation

Each sample was cycled from 5 N to 20 N for 1000 cycles at 1 Hz followed by a pull-to-failure at 12.5 mm/s. Load and displacement data were recorded at 500 Hz. The ultimate load and mode of failure were recorded for each sample. Using the load-displacement curves, cyclic displacement was determined at cycles 1, 100, and 1000.

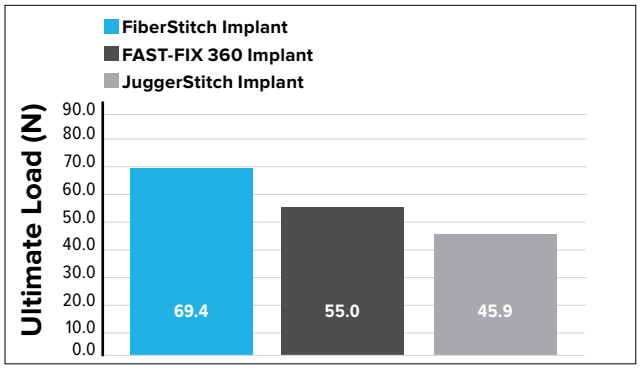
## Results and Conclusions

Table 1 shows the mean and standard deviation for all the metrics tested, and ultimate loads are shown graphically in Figure 3.

**Table 1.** Result Summary for Tested Implants

| Implants | Displacement at Cycle (mm) | | | Ultimate Load (N) |
|---|---|---|---|---|
| | 1 | 100 | 1000 | |
| **FiberStitch™** | 2.43 ± 0.66 | 4.63 ± 0.92 | 6.66 ± 0.94 | 69.4 ± 11.2 |
| **FAST-FIX 360** | 2.40 ± 0.90 | 5.00 ± 0.60 | 8.80 ± 1.90 | 55.0 ± 9.0 |
| **JuggerStitch** | 2.90 ± 1.01 | 5.93 ± 1.73 | 8.31 ± 2.45 | 45.9 ± 32.9 |

**Figure 3.** Ultimate load comparison of the FiberStitch, FAST-FIX 360, and JuggerStitch implants




## Results and Conclusions

The results of this testing illustrate that the FiberStitch implant has a statistically equivalent tensile strength and displacement capabilities as the JuggerStitch implant and FAST-FIX 360 implant. Although no significant differences were found, the mean ultimate load and total displacement of the FiberStitch implant were superior to the JuggerStitch and FAST-FIX 360 implants.