Arthrex® CapsuleCut™ Blade Bending Test

Arthrex Research and Development

Objective

The purpose of this testing is to determine the mechanical strength of the Arthrex CapsuleCut Blade (AR-6527-02) and compare the results to those of the Stryker Pivot Samurai Blade (CAT00227).

Methods and Materials

Mechanical testing was performed using an E3000 Electropulse INSTRON Materials Testing Machine with a 3kN load cell secured to the crosshead. A spade-tipped plunger was attached to the load cell and a vice fixture was clamped to the testing surface. Each blade sample was secured tightly in a 4 mm metal collet such that only the machined portion of the blade was exposed and oriented as shown in Figure 1. The collet was secured by the vice fixture and the plunger was moved into contact with the blade, 8 mm from the tip. A manual preload of 10N to 20N was applied. The INSTRON was calibrated and operated using Bluehill software, and load and displacement data were recorded at 500Hz. For each sample, the maximum load and mode of failure were reported.

Results

The maximum load of the Arthrex CapsuleCut Blade was 87.9 ± 13.2 lbf and the mode-of-failure for all samples (n = 5) was the blade bending, as shown in Figure 1. The maximum load of the Stryker Pivot Samurai Blade was 51.5 ± 7.5 lbf and the mode of failure for all samples (n = 4) was the blade tip breaking, as shown in Figure 2.

A student's t-test was performed to compare differences between the means of the two sample groups. The Arthrex CapsuleCut Blade had a significantly higher maximum load compared to that of the Stryker Pivot Samurai Blade (p = 0.002).

Conclusion

The Arthrex CapsuleCut Blade not only provides improved mechanical strength when compared to the Stryker Pivot Samurai Blade, but its mode of failure of bending rather than breaking is more desirable for arthroscopic procedures.

Figure 1: The mode-of-failure for all Arthrex CapsuleCut Blades was bending.

Figure 2: The mode-of-failure for all Stryker Pivot Samurai blades was the blade tip breakage.