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The Biomechanical Performance of a New Forked Knotless Biceps Tenodesis Compared to a Standard Knotless and Suture Anchor Tenodesis

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Summary:
The new 8mm forked knotless anchor fixation significantly enhances construct stability compared to a 5.5mm double-loaded suture anchor fixation as well as the 5.5mm knotless suture anchor.

Abstract:
Purpose: Biomechanical Comparison of three different fixation techniques for a proximal biceps tenodesis.

Methods: 18 human cadaver specimens were used for the testing. After resection of the soft tissues, a tenodesis of the proximal biceps tendon was performed using a double-loaded suture anchor (5.5mm Corkscrew, Arthrex) creating two simple suture repairs, a knotless suture anchor (5.5mm SwiveLock, Arthrex) using Fiberwire No.2 to create a modified Krackow-stitch. Finally, a forked knotless suture anchor (8mm SwiveLock, Arthrex) using Fiberwire No. 2 and a modified Krackow-stitch was tested. Reconstructions were cyclically loaded for 50 cycles from 10 to 60N, 10 to 100N and 10 to 180N. Cyclic displacement and ultimate failure load were determined and mode of failure was evaluated.

Results: Cyclic displacement at 60N revealed a mean of 3.3 ± 1.1mn for the Corkscrew anchor, 5.4 ± 1.4mm for the 5.5mm SwiveLock anchor and 2.9 ± 1.6mm for the 8mm forked SwiveLock anchor. At 100N 5.1 ± 2.2mm were seen for the Corkscrew anchor, 8.7 ± 2.5mm for the 5.5mm SwiveLock anchor and 4.8 ± 3.3mm for the 8mm forked SwiveLock anchor. Significant lower cyclic displacement was seen for the Corkscrew anchor ($p<.020$) as well as the 8mm SwiveLock anchor ($p<.023$) compared to the 5.5mm SwiveLock anchor at 60N. An ultimate load-to-failure of 109 ± 27N was found for the Corkscrew anchor, 125 ± 25N were measured for the 5.5mm SwiveLock anchor and 175 ± 42N were found for the 8mm forked SwiveLock anchor. Significant differences were seen between the 8mm SwiveLock compared to the 5.5mm SwiveLock ($p<.044$) as well as the Corkscrew anchor ($p<.009$), No significant differences were seen between the Corkscrew and the 5.5mm SwiveLock anchor.

Conclusions: The new 8mm forked SwiveLock anchor significantly enhances construct stability compared to a 5.5mm double-loaded Corkscrew anchor as well as the 5.5mm SwiveLock suture anchor. However, a restrictive postoperative rehabilitation seems to be important in all tested reconstructions in order to avoid early failure of the construct.