

Biomechanical Comparison of Suspensionplasty and Flexor Carpi Radialis Ligament Reconstruction for Treatment of Thumb Carpometacarpal Osteoarthritis

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INTRODUCTION:

Patients with thumb carpometacarpal arthritis present with significant pain at the base of the thumb, grip weakness, and limited range of motion. Purpose of this study was to compare the cyclic and load to failure characteristics of Thumb Carpometacarpal Suspensionplasty with the FiberLock® Suspension (FLS) to flexor carpi radialis ligament reconstruction (FCRLR). We hypothesized that FiberLock will have increased stiffness, and higher yield and ultimate load compared to LR.

METHODS:

Ten matched pairs of cadaveric hands were used for this study. A complete trapeziectomy was first performed in all cadaveric specimens. The specimens were randomly assigned to either the *FCRLR* group or the *FLS* group and the respective reconstructions were performed. The FCRLR and FLS constructs were tested to quantify cyclic and load to failure characteristics using a custom testing fixture and a testing machine. The specimens were axially preloaded to 1N followed by 30 cycles of 1N to 10N from distal to proximal direction. Following the cyclic loading, specimens were loaded to failure.

RESULTS:

The FiberLock Suspensionplasty displayed 1) decreased nonrecoverable deformation (Figure 1) and deformation at peak load during cyclic loading, 2) increased stiffness, yield load, ultimate load, load at 10mm displacement, and energy absorbed at 10mm displacement during load-to-failure testing (Figure 2). All 10 FCRLR conditions failed with the suture tearing through the tendon. Nine FLS specimens failed due to suture slipping from SwiveLock anchor while the remaining specimen failed due to the FiberTak anchor pulling through the index metacarpal.

DISCUSSION AND CONCLUSION:

Thumb Carpometacarpal Suspensionplasty with the FiberLock Suspension System demonstrated significantly superior structural integrity compared to flexor carpi radialis ligament reconstruction. These findings may result in decreased thumb subsidence, decreased construct failure, minimal adverse effects, avoidance of harvest site morbidity, and optimal postoperative thumb and wrist function.

