

BIOMECHANICAL PULLOUT STRENGTH OF QUATTRO™ X AND QUATTRO™ LINK ROTATOR CUFF ANCHORS

OBJECTION:

The purpose of this study is to evaluate the pullout strength of the Cayenne Quattro X threaded rotator cuff repair anchor and the Cayenne Quattro Link push-in knotless rotator cuff repair anchor. We specifically used a testing protocol modeled after Barber et al.¹⁻³ in order to allow comparison to published data. Using published historical data the pullout strengths are placed within the context of other commercially available anchors.

CLINICAL BACKGROUND:

Contemporary arthroscopic rotator cuff repair techniques commonly employ one of two methods: either a double row repair or single row repair. In double row repair the surgeon will typically use a medial row threaded anchor with attached sliding braided high-strength sutures, and a lateral row knotless push-in anchor. For single row repair surgeons will use either the threaded anchor or the knotless anchor based upon their preference. Regardless of the type of anchor selected, desirable characteristics of the anchor would include high initial pullout strength, low likelihood of suture pullout through the eyelet, and retention of strength through the tissue healing period. Ease of postoperative imaging and ease of revision would also be useful.

METHODS & MATERIALS:

The parameters in this protocol were modeled after those found in Barber et al.¹⁻³ This was done to facilitate comparisons of the Cayenne Medical shoulder anchors to other shoulder anchors tested using similar methods.

There are two types of Quattro Link Knotless Anchors; the first is PEEK only and is available in two sizes, 4.5mm and 5.5mm. The second type

is PEEK with a Titanium alloy tip and is offered in one size, 4.5mm.

The Cayenne Medical, Inc. Quattro X Suture Anchor is made of PEEK and is pre-loaded with two #2 high strength UHMWPE non-absorbable sutures. The implant is offered in two sizes, 5.5mm and 6.5mm.

Mature porcine femurs were obtained from pigs at least two years old and weighing approximately 450 pounds. Ten anchors of each type of Quattro X 5.5mm and Quattro Link 4.5mm were tested.

Materials:

- TCD-500 force tester and operator console (Chatillon P/N TCD500-0500E)
- E-DFE-500 2500N limit force gauge (Chatillon P/N E-DFE-500)
- Force gauge to test stand interface cable (Chatillon P/N NC000647)
- PC with NEXYGEN™ TCD Series software installed

Testing was performed at room temperature. Anchors were placed 1cm apart in alternating locations in metaphyseal cortex. Using the testing apparatus the high strength suture was pulled in-line with the anchor insertion axis at a rate of 5mm per second, and load at failure was recorded.

RESULTS:

The Quattro X Suture Anchor has ultimate repair strength of $447 \pm 44\text{N}$ (Table 1). The Quattro Link Knotless Anchor has ultimate repair strength of $519 \pm 68\text{N}$ (Table 2).

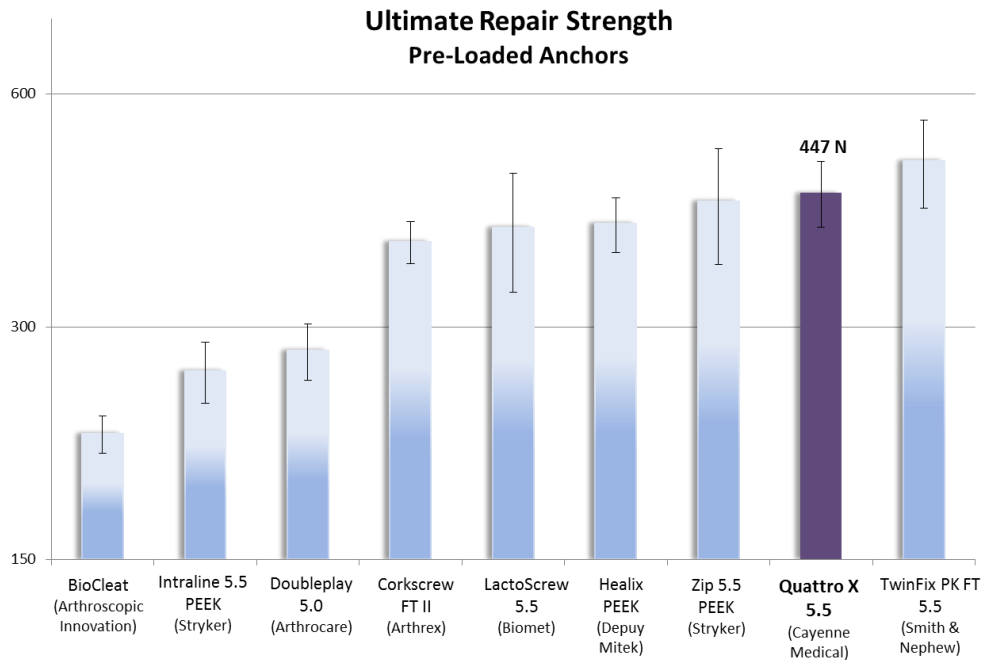


TABLE 1. Pre-loaded anchor mean load to failure (N)

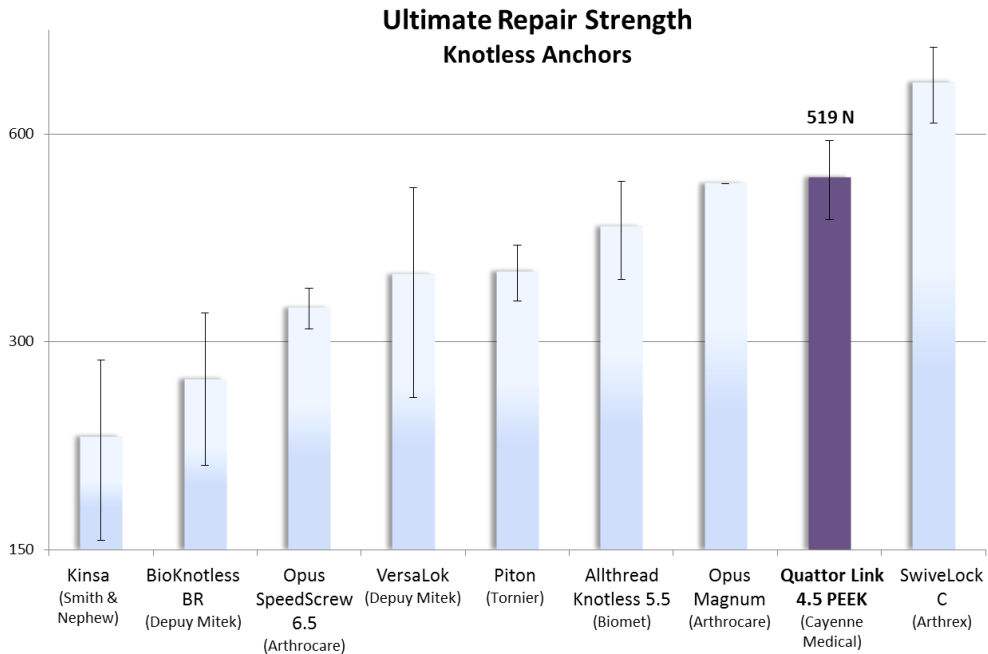


TABLE 2. Knotless anchor mean load to failure (N)

CONCLUSIONS:

Both the Cayenne Quattro X and Quattro Link rotator cuff anchors performed favorably, satisfying desirable time-zero mechanical characteristics. Further direct

comparative testing will be performed. Note that comparative data is for reference only, and does not indicate that direct mechanical testing was performed in this test.

REFERENCES:

1. Barber FA, Herbert MA, Beavis RC, Barrera-Oro F. Suture anchor materials, eyelets, and designs: Update 2008. *Arthroscopy* 2008;24:859-867.
2. Barber FA, Herbert MA, Hapa O, Ropley JH, Barber CA, Bynum JA, Hrnack SA. Biomechanical analysis of pullout strengths of rotator cuff and glenoid anchors: 2011 update. *Arthroscopy*. 2011 Jul;27(7):895-905.
3. Barber FA, Herbert MA, Richard DP. Sutures and Suture Anchors: Update 2003. *Arthroscopy*. Nov 2003; 19 (9): 985-990.

