Fixation Strength for PEEK Knotless Corkscrew® Suture Anchor versus Knotted PEEK SutureTak® Suture Anchor

Arthrex Research and Development

Objective:

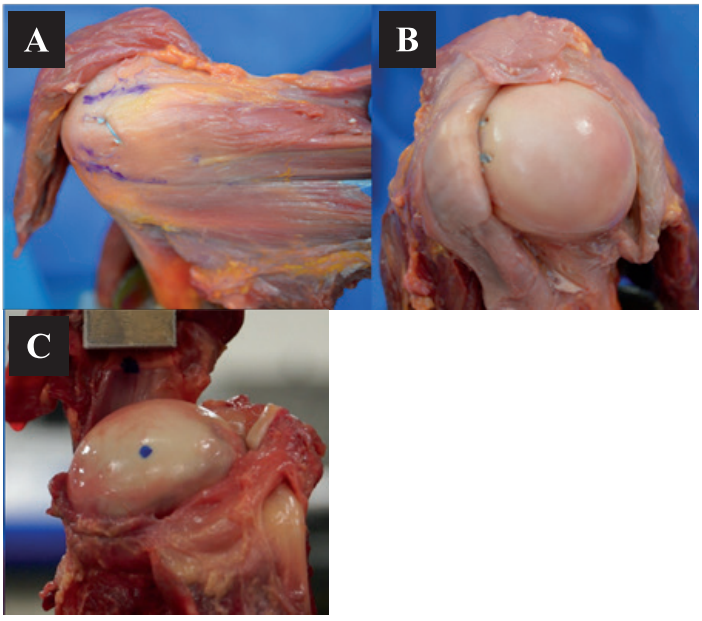
Anterior shoulder instability associated with mild glenoid bone loss and a large Hill-Sachs lesion is a well-known skeletal pathology of the shoulder[1]. Numerous operations have been used to address bone loss, and among these, arthroscopic Remplissage is one of the options with good long-term results reported in the literature[2]. Briefly, this procedure aims to convert a bony intra-articular defect into an extra-articular defect by insetting the infraspinatus into the Hill-Sachs lesion. The purpose of this study was to investigate fixation strength and gap formation of 2 different Remplissage fixation methods, namely, knotted medial pulley and knotless medial pulley in cadaveric shoulders and foam blocks.

Materials & Methods:

Cadaveric Study:

Seven matched pair cadaveric shoulders (age ≤ 65 years) were used. Each side randomly received either a knotted (PEEK 3.0 mm SutureTak® Anchor, AR-1934PS, Arthrex, Inc.) or knotless (PEEK 3.9 mm Knotless Corkscrew® Anchor, AR-1941PS, Arthrex, Inc.) construct using the surgical technique mentioned by Koo, et al. (Figures 1A and 1B). Post-Remplissage, biomechanical testing was conducted. The humerus was clamped in 60º and 15º of external rotation with respect to anatomic configuration and musculotendinous junction of infraspinatus was cryoclamped (Figure 1C). Specimens were cyclically loaded between 10N-100N with 1Hz frequency followed by pull to failure at 33 mm/s. Load at 5 mm displacement was recorded as 5 mm and was considered a clinical failure.

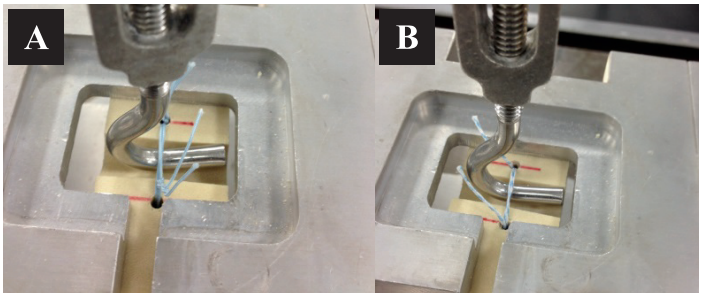
***Figure 1*:** (A and B) Shows surgical repair using Remplissage technique. (C) Shows biomechanical test setup.



Foam Block Study:

Ten 30 lf/ft cubed foam blocks, 5 for knotted suture anchor and 5 for knotless suture anchor, were prepared by creating a "trench" in the center to accommodate hook and drilling 2 pilot holes 20 mm apart using same instrumentation (drill, spear, mallet, etc) used for cadaveric study. Using box fixture and hook, mechanical test was performed using same loading protocol as cadaveric study (Figure 2). Ultimate load and cyclic displacement was recorded.

Figure 2: (A) Shows experimental set up for knotted suture anchor. (B) Shows experimental setup for knotless suture anchor.



Results:

Cadaveric Study:

Before clinical failure (5 mm displacement), the knotless suture anchor achieved higher loads and there was a statistically significant difference in load between the 2 groups (P = 0.015) (Figure 3).

Foam Block Study:

The knotless suture anchor achieved higher ultimate load as compared to the knotted suture anchor and there was a statistically significant difference in ultimate load between the 2 groups (P = 0.006) (Figure 4). There was no statistically significant difference in cyclic displacement between the 2 groups (P = 0.059) (Figure 5).

NOTE: See charts on second page.

Conclusion:

The PEEK 3.9 mm knotless Corkscrew® anchors performed better and provide a mechanically superior repair when compared to the knotted PEEK SutureTak® anchors.

Figure 3: Load at 5 mm displacement for cadaveric study

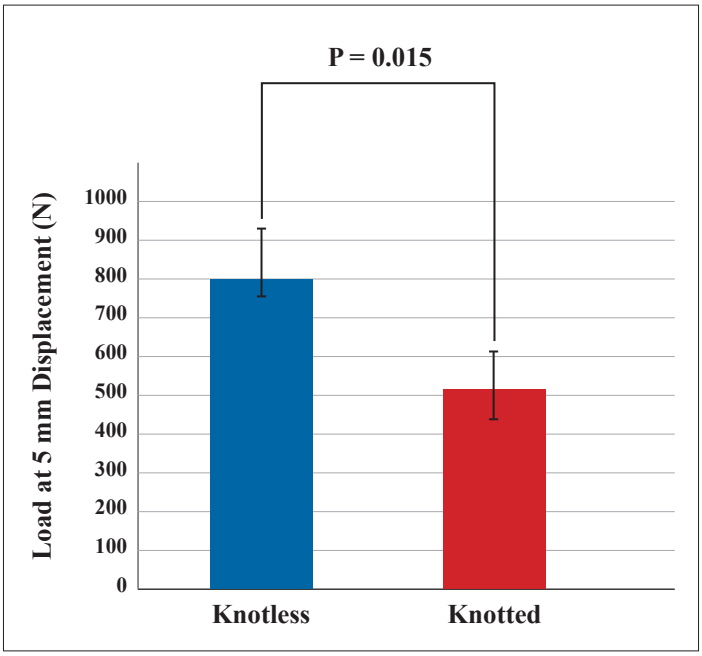


Figure 4: Ultimate load for foam block study

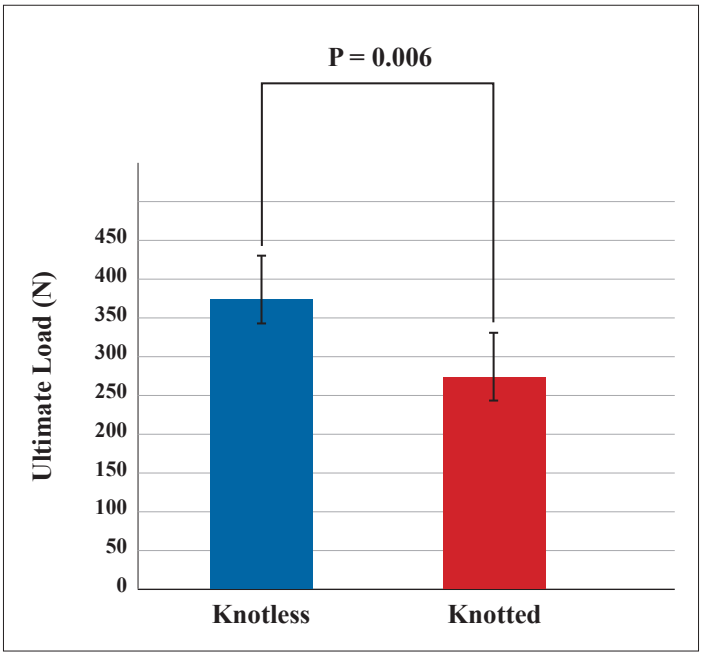
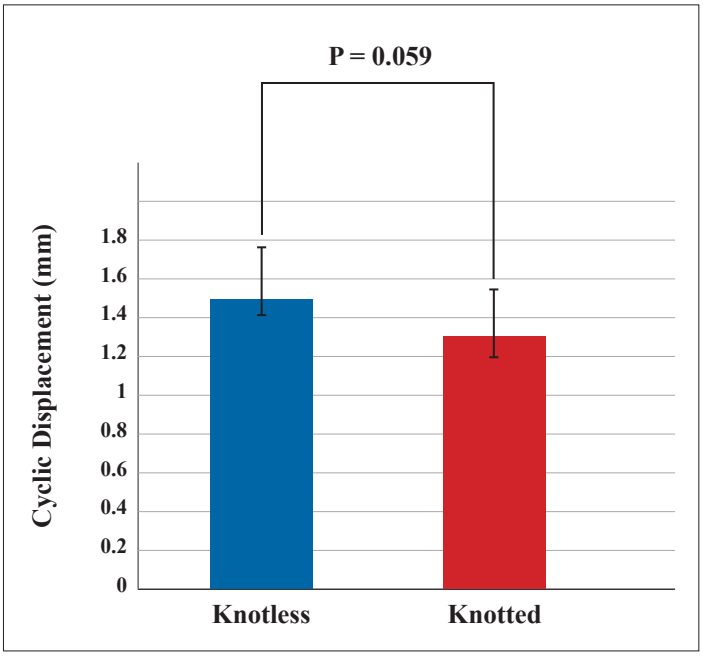


Figure 5: Cyclic displacement for foam block study



References:

1. Koo SS, Burkhart SS, Ochoa E. Arthroscopic double-pulley remplissage technique for engaging Hill-Sachs lesions in anterior shoulder instability repairs. *Arthroscopy.* 2009;25(11):1343-1348. doi:10.1016/j.arthro.2009.06.011.
2. Hartzler RU, Bui CN, Jeong WK, et al. Remplissage of an off-track Hill-Sachs lesion is necessary to restore biomechanical glenohumeral joint stability in a bipolar bone loss model. *Arthroscopy.* 2016;32(12):2466-2476. doi:10.1016/j.arthro.2016.04.030.

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