Editorial Commentary: A New Star Is Born—The Knotless All-Suture Anchor

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Abstract: The development of all-suture anchors has revolutionized the field of orthopaedic surgery. Biomechanically, these anchors have similar or better strength when compared with conventional solid anchors. All-suture anchors allow the suture to be placed in cortical bone tunnels, with a smaller diameter, thus limiting potential iatrogenic damage. To avoid the inconsistencies of knot tying and eliminate knot stacks, knotless all-suture anchors have been increasingly used in arthroscopic surgery. This may reduce the potential risk of knot abrasion, which can lead to soft-tissue or cartilage damage. Depending on the intraoperative situation and surgeon preference, surgeons must decide whether knotted or knotless anchor systems are indicated.

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We would like to congratulate Lacheta, Brady, Rosenberg, Dornan, Dekker, Anderson, Altintas, Krob, and Millett[1] on their study entitled "Biomechanical Evaluation of Knotless and Knotted All-Suture Anchor Repair Constructs in Four Bankart Repair Configurations." In their biomechanical investigation using 30 human cadaveric shoulders, Lacheta et al. found that both 1.8-mm knotless and knotted all-suture anchor Bankart repairs showed similar values of ultimate load, first failure load, and stiffness. In addition, ultimate load and first failure were similar to those of the native state.

The use of suture anchors and subsequent biomechanical testing has a long history in orthopaedic surgery.[2] The anchor first patented by Goble and Somers in 1985[2] was designed for use in capsulolabral repair with a pullout strength of 90 N.[3] Since then, various anchor designs have been proposed,[3,4] mostly based on the same biomechanical properties.[2] The first biomechanical study comparing available suture anchors dates back to 1993, when Carpenter et al.[3] compared 5 commercially available suture anchors and found failure loads ranging between 70 and 120 N. Logically, Carpenter et al. found that bone quality and direction of pull have a significant effect on load to failure. Of interest, the suture anchor chain was also noted as the weakest point.[4] In addition, most biomechanical testing protocols adapted similar methods to those of Barber et al.,[2,5] whereas direct pullout strength in an axial direction was thought to be the one and only condition.[2] However, Burkhart et al.[6] changed this mindset, and a new era of cyclical biomechanical testing started.[7-11]

In 1997, it was Barber et al.[5] who again advocated that inconsistent results of arthroscopic knot tying were a significant obstacle in arthroscopic surgery. Thus, in 2001, Thal[12] published the first article using a knotless suture anchor with a pullout force of almost 270 N. Since then, various designs and innovations have been proposed to reduce the pro-arthritic potential of anchor use.[2,13-16] As a result, innovative surgeons were pleading for smaller and softer anchors. This was noted as a major challenge for anchor designers, and the hunt for the best and most innovative anchor became a reality. In addition, because knotting is a very delicate procedure and perhaps too challenging for some orthopaedic surgeons, a new star was born—the knotless all-suture anchor: smaller, better, faster. And more expensive.

Once more, a new era of biomechanical testing started,[2] prompting the publication of multiple important

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biomechanical studies comparing the pullout strength, displacement, and failure mode of all-suture anchors.[17,18] All-suture anchors have shown promising biomechanical and clinical results[2,17,19] and may reduce iatrogenic damage, often caused by insertion. Moreover, as Lacheta et al.[1] have thoughtfully stated, repairs using knotless anchors may avoid the inconsistencies of knot tying and eliminate knot stacks. This is of clinical relevance because it limits the potential risk of knot abrasion leading to soft-tissue or cartilage damage.[1] Moreover, the authors should be congratulated on modifying an established biomechanical test protocol and on creating a standardized anteroinferior labral tear, highlighting the potential for future research. This is an important consideration because most evidence on anchor testing either has come from the same author[2] or has been limited to nonstandardized labral tears,[1] warranting validation by other groups.

On reading the recent work by Lacheta et al.,[1] which once again contributes to the current literature and has clinical relevance, one may think that this biomechanical work reads like a well-placed and well-performed commercial, advocating the use of knotless all-suture anchors. Comparing anchors from the same designer in a journal with a high impact factor, whose results are read by surgeons all over the world, is akin to running a commercial with Tom Brady during the Super Bowl: It reaches the target audience. In our opinion, when a new design is released for surgical application, it has already been tested in detail by the patent holder. Thus, worse outcomes than with older or similar products would be very surprising. To reproduce similar findings in the future, it may be more important to test anchors from different designers or anchors requiring different fixation techniques. However, as stated successfully by Lacheta et al.[1] in the limitations, the results of this study are limited to the anchors tested and the findings cannot be generalized.

In conclusion, with increasing operative demands, biomechanical investigations of anchor pullout still merit a place in orthopaedic surgery. Both knotted and knotless anchors can be used because one has not proved superior to the other. Surgeons should rely on their experience and preference to decide which anchor system is indicated.

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