What Method of Fixation Is Superior for Biceps Tenodesis?

To the Editor:

The recently published article about open biceps tenodesis by Diaz et al1 is highly timely and attempts to address the question of which fixation method is superior for biceps tenodesis. Management of the long head of the biceps (LHB) tendon is currently one of the most controversial topics among shoulder surgeons.2 Diaz et al3 evaluated 6 techniques for biceps tenodesis by comparing ultimate failure load (UFL) and failure mechanism. They found that UFL did not differ significantly among those techniques.

The results of this study showed that the mean UFLs of the double-loaded 1.9-mm all-suture anchor, soft tissue, and interference screw groups were lower than the physiologic load on the LHB tendon. Is it the perceived contraindications? There is no doubt that sufficient primary stability, or load-bearing ability, is essential to allow direct postoperative early rehabilitation in the form of active flexion of the elbow. However, the LHB tendon accounts for 0% to 25% of the muscle’s strength in the actual situation.3 In vitro stresses on the biceps tenodesis screw, cortical button, and suture anchor in sheep, porcine, and human cadaveric specimens exposed them to submaximal loads.4,5 Further, it is likely that the patient in a sling postoperatively has less weight loading than that undergoing materials testing.

It is challenging for clinicians to interpret the results of biomechanical and clinical studies for biceps tenodesis. The time-zero biomechanical studies are not the same as clinical outcomes, which are paramount for patients. The pathology of the LHB is often associated with other shoulder pathologies, such as rotator cuff tear and subacromial impingement.4,5 Management of the LHB is only part of the shoulder surgery. Clinical studies, and our own clinical experience, have frequently shown no significant clinical advantage of any fixation method. It is well-known that in orthopedic procedures such as ligament repair/reconstruction, tendon-to-bone and tendon-to-soft tissue internal fixation constructs provide only temporary primary fixation for healing during the first 4 or 6 weeks postoperatively. Ultimate strength depends on tendon healing to or into bone. Because the effect of biological factors such as tendon ingrowth cannot be predicted based on these biomechanical experiments, it is more clinically meaningful to investigate in vivo which fixation method offers faster and stronger healing.

In the absence of convincing data demonstrating improved healing, function, or pain relief for one fixation method over another, we continue to choose a comfortable and convenient method—subpectorals tenodesis with a suture anchor—for the majority of our patients.

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REFERENCES


Reply:

We appreciate the thoughtful remarks from Dr Zhong and colleagues regarding our article.1 We would like to comment specifically regarding our findings that the mean UFLs of double-loaded 1.9-mm all-suture anchor repairs, soft tissue repairs, and interference screw repairs were lower than those found with physiologic loading.

Given their known limitations, we agree that findings from biomechanical studies should not be used in isolation to guide clinical practice, surgical decision making, or postoperative patient instructions. As mentioned in the limitations section of our article, our study solely provides information about fixation strength immediately after the procedure and does not comment on the manner in which different techniques influence biologic healing. Furthermore, we performed our study on cadaveric, devitalized specimens with all soft tissue structures other than the LHB removed. These are factors that may contribute to an underestimation of the true postoperative fixation strength. De-
spite this, the mean failure load achieved by our double-loaded 1.9-mm all-suture anchor group was 111 N, not significantly lower than the reported physiologic load on the LHB. While we found it interesting that the interference screw group in particular achieved failure loads below physiologic load, the statistical significance of this was not assessed because this was not a primary aim of our study.

Our aim was to establish a baseline comparison of the biomechanical strength of a few commonly used techniques and to establish biomechanical viability for newer construct types. We believe there is great utility in using biomechanical testing to provide a point of reference for construct integrity and to augment our understanding of clinical studies. This study may allow surgeons to be more comfortable with different constructs and to weigh other factors in their choice of surgical approach. Our finding that the UFL did not differ significantly among the 6 tested constructs provides a point of evidence supporting surgeons’ decision to choose a tenodesis technique based on operative difficulty, available resources, operating time, cost, and risk of complications such as iatrogenic humeral fracture from large-diameter drills creating stress risers.

Like Dr Zhong and colleagues, we also prefer a subpectoral approach with a small-diameter suture anchor.

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