Editorial Commentary: Shoulder Biceps Tenodesis Versus Tenotomy: Both Show Good Results and Have Different Indications

Adrián Cuéllar, M.D., Editorial Board, Asier Cuéllar, M.D., and Ricardo Cuéllar, M.D., Ph.D.

Abstract: Shoulder long head biceps pathology is one of the most common causes of shoulder pain. The fact that there are many surgical techniques available has led to discussion of which should be the best treatment; although, in general terms, the two main options are tenotomy or tenodesis. Tenotomy is a simple technique, with a low rate of complications and a very good cost-benefit ratio, faster recovery, and less use of narcotic pain medications. Tenodesis has a lower risk of "Popeye deformity" and theoretically better biomechanics and strength, but few studies confirm superior outcomes in cases of biceps disease without concomitant lesions. In addition, there is no consensus as to which technique provides the best result: open or arthroscopic technique, subpectoral or fixation in the bicipital groove, soft tissue, or bony fixation. Generally, all techniques function at least two years after the surgery. We indicate arthroscopic suprapectoral bone tenodesis fixed with a screw in very selected cases: 20 patients <50 years old with good bone quality and engaged in work or sports that require flexion and supination strength. On the other hand, in chronic rupture with Popeye deformity and pain after rehabilitation, we perform open subpectoral tenodesis due to residual retraction, making suprapectoral fixation impossible or overtensioned. The correct length-tension of the long head biceps during tenodesis is critical; inappropriate tensioning can result in undesirable outcomes.

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How to treat the lesions of the long head biceps (LHB) achieving the best result is still controversial. There is no consensus on the indications for tenodesis or tenotomy after the failure of conservative treatments. Tenotomy is a simple technique, with a low rate of complications and with a very good cost-benefit ratio. Among its advantages, it has been shown to achieve faster pain relief and a greater reduction in the use of narcotic medication than tenodesis.[1] The "Popeye deformity" has always been highlighted as the most frequent adverse effect of this technique.[1-5] While the different tenodesis techniques have lower risk of "Popeye deformity" and theoretically provide better biomechanics and strength to the arm, there are hardly any studies that confirm the clinical improvement of tenodesis in cases of biceps disease without concomitant lesions. That is why studies like "Biceps Tenodesis Without Concomitant Rotator Cuff Repair or Shoulder Arthroplasty Results in Significant Improvement and High Survivorship at 2-Year Follow-Up"[6] by Yanke, Huddleston, Forlenza, Mehta, Laux, Parvaresh, Cole, Verma, and Forsythe, are very useful to clarify the results of tenodesis. It is a retrospective review study of 110 patients who underwent biceps tenodesis due to a long head biceps (LHB) injury and in the absence of other rotator cuff tendon lesions. It provides a 2-year follow-up examining the pain improvement in correlation to functional clinical outcome. Patients achieved an improvement in American Shoulder and Elbow Surgeons (ASES) and the Single Assessment Numeric Evaluation (SANE). The results also reflect that the "workers compensation" (WC) have a higher percentage of worse results (PASS), although not of failures of the technique. This study also demonstrates that there are no significant differences in the results between the open subpectoral tenodesis and arthroscopic suprapectoral tenodesis. Esthetic deformities or loss muscle

San Sebastián, Spain (A.C., R.C.)

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mass were not identified. This study confirms that biceps tenodesis continues doing the function at least two years after the surgery, regardless of various factors, such as different techniques and fixing systems used. However, they do not allow us to advance in the question posed: tenodesis versus tenotomy. Reviewing other studies that randomly analyze tenodesis and tenotomy of the biceps, disparate results are found.[1,7-11] While some studies do not find significant differences in loss of flexion force between tenodesis and tenotomy,[10,11] others do show a significant loss of supination force and arm flexion force in patients with tenotomy compared to patients with tenodesis.[12-13] Most of the studies show a higher proportion of "Popeye deformity" occurring after tenotomy.[1-5] The proportion is variable between different studies, but a meta-analysis of Leroux et al. established a residual deformity of 15.5 for tenotomy and 3.9 for tenodesis technique.[14] On the other hand, in many cases, a synovial vinculum in the biceps groove avoids a distalization of the biceps, producing a tenodesis effect.[15] In 30% of our patients operated for supraspinatus tear associated to LHB lesion, we performed a simple technical gesture of fixation the biceps using the anterior anchors.[16] In our experience, it is also very common to find an LHB lesion in the treatment of shoulder pathology, but in most cases, it is combined with other cuff lesions, and it is less frequent to find isolated injuries of the biceps. We have usually found these cases with isolated injuries of the biceps in young patients, and then we choose to perform suprapectoral arthroscopic tenodesis. When patients present subscapularis lesions associated with lesion of the LHB in the bicipital groove, we sometimes perform a soft tenodesis with the same anchors of the subscapularis tendon, but in most of them, we choose tenotomy.[16] As it was also pointed by Belay et al.,[1] we have found that patients with tenotomy need less rehabilitation, and their pain improves faster, needing less postoperative narcotic medication. Our patients are satisfied with their clinical improvement after biceps tenotomy, despite the aesthetic deformity, as it was also pointed by Meeks et al.[17]

The debate on which patients need tenodesis is still open. Because of the fact that tenodesis shows superior biomechanical results, but not clinical, we indicate an arthroscopic suprapectoral bone tenodesis fixed with a screw in very selected cases: young patient (<50 years) with good bone quality and engaged in work or sports activities that require flexion and supination strength of the arm. In these cases, the patient is informed of the risk of residual pain in the anterior aspect of the shoulder due to an overtension in the fixation of the tendon or an inflammatory process in the PLB. On the other hand, in those cases of chronic rupture of the LHB with Popeye-type deformity that continue with pain after rehabilitation, we opted for open subpectoral tenodesis. In these cases, we do not consider suprapectoral fixation due to the residual retraction of the tendon, which makes fixation impossible, or the result is overtensioned.

The correct length-tension of the LHB during tenodesis is another important point of debate, as inappropriate tensioning can result in undesirable outcomes. If the tendon is overtensioned, it can produce cramping or pain, and if it is not tensioned enough, the patient can suffer a cosmetic deformity. If the biceps are not marked, the length reference is lost when the tendon is cut. Then the tension can vary depending on the depth of the hole in the bone, the position of flexion of the elbow, how much of the tendon is resected, and the height of the hole in the groove. Considering that each anatomic tensioning and that a small variation in the position of the arm can vary the tension that is given, I think that giving it the optimal tension is a complicated but very important point. To control the correct tension, we use a suture as landmark in the LHB before cutting it at the same height of the tenodesis hole in the biceps groove.

More level I and II studies would be necessary to establish a better algorithm for the treatment indication of the pathology of the LHB. In this study, the authors performed a follow-up of 2 years after isolated LHB tenodesis without a control group of tenotomy. Despite these limitations the current study shows this technique to be a good tool for active patients with lesion of the biceps without any lesion in the rotator cuff.

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