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ORIGINAL ARTICLE

Immediate physical therapy without postoperative restrictions following open subpectoral biceps tenodesis: low failure rates and improved outcomes at a minimum 2-year follow-up

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Hypothesis: We aimed to determine patient-reported outcomes in patients undergoing open subpectoral biceps tenodesis with a dual-fixation construct who had no postoperative range-of-motion or weight-bearing restrictions. Our hypothesis was that patients without postoperative restrictions would have low failure rates with improved patient-reported outcomes. We further hypothesized that this technique would allow an earlier return to activity and similar functional outcomes when compared with those reported in the literature.

Methods: In this institutional review board–approved retrospective outcome study, we evaluated 105 patients who underwent primary open subpectoral biceps tenodesis with a bicortical suture button and interference screw construct without postoperative restrictions. The primary outcome measure was failure of the biceps tenodesis. Postoperative outcome scores included the Short Form 12 (SF-12) Physical Component Score; SF-12 Mental Component Score; American Shoulder and Elbow Surgeons total score and subscales; and Disabilities of the Arm, Shoulder and Hand score.

Results: A total of 98 patients (85%) were available for final follow-up at an average of 3.5 years. There were 2 failures (2.2%), at 5 weeks and 9 weeks postoperatively. Four patients underwent additional surgery unrelated to the previous tenodesis procedure. Final outcome scores indicated high levels of function, including the SF-12 Physical Component Score (mean, 51.5; SD, 7.8), SF-12 Mental Component Score (mean, 54.7; SD, 6.7), American Shoulder and Elbow Surgeons total score (mean, 89.4; SD, 14.2), and Disabilities of the Arm, Shoulder and Hand score (mean, 11.3; SD, 13.4).

Conclusion: Open subpectoral biceps tenodesis using a dual-fixation construct with no postoperative motion restrictions resulted in excellent outcomes with a low incidence of failure.

Level of evidence: Level IV; Case Series; Treatment Study

Keywords: Biceps tenodesis; shoulder arthroscopy; suture button; subpectoral; anterior shoulder pain; biceps tendinitis; biceps tenosynovitis

Institutional review board approval was obtained prior to the initiation of this retrospective outcome study.

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The proximal tendinous portion of the long head of the biceps (LHB) brachii muscle is a common cause of anterior shoulder pain. While LHB tendinopathy may occur in isolation, it more often manifests in the setting of other pathologic conditions about the shoulder including rotator cuff tears, labral tears, superior labral anterior-to-posterior (SLAP) lesions, subacromial impingement, and bursitis. Well-established operative treatment options exist for these conditions, and during surgery, symptomatic LHB lesions are commonly concomitantly addressed.

When operative intervention becomes necessary, biceps tenodesis is one option that reliably provides pain relief. Hitchcock and Bechtol[12] were among the first authors to describe a tenodesis technique with sutures for operative treatment of LHB tendinopathy. Early clinical outcomes of tenodesis were disappointing, particularly after long-term follow-up.[2] Since then, significant research has been done to improve the surgical technique of biceps tenodesis, as well as gain further understanding of the biomechanical role of the LHB proximal tendon.[7,8,14] While the role the LHB tendon plays in shoulder mechanics remains less clear, clinical outcomes have greatly improved. Given its success, biceps tenodesis has become an increasingly common procedure for patients with biceps tenosynovitis, SLAP lesions, and failed biceps tenotomy or SLAP repairs, with 1 study showing a 1.7-fold increase in tenodesis procedures performed in the United States over a 3-year period.[24] This increasing trend in the number of biceps tenodesis procedures performed may be a result of reports in prior literature suggesting improvements in supination, abduction strength, and cramping compared with biceps tenotomy.[15-18,25]

Biceps tenodesis is performed arthroscopically or through a limited incision (mini-open) subpectoral approach. While studies have failed to show significant differences in clinical outcomes,[1,10] a recent study by Sanders et al[20] showed significantly higher revision rates in arthroscopic tenodesis patients when fixation of the tendon was proximal to the bicipital groove; this may be because the tendon was not released from the tendon sheath, suggesting that residual pain may stem from pain generators, which lie directly in the groove. In another study, Werner et al[24] showed a tendency for overtensioning and subsequent graft weakness with the arthroscopic proximal tenodesis technique when compared with the open subpectoral approach. Therefore, several authors have advocated the mini-open subpectoral approach with fixation distal to the bicipital groove. Several fixation methods are used in the open subpectoral approach, including bicortical suture buttons, keyholes, bone tunnels, and interference screws.[21,22] It was previously believed that, among these different methods of fixation, interference screw fixation provided the greatest strength of repair[9,13,19]; however, 2 recent studies have suggested equivalent biomechanical outcomes between screw fixation and bicortical suture button techniques.[3,4]

Despite improvements in fixation methods and incremental improvements in graft fixation strength following surgery, the tendon that has undergone tenodesis is still thought to be weaker than the native biceps tendon. This weakness necessitates postoperative weight and range-of-motion (ROM) restrictions, which limits early rehabilitation and recovery. A robust fixation technique allowing early postoperative ROM and rehabilitation could improve functional outcomes and decrease postoperative stiffness, which would be particularly beneficial in patients returning to sport or work.

The purpose of this study was to determine patient-reported outcomes in patients undergoing a biceps tenodesis technique with a dual-fixation construct who had no postoperative ROM or weight-bearing restrictions. Our hypothesis was that patients who underwent biceps tenodesis with immediate postoperative active rehabilitation without restrictions would have low failure rates with improved patient-reported outcomes. We further hypothesized that this technique would allow an earlier return to activity and similar functional outcomes to other types of open subpectoral biceps tenodesis techniques in the literature.

Methods

Study population

All patients who underwent an open subpectoral biceps tenodesis by a single surgeon (T.R.H.) between January 2010 and April 2014 were included in this study. Patients were included in the study if they underwent a biceps tenodesis procedure for a diagnosis of biceps tendinitis or tenosynovitis, proximal biceps tendon tears without distal retraction, or degenerative SLAP tears. Patients were excluded if they were younger than 18 years or had a concomitant ipsilateral shoulder procedure necessitating ROM restrictions, including rotator cuff repair, capsulorrhaphy, total shoulder arthroplasty, proximal humeral fracture, labral repair, or SLAP lesion repair. Patients were not excluded on the basis of associated procedures not requiring ROM restriction, such as intra-articular débridement, subacromial decompression, acromioplasty, or distal clavicle excision. Patient selection details are documented in Figure 1.

Surgical technique

The patient was taken to the operating room and positioned in either the lateral decubitus or beach-chair position based on concomitant procedures performed. The biceps tendon was visualized arthroscopically from the standard posterior portal during a diagnostic arthroscopy. A standard anterior portal was established, and after joint débridement, the LHB tendon was released. All additional arthroscopic procedures were then performed as required. Next, a 3-cm vertical incision was made in the axillary crease, and dissection was carried down through the soft tissue to the interval of the pectoralis major muscle and the short head of the biceps tendon to expose the released LHB (Fig. 2). A No. 2 FiberWire (Arthrex, Naples, FL, USA) on a Keith needle was then whipstitched through the tendon in standard fashion beginning near the musculotendinous junction and progressing 2-2.5 mm along the length of the tendon. The remaining free end of the tendon was débrided and cut. A suture button (BicepsButton; Arthrex) was then attached to the No. 2 FiberWire.