Endobutton Repair of Distal Biceps Tendon Ruptures

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Anatomic reconstruction is now recognized as the optimal treatment for distal biceps ruptures to maximize functional upper extremity potential. Reconstruction minimizes the loss of flexion and supination strength and endurance that is associated with neglected or untreated ruptures. A single-incision, anterior approach for reconstruction of distal ruptures is facilitated by the use of a titanium button that is anchored to the end of the tendon and then engaged on the posterior proximal radius. This construct has been shown to have superior strength, facilitating early rehabilitation and return to activity. *(J Hand Surg 2009;34A:1541–1548. © 2009 Published by Elsevier Inc. on behalf of the American Society for Surgery of the Hand.)*

Key words Biceps tendon, tendon rupture, tendon repair, endobutton.

Before 1961, the recommended treatment for distal biceps ruptures was conservative care. Aside from suturing or attaching tendons through bony drill holes, there was no satisfactory, reliable technique to repair ruptures and, in general, patients regained motion and functional use of their arm. The 2-incision technique, popularized by Boyd and Anderson in 1961,[1] provided surgeons with a fairly straightforward, anatomic method of tendon repair. This technique continues to be favored by upper-extremity surgeons. Modifications of the original technique have enabled surgeons to perform tendon reconstructions with fewer complications, notably synostosis that results from heterotopic ossification.[2,3] In 1985, Morrey et al. published results of a comparative biomechanical study demonstrating superior results and outcomes in patients who had their tendon repaired primarily.[4] In addition to this clinical study, numerous papers have shown superior strength and endurance in patients who have had tendon reconstruction.[5–9]

Single-incision surgical reconstructions using an isolated anterior approach are possible owing to the development of a variety of suture anchor devices that facilitate the attachment of tendon to bone. These anchors allow the surgeon to approach and reattach the tendon using a single anterior approach. The strongest construct, proven in multiple biomechanical studies, uses a titanium button (endobutton; Acufex; Acufex Microsurgical, Mansfield, MA) that is anchored to the tendon but is deployed on the posterior aspect of the proximal radius[10–16] (Fig. 1). Endobutton techniques have been extrapolated from sports medicine procedures that reconstruct the knee anterior cruciate ligament, for reconstructing the biceps tendon.[11,13,15,17–19] The advantages of Endobutton use are simplicity of the approach, ease of deployment, and avoidance of blind suture tying. Most important, however, the strength of the construct facilitates early aggressive rehabilitation. The strength of this construct allows the surgeon to reconstruct chronically ruptured tendons primarily. In both acute and chronic repairs, myostatic relaxation occurs and the construct is strong enough to resist pullout.

From the Indiana Hand Center, Indianapolis, IN.

Received for publication January 28, 2009; accepted in revised form January 29, 2009.

No benefits in any form have been received or will be received related directly or indirectly to the subject of this article.

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0363-5023/09/34A08-0027$36.00/0
doi:10.1016/j.jhsa.2009.05.021

TECHNIQUE

Patient selection

Eccentric loading is the usual mechanism for distal biceps rupture. Mechanical, degenerative, metabolic, and anatomic factors probably contribute. Most patients who sustain distal biceps ruptures are between 40 and 60 years old with productive, working lifestyles. The goal of surgical reconstruction is restoration of strength and endurance, maximizing function. Patients need to understand the risks of surgery and be willing and able

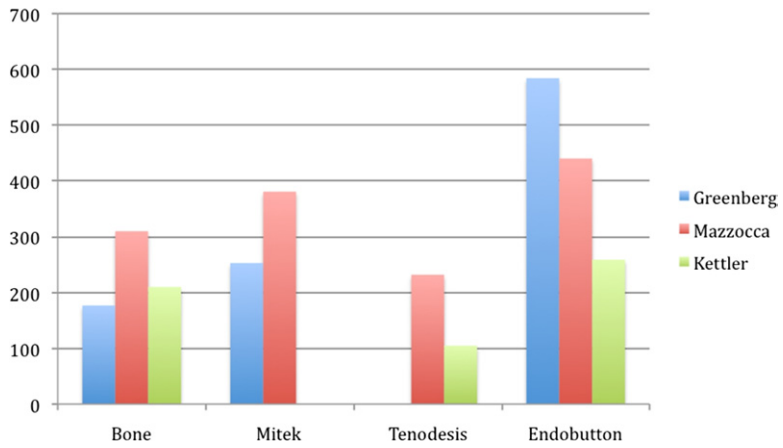

FIGURE 1: Graphic representation of comparative data from 3 biomechanical studies. In each study, the Endobutton repair had the highest pullout strength and highest load to failure compared with the other devices tested in that study.

to participate in the rehabilitation necessary for satisfactory outcomes. Consideration for nonsurgical treatment is appropriate for the low-demand, sedentary patient.

Positioning

The procedure is done with the patient supine and the area supported on an arm board. Sufficient area for intraoperative fluoroscopy is necessary. A sterile tourniquet is used. In some select cases in which proximal retraction has occurred, tourniquet use may not be possible.

Approach

The proximal position of a Henry anterior approach is used (Fig. 2). An incision starts at the antecubital flexion crease and extends distally over the brachioradialis. The muscular interval between the brachioradialis and brachialis proximally and the brachioradialis and pronator teres distally is used. For potential extensile exposure, a longitudinal incision is recommended; however, the procedure may be accomplished via a transverse incision as well. It is not necessary to incise along the antecubital flexion crease or extend proximally to the antecubital flexion crease. In chronic cases or cases in which significant tendon retraction or scarring has occurred, a separate transverse incision may be used proximally (Fig. 3). In these cases, access to the tendon and biceps tenolysis is accomplished via the transverse proximal incision. Once the tendon is freed up, it can be delivered under an intact skin bridge to the distal incision.

While developing the muscular interval, care must be taken to avoid injury to the lateral antebrachial cutaneous nerve. The lateral antebrachial cutaneous nerve enters the forearm in the interval between the biceps and brachialis. It is usually retracted with the lateral skin flap. It lies directly on the medial side of the brachioradialis as it progresses distally (Fig. 4). In chronic reconstructions, it is important to isolate the nerve from the tendon proximally because the nerve may be scarred to the chronically retracted tendon and injury to the nerve is possible during biceps tenolysis and delivery of the tendon distally. Lesions of this

FIGURE 2: In this patient with an acute biceps rupture, notice the extensive hematoma that is frequently present anteriorly and medially. The incision that will be used for reconstruction starts at the antecubital flexion crease and extends distally.