

Endoscopic Repair of Acute and Chronic Retracted Distal Biceps Ruptures

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Distal biceps tendon (DBT) ruptures are infrequent injuries that result in pain, weakness, and cosmetic deformity. Severe retraction of the ruptured DBT can occur at the time of injury, or in chronic neglected ruptures, and surgical exposure is performed using a single incision or a 2-incision technique. The technique presented here describes an endoscopic approach using 3 portals that provide access to the retracted DBT, biceps sheath, and radial tuberosity. Pre-operative sonographic localization of the retracted DBT and neurovascular structures is used to guide portal placement. The parabiceps portal is used for visualization of the biceps sheath remnant, and the midbiceps portal is used to visualize and retrieve the retracted tendon in the arm. The retracted DBT is shuttled through the biceps sheath into the upper forearm, and 2 suture anchors are passed into the radial tuberosity under direct endoscopic vision. The DBT is whipstitched via the distal anterior portal, and nonsliding knots are tied to securely reattach the DBT to the prepared radial tuberosity. (*J Hand Surg Am.* 2016; ■(■): ■—■. Copyright © 2016 by the American Society for Surgery of the Hand. All rights reserved.)

Key words Biceps rupture, distal biceps, elbow arthroscopy, popeye biceps, bicipital tuberosity.



DISTAL BICEPS TENDON (DBT) TEARS ARE uncommon injuries and usually necessitate surgical repair.¹ Chronic ruptures involve proximal retraction of the DBT out of the cubital fossa, and the tendon may be palpable in the midarm. Chronic shortening of the biceps muscle fibers and adhesions surrounding the DBT necessitate a large open surgical approach to retrieve and release the DBT for fixation in the forearm. Occasionally, an acutely ruptured DBT may retract farther proximally into the arm, and open 1- and 2-incision approaches have been described for reattachment.² Endoscopic-assisted and

all-endoscopic repair techniques have been described for acute nonretracted tears; however, the utility of this technique for retracted tears (acute and chronic) has not been explored.^{3–7} The technique presented here involves endoscopic visualization and instrumentation for retrieval, redirection, and reattachment of the severely retracted DBT rupture. The “parabiceps portal” (PBP) is used throughout the procedure for visualization, and 2 additional portals are utilized to reattach the DBT using dual suture anchors.

INDICATIONS AND CONTRAINDICATIONS

Distal biceps endoscopy is indicated in partial and complete ruptures of the DBT. Partial tears of DBT are debrided, and nonretracted and retracted tears can be explored and reattached to the bicipital tuberosity. The 3-portal technique described here is indicated in retracted DBT ruptures, both acute and chronic (8–12 weeks). Distal biceps tendon endoscopy is contraindicated in ruptures that have been left untreated for more than 12 weeks because these are likely to require additional tendon grafting. Posttraumatic soft tissue injury and its subsequent complications (scarring,

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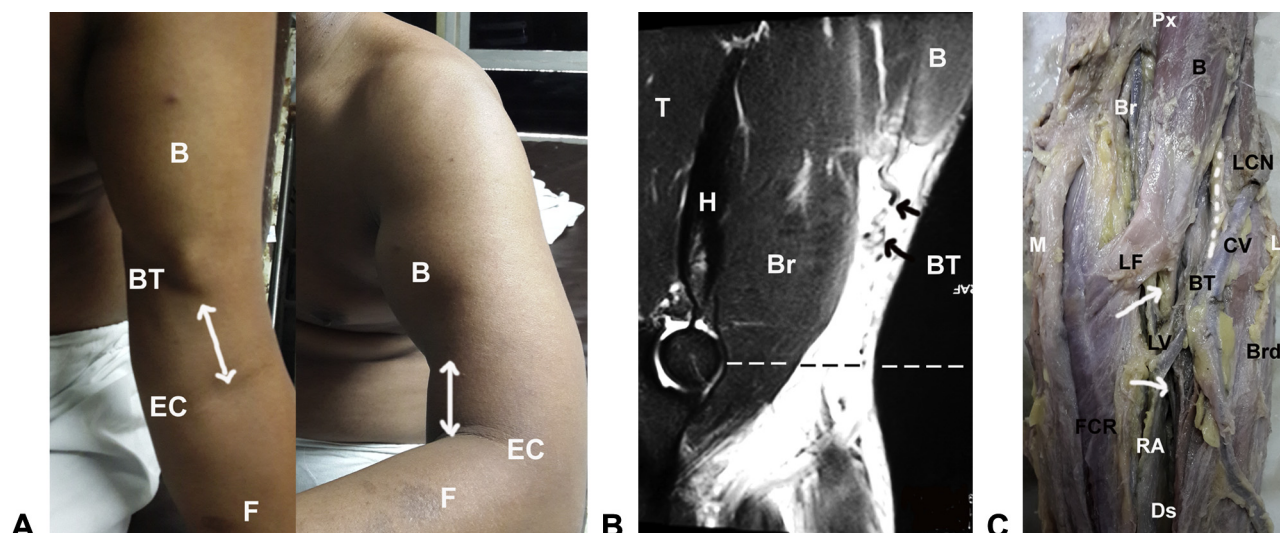


FIGURE 1: **A** A retracted DBT tear presents as a bulge (B) in the left upper arm, and a depression (arrows) in the lower aspect of the arm. The retracted tendon (BT) can be visualized in the arm. EC, elbow crease; F, forearm. **B** Magnetic resonance imaging shows severe retraction of the BT. The EC (dotted line) is shown for reference. Br, brachialis; H, humerus; T, triceps. **C** Surgical anatomy of the left elbow distal BT and cubital fossa is shown. The distal BT passes dorsal (arrows) to the leash of vessels (LV) formed by branches of radial vessels (RA) that supply the brachioradialis (Brd). B, biceps muscle; Br, brachial vessels; CV, cephalic vein; Ds, distal; FCR, flexor carpi radialis; L, lateral; LCN and dotted line, lateral cutaneous nerve; LF, lacertus fibrosus; M, medial; Px, proximal; RA, radial artery.

heterotopic ossification, presence of surgical flaps) alter the anatomy of the cubital fossa; the procedure should be avoided in these cases. Similarly, vascular abnormalities, tumors, and malunited fractures are absolute contraindications. The procedure is technically complex, and surgeon inexperience is a relative contraindication.

SURGICAL ANATOMY

The DBT originates in the lower arm (~ 1–2 cm proximal to the elbow crease) and courses across the elbow crease to insert into the radial bicipital tuberosity (~ 3–4 cm distal to the elbow crease). The tendon passes dorsal to the superficial vasculature (radial and recurrent radial vessels) of the upper forearm and is in close proximity to the vascular leash formed by the radial vessels.⁸ The PBP is close to the lateral antebrachial cutaneous nerve (1.9–10.6 mm) and the cephalic vein (2.8–26 mm) in the lower arm, and the distal anterior portal is in proximity to the radial artery (0–11.4 mm) and the superficial radial nerve (0–13.7 mm).^{7–9} The anatomy is altered in retracted DBT ruptures, and the brachial vessels are potentially at risk, being close to the PBP (mean distance, 12.8 mm) (Fig. 1C).

SURGICAL TECHNIQUE

Preoperative sonographic localization of the retracted DBT is performed using biplanar visualization with a

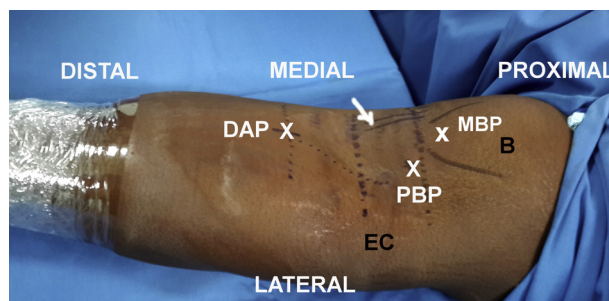


FIGURE 2: Surface marking of the portals in a left elbow. The PBP is used for distal visualization in the forearm, and the MBP is used for proximal viewing. The DAP is the working portal for instrumentation and fixation. B, biceps muscle; EC, elbow crease.

linear transducer probe. The retracted DBT may be palpable or even visible in the subcutaneous tissues of the arm. The proximal end of the DBT is marked on the skin. In addition, the brachial vessels are traced and marked in the arm and cubital fossa (Fig. 1A, B).

Surgery is performed in the supine position under general anesthesia. The elbow is positioned in 20° to 30° of flexion, and a tourniquet is used throughout the procedure (Fig. 2). A PBP is placed approximately 2 to 3 cm proximal to the elbow crease. A 2.9-mm arthroscope (via a 4-mm sheath) is passed approximately 7 cm distally, and the radial tuberosity is visualized (Fig. 3). A distal anterior portal (DAP) is placed just above the tuberosity and is usually 4 cm

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