

Original Article

Low incidence of failure after proximal biceps tenodesis with unicortical suture button



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ARTICLE INFO

Article history:

Received 12 March 2017

Accepted 22 June 2017

Available online 27 June 2017

Keywords:

Biceps tenodesis

Suture button

Subpectoral

Failure rate

Complications

ABSTRACT

Purpose: Recent interest in suture button fixation has developed with regard to proximal biceps tenodesis fixation. Biomechanical studies have demonstrated viability of a unicortical suture button technique *in vitro*. Despite this, no clinical data has been reported to validate the biomechanical data. The purpose of this study is to report on complication and failure rates in the early postoperative period after bicep tenodesis with a unicortical suture button.

Methods: A retrospective review was performed of all biceps tenodesis performed at our institution over a 36-month period using a unicortical suture button for fixation. All included patients had a minimum 12 weeks follow up. Failures were defined as complete loss of fixation, change in biceps contour during the early postoperative period, acute pain at the tenodesis site, or acute loss of supination strength.

Results: 145 of 166 biceps tenodesis procedures performed by the 4 surgeons at our institution met inclusion criteria. 80.1% of the patients were active duty military at the time of surgery. The average age was 38.2 years. There were 7 total complications (4.8%), including one failure (0.7%) requiring revision. **Conclusion:** Failure and complication rates in the early postoperative period using a unicortical suture button for biceps tenodesis fixation are consistent with other reported techniques. This study adds clinical data to the existing biomechanical reports that this technique is strong enough to provide stable fixation of the biceps tendon to allow healing of the tendon to the humerus.

Published by Elsevier, a division of RELX India, Pvt. Ltd on behalf of Prof. PK Surendran Memorial Education Foundation.

1. Introduction

Tenodesis of the long head of the biceps tendon (LHBT) is a procedure that has been growing in popularity and frequency.¹ Techniques are widely variable. Approaches may be described as open, mini-open, or arthroscopic. Location of the tenodesis has been reported intra-articular, supra-pectoral, sub-pectoral, or soft tissue. Fixation techniques have included bone tunnels, tenodesis screws, anchor fixation, anchorless fixation, suture fixation, and cortical button fixation.

Open, subpectoral biceps tenodesis continues to be commonly performed, though arthroscopic techniques are growing in frequency.¹ No consensus exists on a superior tenodesis technique, and many biomechanical studies have been performed to establish the optimal fixation. Additionally, reports of humerus fractures

after LHBT due to the larger drill holes acting as stress risers have increased interest in techniques using smaller diameter holes.^{2–5} One such technique utilizes a cortical suture button. In the last three years, four biomechanical studies have looked at the use of cortical button fixation for LHBT. Sethi et al. found the button, placed on the posterior cortex of the humerus, to be inferior to screw fixation.⁶ The remaining three studies, with a unicortical button secured on the intramedullary surface of the anterior cortex, showed no statistical difference between button fixation and an intramedullary screw techniques.^{7–9}

Use of a unicortical suture button for fixation in LHBT procedures has been mentioned in reviews of biceps tenodesis.¹⁰ However, there is a paucity of literature clinically supporting the use of a unicortical button for LHBT. No studies have clinically validated the biomechanical data that a unicortical suture button is strong enough to maintain fixation of the biceps tendon until healing. The purpose of this study was to determine the early incidence of fixation failure and complication rates after LHBT using a unicortical suture button with a subpectoral approach.

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2. Methods

This was an IRB approved, retrospective review. All biceps tenodesis performed at the study institution by four orthopaedic surgeons were identified from January 2013 (when the technique was first employed) to January 2016. Clinical and operative notes were reviewed to confirm the procedure performed as well as technique utilized. Inclusion criteria included any patient 18 years old or older in which a unicortical suture button was utilized to perform an LHBT procedure. Any patient without 12 weeks follow up was excluded from results analysis.

Clinical notes and operative logs were also reviewed for complications. Fixation failure was defined as clinical findings suggestive of loss of fixation such as “popeye” deformity, change in muscular contour during the early postoperative period, acute clinical weakness in supination, or acute pain at the tenodesis site. Confirmation of clinical findings was performed with magnetic resonance imaging (MRI).

2.1. Technique

A diagnostic arthroscopy is performed either in the beach chair or lateral position according to surgeon preference. The relevant pathology is identified and treated. Indications for biceps tenodesis at our institution include longitudinal tear of the biceps tendon, irreparable SLAP (superior labrum anterior – posterior) tear, unstable biceps or compromised biceps sling, or significant biceps tendinopathy that responded to a diagnostic injection at the bicipital groove. LHBT was also often performed in conjunction with rotator cuff repair, pan labral repair, or repair of the upper subscapularis tendon. The biceps tendon can be tagged just distal to its insertion on the superior labrum if desired using a scorpion (Arthrex Inc., Naples, FL), bird beak, or spinal needle, but then is released using arthroscopic scissors.

The arm is slightly flexed, abducted, and externally rotated. A small, 3 cm, longitudinal incision is made at the lower border of the pectoralis tendon in the anterior portion of the axillary fold (see Fig. 1a and b). Incision is made sharply through the dermis with a knife. Electrocautery is used for hemostasis. The subcutaneous tissue and overlying fascia are then released and blunt dissection is used to palpate the biceps tendon (see Fig. 2). A right angle can be used to retrieve the tendon, but often only digital palpation is needed. The lower border of the pectoralis tendon can be palpated, under which the bicipital groove can be felt. The long head of the tendon is often under a final layer of fascia that must be opened to access the tendon. The tendon is then retrieved out of the wound (see Fig. 3a).

Starting at the musculotendinous junction, a Fiberloop (Arthrex Inc., Naples, FL) is used to perform a modified whipstitch for about 2 cm proximally. The final pass of the needle goes just proximal to the previous stitch and exits on the deep surface of the tendon, as it will lie on the bone (see Fig. 3b). The loop is cut to remove the needle and the biceps button (Arthrex Inc., Naples, FL) is applied. The sutures are gently pulled to ensure they slide freely then a snap placed on the sutures.

To prepare the bone, a small pregnant Hohmann is carefully placed on the medial border of the humerus, a larger narrow Hohmann can be used on the lateral border exposing the lower border of the pectoralis tendon and bicipital groove between the two retractors. In larger, more muscular individuals, an Army-Navy is used superiorly for further exposure (see Fig. 3b). The arm may need to be rotated slightly to provide direct access to the distal portion of the bicipital groove. A knife or electrocautery is used to open the periosteum for a length of about 2 cm starting just proximal to the distal border of the pectoralis tendon. A rasp is then used to prepare the cortex (see Fig. 4a). A unicortical hole is drilled

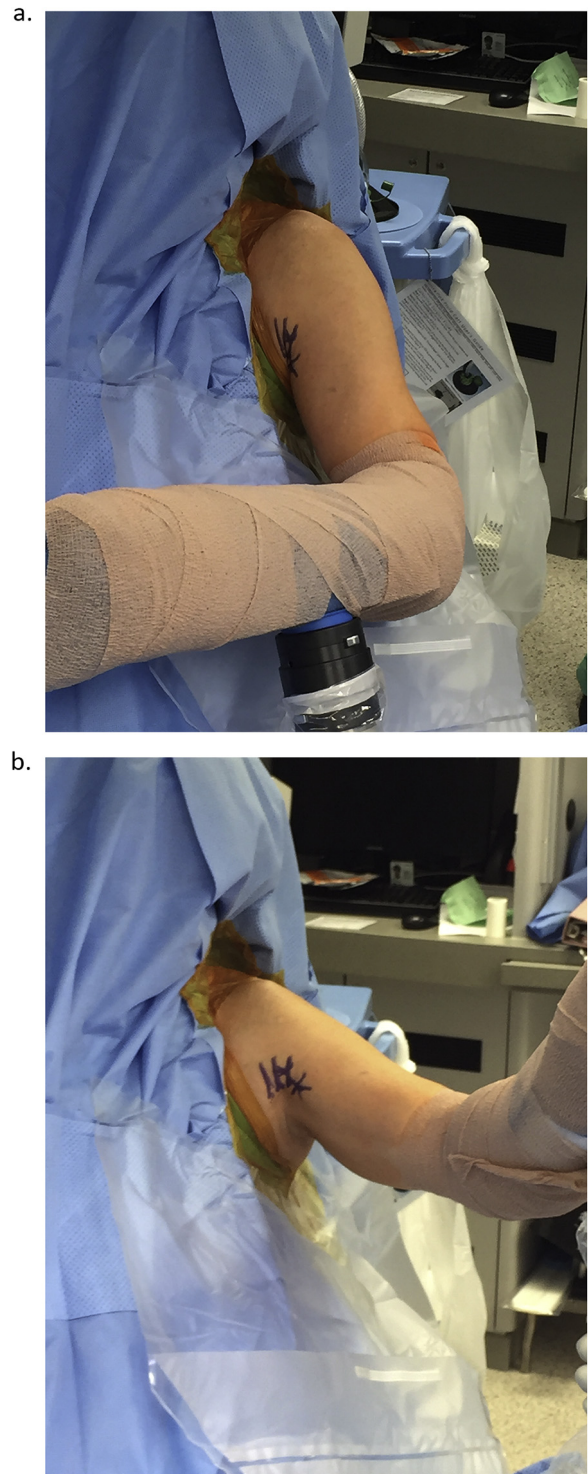


Fig. 1. a) The arm is marked while at the side to orient natural skin folds. b) The incision is made over the biceps near the axillary fold, usually it does not need to be extended more than 3–4 cm.

in the anterior cortex of the humerus near the top of the exposed cortex, centered in the bicipital groove (see Fig. 4b).

After preparation, the button inserter is used to place the button in the intramedullary canal, and the two strands of the suture are pulled partially to ensure that the button has flipped prior to removing the inserter (see Fig. 5). After the inserter is removed, a free needle is used to pass one suture strand through the tendon

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