Acta Scientific Orthopaedics (ISSN: 2581-8635)

Volume 5 Issue 11 November 2022

Case Report

# Mini Invasive Anterior Approach for the Reinsertion of Distal Biceps Tendon: Our Experience

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**DOI:** 10.31080/ASOR.2022.05.0609

**Received:** August 29, 2022

**Published:** October 17, 2022



## Abstract

**Introduction:** elbow injuries are not uncommon and distal ruptures of the biceps are rare when compared to proximal ones. They often occur in men during eccentric contraction of the biceps or after overload with flexed elbow. Usually, surgical treatment is the best choice, except in elderly patients or in patients who have a low functional demand.

**Aim:** the aim of our work is to evaluate the mid-term results of a mini-invasive anterior approach for the reinsertion of distal biceps tendon using a resorbable anchor.

**Materials and methods:** we collected data from 22 patients treated for total distal biceps tendon rupture from January 2019 to March 2021. We included all male patients, mean age 40 years (35-55) who underwent distal biceps tendon rupture after sport injuries. The tendon was repaired through a single anterior longitudinal mini open approach (3 cm incision) using a resorbable anchor (2.9mm) inserted into the bicep's radial tuberosity. We used DASH test to evaluate patient satisfaction rate. The average follow-up of our study was 12 months.

**Results:** twelve months after the surgical procedure, patients' satisfaction was very good (mean score 82), and all the patients came back to their daily living activities in forty days.

**Conclusions:** the mini-invasive single longitudinal anterior approach is a valid surgical option in distal biceps tendon rupture. This technique has a minimal aesthetic impact, and it allows a good functional outcome. On a functional point of view, the anchored tendon allows the complete range of motion of the elbow after five weeks. In four months, patients were completely back to their previous sport activities.

**Keywords:** Distal Biceps Tendon, Mini Invasive Anterior Approach

## Introduction

Elbow injuries are not uncommon and distal ruptures of the biceps are rare when compared to proximal ones. The international literature reports 96% of injuries affecting the long head, 1% for the short head and 3% for injuries of the distal brachial biceps tendon [1].

They often occur in men during eccentric contraction of the biceps or after overload with flexed elbow.

In most cases, the rupture occurs with a complete disinsertion (detachment) of the tendon from the tuberosity of the radius, less frequently the tendon rupture is partial or occurs at the junction between it and the muscular portion of the biceps [2].

Pathogenesis of tendon rupture is always related to an alteration of the constitution of its structure (degenerative process) that occurs in predisposed subjects. Some diseases, in particular endocrinological ones (diabetes, hyperparathyroidism), or certain lifestyle habits, such as the use of anabolic steroids, predispose to degeneration and tendon rupture. In these cases, the injury also occurs due to simple traumas [3].

The diagnosis is mainly clinical. Affected patients report intense pain in the cubital region, and on physical examination a deformity of the distal part of the body of the biceps muscle is visible with functional impotence in flexion and supination movements. The distal bicipital tendon is often palpable proximal to the antecubital fossa, on the medial side of the arm.

Sometimes the presence of an ecchymosis indicates its approximate location and provides a useful guide in formulating the diagnosis. X-ray examination can highlight the formation of hypertrophic bone at the radial tuberosity. Lateral view in supination is useful to evaluate heterotopic ossifications. Ultrasound confirms the clinical diagnosis especially in total ruptures, while the Magnetic Resonance is mandatory in partial ruptures. Finally, CT can highlight the avulsion of the radial tuberosity.

Patients with this injury can be treated conservatively or with surgical repair [4]. Those treated conservatively are expected to decrease in strength, flexion and supination ability. Furthermore, the morphology of the arm will not be the same as the contralateral because the distal biceps muscle will lay on the brachialis muscle. Surgical treatment is indicated in patients with good functional demand, high-level athletes, body builders and generally in people who require strength and supination for their work or daily activity. The loss of motility after nonoperative surgery is evident (30-40% in flexion, 50% for supination). Various types of treatment have been proposed for surgical reinsertion of the injured tendon. Surgical access provides different options: anterior access to the cubital fossa (Henry's access), double anterior and posterior incisions (Boyd and Anderson), single posterior incision or single anterior access [5-6].

The aim of our work is to evaluate the mid-term results of a mini-invasive anterior approach for the reinsertion of distal biceps tendon using a resorbable anchor.

## Materials and Methods

A retrospective analysis was performed on prospectively collected data from 22 patients treated for total distal biceps tendon rupture in fifteen months from January 2019 to March 2021. We included all male patients, mean age 42 years (35-57) who underwent distal biceps tendon rupture after sport injuries. Clinical diagnosis was made (Figure 1) and radiological confirmation was obtained through Magnetic Resonance performed a few days after the trauma. In the whole sample the tendon rupture was complete. The mean time between tendon rupture and surgical procedure was 9 days. There were no delays beyond 21 days and this allowed us to have no significative difficulty in catching the part of the tendon.

**Figure 1:** Clinical evaluation of distal biceps tendon rupture with visible deformity of the arm.

In our surgical technique, we anatomically repaired the tendon through a single longitudinal anterior mini open approach (3 cm incision) (Figure 2) targeted to the radial tuberosity, previously identified by intraoperative x-ray. We extracted the proximal portion of the tendon through the incision (Figure 3) and anchored it to the radial tuberosity using a resorbable anchor (2.9mm) (Figure 4) and maintaining the supinated elbow in flexion of about 30 degrees.

Skin was closed using resorbable sutures (Figure 5).

After the surgical procedure, elbow brace set at 90° flexion with the arm in neutral rotation to its resting tension following the repair was maintained for two weeks, then rehabilitation started with passive exercise of flexion and extension of the elbow then

**Figure 2:** Skin incision with a single longitudinal mini-invasive approach (3 cm).

**Figure 3:** Finding of the proximal portion of the tendon through the incision.

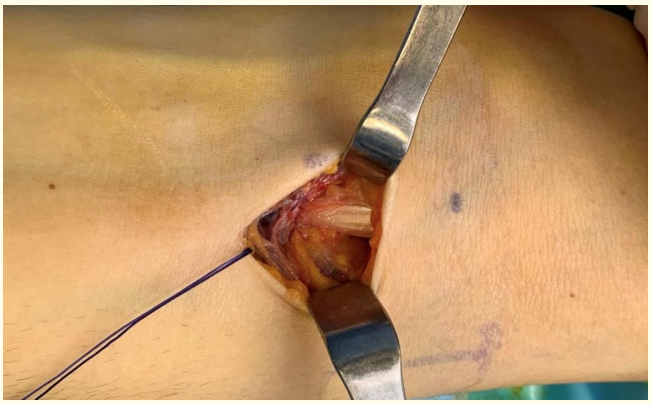

**Figure 4:** Tendon is anchored to the radial tuberosity with the restoration of the anatomical continuity of the tendon.

**Figure 5:** Skin closure with absorbable suture.

followed by a progressive active motion program (Figure 6). After 6 weeks the patient was allowed to use the arm for all activities of daily living with limited weight bearing until 3 months postoperatively. At that time, the patient started progressive biceps strengthening exercises.

**Figure 6:** Patient (male, 36 year) who underwent bilateral distal biceps tendon rupture, complete restoration of flexion-extension of the elbow forty days (left side) and sixty days (right side) after the surgical procedure.

We evaluated patients' satisfaction using the disabilities of the arm, shoulder and hand (DASH) questionnaire [7] that is a self-administered region-specific outcome instrument developed as a measure of self-rated upper-extremity disability and symptoms. The DASH consists mainly of a 30-item disability/symptom scale, scored 0 (no disability) to 100.

The clinical follow-up of our study was at 1-3-6 and 12 months.

## Results

During the follow-up after the surgical procedure, patients' satisfaction was very good increasing during the follow-up until a

mean score of 82 at one-year follow-up. No severe functional impairment was reported. We did not report nerve damage or infections. We reported a single case of fibrotic scar.

All the patients came back to their daily living activities in forty days.

## Discussion

Different therapeutic options have been proposed for the treatment of distal biceps tendon rupture and at this time there is no consensus about the best surgical approach. In our experience, we focused on a surgical technique that allows a very satisfying recovery of the affected elbow without complications such as persistent pain, stiffness or neurological symptoms.

In our experience, the mini-invasive anterior approach with a single longitudinal incision is a valid surgical option with a minimal aesthetic impact and it allows a good functional outcome in flexion, extension and pronation-supination of the elbow. On a functional point of view, the anchored tendon allows the complete range of motion of the elbow after five weeks. In four months, patients were completely back to their previous sport activities.

## Conclusions

In our experience, anatomical reinsertion of distal biceps tendon through a mini open anterior approach using a resorbable anchor is a valid surgical option with a very low rate of complications and high rate of satisfaction. This procedure leads to biceps strength restoration and complete range of movement of the elbow after a few months.

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