The Philippine Journal of Orthopaedics

CASE REPORT

Reconstruction of a Chronic Distal Biceps Tendon Rupture Using an Iliotibial Band Autograft and Endobutton Fixation: A Case Report

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ABSTRACT

This paper presents a surgical technique using an autologous iliotibial band (ITB) graft combined with Endobutton fixation for reconstructing a chronic distal biceps tendon rupture. The technique addresses the often-seen challenges of tendon retraction, tissue compromise, and stability of bony insertion. A 57-year-old male with a chronic distal biceps tendon rupture underwent surgery using a 16 x 2 cm ITB autograft, resulting in significant improvement in range of motion, functional scores (Filipino version of the Disabilities of the Arm, Shoulder and Hand [Fil-DASH] questionnaire), and resolution of pain at 18-month follow-up. The authors conclude that the combined use of autologous ITB graft and Endobutton fixation led to excellent outcomes in this case of chronic distal biceps tendon rupture.

Keywords. chronic distal biceps tendon rupture, iliotibial band autograft, Endobutton, cortical button fixation, tendon reconstruction

INTRODUCTION

Chronic distal biceps tendon ruptures present a distinct surgical challenge due to tendon retraction, fibrosis, and muscle atrophy, which often preclude primary repair. Because of these challenges, autograft or allograft tendon reconstruction is often necessary to bridge the gap and restore function. While various graft choices and fixation methods such as suture anchors and interference screws have been described in the literature, there remains an ongoing debate regarding the optimal reconstruction strategy. This case report details our approach using iliotibial band (ITB) autograft secured with an Endobutton to provide a highly stable and anatomically robust reconstruction that requires only brief postoperative immobilization and allows early range of motion.

CASE

A 57-year-old male consulted due to limited range of motion, inability to use his left forearm because of pain, and a gross deformity of his biceps. The patient had a known comorbidity of stage 2 hypertension and a 40 pack-year history of smoking. A focused examination of the patient's left upper extremity showed a positive Popeye sign, limited supination with associated pain, and a palpable gap at the antecubital fossa. He tested positive for the hook test and exhibited weakness in supination and flexion compared to the contralateral arm. His Fil-DASH score was 50.6, indicating severe disability, and surgical reconstruction

ISSN 0118-3362 (Print)
eISSN 2012-3264 (Online)
Printed in the Philippines.
Copyright© 2026 by Hernandez and Sibonga.
Received: June 23, 2026
Accepted: August 24, 2026
Published Online: November 5, 2026
https://doi.org/10.69472/poai.2026.18211

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was recommended. Notably, the patient suffered a similar injury to the right (contralateral) elbow 10 years prior and was treated acutely with direct end-to-end tendon repair.

Surgical technique

Patient positioning and exposure

The patient, under axillary block and general anesthesia, was positioned supine with the left arm extended and the forearm supinated on a radiolucent table. A 10-cm anterior lazy-S incision was made over the antecubital fossa, and blunt dissection was carried down to expose and release the bicipital aponeurosis. Grossly, we found an avulsed biceps tendon with the stump retracted 8 cm proximal to the radial tuberosity (Figure 1).

Harvesting ITB autograft

An autologous iliotibial band (ITB) graft was harvested from the left thigh. After marking the skin, a 10-cm incision was made on the direct lateral thigh 15 cm distal to the anterior superior iliac spine (ASIS), at the beginning of the confluence of the tensor fasciae latae (TFL) and ITB. The ITB normally runs ~50 cm from the iliac crest down to its insertion with a width of 5 cm at the mid-thigh and a thickness of 2 to 3 mm. After exposing the ITB, we harvested a 16 x 2 cm graft to span the 8-cm gap with extra length for proximal juncture and distal juncture repair of at least 4 cm each (Figure 2). The distal biceps tendon exhibits considerable anatomical variability. A three-dimensional cadaveric study reported a mean total tendon length of 126.7 ± 10.7 mm, with an internal width of 12.0 ± 4.2 mm and an external width and thickness of 6.0 ± 1.0 mm and 3.0 ± 0.5 mm, respectively.[1]

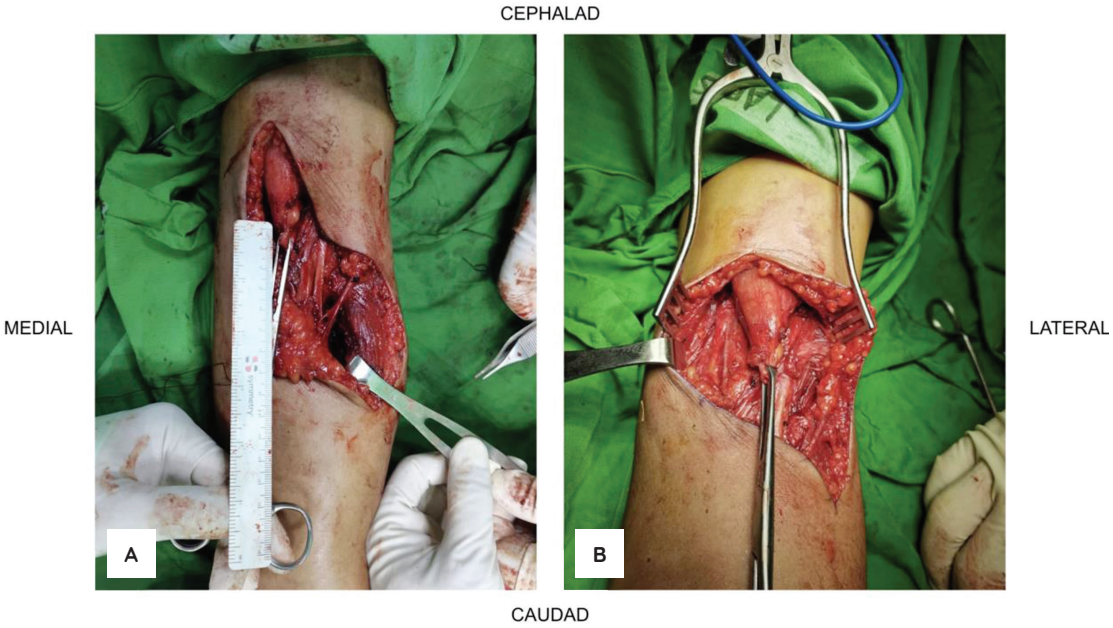


Figure 1. Volar aspect of the left forearm showing an almost 8-cm gap from the distal biceps tendon stump to the bicipital tuberosity of the radius **(A)**. Muscle belly of biceps showing remnant biceps tendon stump **(B)**.

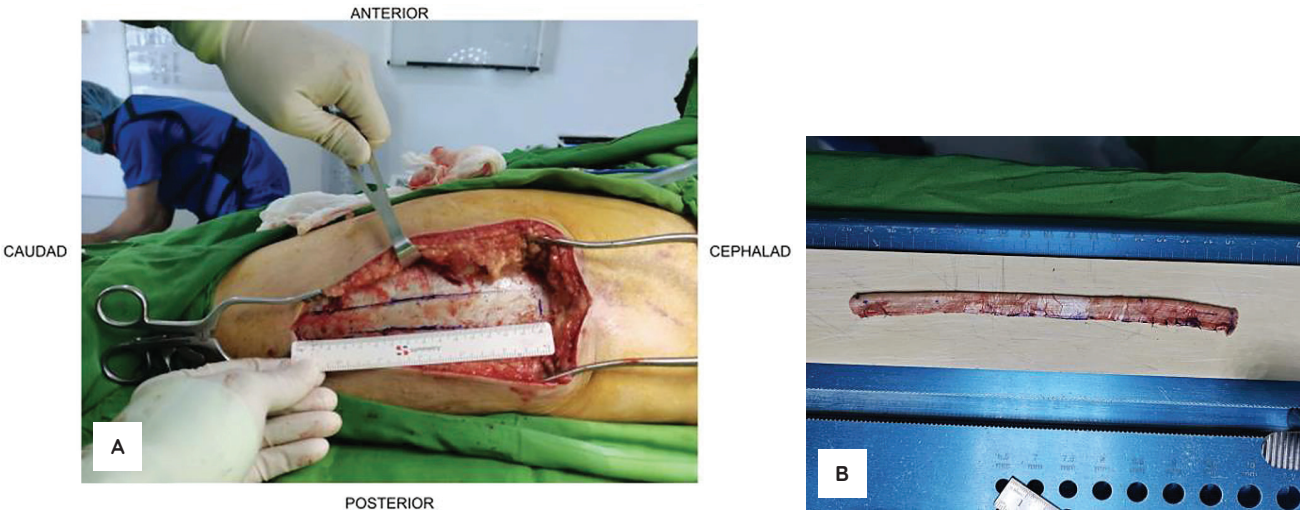


Figure 2. Incision on the direct lateral thigh exposing the ITB **(A)**. Harvested graft from the anterolateral ITB measuring 16 x 2 cm (L x W) **(B)**.

Folding a 2-cm-wide graft longitudinally yielded a 1-cm wide autograft. A longer open incision to the ITB allowed direct visualization and protection of the lateral femoral cutaneous nerve, and ensured a uniform width of the graft.

Preparation of radial tuberosity and tendon reconstruction and fixation

The radial tuberosity was located and decorticated. A bicortical drill hole was created with a 5-mm drill bit for later passage of the Endobutton (ConMed, 15-mm XO Endobutton). Three whipstitches were applied to the distal juncture of the ITB graft and the suture ends were passed through the Endobutton. While keeping the suture ends tensioned outside the bone, the Endobutton was passed through the drill hole longitudinally and flipped after it went past the distal cortex. The suture ends were sutured to the graft itself just proximal to its bony insertion. With the elbow in 90 degrees of flexion and neutral forearm rotation, the proximal juncture was repaired with a Pulvertaft weave of the ITB graft with the biceps muscle, reinforced with a figure-of-eight suturing technique using Ethibond 2-0 (Figure 3).

Closure

Fixation was confirmed intraoperatively under the image intensifier (Figure 4). The wound was closed in layers. The elbow was kept in an arm sling in 90 degrees of flexion and neutral forearm rotation.

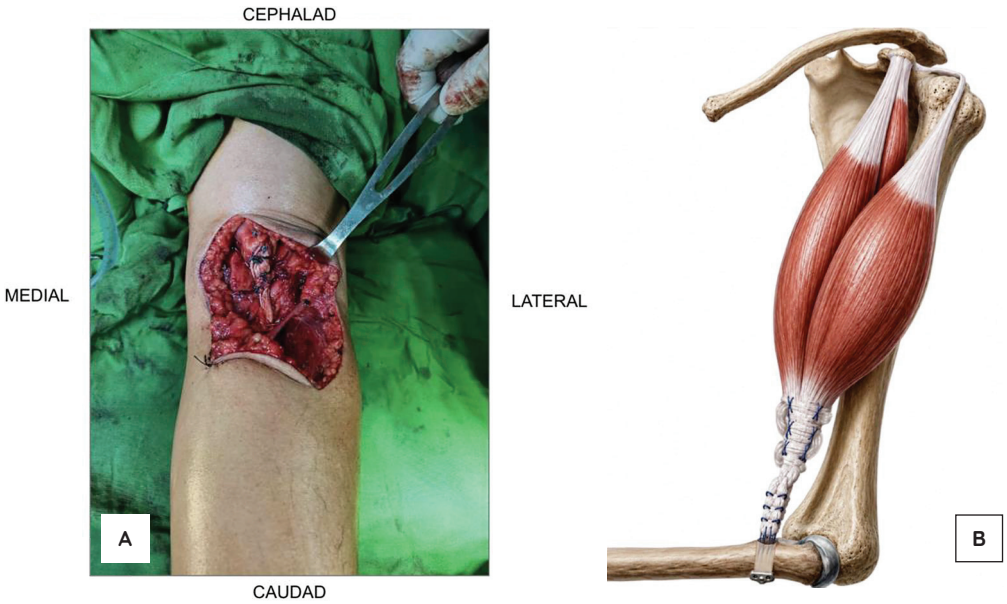


Figure 3. Reconstruction of the distal biceps tendon is shown **(A)**. Diagram of the proximal juncture Pulvertaft weave and figure-of-eight suturing, and distal juncture repair with Endobutton fixation **(B)**.

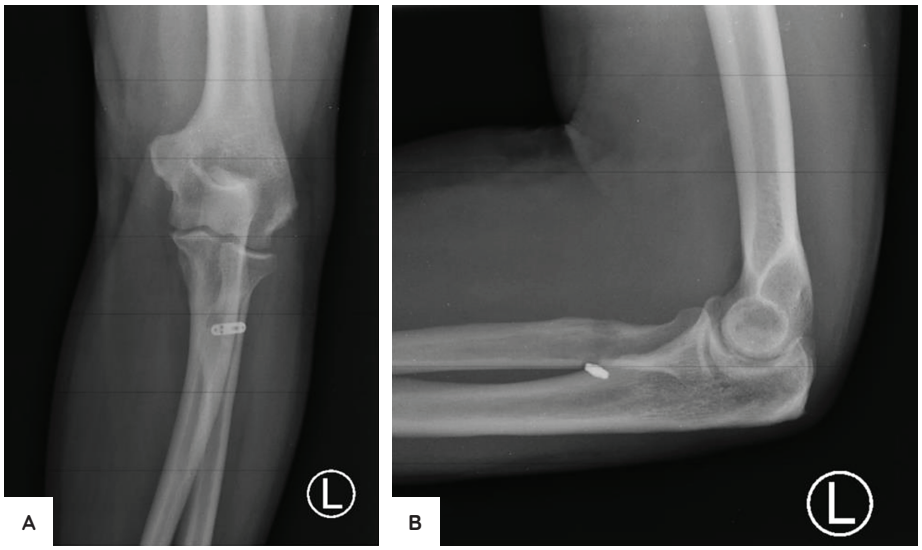


Figure 4. Elbow AP/L radiographs presenting an intact construct with the Endobutton. AP view shows the position of Endobutton at native insertion of biceps **(A)**. Lateral view shows Endobutton anchored at the distal cortex with adequate tension **(B)**.

Postoperative rehabilitation and outcomes

The patient was discharged one day postoperatively without complications. A progressive rehabilitation protocol was started (Table 1).

At 18 months follow-up, the surgical site was completely healed with no Popeye sign. The patient demonstrated a functional arc of motion of the forearm (supination 78°; pronation 75°; total arc 153°) and elbow (20–140° extension/flexion) (Figure 5). The Fil-DASH score improved to 19, indicating minimal disability, and the patient reported high satisfaction with the procedure.

Bilateral elbow MRIs were performed to assess the status of the biceps tendons and the integrity of the surgical construct of both elbows (Figures 6 to 8). This evaluation compared an acutely repaired biceps tendon rupture in the right elbow 10 years postoperatively to a reconstructed chronic biceps tendon rupture in the left one year postoperatively. Imaging revealed no significant differences in the structural integrity

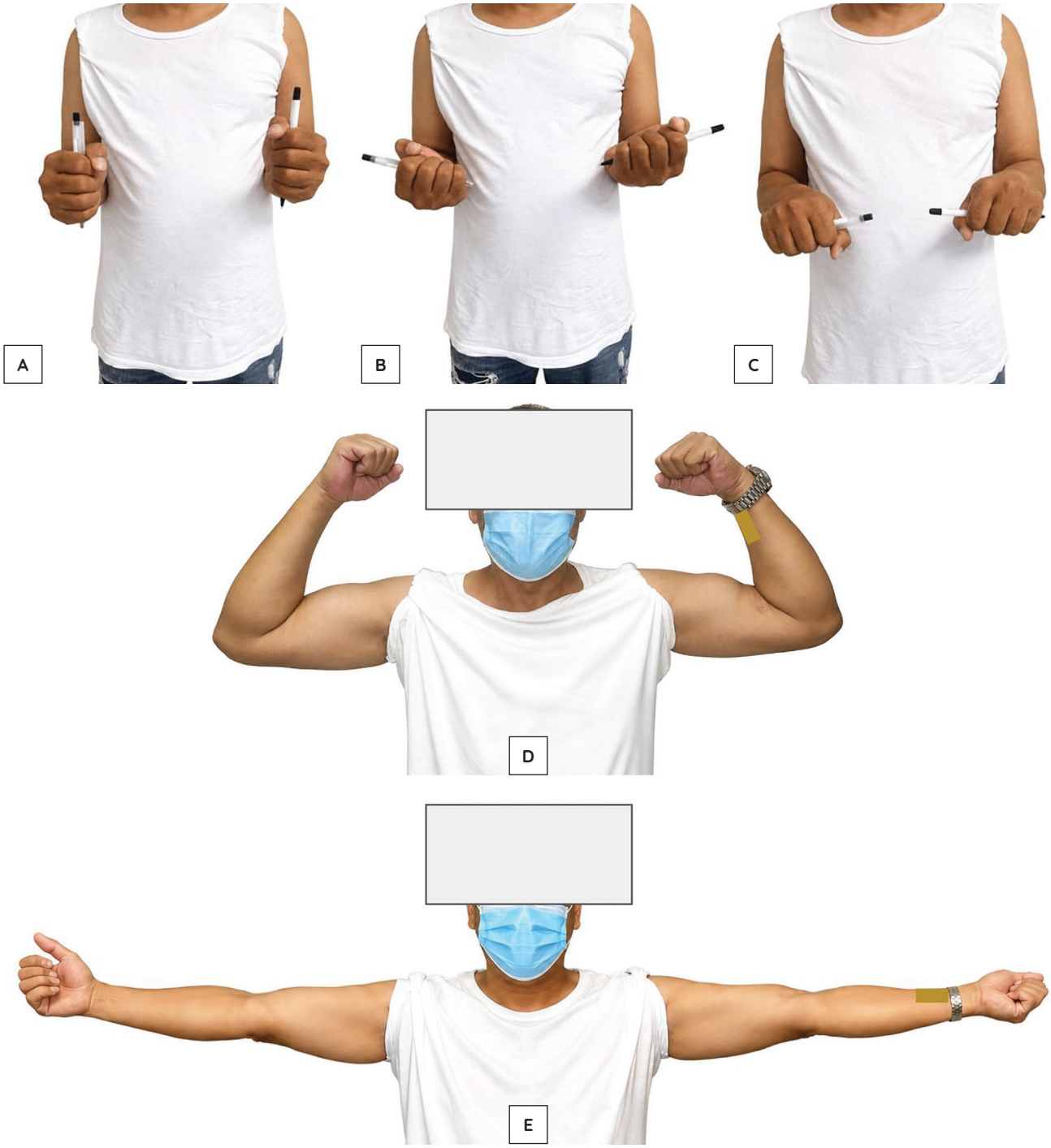


Figure 5. Assessment of range of motion. Neutral forearm **(A)**, supinated forearm **(B)**, pronated forearm **(C)**, with a total arc of motion of 153° on the left side (pronation: 75°; supination: 78°) compared to 167° on the contralateral right side (pronation: 82°; supination: 85°). Flexed elbows **(D)**, extended elbows **(E)**. The elbow total arc was 120° (extension: 20°; flexion: 140°).

Table 1. Postoperative Rehabilitation Protocol

Postoperative Timeframe	Immobilization Status	Range of Motion (ROM) Guidelines	Strengthening and Activity
Day 1 to Week 1	Bulky dressing with armsling in 90 degrees of elbow flexion and neutral forearm rotation	Immobilized	Rest; refrain from lifting weights
Weeks 1 to 4	Bulky dressing with armsling in 90 degrees of elbow flexion and neutral forearm rotation	Active ROM exercises as tolerated Weekly increase in elbow extension by 20 degrees until 0 degrees of extension Weekly increase in pronation and supination from neutral by 20 degrees until 90 degrees	Refrain from lifting weights
Weeks 4 to 8	None	Passive ROM exercises to reach functional elbow flexion and extension and forearm pronation and supination arc of motion	Isometric strengthening
Weeks 8 to 12	None	Full functional arc of motion	Strength training and full resistance exercises

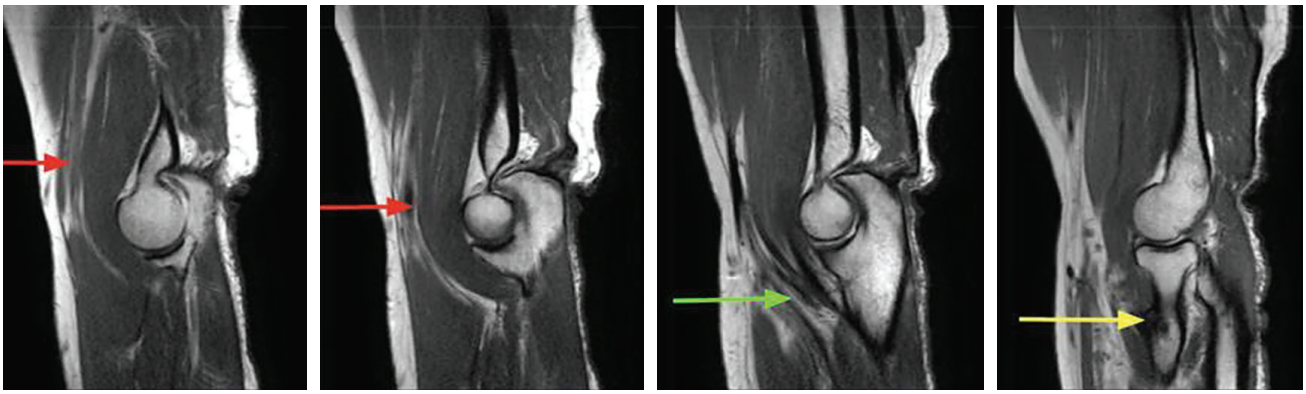


Figure 6. Right elbow MRI taken 10 years postoperatively showing intact biceps brachii tendon with diffuse thickening likely due to post-surgical changes (s/p distal biceps tendon repair) *(red arrow: biceps; green arrow: biceps tendon; yellow arrow: bicipital tuberosity).*

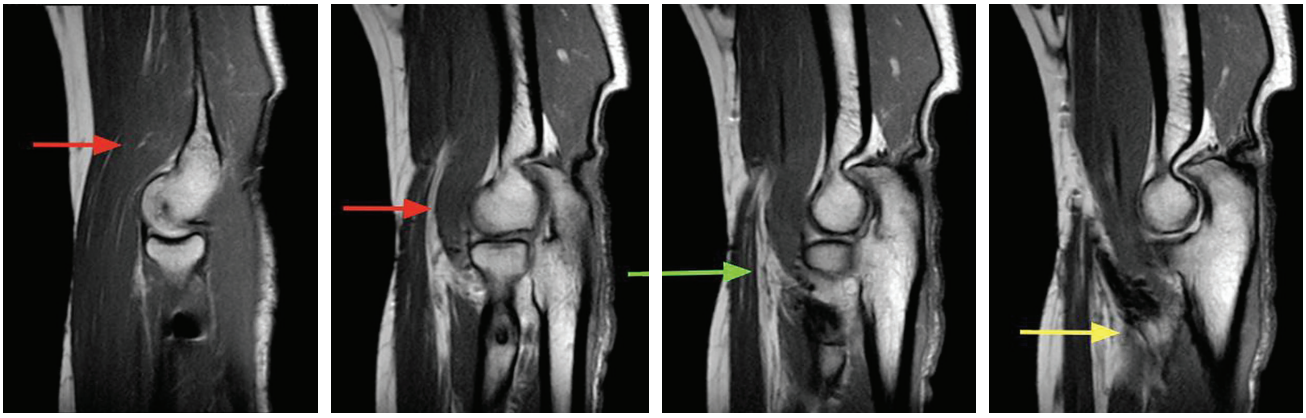


Figure 7. Left elbow MRI taken one year postoperatively showing intact biceps brachii tendon with diffuse thickening likely due to post-surgical changes (s/p reconstruction with ITB and Endobutton) *(red arrow: biceps; green arrow: biceps tendon; yellow arrow: bicipital tuberosity).*

of the constructs. The right elbow demonstrated post-operative scar tissue within the previously repaired biceps tendon. In the left elbow, the reconstructed biceps tendon remained intact, secured by the ITB autograft and Endobutton.

DISCUSSION

Chronic distal biceps tendon ruptures present a unique reconstructive challenge because delayed presentation results in proximal tendon retraction, fibrosis, and poor tissue elasticity, making primary repair difficult or impossible.[2] Consequently, tendon reconstruction using a biological graft is often required to restore the native tendon length and optimize elbow flexion and forearm supination.[2,3] The choice of graft and fixation method therefore becomes critical in achieving a durable reconstruction with satisfactory functional outcomes.

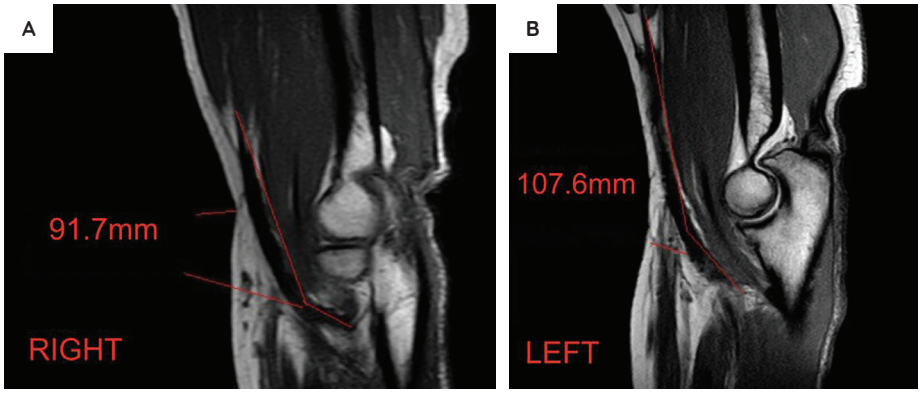


Figure 8. Postoperative MRIs of both elbows, comparing the lengths of the distal biceps tendon of 91.7 mm on the right **(A)** and 107.6 mm on the left **(B)**.

Numerous graft options have been described for chronic distal biceps reconstruction, including semitendinosus autograft, Achilles tendon allograft, peroneus longus autograft, and fascia lata grafts.[3] In the present case, an iliotibial band (ITB) autograft was selected because it provides several advantages relevant to chronic reconstruction. The ITB offers adequate graft length to bridge large tendon defects, possesses high tensile strength suitable for load-bearing reconstruction, and has low donor-site morbidity without significantly compromising lower extremity function. Furthermore, as an autologous biological graft, it eliminates the risks of disease transmission and host rejection associated with allografts while providing favorable biological incorporation into host tissue.

Although fascia lata grafts have previously been reported for distal biceps reconstruction,[4] literature specifically describing the use of an ITB autograft remains limited. Morrell et al reported excellent restoration of elbow flexion and forearm supination using fascia lata autografts with suture anchor fixation,[5] while more recent work by Fawzy et al demonstrated durable long-term functional outcomes using fascia lata allografts despite a small incidence of transient neuropraxia.[6] These studies support the biological suitability of fascia lata-derived grafts for chronic distal biceps reconstruction and provide the foundation for the present technique.

The fixation method is equally important in determining the success of tendon reconstruction. Biomechanical studies consistently demonstrate that cortical button fixation provides one of the highest load-to-failure strengths among available distal biceps fixation techniques, exceeding that of isolated suture anchors and interference screw fixation.[7] The bicortical Endobutton provides secure tendon-to-bone fixation while preserving bone stock through a relatively small bone tunnel.[8] This robust fixation permits early controlled rehabilitation, minimizes the risk of graft pullout, and facilitates biological incorporation at the radial tuberosity.

The novelty of this case lies not only in the use of an ITB autograft but also in its method of reconstruction. Proximally, the graft was integrated into the native musculotendinous unit using a Pulvertaft weave combined with figure-of-eight Ethibond suturing to maximize tendon-to-muscle contact and distribute tensile forces. Distally, fixation was achieved using a bicortical Endobutton secured to the ITB autograft with whipstitches, creating a construct that combines biological reconstruction with strong biomechanical fixation.[9] To our knowledge, reports describing this specific combination of ITB autograft reconstruction with Endobutton fixation remain scarce in the literature.

Our patient demonstrated satisfactory restoration of elbow function following reconstruction, supporting previous reports that biological graft reconstruction can successfully restore strength and stability in chronic distal biceps tendon ruptures.[3] While this single case cannot establish superiority over other reconstructive techniques, it demonstrates that ITB autograft combined with Endobutton fixation is a feasible and reproducible option when primary repair is not possible.

The principal limitation of this report is its nature as a single-case experience with limited follow-up. Larger comparative studies with longer-term functional evaluation are necessary to determine whether ITB autograft reconstruction offers clinical or biomechanical advantages over other established graft choices. Nevertheless, this case adds to the growing body of evidence supporting biological graft reconstruction for chronic distal biceps tendon ruptures and highlights ITB autograft with bicortical Endobutton fixation as a promising reconstructive technique.

CONCLUSION

This case highlights a highly effective technique for chronic distal biceps tendon reconstruction combining ITB autograft with bicortical Endobutton fixation. This combined method addresses both the gap created by tendon retraction and the need for immediate structural stability, serving as a durable alternative to traditional graft and anchor techniques that allows early range of motion.

ETHICAL CONSIDERATION

Patient's consent was obtained before submission of the manuscript.

STATEMENT OF AUTHORSHIP

All authors certified fulfillment of ICMJE authorship criteria.

CREDIT AUTHOR STATEMENT

EFH: Conceptualization, Methodology, Software, Validation, Formal analysis, Investigation, Resources, Data curation, Writing – original draft preparation, Writing – review and editing, Visualization, Project administration, Funding acquisition; **RLS:** Conceptualization, Methodology, Software, Validation, Formal analysis, Investigation, Resources, Data curation, Writing – original draft preparation, Writing – review and editing, Visualization, Supervision, Project administration, Funding acquisition.

DATA AVAILABILITY STATEMENT

No datasets were generated or analyzed for this study.

AUTHOR DISCLOSURE

The authors declared no conflict of interest.

FUNDING SOURCE

None.

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