International Journal of Research in Orthopaedics
*Tuteja S et al. Int J Res Orthop. 2025 Mar;11(2):420-423*
http://www.ijoro.org

DOI: https://dx.doi.org/10.18203/issn.2455-4510.IntJResOrthop20250034

**Case Report**

# Anatomic repair of a chronic distal biceps tendon rupture: a case report

**Sanesh Tuteja, Timothy Rodricks***

Department of Orthopaedics, Fortis Hospital, Mulund, Mumbai, Maharashtra, India

**Received:** 30 December 2024
**Revised:** 09 January 2025
**Accepted:** 10 January 2025

***Correspondence:**
Dr. Timothy Rodricks,
E-mail: timothyrodricks@hotmail.com



## ABSTRACT

Chronic distal biceps tendon ruptures, common in weightlifting, pose significant challenges for surgical repair due to the high demands placed on the biceps muscle. Traditional repair techniques, such as direct suture fixation, may be inadequate for athletic patients. This case report presents a novel approach using the modified Boyd-Anderson two-incision technique, incorporating an endobutton and fiberloop to enhance tendon stability and functional recovery. A 40-year-old male weightlifter with a chronic distal biceps rupture underwent surgical repair after physical examination and imaging confirmed the injury. The modified Boyd-Anderson technique, involving two incisions, allowed optimal tendon exposure. An endobutton was used to secure the tendon to the radial tuberosity, while a fiberloop reinforced the repair. The procedure, performed under general anesthesia, minimized soft tissue damage. Postoperative rehabilitation focused on strength training and follow-up at 2 months showed significant improvement in range of motion, strength and overall function, enabling the patient to return to daily activities. This technique, with its use of the endobutton and fiberloop, provides a promising option for anatomical repair of chronic distal biceps ruptures in athletic individuals, offering effective restoration of function and strength. It underscores the importance of customized surgical approaches for tendon repair in active patients.

**Keywords:** Distal biceps tendon, Elbow, Tendon repair, Two-incision

## INTRODUCTION

Chronic distal biceps tendon ruptures are common in weightlifters and athletes and can severely impact functional performance.[1] Traditional single-incision repair methods may be insufficient for these patients due to the specific demands of powerlifting.

The modified Boyd-Anderson two-incision technique offers improved visualization and tendon fixation, incorporating an endobutton and fiberloop for enhanced stability.[10] This case report details the surgical management of a chronic distal biceps tendon rupture in a 40-year-old powerlifter, highlighting the effectiveness of this approach in restoring function and facilitating a return to high-level athletic performance.

## CASE REPORT

A 40-year-old right arm dominant male, a powerlifter and office worker by profession, presented to the OPD with complaints of pain, visible deformity and weakness over the right arm and elbow while carrying heavy weights, following an injury which occurred in the gym 45 days ago.

The injury occurred while spotting a friend during a barbell bench press, where the friend abruptly let go of the bar causing a sudden jerky hyperextension of the patient's right elbow. He soon noticed a deformity and progressive weakness over the right arm with difficulty performing activities of daily living.

***Clinical findings***

On clinical examination, prominent retraction of the biceps belly was noted, a positive Reverse Popeye sign (Figure 1) and palpation demonstrated a negative Tilt sign ruling out a partial tear, a positive Hook test, with a significant reduction in flexion and supination. On performing Yergason's test, it was found to elicit pain and thus positive. There was no distal neurological or vascular deficit.

***Diagnostic assessment***

He was advised to undergo an MRI of the right arm with the elbow joint, which showed a near complete avulsion of the bicep's tendon from its insertion into the radial tuberosity with retraction of the tendon fibres approximately 9 cm proximal to the expected site of insertion. The distal end of the torn retracted tendon was noted in the distal arm with evidence of fluid pockets around it along with oedema surrounding the distal tendon (Figure 2). There was no joint effusion, synovitis, ligament injury or osteolytic lesions seen. He was counselled to undergo a direct repair of the distal biceps tendon.

***Therapeutic intervention***

The patient was explained about the condition and treatment options, Conservative, resulting is some loss of strength and visible deformity versus surgical repair. Benefits and complications were discussed. A decision to surgically fix the torn tendon was made and an informed consent obtained.

The patient was scrubbed, painted and draped, in Supine position under General anaesthesia, a modified Boyd-Anderson approach was used and a Longitudinal incision distal to skin crease was made and Cephalic vein visualised. Lateral cutaneous nerve was protected while identifying the plane between Brachio-radialis and Pronator Teres. Dissection was done down to the radial tuberosity along the medial border of brachioradialis and Leash of Henry veins coagulated.

Tuberosity was exposed and cleared of bursal tissue, the Tendon was found to be completely avulsed with a minimal strand of remnant intact tendon, the rest of the stump was scarred in the mid-arm and irretrievable from the forearm incision.

Tendon stump was then palpated subcutaneously and an incision was taken over the stump. Dissection was made down to biceps muscle and the stump found curled and adhered to Brachialis. It was dissected out and the Tendon end was trimmed of abnormal tissue and whipstitched with Fiberloop (Figure 3). A Biceps Endobutton was inserted over the Fiberloop. The tendon was then routed subcutaneously to emerge from the forearm incision. A Guide pin was inserted through both cortices of radial tuberosity and under fluoroscopy. The bone around the drill site was freshened to a bleeding surface. The Endobutton was inserted and passed through under traction and flipped. The tendon was secured to bicipital tuberosity by tightening the lead arms of the whip stitch and secured with knots. The Endobutton position was confirmed on fluoroscopy and found to be satisfactory (Figure 4). A saline wash was given and the wounds were closed with Vicryl (Polyglactin) to subcutaneous and 3/0 Monocryl (Poliglecaprone) and Steri-strips to skin with an Above Elbow Slab for stabilisation.

***Follow-up and outcomes***

The patient was monitored in the ward and was encouraged to perform active finger and wrist movements. He was vitally stable with no neurovascular deficit and was discharged the day after surgery following which he was reviewed in the OPD on post-operative day 14 for a wound examination and was initiated with gentle range of motion exercises.

At 2 months post-surgery, he showed a significant reduction in his weakness and improved flexion, supination and rotatory movements (Figure 5). A DASH score of 1.7 was obtained where he had mild difficulty with carry a heavy object and pushing a heavy door. He was advised to continue all daily activities without restriction and to resume heavy gym activities after 2 months.

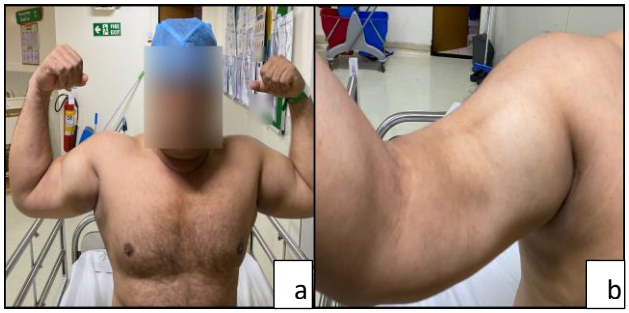


**Figure 1 (a and b): Clinical images showing the classic reverse-popeye sign.**

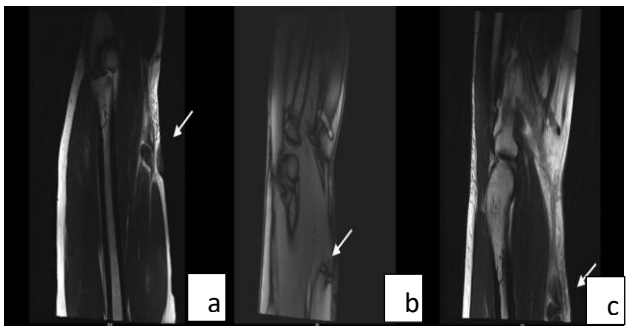


**Figure 2 (a-c): Series of MRI images showing the complete avulsion of the biceps tendon with approximately 9cm of retraction from its insertion site with fluid pockets around the torn tendon.(white arrows).**


**Figure 3 (a-c): Series of intraoperative images showing a proximal and distal incision with whipstitching of the trimmed tendon with tunelling through and anchored onto the radial tuberosity.**

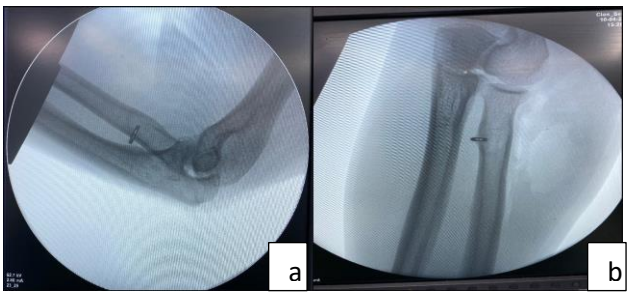


**Figure 4 (a and b): Intraoperative fluoroscopic images showing the satisfactory position and locking of the Endobutton over the distal cortex.**


**Figure 5 (a and b): 2 month follow up showing the range of movements of the elbow with good flexion and extension.**

## DISCUSSION

The distal biceps tendon from the two heads may converge or remain anatomically separate before they attach to the radial tuberosity. Despite this variance in anatomy, the biceps short head attaches more distal than that of the long head over the radial tuberosity. The orientation of the biceps short head primarily contributes to elbow flexion strength while the biceps long head primarily provides supination strength while the elbow is in a flexed position.[2] Lacertus fibrosus originates from the distal short head of the biceps tendon passing obliquely across the cubital fossa and runs distally and medially, helping to protect the underlying brachial artery and median nerve. It is continuous with the deep fascia of the flexor tendon origin, envelopes flexor muscle bellies and is often mistaken for an intact distal biceps tendon. Rupture of the distal biceps tendon is usually traumatic and most commonly occurs in males athletes, manual workers and weight lifters commonly between the 4th and 6th decade of life. The tendon is usually injured when a strong and abrupt extension force is placed on the elbow and is resisted with the demand on the tendon exceeding its capacity to resist the motion.[2,3]

Although the classic clinical evidence, the rarity of the injury and the good movement arc presented by the patients lead to a late presentation and diagnosis. Biomechanical studies demonstrated loss of flexion and supination forces of up to 30% and 40% respectively and therefore many authors recommended that the acute anatomical repair should be preferred to the non-anatomical repair with the brachial tendon.[4] Distal biceps tendon injuries can be classified as acute (<4 weeks) or chronic (>4 weeks). They can be also subdivided into major injuries (complete tear or tendon rupture, with or without rupture of the lacertus fibrosus, high-grade partial tear) and minor injuries (low-grade partial tear strain or tendinopathy) based upon whether they require surgical management or not.[5]

Low grade or partial tears are clinically detected with tenderness over the bicipital groove on flexion and over the radial tuberosity when the elbow is flexed to 90 degrees indicating a positive Tilt sign. Complete tears on the other hand would show the classic Reverse Popeye sign, elicit a positive Hook test and Yergason's test with reduced degree of flexion and supination of the arm and forearm with lower grades of motor power.[6,7]

A lateral radiograph of the elbow might show abnormal soft tissue shadow, but these findings are inconsistent. On ultrasonography, Partial and complete tears are characterized by partial or complete tendon discontinuity or detachment and/or peritendinous effusion with or without fibre retraction, whereas other alterations of the tendon without any evidence of fibre disruption, but its drawbacks are the accuracy differentiating between complete or partial tears. MRI continues to be the gold standard for a distal biceps rupture.[8]

Acute injuries, if addressed early via surgical management, offer favourable results. Chronic injuries are often difficult to treat due to tendon retraction, muscular atrophy and associated fibrosis. Conservative treatment presents unsatisfactory outcomes as there is a gradual decline in flexion and supination. Operative procedures include direct anatomic repair with traditional bone trough or repair with modern devices, such as suture anchors, Endobutton and interference screws. Endoscopic minimally invasive procedures have been found to have significant success with acute tears. Chronic tears respond

better to a direct open repair and in cases of severe retraction, degeneration of the fibre ends, loss of elasticity, stump atrophy, a reconstructive procedure with autograft, allograft or acellular dermal matrix can be considered.[9]

Distal biceps injuries can be repaired through a single incision (Boyd-Anderson approach), a two-incision technique (modified Boyd-Anderson approach) or even a modified endoscopic access.[10] In our case, we decided to approach with a two-incision technique due to the massive retraction of the distal tendon fibres. The EndoButton is advantageous such that it allows for the passage of the tendon by the radius to be done blindly, with traction on the tendon and EndoButton maintained in the line of traction. The threads can be passed through using a blunt guidewire with diameter of 2 mm or less, which makes injury of neurovascular structures highly unlikely.[11] A metal/bioabsorbable screw was not used for the fixation as they have proven to cause osteolysis over the proximal radius and tenodesis of the biceps tendon.[12]

## CONCLUSION

Distal biceps tendon injuries can be acute or chronic, with chronic cases presenting challenges due to tendon retraction and muscle atrophy. While acute repairs often yield good outcomes, the modified Boyd-Anderson technique is particularly effective for chronic tears, providing improved access and visualization for repair. This two-incision approach enhances the chances of successful recovery and functional restoration in patients with chronic distal biceps injuries.

*Funding: No funding sources*
*Conflict of interest: None declared*
*Ethical approval: Not required*

## REFERENCES

1. Kapicioglu M, Bilgin E, Guven N, Pulatkan A, Bilsel K. The role of deadlifts in distal biceps brachii tendon ruptures: an alternative mechanism described with YouTube videos. Orthopaedic J Sports Med. 2021;9(3):2325967121991811.
2. Virk MS, DiVenere J, Mazzocca AD. Distal biceps tendon injuries: treatment of partial and complete tears. Operative Techniq Sports Med. 2014;22(2):156-63.
3. Caroline C. Upper extremity: An update on distal biceps tendon ruptures. Current Orthopaedic Practice. 2015;26:119-25.
4. Mazzocca AD, Burton KJ, Romeo AA, Santangelo S, Adams DA, Arciero RA. Biomechanical evaluation of 4 techniques of distal biceps brachii tendon repair. Am J Sports Med. 2007;35(2):252-8.
5. Fuente J, Blasi M, Martínez S. Ultrasound Classification of Traumatic Distal Biceps Brachii Tendon Injuries. Skeletal Radiol. 2018;47(4):519-32.
6. Caekebeke P, Meglic U, van den Bekerom MPJ, van Riet R. Evaluation of clinical tests for partial distal biceps tendon ruptures and tendinitis. J Shoulder Elbow Surg. 2022;31(3):532-6.
7. Zwerus EL, van Deurzen DFP, van den Bekerom MPJ, The B, Eygendaal D. Distal Biceps Tendon Ruptures: Diagnostic Strategy Through Physical Examination. Am J Sports Med. 2022;50(14):3956-62.
8. Deschrijver M, Hautekiet A, Steyaert A, De Muynck M, Luypaert E. Distal biceps tendon ruptures: more efficient diagnostics for a better outcome. Acta Orthopædica Belgica. 2022;1;88:160-7.
9. Storti TM, Dias RG, Dantas GC, Faria RS, Simionatto JE, Paniago AF. Clinical evaluation of the reconstruction of the biceps brachii using triceps graft. Revista Brasileira de Ortopedia. 2021;56(5):656-63.
10. Boyd H, Anderson L. A method for reinsertion of the distal biceps brachii tendon. J Bone Joint Surg Am. 1961;43:1041-3.
11. Dillon MT, Bollier MJ, King JC. Repair of acute and chronic distal biceps tendon ruptures using the EndoButton. Hand (NY). 2011;6(1):39-46.
12. Potapov A, Laflamme YG, Gagnon S, Canet F, Rouleau DM. Progressive osteolysis of the radius after distal biceps tendon repair with the bioabsorbable screw. J Should and Elbow Surg. 2011;20(5):819-26.

**Cite this article as:** Tuteja S, Rodricks T. Anatomic repair of a chronic distal biceps tendon rupture: a case report. Int J Res Orthop 2025;11:420-3.