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Case Report

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Late presentation of distal biceps brachii tendon rupture in a collegiate cricket player treated with peroneus longus interposition graft augmented repair – a case report

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ABSTRACT

The incidence of distal biceps brachii tendon rupture in athletes is a rare condition with an incidence of 1.2 – 2.55 cases per 100,000 patients per year. The injury mechanism often involves an eccentric load on a flexed, supinated elbow. Most commonly, these injuries occur in strength athletes and in those involved in contact sports such as American football and rugby. The additional risk factors include smoking, anabolic steroid use and obesity. Distal biceps brachii tendon rupture is a very rare injury in cricket players which has not been reported in the published literature. A delayed presentation of such an injury is even more rare and a challenge to the treating physician. A club-level cricket player in his late thirties presented 3 months after an injury to his left elbow while playing a match. His complaints were pain and inability to play the cricketing drive shots. On clinical examination he had good power of isolated elbow flexion with poor grades of power of supination of his forearm in a flexed elbow position. The distal biceps brachii tendon was not palpable in a hook test with mild swelling of his arm with a 'popeye' bulge on attempted elbow flexion. He was diagnosed to have a distal biceps brachii tendon rupture and was managed with surgical repair incorporating an autologous peroneus longus tendon as an interposition graft. At six months follow-up he was completely recovered and back to playing cricket. This case signifies the importance of diagnosing a rare cricketing injury. A detailed surgical plan which essentially involved confirming the site of rupture of the tendon, planning for an interpositional tendon augmentation in view of the retracted, immobile tendon ends and a tailored rehabilitation program was instrumental in yielding a successful outcome.

Keywords: Biceps brachii, Peroneus longus, Augmented repair, Case report

INTRODUCTION

The distal biceps brachii tendon is an extra-synovial structure covered by paratenon. Functionally, the biceps brachii acts as both an elbow flexor and a primary supinator of the forearm. It has two distinct heads: the long head, originating from the supraglenoid tubercle and the short head, arising from the tip of the coracoid process. Distally, both converge to insert on the radial tuberosity. The insertion of this tendon shows considerable anatomical variation with a single, double or even a triple tendon morphology. Lacertus fibrosus is a variable extension from the tendon medially which inserts on to the deep forearm fascia. Injuries to the biceps tendon most often result from eccentric loading or resisted elbow flexion during activities such as heavy lifting or falls onto an outstretched hand. The rise in participation in contact sports, bodybuilding, and weightlifting over the past two decades has led to a higher prevalence of distal biceps ruptures among active individuals.[1] Although complete distal biceps tendon ruptures are uncommon, with an estimated incidence of 1.2–2.55 cases per 100,000

annually, they predominantly affect men between 30 and 50 years of age, with about 86% occurring in the dominant arm.[2] Distal biceps tendon ruptures most commonly result from an eccentric load applied to an elbow in flexion and supination. Underlying inflammatory or degenerative changes within the tendon, compounded by relative hypovascularity and anatomical variations such as a radial tuberosity spur, may account for the predisposition to rupture. Additional risk factors include elevated body mass index (BMI), tobacco use and anabolic steroid exposure.[3,4] In cricket athletes, particularly bowlers and batters, the distal biceps tendon is under repetitive eccentric loading during elbow flexion and forearm supination (e.g., bowling acceleration, bat swing, forceful grip). Sudden overload—such as resisting a fast ball with a flexed, supinated elbow—can cause avulsion of the tendon from the radial tuberosity.[1] When diagnosis is delayed, as is common in field sports where early symptoms mimic simple strains, the lesion progresses to a chronic rupture with functionally significant supination weakness impacting batting control, spin bowling and throwing performance.[2]

Peroneus longus tendon (PLT) interposition graft augmented repair has emerged as a surgical solution for chronic ruptures where tendon ends cannot be approximated. The PLT offers sufficient length and tensile strength to bridge the gap and restore anatomic length-tension relationships of the biceps muscle. Its harvest is technically straightforward, donor site morbidity is minimal, and biomechanical studies confirm its suitability for high-demand reconstructions. Compared to alternative grafts such as semitendinosus, palmaris longus, or allografts, PLT provides greater consistency in diameter and length, avoiding multiple small grafts or the morbidity of hamstring harvest.[5] This can translate into superior restoration of supination torque and flexion strength, faster rehabilitation and reliable return-to-sport outcomes for athletes.[6]

This case report documents a club-level cricket player treated with PLT interposition graft augmentation for chronic distal biceps rupture, highlighting technical considerations and contextualizing outcomes against current literature. Published literature on the use of PLT in distal biceps specifically is sparse underscoring the novelty and relevance of documenting such a case.

CASE REPORT

A 37-years-old right-handed male club-level cricketer presented with pain over the left elbow, weakness in forearm rotations and inability to play cricket drive shots. He gave history of a sharp crampy pain after he mistimed a cricket drive shot at a club level match three months back. Initially he was managed in a local facility for an elbow sprain with an arm sling immobilisation, standard analgesia and activity modification. He was referred to our facility when he poorly responded to the initial symptomatic treatment. At presentation, on examination he had mild swelling of the left arm, a ‘popeye’ bulge in the arm on attempted flexion of the elbow, a positive Hook test (unpalpable distal biceps tendon at the elbow crease). His supination power in a flexed elbow position was very weak (2/5), isolated elbow flexion power was adequate (4/5).

He was investigated with an X-ray of the elbow which ruled out any bony pathology. A high frequency ultrasonogram imaging (USG) showed a bulky and heteroechoic distal biceps tendon with intramuscular hematoma suggestive of a full thickness rupture of the distal bicep’s tendon. A magnetic resonance imaging (MRI) confirmed distal biceps tendon rupture from radial tuberosity with interstitial tear and edema at the musculotendinous junction with early fatty infiltration in the muscle belly. The proximal end of the retracted tendon measured approximately 5.5 cm from radial tuberosity (Figure 1).

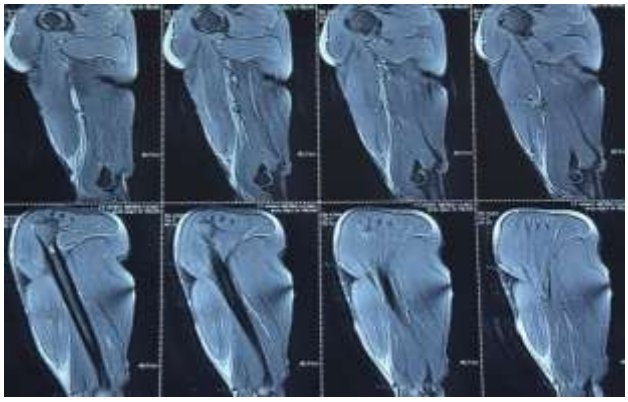

Figure 1: Pre-operative MRI images showing distal biceps brachii tendon rupture with retracted proximal stump.

After detailed counselling regarding the prognosis, surgical options and a prolonged rehabilitation operative repair was planned. Since the injury was chronic (more than 3 months), a detailed surgical plan was developed which included the utilisation of an interposition graft to bridge the gap between the proximal stump and the insertion site of the tendon.

Under general anaesthesia and a regional nerve block, the patient was positioned supine with an arm table extension. A high arm tourniquet was set and cleaning and draping were done in standard fashion. The ipsilateral leg was also prepared to harvest an autologous peroneus longus tendon graft. A longitudinal incision of length approximately 8 cm crossing and extending on either side of the elbow flexion crease was utilised. A layered dissection to identify and isolate the lateral antebrachial cutaneous nerve (LABCN) was done and radial tuberosity with the ruptured tendon stump was exposed through the biceps bursa.

The hematoma was washed off and a subcutaneous proximal finger dissection identified a palpable, retracted

proximal stump which was brought into the incision using Allis forceps. Incarceration of the LABCN between the stump and underlying tissues was carefully avoided. A thorough finger dissection all around the proximal stump improved the excursion with the final gap between the proximal stump and the radial tuberosity measuring 3.5 cm. A peroneus tendon autograft was harvested from the ipsilateral leg via a 2.5 cm lateral lower leg incision. The graft was doubled and the closed end was trimmed, stitched together and tubularised to measure approximately 8 mm in diameter. The radial tuberosity was prepared systematically with debridement of all soft tissues, sequential drilling with a 3.2mm endo-button drill bit and an 8mm drill bit at the ulnar half of the radial tuberosity to make a socket to receive the graft. The standard endo-button technique was used to fix the tendon graft in the socket and the fixation was augmented with a 7×10 mm PEEK tenodesis screw (Arthrex). Rest of the tendon strands were quadrupled and stitched to one another to make a broader sheet of tendon to replace the distal stump. With the elbow at approximately 90 degrees of flexion and the forearm in full pronation, the free ends of the graft were laced through the proximal stump (musculotendinous junction) and sutured securely using a pulvertaft weave technique. At the end of the surgery, adequate tension of the interposition graft was confirmed. The proper position of the endo-button was verified with fluoroscopy. The wound was lavaged and closed in layers in standard fashion. An above elbow plaster slab was applied in 90 degrees of elbow flexion after the dressings (Figures 2 and 3).

A tailored post-operative rehabilitation protocol was followed which included plaster removal at 4 weeks, initial passive to active assisted to active elbow and forearm range of motion exercises between 4th and 12th weeks and strengthening exercises of the biceps after 3 months. The patient regained full power and range of motion of elbow flexion and forearm supination at 4 months and the strengthening exercises were continued until 6 months (Figures 4 and 5).

Figure 2: Intra-operative image showing retracted proximal stump with absent distal tendinous portion of biceps brachii.

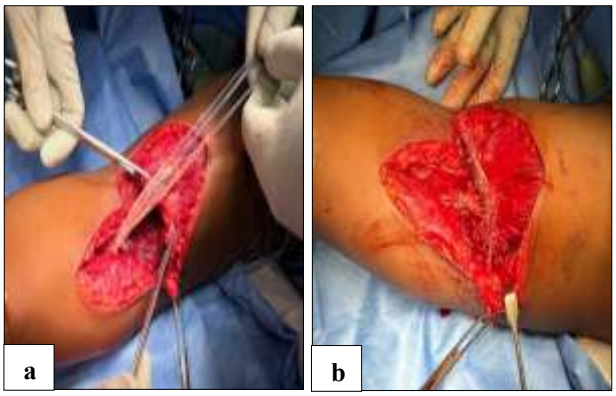

Figure 3: Intra operative images showing (a) peroneus longus graft after distal radial fixation, and (b) after completion of repair.

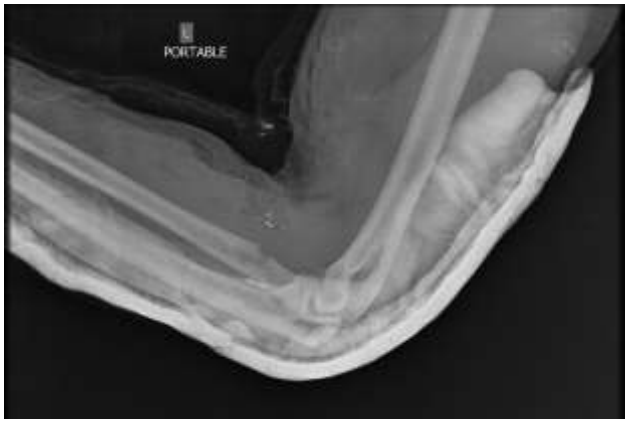

Figure 4: Post-operative X-ray of left elbow showing radial tuberosity bone tunnels and endobutton implant.

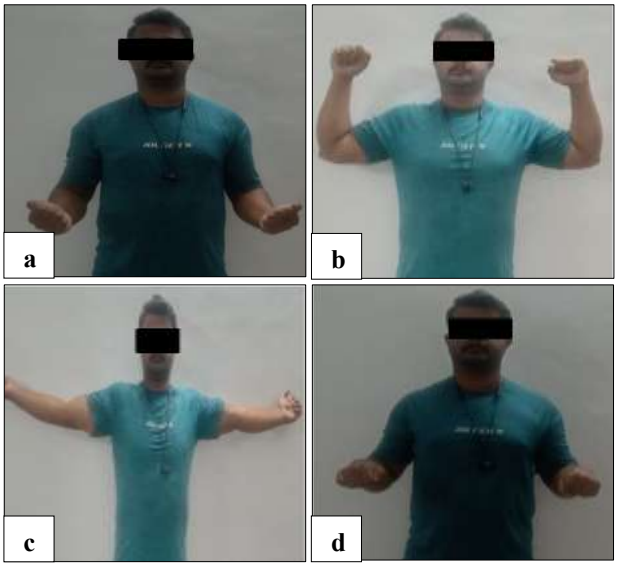

Figure 5 (a-d): Post-operative clinical images at 3-months showing full active range of movements of the elbow with prono-supination of forearm.

DISCUSSION

Chronic injuries of the distal biceps brachii tendon is typically associated with a marked retraction of the proximal stump to the lower arm significantly reducing the chances of an anatomical primary repair. Therefore, often three different treatment options are possible: non-anatomical repair with brachialis muscle attachment, biceps mobilisation with lacertus fibrosus release and interposition graft reconstruction.

A non-anatomical repair is an option which causes many restrictions including loss of elbow function, particularly in supination and flexion. Another study demonstrated a deficit of 40% of supination power and 21-30% of elbow flexion power respectively.[7] They demonstrated that the results of a non-anatomical repair are most often only an aesthetic option for an established deformity and is comparable with the results of a non-operative method of treatment.

A retracted proximal stump mobilisation is a viable option when it is possible to bring the stump to the anatomical position on the radial tuberosity with an elbow flexion of 30-40 degrees. It typically involves extensive release of additions, lacertus fibrosus release and relief incisions made in the muscle belly. But it may not be feasible in every case.

Many authors believe that the most appropriate treatment option in a neglected or chronic distal biceps brachii tendon rupture with inability to achieve an anatomical repair despite the best efforts of mobilisation is a reconstruction using autologous grafts or allografts. The different types of grafts described in the literature are tensor fascia lata, Achilles (allograft), palmaris longus, semi tendinosus and flexor carpi radialis bundle. The results with all these grafts were similar with good functional recovery and pain relief.[8]

Recently, a human dermal allograft augmentation has been recognised as a promising option for chronic extensive partial tears of the distal biceps brachii tendon wherein an allograft wrap of the deficient tendon restores tendon thickness and biomechanical integrity.[9]

According to the literature, among the options for tendon fixation on to the radial tuberosity (bone tunnel with interference screw, endobutton and suture anchors) endobutton has the highest biomechanical resistance followed by suture anchors, nonetheless when submitted to physiological forces no statistical difference was observed between them.[10]

In the case presented a peroneus longus autograft was used to augment the repair. The graft was secured to the distal anatomical location on radial tuberosity using a simple, standard endobutton plus interference screw technique and proximally attached to the mobilised, retracted stump using a standard tendon repair technique (pulvertaft). The addition of the interference screw to the distal repair increased the strength of the distal repair allowing for early mobilisation with better pull-out strength of the construct. Both these techniques are easily reproducible and fairly quick in the hands of a general orthopaedic surgeon.

The choice of peroneus longus as an autograft made the construct stronger as peroneus longus grafts are often used in anterior cruciate ligament reconstructions with great success. They are longer and broader grafts than semi tendinosus grafts which allows for approximation of large surfaces especially in the setting of a tear near the musculotendinous junction. There harvest is quick and simple and leaves minimal to no morbidity for the patient.

Several techniques have been developed to reduce the complications associated with the distal biceps brachii tendon repair such as injury to the posterior interosseous nerve, medial and lateral ante brachial cutaneous nerve, heterotopic ossification and proximal radioulnar synostosis, most commonly observed in a double approach technique described by Boyd and Anderson.

The anterior S-shaped incision allows for greater visibility, effective mobilisation of the retracted proximal tendon stump, incarceration of the cutaneous nerves under the tendon and the ease of attaching the interpositional graft.

CONCLUSION

The peroneus longus tendon autograft augmented reconstruction of a chronically ruptured distal biceps brachii tendon with tissue loss is a simple, viable and easily reproducible technique with low morbidity and few complications which yields consistent results in athletic population and allows for an early return to sports.

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