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Research Article

# Single Incision Approach and Cortical Button Fixation System for Distal Biceps Tendon Ruptures: Functional Outcomes and a Literature Review

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## Abstract

**Introduction:** Distal biceps brachii tendon detachment is an uncommon lesion which results from rapid elbow flexion against resistance and more often affects males between fourth and sixth decade of life. Among therapy options, surgical treatment leads to anatomic reinsertion of the tendon with better functional recovery. In literature, different methods have been proposed, regarding surgical treatment, with satisfactory outcomes. The aim of this study is to present the functional outcomes of our patients, in one year, who underwent surgical treatment with singe incision and cortical button implant and to analyze the complications and final patient satisfaction.

**Material and Methods**: From 2018 until 2020 thirty-five male patients underwent surgical repair for traumatic distal biceps tendon rupture with an average age of 40,5 years old (range from 22 to 68). Clinical diagnoses for the rupture were confirmed with ultrasound in majority of patients, and MRI in eight cases. The most common cause of lesion is rapid elbow flexion against resistance. All patients were repaired with anterior single incision, and cortical button fixation system while the average time from injury to surgery was 12,5 days (from 4 to 45 days). After operation, a functional elbow brace was applied, and all patients followed specific rehabilitation protocol.

**Results**: Mean time follow-up period was 18,9 months (range from 13 to 28 months). Results were evaluated according to complications, range of motion of elbow joint, Mayo Elbow Performance Score, Dash Score, EQ-5D-5L, and satisfaction of the patients. Major complications were paresthesia of posterior interosseous and lateral anterobrachial cutaneous nerves (17,1%). At the final reexamination the mean range of motion was flexion 135°, extension -5°, pronation 79° and supination 78°, mean MEPS was 98,1 ± 8,4, mean Dash score was 8,5 ± 7,5, and the EQ-5D-5L was 93. The majority of patients was very satisfied (68,5%) and satisfied (25,8%) and only the 5,7% of cases was unsatisfied.

**Conclusion**: Distal biceps brachii reattachment with single incision and fixation with cortical button is a successful surgical method according to the superiority of biomechanical stabilization between other fixation system and better functional outcomes. Neurological complication, if presented, recovers in a relatively short period of time (range from 3 to 6 months) while patients return soon to the previous level of activity. Because all the surgical procedures of reattachment of distal biceps tendon rupture, present a large number of neurological, the patient should be informed of these conditions.

**Keywords:** Biceps Brachii Distal Tendon Rupture; Avulsion; Surgical Treatment; Single Incision Technique; Cortical Button Fixation System

## Introduction

Distal biceps brachii tendon rupture or avulsion is a pathological lesion which appears more often in middle age of somatically energetic men and if undiagnosed or untreated leads in functional incapacity. Kelly., *et al*. (2015) report the increase of incidence of this lesion in 1,2-2,5 per 100,000 citizens in United States [1]. Male between fourth and sixth decades affected in majority of cases followed grueling sports (lifting heavy weights) or involved in somatically heavy works [2]. Dominant arm is affected in 86% of the cases but in literature, it has been also reported bilateral ruptures of the distal biceps tendon as a cases reports [3,4]. The most common mechanism of injury is an eccentric extension force loaded on an extended and supinated forearm [6].

Regarding therapy, it has been proposed nonoperative and surgical reattachment or tendon. Freeman., *et al*. (2009) refer to the advantages of conservative treatment of distal biceps tendon ruptures and that the specific therapy can offer acceptable functional results with moderate strength, especially supination compared with contralateral nonaffected limb [8]. Hetsroni., *et al*. (2007) in a comparative study between operative versus nonoperative treatment in middle aged population concluded that surgical anatomic restoration of complete rupture of distal biceps brachii tendon achieves superior results subjectively and objectively [5].

Untreated or conservatively treated, the patients present decreased supination and elbow flexion of the affected arm and worse functional results [6]. The affected limb, in order to be adjusted in this new condition, increased the use of shoulder muscles with abduction of the arm and shoulder to rotate the forearm outward for increasing supination strength [9]. Stoll., *et al*. (2016) report that nonoperative treatment of complete rupture of the distal biceps tendon brachii leads to loose 21% to 55% of supination strength, 79% of supination resistibility, 10% to 40% of flexion strength and 30% of flexion resistibility. Finally, conservative treatment is the only recommendation proposed in sedentary, elderly and low demanding patients and in those in which comorbidities are burden for operative treatment [10,14].

Regarding surgical restoration of distal biceps brachii tendon, there is no consensus concerning the approach (one or double) but neither for the implant. Researchers have presented varying percentages of functional outcome's as well as complications. These include single anterior approach method using suture anchors, intraosseous screws or cortical buttons, and double incision method using suture fixation through bone tunnels [11]. Complication percentages after surgical reattachment have been reported in a percentage up to 24,5% [12]. There are reports in literature that give conflicting percentages of complications related to surgical approaches (single or double) [12]. Amarasooriya., *et al*. (2020) in a systematic review, among complication rate according to surgical approach and fixation technique, report that all approaches and techniques present different category of complications (neurological, synostosis, arterial injury, new ruptures) which is an essential element for the preoperative planning and patient consent [13]. Vandenberghe., *et al*. (2016) report that postsurgical complication rate increased with delay repair, leads to scar tissue and retraction of the tendon due to augmentation by tendon graft [14].

The aim of this study is to present our functional results of patients with ruptures of distal biceps brachii tendon in long term (one year) who underwent surgical treatment with single incision with cortical button (Toggleloc™ distal biceps reattachment device -Biomet) and to analyze the complications, range of motion and final patient satisfaction.

## Material and Method

This study was performed at the Orthopaedic department of General Hospital of Heraklion- "Venizeleio-Pananeio" from January 2017 to February 2020. The Institutional Ethical Committee approved the study. Inclusion criteria were I age > 18 years old, II surgical procedure with single incision technique with Toggleloc™ distal biceps reattachment device, III follow-up interval at least one year postoperatively. Exclusion criteria were chronic tendon biceps ruptures that required tendon allograft and preexisting shoulder or elbow conditions. The operations were performed by three of the authors.

In this study the following information was acquired, demographic elements (age, sex and occupation), mechanism of injury, time interval from injury to surgery. Thirty-five patients, all males, with an average age of 40,5 years old, were operated in our department for acute rupture of distal biceps brachii tendon between 2018 until 2020. The right hand was involved in 27 cases while the left in 8. The dominant hand was the right in 24 patients, the left in 7 patients and the non-dominant in 3 cases. (Table 1) Mechanism

| Gender (male) | 35 |
|---|---|
| Mean Age | 40,5(22-68) |
| Hand Involved (Right/Left) | 27/8(77,1%/22,9%) |
| Hand Dominance (Right/Left) | 24/7(77,1%/20%) |
| Median time to surgery | 12,5 days (5- 45) |
| Mechanism of injury | |
| Lifting | 22(62,9%) |
| Fall | 3(8,6%) |
| Martial arts | 4(11,4 and) |
| Sports (basket, softball) | 6(17,1%) |

**Table 1:** Demographic characteristics of patients.

of injury in majority of cases (19/27) was lesion in elbow extension during stodgy elevation. Patients during clinical examination presented pain, ecchymosis and decreased elbow supination and flexion strength. All the clinical tests that indicated tendon rupture were positive (biceps squeeze test, pronation - supination test, hook test and biceps crease interval test) [17]. Radiological examination does not distinguish any elbow injury or other sign that indicate degenerative abnormalities of distal biceps tendon insertion to bicipital tuberosity. Clinical diagnoses for the rupture were accompanied with MRI in 8 patients and ultrasound in the rest. Most of the patients had occupations that require extensive and continuous elbow movement with concomitant weightlifting, while 5 patients were amateur weightlifters. Five patients presented one or more comorbidities in their clinical history including diabetes mellitus II (2 cases), hypertension (4 patients), while 29 cases were smokers consuming more than 20 cigarettes per day. Median average time from injury to surgery was 12,5 days (4 to 45 days).

## Surgical technique

All patients were operated with general anesthesia, in supine position with arm tourniquet in the affected elbow in arm table. With the forearm in supination a longitudinal incision about 3 cm (2cm distal to elbow crease) is made centrally to the forearm. We identified the lateral antebrachial cutaneous nerve superficially to the brachioradialis muscle. The stump of the bicep's tendon generally is proximal to elbow crease. We mobilized the tendon stump by digit with the elbow in slight flexion. The degenerate distal tendon stump was debrided to healthy tendon. We attached the ToggleLoc with a Krackow suture to the tendon with scope to provide a stiff and secure attachment to the tendon. (Figure 1) With the arm in full supination, we inserted the 2,4mm guide pin bicortically into the footprint of the bicep's tendon in radial tuberosity. We drilled through the posterior cortex over the guide pin with canulated 4,5mm drill. Again with 2,4mm guide pin we reamed again 3mm proximal the first drill hole with a depth of about 10mm and we ream again with 4,5 drill over the guide pin. We connected the two holes with a small ronguer and we create an oval longitudinal bone socket. (Figure 2) We passed a beath pin with the passing sutures from the ToggleLoc fixation through the 4,5mm hole in posterior cortex, and we pull the button through it and then we pull up all of the sutures to engage the posterior cortex and lock the ToggleLoc device into place. Finally with the elbow in full flexion we tension the zip suture to pull the tendon into the bone tunnel and remove the passing sutures. (Figure 3) We tested the reattachment tendon, and we checked the position of the cortical button with fluoroscopy in two position (profile and anteroposterior) views. We closed the subcutaneous tissue with a vicryl suture and skin with nylon 3.0. Postoperatively we applied a functional elbow brace with a limitation of 40 extension block. We allowed patient to perform gentle active range of motion with the limitation of the brace. Brace range of motion is increased gradually at two weeks for goal of full range at four weeks. The brace continues until the sixth week and then a rehabilitation program is started until twelve weeks postoperatively. The main goals of the rehabilitation program are firstly, to maintain the integrity of repair, to decrease the pain and inflammation and to promote tissue healing. Secondly, at 3 weeks passive elbow flexion and active extension, limited to 30 degrees, is started while active/passive wrist, finger movements, and shoulder range of motion as tolerated with no active supination are performed. Patient is educated of precautions and of home exercise program. At 3-6 weeks, passive elbow flexion/active extension is performed and extension is progressively increased with goal of full extension by 6 weeks. Strengthening exercises are initiated with isometrics and passive elbow extension to tolerance with Grade III/IV joint mobilizations, if necessary. At 6/8-12 weeks AROM elbow flexion/supination are initiated and more strengthening exercises are performed.

**Figure 1:** Preparation of the stump of tendon with Krackow suture.

**Figure 2:** Creating an oval longitudinal bone socket on radial tuberosity.

**Figure 3:** Tendon of distal biceps is reattached to the bone.

**Figure 4:** Male 42 years manual worker with left dominant - hand operated 7 days after injury, range of motion at one year (a, b, c, d).

## Results

The mean follow-up is about 18,9 months (range from 13 months to 28 months). None of the patients missed out the last re-examination. Patients were assessed in two weeks and in 1,3,6,12 months post surgically. Results were evaluated according to range of motion of elbow joint, complications, Mayo Elbow Performance Score (measures elbow function across four domains: pain, stability, range of motion and daily functional tasks), Dash Score, EQ-5D-5L (which measures health status using three levels of severity in five dimension), and satisfaction of the patients using the "Patient satisfaction rating scale, and satisfaction of the patients [15,16,30]. Range of elbow joint motion was measured compared with the contralateral healthy limb. Flexion was 97% (range from 117°-140° with a mean of 135°), Extension was 97% (from min -4° - min -10° with a mean 5°), supination was 94% (from 18°to 90° average 78°) and pronation was 96% (varied 13°-90° with an average 79°).

Among complications two cases presented superficial infection one week after operation which was managed with antibiotics and daily dressing for a period of ten days in one patient, while in the other case debridement of the wound and antibiotics for fifteen days were required, and the final functional outcomes were not affected. The most ordinary complication was nerve injury in a rate of 17,1%. The percentage was higher in lateral anterobrachial cutaneous nerve (11,4%) that in posterior interosseous nerve (5,7%). In cases with lateral anterobrachial nerve neurapraxia (LABCN) in all cases was not required exploration of the nerve and the symptoms were ameliorated in a mean time of 4,25 months (range from 3 to 6 months). Regarding the palsy of the PIN, nerve was restored at six and seven months. The mean tourniquet time was 50,2 minutes (Table 2).

In one case during follow-up, we diagnosed at one-year heterotopic ossification at the x-Ray control without consequences in the final functional outcomes and the patient was not mentioned any discomfort and had returned to his previous activity. Finally, in one case intra-operatively, one suture from the cortical button was ruptured but did not affect the strength of the reattachment tendon. In this patient we locked the elbow in functional brace and in neutral position, and we delay increasing gradually the range of motion for period of three weeks. This failure of the implant did not influence the outcomes. In all cases the cortical button remained in the correct position, and we don't have any re-rupture or osteolysis.

| Type | Patients % |
|---|---|
| Infection | 2(5,7%) |
| Heterotopic Ossification | 1(2,9 %) |
| Re-rupture of tendon/Reoperation | 0(0%) |
| Implant Failure | 1(2,9%) |
| Nerve Palsy | |
| LABCN | 4(11,4%) |
| PIN nerve | 2(5,7%) |
| Total | 10(28,6%) |

**Table 2:** Complications.

The Mayo Elbow Performance Score (MEPS) was 98,1 ± 8,4 while the mean Disabilities of Arm, Shoulder and Hand score (DASH) was 8,5 ± 7,5. The EQ-5D-EL was used to assess the self-care status and at final follow up, 90% of the patients did not report any severe problems on the EQ-5D-5L and in five dimensions: mobility, self-care, usual activities, pain and anxiety (health profile mean value in 5 levels was 11112) and the average EQ VAS was 95. At the last examination, all patients' response to major question mentioned to the satisfaction rating scale with five elements (very satisfied, satisfied, neutral, unsatisfied, very satisfied). From thirty-five patients twenty-four were very satisfied (68,5%), nine satisfied (25,8%) and two cases were unsatisfied (5,7%). The cases with poor results present MEPS (90 - 85) DASH score (4,2 - 3,3) they have a delay to surgery with a mean three weeks and were both smoking person. The range of motion was satisfactory and in one case we have posterior interosseous nerve neuropraxia for a period of eight months. The majority of patients returned to previous work activity in a mean period of 1,9 months (range from 1,5 to 4 months). Based on the results we suggest that reduced time from injury to surgical repair to prevent degeneration of the tendon stump, carefully surgical approach to avoid damage to the nerves and proper placement of the implant leads to better functional outcomes.

## Discussion

Biceps brachii muscle constitutes of two heads, long head which proximal originates on the supraglenoid tubercle and the short head on the coracoid process [18]. Distally, the tendon externally rotates such that the short head portion of the tendon inserts distal to the long head on the bicipital tuberosity. The radial protuberance (apex of the tuberosity) functions as a mechanical cam maximizing supination torque throughout rotation [19]. Seiler., *et al*. (1995) in an anatomic study describe three vascular zones in the distal biceps tendon. Vascular contributions were consistently noted from the brachial artery proximal and from the posterior recurrent artery distally, while a hypovascular zone averaging 2.14 cm was evident between the proximal and distal zones. Also 85% of proximal radioulnar joint space was occupied by the distal tendon in full pronation. Author concluded that mechanical impingement on the bicep's tendon during forearm rotation and hypovascularity within sections of the tendon may contribute to attritional ruptures of the distal bicep's tendon [20]. Green., *et al.* (2012) support that a systemic etiology, chronic tendinitis or anatomic variants can lead to bilateral ruptures of distal biceps tendon in a single individual [33]. The most common mechanism described for distal biceps tendon ruptures comprise glenohumeral elevation, elbow extension, and forearm supination [21]. Nowadays, is well known that degeneration, inflammation of the deep radial bursa, hypovascularization, or friction of the tendon (bony irregularities at the tuberosity of the radius) are causes that participate to contingency of rupturing the tendon [22]. Kelly., *et al*. (2015) support the smokers have seven-time greater predisposition on to tendon tears while athletes who abuse or used anabolic steroids have increased risk for bilateral rupture of the distal bicep's tendons [1,24].

Srinivasan., *et al.* (2020) refer that diagnosis of distal biceps tendon rupture can be missed or delayed. History of patient injury accompanied with careful clinical examination (elbow ecchymosis, pain, edema) and specific tests (reverse Popeye, hook test, pronation-supination test, biceps crease interval test) is a basic element for the diagnosis of complete tendon tears [23]. Radiographic examination is normal except in cases which appear with predisposing factors of degenerative changes of the tendon insertion (flattening of the radial tuberosity) [14]. Ultrasound can confirm the diagnosis, is a cheaper imaging examination than MRI but depends on form experience of the operator [25]. Magnetic reasonable image, in particular the flexion-abduction-supination (FABS) view, is the most correct view that can be used for optimal visualization of tendon rurpure [26]. In general, MRI is not necessary to confirm the diagnosis of complete distal biceps tendon rupture. It can be used only in cases of chronic or partial tears for visualization of the entire course of the distal biceps tendon, the formation of scar tissue, and the amount of proximal retraction. This information will

help the surgeon for preoperative planning of surgery according to the technique of reattachment or to use tendon grafts (Achilles tendon, Palmaris longus) [14,26]. In our study only in 8 cases we performed MRI because clinical examination and ultrasound did not confirm correctly the clinical diagnosis. In 4 patients, the diagnosis was concluded in more than 4 weeks post-injury and we wanted to know the quality of the tendon and in the other four cases we have suspicion of partial tear.

The purpose of surgical repair of tendon rupture is to restore supination and flexion strength. A factor that has a significant role in tendon reconstruction is the time interval between the injury until the stage of surgery. In delayed cases the tendon retracts proximally and is difficult to reattach to radius. Moreover, healing process starts early, and scar tissue may obliterate the original location of the tendon, while tendon stump degenerates [27]. Delayed reconstructions can achieve to restore flexion up to 90% and supination strength almost 80% compared with contralateral side if tendon is able to reattach to the bone compared with cases which need graft [31]. Cain., *et al*. (2012) and Bisson., *et al.* (2008) report that the complication rate increased to 40%-41% in patients which operated four weeks postinjury, while Kelly., *et al.* (2000) report 24% rate of complications if operation is within 10 days and 41% if operated after 21 days [14,32]. In our series cases, which were operated minimum in 15 days from the initial injury, better functional outcomes are presented, without complications (24/35). Two cases with most delayed surgery (40-45 days) the stump was degenerated and after debridement it was shorter than the other cases.

In literature, two major open techniques have been described (one or two incision) with several fixation technique included bone tunnels, screws, suture anchors, cortical button (with or without interference screws) to reattach the tendon to its anatomic insertion [11,13,27-29]. Biomechanically both surgical methods (single or double) appear to obtain stabilization, and to ensure efficacious functional outcomes (function, strength, elbow motion) with extensive and minimally invasive versions of each technique used [13,23]. Both techniques present complications which the incidence reaches 24,5% but each technique exhibits a different type of complication.

Historically an anterior single technique was used but owing to high incidence of neurovascular complication Boyd and Anderson suggested the double incision method which achieves stabilization by passing sutures sewn to the tendon through bone tunnels in the radial tuberosity [11,28]. Major complication of the technique was heterotopic ossification (HO) and for these reasons Kelly., *et al*. (2000) modified the technique with scope to restrict the heterotopic ossification formation [34]. Regarding increased percentage of HO, postoperative stiffness and weakness of operated elbow compared with contralateral, the single method was leaded more widespread among surgeons [34,35]. This trend of surgeons led to the development of commercial implants (Anchors, cortical button with or without interference screw) for this technique limited extensive surgical approach of the cubital fossa and decreased neurological complication from radial nerve [36,37].

Grewal., *et al*. (2012) comparing single versus double incision report no different at 12-24 months according to DASH, American Shoulder and Elbow Surgeons Elbow Score, Patients -Rated Elbow Evaluation, Isometric strength supination- pronation and Range of Motion. Double incision group had slightly better isometric final flexion (104%/94%), while single incision group higher rate of nerve complication. (44%/7%) So it is concluded that the technique used was up to the individual operating surgeon and patient [38]. Hasan., *et al.* (2012) demonstrated that a double-incision technique recapitulated 73% of the original biceps tendon insertion compared with 10% for a single-incision approach [39]. Schmidt., *et al*. (2015) demonstrated that preserving the radial tuberosity height (no trough) improved the supination moment arm at 60˚ by 27%, so radial tuberosity functions as a cam, potentially maximizing end-supination strength and resistance to fatigue. Concluded that double incision technique may optimize the cam effect reattach the tendon beyond the apex of the bicipital tuberosity supination torque maximized [19].

The major disadvantage of the double incision is heterotopic ossification between proximal radius and ulna, which leaded in decreased range of movement with an of incidence varied from 2% to 15% [27-29]. Cerciello., *et al*. (2019) report unsatisfactory results of double incision technique due to heterotopic ossification [27]. Dunphy., *et al*. (2017) report that HO is misjudged because patients are not checked with radiographs in postoperative period of follow-up and a percentage of patients with HO are asymptomatic [28]. Revision surgery for HO excision has an incidence of 4,1% [28]. Morrey., *et al*. (1985) suggest to avoid HO and a muscle-split-

ting approach through the ECU or extensor digitorum communis must be performed, instead of detaching anconeus, and staying away from the ulna during a posterior approach, while bony debris create during drilling must to evacuated completely [34,40]. Finally, Ford., *et al*. (2018) suggest that postoperative administration of indomethacin may decrease the development of HO.

Neurological injuries (neuropraxia, palsy) of Lateral Antebrachial Cutaneous Nerve (LABCN), Radial sensory nerve RSN), Posterior Interosseous nerve (PIN) are the most common complication of single incision technique. Incidence of neurapraxia, of LABCN have been reported in 16,1%, 5,8% in RSN and 14% of PIN [28,41]. Dunphy., *et al*. (2017) in his research report that PIN palsy occurs more often in double incision than in single incision technique while Amin., *et al*. (2016) refer a higher rate of injury of PIN in single as compared with the double incision (2,7%/0,2) [28,42]. Nigro., *et al*. (2013) report that rate of PIN complication was 3,2% [41]. General current impression is that PIN injuries will be restored without intervention in majorities of cases. In the study by Nigro., *et al*. (2013) in 9 cases of his series noted a mean of 86 days (41-145) to recover the symptoms, and in our series in two cases the time to recover was 6 and 7 months [41]. Thumm., *et al.* (2015) suggest tips to avoid PIN injury comprise hypersupination during an anterior approach and pronation during a posterior approach, both of which move the PIN away from the bicipital tuberosity, if bone tunnels or distal biceps buttons are used, it is best to angle the drill ulnarly and proximally, away from the distal postero radial aspect of the bicipital tuberosity where the PIN is located [43].

In a systematic review comparing single versus double incision technique according to the outcomes and complication rate report better satisfactory results in single incision with a proportion 94% than 60%, however complication rate was higher in single than in double incision (18%/16%) [35]. Dunphy., *et al.* (2017) detailing complications in patients within the Kaiser Permanente system between the two surgical approaches reported higher rates of HO (7,6%/2,7%), PIN palsy (3,4%/0,8%), and reoperation (8,3%/2,3%) in double versus single incision techniques [28]. Watson., *et al.* (2014) in a systematic review evaluating the complication rate report higher incidence in double incision (25,7%) than in single (23%) [44]. Amarasooriya., *et al*. (2020) compared fixation technique (Suture anchors, cortical Button, Interference screw, Button -screw) and complication rate report that 22,4% for anchors, 32,8% cortical button, 24,6% screw and 16,4% for button-screw. Among the fixation techniques suggested that biomechanical data show that cortical button fixation without a screw has equivalent load to failure [13]. In other systematic review compared complication rate between fixation technique report 26,4% for anchors, 44,8% for intraosseous screws and 0% for cortical button and concluded that cortical button fixation proved superior to intraosseous screw [44]. In our study the neurological complication rate was 17,1% with no reoperation incidence and the method provided stable reattachment of the tendon with good functional results and satisfaction of the patients in a proportion of 94,5%.

Dunphy., *et al*. (2017) report that surgery characteristics is a factor which is not analyzed in orthopaedic research but can influence the results of study's conclusions [28]. Surgeons with few years of practice used the single incision technique because it is more familiar with new implants. In addition, among surgeons who perform the single-incision technique, those without fellowship training were more likely to use suture anchor fixation than a form of cortical button fixation, show greater fear regarding complications (nerve injury or fracture) [28]. Ford., *et al.* in his research suggest that surgeons with sports medicine training use 3,7 times the double incision technique than hand surgeon which prefer the single incision [29].

This study has the following limitations: first, the small sample number, more patients would probably affect the results regarding functional outcomes. Second, the time of follow up must be more than one year and to compare groups according to age, occupation, complication as heterotopic ossification.

## Conclusions

Distal Biceps tendon rupture is a common injury which appears in middle age of somatically energetic men. Conservative treatment leads to dysfunction of affected elbow, regarding to supination and flexion movements and muscle strength. Surgical reattachment of the distal biceps brachii tendon is a successful surgical procedure with compensatory functional outcomes and an admissible complication rate. Biomechanical study reports the superiority of cortical button fixation method versus other fixation system, while the technique showed economic benefits and advantages according to functional outcomes. Because all the techniques may present a large number of neurological complications, the patient should be aware of these conditions.

## Conflict of Interest

The authors declare that have no conflict of interest.

## Ethical Approval

The Institutional Ethical Committee approved this study.

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