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Distal biceps tendon injuries: a clinically relevant current concepts review

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- Distal biceps tendon (DBT) conditions comprise a spectrum of disorders including bicipitoradial bursitis, partial tears, acute and chronic complete tears.
- In low-demand patients with complete DBT tears, non-operative treatment may be entertained provided the patient understands the potential for residual weakness, particularly in forearm supination.
- Most acute tears are best treated by primary repair using either single-incision or double-incision techniques with good clinical outcomes.
- Single-incision techniques may carry a higher risk of nerve-related complications, whereas double-incision techniques have historically been considered to carry a higher risk of heterotopic ossification, particularly if the ulna is exposed.
- Various fixation techniques, including bone tunnels, cortical buttons, suture anchors, interference screws or a combination seem to provide different fixation strength but similar clinical outcomes.
- Some chronic tears may be repaired primarily, provided tendon tissue can be identified; alternatively, autograft or allograft reconstruction can be considered, and good outcomes have been reported with both techniques.

Keywords: distal biceps tendon; tendon tear; elbow; repair

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Introduction

Distal biceps tendon (DBT) conditions are relatively common in middle-aged males. The number of reported DBT tears seems to have increased over the last few years, likely related to better understanding and improved diagnostic methods.[1] While some individuals may maintain reasonable function after non-operative treatment of a ruptured DBT, biomechanical and clinical studies suggest that most individuals benefit from surficial repair or reconstruction.[2] Over the last decade, there has been a substantial increase in the number of studies focussed on DBT tears, mostly reporting on biomechanical and clinical outcomes depending on the surgical technique or fixation method.[2-4] However, some aspects of the evaluation and treatment of DBT-related conditions remain controversial. The purpose of this article is to provide an up-to-date review of the literature with emphasis on the most clinically relevant available information.

Relevant anatomy

Surgical management of DBT conditions requires an understanding of the anatomy of the DBT footprint at the insertional area on the bicipital tuberosity, the relationships between the DBT and the lateral antebrachial cutaneous (LABC) and posterior interosseous nerves (PIN), and the relative importance of the *lacertus fibrosus*.

Insertional anatomy

The two heads of the biceps brachii have specific insertional areas.[5] The short head of the biceps runs more medial in the arm, inserts more distally, and typically includes the apex of the bicipital tuberosity. The long head runs more lateral in the arm, passes deep to the short head, and inserts more proximally in the bicipital tuberosity.[5] This disposition implies that the biceps brachii musculotendinous unit makes a 90° external rotation twist from origin to insertion.[5,6] These anatomic considerations are important to understand the function of the biceps brachii, and to avoid repair of the tendon with the wrong rotational orientation. From a biomechanical standpoint, the short head of biceps will have a higher moment arm, with the forearm in neutral and pronation, and likely contributes more to elbow flexion.[7,8] In contrast, the long head of biceps will have a higher moment arm in supination due to the fact that its insertion is more proximal and farther away from the radial axis of rotation.[7,8] When repairing the DBT, the medial aspect of the tendon must be secured distally, and the lateral aspect of the tendon laterally; this may be facilitated by using medial and lateral sutures of different colours or lengths.

LABC nerve and PIN

The lateral antebrachial cutaneous nerve (LACN) is a sensory terminal branch of the musculocutaneous nerve located consistently in the subcutaneous fat distal to its emergence from the lateral border of the biceps tendon.[9] This nerve can be injured by entrapment at the lateral aspect of the biceps tendon[10] during surgical treatment of DBT (usually as a transient neurapraxia),[11] or become entrapped within scar tissue in chronic retracted DBT ruptures.[7-12] Care must be taken to avoid forceful use of retractors in the vicinity of the LABC nerve, and to protect the nerve at the time of passage of the ruptured tendon into the bicipital tunnel to avoid iatrogenic entrapment by the repaired tendon or sutures.

The PIN is the motor branch of the radial nerve after bifurcation nearby the cubital crease.[7] This nerve surrounds the bicipital tuberosity at between approximately 1 and 1.5 cm distal to its midpoint.[7,12] The distance between the point where the PIN crosses the radius and the radiocapitellar joint changes with forearm rotation: the mean distances are 4.2 cm, 5.6 cm and 3.2 cm in neutral, pronation and supination respectively.[7,13] The PIN can be injured during the surgical treatment of DBT, or become entrapped by scar tissue in chronic DBT tears.[7,12] Avoidance of anterior pointed retractors resting on the radius, and careful dissection and protection of the PIN in selected chronic tears help prevent iatrogenic nerve injury.

Lacertus fibrosus

The *lacertus fibrosus* (bicipital aponeurosis) is a connective tissue structure originating at the anterior aspect of the DBT and running ulnarly, merging with the fascia of the forearm flexors. This structure stabilises the DBT, particularly the short head,[7] and when intact it may lessen the functional deficits of a DBT tear in low-demand patients.[3] Some authors believe that a tense lacertus fibrosus secondary to contraction of the forearm flexors may contribute to tendon rupture by creating a medial pull to the DBT at the time of injury.[2] The need to preserve an intact lacertus fibrosus or even repair the lacertus at the time of surgery is very controversial.[14] If the lacertus fibrosus is repaired, it should be done in forearm pronation and extension to minimise the risk of impingement on adjacent neurovascular structures.[7,15] If the lacertus fibrosus is intact in a chronic tear, it usually prevents the proximal migration of the tendon, and may make tendon repair easier. On the other hand, if it is not intact in the setting of chronic tears, the need to consider graft reconstruction as opposed to a primary repair increases. Some authors have suggested using the lacertus fibrosus as a local graft source in chronic DBT tears.[16]

The spectrum of the disease

DBT is involved in a broad spectrum of the disease. Complete ruptures of the DBT at the tendon to bone interface are the most common types of injuries. Other conditions include bicipitoradial bursitis, partial thickness tears and tears at the myotendinous junction. Classically, DBT tears have been catagorised as partial (insertional or intrasubstance) or complete tears, acute for less than four weeks, and chronic for more than four weeks with either intact or ruptured lacertus fibrosus.[17]

Diagnosis

Complete distal biceps tendon tears

The diagnosis of complete DBT tears can often be established based on patient history and physical examination. However in a number of instances, the diagnosis is initially missed. DBT ruptures are most common in middle-aged men, and often results from uncontrolled eccentric load on the bicep tendon; the elbow is forcibly extended at the time of injury while the bicep is actively contracting. Patients may report a painful ‘pop’ at the time of injury. Manual labour, weight training and use of anabolic steroids are known risk factors.

The physical exam should always begin with an inspection. Ecchymosis in the distal arm and proximal forearm may be seen at an early stage. Proximal retraction of the biceps creates flattening of the distal contour of the arm; when not easily noticeable (usually in heavier patients), the crease-to-biceps distance between the elbow flexion crease and the round biceps muscle belly can be compared with the opposite arm. The exception is the tear at the myotendinous junction, which will show as an abrupt discontinuity of the muscle shape in the mid portion of the arm.

Some patients complain of pain in the antecubital fossa, but pain subsides somewhat rapidly. A ruptured BDT translates as some weakness in flexion and mostly supination; this may be difficult to demonstrate in the office, especially in stronger patients.

A particularly useful clinical test was described by O’Driscoll et al, the so-called ‘hook test’.[18] The patient is asked to look at the palm of his hand on the affected side with the shoulder elevated, the elbow flexed at 90° and the forearm in supination. An intact distal bicep tendon allows the examiner to hook his finger around its cord-like structure. If the bicep is torn, since the distal brachialis is flat, the examiner cannot hook his finger around any anterior structures (Fig. 1).

The authors reported that this test has a sensitivity and specificity of 100%,[18] but such degree of certainty has not been studied by others. Palpation on the medial aspect of the antecubital fossa to feel the lacertus fibrosus, when intact, may represent an important piece of information, especially in chronic cases.

Partial distal biceps tendon tears and bicipitoradial bursitis

These conditions present with deep-seated pain in the front of the elbow and proximal forearm. Fluid accumulation may occasionally present as visible swelling in the antecubital fossa. Male predilection is less marked than for complete tears. Pain may increase with resisted forearm supination and/or elbow flexion. The hook test manoeuvre will demonstrate an intact tendon, but anterior pull may be painful. Strength may be decreased; it is unclear if weakness is secondary to pain or disruption of some tendon fibres in partial tears.

Imaging studies

Plain radiographs are usually normal. Ultrasound (US) and magnetic resonance imaging (MRI) provide more valuable information. The added value of any of these advanced imaging studies in patients with a clear diagnosis of a complete tear is unclear, and from a cost-effectiveness perspective, probably best avoided. The use of US and MRI are best suited to patients with bursitis, partial thickness tears and, potentially, chronic tears. Fluid accumulation around the course of the biceps tendon and partial tendon disruption confirm the first two diagnoses. In chronic tears, US and MRI may provide an accurate idea of retraction, and presence or absence of any remaining tendon stump.

During evaluation, US has proved to be a good test for the identification of complete and partial tears. Lobo et al reported 95% sensitivity, 71% specificity, and 91% accuracy for the diagnosis of complete *versus* partial DBT tears.[19] The presence of posterior acoustic shadowing at the DBT had 97% sensitivity, 100% specificity, and 98% accuracy for complete tear *versus* normal tendon.[19]

An MRI may be easier to interpret for clinicians with little training in ultrasound evaluation. Although standard positions and sequences for elbow MRI allow satisfactory assessment of the biceps tendon, Giuffrè and Moss described a specific position for the MRI of DBT tears, the so-called FABS position: flexed, abducted, supinated position.[20] The arm is positioned with the elbow at 90°, the shoulder in maximum abduction, and the forearm in complete supination (Fig. 2). One of the advantages of this position is that it provides a longitudinal image of the tendon, from the musculotendinous junction to its insertion, usually in one section.[20] This is particularly helpful for the identification and quantification of partial thickness tears.

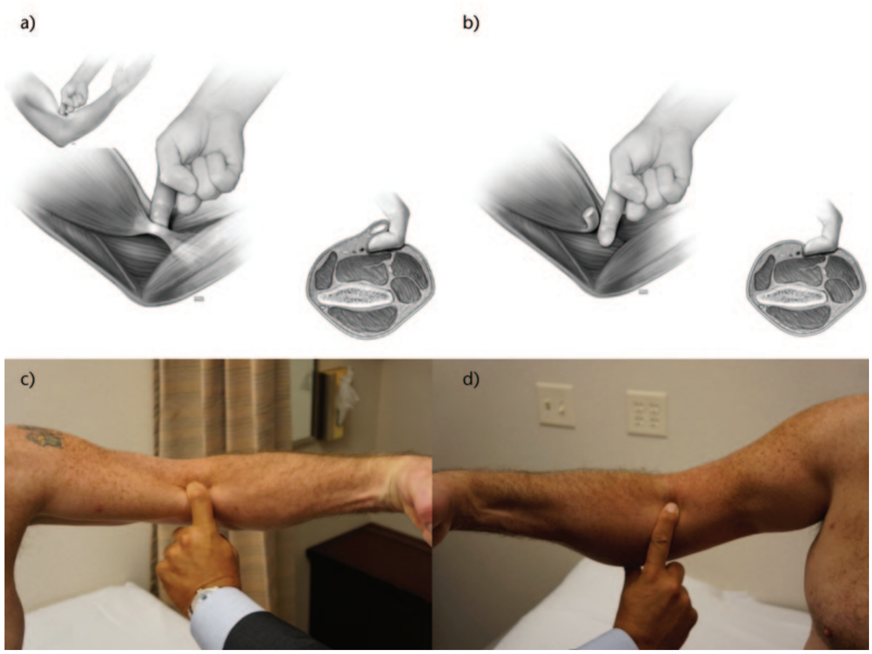

Fig. 1 The hook test for distal biceps tendon, as described by O'Driscoll.[18] a) The normal test in which the examiner's finger to can be hooked under the biceps tendon. (Used with permission of the Mayo Foundation for Medical Education and Research. All rights reserved). b) The abnormal test, in which the examiner is unable to hook the distal biceps tendon. (Used with permission of the Mayo Foundation for Medical Education and Research. All rights reserved). c) Demonstration of a normal hook test. As shown, a cord-like structure is felt under the index finger. d) Clinical picture demonstrating an abnormal hook test. The examiner is unable to feel the cord-like structure corresponding to the distal biceps tendon.

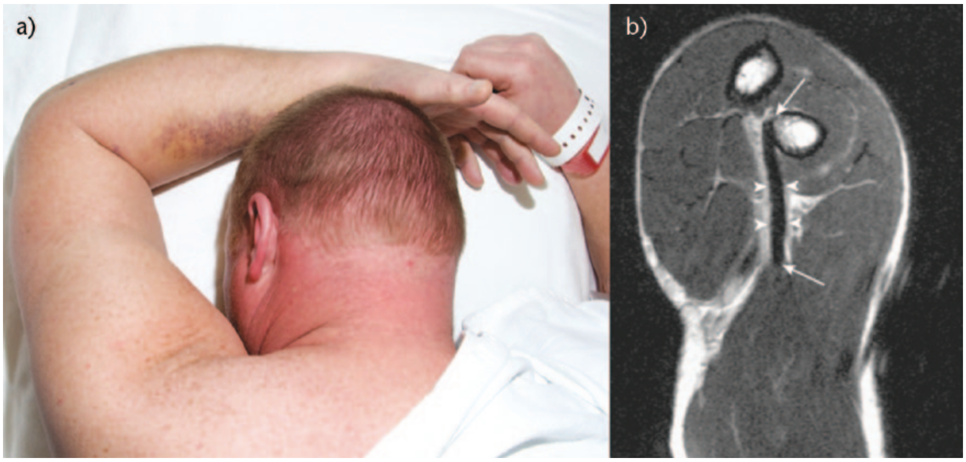

Fig. 2 Clinical and imaging demonstration of the FABS test as described by Giuffrè and Moss.[20] (Used with permission of the Mayo Foundation for Medical Education and Research. All rights reserved). a) Clinical image of the FABS position with the patient lying supine, the shoulder fully abducted and the elbow and supinated. b) MRI appearance of the FABS position. Note the normal distal biceps tendon (white arrows and arrow heads).

Treatment of tendon tears

Acute complete tears

Decision-making

Some individuals tolerate a complete tear of the DBT once the early inflammatory symptoms subside. However in many patients, conservative treatment does lead to suboptimal restoration of function. Most symptomatic patients complain of deep achiness with repetitive use of the arm during activities that require elbow flexion or forearm supination (for example shaving, using a screwdriver). Without surgery, the deformity does not resolve itself, and some individuals may also complain of subjective weakness if they need to lift very heavy objects, although many feel that their subjective strength is not compromised too severely.

A number of biomechanical studies have investigated objective loss of strength after a complete DBT rupture. Patients with non-operated tendon tears demonstrate a loss of strength for supination (74% strength compared to contralateral side, which decreases to 60% if the dominant arm is affected) and flexion (88% compared to the contralateral side).[21] In one study, patients undergoing non-operative treatment had a significantly decreased level of strength for supination when compared to surgically-treated patients (74% *vs* 101%, respectively), but the differences were not significant for elbow flexion (88% *vs* 97%, respectively).[21] The Disabilities of the Arm, Shoulder and Hand (DASH) score for patients treated non-operatively can be acceptable and comparable to patients undergoing surgical treatment.[21] Nesterenko et al have also demonstrated significantly decreased strength for supination and elbow flexion in the ruptured side when compared to the healthy contralateral side, as well as earlier fatigue after endurance testing due to a lower starting point of strength.[22]

In our practice, we discuss all of the information summarised above with the patient thoroughly, and very seldom do patients choose not to have surgery once they understand the natural history of an unrepaired DBT tear. However, low-demand individuals with concerns regarding anesthesia and surgery may be treated non-operatively. It is important for the patient to understand that delay in the timing on repair does seem to be associated with a higher risk of complications, so it is best to make a final decision at an early stage of the process, as opposed to thinking it over for a few weeks or months and then deciding.

Surgical treatment

The surgical treatment of DBT tears has been studied extensively. The techniques available for repair involve a three-level distinction: anatomic *versus* non-anatomic repair, single-incision *versus* double-incision exposure and fixation method (most commonly the use of cortical button, interference screws, transosseous sutures or suture anchors).[2,3] These different techniques have been compared in biomechanical and clinical studies.[2,3]

Surgical exposure for tendon repair may be performed through a one-incision exposure of single anterior approach, or using two-incision separate exposures. In one-incision repairs, tendon preparation and reinsertion are both performed through dissection in the antecubital fossa. In two-incision repairs, a more limited anterior exposure at the elbow flexion crease is used for tendon retrieval and preparation, whereas a second dorsal exposure to the radial tuberosity is used for tendon reattachment once the tendon is passed from the anterior to the

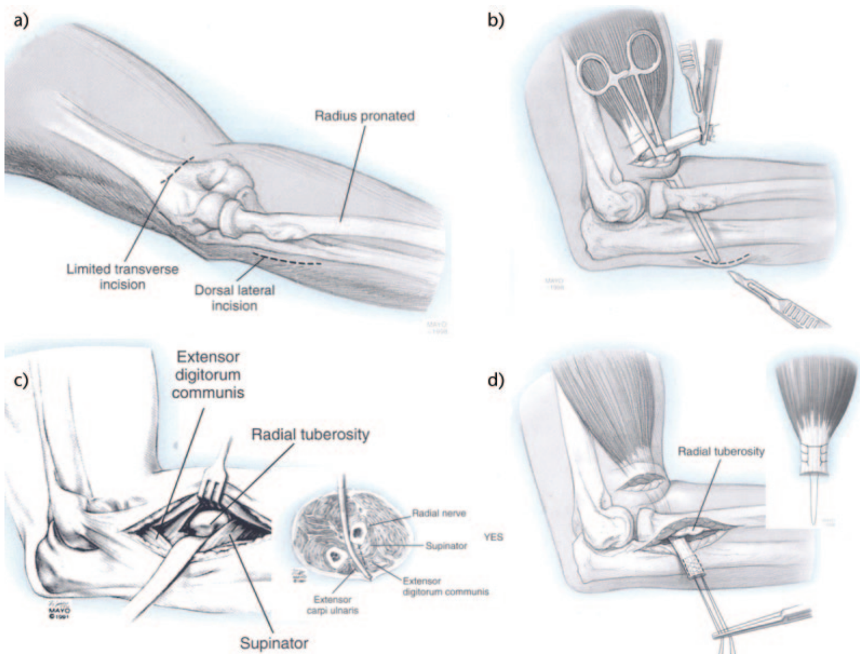

Fig. 3 Representation of the two-incision technique for repair of acute distal biceps tendon ruptures. (Used with permission of the Mayo Foundation for Medical Education and Research All rights reserved). a) Location of the transverse anterior incision at the level of the distal humerus-anterior elbow, and the longitudinal posterior incision at the level of the posterior and proximal forearm. b) Trimming of the tendon, and creation of the passing plane with a blunt instrument from the anterior incision to the posterior aspect of the proximal forearm following the tract of the biceps tendon. The skin is indented and a knife is used to create the second incision over the instrument. c) Demonstration of the relevant anatomy to create the passing plane for the distal biceps tendon. Note that the common extensor and supinator muscles are split to expose the radial tuberosity, avoiding exposure of the ulna. d) Passing of the distal biceps tendon (with the Krakow suture) from the anterior-proximal incision to the posterior-distal incision.

posterior exposure. It is currently recommended to perform the dorsal exposure through a muscle-splitting approach, avoiding exposure of the ulna to decrease the chances of ectopic bone connecting both bones (Fig. 3). A third alternative is to complete the repair with endoscopically-assisted visualisation, a technique developed primarily for partial tears, as discussed below, but also considered by some for complete tears.

Most surgeons use bone tunnels when utilising a two-incision technique, whereas use of bone tunnels anteriorly is much more cumbersome, and fixation is often performed with any of the alternatives. For these reasons, the relative benefits and risks of just the exposures are difficult to separate from those of the fixation methods, since the exposure technique may dictate the fixation modality.

It has been proposed that a truly anatomic repair of the DBT to the native footprint cannot be consistently achieved with the use of the single-incision suture anchor technique.[23] Biomechanical evidence suggests that a non-anatomic DBT position may affect supination strength.[24] The DBT may lose the cam effect and decrease the ability to generate full supination torque, particularly if the forearm is in neutral rotation or supination.[24]

A randomised controlled trial was conducted to compare acute DBT tears treated surgically with a single-incision technique (fixation with two suture anchors) or double-incision technique (fixation with transosseous bone tunnels).[11] The authors found that both techniques provided similar results in terms of pain, American Shoulder and Elbow Surgeons (ASES) elbow scores, and functional sub-scores, DASH score, patient-rated elbow evaluation (PREE) score, and isometric extension, pronation or supination strength. However, the double-incision technique resulted in significantly higher strength for elbow flexion when compared to the single-incision technique (104% *vs* 94%, respectively).[11] In addition, there were more nerve-related complications in the anterior incision group, mostly LABC injuries. In another study, the single-incision technique elicited more degrees of elbow flexion compared to the double-incision.[25]

A recent systematic review compared the two surgical techniques and various fixation methods.[4] The review involved 22 studies with a total of 494 patients. The complication rates between the single- and double-incision groups consisted of LACN neurapraxia (11.6% and 5.8%, respectively, which was statistically significant); heterotopic ossification of 3.1% and 7%, respectively ($p = 0.06$); stiffness 1.8% and 5.7%, respectively ($p = 0.01$); re-rupture 1.8% and 1.2%, respectively (no p value provided); infection 1.2% and 0%, respectively (no p value provided); and synostosis 0% and 2.3%, respectively (no p value provided).[4] Adding all complications together, the rate was

23.9% in the single-incision and 25.7% in the double-incision (non-significant).

Watson et al[4] also observed in their systematic review that the bone tunnel and cortical button methods had significantly lower complication rates (20.4% and 0%, respectively) compared with suture anchors and interference screws (26.4% and 44.8%, respectively). In two recent studies,[26,27] the single-incision cortical button and interference screw fixation technique has been compared to bone tunnel suture fixation (double-incision) and suture anchors (single-incision). DASH scores and complications were similar between the cortical button and suture anchors, but pronation was better in the former, and elbow flexion and supination better in the latter.[26] Single-incision cortical button demonstrated more complications (30%) compared to double-incision bone tunnel suture fixation (4.8%), mostly consistent with permanent superficial radial nerve paresthesias.[27] Overall, both techniques provided good clinical results.

Based on the available literature, we believe it is fair to say that the reported techniques can provide a successful outcome in the vast majority of patients. Surgeons should probably select one technique over another, taking cost and experience into account. The key is to be aware of tips and tricks to avoid iatrogenic nerve injury and ectopic bone formation. Our preference is to utilise the double-incision bone tunnel technique, due to a) lower cost, if suture anchors, cortical buttons, interference screws, or a combination are used; b) a lower reported rate of neurologic complications; c) easier ability in our hands to reattach the biceps to the true anatomic footprint; and d) training. In general, the re-rupture rate in the double-incision technique is low (1.5%), provided there is adequate rehabilitation and compliance by the patient.[28] The recurrence rate for the single-incision technique is also low.[2]

Chronic complete tears

Patients presenting for treatment late after a DBT rupture are either those in whom the initial diagnosis was missed, or those with persistent pain and function after an initial trial of non-operative treatment.

A number of issues make surgical management of chronic tears somewhat problematic. In a matter of weeks the muscle and tendon retract proximally, loose their elasticity, and become atrophied.[29] In addition, the natural space or tunnel for passage of the biceps tendon becomes obliterated with fibrous tissue, which it may be difficult to recreate. Finally, the lateral antebrachial cutaneous (LACB) nerve may be scarred to the muscle belly and a more formal dissection of the nerve may be required, which might lead to an increased rate of nerve dysfunction after surgery.

Traditionally, it was considered that most chronic DBT tears would require some form of augmentation at the time of surgery. This was mostly due to the fact that after primary repair of chronic tears, retraction would lead to very limited elbow extension at the end of the procedure. Surgeons would then be concerned that either elbow extension would never be regained, or a re-rupture would occur. Current evidence seems to show that a number of chronic tears can be repaired primarily, even if elbow extension is limited at the end of surgery: patients seem to stretch out their biceps and regain a good arc of motion without a concerning rate of re-rupture. Morrey et al[30] reported a retrospective case-control study where patients with DBT tears in whom a repair had to be done at 60° or more of elbow flexion were compared to a control group of patients in whom the repair could be carried out at less than 30° of flexion. Most patients regained functional or full extension, and there was only one re-rupture.

This information has changed our practice. In the past, we based the need for graft augmentation solely on time. Now, it becomes an intra-operative decision: a primary repair is favoured, provided there is still tendinous tissue remaining and that the repair can be completed by placing the elbow in, at the most, 90° of flexion. Repairing the DBT in high degrees of flexion is extremely difficult through a single-incision approach, and much easier tying transosseous sutures over the radius with the elbow in whatever flexion is needed. As mentioned previously, an intact lacertus fibrosus is a good indicator of the ability to repair a chronic tear primarily.

Graft augmentation is selected when there is no tendon structure left, as well as in cases of extreme retraction.[3] Graft reconstruction can be considered using either a single-incision or two incisions, and fixation of the graft tendon to the radius can be achieved with any of the methods previously mentioned. Anterior dissection needs to be proximally more extensive in order to free up the biceps and selectively dissect the LACB nerve. Use of autograft or allograft is based mostly on availability and surgeons' preferences. The most popular graft choices for chronic DBT tears are the semitendinosus autograft (where the graft can be interwoven into the DBT) and the Achilles allograft.[29-32] The Achilles allograft was first used with the a calcaneous bone block attached for bone-to-bone healing in the bicipital tuberosity.[33] Satisfactory subjective results were reported with full range of motion and an excellent Mayo Elbow Performance Score at a mean of 2.8 years of follow-up.[33] More recent studies have demonstrated excellent clinical and functional results with the use of Achilles allograft without calcaneous bone block (Fig. 4).[34,35]

Partial tears and bursitis

Partial DBT tears are less common and likely under-diagnosed. Most surgeons recommend a trial of non-operative treatment, including activity modifications, use of non-steroidal anti-inflamatories, and physical therapy. Surgery is recommended when debilitating symptoms persist for between three and six months despite adequate treatment, and may

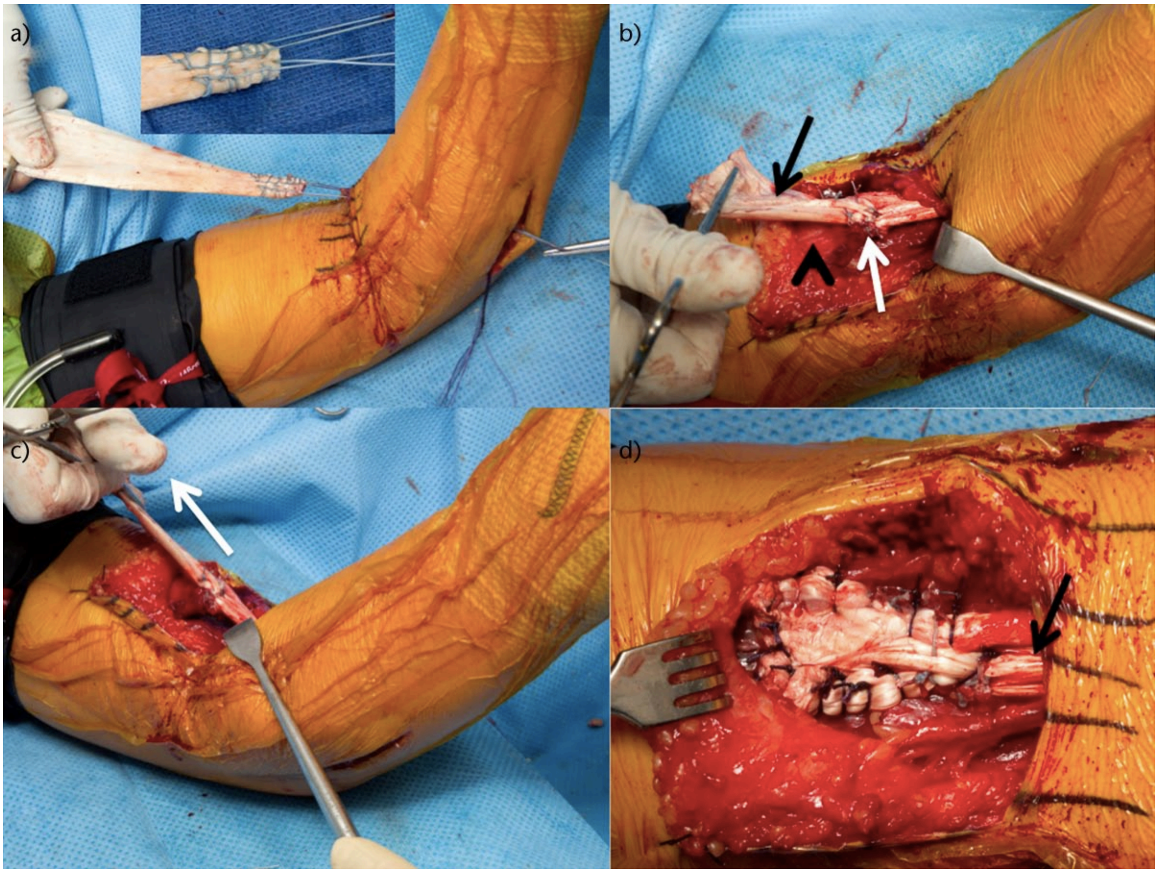

Fig. 4 Surgical photographs demonstrating the two-incision distal biceps reconstruction technique for chronic tears using an Achilles tendon allograft. a) A double Krakow suture is placed in the distal Achilles allograft. The Achilles allograft is then brought through the anterior incision and passed to the posterior-distal incision. b) Detail of the attachment of the Achilles allograft into the native remnant of the distal biceps tendon (white arrow). The remaining allograft tissue (black arrow) will be attached to the remaining distal biceps muscle (black arrow head). c) The graft is typically tensioned in approximately 45° of flexion, but the position varies depending on the shape of the biceps as compared with the opposite, normal side. d) Final demonstration of the reconstruction. The distal biceps tendon has been reconstructed with the Achilles tendon allograft (black arrow).

also be considered for high-grade tears in patients unable to limit their activities and at risk for rupture completion.

Traditionally, partial tears managed surgically have been treated by completing the tear (dividing intact fibres), performing a debridement of the area of tendinosis, and proceeding with a primary repair of the whole tendon.[36,37] Surgery may be performed through three exposures: two incisions, a single anterior incision, or a single posterior incision. Our preference is to use a single posterior incision. The biceps tendon is retrieved through a single posterior incision using traction sutures on the incompletely torn tendon substance, and the repair is also completed through the same incision once the tendon has been completely detached. In a case series, Kelly et al[37] observed excellent clinical outcomes (range of motion, flexion and supination strength and ASES score) and satisfaction in patients treated with surgical repair of partial DBT tear through a single posterior incision, with bone tunnel suture fixation.

With the development of endoscopic extra-articular surgery, some surgeons have reported on endoscopic management of bursitis and partial thickness tears. Options include debridement with a motorised shaver under endoscopic visualisation, suture anchor repair of only the detached portion of the tendon, or completing the tear and performing a repair of the whole tendon with endoscopic assistance.[38,39] Debridement or partial repair seems to be favoured for ruptures affecting less than 50% of the tendon.

Prevention and management of complications

Nerve injuries

Injuries to the PIN and the lateral antebrachial cutaneous (LABC) nerve have been reported in 5% to 40% of elbows respectively, more commonly with a single anterior incision.[11,40]

PIN injury may be prevented with careful dissection and avoidance of forceful retraction. In the two-incision technique, lever pointed retractors placed over the radial shaft anteriorly, and distal to the tuberosity can create a crush injury on the nerve. Most PIN injuries recover fully; if they do not, tendon transfers are more commonly considered than primary nerve surgery.[17] LABC nerve injuries are almost always the result of poor dissection or excessive retraction. Although these sensory paresthesiae are fairly minor when compared to a motor nerve injury and tend to resolve over time, they can also become permanent or elicit a chronic regional pain syndrome. Selective LABC nerve blocks or even neurectomy after ultrasound may be considered for refractory symptoms.

Heterotopic ossification

Heterotopic ossification may be seen on radiographs after DBT repair using any exposure or fixation technique, but it seems to be more common and tends to interfere more with forearm rotation using a two-incision technique. As mentioned earlier, when performing a two-incision technique care should be taken not to expose the ulna. Also, anecdotally, heterotopic ossification seems to be prevented by frequent and abundant irrigation especially after drilling.[3] Most surgeons do not use formal prophylaxis with radiation therapy or indomethacin.

When heterotopic ossification interferes with forearm rotation, a reoperation is sometimes required to restore motion. Some studies suggest that forearm rotation is always restored to normal once the area of ectopic bone is removed,[12] but in our experience some patients will not achieve full forearm rotation, although improvements are typically to the functional range. When performing heterotopic ossification removal, the surgeon should be ready to repair the biceps again if encased in ectopic bone. Additional forearm rotation may be obtained by excavating the ulna a little at the area of the bicipital tuberosity.

Summary

The DBT may be affected by a number of conditions including bicipitoradial bursitis, partial tears and complete tears. Acute complete tears are occasionally treated non-operatively in low-demand individuals, but most patients benefit from surgical repair. It is important not to miss the diagnosis initially, since delay in surgery does increase the chance of complications. Patients presenting with a chronic tear can be considered for either primary repair in high flexion or graft augmentation, depending on the presence of residual tendinous tissue and the severity of retraction. Partial tears and bursitis may be addressed endoscopically with debridement or partial repair, but when most of the tendon is affected, completing the tear and performing primary repair seems to be favoured. Single-incision and double-incision techniques are both successful in most patients, with a slightly higher rate of cutaneous nerve injuries in the former. The main complications of DBT repair are injuries to the posterior interosseous nerve or the lateral antebrachial cutaneous nerve, as well as heterotopic ossification.

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