



AN ALL ARTHROSCOPIC SUPRAPECTORAL DOUBLE ROW TECHNIQUE OF LONG HEAD OF BICEPS TENODESIS USING ALL SUTURE ANCHORS AND MAINTAINING INHERENT LENGTH AND TENSION OF THE TENDON - A COMPREHENSIVE STEP BY STEP TECHNICAL NOTE WITH ILLUSTRATIONS

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ABSTRACT

Long Head of Biceps tendon (LHBT) tenodesis is a widely accepted modality that produces satisfactory outcomes, low revision rates and low complication rates in the treatment of pathologies affecting the LHBT[1,2]. The latter is recognized as a common source of shoulder pain and disability [1], often found in association with other lesions in the shoulder. Arthroscopic LHBT tenodesis is therefore an appealing minimally invasive procedure that can be combined with other arthroscopic interventions during the same sitting to address coexisting shoulder pathologies[3]. Various techniques have been described and in the absence of an undisputed superior technique, we present, in this article, a novel method of performing an all arthroscopic suprapectoral LHBT tenodesis with a double row repair maintaining its inherent length-tension relationship. In this particular technique, two all-suture anchors are used to secure the tendon cinch sutures for better apposition of the tendon over the bone bed. Performing the tenodesis prior to the tenotomy enables us to maintain the native length of the LHBT, preserving the length-tension relationship. Furthermore, securing the proximal intra-articular segment of the LHBT initially during diagnostic arthroscopy facilitates its retrieval after dividing the LHBT following the tenodesis.

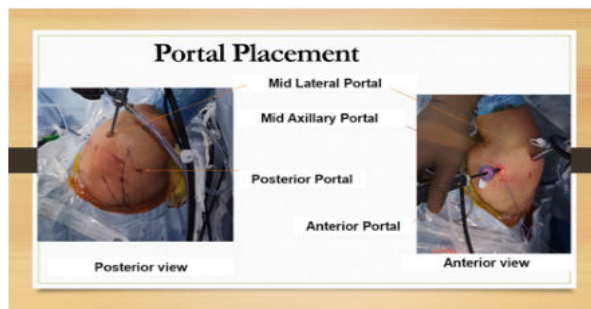
KEYWORDS : Long Head Biceps Tenodesis, Arthroscopic Tenodesis, LHBT, all suture anchor LHBT tenodesis, Double Row LHBT Tenodesis

Summary

LHBT tenodesis is a widely accepted modality that produces satisfactory outcomes, low revision rates and low complication rates in the treatment of pathologies affecting the LHBT[1,2]. The latter is recognized as a common source of shoulder pain and disability [1] and tenodesis is commonly indicated for tenosynovitis, SLAP tears, partial tears, instability and clinical examination revealing LHBT as pain generator [5]. While offering better cosmesis and ability to address coexisting shoulder pathologies [7], concerns have been raised regarding ability to maintain length tension relationship of the LHBT during arthroscopic tenodesis compared to open techniques, potentially leading to cramping, early fatigue and overstressing of the tenodesis construct.[8] Our technique addresses this potential loophole and this technical report gives a step wise, reproducible and illustrated description of the procedure.

Patient Positioning

The patient is placed in a lateral position and 5kg skin traction is used.



Surgical Technique

Standard diagnostic arthroscopy through the posterior portal to evaluate proximal LHBT and concomitant pathologies.

Using an antegrade suture passer, a cinch suture is passed through the intra-articular portion of the LHBT to secure it in order to facilitate its extraction after tenodesis. A Mid Lateral portal is made using an outside-in technique, which is used as a viewing portal, focusing over the bicipital groove. A mid-axillary (MA) portal is created, overlying the groove and is used as a working portal. Using a radiofrequency ablator (RFA), the LHBT is felt as a soft area between the two bony ridges of the bicipital groove. The overlying tissues are debrided and the transverse humeral ligament transected, more towards the lateral ridge to avoid damage to the insertion of the subscapularis tendon. To optimize visualization and access to the floor of the groove, a probe is introduced through an anterior portal to gently retract the LHBT medially.

The site chosen for the first suture anchor is at the distal margin of the bicipital groove. A double-loaded all-suture anchor is inserted through the midaxillary portal, following which a bird beak is employed to pass one limb of firewire underneath the tendon, to the opposite side and retrieved through the MA Portal.

Using an antegrade suture passer, a cinch suture is placed through the substance of the tendon. (The loop is retrieved externally and the same limb passed through it). The construct is tightened but not knotted, to allow retraction of the LHBT to place the 2nd suture anchor (single loaded all suture anchor). Suture management is eased by parking the sutures in the

anterior portal. Tendon healing onto the bone bed is enhanced by burring and micro fracturing.

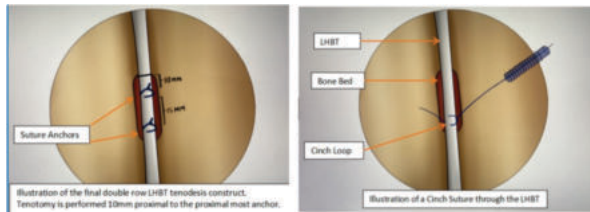
The second suture anchor is inserted 15mm proximal to the first anchor. The procedure is performed as for the first suture anchor.

The proximal cinch suture is tightened and half hitches are applied to secure the knot. The same procedure is then performed on the distal suture anchor, which results in good apposition of the tendon onto the anchor and bone bed.

The LHBT is then transected 10 mm proximal to the proximal suture by a radiofrequency ablator.

The author prefers using a double-loaded suture anchor for the proximal anchor since the second suture can be used as a backup in case of inadequate knot tightness with the first suture.

While viewing from the posterior portal, the proximal remnant of the tendon is then cut at its labral attachment by the radiofrequency ablator and removed from the joint by simply pulling on the cinch suture that had been placed through it at the very beginning of the procedure.



DISCUSSION

Contrary to the lack of consensus regarding its function around the shoulder, the role of the LHBT as a pain generator arising from a multitude of underlying pathologies is well recognized [1]. To address these pathologies, tenodesis of the LHBT has proven to be a procedure producing good patient satisfaction and associated with a low rate of complications [2]. Excellent clinical outcomes have been reported in both suprapectoral and subpectoral biceps tenodesis, the advantage of the former being that it can be performed arthroscopically, enabling concomitant pathologies to be addressed [3,4].

Common indications for performing biceps tenodesis are fraying, partial tears, tendinitis and SLAP lesions (5), for which tenodesis is superior to tenotomy in terms of incidence of 'popeye' deformity [6].

The arthroscopic techniques offer better cosmesis and the ability to address coexisting lesions [7]. However, when compared to open methods, one of the challenges of arthroscopic LHBT tenodesis techniques is to recreate the native length of the LHBT to maintain the length-tension relationship, due to the inability to visualize its musculotendinous junction as a reference point. Failure to achieve optimal muscle tension may result in under-tensioning or over-tensioning. The former has been implicated in post-operative cramps, fatigue and popeye signs whereas the latter has been blamed to exert undue stress on the tenodesis construct [8]. We opt to perform the tenodesis prior to the tenotomy to achieve this goal, as echoed by Edward Thomas Haupt et al [9].

Our technique resulted in an onlay tendon graft, secured proximally and distally, rather than an inlay type of tendon graft which results from using interference screws and cortical buttons. Haidamous G et al highlighted the superiority of the onlay graft technique by reporting a higher incidence of 'popeye' deformity and a higher rate of revision surgery in

patients having undergone LHBT tenodesis by inlay graft. [10]

As discussed above, our technique has several advantages:

- Performing the tenodesis prior to the tenotomy maintains the native length of the LHBT, preserving its length-tension relationship.
- The use of a double row of suture anchors confers stability to the tendon overlying the recipient bone bed.
- The onlay graft technique used has been shown to have lesser complications while achieving similar functional outcomes than inlay techniques.
- The use of a cinch loop suture technique allows for good apposition of the tendon onto the anchor and bone, which may help in optimizing tendon-to-bone integration.
- The use of an antegrade suture passer to perform the cinch loop suture avoids the need to make additional portals for suture management and requires the handling of fewer instruments, thereby reducing operating time.

CONCLUSION

Our technique is an amalgamation of the best available evidence applied at each step in performing this deceptively simple procedure in a bid to offer the most successful outcome to the patient.

Textbox outlining steps of the technique described

All Arthroscopic Suprapectoral Double Row technique of Long Head Of Biceps Tenodesis using all suture anchors and maintaining inherent length and tension of the tendon

- Patient in the lateral decubitus
- Diagnostic Arthroscopy via posterior portal
- Applying cinch suture to proximal LHBT via anterior portal
- Swapping viewing portal to Mid Lateral (ML) portal
- Creation of Mid Axillary (MA) portal as a working portal
- Transection of transverse humeral ligament
- Placement of a distal all suture anchor at lower margin of the bicipital groove
- Passing one limb of the suture underneath the LHBT and delivering through the MA portal
- Applying cinch suture with the antegrade suture passer
- Bone bed preparation
- Inserting a second all suture anchor 15mm proximal to the previous anchor
- Repeating the procedure of passing the suture limb underneath LHBT and applying the cinch suture
- Knotting LHBT onto proximal anchor with half hitches
- Repeat the procedure on the distal anchor
- LHBT tenotomy 10mm proximal to anchor with RFA
- Proximal LHBT transection from labral attachment
- Extraction of the proximal segment of LHBT by pulling on cinch suture

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