Arthroscopic Long Head Biceps Tenodesis in Coracoid associated with its Transfer to the Conjoined Tendon

José Carlos Garcia Jr.[1], Alvaro Motta Cardoso Jr[1]., Marcelo Boulos D. Mello[1]

Abstract

Introduction: The knowledge of the long head of biceps tendon as a potential source of pain in the shoulder has been longstanding. However LHBT's pathology and its treatment remains controversial. Current surgical options include tenotomy, tenodesis, or transfer. The author has presented a surgical technique of LHBT tenodesis in coracoid associated to its transfer to the conjoined tendon.

Methods: Patients were assessed before the surgeries using UCLA score. After surgery UCLA, SF-36 and raw scale for function, physical limitation and pain were evaluated 2 years after surgeries.

Results: The average UCLA changed from 22.00±0.69 to 33.14±0.52, p=0,0001. The average SF-36 6-month-after-surgery was 140.40±1.44. The minimal follow up was 2 years. There was no surgery failures.

Conclusion: The surgical procedure has achieved satisfactory results and it can be one more surgical option in order to treat the biceps pathologies. The author do not belive LHBT transfer isolated may be superior to its association with tenodesis in the coracoid.

Level of evidence: This is study has a level of evidence 4

Key words: arthroscopy, biceps, tenodesis, transfer

Introduction:

The knowledge of the long head of biceps tendon (LHBT) as a potential source of pain in the shoulder has been longstanding [1-4].

When conservative management fails treatment options are either tenotomy or tenodesis. Tenotomy provides reliable pain relief, however its complications include muscle spasm in younger patients and cosmetic deformity in all ages [5-8].

In 1936 Gilcreest wrote about many different types of biceps tenodesis such as suture of the tendon to the short head of biceps, suggested by Bazy; suture to the coracoid process, suggested by Perthes, suture to the insertion of the pectoralis major, suggested by Hoffman and suture in the sulcus intertubecularis, suggested by Roloff9. The Gilcreest's personal option was by combining the Bazy and Perthes techniques [9].

Many other LHBT surgical techniques have also been reported since them, however LHBT's treatment remains controversial [2, 3] .

O`Brien suggested that the suture of the tendon to the short head of biceps could present superior healing when compared with the bony tenodesis. Other advantage is that it could also preserve the natural biceps axis [10].

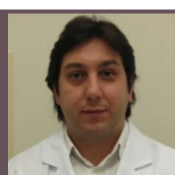
When Gilcreest combined Bazy and Perthes techniques [5] he preserved the natural biceps axis [10] with the advantages of soft tissue healing and also added the advantages related to the bony tenodesis in a stronger and safer system [9].

All the ancient techniques mentioned above, unless the Gilcreest's one, currently can be done by using minimally invasive procedures, with its related benefits [10].

The author developed an arthroscopic technique of LHBT transfer to conjoined tendon associated with its tenodesis on the coracoid`s tip and presents its results in this study.

[1]NAEON-Santa Catarina Hospital

Address of Correspondence
Dr. Jose Carlos Garcia Jr., MD, MSc, PhD
NÆON-Hospital Santa Catarina-SP-Brazil
Email: jose.cjunior@hsl.org.br



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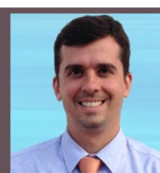

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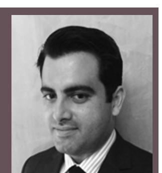

Dr. Marcelo Boulos D. Mello

Methods:

From June 2008 to January 2009 15 patients underwent to the arthroscopic Gilcreest procedure in this service.

Inclusion Criteria:

- Patients older than 18 years.
- At least two years follow up
- Patients with biceps pathology associated or not with rotator cuff lesions or acromioclavicular osteoarthritis.

Exclusion Criteria:

- Patients with other shoulder pathologies
- Patients that underwent to other surgical procedures after the tenodesis
- Patients that refused to take part of this trial

Surgical Technique:

The patient is placed on the beach-chair position on the operating room table. A standard posterior viewing portal is established and the arthroscope is introduced. Diagnostic arthroscopy is performed and an accessory portal in the anterior triangle is established.

At this point, the biceps tendon is inspected,

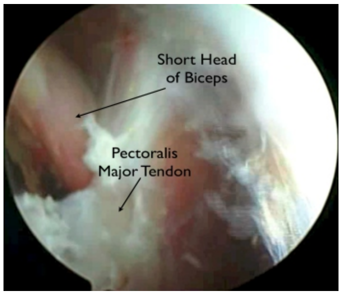

Figure 1: Arthroscopic view of Pectoralis Major and short head of biceps

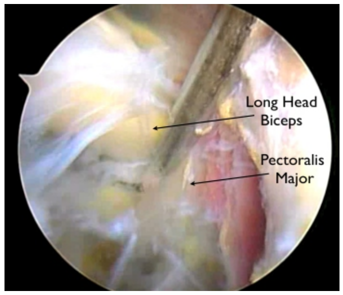

Figure 2: Long Head of Biceps and its relation with pectoralis major tendon

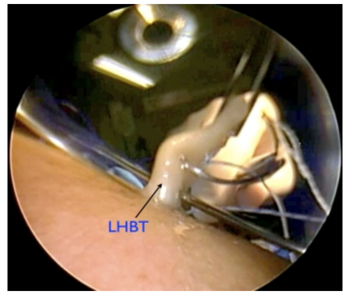

Figure 3: Long Head of Biceps pulled out of the body

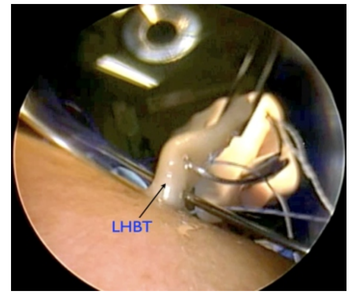

Figure 4: Suture anchor and its relation to the coracoid

including the anchor to the superior labrum. A probe is used to low the tendon allowing better visualization of its entire intra-articular portion.

The scope is located in the subacromial space and a decompression is performed by using a combination of shaver and radiofrequency. Visualization of the subacromial space and of the bicipital groove laterally is them possible. Other procedures such as rotator cuff reconstructions or suprascapular nerve release can also be performed at this time, if necessary.

A spinal needle is then used to localize a superior, anterolateral portal just anterior to the bicipital groove allowing introduction of devices to work in this space.

The coracoacromial ligament completely removed, allowing better access and visualization to the lateral aspect of the coracoid and conjoint tendon by using the arthroscope in the lateral portal. The subdeltoid space needs to be carefully cleared to better expose the conjoint tendon(figure 1). The scope direction changes to dowonwards until it faces the insertion of the pectoralis major insertion. At this moment the LHBT is cleaned just superiorly to the pectoralis major tendon using the probe and the shaver (figure 2). Bleeding is a frequent problem in this space and radiofrequency devices are used to stop local bleeding.

The biceps tendon is tagged in this space using a Caspary`s(Conmed/Linvatec®) device through a nylon 0 for making landmarks. The scope returns to the posterior portal through the intraarticular space and the biceps tendon is tenotomized from its origin on the superior labrum. The scope returns to the lateral portal and the LHBT is pulled out of the body using a grasper through the anterolateral portal (figure 3). Sometimes all the intertubecularis sulcus need to be released to allow biceps extrusion.

A 3mm anchor is inserted at the superolateral portion of the coracoid(figure 4). The anchor wires are pulled out through the same anterolateral portal where the tendon is. Cannulas are not recommended on this surgical step.

Using a Caspary`s (Conmed/Linvatec®-Largo-FL-USA) (figure 5), 2 fiber wire® (Arthrex®-Naples-Fl-USA) wires passes through the short head of biceps tendon just under the coracoid tip to the posterior portal.

Out of the body the LHBT is sutured using Krakov suture by using one wire from the suture anchor. The simple knot pushes the sutured tendon into the subdeltoid space to find the coracoid and the tenodesis is done. Using a 18 gauge needle 2 nylon 0 wires are passed through the LHBT in its new location at the same level the fiberwires® have been passed in the short head.

The nylon wires guides the fiberwires® through the LHBT and the suture between both biceps heads are made using regular arthroscopic knots (figures 6 and 7).

II) Patients evaluation:

Patients were evaluated before the surgeries using UCLA score and six monts after surgery using the UCLA score, SF-36, raw scale for function, physical limitation and pain.

Patients were interviewed by phone 1 year and 2 years after surgeries using the raw scale evaluation for function, physical

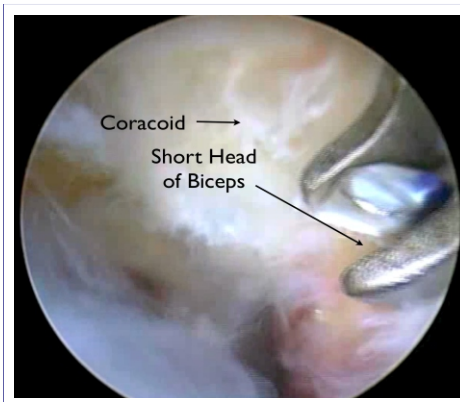

Figure 5: Passing guide wires through the conjoined tendon for allowing the solidarization

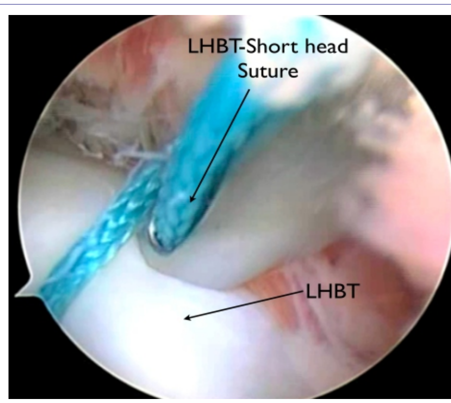

Figure 6: Solidarization Long Head-Conjoined tendon.

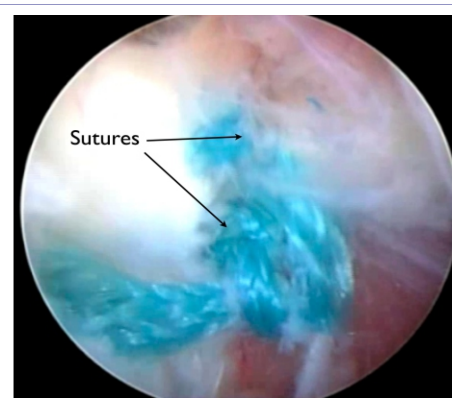

Figure 7: Solidarization Long Head-Conjoined tendon

limitation pain and the presence of popey sign.
Data from UCLA were also checked at these times, patients with changes in UCLA were assessed again and just the last result was recorded.
Our minimal follow up was 2 years.
Statistic tests followed the characteristics of the curves.

Results:

Fifteen patients were enrolled in this study were 15 with tendinopathy of the long head of biceps tendon (LHBT) were chosen to be submitted to surgical treatment.
One patient was withdrawn because he did not approved his data for publication.
In 12 patients supraspinal tendon lesions were associated.
In 5 patients subscapular tendon lesions were associated.
No patients presented Popey sign after surgery.
UCLA two-year post surgery changed from 22.00±0.69 to 33.14±0.52, p=0,0001. The statistical test used was Wilcoxon matched-pairs signed rank test.
SF-36 two-year post surgery was 140.40±1.44. The raw scale of function two-year post surgery was 93.43%±1.33%. The raw scale for physical limitation two-year post surgery was 96.43%±2.04%. The raw scale for pain two-year post surgery was 94.64%±1.61.
The 1 year and 2 years after surgeries interview by phone used the raw scale evaluation for function, physical limitation pain, the presence of popey sign and patients were also questioned about possible changes in UCLA.
The interviews 2-yer-after-surgery revealed no changes for UCLA scores.
No overtensioning happened.
There was an anterior discomfort for extremes of adduction

Discussion:

The long head biceps tendon continues to play a controversial role in shoulder surgery. In fact, its exact role in shoulder kinematics has not yet been elucidated. Some authors believe that the tendon may play an important role in shoulder stability [11-13]. Others believe that the tendon is clinically insignificant, serving only as a vestigial structure [14-16]. Despite this controversy, it is commonly accepted that the biceps tendon can play an important role in shoulder pathology and serve as a pain generator in the shoulder. The surgical management of biceps tendon pathology remains equally controversial. Current surgical options include tenotomy, tenodesis, or transfer [2, 3, 17, 18].
Tenotomy provides reliable pain relief with the shoulder at rest 5-7. However, in younger patients, complications including cosmetic Popeye deformity and spasm of the biceps muscle belly were not uncommon.
Multiple techniques of LHBT fixation can be used to avoid these problems. Bone tunnels, bone anchors, staples, or interference screws are available options 3, [18-22]. Earlier techniques of transposition of the long head biceps to the conjoint tendon have involved direct tenodesis to the coracoid process [4, 17, 23, 24] reviving the description of Gilcreest in 1936.
O`Brien reported the LHBT transference as being a reliable option when focusing a closer reproduction of the native axis of pull of the biceps muscle and allow the long head and short head to share load. The transfer allows a soft-tissue healing, which may be more favorable than soft tissue to bone healing as it recreates the normal bungee effect of the superior labrum/biceps anchor complex. Finally, this technique provides the surgeon with direct visualization during tensioning and suturing helps prevent overtensioning of the tendon [2].
Our technique has associated the LHBT tenodesis into the coracoid to the O`Brien`s transfer technique in order to avoid loss of the surgeries. We added the tenodesis protection to the soft tissue healing purposed by O´Brien.
The coracoid tenodesis associated to transfer has presented higher difficulty than in the traditional humeral biceps tenodesis.
Some authors belive that if the LHBT natural location`s is the biceps groove in the humerus, moving the tendon can raise unknown biomechanical consequences [11, 12, 16, 17, 21, 23, 24].
However for others the transfer to the coracoid can be more favorable to the biceps natural axes and can be the best choice for the tendon healing [2].
Our experience suggests that in terms of healing and activities, the coracoid axis do not cause clinical problems, however this transference demands proper training and increases time to the surgical procedure.

Conclusion:

Indeed our long term results are favorable, however the author do not believe this technique is better than other types of tenodesis.
The surgery increased time to the surgery and demanded very specific training.
This technique is a possible option for biceps pathology.

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