

Self-locking tenotomy of the long head of the biceps: What is the benefit?

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Abstract

Tenotomy and tenodesis of the biceps are the surgical techniques used to treat pathology of the long biceps. Between the proponents of the two techniques, the superiority of one over the other is still debated. The Popeye sign is often cited to the disadvantage of tenotomy. The aim of our study is to report on our experience using a self-locking tenotomy and its impact on Popeye's sign, and to assess our functional results.

This is a retrospective study of 53 shoulders treated for long biceps tendinopathy, isolated or associated with a rotator cuff tear. All patients underwent surgery at the AILE 4 orthopedic department of the Ibn Rochd University Hospital in Casablanca over a period of five years, and were reviewed at least six months later.

A self-locking tenotomy was performed in all patients. The mean age at surgery was 58 years. Popeye's sign was observed in five patients and was well accepted in four patients. Constant-Murray scores improved significantly by an average of 25 points. Satisfaction was over 90%. Professional and sporting activities were resumed in all patients.

We highlight the value of the self-locking tenotomy as a simple, rapid, reproducible, effective and low-cost arthroscopic technique, ensuring a tenodesis effect by reducing the rate of appearance of Popeye's sign.

Keywords: Self-locking tenotomy; Tenodesis; Popeye's sign; Long head of biceps; Shoulder arthroscopy

1. Introduction

Pathology of the long portion of the biceps (LHB) is a common cause of anterior shoulder pain. (1) The frequency of bicipital disorder, whether isolated or associated with rotator cuff tear, is not well known, although it is easy to diagnose. Its incidence varies from 3 to 70% in the literature.(2)

Tenotomy and tenodesis are the surgical techniques used to treat pathology of the long biceps. These two techniques have demonstrated their effectiveness. However, there is no consensus for treatment of the LHB injuries.

Arthroscopic tenotomy of the LB is a simple, rapid and effective approach, with short post-operative recovery times, allowing a quicker return to activities of daily living. However, It may cause several inconveniences, like Popeye's sign (PS), which is the distal retraction of the biceps muscular body. (3,4) Tenodesis of the LHB consists of fixing the biceps at the level of the bicipital groove, avoiding the appearance of PS, with a higher cost, technical difficulty and more constraining postoperative recovery. (5,6)

From a functional point of view, there was no significant difference between the two techniques.(7,8)

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In the present study, we report an arthroscopic technique of a self-locking tenotomy that we use, and evaluate its impact on the appearance of Popeye's sign. We also share our experience and our functional results.

2. Materials and methods

This is a retrospective study performed at the ibn Rochd hospital in Casablanca over a period of 05 years between January 2018 and December 2023.

We included patients with tendinopathy of the LHB, isolated or associated with a rotator cuff tear, and whose age was over 18 years. These patients were operated on by the same shoulder surgeon according to a standard surgical and physiotherapy protocol with a minimum follow-up of 6 months. The protocol included an arthroscopic self-locking tenotomy of the LHB. We excluded from the study patients with a history of previous surgery on the affected shoulder or incomplete medical records. Over the course of the study, fifty-three consecutive patients (53 shoulders) responded the inclusion criteria.

2.1. Surgical technique

The patient is placed in a beach-chair position, with the shoulder fully exposed to allow easy access to the various arthroscopic approaches. Using the posterior approach, the joint space is first explored and the biceps lesion diagnosed. (Fig 1) The second anterior instrumental approach is performed. A tenotomy is performed at the insertion of the LHB obliquely towards the supraglenoid tubercle, leaving a large proximal fragment. (Fig 2) When the tendon is cut, this large proximal stump is locked at the entrance to the bicipital groove. This is the autotenodesis effect sought by this technique. (Fig 3)

The post-operative period is easy. The limb is immobilized in a sling during the day and in an elbow brace at night for 04 weeks. The next day, pendular movements were allowed and the second week, passive rehabilitation started. Active rehabilitation began in the sixth week. Balneotherapy was allowed as soon as the skin had healed, but the carrying of heavy loads was delayed until the third month.

Post-operatively, the patient was seen in consultation at 03 weeks, 6 weeks, 3 months, 6 months and then annually. Pain was assessed using the visual analogue score (VAS). (9) The functional evaluation was based on the Constant-Murley score. (10), and on measuring joint amplitudes. The Popeye sign was looked for, as well as patients' satisfaction with their operated shoulder.



Figure 1 LHB tendinitis

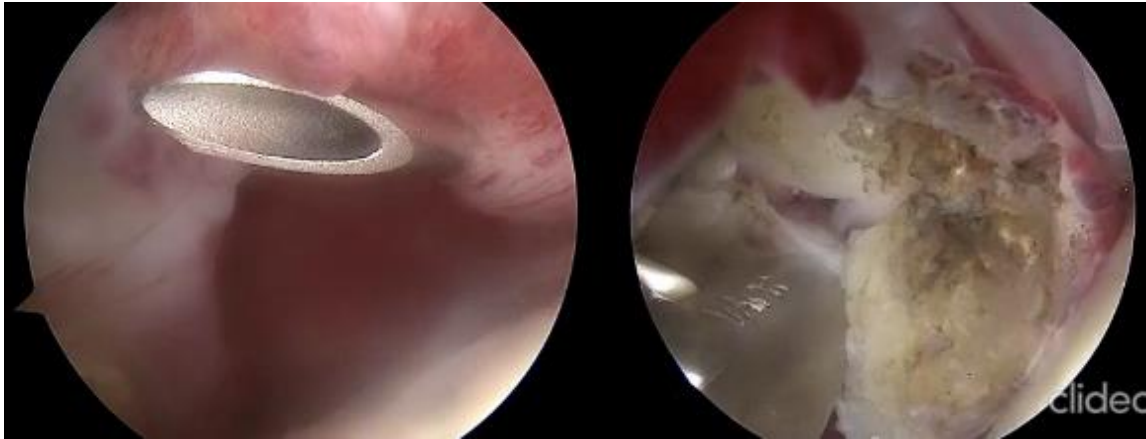


Figure 2 Anterior portal and the tenotomy of LHB with a viper



Figure 3 LHB Self-locked in the entrance of bicipital groove

3. Results

Fifty-three patients underwent arthroscopic self-locking tenotomy surgery for long biceps tendinopathy. Mean follow-up was 20 months (range 8-42), mean age 58 years (range 47-80), with peak frequency between 60 and 70 years. Male gender was dominant, with a sex ratio of 1.7. The dominant side was affected in 67% of cases. In our series, 78% of patients were manual workers, and 61% practiced sport, of which 30% involved the shoulder.

Analgesia was the parameter observed in 84% of patients. The mean postoperative VAS was estimated at 2 versus 7.3 preoperatively. Loss of biceps strength was observed in 66% of cases, with sensations of muscle cramps. Popeye's sign was found in five patients, four of them accepted it well. (Fig 4)

The preoperative Constant score averaged 62 points. A clear improvement was observed, estimated at 25 points, with an average postoperative score of 87 points. This improvement mainly concerned pain and mobility. Post-operative evolution was judged satisfactory in 72% of cases, and stationary in 22%. (Fig 5)



Figure 4 Popeye's sign



Figure 5 Mobility of the shoulder in internal and external rotation

4. Discussion

The results mentioned above suggest that self-locking LHB tenotomy reduces the possibility of Popeye's sign developing, which permits to combine advantages of both tenotomy and tenodesis. In fact, cutting the tendon obliquely towards its insertion provides a wide stump, which helps it to self-tenodesis at the level of the bicipital groove.

Clément et al evaluated the rate of occurrence of Popeye's sign between a tenodesis group and a self-locking T-tenotomy group. In this technique, the labrum is cut on either side of the LHB insertion with a width equal to twice the diameter of the biceps tendon on each side and half its height at the level of the glenoid. The incidence of Popeye's sign and functional results were similar, with superiority of tenotomy over pain.(11) Cho et al, who performed a funnel tenotomy, found no significant difference between the two groups of tenotomy and tenodesis in the rate of appearance of the Popeye's sign.(12)

This is explained by the fact that the long portion of the biceps varies in size throughout its course. Its proximal insertion surface at the supraglenoid tubercle measures 8.5*7.8 mm, while at the entrance to the intertubercular groove it measures 4.7*2.6 mm.(13) so the more proximal the section, greater the chance of trapping the tendon in the groove. (11)

This finding is also supported by the biomechanical study by Bradbury et al. In his study, he compared the force required to pull the LB through the bicipital groove between a group that had undergone a traditional tenotomy and a second group that had undergone a tenotomy of the LB with a fragment of the labrum. The force required was 24 N for the simple tenotomy and 74 N for the tenotomy with the labrum.(14)

In our series, we had five patients in whom we observed a Popeye sign. This was mainly at the beginning of our experience and we justify this rate by a technical defect where the slice of section taken as well as its shape were not sufficient to have the autotenodesis. Popeye's sign, however, only caused annoyance to one young, skinny man who in whom the cosmetic problem was obvious and disturbing.

Arthroscopic tenotomy was first described in 1990 by Walch et al, in the light of the analgesic effect of spontaneous rupture of the LB in massive rotator cuff tears. (15) In fact, the average VAS was only 2 postoperatively compared with 7.3 preoperatively. This had a significant influence on the Constant score, with a gain of 25 points in the postoperative period (62 vs. 87), where an improvement was noted particularly in the pain and mobility aspects. We also noted muscle cramps and a slight loss of strength in flexion with supination of the elbow, as described in the literature.(16)

Several studies have compared the functional results of tenotomy and tenodesis in the treatment of LB tendinopathy, with no clinical or functional difference between the two techniques. in fact, even with a low rate, but we can also have a Popeye sign with tenodesis. (17)

Although this self-locking tenotomy offers the same functional advantages as tenodesis and reduces the appearance of Popeye's sign compared with conventional tenotomy, it is important to mention that it significantly reduces operating time. This is particularly interesting in the case of a lesion of the LB associated with a repairable rotator cuff tear, where this time can be used in repair, while the self-blocking tenotomy solves the problem of the biceps. Furthermore, it is a reproducible technique that is easy to perform, with simple post-operative recovery, and the same tenodesis functional outcomes (8,18) From another economic standpoint, this technique does not require the installation of any type of material, whether anchors or interference screws, making it a low price intervention and competitive one.

5. Conclusion

The benefit of our self-locking tenotomy essentially lies in the autotenodesis effect of the technique. It reduces the rate of Popeye's Sign, and gives good functional results with simple recovery. It also remains simple, fast, reproducible, inexpensive and with a quick learning curve.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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