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A guided surgical approach and novel fixation method for arthroscopic Latarjet

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Background: Most of the complications of the Latarjet procedure are related to the bone block positioning and use of screws. The purpose of this study was to evaluate if an arthroscopic Latarjet guiding system improves accuracy of bone block positioning and if suture button fixation could be an alternative to screw fixation in allowing bone block healing and avoiding complications.

Materials and methods: Seventy-six patients (mean age, 27 years) underwent an arthroscopic Latarjet procedure with a guided surgical approach and suture button fixation. Bone graft union and positioning accuracy were assessed by postoperative computed tomography imaging. Clinical examinations were performed at each visit.

Results: At a mean of 14 months (range, 6-24 months) postoperatively, 75 of 76 patients had a stable shoulder. No neurologic complications were observed; no patients have required further surgery. The coracoid graft was positioned strictly tangential to the glenoid surface in 96% of the cases and below the equator in 93%. The coracoid graft healed in 69 patients (91%).

Conclusions: A guided surgical approach optimizes graft positioning accuracy. Suture button fixation can be an alternative to screw fixation, obtaining an excellent rate of bone union. Neurologic and hardware complications, classically reported with screw fixation, have not been observed with this guided technique and novel fixation method.

Level of evidence: Level IV, Case Series, Treatment Study.

Keywords: Latarjet procedure; arthroscopic Latarjet; shoulder instability; glenoid bone loss; cortical button

Coracoid transfer to address anterior shoulder instability, first proposed by Michel Latarjet in 1954[31] and popularized by Gilles Walch,[46,47] is increasingly used in cases of glenoid deficiency and in revision anterior stabilization.[3,5,8,15,40,42,43] The technique has a 2-fold advantage: (1) it allows reconstruction of the glenoid bone loss (static bone effect), and (2) it reinforces the weak and stretched

The study was performed according to the medical ethical guidelines of our institution, and written, informed consent was obtained. (Approval Ref: Study 2015-9).

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inferior glenohumeral ligament by transferring the conjoint tendon closer to the joint and lowering the inferior part of the subscapularis (dynamic sling or seat-belt effect).[22,31,38,47] Together with the reattachment of the labrum and capsule, it allows ''triple locking'' of the shoulder.[13,36,38] The procedure yields good results with a low rate of recurrent instability, high rate of return to sports to preinjury levels, and high rate of patient satisfaction.[2,6,7,15,19,24,36,46]

With improvements in arthroscopic techniques, the arthroscopic Latarjet procedure is becoming increasingly popular.[9,11,13,29,30,37] However, on the basis of the literature and our experience, there are at least 3 drawbacks to the arthroscopic techniques.

First, arthroscopic positioning of the bone block flush and of the screws parallel to the glenoid surface is technically difficult. Many complications related to this procedure are attributed to graft malposition.[24,36,46,51] The obliquity of the scapula on the thorax makes it challenging to place the screws strictly parallel to the glenoid surface.[13,35] Excessive screw obliquity may cause impingement with the humeral head, leading to rapid-onset arthropathy.[36,42,46,50]

Second, although fixation of the graft with 2 bicortical metal screws is the recommended method of fixation,[2,36,46,48] it is also recognized as the main source of intraoperative and postoperative complications.[13,16,23,43,51,52] There are several potential disadvantages of the screw fixation: screw pullout or loosening, bending or breakage, bone block fracture, nonunion, resorption (3%-28%), and graft migration (4%-11%).[2,46] Some of these complications may be serious and symptomatic enough to warrant reoperation.[13,16,43,51,52]

Third, the proximity of the brachial plexus (especially axillary and musculocutaneous nerves) means that any drilling or screw insertion performed arthroscopically anteriorly is potentially dangerous.[10,11,20,51,52] Posteriorly, there is also a risk of suprascapular nerve injury if the drill and screws are too medially oriented.[28,32,35]

In an attempt to make the arthroscopic Latarjet procedure safer and to reduce complications associated with the traditional screw fixation, we have developed a novel surgical technique and fixation method involving a guided surgical approach for graft positioning and the use of specific suture buttons for fixation (Fig. 1). Herein, we describe the new technique and devices and evaluate its ability to obtain accurate graft positioning and healing in a prospective study with computed tomography (CT) assessment. We hypothesize that (1) use of a guiding system will allow more accurate positioning of the graft and (2) cortical button fixation will allow predictable and reproducible bone union and minimize complications reported with screw fixation.

Materials and methods

Latarjet guiding system

A number of instruments have been designed and developed to improve the safety and accuracy of the arthroscopic Latarjet procedure (Latarjet Guiding System; Smith & Nephew Inc., Andover, MA, USA).

1. **The glenoid drill guide** has 2 functions. First, it ensures that the cortical button suture tunnel is almost parallel (10° angulation) and 5 mm medial to the anterior glenoid rim. Second, it allows intra-articular drilling from posterior to anterior that is limited by a drill stop to avoid neurovascular injury.
2. **The coracoid drill guide** ensures that the cortical button suture tunnel is perpendicular to the coracoid, equidistant from its margins (5 mm), and at a fixed distance from its tip.
3. **Two purpose-designed 2.8-mm drill bits** (RCG Drill, Smith & Nephew) comprising an inner K-wire and outer sleeve.
4. **A pin puller** for removal of the K-wires.
5. **Two low-profile mechanical subscapularis spreaders.** First, these split the subscapularis muscle along its fibers. Second, they protect the axillary and musculocutaneous nerves at the time of coracoid transfer.
6. **An oscillating rasp** to create 2 opposing flat osseous surfaces of anterior glenoid and coracoid undersurfaces.
7. **An oscillating saw blade** for safe and rapid coracoid osteotomy.
8. **A pair of arthroscopic tissue retractors** to improve safety and visualization: the **curved (north) retractor** to elevate the upper part of the subscapularis, and the **straight (south) retractor** to protect the axillary and musculocutaneous nerves and pull down the inferior part of the subscapularis.
9. **A cannulated awl and a K-wire** can be used to create pilot holes and to insert a K-wire to improve visualization of the anterior glenoid neck (by lifting up the upper subscapularis).
10. **A suture tensioner** to obtain compression between the graft and the anterior glenoid.
11. **A coracoid grasper** to manipulate the bone block during fixation.
12. **Two half-pipe cannulas (long and short)** for atraumatic insertion of instruments: the **short half-pipe** is used to introduce intra-articular instruments; the **long half-pipe** is used to introduce instruments through the anteromedial transpectoral portal into the anterior subdeltoid space.

Cortical button fixation device

On the basis of previous biomechanical and clinical studies, cortical button and suture-based suspension devices, such as the Endobutton, have been shown to be a good option for soft tissue graft fixation.[1,18,27,34,39] We hypothesized that such devices could also be used to obtain bone-to-bone healing. Therefore, 2 purpose-designed cortical button devices have been developed to allow coracoid graft fixation and healing (Bone-Link; Smith & Nephew). The fixation device consists of 2 circular metallic buttons, used with a No. 3-4 ultrahigh-molecular-weight polyethylene suture sling running through them (Fig. 1, *C*). The **coracoid**