

Arthroscopic Latarjet Procedure: A Technique Using Double Round ENDOBUTTONs and Specific Glenoid and Coracoid Guides



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Abstract: The Latarjet procedure is a method used for the treatment of shoulder instability in the presence of bone loss. A decade after the first description of the fully arthroscopic Latarjet procedure, modifications to the technique were reported to decrease the risk of complications and improve the position of the bone block. A recent trend toward the use of buttons to fix the coracoid has been reported. The technique described here is an arthroscopic Latarjet procedure that uses 2 pairs of round buttons as an alternative to screw fixation or the use of a single button, and the technique aims to combine the original procedure with safe and stable fixation.

The Latarjet procedure is currently used to address the recurrence of anterior glenohumeral instability in cases of failed previous stabilization as well as in patients with an Instability Severity Index Score over 6 points or >20% glenoid bone loss.¹ With improvements in arthroscopic techniques, the fully arthroscopic Latarjet procedure was described by Lafosse et al. in 2007² using 2 screws to fix the coracoid process to the anterior glenoid. A recent systematic review and meta-analysis demonstrated that arthroscopic Latarjet is a reliable and satisfactory procedure for

patients, with limited pain and a fast recovery in the first postoperative week³; concerns remain because the procedure is still technically demanding for surgeons.

There are several potential drawbacks regarding the use of screws to fix the coracoid process that have been clearly described by Boileau et al.⁴ The most common complications include screw pullout, loosening, bending, and breakage. In addition, fracture of the coracoid process during screwing as well as nonunion, resorption, and graft avulsion can occur. Positioning of the screws parallel to the glenoid surface is challenging because of the obliquity of the scapula on the thorax. The excessive obliquity of the screws may cause impingement with the humeral head. Moreover, the protrusion of the screws may result in soft-tissue irritation. The proximity of the brachial plexus to the location of drilling or screwing is a further limitation of the technique and can lead to nerve complications.

To overcome most of these limitations, the use of a cortical button to fix the coracoid bone block has been recently described,⁴ and suture–button fixation has been reported as an alternative to screw fixation for the Latarjet procedure, obtaining predictable healing with excellent graft positioning and avoiding hardware-related complications.¹ Notwithstanding the satisfactory postoperative outcomes reported by Boileau et al., the use of only one cortical button has been recently hypothesized to expose the graft to rotation around the button, thus compromising the graft-healing process. In

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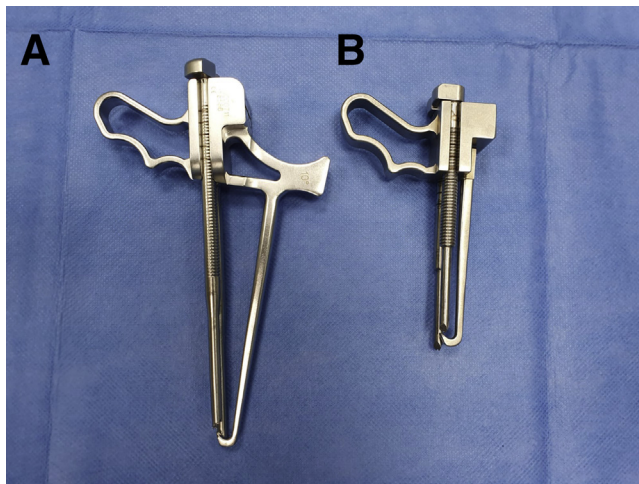


Fig 1. Glenoid and coracoid drill guides. The glenoid drill guide ensures that each drill will be 6 mm below the cortical edge of the glenoid surface, parallel to each other and 10 mm apart. The coracoid drill guide ensures the correct position of 2 tunnels with the same 6 mm offset and the same 10 mm distance as the glenoid tunnels.

lieu of this, Valenti et al.⁵ developed a guiding system to position the coracoid process with 2 cortical buttons to provide stable and secure fixation on the bone block without the risk of hardware complications related to screws. This Technical Note describes our fully arthroscopic Latarjet technique procedure using 2 pairs of round buttons and specific glenoid and coracoid guides (Fig 1).

Surgical Technique (With Video Illustration)

With the patient positioned in the beach chair position, under regional interscalene nerve block and general anesthesia, 6 portals were made: posterior (P); anterosuperior; anterolateral; anteroinferior (AI); axillary (AX), and superior to the coracoid (Fig 2 A

and B). The joint was examined through the P portal. The anteroinferior labrum, the middle glenohumeral ligament, and part of the inferior glenohumeral ligament were resected from the anterosuperior portal. Opening of the rotator interval allowed visualization of the lateral side of the coracoid and release of the coracoacromial ligament. The scope was passed through the anterolateral portal and the anterior wall of the glenoid neck was carefully exposed and abraded with a burr through the anterosuperior portal to enhance graft healing. A spinal needle was inserted from the P portal and brought to rest against the face of the glenoid south of the equator and centered on the anterior glenoid defect. If the needle was not parallel to the glenoid, a second posterior portal was created; thereafter, a specific guide (Latarjet Guiding System; Smith & Nephew, Andover, MA) was inserted posteriorly and its arm was placed flush along the face of the glenoid with the hook passing over the edge (Fig 3A).⁶ The hook was centered on the glenoid defect with the tip of the hook over the glenoid rim, usually at the 4-o'clock position (right shoulder). Once the guide was positioned, a bullet was placed in the inferior hole of the guide. A small skin incision was made, and the bullet was advanced until it firmly contacted the posterior aspect of the glenoid neck. The ratchet teeth of the bullet were aligned with the screws adjacent to the guide handle. The process was repeated for the superior bullet. A 2.8-mm sleeved drill was placed in each bullet and advanced under power until it exited the anterior aspect of the glenoid. The drills were placed 6 mm from the center below the cortical edge of the glenoid face, parallel to one another and 10 mm apart. The inner drill was removed, leaving the cannulated outer sleeve (Fig 3B). Arthroscopic fluid exiting from the outer sleeve posteriorly confirmed intra-articular positioning.

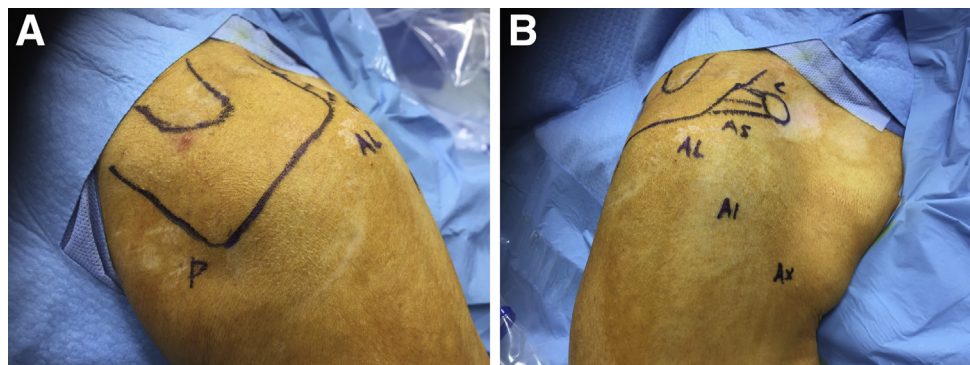
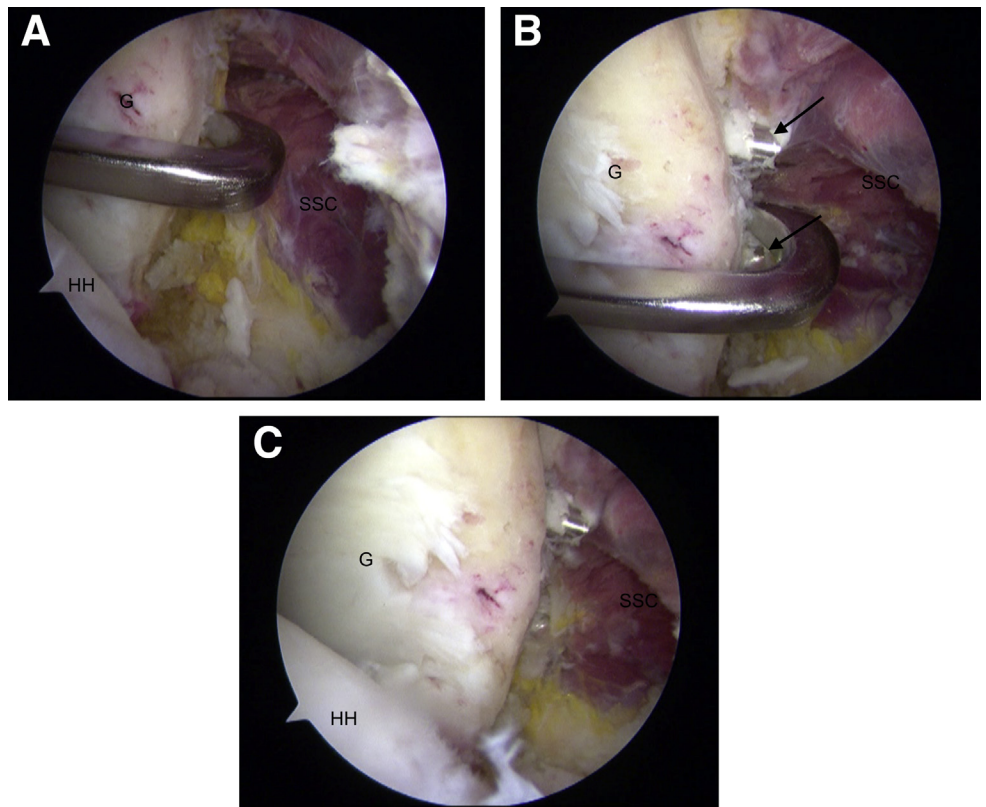


Fig 2. Preoperative pictures of a right shoulder are shown from the back (A) and from the front (B). Arthroscopic portals: standard posterior (P) portal, 1 cm inferior and 1 cm medial to the posterolateral angle of the acromion; anterosuperior (AS) portal, portal placed in the rotator cuff interval; anterolateral (AL) portal, 2 cm lateral to the anterolateral corner of the acromion; anteroinferior (AI) portal 2 cm distal to the tip of the coracoid process, lateral to the conjoint tendon; axillary portal (AX) in the axillary fold; and coracoid portal (C) just above the coracoid process. All portals are lateral to the conjoint tendon.

Fig 3. Arthroscopic view from the AL portal in a right shoulder in the beach chair position. The glenoid drill guide is introduced through the P portal until to engage the anterior edge of the glenoid with the hook (A). The arm of the glenoid drill guide should be parallel and flush to the glenoid surface. The guide is secured posteriorly with two bullets introduced percutaneously. Two 2.8-mm sleeved drills are introduced through each bullet and advanced under power until they exit from the anterior aspect of the glenoid (arrows) (B). Each bullet is removed and the guide is removed afterwards, keeping the drill sleeves in place (C). (AL, anterolateral; HH, humeral head; G, glenoid; SSC, subscapularis.)



Once drilling was completed, the bullets were removed by rotating each bullet to disengage the ratcheting teeth and extracting them posteriorly. The guide was removed at this stage (Fig 3C). Care was taken to ensure that the sleeves remained firmly positioned in the glenoid neck.

The intra- and extra-articular spaces were easily seen from the AI portal. With a switching stick passed through the P portal, the area where the subscapularis split was to be performed was identified (Fig 4A). The split was prepared and performed with radiofrequency in the AX portal with an AI view (Fig 4B). From the AI

portal, it was also possible to visualize the coracoid and the conjoined tendon; the pectoralis minor was detached, and the undersurface of the coracoid process was abraded with the motorized rasp to create a flat surface. A coracoid portal was made to insert the 6 mm-offset coracoid drill guide (Double Bullet Coracoid Guide; Smith & Nephew) (Fig 5). The drill guide was removed after passing 2 K wires 10 mm apart through the coracoid, and then the K wires were overdrilled. In cases in which the coracoid had an unusual shape (eg, curved or hooked), an alternative coracoid guide that allowed a more flexible position of the coracoid bony

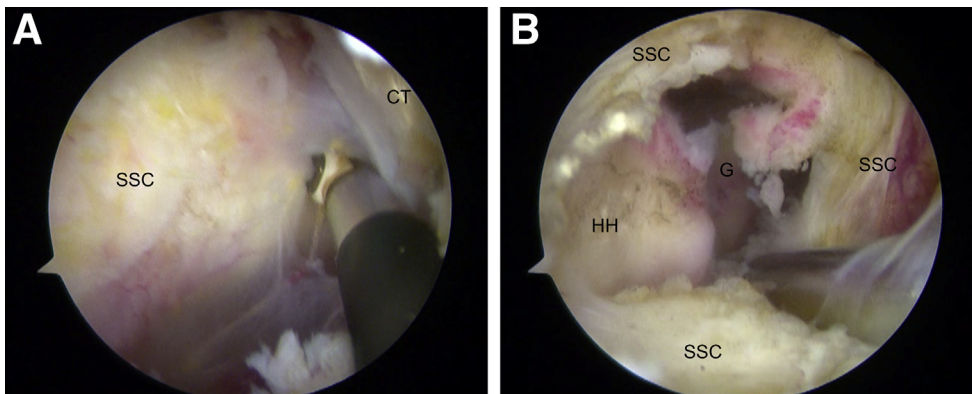


Fig 4. Arthroscopic view from the AI portal in a right shoulder in the beach chair position. The split of the subscapularis is performed with the radiofrequency probe, introduced through the AX portal, from medial to lateral (A), in line with the muscle fibers, until the articular space is reached (B). (AI, anteroinferior; AX, axillary portal; CT, conjoint tendon; HH, humeral head; G, glenoid; SSC, subscapularis.)

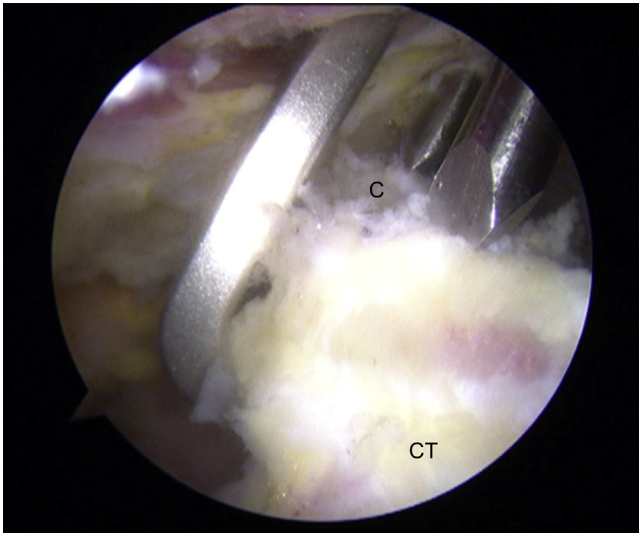


Fig 5. Arthroscopic view from the AI portal in a right shoulder in the beach chair position. From the C portal the Coracoid Drill Guide is introduced about one centimeter from the distal end of the coracoid and secured with 2 bullets introduced percutaneously. Two tunnels are prepared perpendicular to the coracoid with a 6 mm offset and 10 mm apart. (AI, anteroinferior; C, coracoid; CT, conjoint tendon.)

tunnels while maintaining the proper distance between the holes (BJS Coracoid guide; Bone and Joint Solutions SA, Lugano, Switzerland) was used (Fig 6).

Suture #2 was passed through each sleeve with a looped guidewire passing from posterior to anterior in the glenoid. Each suture was then retrieved using a loop grasper, which was passed through the subscapularis split and thereafter through the holes in the coracoid. The drill sleeves were removed after this step was completed. The 2 sutures were shuttled



Fig 6. BJS coracoid guide. In cases in which the coracoid had an unusual shape (e.g., curved or hooked), an alternative coracoid guide that allowed a more flexible position of the coracoid bony tunnels while maintaining the proper distance between the holes was used.

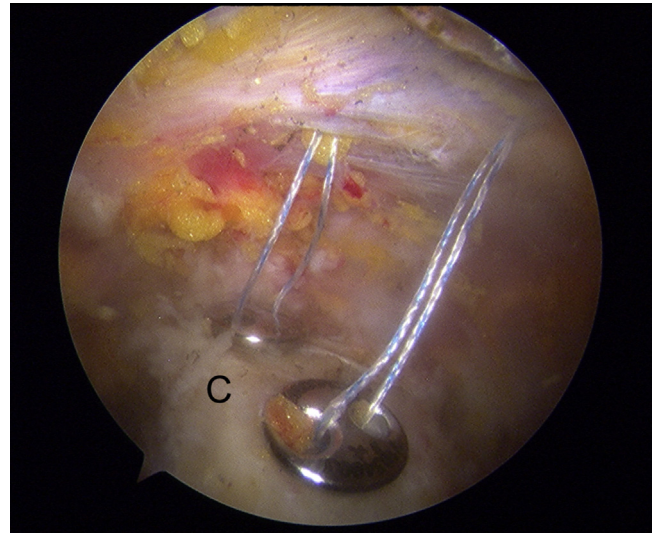


Fig 7. Arthroscopic view from the AI portal in a right shoulder in the beach chair position. Two high-strength sutures are passed through the coracoid and glenoid tunnels and are tied to the 2 Round ENDOBUTTONS. Pulling gently from the rear of the shuttle sutures, the 2 round ENDOBUTTONS are passed through the tunnels from superior to inferior in the coracoid process and from anterior to posterior in the glenoid. (AI, anteroinferior; C, coracoid.)

anteroposteriorly. Round ENDOBUTTONS (Smith & Nephew) were advanced until they were lying flat on the coracoid, with shuttle sutures used for the final fixation. The final fixation device consisted of 2 pairs of circular metallic buttons, with a no. 3-4 ultrahigh-molecular-weight polyethylene suture sling running through them (Fig 7). Coracoid osteotomy was performed with a motorized saw (Fig 8).

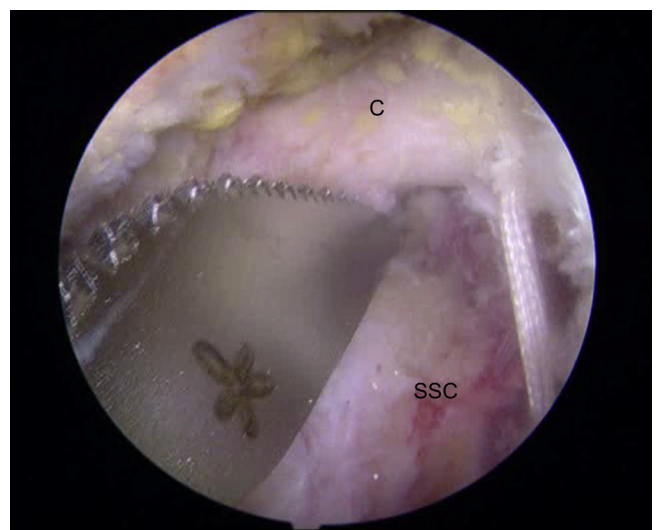


Fig 8. With the scope in AI portal, the reciprocating saw is introduced through the AL portal to perform the osteotomy of the coracoid process. (AI, anteroinferior; AL, anterolateral; C, coracoid; SSC, subscapularis.)

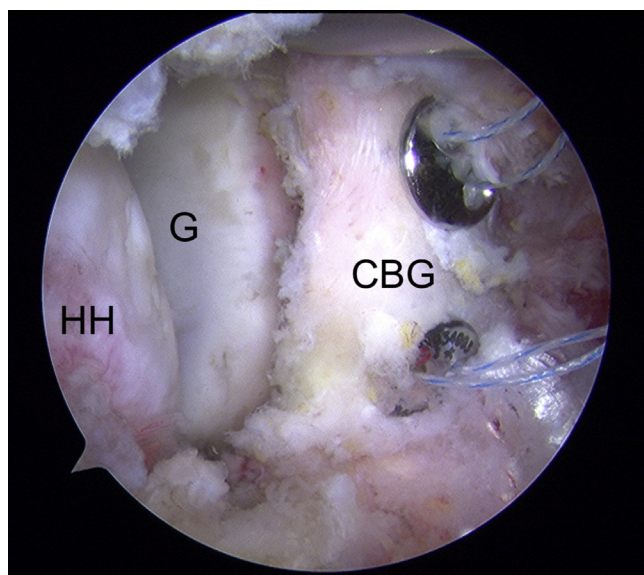


Fig 9. Arthroscopic view from the AI portal in a right shoulder in the beach chair position shows the final positioning of the coracoid bone block with the 2 round buttons. Graft is flush to the glenoid margin. (AI, anteroinferior; CBG, coracoid bone graft; G, glenoid; HH, humeral head.)

The graft was mobilized through the subscapularis by pulling sutures posteriorly. Two switching sticks were passed through the P and AX portals to open the split of the subscapularis and simplify the transfer of the graft. Each bundle was pulled through a hole of the 2-Hole posterior ENDOBUTTON Fixation Device (Smith & Nephew) using either the flexible metallic guidewire or Suture Retriever. The 2-Hole ENDOBUTTON (Smith & Nephew) was advanced down the white suture bundle and then tied with Nice Knot (sliding locking knot) until it sat flush against the posterior face of the glenoid. Suture tension was applied on the back of the shoulder, and 100 N of compression was applied to the bone graft against the anterior glenoid neck. The graft position was checked through the AI (Fig 9) and P portals (Video 1).

Postoperative Care

After surgery, the shoulder was immobilized in a 15° sling for 4 weeks. Passive anterior elevation assistance was allowed. After 4 weeks, the sling was removed, and

rehabilitation with a physiotherapist was initiated. Progressive stretching exercises were started after 6 to 8 weeks, and no heavy lifting was allowed for the first 12 weeks. Return to sports activities, including collision and contact-overhead sports, was allowed between 3 and 6 months postoperatively.

Discussion

Concern has been raised for the arthroscopic Latarjet technique regarding the possible complications and the steep learning curve⁶ associated with this procedure. Athwal et al.⁷ reported rates of 24% for adverse events or complications, and the fixation method for the coracoid with 2 screws was potentially associated with the occurrence of some complications: 7% cases of graft fracture, 3% cases of screw pull-out, bending or fracture, and 4% cases of revision due to the removal of screws. In a long-term follow-up series, screws had to be removed in 12.5% of patients.⁸ In lieu of this, improvement in the methods used for fixation of the coracoid process may represent a step toward widespread adoption of the fully arthroscopic Latarjet technique.⁹ Over the last 5 years, a trend toward the use of buttons to fix the glenoid in the fully arthroscopic Latarjet procedure has been noted.^{1-5,10}

The use of a single button for the fixation of the coracoid has achieved a 95% healing rate of the bone graft, a 3% recurrence rate, and a 2.5% revision rate.¹ Indeed, the use of buttons has several theoretical advantages, such as the low risk of soft-tissue impingement. The screws used for fixing the bone block may be responsible for pain and uncomfortable snapping in the shoulder that is triggered during active external rotation¹¹ and may require screw removal.¹² The round buttons are smaller than screws and lie flush with the coracoid, avoiding soft-tissue irritation. A further advantage of using buttons compared with using screws is represented by the smaller holes that need to be drilled in the coracoid process (Table 1). Larger holes can weaken the bone block with an increasing risk of graft fracture. A recent study comparing the biomechanical performances of traditional screws and a single ENDOBUTTON as a fixator in the Latarjet procedure demonstrated no

Table 1. Main Technical Differences Between the Published Fully Arthroscopic Latarjet Procedures

	No. of Buttons or Screws (b/s)	Type of Fixation	Coracoid Hole Diameter, mm	Glenoid Hole Diameter, mm	Coracoid Hole Drilling	No. of Portals	Bone Block Length, cm
Lafosse et al., 2007 ²	2 s	NA	2.9	3.5	NA	7	2-2.5
Boileau et al., 2016 ⁴	1 b	Endobutton S2, Smith & Nephew	2.8	2.8	Midline	6	1.5
Valenti et al., 2018 ⁵	2 b	TightRope, Arthrex	3.2	3.5	Midline	4	2-2.5
Castricini, Taverna et al., 2020	2 b	Endobutton S2, Smith & Nephew	2.8	2.8	6-mm offset	6	2-2.5

b, button; NA, not applicable; s, screw.

Table 2. Advantages and Disadvantages of the Arthroscopic Latarjet Procedure With 2 ENDOBUTTONS

Advantages	Disadvantages
<ul style="list-style-type: none"> • Low risk of bone or soft impingement and small coracoid and glenoid holes • High rotation stability of the coracoid graft • Large bone block • Bankart repair not required • Accurate positioning of the bone block using specific guides • Arthroscopic portal medial to the conjoined tendon not required 	<ul style="list-style-type: none"> • Technically demanding procedure • Steep learning curve • More expansive than single-button use

differences in the maximal load-to-failure rate between the techniques and a lower risk for graft fracture with the use of the button.¹³ The failure mechanisms were unique to each fixation technique: specimens fixated with screws underwent graft fracture through the drill holes, and specimens fixated with ENDOBUTTONS underwent failure due to glenoid bone fractures. An advantage of the current suture-button fixation technique is the smaller diameter of the 2 holes drilled in the glenoid in comparison to those previously described by Valenti et al.⁵ (i.e., 2.8 mm vs. 3.5 mm).

Although a clinical radiologic benefit has not yet been demonstrated, the use of 2 buttons provides a greater rotation stability in comparison with the single-button construct. Greater rotation stability represents an advantage, especially if a Bankart repair as an additional procedure is not performed after coracoid fixation (Table 2). Indeed, Bankart repair after the positioning of the bone block has been advocated to decrease the potential rotation of the bone block fixated with a single button.¹

The arthroscopic Latarjet procedure is technically challenging and can be associated with dangerous complications.⁷ The use of specific glenoid and coracoid guides provides accurate positioning of the bone block and improves the reproducibility of the technique. The drill guide permits positioning of 2 sleeves into the glenoid with a fixed distance between the glenoid rim and the exit point of the drill bit and between the drill holes and the lateral border of the coracoid process. Thus, the risk of excessive graft medialization or lateralization is reduced. An accurate position of the graft has been reported in more than 90% of cases by Boileau et al. using the same specifically designed instrument.¹ The posteroanterior drilling of the glenoid tunnels decreases the risk of injury to the anterior neurologic structures and eliminates the risk of iatrogenic damage to the suprascapular nerve.⁴ Indeed, no neurologic complications have been recently reported using this dedicated systematic guide for performing the arthroscopic Latarjet technique.¹ In contrast to the other techniques, in the current technique, the specific coracoid guides used allow accurate drilling of the holes that are parallel, 10 mm apart, with a 6-mm offset to allow flush positioning of the bone block to the glenoid rim. Lafosse et al.² used 7 portals to perform the first full arthroscopic procedure, including

a medial portal for the subscapularis split and introduction of the cannula for coracoid handling and fixation. Boileau reduced the number of portals required to perform the procedure to 6⁴, and Valenti et al.⁵ described an arthroscopic technique performed with only 4 portals, all lateral to the conjoined tendon. The current technique involves 6 portals that are all lateral to the conjoined tendon. The limitations of the technique here described include greater costs in comparison with the use of a single round button and the steep learning curve. Indeed, despite the theoretical improvement in the fixation and positioning of the graft, the current technique still is a technically demanding procedure. Further biomechanical studies comparing 1 and 2 buttons to fix the coracoid are warranted to support the use of double fixation of the bone block. Clinical studies including a control group to compare single versus double button fixation could conclusively validate the appropriate choice of fixation.

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