Technical Note

Modified Latarjet Procedure Without Capsulolabral Repair for Failed Previous Operative Stabilizations

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Abstract: The optimal management of recurrent anterior shoulder instability with significant glenoid bone loss continues to be a challenge. The high recurrence rates seen in arthroscopic Bankart repair in the presence of significant glenoid bone loss have led many surgeons to choose bony reconstructions to manage these injuries. The Latarjet procedure acts through the combination of 3 different mechanisms: the coracoid bone graft restores and extends the glenoid articular arc, the conjoint tendon acts as a dynamic sling on the inferior subscapularis and anteroinferior capsule when the arm is abducted and externally rotated, and the effect of repairing the capsule to the stump of the coracoacromial ligament. However, in patients with multiple recurrences and previous surgeries, the anteroinferior labrum and capsule are often very deficient or practically destroyed. This Technical Note provides a detailed description of the modified Latarjet procedure without capsulolabral repair for patients with failed previous operative stabilizations.

The optimal surgical treatment of recurrent traumatic anterior shoulder instability remains a debated topic. The high recurrence rates seen in arthroscopic Bankart repair in the presence of significant glenoid bone loss, Hill-Sachs lesions, or combined glenoid and humeral bony deficiencies have led many surgeons to choose bony reconstructions to manage these injuries.[1]

The Latarjet procedure has proved to be reliable to manage recurrent anterior shoulder instability with significant glenoid bone loss.[2,3] Three processes work together to augment anterior shoulder instability, resulting in a "triple-blocking" effect. First, the bony coracoid block extends the glenoid rim, serving as a static restraint that improves the "safe arc" available for translation before dislocation (bony effect). Second, the conjoined tendon acts as a sling over the humerus, resisting anterior translation when the arm is abducted and externally rotated (sling effect). Third, the labrum and anterior capsule are reattached to the glenoid rim and are reinforced with the coracoacromial ligament (bumper effect).[3]

However, especially in patients with multiple recurrences or previous procedures, the anteroinferior capsulolabral complex is often very stretched or deficient, putting in doubt the effectiveness of these reconstructions.[4,5] In addition, cadaveric and biomechanical studies have shown that capsular repair is not necessary to achieve the desired stability with the Latarjet procedure.[6,7]

This Technical Note provides a detailed description of the modified Latarjet procedure without capsulolabral repair for patients with failed previous operative stabilizations.

Surgical Technique

Anesthesia and Patient Positioning

All the procedures are performed with ultrasound-guided interscalene block and general anesthesia. The patient is secured in a beach-chair position with a pillow behind the scapula to place the glenoid surface perpendicular to the operating table. The shoulder is prepared and draped in the usual sterile fashion. The arm should remain free to allow for intraoperative manipulation of the upper extremity (Video 1).

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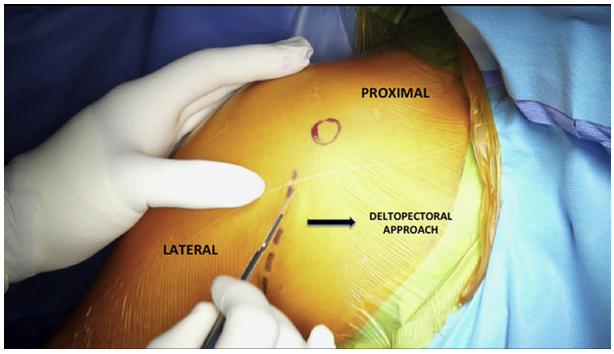

Fig 1. Patient is in beach-chair position, right shoulder. A small standard deltopectoral approach is used (black arrow). The skin is incised 5 to 7 cm starting under the tip of the coracoid process extending distally along the deltopectoral interval to the superior aspect of the axillary fold.

Surgical Approach

A small standard deltopectoral approach is used. The skin is incised 5 to 7 cm starting under the tip of the coracoid process extending distally along the deltopectoral interval to the superior aspect of the axillary fold (Fig 1). The deltopectoral interval is opened and the cephalic vein is taken laterally with the deltoid. One self-retaining retractor is placed in the deltopectoral interval, and the coracoid is exposed from its tip to the insertion of the coracoclavicular ligaments at the base of the coracoid.

Harvesting of the Coracoid Graft

The coracoacromial ligament is dissected from the lateral aspect of the coracoid. The pectoralis minor is cut at its insertion on the coracoid process. Before the pectoralis minor is removed, a No. 0 Vicryl suture (Ethicon, Somerville, NJ) is passed through the tendon edge to facilitate its subsequent reinsertion. Next, a 90° angled saw blade is used to perform an osteotomy of the coracoid just anterior to the coracoclavicular ligaments at the coracoid base (Fig 2). The conjoined tendon is left attached to the coracoid graft to maintain vascularity of the graft and to augment stability of the glenohumeral joint by providing a sling effect. Once the osteotomy of the coracoid has been performed, the pectoralis minor is reinserted in the scapula at the level of the osteotomy with a 5-mm suture anchor.

Preparation of the Coracoid Graft

The bone graft is grasped with forceps and carefully released from its deep attachments. It is important to be careful when dissecting the medial aspect of the conjoined tendon to avoid potential damage to the musculocutaneous nerve. The coracoid graft is then rotated on its longitudinal axis by 90°, and the medial cortex of the graft is removed with a saw blade (Fig 3A). This medial cut surface of the coracoid is the surface that conforms best to the contour of the anterior glenoid where the bone graft will be placed. The lateral cortex can also be cut to facilitate the posterior placement of the parallel drill guide. The next step is to drill the holes for screw fixation. This step can be facilitated using specialized guides (Arthrex, Naples, FL). Grasp the coracoid graft with the grasping coracoid drill guide. Position the guide on the graft with clearance slots adjacent to the surface of the coracoid that will eventually be in contact with the glenoid. The coracoid drill guide allows us to drill 2 parallel 4-mm holes through the graft (Fig 3B). It is important to ensure that the holes are centered on the graft and perpendicular to the prepared surface (Fig 3C).

Glenoid Exposure and Preparation

With the upper limb in external rotation, the subscapularis muscle is divided horizontally in line with the fibers at the two-thirds superior—one-third inferior junction to expose the anterior capsule that is divided in the same manner. Palpate the biceps before starting the cut and start the incision just medial to the bicipital groove. Next, the arm is positioned in internal rotation and a Fukuda retractor is inserted which rests on the posterior margin of the glenoid.

The superior two-thirds of the subscapularis are retracted superiorly and maintained in that position with a Hohmann retractor or a Steinman pin impacted at the superior part of the scapular neck. The inferior part of the subscapularis is retracted inferiorly with a Hohmann retractor pushed under the neck of the scapula. This maneuver completely exposes the anteroinferior border of the scapula. In patients with multiple recurrences or previous procedures, the anteroinferior labrum and capsule are very deficient or practically destroyed. At this point, we resect the remains of the capsule and labrum. In revision cases, it is also important to remove anchors and sutures from previous surgeries that could interfere with proper bone consolidation of the graft. The anterior glenoid neck is

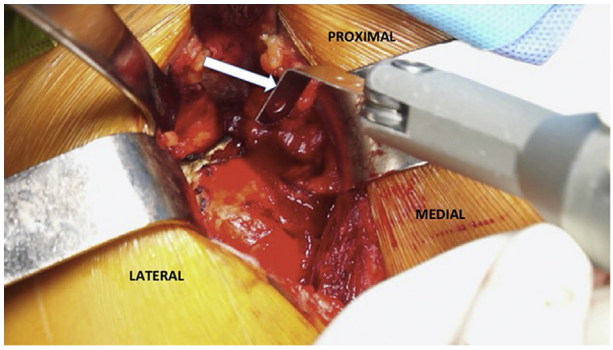

Fig 2. Patient is in beach-chair position, right shoulder. A 90° angled saw blade is used to perform an osteotomy (white arrow) of the coracoid just anterior to the coracoclavicular ligaments at the coracoid base.

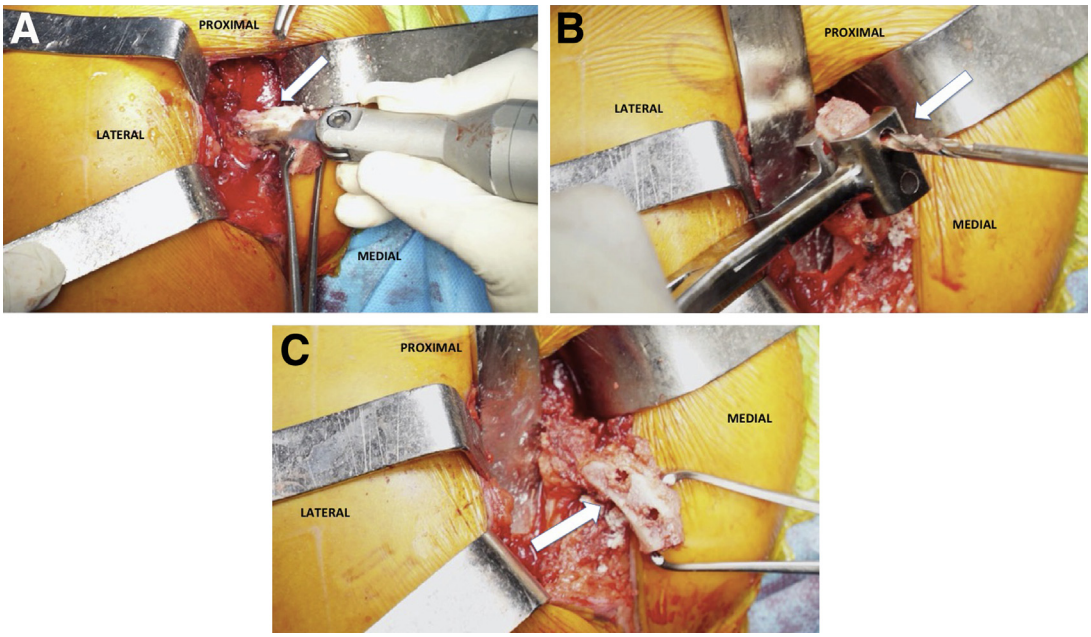

Fig 3. Patient is in beach-chair position, right shoulder. (A) The medial cortex of the graft is removed with a saw blade (white arrow). (B) The coracoid drill guide allows us to drill 2 parallel 4-mm holes through the graft (white arrow). (C) The holes are centered on the graft and perpendicular to the prepared surface (white arrow).

then decorticated with a saw blade to be the recipient bed for the coracoid bone graft (Fig 4A).

Fixation of the Coracoid Graft With Screws

Proper position of the coracoid bone graft relative to the glenoid is critical. The objective of coracoid graft positioning is for the graft to be placed flush with the glenoid articular surface. Placement of the bone graft too far laterally leads to an increased rate of postoperative degenerative arthritis. On the other hand, fixation of the graft too far medially places the shoulder at an increased risk for recurrent subluxation or dislocation. The pegs on the parallel drill guide mate the predrilled holes on the coracoid graft facilitating easy control and positioning of the coracoid graft onto the glenoid. Two 1.6-mm wires are passed through the drill guide directly through the guide, graft, and glenoid. The parallel drill guide is removed leaving both wires in place. A 2.75-mm cannulated drill is used to penetrate the near cortex of the native glenoid before screw insertion. After that two 3.75-mm partially threaded, cannulated, and self-tapping titanium screws are inserted. Commonly, the correct length is 32 to 34 mm (Fig 4B).

Wound Closure

We do not perform capsulolabral repair in any patient. The wound is copiously irrigated and closed in a standard layered fashion. The deltopectoral interval is approximated in an interrupted fashion with No. 0 Vicryl (Ethicon).

The subcutaneous dermal layer is then closed with interrupted No. 2-0 Monocryl (Ethicon) followed by a running subcuticular stitch with No. 3-0 Monocryl (Ethicon) and Steri-Strips (3M, St Paul, MN) to allow

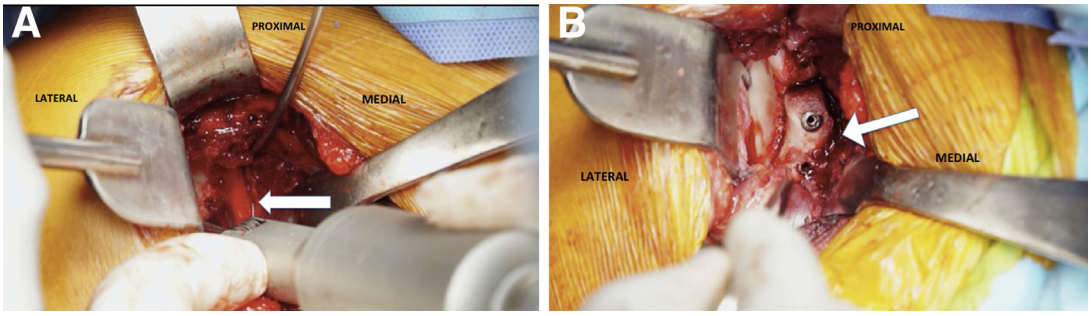

Fig 4. Patient is in beach-chair position, right shoulder. (A) The anterior glenoid neck is decorticated with a saw blade (white arrow). (B) Two 3.75-mm partially threaded, cannulated, self-tapping, titanium screws are inserted (white arrow).

Table 1. Tips and Pearls

Tips
• Be careful when dissecting the medial aspect of the conjoined tendon to avoid potential damage to the musculocutaneous nerve
• A 2.5- to 3-cm graft is desirable. This allows us to place 2 screws separated by 1 cm without risks
• When cutting the lateral and medial cortex of the graft, be careful not to damage the conjoined tendon. You can start the cut with a saw and finish it with a gouge to have more control
• The cortex cut to regularize the graft should be a few millimeters (2 or 3 mm) to avoid jeopardizing the final size of the graft. If the graft is too small, it can be fractured when placing the screws
Pearls
• Proper positioning of the coracoid graft relative to the glenoid is critical: the pegs on the parallel drill guide allow for easy positioning of the coracoid graft onto the glenoid
• The optimal position is between the 3- and 5-o'clock position flush with the articular surface. Excessive medialization of the coracoid graft may fail to improve glenohumeral stability, whereas excessive lateralization of the coracoid graft can result in an increased rate of postoperative degenerative changes about the glenohumeral joint

Table 2. Advantages Versus Disadvantages

Advantages
• Deltopectoral approach is familiar to all shoulder surgeons
• Easy access to the coracoid graft in the same approach
• Adequate exposure of coracoid and glenoid defect
• The original inferior surface of the coracoid lines up with the glenoid surface, and these surfaces have virtually the same radius of curvature
• Successful and reliable technique in primary and revision cases
• By not repairing the capsulolabral complex, the restriction of external rotation is avoided
Disadvantages
• Technically demanding
• The coracoid graft may be insufficient for large defects (greater than 30%). Iliac graft could be an option in these cases
• Potential risk of complications associated with screws: loosening, breakage, and intra-articular penetration
• Potential risk of iatrogenic nerve injury

for improved cosmesis. A postoperative dressing is applied in a sterile fashion followed by the application of a sling. Tips and pearls of our procedure are summarized in Table 1, whereas advantages and disadvantages are summarized in Table 2.

Postoperative Rehabilitation

The arm is supported with a sling for 4 weeks. After 1 week, supervised gentle physical therapy consisting of passive pendulum and gradual passive range of motion (ROM) exercises are begun. Active-assisted ROM exercises are started 2 weeks after surgery. When the patient can perform active forward elevation above the shoulder level, strengthening exercises are started. Running is authorized at 8 weeks. Return to sports is allowed when the patient is pain free, full shoulder ROM is achieved, and shoulder strength is near the same as before the injury.

Discussion

The stability achieved with the Latarjet procedure is classically explained by 2 main mechanisms. First, the coracoid bone graft restores and extends the glenoid articular arc. Second, the conjoint tendon acts as a dynamic sling on the inferior subscapularis and anteroinferior capsule when the arm is abducted and externally rotated. A third stabilizing mechanism is also described, which entails repairing the capsule.[7] However, in our practice, we noted that during surgery, especially in patients with multiple recurrences or previous procedures, the anteroinferior labrum and capsule were very deficient or practically destroyed. Furthermore, some biomechanical and cadaveric studies show that the role of capsule repair has only a minor effect on the stability achieved with the Latarjet procedure. Yamamoto et al.[7] described in a cadaveric study that the main stabilizing mechanism of the Latarjet procedure was the sling effect at both the end-range and the middle-range arm positions and that the capsular repair had only a minor role in the stabilization of the glenohumeral joint. Kleiner et al.,[6] in a biomechanical study, compared the Latarjet procedure with and without capsular repair. The authors showed that the addition of a capsular repair did not result in significant added stability and it could restrict external rotation relative to the Latarjet procedure performed with and without capsular repair.

The Latarjet procedure has proved to be reliable to manage recurrent anterior shoulder instability with significant glenoid bone loss in primary and revision cases.[2,3,8] Bhatia et al.[3] in a recent systematic review of the Latarjet procedure for primary repairs reported excellent functional outcomes in the general population with patients' satisfaction rates of more than 90% and a postoperative recurrent instability rates ranging from 0% to 8% at the final follow-up. In a meta-analysis of 8 clinical studies comparing 416 shoulders treated with the Bankart repair versus 379 shoulders treated with the Latarjet procedure for instability, An et al.[2] reported a significantly lower postoperative recurrent instability rate in the Latarjet cohort (11.6%) compared with the Bankart cohort (21.1%).

Griesser et al.[9] in a recent systematic review of the complications and reoperations after Bristow-Latarjet shoulder stabilization reported a mean loss of external rotation of 13°. Only a few authors specifically evaluated the effect of capsular repair on ROM after the Latarjet procedure. Kleiner et al.[6] in a biomechanical study compared the Latarjet procedure with and without capsular repair and showed that the addition of a capsular repair could restrict external rotation. Hovelius et al.[10] evaluated the effect of capsular repair on the results of the Latarjet procedure. In their study, they

found that patients with a capsular repair associated with the procedure had up to 21° restriction of external rotation and were less satisfied with the procedure. The modified Latarjet technique without capsulolabral repair maintains the 2 main mechanisms of stabilization of the Latarjet procedure, avoiding the potential loss of external rotation associated with capsulolabral repair.

Although the Latarjet procedure has proved to be reliable to manage recurrent anterior shoulder instability, there have been concerns of a higher surgical complication rate associated with this procedure. The most common complications include infection, frozen shoulder, hematoma formation, symptomatic implants, fracture or nonunion of the coracoid graft, neurological complications, arthritis, and recurrence of instability.[9-14] However, a large recent review reported an overall complication rate in the open Latarjet procedure of 15%.[13]

A key step to avoid complications is the proper placement of the graft. An overhanging position may result in the graft causing cartilage damage on the humeral head and early osteoarthritis.[10-12,15] A position that is too medial is associated with a higher risk of recurrence.[10-12,15]

Partial lysis of the coracoid occurs frequently but only rarely leads to persistent apprehension and unsatisfactory outcomes, and no specific management is required unless too proud and/or symptomatic metalwork.[16-18]

Regarding the risk of degenerative changes, Hovelius et al.[11] and Allain et al.[12] reported 15-year results after the Latarjet procedure and found 14% and 19% of moderate and severe osteoarthritis, respectively. These authors emphasized that it is important to avoid a lateral overhanging of the coracoid graft because this is a risk factor for the development of late osteoarthritis.[11,12] As we emphasize in the section of surgical technique, it is essential to put the graft flush with the articular surface. Sometimes after screw insertion the graft could be 2 or 3 mm lateralized and some additional shaping with the saw may be required to obtain the best possible fit.

In conclusion, the Latarjet procedure has been successful for preventing recurrent dislocation and subluxation, particularly in the face of bone or soft tissue loss.

This procedure, however, is associated with a unique set of potential complications and failures. It is important for the shoulder surgeon to know the potential complications associated with an incorrect surgical technique to avoid failures. This Technical Note reviews in detail each step of the surgery and highlights the key points to avoid complications and have a successful outcome.

References

1. Schrumpf MA, Maak TG, Delos D, et al. The management of anterior glenohumeral instability with and without bone loss: AAOS exhibit selection. *J Bone Joint Surg Am* 2014;96:e12.
2. An VV, Sivakumar BS, Phan K, Trantalis J. A systematic review and meta-analysis of clinical and patient-reported outcomes following two procedures for recurrent traumatic anterior instability of the shoulder: Latarjet procedure vs. Bankart repair. *J Shoulder Elbow Surg* 2016;25:853-863.
3. Bhatia S, Frank RM, Ghodadra NS, et al. The outcomes and surgical techniques of the Latarjet procedure. *Arthroscopy* 2014;30:227-235.
4. Boileau P, Bicknell RT, Fegoun AB, Chuinard C. Arthroscopic Bristow procedure for anterior instability in shoulders with a stretched or deficient capsule: The ''belt-and-suspenders'' operative technique and preliminary results. *Arthroscopy* 2007;23:593-601.
5. Maiotti M, Massoni C. Arthroscopic augmentation with subscapularis tendon in anterior shoulder instability with capsulolabral deficiency. *Arthrosc Tech* 2013;2:e303-e310.
6. Kleiner MT, Payne WB, McGarry MH, Tibone JE, Lee TQ. Biomechanical comparison of the Latarjet procedure with and without capsular repair. *Clin Orthop Surg* 2016;8:84-91.
7. Yamamoto N, Muraki T, An KN, et al. The stabilizing mechanism of the Latarjet procedure: A cadaveric study. *J Bone Joint Surg Am* 2013;95:1390-1397.
8. Schmid SL, Farshad M, Catanzaro S, Gerber C. The Latarjet procedure for the treatment of recurrence of anterior instability of the shoulder after operative repair: A retrospective case series of forty-nine consecutive patients. *J Bone Joint Surg Am* 2012;94:e75.
9. Griesser MJ, Harris JD, McCoy BW, et al. Complications and re-operations after Bristow-Latarjet shoulder stabilization: A systematic review. *J Shoulder Elbow Surg* 2013;22:286-292.
10. Hovelius L, Sandström B, Olofsson A, Svensson O, Rahme H. The effect of capsular repair, bone block healing, and position on the results of the Bristow-Latarjet procedure (study III): Long-term follow-up in 319 shoulders. *J Shoulder Elbow Surg* 2012;21:647-660.
11. Hovelius LK, Sandstrom BC, Rosmark DL, Saebo M, Sundgren KH, Malmqvist BG. Long-term results with the Bankart and Bristow-Latarjet procedures: Recurrent shoulder instability and arthropathy. *J Shoulder Elbow Surg* 2001;10:445-452.
12. Allain J, Goutallier D, Glorion C. Long-term results of the Latarjet procedure for the treatment of anterior instability of the shoulder. *J Bone Joint Surg Am* 1998;80:841-852.
13. Longo UG, Loppini M, Rizzello G, Ciuffreda M, Maffulli N, Denaro V. Latarjet, Bristow, and Eden-Hybinette procedures for anterior shoulder dislocation: Systematic review and quantitative synthesis of the literature. *Arthroscopy* 2014;30:1184-1211.

14. Domos P, Lunini E, Walch G. Contraindications and complications of the Latarjet procedure. *Shoulder Elbow* 2018;10:15-24.
15. Hovelius L, Saeboe M. Neer Award 2008: Arthropathy after primary anterior shoulder dislocation 223 shoulders prospectively followed up for twenty-five years. *J Shoulder Elbow Surg* 2009;18:339-347.
16. Di Giacomo G, Costantini A, de Gasperis N, et al. Coracoid graft osteolysis after the Latarjet procedure for anteroinferior shoulder instability: A computed tomography scan study of twenty-six patients. *J Shoulder Elbow Surg* 2011;20:989-995.
17. Ranalletta M, Rossi LA, Bertona A, Tanoira I, Maignon GD, Bongiovanni SL. Modified Latarjet procedure without capsulolabral repair for the treatment of failed previous operative stabilizations in athletes. *Arthroscopy* 2018;34:1421-1427.
18. Ranalletta M, Rossi LA, Bertona A, et al. Modified Latarjet without capsulolabral repair in rugby players with recurrent anterior glenohumeral instability and significant glenoid bone loss. *Am J Sports Med* 2018;46:795-800.