General

Arthroscopic Latarjet: Transition from Open to All Arthroscopic

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Keywords: Latarjet, shoulder instability, technique, arthroscopic surgery

https://doi.org/10.52965/001c.133984

Orthopedic Reviews

Vol. 17, 2025

Background

The Latarjet technique is the gold standard for treatment of anterior shoulder instability with glenoid bone loss or hyperlaxity. Since its initial description by Latarjet in 1954, the procedure has undergone significant evolution. While existing literature describes each of the various advances and alterations in technique, there is no existing literature that describes the complete history of the Latarjet procedure.

Questions/Purposes

The purpose of this study is to provide a comprehensive review of the evolution of the Latarjet procedure, while highlighting the underlying biomechanical principles of the technique.

Methods

This study was performed as a systematic review of literature aimed at characterizing the history and rationale of the open Latarjet procedure as well as its initial outcomes and its subsequent evolution of technique.

Results

Long-term studies of the open Latarjet procedure have consistently demonstrated low rates of recurrent instability, high patient satisfaction, and high rates of return to sport. Though a reliable procedure, complication rates have been reported between 7-35%. The arthroscopic Latarjet was first described in 2007 and combined the benefits of minimally invasive arthroscopic surgery with the reliability of the open procedure, though with an initial learning curve. Finally, Boileau et al described the utilization of low-profile cortical buttons for fixation in place of the traditional screws. Subsequent analysis has demonstrated no significant biomechanical differences in the two techniques with proposed benefits of improved graft union and positioning as well as decreased rates of neurologic injury.

Conclusion

The Latarjet procedure has remained a reliable technique to address anterior shoulder instability. The initial technique has undergone several iterations in an effort to improve outcomes, minimize complications, and capitalize on the benefits of minimally invasive techniques. As technology and techniques improve, we anticipate that the all-arthroscopic Latarjet will become more commonly performed to address anterior shoulder instability.

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INTRODUCTION

The Latarjet procedure has stood the test of time and remains the gold standard for surgical treatment of recurrent anterior shoulder instability with glenoid bone loss and or hyperlaxity. While core biomechanical principles remain, the procedure has undergone a noteworthy evolution over the past several decades, specifically as it relates to the surgical technique and method of fixation. Traditionally done with an open approach, in recent years, an all-arthroscopic technique has gained increasing popularity. This trend towards a minimally invasive approach has continued as arthroscopic techniques and technology continue to advance. An arthroscopic approach confers several advantages such as smaller incisions, improved visualization and accuracy for graft placement, the ability to address concomitant shoulder pathologies, and direct visualization and protection of the at-risk neurovascular structures, all while producing equivalent outcomes. Furthermore, advances in suture button technology have provided the ability to drill from posterior to anterior with guided drilling systems, thereby limiting retraction of the brachial plexus which is necessary for anterior to posterior drilling and screw placement. The overall aim of this study is to review the evolution of the Latarjet procedure from open to arthroscopic, while highlighting the key technical aspects of the all-arthroscopic Latarjet.

OPEN LATARJET: HISTORY AND RATIONALE

Michel Latarjet originally published his surgical technique for the treatment of anterior shoulder instability in 1954.[1] In his original manuscript, he describes a bone block procedure in which the coracoid process and conjoint tendon are transposed and fixed to the anteroinferior rim of the glenoid using a single bicortical screw. In 1958, Helfet described the Bristow technique, after his mentor, in which fixation is obtained by suturing the conjoint tendon to the subscapularis muscle, rather than screw fixation.[2] Because of the similarities in biomechanics between the two techniques, it is commonly referred to as the Bristow-Latarjet procedure.

The Latarjet confers biomechanical stability through the 'triple blocking effect', which was first described by Patte.[3,4] First, the bone-block effect is created by the reconstruction of the anterior glenoid with the coracoid process, thereby lengthening the glenoid arc. This works to increase the diameter of the glenoid and prevents engagement of a Hill-Sachs lesion on the deficient anteroinferior glenoid. Secondly, the interaction between the repositioned conjoint tendon and the subscapularis muscle tendon unit creates a 'sling effect' that confers dynamic stability when the shoulder is in abduction and external rotation. Both the conjoint tendon and the lowered subscapularis reinforce the deficient anterior inferior glenohumeral ligament (AIGHL) when the arm is in the "at risk" (abduction external rotation) position. The final component of the "triple blocking effect" is the repair of the anterior capsule to the coracoacromial (CA) ligament or to the glenoid rim. Several studies have evaluated the main stabilizing mechanism of the procedure. In a cadaver study conducted by Yamamoto et al., it was found that the main stabilizing mechanism of the Latarjet was the 'sling effect' of the conjoint tendon and subscapularis interaction at both mid-range and end-range of motion.[5] At end-range of motion, the 'sling effect' appeared to have a greater role in reduction of translation forces of the humeral head (76-77%), with the remaining force reduction being contributed by the suturing of the capsular flap (23-24%).[5] Overall, the Latarjet has been found effective in reducing anterior translation of the humeral head while preserving range of motion and reducing recurrence rate of anterior glenohumeral instability.[6-9] Recently, the utility of the sling effect has been called into question by a randomized controlled trial comparing the short term outcomes of the Latarjet and iliac crest free bone graft (J-bone graft).[10] However, longer follow up is needed to determine if there is a difference in the outcomes and rates of recurrent instability.

Table 1. Evolution of the Latarjet Procedure

Open Latarjet with Cortical Screw Fixation
↓
Open Latarjet with Congruent Arc technique
↓
Arthroscopic Latarjet with Screws
↓
Arthroscopic Latarjet with Suture Buttons

The Latarjet has undergone a number of modifications over the last several decades in order to optimize outcomes while minimizing complications (Table 1). Walch and Boileau popularized the techniques of two bicortical screws instead of one for fixation, suturing of the capsule to the coracoacromial ligament, and preservation of subscapularis by exposing the glenoid through a subscapularis split.[3] Lafosse et al. first described the arthroscopic Latarjet technique with screw fixation.[4] Boileau et al. further innovated by switching from two bicortical screws to utilization of a suture button with the arthroscopic Latarjet.[11,12] Irrespective of modifications to the original technique, the open Latarjet has consistently demonstrated reliable clinical outcomes with high rates of return to play and low revision rates.[9,13]

OPEN LATARJET TECHNIQUE: TRADITIONAL VERSUS CONGRUENT ARC

The Latarjet consists of four key steps.[3] Patient is secured in beach chair position and a deltopectoral approach is utilized. The incision is slightly more medial and goes from the tip of the coracoid to the axillary crease. The first step described is harvesting the coracoid graft. The arm is abducted and externally rotated to expose the coracoacromial ligament, which is released approximately 1 cm from the coracoid. Then the arm is adducted and internally rotated to release the pectoralis minor insertion from the medial aspect of the coracoid. Next, the coracoid process is osteotomized with at least a 20mm length graft. The coracoid graft is then flattened and decorticated using a 90-degree angled saw. Two holes are then drilled in parallel fashion and measured with a depth gauge. The glenohumeral joint is then exposed for graft positioning. The initial technique described a subscapularis tenotomy, however a subscapularis split has gained favor and allows for adequate exposure. After performing a subscapularis split, a vertical (or an horizontal) capsulotomy is performed and a Trillat or Fukuda retractor is placed to expose the glenoid. An anterior fourk retractor is placed the subscapularis fossa and a superior spiked Homan or Steinman pin can be utilized to retract the superior subscapularis. After predrilling the inferior glenoid hole with the appropriate offset, the coracoid is secured with two bicortical screws. The coracoacromial ligament is repaired to the anterior capsule.

Currently, there are two described techniques for coracoid transfer and positioning: The traditional Latarjet (TL) and the congruent arc Latarjet (CAL). In the originally described and most popular technique, the inferior surface of the coracoid is fixed to the glenoid.[3] Burkhart et al. described modifications to the original technique in which the graft is rotated 90^{0} and the medial surface of the coracoid is fixed to the glenoid.[14] This is known as the congruent arc technique. Both versions are effective.[15-17] Several studies have analyzed key differences between the two techniques such as amount of glenoid width which is reconstructed, biomechanical strength, bone consolidation, risk for arthropathy, and overall technical difficulty.

The rationale for the CAL lies in the concave shape of the inferior portion of the coracoid, which closely matches the concavity of the glenoid fossa. Armitage et al. noted that the radius of curvature of the inferior coracoid was not statistically different (P=.75) from the radius of curvature of the glenoid rim (13.6 mm and 13.8 mm).[18] Similarly, it was found that the inferior surface of the coracoid used in the CAL measured on average 15 mm wide, which was wider than the coracoid width used in the TL measuring at an average of 10.5 mm.[18] With the graft oriented in the congruent arc position, the size of the graft allows for correction of larger glenoid defects (>30%).[18,19] Due to the similar radius of curvature of the coracoid graft position in the CAL technique, it has been hypothesized that there is a reduction in contact pressure between the humeral head and glenoid. Multiple studies have found that with the CAL technique the mean contact pressure was restored to 120% versus 137% with the TL technique.[19] This reduction in contact pressure may reduce risk of arthropathy as a result of abnormal joint stresses, although no clinical studies have proven this. Biomechanical models have compared the fixation strength between the TL and CAL techniques. A study conducted by Montgomery et al. evaluated tensile forces applied through the conjoint sling, a key stabilizing mechanism of the Latarjet, and found a significantly lower mean failure load with the CAL technique (239 ± 91 N versus 303 ± 114) (P=.005).[20] However, a recent study by Prinja et al. reported a mean load to failure of 325.71 N with the TL versus 327.14, which was noted to not be statistically significant.[21] Despite the potential biomechanical benefits of the congruent arc technique, the traditional Latarjet technique is most commonly utilized due to the wider surface area for drill hole and screw placement and less risk for graft fracture.[11,22]

OUTCOMES OF OPEN LATARJET

The open Latarjet is an established procedure for treatment of anterior shoulder instability with several long-term studies that have consistently demonstrated its efficacy in achieving stability of the shoulder.[23] A systematic review of 822 patients who underwent open Laterjet procedure with minimum 10-year follow-up demonstrated 86% of patients reporting good-excellent outcomes and 94.8% reporting satisfaction with the procedure.[24] In this study, there was a reported 8.5% rate of recurrent instability with 6.7% rate of recurrent subluxation and only 3.2% rate of recurrent dislocation.[24] In a follow-up systematic review with minimum 15-year follow-up, good-excellent outcomes were reported 86.8% of the time, with 93.5% of patients reporting satisfaction with their open Latarjet procedure.[25] The mean Rowe score in 312 patients was found to be 88.5 +/- 5.5 (5-100). In this second series, instability events were recorded at 7.7% across nine studies, with 5.8% rate of subluxation events and 3.4% rate of redislocation.[25] In another classic study of 40 patients with minimum follow-up of 24 years, two patients reported subluxation events (5%) with no patients reporting recurrent dislocation. In this cohort, the mean Rowe score was 84.5 with 70% of patients reporting an excellent result.[26] Low rates of recurrent instability were similarly reported in a series of 93 patients who underwent open Latarjet by Zimmerman et al. The authors reported subluxation events in 2 (2%) patients and redislocation events in 1 (1%) of included patients at a mean follow up of slightly more than 10 years.[27]

High rates of return to sport have also been well documented after open Latarjet for anterior instability. In a series of 89 athletes who underwent open Latarjet, 86 (97%) were able to return to sport with 74% returning at or just slightly below the same level.[28] In this series, patients also reported excellent PRO scores with significant improvement from preoperative baseline that met minimal clinically significant different (MCID) for ASES, SANE, and QuickDASH scores. In a systematic review of 36 studies with 2134 cases, the return to sport rate after undergoing Laterjet was found to be 88.8% with 72.6% returning to the same level of play. Collision athletes were able to return to sport 88.2% with 69.5% of these athletes returning to the same level of play.[29]

Though a reliable procedure, the open Latarjet procedure has complication rates between 7 and 35%.[23] Reported complications include neurologic injury, postoperative hematoma, infection, nonunion, hardware complications (screw bending, breakage and prominent screws).[30] External rotation deficit has been reported in the literature with a mean loss of 10-15°.[26] Residual pain postoperatively has been reported in 33.3% of patients at 15-year follow-up, with 8.6% reporting daily pain.[25] While some studies have reported rates of degenerative changes between 20-25%, the systematic review by Davey et al reported evidence of arthropathy in 41% of postoperative patients across all studies.[25]

TRANSITION TO ARTHROSCOPIC LATARJET WITH SCREWS

The arthroscopic Latarjet was first described by Lafosse in 2007 with the goal of combining the success of Latarjet's open stabilization technique with the benefits of arthroscopic surgery.[31] The initial technique published by Lafosse described five steps. The patient is positioned in beach chair. The first step consists of exposure of the conjoint tendon from the underlying subscap tendon and the overlying anterior deltoid. Next, the anterior rim of the glenoid is prepared for the graft and flattened. In the second step, the coracoid is exposed and prepared, followed by creation of the coracoid portal. Next, the coracoid drill holes are placed after first placing wires. Coracoid osteotomy is then performed. In the fourth step, a transpectoral portal is created and the subscapularis is split for passage of the graft. In the final stage, the coracoid graft is appropriately positioned and fixation is achieved first with wires and then with cannulated screws.

In a follow-up technical note in 2010, Lafosse noted multiple advantages of the arthroscopic technique including better visualization and placement of the coracoid graft, less postoperative stiffness, pain, and improved cosmesis, as well the ability to address concomitant pathologies such as soft tissue injuries or posterior inferior labral pathology[4][Lafosse, 2010 #585]. In the series of his first 100 consecutive patients, Lafosse noted a steep learning curve with improvement of operative time from 4 hours to an average of 45-50 minutes.[4] At 26-months postoperatively, 91% of patients reported an excellent outcome, though with an average loss of 18 degrees of external rotation. Eighty percent of grafts were found to be flush on postoperative CT, while four cases were found to have nonunion of the graft.[4]

SCREW-RELATED COMPLICATIONS

While arthroscopic Latarjet has a steep learning curve, one specific complication of the Latarjet technique related to screw fixation. In a systematic review of 28 studies by Butt et al, the rate of complications attributed to hardware was 6.5%, though hardware-related complication rates after arthroscopic Latarjet have been reported as high as 17.6%.[32,33] Inferior placement of the bone block can result in inadequate purchase with screw fixation, leading to nonunion or malunion.[30] Malpositioned screws can also lead to glenohumeral impingement and subsequent arthrosis.[12] Screws that are too long can result in posterior shoulder pain or impingement in the spinoglenoid notch on the suprascapular nerve, while proud screws can result in anterior shoulder pain, subscapularis injury, and cartilage wear.[12,30] A systematic review of screw-related complications in arthroscopic Latarjet procedure found a hardware removal rate between 0 and 18% across all included studies.[33]

TRANSITION TO ARTHROSCOPIC LATARJET WITH BUTTONS

Given the screw related complications, the arthroscopic suture-button technique was developed as an alternative approach to mitigate associated hardware complications.[11,12,34] As described by Boileau et al.,[11] the technique utilizes low-profile cortical button fixation devices anatomically designed to allow for suture passage and to minimize suture cut-through. Specifically, after drilling across the glenoid with a guide, the construct incorporates two buttons (anterior and posterior) connected with a loop of suture forming four parallel strands that are shuttled through the glenoid to fixate the coracoid graft. A mechanical suture tensioner is then utilized to provide necessary compression after tying a Nice knot. This converts the flexible fixation into a rigid construct, similar to a rivet or bolt. In multiple biomechanical studies, data demonstrates that there is no significant difference in maximum load to failure or mean strain at failure when comparing screw fixation versus suture-button fixation.[35-37] Of note, Williams et al. noted that screw fixation was more resistant to early (time zero) direct loads to the coracoid graft when compared to suture-button fixation.[38] However, the findings of this study are limited secondary to its time-zero design and force direction (compared to tension forces).

Regarding outcomes, Boileau et al. demonstrated a 95% bone-block healing rate, along with accurate positioning of the graft, when utilizing the suture-button technique.[12] Specifically, mechanical tensioning of the bone block demonstrated a significantly higher rate of bone block healing when compared to manual/hand tensioning (94% versus 74%, p=0.043), without affecting bone block position.[39] Prior literature has demonstrated graft union rates of 88.6% in open Latarjet procedures and 78% in arthroscopic Latarjet procedures performed with screw fixation.[39,40] Compared to rigid screw fixation, Boileau et al. and Wang et al. noted that the slightly flexible fixation construct of suture-buttons allowed for self-correction and physiologic remodeling overtime.[12,41] Clinically, multiple studies have demonstrated no significant difference between groups regarding clinical outcome scores, return-to-sport, and range-of-motion.[12,34,35,37,41-43] Boileau et al. demonstrated a 93% return to sport rate at final follow up (mean 26 months).[12] Girard et al. demonstrated a statistically significant short-term difference in return to sport at 3 months for screw fixation (48% versus 11%, screw versus suture-button, p=0.01); however, this difference became not significant by 6 months.[44] More recently Descamps et al. reported excellent long-term outcomes (minimum 10-year follow up) of the arthroscopic Latarjet with suture buttons.[45] At follow-up, 94% (64/68) of the shoulders had no recurrence of instability. Furthermore, Greco et al. reported on 136 contact/collision athletes following arthroscopic Latarjet with suture buttons.[46] They found that 93%

of patients were satisfied, and 98% achieved shoulder stability at a mean follow-up of 60 months (range, 24-117 months). No suture button-related complications or neurovascular issues were reported. Overall, 82% (112/136) returned to contact/collision sports. The mean time to return to sport was 5.3 ± 1.2 months (range, 3-7.3 months).

Regarding complications, Boileau et al. noted a low recurrence (3%) and revision rate (2.5%) with suture-button fixation.[12] Moreover, there were no neurologic complications associated with the suture-button technique, in comparison to screw fixation in which prior literature has demonstrated neurologic injury rates ranging from 2-12%.[12] Song et al. demonstrated less coracoid graft resorption and no hardware complications with utilization of the suture-button technique.[43] Thus, with decreased bony resorption, there is the theoretical benefit of less complicated revision surgery if needed. Contrarily, Hardy et al. noted an increased risk of recurrent dislocation with suture-button fixation compared to screw fixation (8.3% versus 2.5%, p=0.02).[47] However, the authors recognized that the increased stability with screw fixation must be weighed against the increased risk for reoperation, commonly secondary to hardware complications. Overall, suture-button fixation is a safe, alternative approach to the Latarjet procedure that avoids screw related hardware complications with similar clinical outcomes.

OUTCOMES OF ARTHROSCOPIC LATARJET

Compared to open Latarjet procedures, the arthroscopic technique is proposed to offer advantages such as improved visualization, more accurate bone graft placement, quicker recovery, fewer wound complications, decreased postoperative pain, flexibility to address concomitant pathology, and better cosmesis given the minimally invasive approach.[11,12,48-50] Boileau et al. noted that the expanded arthroscopic visualization of the glenohumeral joint and anterior neck of the scapula allows for accurate placement of the bone block and identification of the axillary nerve.[51] Specifically, the axillary nerve was identified intraoperatively in all of the included cases and no neurologic injuries were encountered. At final follow up of mean 46.2 months for arthroscopic Latarjet procedures, Hurley et al. reported a WOSI percentage of 27.1% ± 25.7% and VAS pain score of 1.3 ± 2.[50] Additionally, at a minimum of 24 months follow up, Ali et al. noted a WOSI percentage of 21% ± 13% and VAS pain score of 1 ± 2.4.[52] Furthermore, Maiotti et al. reported an excellent mean Rowe score in 81.6% of patients at final follow up (57.5 months), along with improvement in WOSI score from 1250 to 221.[53] At a mean final follow up of 26 months for suture-button fixation, Boileau et al. demonstrated mean Rowe and Walch-Duplay scores of 90 (range 40-100) and 91 (range 55-100), respectively.[12] In a systematic review evaluating return to sport for anterior shoulder instability, Abdul-Rassoul et al. identified a 94.0% return to sport rate at a mean of 5.86 months for arthroscopic Latarjet procedures.[54] Moreover, Hurley et al. reported a 6.7% total recurrent instability rate, with 3.3% redislocations and 3.3% subluxation rates for arthroscopic Latarjet procedures.[50]

In clinical comparison between open and arthroscopic techniques, a systematic review performed by Horner et al. identified significantly lower early post-operative pain relief with arthroscopic procedures; however, this difference subsequently became equivalent by one month.[49,55,56] Hurley et al. found no significant difference between open and arthroscopic Latarjet procedures regarding functional outcomes (i.e., WOSI score), return to work/play, recurrent instability, and overall complication rate (11.1% versus 6.7%, p=0.72) at final follow up.[50] Similarly, at a mean follow up of 37.4 months, Zhu et al. demonstrated no significant difference in clinical outcomes between open versus arthroscopic Latarjet procedures (i.e., range of motion, ASES score, Constant-Murley Score, and Rowe Score). Notably, less coracoid graft resorption was noted in the arthroscopic cohort at 1 year postoperatively.[57] However, the arthroscopic cohort was noted to have significantly longer operative time compared to open procedures (122.8 ± 41.3 min versus 89.3 ± 30.3 min, p=0.003).

In a systematic review performed by Lacouture-Suarez et al., the authors demonstrated a range of arthroscopic Latarjet complication rates from 2.8-17.6%.[33] Moreover, in a systematic review of short-term complications, Hurley et al. reported an overall arthroscopic Latarjet complication rate of 6.8%.[58] In this cohort, 3.2% graft-related, 0.5% wound, and 0.7% nerve complication rates. In comparison to open Latarjet procedures, there was no statistically significant difference in complication profile. Additionally, in a comparative study of 150 patients performed by Hurley et al., there was no significant difference in overall 90-day complications between open and arthroscopic Latarjet procedures.[58]

While the optimal position is debated and the literature is mixed regarding coracoid graft placement, Russo et al. noted that open Latarjet procedures demonstrated significantly better coronal plane graft position (subequatorial position versus at the level or over the equator) compared to arthroscopic procedures.[59] Similarly, Zhu et al. demonstrated that the coracoid graft was positioned below the equator in 100% of open procedures compared to 91.3% of arthroscopic procedures (p<0.001).[57] However, Boileau et al. reported ideal graft position (flush with the glenoid rim and subequatorial) in >92% of patients utilizing the arthroscopic suture-button technique.[39] Overall, the arthroscopic Latarjet technique provides unique benefits compared to the open approach, excellent clinical outcomes, and a low complication rate (Table 2).

SUMMARY OF LEARNING CURVE OF ARTHROSCOPIC LATARJET

Given the overall complexity of arthroscopy, the literature has demonstrated a learning curve associated with the arthroscopic Latarjet approach. In regard to screw fixation, Castricini et al. noted a significant decrease in operative time after performing 15 cases (132 to 99 min, p<0.001), without significant differences in functional outcomes and

Table 2. Comparison of Latarjet Technique

Comparison Criteria	Open Latarjet with screws	Arthroscopic Latarjet with Screws	Arthroscopic Latarjet with suture buttons
Treatment of additional pathologies	No	Yes	Yes
Graft Visualization on Glenoid	Yes	Improved	Improved
Screw-related Complications	Yes	Yes	No

complications.[60] Bishai et al. reported a significant decrease in operative time after performing 25 cases (105.7 min to 82.4 min, p=0.00088).[61] Boe et al. reported significantly decreased operative time and complications as surgeon experience increased beyond 25 cases.[62] Kordasiewicz et al. reported a significant decrease in operative time, complications, and hardware problems after the first 30 cases.[63] For open versus arthroscopic Latarjet procedures, Cunningham et al. noted that 10 arthroscopic procedures were necessary to overcome the need for conversion and 20 cases were required to accomplish similar operating time.[64] On the contrary, Vetoshkin et al. reported that more than 120 arthroscopic procedures were necessary to reach steady operative times, along with greater than 20 procedures required to obtain a significant reduction in complication rate.[65] In general, Dauzere et al. reported a significant reduction in early complication rate, operative time, and hospital stay as surgeon experience increased.[66]

Regarding arthroscopic Latarjet with suture button fixation, Bonnevialle et al. reported optimization of surgical time after 30 cases (76 ± 12 min).[67] Similarly, Valsamis et al. noted a requirement of approximately 30-50 procedures to obtain steady-state operative efficiency, with continued improvement in bone block positioning.[68] Overall, the literature evaluating the learning curve for arthroscopic Latarjet procedures for both screw and suture button fixation predominantly converges at approximately 30 cases to obtain the surgeon experience necessary to minimize operative time and complications.

Historically, numerous shoulder procedures have transitioned from open to arthroscopic approaches with the goal of obtaining the benefits of minimally invasive surgery while preserving patient outcomes. Similar to the progression of Latarjet approaches, there was an associated learning curve. Specifically, Guttman et al. investigated the repair time for patients undergoing arthroscopic rotator cuff procedures and demonstrated a significant decrease between the first and second cohort of 10 cases.[69] Elkins et al. reported a decrease in mean operative time for arthroscopic rotator cuff repairs as surgeon experience increased, along with a decrease in rotator cuff retear rates.[70] Moreover, arthroscopic Bankart procedures have demonstrated a prolonged learning curve.[71] In summation, as innovative approaches are developed, surgeons should expect an associated learning curve as skills are refined and experience is gained.

CONCLUSION

The Latarjet procedure has remained a reliable technique to surgically address anterior shoulder instability since first described in 1954. Over the years, the procedure has evolved in effort to optimize fixation and outcomes while minimizing complications. As has been seen with rotator cuff surgery, there has also been natural progression towards minimally invasive methods of addressing instability. Though technically challenging with a considerable learning curve, the all-arthroscopic Latarjet technique combines the advantages of arthroscopic surgery with the reliability of the Latarjet stabilization. As technology and arthroscopic skills continue to refine, the arthroscopic Latarjet will become more commonly performed as an effective means of addressing anterior instability.

ACKNOWLEDGEMENTS

None

AUTHORSHIP CONTRIBUTIONS

Mary K Skalitzky: acquisition of relevant literature/data, drafting the work, final approval, agreement to be accountable for all aspects of the work

Christopher T Eberlin: acquisition of relevant literature/data, drafting the work, final approval of the work

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Brendan M Patterson: reviewing the work and final approval of the version to be published

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Joseph W Galvin: conceptualization of the work, reviewing the work and final approval of the version to be published, agreement to be accountable for all aspects of the work

Pascal Boileau: conceptualization of the work, reviewing the work and final approval of the version to be published, agreement to be accountable for all aspects of the work

FINANCIAL SUPPORT AND SPONSORSHIP

Dr. Boileau is a consultant of Smith and Nephew and receives royalties related to his work.

CONFLICTS OF INTEREST

Dr. Boileau was involved in the development of the cortical suture button utilized in the technique described in this review. He is also a consultant of Smith and Nephew.

Submitted: January 19, 2025 EST. Accepted: February 09, 2025 EST. Published: July 18, 2025 EST.

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