Failed Latarjet Treated With Full Arthroscopic Eden—Hybinette Procedure Using Two Cortical Suture Buttons Leads to Satisfactory Clinical Outcomes and Low Recurrence Rate

Natalia Martinez-Catalan, M.D., Jean-David Werthel, M.D., Efi Kazum, M.D., and Philippe Valenti, M.D.

Purpose: To report clinical and radiologic outcomes of arthroscopic Eden—Hybinette using 2 cortical suture buttons in a series of patients with previous failed Latarjet and persistent glenoid bone loss. **Methods:** Between 2015 and 2019, patients with recurrent anterior instability after failed Latarjet underwent arthroscopic Eden—Hybinette procedure using 2 cortical buttons for graft fixation. Exclusion criteria were open and primary Eden—Hybinette and less than one year follow-up. Functional assessment was performed using Rowe and Walch-Duplay scores, subjective shoulder value, visual analog scale, and degree of satisfaction. Iliac crest bone graft placement and healing were assessed postoperatively with computed tomography imaging. **Results:** A total of 17 patients with a mean age of 28 years (range, 21-43 years) at time of revision were included. The mean glenoid bone loss was 23% (range, 18%-42%). Medium or deep Hill—Sachs lesion (Calandra 2 and 3) was present in 65% of cases. At a mean follow-up of 3 ± 1.6 years, all but 1 patient (94%) considered their shoulder stable, and 15 patients (88%) were satisfied or very satisfied. The subjective shoulder value increased from 51% to 87% ($P < .05$), the Walch—Duplay increased from 23 to 86 points ($P < .05$), and Rowe scores improved from 30 to 92 points ($P < .05$). Apprehension was still positive in 3 patients (17.6%), with this percentage being greater in the presence of Hill—Sachs Calandra 3 ($P = .02$). Postoperative computed tomography scans showed optimal bone autograft position in all patients (below the glenoid equator and flush to the glenoid rim). Iliac crest bone graft healed to the anterior glenoid neck in 16 shoulders (94%). The rate of recurrent instability was 11.7% but only 1 patient required revision surgery (5.8%). **Conclusions:** Arthroscopic Eden—Hybinette using 2 cortical buttons leads to satisfactory clinical outcomes and a low recurrence rate after failed Latarjet, allowing successful reconstruction of the anterior glenoid rim and simultaneous treatment of capsular deficiency and humeral bone loss. **Level of Evidence:** Therapeutic, level IV, retrospective case series.

Failure of the Latarjet procedure, in the form of recurrent anterior instability, occurs in only 1% to 5% of cases.[1-5] However, this is a challenging surgical problem[6-8] due to (1) glenoid bone loss (with or without associated humeral bone loss), (2) the fragility or absence of anterior capsule—labral structures, (3) the presence of anterior scarring around the subscapularis and the absence of conjoint tendon as a medial landmark placing neurovascular structures at risk, (4) deterioration of the subscapularis muscle-tendon unit, and (5) hardware management from the previous coracoid fixation (screws or cortical button).

Because persistent glenoid bone loss is the main contributor to recurrence of anterior instability after a

From the Institut de la Main Clinique Bizet, Paris Shoulder Unit, Paris, France (N.M.-C., P.V.); Hospital Fundación Jiménez Diaz, Madrid, Spain (N.M.-C.); Hopital Ambroise Paré, Boulogne-Billancourt, France (J.-D.W.); and Division of Orthopaedic Surgery, Tel Aviv Sourasky Medical Center, Sackler Faculty of Medicine, Tel Aviv University, Tel Aviv, Israel (E.K.).

The authors report the following potential conflicts of interest or sources of funding: P.V. is a consultant for VIMS and has developed the implants and the instruments used to perform the arthroscopic-guided Latarjet procedure with suture-button fixation. Full ICMJE author disclosure forms are available for this article online, as supplementary material.

Received May 18, 2021; accepted October 21, 2021.

Address correspondence to Natalia Martínez-Catalán, M.D., Institut de la Main Clinique Bizet, Paris Shoulder unit, 21 bis Rue Georges Bizet, 75116 Paris, France. E-mail: natalia.martinezcat@gmail.com

0749-8063/21707/$36.00

https://doi.org/10.1016/j.arthro.2021.10.026

Latarjet, soft-tissue revision is often insufficient to stabilize such shoulders, and restoration of glenoid bone stock is required.[9] The Eden−Hybinette procedure is one of the few surgical options available for treating persistent instability after failed Latarjet in the setting of severe glenoid bone loss[6-8,10-11] associated or not with Hill−Sachs lesion.

This procedure can be either performed open or arthroscopically. However, open Eden−Hybinette for a failed Latarjet is known to be a difficult surgery.[7] Indeed, dissection of the scarred subscapularis that has been split for the previous Latarjet can be potentially dangerous for neurovascular structures and the necessity to take down the subscapularis might also be a concern.[12] Arthroscopic Eden−Hybinette offers some advantages in this regard, including (1) the preservation of the subscapularis muscle (the harvested Iliac crest bone graft [ICBG] is introduced inside the glenohumeral joint through the rotator interval) and (2) the ability to treat other associated instability lesions (capsular deficiency, humeral bone loss).

Graft fixation can be performed using metal screws (3.5 mm) or cortical suture buttons. Compared with screw fixation, the use of cortical buttons seems to facilitate revision surgery because it requires small glenoid tunnels and, in cases in which removal of glenoid screws is not technically possible, fixation can be performed even in the presence of remaining screws.[6,11]

The purpose of this study was to report clinical and radiologic outcomes of arthroscopic Eden−Hybinette using 2 cortical suture buttons in a series of patients with previous failed Latarjet and persistent glenoid bone loss. We hypothesized that arthroscopic Eden−Hybinette with 2 cortical suture buttons for failed Latarjet procedure is a safe technique, allowing accurate placement and consistent healing of the bone graft.

Methods

Between June 2015 and December 2019, patients with recurrent anterior instability after failed Latarjet who underwent arthroscopic Eden−Hybinette procedure using 2 cortical buttons were included in this study. Surgeries were performed by 2 surgeons (P.V., J.D.W.) who specialized in shoulder surgery. Exclusion criteria were open and primary Eden−Hybinette and less than 1 year follow-up. All medical records were reviewed retrospectively. No patient was lost to follow-up.

Surgical Technique

This technique has been already described.[13] A tricortical bone graft is harvested from the ipsilateral sided (typically 20 mm), although the size can be customized depending on the size of the glenoid bone defect. Using the designated coracoid guide, two 3.0-mm holes are drilled through the graft, 7 mm from the lateral edge of the block. The arthroscope is introduced in the posterior portal. An intra-articular inspection of the joint is systematically performed, and the posterior Hill−Sachs lesion is visualized statically and dynamically with the arm mobilized in abduction and external rotation. A large resection of the rotator interval and fibrous tissue from the previous Latarjet is performed to facilitate the transport of the ICBG. The anterior wall is debrided and flattened with a flat burr (PowerRasp; Arthrex, Naples, FL), and preparation for the future Bankart repair is performed, which will be completed at the end of the procedure. The posterior portal is expanded to a 10-mm skin incision, and the interval between the infraspinatus and teres minor is split with blunt scissors. The glenoid guide is inserted until complete contact with the posterior wall of the glenoid is obtained. Two 3-mm tunnels are drilled through the guide, 7 mm medial to the glenoid rim, without passing through the subscapularis to prevent an iatrogenic axillary nerve lesion. The 2 cannulas exist through the tunnels at 3 and 5 o'clock. A polydioxanone suture is passed through each cannula and retrieved from the anterior portal. The 2 cannulas are then removed, leaving the 2 polydioxanone sutures inside the glenoid tunnels, which are used to pass the superior and inferior strands of the cortical buttons (ArthroVIMS Button, Vims, France) from posterior to anterior. Subsequently, each suture is passed through the respective superior and inferior holes of the iliac crest bone graft that have been previously prepared. The cortical buttons are pulled down to reach the superior aspect of the ICBG by retracting gently and alternatively on the strands exiting through the posterior aspect of the glenoid. The anterior portal is expanded to 10 mm skin incision and the ICBG is introduced into the glenohumeral joint via the enlarged rotator interval. The progressive alternate pull on the lower and upper strands allows seating of the graft on the anterior glenoid neck. The use of 2 cortical buttons prevents the rotation of the bone block and facilitate the guiding of the bone block. The implants are tightened with a tensiometer to secure the graft in its subequatorial position and flush with the joint. Tensioning is complete once 100 N of force is achieved twice and additional locking knots are tied to lock the construct. Two to three 2.9-mm knotless anchors (PushLock, Arthrex) are loaded with the capsulolabral nonabsorbable sutures (FiberWire; Arthrex) that had been prepared at the beginning of the procedure and impacted into the margin of the glenoid at 3- and 5-o'clock position. This capsuloligamentous tensioning from inferior to superior recreates a glenoid concavity by creating a real anterior "bumper" effect and ensures the extra-articular positioning of the bone graft.

Postoperative Management

The upper limb is maintained in a sling with the shoulder kept in neutral rotation during the first week.

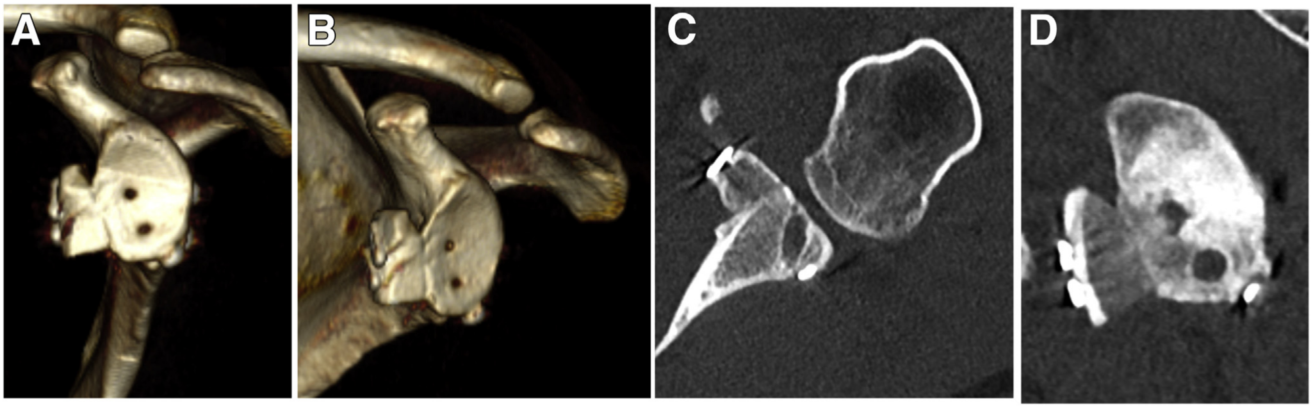

Fig 1. (A-B) Three-dimensional computed tomography (CT) reconstruction showing optimal position of the bone graft (subequatorial and flush to the glenoid rim). Axial (C) and sagittal (D) views of CT scan showing bone graft healing.

At the beginning of the second week, the patient is encouraged to begin with self-assisted during 3 weeks. Passive anterior elevation assisted by the contralateral upper limb is allowed, while external rotation and pendulum exercises are restricted. One month postoperatively, the patient begins an active mobilization protocol in forward elevation an external rotation guided by a physiotherapist. Strengthening exercises are initiated from the third month. Return to all types of sports activities varies between 3 to 6 months postoperatively and depends on muscle strength status and graft integration as demonstrated on computed tomography (CT) scan (Fig 1).

Clinical and Radiographic Assessment

Patients were followed and examined clinically at 2 weeks, 3 months, 6 months, and 12 months postoperatively and annually thereafter. The primary end

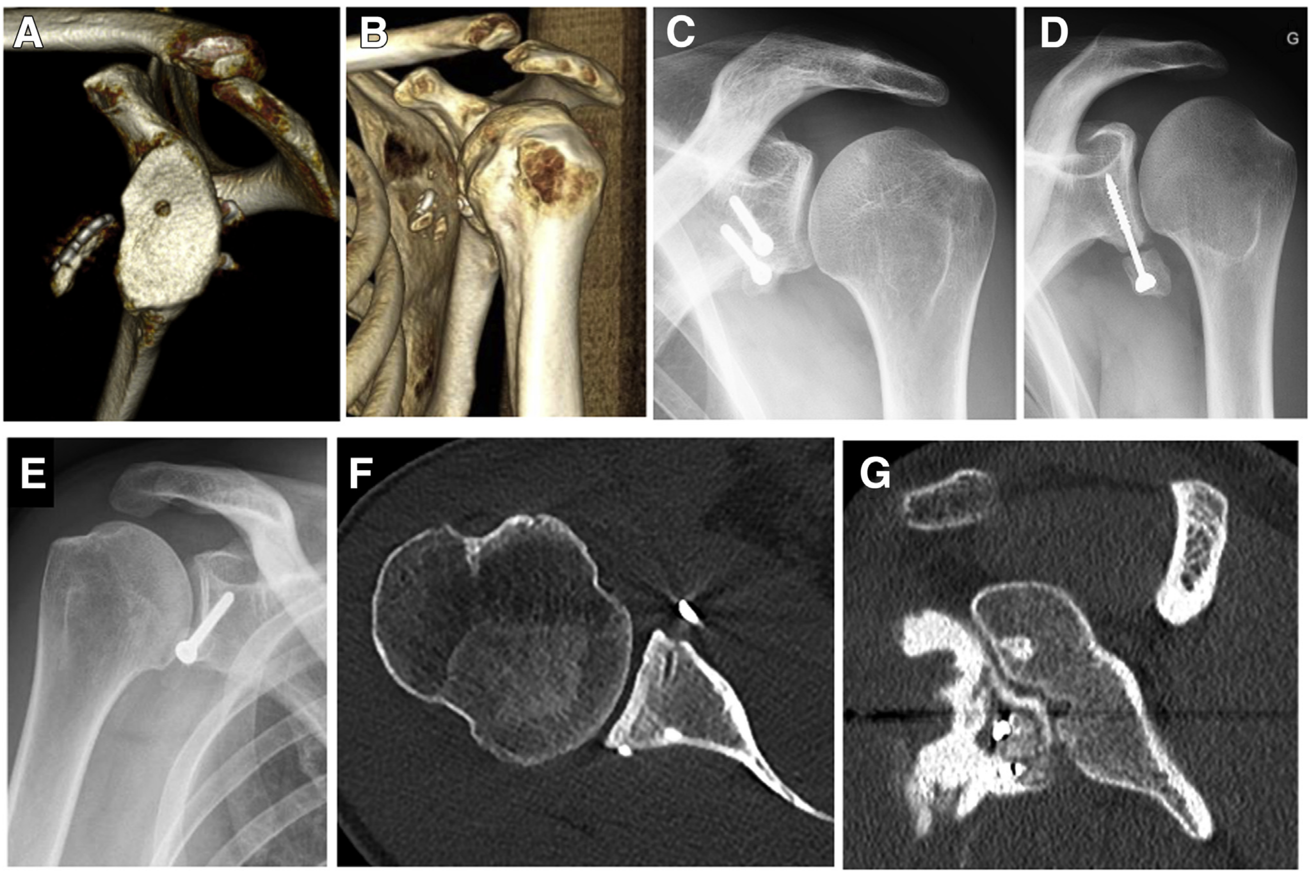

Fig 2. (A) Coracoid avulsion. (B) Coracoid fracture. (C) Coracoid medially positioned. (D) Coracoid inferiorly positioned. (E) Coracoid laterally positioned. (F) Coracoid osteolysis. (G) Coracoid nonunion.

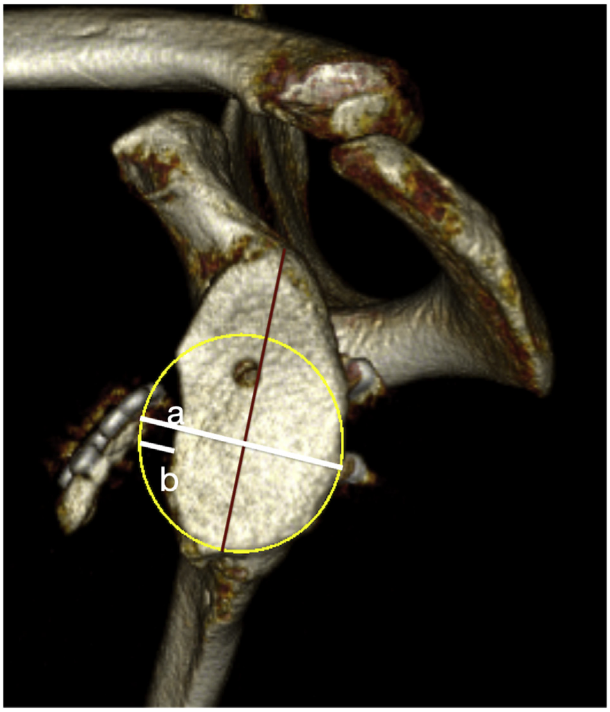

Fig 3. Quantifying method of the glenoid bone loss. Percentage defect of the glenoid is defined as a ratio of defect width (b) against the diameter of the assumed inferior circle of the glenoid (a).

point of the study was Rowe and Walch-Duplay scores at final follow-up. Secondary end points included the subjective shoulder value and degree of satisfaction (very satisfied, satisfied, acceptable, unsatisfied), recurrence, complications or revision surgery. Any postoperative dislocation or subjective complaint of occasional to frequent subluxation was considered a failure.

Postoperative plain radiograph studies in anteroposterior and lateral views were performed in each revision to evaluate the correct position of the bone graft and the screws. A CT scan at 6 months postoperatively was systematically performed to assess graft position and bony union between the ICBG and the anterior glenoid rim. Bony union was determined by the presence of bridging bone between the graft and the scapula neck. Postoperative areas of bony resorption were assessed according to Di Giacomo et al.[14] The ideal position of the graft was defined as below the glenoid equator (in the vertical plane) and flush to the glenoid rim (in the horizontal plane). The bone block was judged to be too lateral if a step was visible beyond the level of the glenoid rim and too medial if it was 5 mm medial to the rim.[15]

Statistical Assessment

Continuous data are expressed as mean and standard deviation in the case of normally distributed data. Comparisons of score values before and after intervention were performed with the paired *t* test for normally distributed differences and with the nonparametric Wilcoxon's signed rank test otherwise. All tests are 2-sided, and $P < .05$ was considered significant.

Results

Demographics

A total of 17 patients (16 males and 1 female) with recurrent shoulder instability after failed Latarjet were included. The average age was 25 ± 6 years (range 16-41 years) at the time of primary Latarjet procedure and 28 ± 5 years (range, 21-43 years) at the time of the revision Eden—Hybinette. Dominant side was affected in 12 patients (71%) and 13 patients (76%) were involved in sports. Two patients (12%) had epilepsy, and 7 patients (41%) had bilateral external rotation at the side of greater than 90° and were considered to have shoulder hyperlaxity.

The Latarjet procedure was performed arthroscopically in 8 patients (47%) and open in 9 patients (53%). Regarding coracoid fixation, cortical buttons had been used in 6 patients (35%) and screws in 11 patients (65%). The coracoid was avulsed (Fig 2A), fractured or partially displaced (Fig 2B) in 6 cases (35%). The coracoid was malpositioned in 4 cases (24%): too medial in 2 cases (Fig 2C), too low in 1 patient with associated nonunion (Fig 2D) and too lateral in 1 patient with associated intraarticular screw (Fig 2E). In 5 cases (29%) the coracoid presented osteolysis or partial resorption (Fig 2F) and 1 case there was a coracoid nonunion (Fig 2G).

Indication for revision surgery was: (1) one or more redislocations in 10 patients (59% and (2) pain and apprehension in 7 patients (41%). Eight patients (47%) had an acute event precipitating recurrent dislocation. Coracoid malposition, fracture or avulsion was present in 90% of patients with recurrent dislocation while coracoid osteolysis or nonunion was observed in 86% of patients with pain and persistent apprehension. Three patients (18%) had additional surgery for screw removal before revision, and 1 patient had subscapularis damage related with screws of previous surgery.

The mean percentage of glenoid bone loss according to Sugaya's methodology[16] was 22.8% (range, 18%-42%) and severe glenoid erosion (≥25%) was found in 50% of patients (Fig 3).

A Hill—Sachs lesion was present in 13 (76%) patients. According to Calandra et al.,[17] there were 2 (15%) small (Calandra I) (Fig 4 A-B), 5 (38%) medium (Calandra II), and 6 (46%) deep (Calandra III) (Fig 4 C—D). According to Samilson—Prieto,[18] 3 patients had signs of mild arthritis (stage 1) before the Eden—Hybinette procedure.

Mean time to revision was 3 ± 4 years (range, 1-12 years). Screws from the previous Latarjet were fully

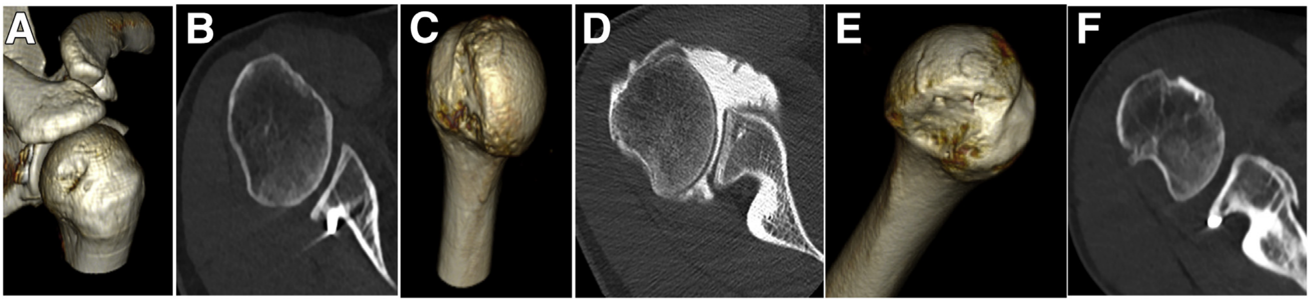

Fig 4. Hill–Sachs lesions. (A-B) Small size Hill–Sachs (Calandra 1). (C-D) Medium Hill–Sachs (Calandra 2). (E-F) Large and deep Hill–Sachs (Calandra 3).

removed under arthroscopy in 7 patients (the other 3 had been previously removed) and in only one patient the screw was impossible to remove. The cortical buttons were fully removed only in 3 of 6 patients (50%), without this causing any inconvenience for the correct positioning of the new bone block. Capsulorraphy and labral repair was performed only in 8 of 17 patients (47%) due to poor quality of soft tissues. For 3 patients with a large and deep Hill–Sachs (Calandra 3), an additional remplissage was performed.

Outcomes

At a mean follow-up of 3.3 ± 1.6 years (range, 1-5.3years), all but 1 patient (94%) considered their shoulder stable. The subjective shoulder value increased from 51% to 87% points ($P < .05$), the Walch–Duplay increased from 23 to 86 points ($P < .05$) and Rowe scores improved from 30 to 92 points ($P < .05$). Using a minimal clinically important difference[19] of 9.7 for the Rowe score,[20] 100% of patients exceeded the minimal clinically important difference.

The average forward flexion was 176° (range 160-180°), average external rotational the arm at the chest was 68° (range, 30-90°), average external rotation the arm in 90° of abduction was 84° (range 60-90°) and average internal rotation 76° (range 60-90°), without significant differences comparing with preoperative range of motion (Table 1). Between 13 patients involves in sports, all but 1 patient (92%) returned sport practice although 25% (3 patients) changed activity.

Bone Graft Positioning and Healing

Postoperative CT scans performed at 6 months showed that the bone graft was optimally positioned in all patients. The ICGB had healed to the anterior glenoid neck in 16 shoulders (94%), and 1 ICBG presented osteolysis. In this patient, using CT scan analysis, on average, 75% of the entire bone graft underwent osteolysis.

Complications and Recurrence

No intraoperative or postoperative complications occurred. No hardware failures were observed. Two patients suffered from recurrent instability (11.7%). The first patient presented ICBG osteolysis requiring new massive iliac bone graft revision procedure at a mean of 5.2 years. The second patient, who had previous subscapularis damage related with screws used in Latarjet procedure, suffered one new dislocation after EH procedure that was treated with muscle strengthening and did not require additional surgery. The rate of revision surgery after arthroscopic Eden–Hybinette with suture button fixation was 5.8%. Apprehension test was still positive postoperatively in 3 patients (17.6%) presented deep and large HS stage 3 in which a remplissage was not performed. The other 3 patients with HS stage 3 treated with Eden–Hybinette procedure and additionally remplissage referred their shoulder stable. The percentage of positive postoperative apprehension test was higher in patients with HS Calandra 3 compared with the others (50% vs 0%, $P = .02$). There

Table 1. Preoperative and Postoperative Clinical and Functional Outcomes

Variable	Preoperative	Postoperative	Gain	*P* Value
Flexion,° mean ± SD (range)	178 ± 4 (170-180)	176 ± 7 (160-180)	−2 ± 8 (−20 to 10)	.38
ER1,° mean ± SD (range)	74 ± 23 (10-90)	68 ± 23 (30-90)	−6 ± 31 (−50 to 80)	.44
ER2,° mean ± SD (range)	83 ± 13 (40-90)	84 ± 10 (60-90)	1 ± 17 (−30 to 50)	.89
IR,° mean ± SD (range)	79 ± 5 (60-80)	76 ± 8 (60-80)	−2 ± 10 (−20 to 20)	.33
SSV, %, mean ± SD (range)	51 ± 22 (10-100)	87 ± 11 (60-100)	34 ± 20 (0-79)	<.05
VAS, mean ± SD (range)	3 ± 2 (0-7)	1 ± 2 (0-5)	−2 ± 2 (−5 to 2)	<.05
Rowe score, mean ± SD (range)	29 ± 13 (15-60)	92 ± 14 (55-100)	59 ± 25 (0-85)	<.05
Walch-Duplay, mean ± SD (range)	23 ± 17 (0-100)	86 ± 15 (60-100)	60 ± 25 (0-100)	<.05

ER, external rotation; IR, internal rotation; SD, standard deviation; SSV, subjective shoulder value; VAS, visual analog scale.

Table 2. Factors Associated With Persistent Apprehension

Variable	Persistent Apprehension (n = 3)	No Persistent Apprehension (n = 14)	Total (n = 17)	*P* Value
Age at Latarjet, mean ± SD	26.5 ± 5	24.5 ± 6		.57
Age at revision, mean ± SD	28.2 ± 5	28.4 ± 5		.95
Hyperlaxity, n (%)	1(33)	6 (43)	7 (41)	1
Epilepsy, n (%)	1 (33)	7 (7)	2 (12)	.33
Hill−Sachs Calandra III, n (%)	3 (100)	0	6 (35)	.029
Glenoid bone loss, mean ± SD	25.6 ± 1	22.2 ± 8		.23
Bankart, n (%)				.57
Yes	2 (67)	6 (43)	8 (47)	
No	1 (33)	8 (57)	9 (53)	
Remplissage, n (%)				1
Yes	0	3 (21)	3 (18)	
No	3 (100)	11 (79)	14 (82)	

SD, standard deviation.

was no significant associated between postoperative apprehension and the glenoid bone loss >25% ($P = .45$) (Table 2).

At latest follow-up, progression of arthritis occurred in only 1 patient from stage 1 to 2 (Fig 5), and only 1 patient developed new-onset arthritis. The global rate of glenohumeral arthritis was 23%. Patients with postoperative arthritis were older (30 ± 2 vs 28 ± 6) and had a greater percentage of preoperative glenoid bone loss (3.7 ± 0.8 vs 0.62 ± 0.9, $P = .0032$), although these differences were not statistically significant. The presence of arthritis was associated with greater postoperative pain score. No statistically significant differences were found in terms of range of motion or functional scores.

A total of 15 patients (88%) were satisfied or very satisfied with procedure; however, one complained of pain due to the presence of arthritis and another of persistent instability due to graft resorption requiring revision surgery.

Discussion

The results of this study show that arthroscopic Eden−Hybinette procedure using 2 cortical buttons leads to satisfactory clinical outcomes and low recurrence rates after failed Latarjet. The rate of recurrent anterior instability after revision was 11.7% at a mean follow-up of 3 years. This recurrence rate is similar to previous reports. Lunn et al.[7] assessed the results of a modified open Eden−Hybinette, using metal screws, as a salvage procedure after failed Latarjet. Recurrent dislocation occurred in 12% of patients at an average of 6.8 years follow-up with a rate of revision surgery of 1%. Giannakos et al.[8] reported the results of arthroscopic Eden−Hybinette procedure using cannulated metal screws in the setting of revision after failed surgery for

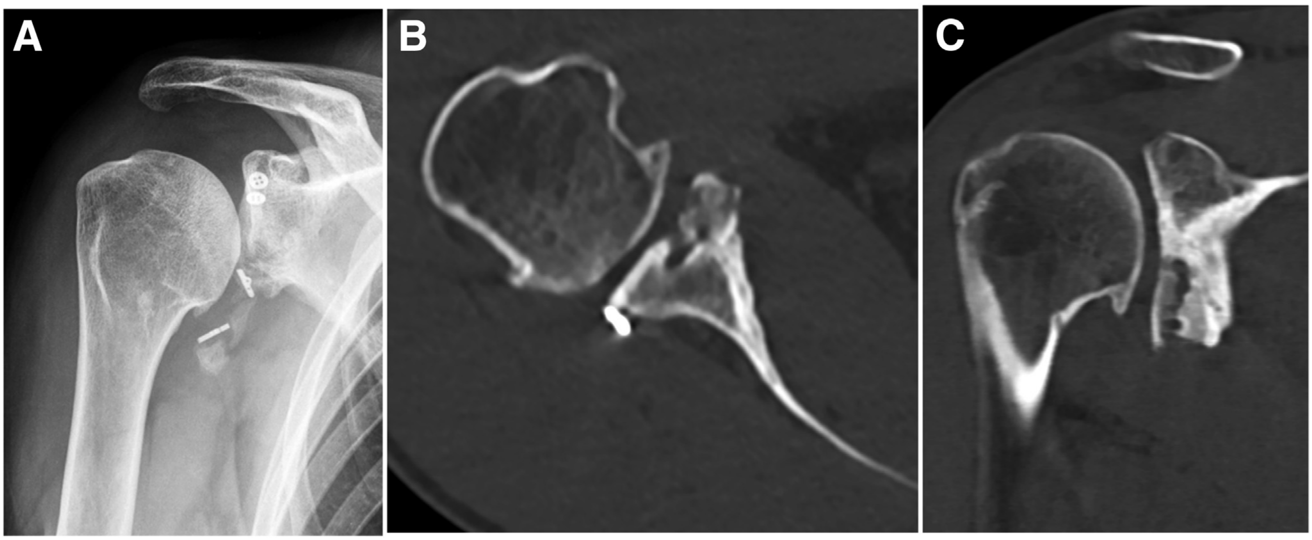

Fig 5. (A) Anteroposterior radiograph showing glenohumeral arthritis Samilson I in a patient with coracoid fracture and avulsion. Axial (B) and sagittal (C) views of computed tomography scan showing anteroinferior glenoid rim reconstruction after Eden−Hybinette using 2 cortical buttons and progression of glenohumeral arthritis to Samilson II.

shoulder instability (10 failed Latarjet and 2 failed Bankart). Recurrent dislocation occurred in 2 patients (17%) at an average of 2.3 years, but the rate of revision surgery was 42%. Boileau et al.,[6] at mean follow-up of 21 months, using one cortical button for arthroscopic Eden—Hybinette after failed Latarjet, reported that only 1 of 7 patients had an unstable shoulder (14%).

Despite open and arthroscopic techniques lead to similar recurrence rates, rates of postoperative apprehension have been reported to be high.[7,8] In the study of Lunn et al.,[7] at final follow-up, 13 patients (48%) complained of sensation of persistent apprehension. Giannakos et al.,[8] at an average follow-up of 28 months, reported a 42% of positive apprehension test. Lower rates were observed in the series of Boileau et al.,[6] in which only 1 of 7 patients (14%) referred persistent apprehension. Interestingly in this study, a Hill—Sachs remplissage was performed in all patients with large, deep, engaging humeral head fracture. That could explain the low rate of postoperative apprehension compared with previous studies.

The relation between postoperative apprehension and the presence of severe humeral bone loss has been previously reported.[9] Lavoué et al.[9] reported outcomes of 41 patients with recurrent anterior shoulder instability after failed Bristow or Latarjet procedure treated with soft-tissue stabilization, whether unipolar (Bankart) or bipolar (Bankart-remplissage). In patients with little bone loss, arthroscopic soft tissue stabilization offered good clinical outcomes and low recurrence rate. However, the presence of a medium or severe Hill—Sachs lesion (Calandra 2 and 3) was associated with a greater rate of persistent anterior apprehension compared with those with small Hill—Sachs lesion (Calandra 1) at final follow-up (67% vs 13%, $P = .04$). In addition, the presence of severe glenoid bone loss (over 25% of the surface of the glenoid) was associated with greater rates of persistent apprehension (53% vs 17%, $P = .04$) and lower rates to return to sports (60% vs 95%). In our study, there was no significant association between postoperative apprehension and the glenoid bone loss >25% ($P = .45$), maybe because anterior glenoid bone loss has been restored with iliac crest bone graft. However, the percentage of positive postoperative apprehension test was higher in patients with HS Calandra 3 compared with the others (50% vs 0%, $P = .02$). When patients with failed Latarjet and large HS lesion were treated with Eden—Hybinette procedure and additional remplissage, all patients referred their shoulder stable. Therefore, in revision surgery after failed Latarjet is not only important to restore glenoid bone loss but also to treat large Hill—Sachs lesions, similarly that has been reported in primary stabilization surgery.[21] This is important because one of the advantages of performing arthroscopic Eden—Hybinnete procedure is the possibility to assess and treat Hill—Sachs lesions, which is more difficult with open approaches. According to the results of this study, in patients with recurrent shoulder instability and bipolar glenohumeral bone loss, in which a primary bony-stabilization procedure has failed to provide sufficient stability, in the presence of concomitant large and deep Hill—Sachs lesion, performance of simultaneous arthroscopic Eden—Hybinette and remplissage procedures may improve shoulder stability and decrease the prevalence of postoperative apprehension.

In addition, the use of suture-button fixation with a posterior guided technique seems to simplify graft transport and positioning, allowing acute placement of bone graft. Compared with 1 button, the use of 2 cortical buttons prevents the rotation of the bone block, reducing the risk of malposition and improving healing of the ICBG to the anterior glenoid rim. In our study, bone graft was optimally positioned in all patients and the ICGB healed to the anterior glenoid neck in 94% of cases with only 1 graft presented osteolysis.

Finally, the rate of complications and revision surgery associated with this technique is low. In our study, no intraoperative or postoperative complications occurred, and no hardware failures were observed. Guided glenoid drilling technique from posterior to anterior prevents brachial plexus injury anteriorly and suprascapular nerve injuries posteriorly.[22,23] Moreover, the use of suture-button fixation provides some advantages in revision surgery because (1) requires small glenoid tunnels taking into account the potentially misplaced tunnels of the previous procedure; (2) in cases in which removal of glenoid screws is not technically possible, fixation can be performed even in the presence of reaming screws; and (3), as we have seen in our study, buttons used in previous surgery can be left in place without causing any problem in the final position of the ICBG.

Limitations

It is a retrospective case series, the number of patients is small, and there is not a match cohort for comparison with a different technique. Furthermore, despite the fact that radiologic measurements were all performed by the same surgeon (N.M.C.), an intraobserver reliability was not performed.

Conclusions

Arthroscopic Eden—Hybinette using 2 cortical buttons leads to satisfactory clinical outcomes and a low recurrence rate after failed Latarjet, allowing successful reconstruction of the anterior glenoid rim and simultaneous treatment of capsular deficiency and humeral bone loss.

References

1. Wong SE, Friedman LGM, Garrigues GE. Arthroscopic Latarjet: Indications, techniques, and results. *Arthroscopy* 2020;36:2044-2046.

2. Domos P, Lunini E, Ascione F, et al. Clinical and radiographic outcomes of open Latarjet procedure in patients aged 40 years or older. *J Shoulder Elbow Surg* 2019;28:e304-e312.
3. Moroder P, Schulz E, Wierer G, et al. Neer Award 2019: Latarjet procedure vs. iliac crest bone graft transfer for treatment of anterior shoulder instability with glenoid bone loss: A prospective randomized trial. *J Shoulder Elbow Surg* 2019;28:1298-1307.
4. Boileau P, Saliken D, Gendre P, et al. Arthroscopic Latarjet: Suture-button fixation is a safe and reliable alternative to screw fixation. *Arthroscopy* 2019;35:1050-1061.
5. Di Giacomo G, Peebles LA, Midtgaard KS, de Gasperis N, Scarso P, Provencher CMT. Risk factors for recurrent anterior glenohumeral instability and clinical failure following primary latarjet procedures: An analysis of 344 patients. *J Bone Joint Surg Am* 2020;102:1665-1671.
6. Boileau P, Duysens C, Saliken D, Lemmex DB, Bonnevialle N. All-arthroscopic, guided Eden-Hybbinette procedure using suture-button fixation for revision of failed Latarjet. *J Shoulder Elbow Surg* 2019;28:e377-e388.
7. Lunn JV, Castellano-Rosa J, Walch G. Recurrent anterior dislocation after the Latarjet procedure: Outcome after revision using a modified Eden-Hybinette operation. *J Shoulder Elbow Surg* 2008;17:744-750.
8. Giannakos A, Vezeridis PS, Schwartz DG, Jany R, Lafosse L. All-arthroscopic revision eden-hybinette procedure for failed instability surgery: Technique and preliminary results. *Arthroscopy* 2017;33:39-48.
9. Lavoué V, Gendre P, Saliken D, Brassac A, Boileau P. The role of arthroscopic soft tissue reconstruction for failed Bristow-Latarjet procedure. *Arthroscopy* 2019;35:2581-2588.
10. Tytherleigh-Strong GM, Morrissey DI. Failed Latarjet procedure treated with a revision bone block stabilization using a suture-button fixation. *J Shoulder Elbow Surg* 2017;26:e102-e107.
11. Milenin O, Sergienko R, Badtieva V. The combined arthroscopic revision technique after the Latarjet procedure. *Arthrosc Tech* 2019;8:e917-e921.
12. Scheibel M, Habermeyer P. Subscapularis dysfunction following anterior surgical approaches to the shoulder. *J Shoulder Elbow Surg* 2008;17:671-683.
13. Valenti P, Martinez-Catalan N, Werthel JD, Kazum E. Full arthroscopic Eden-Hybinette procedure using 2 cortical suture buttons for the reconstruction of anteroinferior glenoid defects [published online ahead of print, 2021 Apr 23]. *Tech Hand Up Extrem Surg* 2021. doi:10.1097/BTH.0000000000000348.
14. 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.
15. Metais P, Clavert P, Barth J, et al. Preliminary clinical outcomes of Latarjet-Patte coracoid transfer by arthroscopy vs. open surgery: Prospective multicentre study of 390 cases [published correction appears in *Orthop Traumatol Surg Res* 2017;103:475]. *Orthop Traumatol Surg Res* 2016;102:S271-S276.
16. Sugaya H. Techniques to evaluate glenoid bone loss. *Curr Rev Musculoskelet Med* 2014;7:1-5.
17. Calandra JJ, Baker CL, Uribe J. The incidence of Hill-Sachs lesions in initial anterior shoulder dislocations. *Arthroscopy* 1989;5:254-257.
18. Samilson RL, Prieto V. Dislocation arthropathy of the shoulder. *J Bone Joint Surg Am* 1983;65:456-460.
19. Harris JD, Brand JC, Cote MP, Faucett SC, Dhawan A. Research Pearls: The significance of statistics and perils of pooling. Part 1: Clinical versus statistical significance. *Arthroscopy* 2017;33:1102-1112.
20. Park I, Oh MJ, Shin SJ. Minimal clinically important differences and correlating factors for the Rowe score and the American Shoulder and Elbow Surgeons score after arthroscopic stabilization surgery for anterior shoulder instability. *Arthroscopy* 2019;35:54-59.
21. Saliken D, Lavoué V, Trojani C, Gonzalez JF, Boileau P. Combined all-arthroscopic Hill-Sachs remplissage, Latarjet, and Bankart repair in patients with bipolar glenohumeral bone loss. *Arthrosc Tech* 2017;6:e2031-e2037.
22. Maquieira GJ, Gerber C, Schneeberger AG. Suprascapular nerve palsy after the Latarjet procedure. *J Shoulder Elbow Surg* 2007;16:e13-e15.
23. Avramidis G, Kokkineli S, Trellopoulos A, et al. Excellent clinical and radiological midterm outcomes for the management of recurrent anterior shoulder instability by all-arthroscopic modified Eden-Hybinette procedure using iliac crest autograft and double-pair button fixation system: 3-year clinical case series with no loss to follow-up. *Arthroscopy* 2021;37:795-803.