Open Versus Arthroscopic Latarjet Procedure for the Treatment of Chronic Anterior Glenohumeral Instability With Glenoid Bone Loss

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Purpose: The purpose of this study was to compare the clinical, functional, and radiographic outcomes of open versus arthroscopic Latarjet procedures. **Methods:** Between December 2009 to January 2015, all patients older than 18 years of age who were treated with a Latarjet procedure for chronic osseous anterior instability by a single surgeon were included in this retrospective cohort study. Range of motion, strength, Rowe, Western Ontario Shoulder Instability Index (WOSI) scores, and pain level according to the Visual Analog Scale (VAS) were evaluated. In addition, postoperative computed tomography scans were used to evaluate the position of the transferred coracoid, screw orientation, and degree of graft resorption. **Results:** Forty-eight patients with a mean age of 29.5 years (range 19-59 years) who underwent open (n = 15; group OL) and arthroscopic (n = 33; group AL) Latarjet procedures were included in the study. The mean follow-up was 30.5 months (range 24-50 months). At final follow-up there were significant differences in the mean internal rotation loss (mean of 9° vs 14°, $P = .044$) favoring open surgery and WOSI ($P = .017$) scores favoring arthroscopic. No significant differences were detected in mean forward flexion loss ($P = .918$), external rotation loss ($P = .883$), Rowe ($P = .429$), and Visual Analog Scale ($P = .208$) scores. Mean superoinferior position of the coracoid bone graft was found between the 1:55 and 4:49 o'clock positions (2:05-4:55 for group OL; 1:51-4:47 for group AL) in en-face views. The grafts were placed laterally in 13% (group OL) and 9% (group AL) of patients. The mean α angles of the screws were 11° and 19.2°, respectively ($P = .004$). The mean graft resorption rates were 21% and 34% ($P = .087$), respectively. **Conclusion:** Good functional results were obtained after both open and arthroscopic Latarjet procedures for the treatment of chronic osseous anterior shoulder instability. Comparative analysis showed small but statistically significant differences in internal rotation loss favoring open and in WOSI favoring arthroscopic techniques. All measured radiographic parameters were similar with the exception of a significant difference in alpha angle with improved screw position in open surgery. OL and AL techniques provide similar clinical and radiographic outcomes. **Level of Evidence:** III; Retrospective cohort study with comparison group.

See commentary on page 950

The Latarjet procedure has been popularized as a treatment for anterior shoulder instability in the setting of glenoid bone loss or irreparable capsuloligamentous damage. The procedure, originally described in 1954,[1] stabilizes the shoulder through the static effect of the transferred coracoid process and the dynamic sling effect of the conjoint tendon.[2] The success of the surgery has been linked to the correct placement of the transferred coracoid process,[3] with multiple biomechanical and clinical studies demonstrating the effect of the correct graft positioning on clinical results.[4,5]

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Although it was historically performed as an open surgery, Lafosse et al.[6] first described an arthroscopic technique to accomplish transfer of the coracoid process. Some studies have shown that the arthroscopic Latarjet procedure leads to similar clinical results compared with the open surgery after both short- and mid-term follow-up.[7-10] In addition to general benefits of arthroscopic treatment over open surgery, including smaller incisions, lower morbidity rates, and a faster healing period, it is also reported to provide advantages such as more accurate placement of the graft, as well as the ability to address concomitant pathology.[1,5,11] However, other studies reported that open surgery provides improved superior-inferior graft position and better screw orientation.[12,13]

The primary variable was overall functional outcome as assessed by range of motion, strength, and clinical outcomes measures including Rowe, Western Ontario Shoulder Instability Index (WOSI), and Visual Analog Scale (VAS) scores. A secondary variable was an assessment of the radiographic outcome of the surgery. The purpose of this study was to compare the clinical, functional, and radiographic outcomes of open versus arthroscopic Latarjet procedures. The hypothesis was that the arthroscopic Latarjet procedure would show similar functional and radiographic outcomes compared with the open surgery.

Methods

Study Design

Institutional Review Board approval was obtained for this study (29.08.2014/1). Between December 2009 and January 2015, all patients over the age of 18 with chronic anterior glenohumeral instability with significant bone loss requiring a primary open or arthroscopic Latarjet procedure by the senior author without a previous shoulder stabilization surgery with a minimum 24 months of follow-up were included in this study. The indications for the Latarjet procedure were persistent anterior shoulder instability with an anteroinferior glenoid osteochondral defect >13.5%, Instability Severity Index Score (ISIS) >3 combined with mid-range positive anterior apprehension. This is based on evidence that in a population with a high level of mandatory activity, bone loss above 13.5% led to a clinically significant decrease in WOSI scores consistent with an unacceptable outcome, even in patients who did not sustain a recurrence of their instability.[14] Moreover, as evidence suggests, arthroscopic stabilization in patients with an ISIS $\leq$ 3 was associated with a significantly lower risk of recurrence of glenohumeral instability compared with that in patients with an ISIS >3 points.[15]

The Latarjet procedure was performed on the basis of a patient's medical history, clinical examination results, and radiologic findings. The senior author started his practice with the open Latarjet procedure and progressed to an arthroscopic approach over time. Once the learning curve of both procedures was over, the patients were asked to choose one approach over the other. Both groups had similar baseline characteristics. Patients whose computed tomography (CT) scans could not be obtained or who had less than 24 months of follow-up were excluded from the analysis.

Open Surgical Technique

All procedures were performed with the patients in the beach chair position. A limited deltopectoral incision of 4 to 5 cm length was made from the tip of the coracoid process toward the axillary fold. The cephalic vein was retracted laterally, and the medial branches were ligated. The coracoid process was exposed after splitting the deltoid muscle's anterior fibers. The arm was taken to abduction and external rotation to place the retractor on the coracoid. The coracoacromial (CA) ligament was detached approximately 1 cm distal from the insertion site, and the underlying coracohumeral ligament was released. The arm was then placed into adduction and internal rotation, and the pectoralis minor was carefully detached from the medial coracoid. An osteotomy was performed with an oscillating saw from medial to lateral while staying perpendicular to the coracoid process, harvesting a graft of approximately 3 cm. Two holes approximately 1 cm apart from each other were drilled in the bone block. Next, the subscapularis was split horizontally at the junction of the upper two-thirds and lower one-third, at the same level as the future location of the graft. The capsule was then incised longitudinally with the electrocautery. After the excision of the anteroinferior labrum and preparation of the anterior glenoid neck to achieve a bleeding bone bed, the graft was fixed with two 3.5-mm cancellous screws to the anterior glenoid. Finally, the capsule was repaired to the CA ligament stump with the arm in external rotation followed by standard wound closure.[16]

Arthroscopic Surgical Technique

The procedure was performed as described by Lafosse at al.[17] Briefly, a diagnostic arthroscopy was performed to rule out or treat any additional intraarticular pathology. Next, the anteroinferior capsulolabral tissue was resected using a radiofrequency device and the anterior glenoid neck was prepared with a burr to achieve a bleeding bone bed. The CA ligament and pectoralis minor were circumferentially detached from the coracoid process while keeping the conjoint tendon intact. Two Kirschner wires were inserted into the coracoid process through the coracoid portal by using the coracoid drill guide and then drilled over. A ''top-hat'' washer was inserted into each hole. The coracoid process osteotomy was next performed with a curved

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osteotome after decortication of the coracoid base. The subscapular split was performed at the junction of the upper two-thirds and lower one-third. After preparation of the inferior cortex of the coracoid process with a burr, the Kirschner wires were inserted through the coracoid guide with the graft in the desired position. A 2.8-mm cannulated drill bit was used to predrill each hole before insertion of the 3.5-mm cannulated screws, beginning with the inferior screw. The graft and screw position were checked by introducing a switching stick through the posterior portal to assess and verify flush graft positioning. The portals were closed in standard fashion.

Clinical and Functional Outcome Assessment

An orthopaedic surgeon and a physical therapist without prior knowledge of the radiographic or functional outcome assessed the patients. Postoperative range of motion including the forward flexion, abduction, external rotation (ER) and internal rotation (IR) were measured for both shoulders and the difference from the unaffected side was calculated as motion loss using a universal goniometer. A manual dynamometer (Nicholas Manual Muscle tester, model 01160; the Lafayette Instrument Company, Lafayette, IN) was used to assess the IR and ER strength on both shoulders. The apprehension test was used to assess the glenohumeral stability. The arm is abducted to 90° and rotated externally. With continued ER, those who express fear of dislocation and instability were considered to have a positive apprehension test result. Postoperative outcome measurements included the Visual Analog Scale (VAS), Rowe and Western Ontario Shoulder Instability Index (WOSI) scores.

Radiographic Assessment

A musculoskeletal radiologist without prior information regarding the clinical outcome or the surgical approach performed the radiographic assessment. Glenoid bone loss was measured using the sagittal en face view of the glenoid obtained from the preoperative CT multiplanar reconstruction images. The Gerber index,[18] Sugaya index,[19] and bone loss percentage[20] were calculated (Fig 1).

The superoinferior position of the coracoid graft was assessed on the early postoperative CT scan as described by Kraus et al.[21] using the SCA and SCB angles (Fig 2). The graft position in the mediolateral direction was assessed using 5 different categories to describe the localization of the graft with respect to the glenoid surface on axial sections (too medial, medial, flush, congruent and lateral) (Figs 3 and 4).[22,23] The orientation of the screws was determined by measuring the alpha (α) angle on axial cuts (Fig 5).[24]

Graft resorption was determined based on the en face images from early postoperative CT and CT at the final

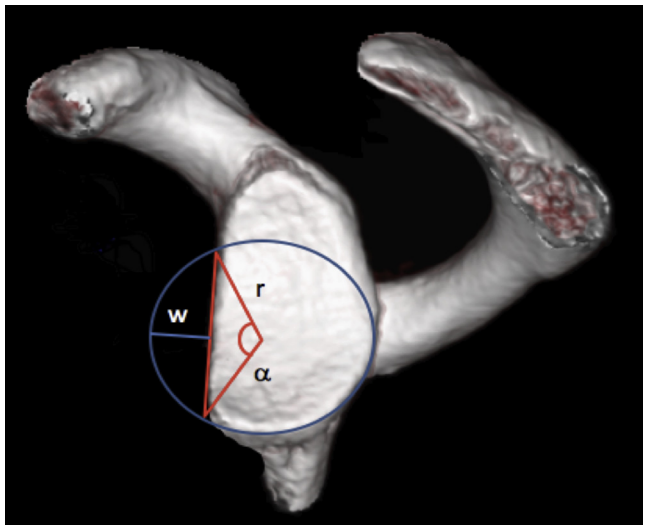

Fig 1. Calculation of defect area percentage: (r) radius of the glenoid, (α) angle of the defective region, (w) defect depth.

follow-up by comparing the early postoperative graft surface area (S1) and glenoid surface area (G1), final check-up graft surface area (S2) and glenoid surface area (G2).[25] The exact same sections could not be obtained from different CT images. This leads to different values between G1 and G2. Therefore, to adjust for this discrepancy we calculated S2* to give us the corrected graft surface without resorption by removing the variability of different CT slices by using following formula: $\frac{S2^*}{S1} = \frac{G2}{G1}$. Thus $(S2^*) = S1\frac{G2}{G1}$. The amount of graft resorption was calculated as (L) = $S2^* - S2$. The percentage of the graft resorption was

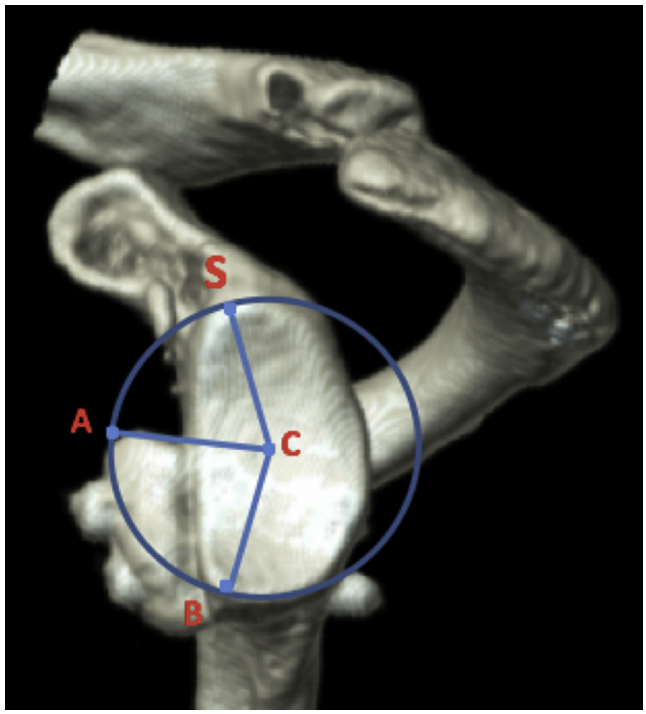

Fig 2. Graft placement: Center of the circle (C), the upper (A) and lower (B) points where the graft contacts the glenoid.

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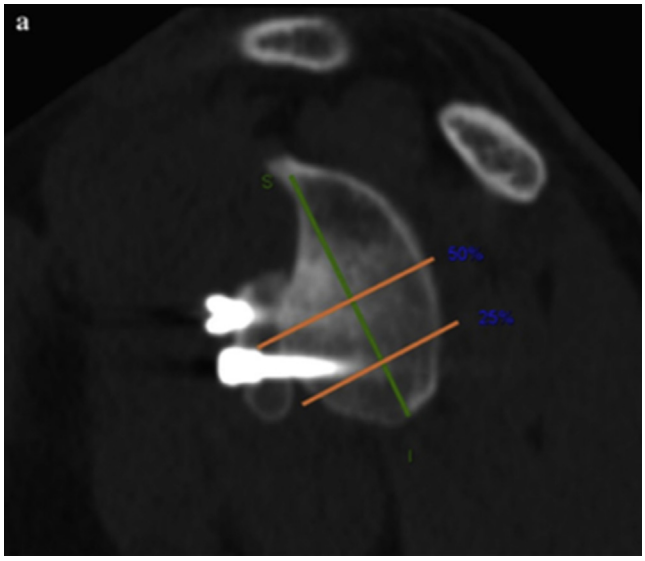

Fig 3. Adjustment of SI distance in the sagittal plane and detection of 50% and 25% levels.

measured by dividing the graft surface area by the amount of resorption L/*S*2* × 100% (Fig 6).

The degree of glenohumeral osteoarthritis was assessed in the radiographs at the time of final follow-up according to the Samilson and Prieto classification.[26] The patients were divided into 3 groups (mild, moderate, and severe).

Statistical Analysis

Statistical analysis was performed by a biostatistician using the IBM SPSS Statistics for Windows, v22.0. (IBM Corp. Armonk, NY). The Mann Whitney U-test was used to compare differences between 2 groups. Groups with more than 2 variables were assessed with the Kruskal Wallis test. The χ^2 test was used to assess categorical values. There was no normal distribution of the measurements during correlation analysis according to the Kolmogorov-Smirnov test. Nonparametric methods were used with the Spearman correlation coefficient. The results are reported as 95% confidence intervals (CIs) and related *P* values. Results with $P < .05$ were regarded as statistically significant.

Results

Between December 2009 and January 2015, a total of 62 patients with chronic anterior glenohumeral instability with significant bone loss were treated with an open or arthroscopic Latarjet procedure by the senior author (initials blinded for review). Fourteen patients (10 from the OL group, 4 from the AL group) whose CT scans could not be obtained or who had less than 24 months of follow-up were excluded from the study. Of the 48 patients included in the retrospective analysis, 15 patients underwent open (group OL) and 33 patients underwent arthroscopic (group AL) Latarjet procedures. Group OL comprised 12 men (80%) and 3 (20%) women. Eight (53%) had surgery on the dominant side. Group AL consisted of 29 men (88%) and 4 women (12%). Eighteen (55%) had surgery on the dominant side. There were no statistically significant differences between groups both for male/female ratios ($P = .662$) or hand dominance ($P = .938$).

The mean follow-up duration was 30.5 months (range 24-50 months). For the patients who underwent open surgery, the mean follow-up was 30.5 months (range 24-45 months), whereas for those after arthroscopic surgery, it was 30.4 months (range 24-50 months). There was no statistically significant difference for the follow-up interval ($P = .728$).

Clinical and Functional Outcomes

Mean postoperative WOSI scores were 670 ± 372 (95% CI, 464 to 877), for group OL and 448 ± 275 (95% CI, 351 to 545), for group AL ($P = .017$). Mean postoperative Rowe scores were 78 ± 11 (95% CI, 72 to 84) for group OL and 80 ± 13 (95% CI, 76 to 85) for group AL ($P = .429$). Patients who underwent arthroscopic surgery (21 ± 13; 95% CI, 17 to 26) were observed to have lower percentage of WOSI scores compared with patients who underwent open surgery (32 ± 18; 95% CI, 22 to 42) ($P = .017$) (Table 1).

Mean postoperative forward flexion, abduction, IR and ER loss, was 17° ± 21° (95% CI, 6° to 29°), 32° ± 24° (95% CI, 18° to 45°), 9° ± 12° (95% CI, 2° to 16°), and 16° ± 11° (95% CI, 10° to 22°), respectively, for group OL and 14° ± 15° (95% CI, 9° to 19°), 31° ± 19° (95% CI, 24° to 38°), 14° ± 11° (95% CI, 11° to 18°)

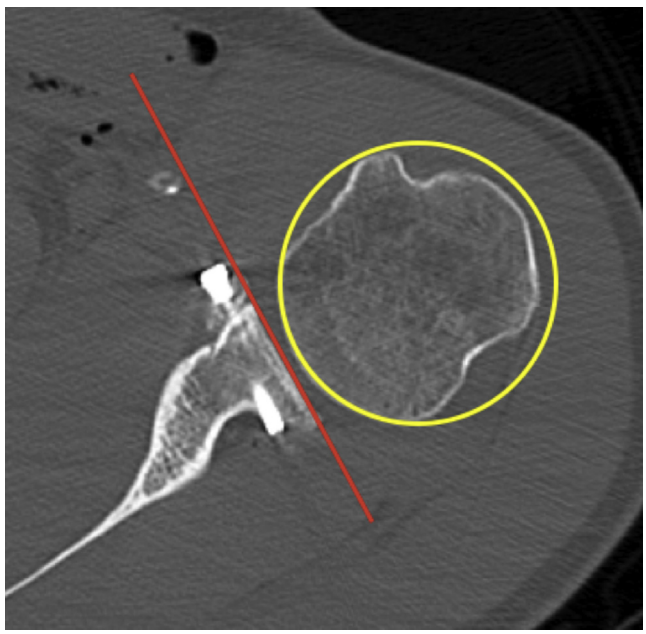

Fig 4. The line passing through the anterior and posterior glenoid subchondral corners and a circle that includes the humerus head in the axial plane. Note that the graft is exactly on the line.

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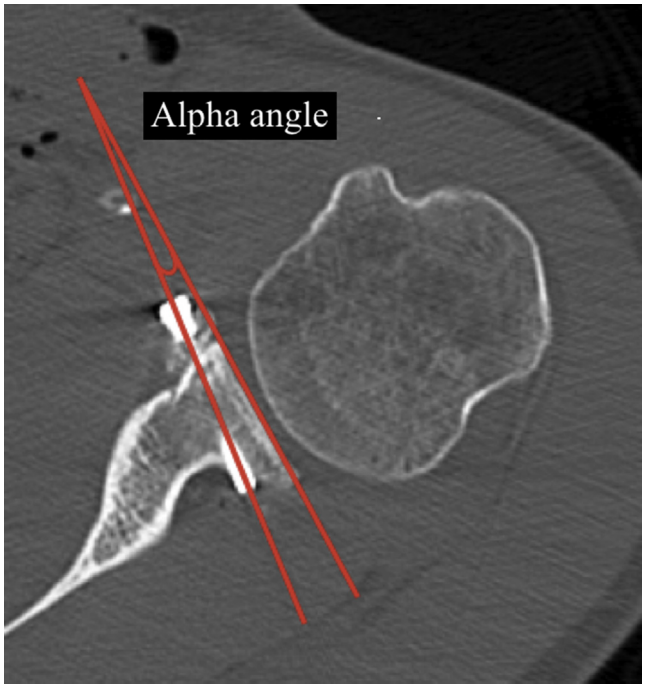

Fig 5. Alpha (α) angle between the line passing through the glenoid surface and the screw in the axial plane.

and 18° ± 15° (95% CI, 12° to 23°), respectively, for group AL. The difference in the amounts of IR loss (P = .044) in group OL was found to be significantly less compared with group AL. There was no significant difference in IR or ER strength when comparing groups (Table 1). There was no significant statistical correlation between radiographic parameters including postoperative graft resorption with functional scores or clinical outcomes (Table 2).

Radiographic Outcomes

The α angle in group OL (11°± 8°; 95% CI, 6° to 16°) was found to be significantly less compared with group AL (19° ± 9°; 95% CI 16° to 23°) (P = .004). Mean superoinferior position of the coracoid bone graft (SCA and SCB angles) was found between 1:55 and 4:49 o'clock (2:05-4:55 for group OL; 1:51-4:47 for group AL) in en-face views. The mean graft resorption rates were 21 ± 23% (95% CI, 8% to 34%) for group OL and 34 ± 21% (95% CI, 27% to 42%) for group AL (P = .087). All measured radiographic parameters are summarized in Table 1.

The apprehension test was positive in 44% of all patients after surgery. The apprehension test was positive in 37% of the patients after arthroscopic surgery and in 62% of patients after open Latarjet procedure. However, this difference was not statistically significant (P = .221). There also was no significant statistical correlation between postoperative apprehension test positivity with preoperative Sugaya index, Gerber index, glenoid defect percentage, α angle, and superoinferior position of the graft. However, there was a significant correlation between the amount of graft resorption and postoperative apprehension test positivity (P = .041) (Table 3).

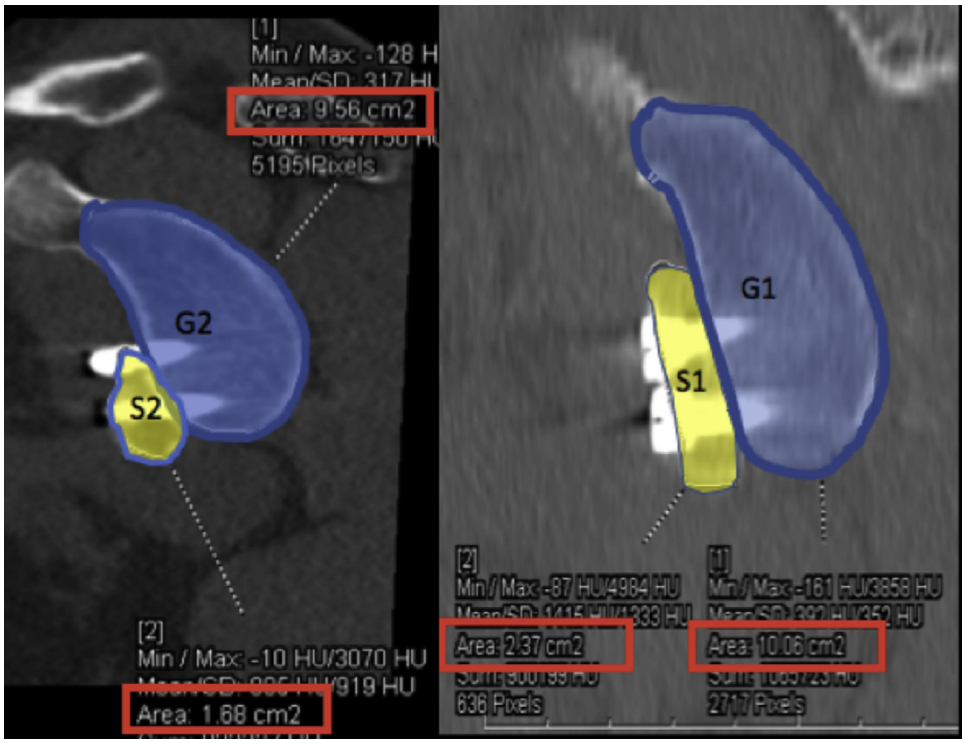

Fig 6. Calculation of graft resorption area on en-face view.

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Table 1. Comparison of quantitative data of the groups

	Group OL	Group AL	
	Mean ± SD [95% CI]	Mean ± SD [95% CI]	*P*
Age	28 ± 10 [23-34]	30 ± 7 [27-33]	.212
Hill-Sachs ratio	8 ± 3 [6-10]	8 ± 3 [7-9]	.764
Sugaya index	17 ± 8 [12-21]	14 ± 6 [12-16]	.436
Gerber index	71 ± 16 [61-80]	70 ± 11 [66-74]	.947
Defect percentage %	17 ± 5 [12-17]	15 ± 5 [13-17]	.938
SCA	02:05:00 ± 00:41:00 [01:43:00-02:28:00]	01:51:00 ± 00:43:00 [01:36:00-02:06:00]	.286
SCB	04:55:00 ± 00:34:00 [04:36:00-05:14:00]	04:47:00 ± 01:11:00 [04:22:00-05:12:00]	.125
Alpha angle	11 ± 8 [6-16]	19 ± 9 [16-23]	.004
Graft resorption %	21 ± 23 [8-34]	34 ± 21 [27-42]	.087
Forward flexion loss	17 ± 21 [6-29]	14 ± 15 [9-19]	.918
Abduction loss	32 ± 24 [18-45]	31 ± 19 [24-38]	.937
ER loss	16 ± 11 [10-22]	18 ± 15 [12-23]	.883
IR loss	9 ± 12 [2-16]	14 ± 11 [11-18]	.044
ER strength difference	0.4 ± 0.8 [−0.1 to 0.9]	0.5 ± 0.8 [0.2-0.8]	.339
IR strength difference	0.9 ± 0.5 [0.6-1.2]	0.8 ± 0.7 [0.6-1.1]	.893
VAS	2.5 ± 3.3 [−0.3 to 5.3]	1 ± 2.4 [-0.2-2.2]	.231
WOSI %	32 ± 18 [22-42]	21 ± 13 [17-26]	.017
WOSI	670 ± 372 [464-877]	448 ± 275 [351-545]	.017

AL, Arthroscopic Latarjet; CI, confidence interval; ER, external rotation; IR, internal rotation; OL, open Latarjet; SCA, (S)superior tubercle-(C)center-(A)superior attachment point of graft; SCB, (S)superior tubercle-(C)center-(B)inferior attachment point of graft; VAS, Visual Analog Scale; WOSI, Western Ontario Shoulder Instability Index.

The mediolateral orientation of the graft did not have an effect on the outcome scores ($P > .05$). There was no statistical correlation between the mediolateral position of the graft and a postoperative positive apprehension test ($P = .378$), although it was 100% positive in all 5 patients with "too medial" position.

In the final follow-up, 1 patient in group OL (6%) and 2 patients (6%) in group AL showed mild

Table 2. Relationship between radiographic parameters with functional scores and clinical outcomes

	Hill-Sachs ratio	SCA	SCB	ACB	Gerber index	Graft resorption %
Forward flexion loss						
RS	0.058	−0.283	−0.149	0.153	0.084	0.116
P	.695	.051	.311	.299	.569	.43
Abduction loss						
RS	0.117	0.091	−0.134	−0.154	−0.17	−0.03
P	.429	.54	.365	.297	.247	.839
ER loss						
RS	−0.042	0.073	−0.038	−0.106	0.087	−0.277
P	.779	.622	.797	.472	.556	.057
IR loss						
RS	0.041	−0.085	−0.096	0.006	0.031	0.106
P	.784	.566	.516	.97	.832	.474
ER strength difference						
RS	0.028	−0.013	0.084	0.075	−0.175	0.151
P	.85	.93	.572	.611	.234	.307
IR strength difference						
RS	−0.248	−0.08	−0.194	−0.089	0.084	−0.077
P	.089	.589	.187	.548	.572	.601
WOSI %						
RS	0.262	0	0.038	0.02	−0.086	−0.097
P	.072	1	.797	.894	.559	.511
Rowe						
RS	0.03	−0.052	−0.185	−0.128	−0.038	−0.101
P	.841	.728	.207	.384	.796	.493
VAS						
RS	−0.023	−0.143	0.017	0.265	−0.074	−0.055
P	.908	.476	.934	.181	.715	.787

ACB, (A)superior attachment point of graft-(C)center-(B)inferior attachment point of graft; ER, external rotation; IR, internal rotation; RS, Spearman's rho; SCA, (S)superior tubercle-(C)center-(A)superior attachment point of graft; SCB, (S)superior tubercle-(C)center-(B)inferior attachment point of graft; VAS, Visual Analog Scale; WOSI, Western Ontario Shoulder Instability Index.

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Table 3. Relationship between apprehension and preoperative defect size, postoperative graft placement, amount of graft resorption and functional outcomes

	Negative apprehension N: 26	Positive apprehension N: 22	
	Mean ± SD [95% CI]	Mean ± SD [95% CI]	*P* value
SCA	02:04:00 ± 00:36:00 [01:58:00-02:12:00]	01:34:00 ± 00:38:00 [01:26:00-01:42:00]	.067
SCB	04:49:00 ± 00:35:00 [04:42:00-04:56:00]	04:59:00 ± 01:50:00 [04:36:00-05:23:00]	.456
Alpha angle	14 ± 8 [12-15]	17 ± 13 [14-19]	.719
Sugaya index	15 ± 7 [14-16]	12 ± 6 [11-13]	.347
Gerber index	68 ± 14 [66-71]	67 ± 12 [65-70]	.943
Defect ratio	15 ± 5 [14-16]	14 ± 4 [13-14]	.373
Graft resorption %	23 ± 16 [20-27]	39 ± 18 [35-42]	.041
WOSI %	26 ± 17 [23-29]	32 ± 21 [27-36]	.548
Rowe	81 ± 11 [79-83]	77 ± 15 [69-76]	.2

SCA, (S)superior tubercle-(C)center-(A)superior attachment point of graft; SCB, (S)superior tubercle-(C)center-(B)inferior attachment point of graft; WOSI, Western Ontario Shoulder Instability Index.

glenohumeral osteoarthritis without clinical symptoms. The radiographic analysis of graft position of these patients revealed different superoinferior position with a lateral positioning of the graft.

Complications

Three patients (20%) after OL surgery had a nonunion on the CT scan. One of these 3 patients with the nonunion remained symptom free 32 months after surgery, whereas another required revision augmentation with iliac crest bone graft 14 months after surgery. The third patient suffered a screw fracture after an anterior dislocation 5 months after surgery.

Five patients (15%) suffered complications in Group AL. One of them had redislocation at 6 months postoperatively after trauma. This patient went on to have closed reduction, followed by nonoperative treatment. At the final follow-up 42 months after surgery, he was symptom free. Two patients (6%) underwent arthroscopic hardware removal at 12 and 14 months after surgery because of pain. The other 2 patients developed high degree (>90%) graft resorption 7 and 9 months after surgery. One of them showed signs of subjective and objective instability and was treated with a revision using iliac crest bone graft augmentation (Eden Hybinette surgery). The other patient remained symptom free at the final follow-up 16 months after surgery.

Discussion

The most important finding of this study is that similar overall functional and radiographic results were obtained following both open and arthroscopic Latarjet procedures for the treatment of chronic osseous anterior shoulder instability.[27] With the more recent advancements of the arthroscopic method, questions remain regarding which technique provides superior results. Prior studies have shown postoperative satisfaction at overall high rates (>90%) following Latarjet procedure.[9,16,28] Especially long-term studies with a minimum of 10 years follow-up show excellent outcomes after open Latarjet procedure.[29-36]

In the early postoperative period, arthroscopic Latarjet was shown to be less painful with better functional results, although in the long-term, persistent apprehension and recurrence rates are reported to be higher after arthroscopic surgery.[13] In addition similar clinical outcome scores have been reported for open and arthroscopic techniques in longer-term follow-up.[7-9] This was demonstrated in the current study with no significant differences in VAS or Rowe scores; however, there was a significant difference in the WOSI score. This single outcome favored the arthroscopic group and can be considered clinically meaningful. It is possible that the less-invasive nature of the arthroscopic technique could lead to less scarring and adhesions and be reflected in the lower WOSI score.

Given the minimally invasive nature of the arthroscopic technique, it would also be intuitive to think that ROM may be improved as compared to open but this was not the case. Classically the Latarjet procedure is associated with a loss in ER, and this was seen similarly in both groups. A difference in IR loss favored the open group and while statistically significant, we believe this is not likely clinically relevant. It is possible as well that increased postoperative apprehension in the open group could related be to an increased ROM, although we would expect this to be more associated with ER, rather than IR. There was also no major difference in strength to account for the increased apprehension.

In both open and arthroscopic techniques, correct positioning of the coracoid process is believed to be one of the critical steps of the Latarjet procedure. Medial positioning may result in persistent instability[29] whereas lateral positioning may cause friction with the humeral head, potentially leading to degenerative changes.[4,5,32] The ideal graft position is below the

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glenoid equator, neither too medial nor too lateral, less than 10 mm from the cartilage.[23] The visualization of the glenoid for positioning may be more difficult in open surgery; however, many of the technical steps are more easily accomplished with an open exposure. The advantage of the arthroscopic technique lies in visualizing the entire glenoid articular surface, which is reported to reduce the risk of graft malpositioning.[5,24] In this study, lateral positioning of the graft was more commonly observed with open surgery, which is consistent with the literature.[7,21,37] For all patients after both arthroscopic and open Latarjet surgery, there was no statistically significant difference between the mediolateral position of the graft and the functional results.

Biomechanical studies have shown that the best graft position to prevent anterior dislocation of the humeral head is at 4 o'clock[5,23,38] with more superior placement leading to recurrence.[39,40] and more inferior positioning with a higher risk of non-union.[41] In this study, no significant difference in graft position could be found between the groups and was in accordance with the previously published literature.[5,23,38]

The position of the screws for fixation of the graft should also be carefully considered to prevent complications. The exit of the upper screw is shown to be approximately 4 mm away from the suprascapular nerve.[42] To prevent injury to the nerve, the α angle between the glenoid surface and the screw should be between 10° and 28°.[23,24] In the current study, the α angle was significantly lower in patients with open surgery in concordance with the results shown by literature.[13,43] Although this was statistically significant, the α angle for both groups still fell within the currently accepted limits and may not have be clinically meaningful. There were no documented cases of suprascapular neuropathy from screw position.

Graft resorption is one of the most common complications after coracoid transfer and is reported up to 63.9% in the literature.[44] Resorption has been shown to have limited documented clinical importance for recurrence of instability and was shown to be greater in patients with larger glenoid bone loss and following arthroscopic surgery.[44-46] In contrast, graft resorption in the current study was observed more frequently after open surgery compared with arthroscopy.[12] There was a significant correlation found between graft resorption percentage and positive apprehension test after surgery; however, graft resorption did not correlate with other functional outcomes. Although asymptomatic graft resorption has been reported in the literature,[5,46] as well as persistent apprehension after the Latarjet procedure,[36,47] it is unclear whether persistent apprehension and presumed translation contributes mechanically to increased rates of graft resorption.

Limitations

This study has several limitations that start with a retrospective design and a small number of patients. The OL and AL groups, although demographically similar, were not equally matched in number, which is suboptimal for analysis. There was no randomization or specific selection criteria for open versus arthroscopic and the choice of procedure represents an evolution in the practice of a single surgeon from open to arthroscopic surgery. There is also no appropriate method to control for the learning curve moving to the arthroscopic procedure, and this could affect the results of patients in the AL group. Finally, the indications to pursue the Latarjet procedure were at the discretion of the senior author and may not reflect the indications in other parts of the world. For instance, the preoperative glenoid defect was somewhat lower than what is the typically accepted indication in the United States, and therefore these data may not be applicable to those patients with a higher starting glenoid bone loss percentage.

Conclusion

Good functional results were obtained after both open and arthroscopic Latarjet procedures for the treatment of chronic osseous anterior shoulder instability. Comparative analysis showed small but statistically significant differences in IR loss favoring open and in WOSI favoring arthroscopic techniques. All measured radiographic parameters were similar with the exception of a significant difference in alpha angle with improved screw position in open surgery. Open and arthroscopic Latarjet techniques provide similar clinical and radiographic outcomes.

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