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Clinical and radiological outcome following arthroscopic Latarjet with cerclage FiberTape fixation with a minimum 1-year follow-up

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Background: The rates of implant-related complications are significant following the Latarjet procedure using metal screws in patients with recurrent shoulder dislocation and bone loss. The purpose of this study is to evaluate the short-term outcome following the arthroscopic Latarjet procedure using cerclage FiberTape (Arthrex, Naples, FL, USA) combined with remplissage and capsulolabral repair. It was hypothesized that performing the procedure with cerclage FiberTape would provide sturdy fixation, comparable to the conventional method of using metal screws, while averting hardware-related complications attributed to the latter in published literature.

Methods: A prospective study was performed in a single institution between 2020 and 2022, with all surgeries performed by a single fellowship-trained shoulder surgeon who has ample experience in performing arthroscopic screw Latarjet procedures. Patient demographics, number of dislocations before surgery, arm dominance, ligamentous laxity, type of sporting activity, Instability Severity Index Score, and percentage of bone loss on the glenoid and humeral sides were recorded. The patients were followed up with visual analog scale, American Shoulder and Elbow Surgeons score, Rowe score, and Walch-Duplay score preoperatively and postoperatively. The coracoid graft position, healing, and remodeling were assessed with computed tomography scans at 3 months postoperatively. Minimum clinical follow-up was for a period of one year.

Results: Overall, 10 patients (all males, average age 28 ± 8.8 years) were operated on with an arthroscopic Latarjet procedure using cerclage FiberTape. The minimum follow-up period was 12 months, and the mean follow-up was 13.2 months. The median and individual visual analog scores during arm motion, American Shoulder and Elbow Surgeons scores, Rowe scores, and Walch-Duplay scores improved in the follow-up period. Computed tomography scans at 3 months showed flushed graft position in 5 patients, medial graft position in two patients, and three patients showed graft nonunion with migration. Out of 10 patients, seven had good graft union in follow-up scans. None of the patients required revision surgery. All three patients with graft nonunion were kept under follow-up beyond the study period for recurrence of instability.

Conclusion: Our study demonstrated that arthroscopic Latarjet using cerclage FiberTape fixation combined with remplissage and capsulolabral repair resulted in high rate of graft loosening and migration (30%). Nonetheless, patients in whom the coracoid graft had united, as well as those in whom it had not, all had good to excellent functional and clinical outcomes, no complications, and did not require any revision surgery.

Arthroscopic Latarjet using metal screws is time-tested and an effective procedure for recurrent shoulder dislocation with significant glenoid bone loss of more than 15%, previous failed Bankart repair, severe soft tissue insufficiency, bipolar bone lesions, and in young contact athletes.[19,20] Despite good results, hardware-related complications were persistently reported in the range of 6.5 to

The Bangalore Shoulder Institute Institutional Review Board approved this study.

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46%.[3] Complications from the use of metal screws include screw pull-out, loosening, breakage, intraarticular hardware, graft fracture, and osteolysis around screws.[10] Some alternatives for graft fixation have been studied to prevent these complications. Buttress plates,[8] bioabsorbable screws,[2] cortical buttons,[22] and cerclage FiberTape[13] are examples of other methods of fixation mentioned in the literature that have been employed as substitutes to metal screws.

The purpose of this study was to analyze the position, rate of union, and osteolysis of the coracoid graft on computed tomography (CT) scan at 3 months, clinical and functional outcomes, as well as implant-related complications, at one year following the arthroscopic Latarjet procedure using cerclage FiberTape (Arthrex, Naples, FL, USA), combined with remplissage and capsulolabral repair. The authors hypothesized that the use of cerclage FiberTape can eliminate the screw-related complications while providing sturdy fixation of the graft, enabling good graft union, and also improving the clinical outcomes after the surgery.

Methods

This was a prospective study including consecutive patients who underwent arthroscopic Latarjet using Cerclage FiberTape combined with remplissage and capsulolabral repair operated by a single surgeon at a single institution between 2020 and 2022 with a minimum follow-up of 1 year. Patients with less than 1 year of follow-up and using an iliac crest graft were excluded from the study. Institutional review board approval was obtained for this study. The inclusion criteria included: 1) patients with glenoid bone loss >15% but <25%; 2) patients with glenoid bone loss >10% with off-track Hill-Sachs lesion; 3) dislocation in contact athletes; 4) failed Bankart repair; or 5) severe soft tissue insufficiency with ISI (Instability Severity Index) score >6. Patient demographics, number of dislocations before surgery, arm dominance, ligamentous laxity, type of sporting activity, ISI score, and percentage of bone loss on the glenoid and humeral sides were recorded.

The range of motion (expressed in degrees) was recorded preoperatively and after surgery. The forward flexion, abduction, external rotation by side (ER1), external rotation at 90-degree abduction (ER2), and internal rotation at 90-degree abduction were recorded before surgery and at the final follow-up. The functional outcomes were recorded with visual analog scale (VAS), American Shoulder and Elbow Surgeons (ASES) scores, Rowe scores, and Walch-Duplay scores preoperatively and after surgery at the final follow-up (at 12 weeks, 6 months, and one year postoperatively).

The graft position, graft union, and graft remodeling were assessed with CT scans at 3 months postsurgery. The graft position with respect to the anterior glenoid articular rim was assessed in axial CT slice at 50% of the glenoid height (distance between superior and inferior tubercles). It was classified as flush when perfectly aligned to the glenoid rim, medial, or lateral when more than a 5mm or 3mm step off was noted, respectively.[4] In the vertical plane, the graft position was assessed at 50% of the glenoid height in a 3D en face view of the glenoid with the humeral head substituted. Presence of bony union and lysis was also determined. Patients who had nonunion of coracoid graft were followed up periodically beyond the study period for recurrence of instability.

Potential implant-related complications[1,11,17] such as intraarticular penetration of implant/tunnel and graft fracture due to overtightening were assessed intraoperatively and on postoperative CT scans and patients were assessed for shoulder tenderness and pain for implant prominence and clinical signs of suprascapular nerve injury during the follow-up visits.

Statistical analysis was performed using non parametric test and Spearman rho tests. Non parametric test was employed to find the median of preoperative and postoperative clinical and functional scores. *P* value was determined by the Wilcoxon signed-rank test and the Spearman rho test was used to analyze the correlation of ISI scores, Beighton scores, and number of preoperative dislocations to the clinical and functional outcomes.

Preoperative assessment

The patients with recurrent anterior shoulder dislocation were assessed with 3D CT and magnetic resonance imaging. The amount of glenoid bone loss and the glenoid track were measured using the best-fit circle method from the “en face” view of the glenoid with humeral head suppression.[21] The Hill-Sachs interval was measured from an axial CT scan and compared with the previously measured glenoid track to assess if the Hill-Sachs lesion was engaging or nonengaging.[15]

Surgical technique

Patient positioning and portal placement

The patient was positioned in a beach chair position under general anesthesia with an interscalene block. The arm was prepped and draped, held by traction cable, with the shoulder in 60-degree anterior elevation, 10-degree shoulder abduction, and neutral rotation. Standard Latarjet portals, as described by Lafosse were used.[18] The surgeries were performed by the senior author using an all-arthroscopic Latarjet procedure. Diagnostic arthroscopy was performed, and associated pathologies were assessed through the posterior portal. The remplissage of the Hill-Sachs lesion was done in all patients with tightening of the remplissage sutures done as the final step after coracoid graft fixation. The coracoid preparation was done by skeletonizing the attached tissue (Fig. 1). The coracoacromial ligament was released from the coracoid attachment. The pectoralis minor tendon was released from the medial aspect of the coracoid from the M portal. Drill holes were made on the coracoid using the drill guide (DePuy-Mitek Raynham, MA, USA). The coracoid graft was harvested along with the conjoint tendon using the curved osteotome (DePuy-Mitek Raynham, MA, USA) through the H portal. The undersurface of the coracoid graft and the medial spike of the osteotomized graft were trimmed to achieve good bone contact while fixation to the glenoid (Fig. 2). The subscapularis split was made after passing a switching stick from the posterior portal. The subscapularis split was intended at the level of superior 2/3rd and inferior 1/3rd of the muscle. The split was carried out until the visualization of the glenoid neck and the glenoid bed was prepared with the burr at the intended site of coracoid fixation. The coracoid graft was captured using the positioning cannula (DePuy-Mitek Raynham, MA, USA) used for arthroscopic screw Latarjet, and the graft was transferred through the subscapularis split using the cannula. The position of the graft was confirmed with the switching stick passed flush to the glenoid face. The graft was secured with two beath pins with suture eye drilling from anterior to posterior direction through the positioning cannula, superior beta hole, and inferior alpha hole, exiting the posterior aspect of the shoulder. The Nitinol wire loop was passed through a beath pin in the beta hole from the anterior to posterior direction, exiting the posterior aspect of the shoulder. One end of the cerclage FiberTape (Arthrex, Naples, FL, USA) was transferred from the posterior to anterior direction, exiting the anterior surface of the shoulder through the nitinol wire loop. Another nitinol wire loop was passed through the beath pin in the alpha hole from the anterior to posterior direction, exiting the posterior aspect of the shoulder. The already transferred end of the cerclage FiberTape was passed through the nitinol wire loop from the anterior surface of the shoulder and

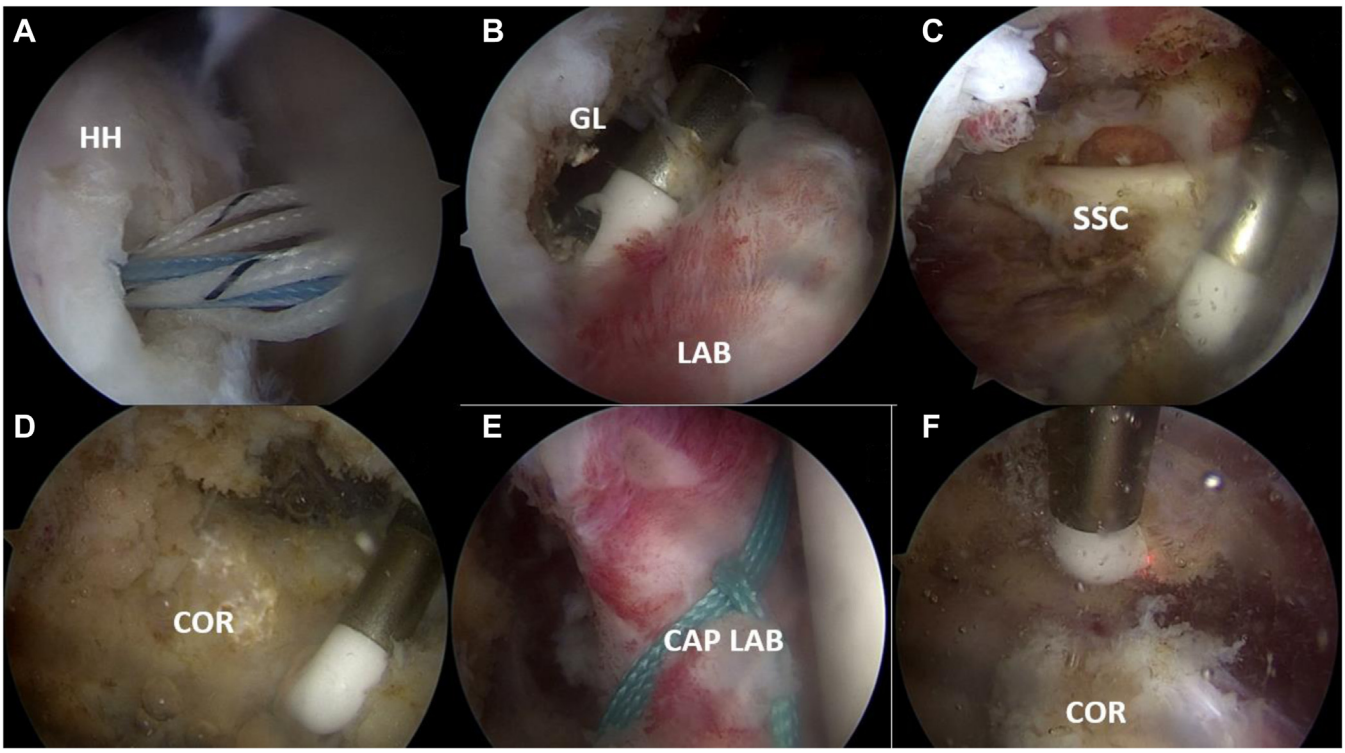

Figure 1 Right shoulder, beach chair position, arthroscopic view, 30° scope. (**A**) The Hill-Sachs lesion was addressed with remplissage with a triple-loaded suture anchor through a posterior portal, working from the accessory posterior portal. (**B**) The capsulolabral complex was detached from the glenoid neck visualizing from the posterior portal and working from the anterior portal. (**C**) The superior capsule and presubscapularis tendon space were released with an ablator visualizing from the posterior portal and working through the anterior portal. (**D**) The rotator interval was exposed, and the coracoid was freed of all soft tissue attachment with the ablator working from the anterior portal and visualizing from the posterior portal. (**E**) The capsulolabral complex was held with a cinch suture working through the anterior portal. (**F**) The pectoralis minor tendon was visualized from the J portal and detached with a radiofrequency probe working from the M portal. *HH*, humeral head; *GL*, glenoid; *COR*, coracoid; *CAP LAB*, capsulolabral complex; *SSC*, subscapularis.

taken out through the posterior aspect of the shoulder. Both ends of the cerclage FiberTape were secured from the posterior aspect of the shoulder, and the looping of the cerclage FiberTape was done as per the protocol. The cerclage FiberTape was interconnected, and tensioning was done with the tensioning device to achieve a maximum tension of 80N, overtensioning may result in graft fractures. The final construct was visualized, ensuring proper bony contact between the coracoid and glenoid neck and also there was no slack in the cerclage FiberTape construct. The entire process of tightening of cerclage FiberTape was visualized from portal J. The capsulolabral tissue was anchored to the glenoid face with a 2.7-mm Arthrex push-lock, leaving the coracoid in an extracapsular position (Fig. 3). The tightening of the remplissage suture anchors was done as the final step. The modifications done were glenoid drill holes made using the positioning cannula with freehand technique instead of the glenoid drill jig (Video 1).

Rehabilitation protocol

The patient's arm was immobilized with an arm sling for 6 weeks. Multidrug therapy and cryotherapy were used for pain control. Shoulder shrugs and assisted elbow flexion with hand grips were initiated from day 1. Passive and active assisted forward flexion and external rotation were initiated from week 2 to attain 180 degrees of forward flexion and 45 degrees of external rotation at the end of week 6. Active shoulder movements and strengthening exercises were started in week 6 to attain a full range of motion and muscle power at the end of week 12. Contact sports were allowed after 6 months after ensuring good graft union in follow-up CT scans. Regarding return to sports, a more cautious approach was employed for one patient with coracoid graft nonunion, who ultimately resumed contact sports (kabaddi) after 9 months.

Results

Demographics

Ten patients underwent an arthroscopic Latarjet procedure with cerclage FiberTape (all males) with an average age group of 28 ± 8.8 years (range 18-50). Six out of 10 patients were operated in their dominant shoulder. Three patients were involved in active contact sports, and one patient had a history of failed Bankart repair in the past. The average glenoid bone loss was 16 ± 4.0% (range 10-25%), and 6 patients had off-track Hill-Sachs lesions. Seven patients had glenoid defects ≥15% (range 15-25%), and 3 patients had ≥10% (range 10-14%) with associated ISI scores >6. The average follow-up period was 13.2 months. One patient had reached a follow-up of 24 months, and nine patients had a follow-up period of 12 months. (Table I).

Pain scores

The pain scores during arm motion were recorded with VAS score. VAS scores were reduced from preoperatively mean 3.7 (range 0-6) to postoperatively mean 1 (range 0-2) at the final follow-up.

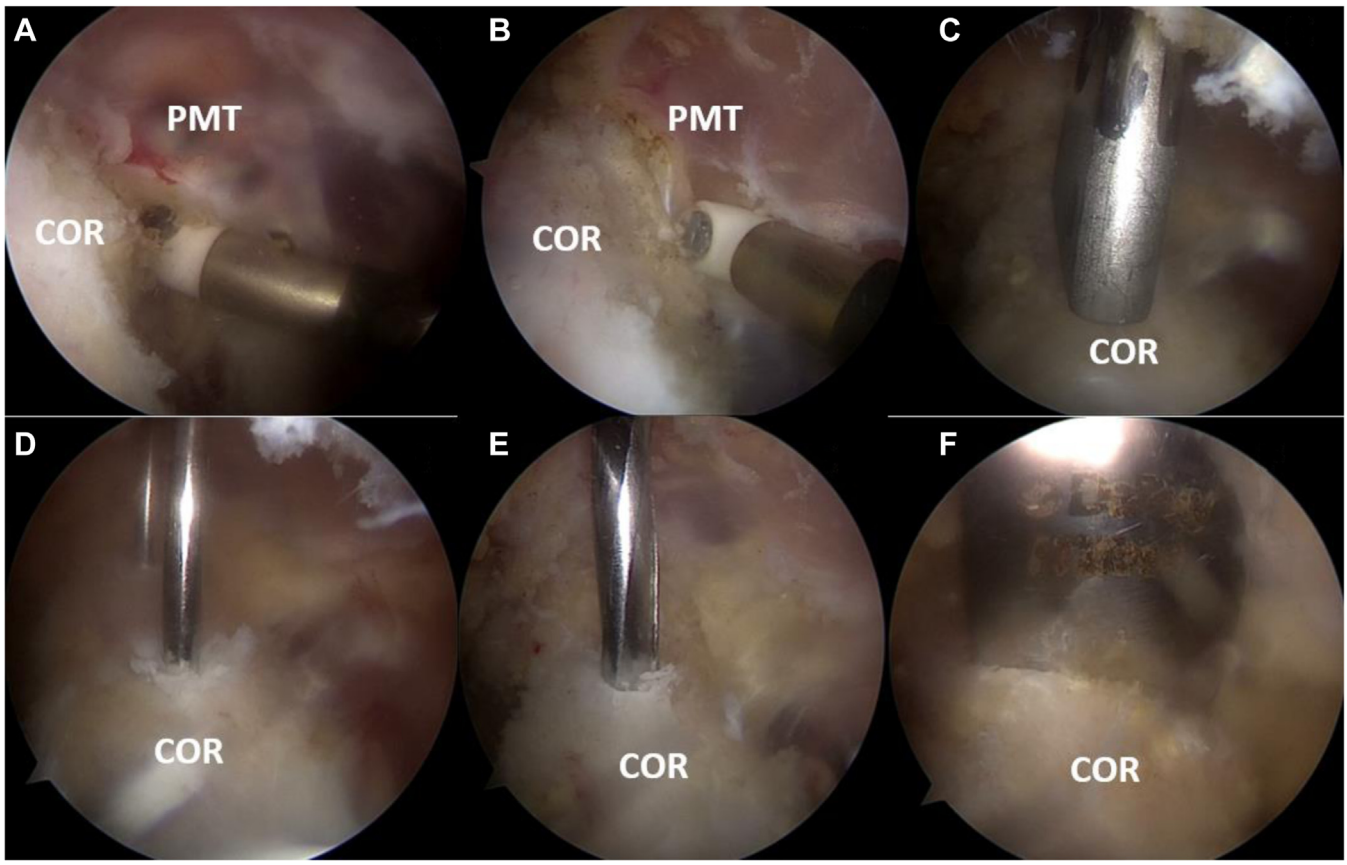

Figure 2 Right shoulder, beach chair position, arthroscopic view, 30° scope. (**A** and **B**) The pectoralis minor tendon was detached from the medial part of the coracoid working from the M portal and visualizing from the J portal. (**C**) Coracoid drilling is done with a specific jig through the H portal. (**D**) K wires drilled through both alpha and beta holes. (**E**) Over-drilling done over the k wires. (**F**) Coracoid osteotomy is done with osteotome (Depuy Mitek). *PMT*, pectoralis minor tendon; *COR*, coracoid.

Clinical assessment

Results of range of motion assessment at one year follow-up are displayed in Table II. None of our patients had clinical evidence of neurological compromise. There were no complaints suggestive of symptomatic hardware.

Functional outcomes

At the final follow-up, the median and individual functional scores had significantly improved in all patients in both the union and nonunion groups. The mean ASES, Rowe, Walch-Duplay, and VAS scores were 95 (range 88-100), 94.5 (range 90-100), 87 (range 70-100), and 1 (range 0-2), respectively. None of our patients had any episodes of subluxation or instability.

Radiological assessment

a) **Graft position:** Graft position was found flush in 5 patients, and 2 patients had a graft in the medial position. Three patients showed graft loosening and migration of the graft by more than 0.5 cm in follow-up CT. In the vertical plane, all the united coracoid grafts were found to be subequatorial.
b) **Graft healing:** Seven patients showed good union of the coracoid healing in the final follow-up CT scan (Fig. 4, *A* and *B*).
c) **Osteolysis:** No osteolysis of the coracoid graft and no widening of the glenoid tunnels were noted.
d) No coracoid graft fracture or intra-articular penetration of the graft tunnel was noted.

Patients who had achieved union of coracoid graft were referred to as being in “graft union group,” and those who had nonunion of coracoid graft were in “graft nonunion group.” (Table II). The mean postoperative ER1 and ER2 were significantly higher than the respective preoperative values (mean preoperative ER1 = 54 vs. 68.5 postoperatively, mean preoperative ER2 = 49 vs. 67 postoperatively). However, despite this amelioration, the mean postoperative ER1 and ER2 remained lower than the respective values of the opposite shoulder (mean ER1 76.5 and mean ER2 75).

Statistical analysis

A statistically significant improvement, defined by *P* value less than 0.05, was seen in all functional outcome scores (ASES, VAS, Walch-Duplay, and Rowe scores), ER1, ER2 and IR2 of the coracoid graft union group. Although significant improvements were seen in the graft nonunion group, reflecting those in the graft union group, the authors refrained from emphasizing a statistical comparison of these two groups bearing in mind the overall small sample size, compounded by the discrepancy in number of patients between the two groups. No statistically significant correlation was found between ISI score, Beighton score, and number of preoperative dislocations to the functional and clinical outcomes. (Table III). However, the authors express caution in their interpretation of this finding given the small sample size.

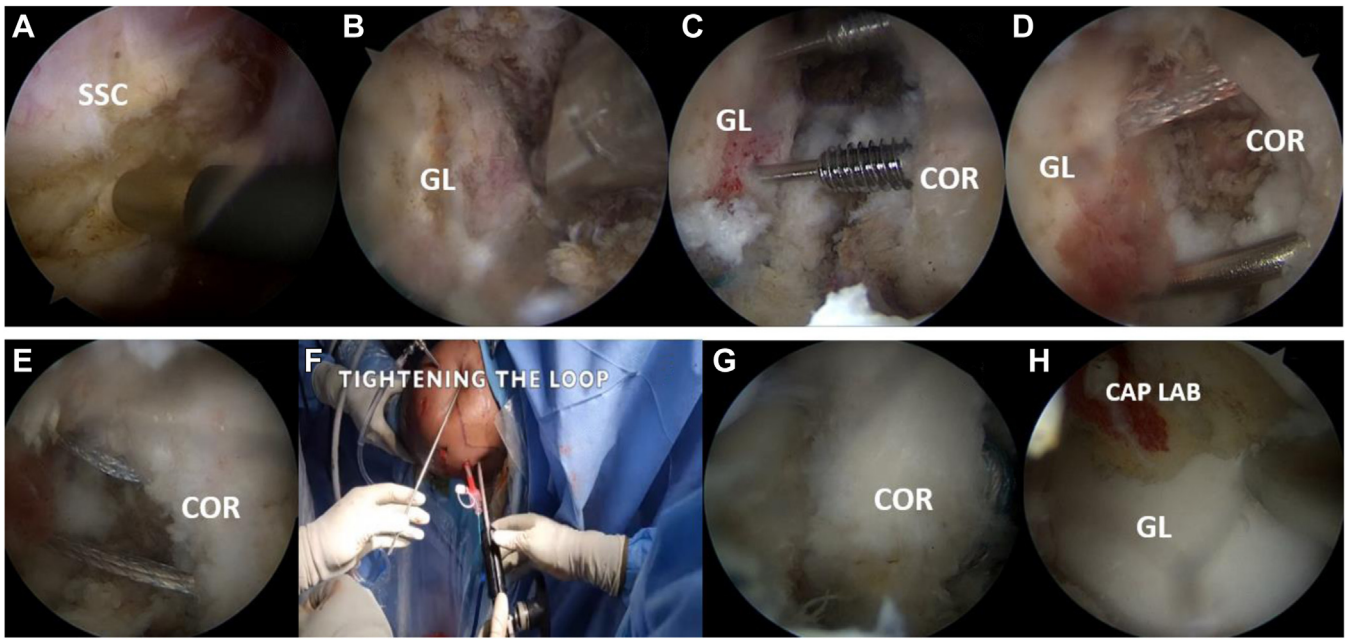

Figure 3 Right shoulder, beach-chair position, arthroscopic view, 30° scope. (**A**) Subscapularis split done working from the M portal and visualizing from the J portal. (**B**) Glenoid bed prepared with a burr to receive the coracoid graft working from the M portal and visualizing from the J portal. (**C**) Drill holes made in glenoid bed and coracoid graft kept in place through M portal, visualizing from J portal, K wires drilled in glenoid bed and over reaming done working from M portal, visualizing from J portal. (**D**) Cerclage FiberTape passed from posterior to anterior direction through beta hole working from M portal and visualizing from J portal. (**E**) Cerclage FiberTape also passed from anterior to posterior direction through alpha hole working from M portal and visualization from J portal. (**F**) Tightening of cerclage FiberTape using a tensioning device from the posterior portal. (**G**) Well-reduced coracoid graft visualized from J portal. (**H**) Capsulolabral complex reattached with 2.7 mm push lock (Arthrex, Naples, FL, USA). *COR*, coracoid; *CAP LAB*, capsulolabral complex; *GL*, glenoid; *SSC*, subscapularis.

Table I
Patient demographics.

Age, mean ± SD (range)	28 ± 8.8 (18-50)
Sex, male/female	10 males
Side, right/left	6 right/4 left
Glenoid bone loss	
>20%	2
>15-20%	5
>10-14%	3
Bankart failure	1
Glenoid tracking	
Off-track	6
On-track	4

SD, standard deviation.

Complications

Out of the ten patients, three showed coracoid graft loosening and migration in their 3rd monthly follow-up CT scans. The CT scans showed migrated graft (>0.5cm) with intact coracoid tunnels (Fig. 4, *C* and *D*). All three patients were kept under follow-up beyond the study period for recurrence of instability; they have had no symptoms of subjective instability. None have required any further interventions to date. There were no infection or neurovascular complications in our study. No symptoms related to symptomatic hardware were reported.

Discussion

In our study, we found out that Latarjet surgery using cerclage FiberTapes had high incidences of graft nonunion and migration in follow-up, without recurrence of instability or additional surgeries. The traditional Latarjet procedure using two metal screws was time-tested and effective in treating recurrent anterior instability.[18,23] Long-term follow-up studies of the Latarjet procedure with metal screws demonstrated complication rates between 15% and 30%.[3,1,11] The short-term follow-up of arthroscopic Latarjet also demonstrated 24% complication rates at 3 months.[1]

Implant-related complications following the Latarjet procedure were reported to be between 6.5% and 46%.[3] Screw-related complications such as intra-articular screw prominence, screw breakage, screw bending, early arthritic changes of the humeral head, and soft tissue irritation (irritation of capsular tissue, subscapularis, or infraspinatus muscle) have been reported.[4,11] Iatrogenic injury of the suprascapular nerve has been reported with anterior to posterior drilling and prominent screws.[17] Long-term studies following the arthroscopic Latarjet procedure by Lafosse reported 12.5% revision surgeries for screw removal.[6] Intraoperative graft fractures following metal screws were reported at around 7%, more common in young females with small coracoid grafts and excessive screw tightening.[1] None of these complications were found in our study.

To reduce screw-related complications, other modes of fixation devices were tried by different authors. Bioabsorbable screws were used for graft fixation, but the long-term follow-up studies reported an increased rate of graft osteolysis and recurrent instability warranting revision surgeries.[2] Mini-plate fixation of the coracoid graft demonstrated superior fixation strength over screw fixation.[8,7] Chaudhary et al demonstrated satisfactory outcomes after mini-plate fixation,[5] while mini-plate fixation needed extensive soft tissue dissection and caused soft tissue irritation. Suture button fixation demonstrated good outcomes with good union rates of bone block and also reduced revision surgeries when compared to metal screws.[3] Hardy et al reported an increased risk of redislocation with suture button fixation compared to metal screws.[13] Compared to rigid and metal implants, the potential benefits of using cerclage FiberTape were avoiding magnetic resonance

Table II
Clinical data, preoperative, and postoperative range of motion values and scores.

Patient	Age (years)	Date of surgery	Comments	Affected shoulder	Shoulder dominance	PreOp dislocations	ISI Score	Activity level	Beighton	GBL (%)	PreOp FF A/P	PreOp ABD A/P	Pre Op ER1	PreOp ER2	Pre Op IR1	PreOp IR2	PreOp ASES	PreOp Walch Duplay	PreOp Rowe	PreOp VAS	PreOp Apprehension	Post Op FF A/P	Post Op ABD A/P	PostOp ER1	PostOp ER2	PostOp IR1	PostOp IR2	PostOp ASES	PostOp Walch Duplay	PostOp Rowe	Post Op VAS	PostOp Apprehension	Post Op CT findings
1	30	Feb-21		Right	Right	10	4	gym-fitness	0	18	180/180	180/180	60/70	50/70	D7/D7	80	44	20	55	2	positive	180/180	180/180	65	60	D7	85	98	90	95	1	Negative	Coracoid graft - bony union
2	17	Jul-21		Left	Left	5	7	Kabaddi	8	13	180/180	180/180	70/90	60/80	L1/D5	40	55	0	40	3	positive	180/180	180/180	80	75	D8	80	98	90	95	0	Negative	Coracoid graft - non union
3	17	Jul-21		Right	Left	4	7	Basketball	2	14	160/180	160/180	30/70	30/70	L1/D7	30	53	10	35	5	positive	180/180	180/180	60	60	D6	80	100	100	100	0	Negative	Coracoid graft - bony union
4	50	Aug-21	Failed Bankart	Right	Right	4*	2	bi weekly exercises	6	15	180/180	180/180	70/90	70/90	D10/D9	65	56	30	55	5	Negative	180/180	180/180	75	75	D10	75	95	80	95	1	Negative	Coracoid graft - bony union
5	26	Aug-21		Right	Right	10	2	tri-weekly exercises	6	15	180/180	180/180	45/80	45/80	D12/D6	55	53	20	40	1	positive	180/180	180/180	70	70	D7	80	98	80	100	0	Negative	Coracoid graft - bony union
6	33	Aug-21		Left	Left	15	2	daily exercises	5	16	180/180	180/180	45/80	45/80	D12/D9	60	48	15	25	4	positive	180/180	180/180	75	75	D9	85	93	90	95	1	Negative	Coracoid graft - bony union
7	29	Sep-21		Left	Right	>15	4	gym-fitness	4	25	180/180	140/180	45/70	30/70	D12/D7	65	48	−10	15	4	positive	180/180	170/170	50	45	D9	75	88	80	90	2	Negative	Coracoid graft-nonunion
8	34	Sep-21		Right	Left	8	2	light exercises	4	16	170/180	160/180	45/80	30/80	D12/D10	55	48	0	5	6	positive	170/170	170/180	70	70	D10	70	95	70	90	1	Negative	Coracoid graft-nonunion
9	26	Sep-21	Latarjet Left Shoulder	Right	Left	6	3	football-leisure	8	18	150/180	160/180	45/50	45/45	L1/L1	30	45	15	30	3	positive	180/180	180/180	60	60	D10	60	95	100	95	1	Negative	Coracoid graft-bony union
10	18	Mar-22		Left	Left	5	8	Basketball	8	10	180/180	180/180	85/85	85/85	D5/D5	90	54	30	40	4	positive	180/180	180/180	80	80	D6	90	90	90	90	2	Negative	Coracoid graft - bony union

PreOp, preoperative; *PostOp*, postoperative; *ER1*, external rotation with arm in adduction (compared to opposite side); *ER2*, external rotation with arm abducted at 90 degrees (compared to opposite side); *IR 1*, internal rotation expressed as vertebral level reached (compared to opposite side); *IR 2*, internal rotation at 90 degrees abduction (compared to opposite side); *PreOp Dislocations*, number of episodes of dislocations before surgery; *GBL*, preoperative glenoid bone loss on CT scan by Sugaya Method; *CT*, computed tomography; *FF*, forward flexion; *ABD*, abduction active; *A/P*, active range/passive range; *VAS*, visual analog score; *ISI Score*, Instability Severity Index Score; *, After the index surgery; *Beighton*, Beighton score; *ASES*, American Shoulder and Elbow Surgeons score; *Rowe*, Rowe score; *Walch Duplay*, Walch Duplay score.

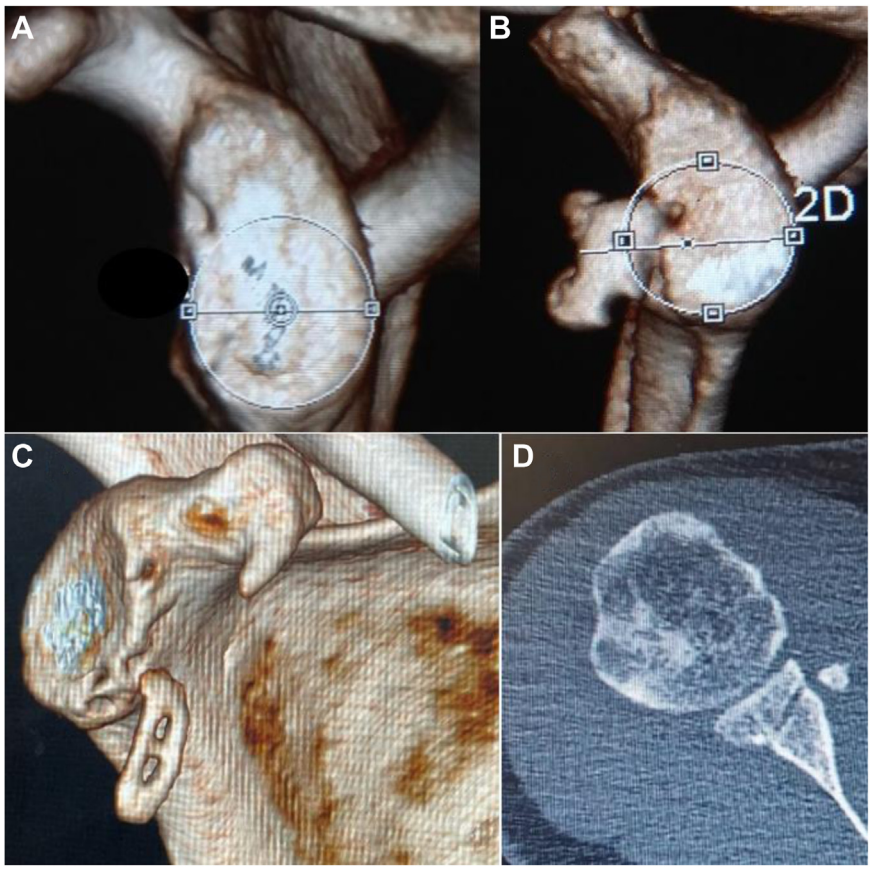

Figure 4 (**A**) Preoperative CT scan with glenoid bone loss. (**B**) Three-month follow-up CT after surgery demonstrating well-positioned and united coracoid graft. (**C** and **D**) Coracoid graft loosening with migration in a 3-month postoperative CT scan. *CT*, computed tomography.

Table III
Median values of preoperative and postoperative range of motion and scores using NPAR test, including the respective *P* values determined by Wilcoxon signed-ranked test.

	Graft nonunion group		Graft union group	
	Median value	*P* value	Median value	*P* value
PreOp FF A	180.0		180.0	
PostOp FF A	180.0	1.000	180.0	.180
PreOp ABD A	160.0		180.0	
PostOpABD A	170.0	.180	180.0	.157
PreOp ER1	45.0		45.0	
PostOp ER1	70.0	.109	70.0	.041
PreOp ER2	30.0		45.0	
PostOp ER2	70.0	.102	70.0	.034
PreOp IR2	55.0		60.0	
PostOp IR2	75.0	.109	80.0	.027
PreOp ASES	48.0		53.0	
PostOp ASES	95.0	.109	95.0	.018
PreOp Walch Duplay	0.0		20.0	
PostOp Walch Duplay	80.0	.102	90.0	.018
PreOp Rowe	15.0		40.0	
PostOp Rowe	90.0	.109	95.0	.018
PreOp VAS	4.0		4.0	
PostOp VAS	1.0	.109	1.0	.018

NPAR, non parametric test; *PreOp*, preoperative; *PostOp*, postoperative; *ER1*, external rotation with arm in adduction; *ER2*, external rotation with arm abducted at 90 degrees; *IR 1*, internal rotation expressed as vertebral level reached; *IR 2*, internal rotation at 90 degrees abduction; *FF A*, active forward flexion; *ABD A*, active abduction; *VAS*, visual analog score; *ASES*, ASES score; *Rowe*, Rowe score; *Walch Duplay*, Walch Duplay score.

imaging artifacts, reducing the chances of implant prominence, and reducing the risks of implant breakage being symptomatic.

Cerclage FiberTape fixation of the coracoid graft was the newest innovation that aimed at reducing implant-related complications while also providing good graft union rates and functional outcomes following the procedure.[12] The biomechanical studies analyzing the fixation strength of the cerclage FiberTape and follow-up studies following the cerclage FiberTape Latarjet are not available in the literature at present.

The authors of the current study of cerclage FiberTape fixation assumed that the initial results following the procedure were not favorable due to increased rates of coracoid graft nonunion with migration. Thus, the hypothesis of the authors that cerclage FiberTape fixation could provide sturdy fixation of the coracoid graft was rejected. However, despite the high rates of graft loosening, none of the patients experienced any further episodes of redislocation until the date of follow-up. The authors consider that the remplissage procedure and capsulolabral tissue reattachment done along with the Latarjet helped in maintaining the stability of the shoulder.

Long-term results of the Latarjet procedure with metal screws reported graft nonunion rates of around 9.1%.[10] Hovelius et al reported 83% union rates with 14% graft migration in their long-term follow-up in open Latarjet with metal screws.[14] Boileau et al in their follow-up study of Latarjet using cortical button reported 95% graft union rates with one case of graft migration[3] and nonunion rates of 20% in another study by the same author.[4] Graft migration was calculated as a gap of 0.5 cm or more between the glenoid bed and

the coracoid graft.[14] Our study using cerclage FiberTape for graft fixation demonstrated graft loosening and migration gaps in three of the total ten patients (30%), which were higher and more significant.

One of the salient findings that stood out were the good to excellent functional outcomes, irrespective of the status of coracoid graft union. Despite the small sample, the procedure employed in our study yielded functional outcomes that are at par with published literature on arthroscopic Latarjet using suspensory type of fixation.[9] Apart from one patient who had a postoperative external rotation that was 5 degrees less than the preoperative value, all patients either regained or improved their external rotation. However, the mean postoperative ER1 and ER2 of the affected shoulder were less than those of the opposite shoulder, a deficit attributed to the remplissage,[16] as well as the Latarjet procedure,[4] which was not specifically complained of by any of the patients.

The authors reported that the chances of implant cut-out were negligible as the integrity of the drill holes in the coracoid graft was maintained in follow-up CT scans. The authors suspected several possibilities for early graft loosening. First, securing the FiberTape fixation in the posterior aspect of the glenoid was a blind procedure. The soft tissue interposition between the glenoid and the FiberTape may lead to early loosening. The authors suspect that fixation of the coracoid graft with cerclage FiberTape was not sturdy enough to withstand the aggressive fast-track rehabilitation protocol usually employed for their patients who have undergone Latarjet with screw fixation, probably being another factor accounting for high rate of graft loosening.

There were several limitations to this study. First, this was a single-center study with a limited number of patients operated on by a fellowship-trained shoulder surgeon. Second, this was a short-term follow-up study. Long-term follow-ups to analyze graft remodeling and osteolysis are warranted. The authors concede that an additional CT scan in the immediate postoperative period would have enabled the differentiation between loosely apposed coracoid graft intraoperatively from postoperative graft loosening as well as distinguishing intraoperative malreduction from postoperative loss of reduction. More studies with longer-term follow-ups and a more significant number of patients were needed to decide on the future use of the cerclage FiberTape.

Conclusion

Our study demonstrated that arthroscopic Latarjet using cerclage FiberTape fixation combined with remplissage and capsulolabral repair resulted in a high rate of graft loosening and migration (30%). Nonetheless, patients in whom the coracoid graft had united, as well as those in whom it had not, all had good to excellent functional and clinical outcomes, no complications, and did not require any revision surgery.

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Supplementary Data

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