International Journal of Research in Orthopaedics
Prashanth BN. Int J Res Orthop. 2023 Jul;9(4):751-756
http://www.ijoro.org

Original Research Article

DOI: https://dx.doi.org/10.18203/issn.2455-4510.IntJResOrthop20231997

Clinical outcomes of primary Latarjet technique in recurrent shoulder dislocation using BioLatarjet® LCS cannulated flat head screws

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Received: 18 April 2023
Revised: 11 May 2023
Accepted: 18 May 2023

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ABSTRACT

Background: The Latarjet technique is an effective procedure that reconstructs and augments the glenohumeral joint instability. It improves stability by increasing the glenoid width and using the sling effect. The aim of the study was to assess the functional outcomes of the primary Latarjet treatment with BioLatarjet® LCS cannulated flat head screws in cases of recurrent shoulder dislocation.
Methods: In this retrospective study, 30 patients were treated with the primary Latarjet technique. Rowe score, visual analog scale (VAS), Quebec back pain disability scale (QDS), and, American shoulder and elbow surgeon score (ASES), and range of motion (ROM) were evaluated in the selected population at the time point of 6-week, 3-month, and 6-month after surgery for the determination of the functional outcomes in them.
Results: The results showed that all patients had excellent or good functional outcomes with significant improvements in Rowe score, VAS score, QDS, and ASES scores ($p<0.0001$). The ROM in patients for forward elevation, cross body adduction, external rotation by side of body/neutral, and internal rotation by side of body/neutral were related to better clinical outcome and less movement of recurrent instability with optimal graft placement.
Conclusions: These findings have clinical significance in that they demonstrate the effectiveness of the Latarjet technique in improving stability without significantly increasing the risk of complications. The BioLatarjet® LCS cannulated flat head screws were found to be safe and efficient for primary Latarjet surgeries, providing appropriate graft healing and a low recurrence of instability, with a good return-to-sports rate.

Keywords: Instability, Primary Latarjet technique, Recurrent dislocation, Shoulder

INTRODUCTION

The shoulder joint in the human body is more prone to instability.[1] Recurrent instability is a typical complication of anterior shoulder dislocation, occurring in up to 60% of patients following arthroscopic soft tissue stabilization when there is severe attritional glenoid bone loss.[2,3] Glenoid bone abnormalities can be reconstructed with iliac crest autograft, allograft, or coracoid transfer. This recurrence is caused by a number of biomechanical alterations.[2] The inclination for recurrence is governed by the type of capsulolabral lesion observation.[4] In addition to assuring a restoration to functionality, definitive treatment of instability is essential for reducing the prevalence of degenerative arthropathies.[3] The Bankart procedure (open or arthroscopic) is an anatomical surgical procedure that associates repair of the capsulolabral components and the inferior glenohumeral ligament to the anterior bony glenoid rim and is most habitually used to treat anterior glenohumeral instability.[4] The Latarjet technique is a non-anatomical bone-block surgery that moves the coracoid process to the anteroinferior edge of the glenoid and offers adequate clinical results with few complications and osteoarthritis progression.[5] A threefold effect provides an

explanation for the procedure's effectiveness: the anterior glenoid's bony repair, which increases the glenoid articular arc; the effect of the newly propped conjoint tendon when the arm is carried off and externally rotated, where it functions as a sling on the inferior subscapularis and anteroinferior capsule, and the effect of mending the capsule to the stump of the coracoacromial ligament on the coracoid.[6] It is an efficient procedure for the treatment of anterior glenohumeral joint laxity.[7] With promising early results, the Latarjet procedure has recently been reported in conjunction with arthroscopic technique and is now being considered as the preferred treatment for recurrent instability in high-risk contact athletes, even in the presence of minor osseous insufficiency.[4,8,9] The Latarjet procedure has proved to be reliable method for treating recurring anterior shoulder instability with considerable bone loss in both the general population and as a primary or secondary procedure.[3] In young athletes, the procedure has demonstrated good long-term outcomes despite the risk of complications like pain, nerve damage, and bone-block nonunion or malposition.[10,11] Arthroscopic Latarjet is being increasingly performed, though evidence supporting this approach is limited but promising. The modified Latarjet procedure has shown stability in both primary and revision procedures, with no instances of recurrence after failed surgical repair for anterior shoulder instability.[12] The objective of this study is to examine the role of the primary Latarjet procedure in the treatment of recurrence after repair(s) for anterior glenohumeral instability. In contrast to the healthy contralateral side, we anticipated that the primary open Latarjet operation is linked to long-term reductions in internal rotation (IR), external rotation (ER), and strength, as well as subscapularis muscle atrophy and increased fatty infiltration.[13]

METHODS

This retrospective study has received approval from the institutional review board. The study was conducted at Sparsh Hospital, Bommasandra, India and the patients were enrolled form the duration of August 2019 to February 2021. A total of 30 patients who underwent the Primary Latarjet procedure using cancellous bone screws for shoulder dislocation surgery for 6-month of time point were included in our study. Based on a patient's medical history, clinical examination, and radiological results, the Latarjet procedure was carried out. For a period of 6-month, our centre screened the patient who underwent surgery for recurrent shoulder dislocation. Patients who had undergone previous shoulder stabilisation procedures, acute instability (or at least two episodes of instability), an unstable painful shoulder, concomitant epilepsy, voluntarily unstable, or had a rotator cuff injury were excluded.

Device description

Rapid consolidation of the bone block is paramount for the success of the Latarjet procedure, where fixation is typically achieved using BioLatarjet® LCS cannulated flat head screws (Chetan Meditech Pvt. Ltd. Ahmedabad, India) for optimal compression and contact. The cancellous screw is a low-profile head device for reducing soft tissue irritation. Low-profile cancellous screws and barbed washers provide continued strength for securing soft tissue to bone. The BAL-26.30. FH-LCS cannulated flat head screw, self-tapping, with diameter of 3.75 mm, and length of 30 mm used for the treatment of recurrent shoulder dislocation where the flat head screw provides a flat surface on the coracoid to minimize stress risers and coracoid fractures. The 3.75 mm cancellous thread used, provides compression lag effect and pull-out strength.

Surgical technique procedure

The patient was instructed to sit in the position of a beach chair while under general anaesthesia utilizing an interscalene block. From the tip of coracoid, a 4-5 cm distally extended incision was made and a deltopectoral interval was created. The coracoacromial ligament was then found, incised, and a 1.5 cm tissue clump was left behind. The pectoralis minor was separated from the coracoid's medical aspect before an arthroscopy was performed utilising an oscillating right angle point at the junction of the horizontal and vertical aspects in order to harvest a 2.5 cm to 3 cm block of coracoid bone for the shaft. The graft was carried using a coracoid holding forceps and twisted after assembly to clean and develop its posterior aspect so that a flat cancellous surface could be achieved using a saw. The coracoid was held with the parallel drill guide and 2.7 mm solid drill bit was used to drill the coracoid. At the point where the inferior one third and superior two thirds meet; a subscapularis fissure was created. Retractors were made available to allow for glenoid exposure: (a) In the middle of the subscapularis fossa, Kolbel retractor was located (b) A 4 mm pin was inserted in superior glenoid neck to recollect the superior subscapularis and (c) Hohmann retractor was inserted on the inferior of subscapularis and below the inferior glenoid neck. The knife was used to create a vertical capsulotomy at the level joint line. Using capsulotomy, the anterior capsule and humeral head were laterally retracted before a Trillat humeral head retractor was inserted into the joint.

The anterior labial lesion was removed along with the bone Bankart fragment, if present, because the anterior glenoid was clearly visible. An osteotome was used to create the anterior glenoid to provide a flat, decorticated surface with bleeding bone. First, 1.2 mm threaded guidewires were passed form the 2.7 mm cannulated drill sleeve and were added medially and parallel to the glenoid joint line at the 5 o'clock position (for the right shoulder) or the 7 o'clock position (for the left shoulder). To protect the brachial plexus and prevent any further potential invasion on the surrounding soft tissue, a trocar was utilized. The trocar was removed, and the pin's location was found.

The inferior bicortical hole in the glenoid was created by drilling over the pin with a 2.7 mm cannulated drill bit. A

gauge was used to determine the length of the screw needed to attach the graft to the glenoid after it had been recovered and put with the grip over the inferior drill hole. Temporarily affixing the graft, a 4.5 mm titanium partially interlaced cannulated low-profile screw was inoculated over the pin. However, the screw was left undone in case minor adjustments were required to confirm that the superior graft was positioned along the joint line to prevent lateral swelling of the graft. The inferior screw was fully compressed to position the graft without applying too much pressure and the graft had been placed appropriately. The superior hole of the coracoid graft was used to hollow out the superior biocritical hole in the glenoid. Finally, to complete the final graft attachment, the superior screw's length was measured with a gauge and tightened.

After the graft was connected to the anterior gland, the trillant humeral head retractor was released. Along with the arm in outward rotation, the anterior capsule was stitched to the coracoacromial ligament remnant clump. After the skin was stitched, dressing was applied.

Postoperative management

For two weeks, the patients' arms were twisted internally in a brace. The 30th postoperative day marked the start of rehabilitation with a physiotherapist, which involved passive and painless incremental mobility recovery. Up to complete passive mobility recovery, no physical workouts, work with weights, or pulling on pulleys was permitted. Only those who had fully fused their radiographic grafts and regained their mobility were permitted to return to sports after six months.

Outcome measures

Patients were evaluated for functional status with a questionnaire that included Rowe score covering 3 domains that are instability, range of motion and function. The visual analogue scale (VAS) was used in patient population for the visual assessment of pain (VAS).[14,15] In addition to this, the other instrument used in the study was Quebec back pain disability scale (QDS) questionnaire that includes various activities and situations where the pain rate is questioned and American shoulder and elbow surgeon shoulder (ASES) score for a patient self-evaluation of the activities of daily living.[15,16] The outcome of the anterior shoulder instability following the open Latarjet procedure was assessed terms of range of motion forward elevation (ROM FE), ROM cross body adduction (CBA) , ROM ER by side of body/neutral (ER1), ROM ER2, ROM IR.[17]

Statistical analysis

A total of 30 patients per group were planned to be recruited for the study. Considering the small number of patients involved in this study, no sample size was calculated based on the endpoint hypothesis. However, the minimum number of patients needed to produce accurate results using a non-probability sampling method was evaluated in order to establish the sample size needed. As a result, the trial was planned to enrol approximately 30 patients each group. All the statistical analyses were performed using SPSS Version 23 (IBM2013). Mean, median, interquartile ranges, and standard deviations were calculated. Descriptive statistics were used for demographic characteristics. The p-value <0.05 was considered to be statistically significant and confidence intervals were set at 95%.

RESULTS

The average age of patients was found to be 34.03±5.95. Out of which, 29 (96.67%) were males and 01 (3.33%) were females. In this study, 19 patients had history of smoking. Total 20 (66.67%) had road traffic accident, 03 (10.00%) had slip and fall history and 07 (23.33%) had sports injury. The type of sports involved was contact in 11 (36.67%) patients, no sports in 05 (16.67%) patients and recreational in 07 (23.33%) patients. In this study the patients having previous dislocation have mean score of 5.13±2.08 (Table 1).

Table 1: Demographic detail and pre-operative functional assessment.

Parameter	N=30
Age, Years, Mean±SD	34.03±5.95
Gender, n (%)	
Male	29 (96.67)
Female	01 (3.33)
S.A., n (%)	
Left	10 (33.33)
Right	20 (66.67)
D.A., n (%)	
Left	9 (30.00)
Right	21 (70.00)
Smoker, n (%)	
Yes	19 (63.33)
No	11 (36.67)
Mode of injury, n (%)	
Road traffic accident	20 (66.67)
Slip and fall	03 (10.00)
Sports	07 (23.33)
Type of sport involved (%)	
Contact	11 (36.67)
No sport	05 (16.67)
Recreational	14 (46.67)
No. of previous dislocation, Mean±SD	5.13±2.08

N-number of subjects, S.A.-surgical arm, S.D.-dominant arm

The outcomes in the patients at different follow-up period starting from pre-op, 1-month, 3-month, and 6-month are shown in the table respectively. There was statistically (p<0.0001) significance in Rowe score at all the time periods from pre-op to 6-month. There was a gradual

increase in all the follow-ups starting from baseline with a mean difference of Rowe score from 24.00±8.75 to 94.83±0.91 at 6-month follow-up period (Table 2). VAS showed significant decrease in the score from 6.93 ± 0.94 at pre-op to 0.10 ± 0.31 at 6-month follow-up (p<0.0001) time point that indicated the improvement in condition of patients. There was gradual decrease in score from pre-op to 6-month with mean score difference 6.93±0.94 to 0.1±0.31 (Table 3). Similarly, QDS score shows statistically significance with p-value <0.0001, there was steep increase in mean score from pre-op to 6-month with mean score 43.71±8.54 to 11.30±6.08 (Table 4).

Table 2: Rowe score in patients at different follow-up periods.

Parameter	Follow-up period	Mean	SD	P value
Rowe score	Baseline	24.00	8.75	-
	1-month	54.67	9.00	<0.0001
	3-month	57.50	6.66	<0.0001
	6-month	94.83	0.91	<0.0001

SD-standard deviation

Table 3: Visual Analog scale in patients at different follow-up periods.

Parameter	Follow-up period	Mean	SD	P value
VAS	Baseline	6.93	0.94	-
	1-month	3.47	0.51	<0.0001
	3-month	1.03	0.96	<0.0001
	6-month	0.10	0.31	<0.0001

VAS-visual analogue scale, SD-standard deviation

Table 4: QDS in patients at different follow-up periods.

Parameter	Follow-up period	Mean	SD	P-value
QDS	Baseline	43.71	8.54	-
	1-month	31.35	6.89	<0.0001
	3-month	19.63	6.13	<0.0001
	6-month	11.30	6.08	<0.0001

QDS-Quebec back pain disability scale, SD-standard deviation

Table 5: ASES in patients at different follow-up periods.

Parameter	Follow-up period	Mean	SD	P-value
ASES	Baseline	47.89	5.47	-
	1-month	68.67	7.52	<0.0001
	3-month	81.10	4.39	<0.0001
	6-month	91.05	4.13	<0.0001

ASES-American shoulder and elbow surgeons shoulder score, SD-standard deviation

There was statistically significance (p<0.0001) in ASES score at all the time periods from pre-op to 6-month and shows gradual increase in all follow-ups starting from baseline with a mean difference of ASES score 47.89±5.47 to 91.05±4.13 on 6-month follow-up (Table 5). Similarly, ROM FE score was statistically significance (p<0.0001) and show steep increase in mean score from pre-op to 6-month follow-up with mean score 146.33±13.36 to 155.67±7.74. Comparably in ROM CBA the p value was found statistically significance (p=0.0029) and shows consistent score at pre-op and 1-month follow-up with mean score 47.33±4.50 and in 3-month and 6-month follow-up with mean score 50.00±0.00. Similarly, ROM ER1 score shows statistically significance with p-value <0.0001, there was steep increase in mean score from pre-op to 6-month with mean score 56.17±6.11 to 70.00 ± 0.00. Likewise, ROM ER2 score was statistically significance (p <0.0001) with gradual increase from pre-op to 6-month with mean score difference 75.33±3.92 to 95.33±5.07. Lastly in ROM IR was found to be statistically significant (p<0.0001) and shows progressive score from pre-op to 6-month with mean score 56.33±5.40 to 69.50±1.53 (Table 6).

Table 6: ROM in patients at different follow-up periods.

Parameter	Follow-up period	Mean	SD	P-value
ROM FE	Baseline	146.33	13.26	-
	1-month	149.33	9.80	<0.0001
	3-month	151.00	6.07	<0.0001
	6-month	155.67	7.74	<0.0001
ROM CBA	Baseline	47.33	4.50	0.0029
	1-month	47.33	4.50	
	3-month	50.00	0.00	
	6-month	50.00	0.00	
ROM ER1	Baseline	56.17	6.11	-
	1-month	62.67	4.10	<0.0001
	3-month	65.67	2.54	<0.0001
	6-month	70.00	0.00	<0.0001
ROM ER2	Baseline	75.33	3.92	-
	1-month	78.33	3.56	<0.0001
	3-month	87.00	7.50	<0.0001
	6-month	95.33	5.07	<0.0001
ROM IR	Baseline	56.33	5.40	-
	1-month	58.50	2.33	<0.0001
	3-month	68.67	2.25	<0.0001
	6-month	69.50	1.53	<0.0001

CBA-cross body adduction, ER1-external rotation by side of body/neutral 1, ER2-external rotation by side of body/neutral 2, FE-Forward elevation, IR1-internal rotation by side of body/neutral, ROM-range of motion, SD-standard deviation

DISCUSSION

The most range of normal of glenohum Continued. s anterior glenohumeral dislocation followed by chronic anterior instability.[17] Patients with recurrent shoulder

instability and glenoid bone insufficiency are being treated with the Latarjet technique more frequently.[2] Reduced skin problems, reduced impairments (particularly in obese and muscular patients), lower surgical pain, less scarring, and speedier rehabilitation are just a few positives of this technique.[18] The Latarjet treatment uses a combination of bone and soft tissue mechanisms to restore stability to the shoulder.[4] The study's objective was to assess the biomechanical durability of BioLatarjet® LCS cannulated flat head screws (Chetan Meditech Pvt. Ltd. Ahmedabad, India) used to anchor the coracoid graft during the Latarjet operation. The accuracy of bone-block placing appears to have increased. Utilizing cannulated screws, participants in the current study attained satisfactory clinical evaluations. At the follow-up of 6-month, the ROW score was 94.83±0.91, VAS score was 0.1±0.31, QDS score was 11.30±6.08 and ASES score was 91.05±4.13 that indicated the improvement patient's condition post-surgical operation.

Latarjet surgery is graded as satisfactory procedure in preventing the future instability because low post-operative recurrence rates of shoulder dislocation rates. According to Chaudhary et al reported that 30 patients treated with open Latarjet procedure, they headed back to their workplace. No one claimed to experience repeated subluxations. Using the Rowe score and Walch Duplay score, functional assessment revealed statistically significant improvement (p=0.034).[19] Balestro et al demostarted that screw resorption turned out to be complete in 11 patients as the graft healed at 3-month follow-up and only one patient required the revision operation at the follow-up of 2 year.[20] Dumont et al stated that one patient had an episode of recurrent shoulder instability operated with arthroscopic Latarjet technique out of 62 patients at the follow-up of 76.4 months.[4] Similar to other studies, the following study found no postoperative recurrences or re-dislocations. We did not experience substantial joint stiffness or restriction of ER, despite the fact that numerous studies have documented shoulder stiffness and a significant loss of ER following this operation.

According to the current findings, neither preoperative nor concurrent supraspinatus repair significantly affected the clinical or radiographic results. At the follow-up 6-month time point, all patients in our study had relative constant scores of more than 90% and had improved range of motion. They also all assessed their overall outcome as good or excellent. None of the patients who were still employed were permanently unable to work or were receiving disability benefits. The post-operative complication was not observed in the patients treated with arthroscopic Latarjet technique for the recurrent shoulder dislocation. Neither more dislocation was detected indicating the efficacious outcome of the performed surgical technique for the treatment.

This study has some limitations. The primary drawback of our study was the use of a questionnaire to assess in small number of patients with short follow-up. The fact that our definition of dislocation excludes subluxation makes it possible to argue that it was overly limited (defined as a recurring shoulder dislocation). The study only covers short-term outcomes, and we cannot say anything about potential long-term complications like pain and arthritic changes.

CONCLUSION

Through use of a BioLatarjet® LCS cannulated flat head screws (Chetan Meditech Pvt. Ltd. Ahmedabad, India), our study aimed to emphasise the clinical results of primary Latarjet procedures in shoulder dislocation. In our study, we found that the mean score improved statistically significantly from pre-op to six months using all the different scales used to assess shoulder stability, motion, and function. The Latarjet procedure in patients provided the greater stability in patients and required the risk of re-injury. Latarjet procedures can therefore be thought of as a helpful alternative for shoulder dislocation because they are safe, well-founded, and produce improved patient-related outcomes, and have a good return-to-sports rate. The cancellous screw shown to be a safe and reliable solution that offers optimal graft recovery. In order to acquire more exact and pertinent data for the generalisation of the conclusion, it was determined that additional large-scale investigations on this subject are necessary.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Prashanth BN. Clinical outcomes of primary Latarjet technique in recurrent shoulder dislocation using BioLatarjet® LCS cannulated flat head screws. Int J Res Orthop 2023;9:751-6.