Anterior Shoulder Stabilization Latarjat Procedure

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Abstract

Background: The shoulder is the most mobile joint in humans; its wide range of movement predisposes to a high susceptibility to dislocation.

Aim and objectives: To evaluate the effect of latarjet procedure in anterior shoulder dislocation in primary and revision cases.

Patients and methods: This prospective cohort study was performed on 40 patients with recurrent anterior shoulder dislocation or failed bankart repair or bony bankart from October 2021 and April 2023. All patients were managed in Egypt, 10 cases were selected from outpatient clinic in Beni Sueif university hospital, 20 cases were selected from the outpatient clinic of Alhelal hospital, and rest of cases were diagnosed and managed in Cairo university hospital.

Results: There were 11 (27.5%) cases with Not Return pre injury level, 9 (22.5%) cases with Return to > 50% of pre injury level and 20 (50.0%) cases with Return to >75% of pre injury level. There was highly statistically significant difference between Pre, and Post 6 Months Regarding Rowe Score p=0.0001. There was highly statistically significant difference between VAS Pre Operative and Post Operative at rest and motion P=0.009.

Conclusion: Open Latarjet procedure is a safe and reliable technique for recurrent anterior shoulder instability. The Latarjet procedure provides good long-term stability although associated with a slight limitation in external rotation.

Key words: Anterior Shoulder Stabilization, Latarjat Procedure

INTRODUCTION

The shoulder is the most mobile joint in humans; its wide range of movement predisposes to a high susceptibility to dislocation. 50% of all joint dislocations involve the shoulder, particularly in young people. 95% of shoulder dislocations are anterior-inferior; posterior dislocations account for 3% and other types 2%. Dislocations of the shoulder may be traumatic or non-traumatic. When traumatic, they result from a direct force on the joint or an excessive vectoral force inducing humeral head dislocation. Non-traumatic dislocations may be associated with a dysplastic glenoid **[1,2]**.

Recurrent anterior shoulder dislocation is a common diagnosis in young, active people. Surgical stabilization of the glenohumeral joint is indicated when recurrent dislocation causes discomfort or when pathology is involved. Operative treatments vary, but all have the purpose of reinforcing the anterior and inferior aspect of the glenohumeral joint **[3,4]**.

Latarjet procedure may be a superior open surgical treatment for recurrent anterior glenohumeral dislocation, so long as the surgeon is familiar with the technique. Although it is a non-anatomical repair, it provides desirable functional resultwith respect to subjective postoperative range of motion, stability, and subjective scorings **[5]**.

The aim of this study was to evaluate the effect of latarjet procedure in anterior shoulder dislocation in primary and revision cases.

PATIENTS AND METHODS

This prospective cohort study was performed on 40 patients with recurrent anterior shoulder dislocation or failed bankart repair or bony bankart from October 2021 and April 2023.All patients were managed in Egypt, 10 cases were selected from outpatient clinic in Beni Sueif university hospital, 20 cases were selected from the outpatient clinic of Alhelal hospital, and rest of cases were diagnosed and managed in Cairo university hospital.

Inclusion criteria: Instability severity index score (ISIS) more than 6. Glenoid track instability manangement score (GTIMS) using 3D ct to asses off track (4 pionts).Bipolar defect. Anterior shoulder instability encompassing abony bankart lesion with glenoid loss more than 20%. Patients with severe soft tissue loss involving the anterior labroligamentous structures. Anterior glenoid rim deficiency.Failed bankart repair with no infectionor osteoartthritis. Large Hill Sachs lesion more than 40%of humural head.

Exclusion criteria: Posterior and inferior shoulder dislocation. Multidirectional shoulder instability. Patients ≤ 6 points according to I.S.I.S score.Instability associated with paresis of the deltoid. Rotator cuff and/or pericapsular musculature.The amount of humeral head defect was calculated in all patients using C.T with humeral subtraction to assess the Hill Sachs lesion, the amount of glenoid bone loss was calculated in all patients by using M.R.I Sagittal view.

Ethical consideration: All patients submitted for oral and written consent to be included in this study.

Methods

Radiological Evaluation

Amount of Humeral head loss

The amount of humeral head defect is calculated in all patients using C.T to assess the Hill Sachs lesion. The size of the Hill-Sachs lesion was measured on axial CT images where the size of the lesion was the largest. On the axial CT image, a virtual circle that included the articular surface of the humeral head was drawn. The width was defined as the distance between both ends.

The amount of glenoid bone loss

The amount of glenoid bone loss was calculated in all patients by using M.R.I Sagital view and we have proposed a simple formula for glenoid width estimation based upon the measured height using ipsilateral MRI study. The resultant formula is easy to remember ((W = 1/3 H + 15 mm)) and incorporate into clinical practice as it can be used on hardcopy or digital MRI with a ruler.

Clinical evaluation

General Examination: Examination of the neck, whole upper limb as well as the opposite shoulder was carried out. **Local examination:** Local examination of the affected shoulder was carried out by inspection and examination. **Inspection:** Inspection of the affected shoulder to detect any evidence of muscle wasting or any deformities. Muscle wasting: None of the patients showed evidence of muscle wasting. Deformity: None of the patients showed any deformities or old fractures around the affected shoulder**. Palpation**: Including the range of motion, the muscle power, and the presence of tender sites. **Muscle power**: All patients had normal muscle power as compared to the opposite side. **Range of motion**: - Examination of the range of motion included forward elevation, external rotation and internal rotation. **Forward Elevation:** Forward elevation ranged between 140°-190° among the patients of this study the

average **External rotation:** Among the patients of this study, the external rotation ranges about 70°. **Internal rotation:** was performed in all cases with average range 70°.**Stability:** The stability of the affected shoulder was assessed using a group of Provocative tests to determine the degree and direction of the instability. The drawer test can detect instability in any of the main directions with recording of the degree of translation. **Neurological Or Vascular Problems:** None of the patients had neurological problems such as axillary nerve injury or any symptoms of neural affection. None of them had any form of vascular injury.

Radiographs: Performed in all cases (100%). These included; the trauma series, namely the AP in External rotation, CT and MRI.

Scoring

I.S.I.S score is used for preoperative selection. Rowe's score to assess stability in our patients pre and post operatively.

Operative stage

Anesthesia: All patients (100%) received general anaesthesia with an endotracheal intubation.

Positioning of the patients: All patients were placed in the beach chair position with the patient sitting 70° with the horizontal. The forearm lies on a support in a neutral position.

Draping

After sterilization, the patient was routinely draped by 2 small drapes one above and another below the shoulder. Then 2 large sheets were used, one to cover, the body from the axilla down to the foot, while the other sheet covers the head, neck and anterior chest. The arm is placed in an arm pouch and then rapped by sterile gauze. Then all of this was covered by a split sheet after passing the draped arm through its slit**.**

Operative technique

A vertical skin incision was made from the tip of the coracoid process extending 4 to 5cm toward the axillary fold. A limited deltopectoral approach was used. The coraco-acromial ligament was divided 1cm from its insertion on the coracoid process and the pectoralis minor released at its insertion on the coracoid process. The coracoid process was then osteotomized at the junction between horizontal and vertical parts. The cortex of the inferior aspect was removed with an oscillating saw to create a flat cancellous bone surface. Two holes were drilled with a 3.2mm drill bit approximately 1-cm apart (1 superior and 1 inferior). The holes were then prepared with a 4.5mm tap and a countersink. The subscapularis muscle was divided in line with its fibers at the junction of the superior two-thirds and inferior one-third to expose the anterior capsule. A vertical arthrotomy was performed and an intra- articular retractor placed. The antero-inferior cortex of the glenoid was removed with an osteotome to provide a flat cancellous bed. The inferior hole was drilled into the glenoid and tapped with the 4.5mm tap. The coracoid graft was then fixed with the first screw so that it lied flush with the glenoid articular surface. A 4mm cancellous screw, typically was inserted using a 2-finger tightening technique to avoid overtightening. Definitive fixation was achieved by drilling the superior hole through the coracoid and the glenoid. The initial screw was further tightened with a 2-finger technique to ensure adequate compression of the graft. The position of the graft was checked to ensure that it was lying flush with the glenoid articular surface. Lastly, the coraco-acromial ligament stump was sutured to the anterior capsule with the arm positioned in maximal external rotation.

Post-operative assessment

Clinically by examination range of movement, pain and muscles power. Also by ROWE, constant score and VAS score. Finally by radiological evaluation by x-ray and CT to evaluate healing of the coracoid graft after 6months **[6]**.

RESULTS

Age ranged from 15 - 35 with mean value 26.33 ± 5.26. There were 24 males (60%) and 16 females (40%), regarding shoulder side affected, right shoulder was (72.5%). Regarding dominant hand, right hand was (87.5%).10 patients (25.0%) cases were sportive, 14 patients (35%) were hobbies, and 16 (40.0%) cases were non sportive. (Table 1)

There were 11 (27.5%) cases with Not Return pre injury level, 9 (22.5%) cases with Return to > 50% of pre injury level and 20 (50.0%) cases with Return to >75% of pre injury level. (Table 2)

Regarding ROM Pre-operatively, FF was (157.63 ± 8.95), ER (67.63 ± 7.87) and IR (72.03 ± 5.42). Post-operatively after 6 months, FF (160.50 ± 9.38), ER (72.83 ± 6.84) and IR (74.38 ± 6.00). (Table 3)

There was highly statistically significant difference between Pre, and Post 6 Months Regarding Rowe Score p=0.0001. (Table 4)

There was highly statistically significant difference between VAS Pre Operative and Post-Operative at rest and motion P=0.009. (Table 5)

Regsrding complications, Stiffness of shoulder in 2 cases, 3cases diagnoised as superficial infection postoperative after 2weeks, one case diagnoised as non union, one patient had asuperficial hematoma, one case had radial nerve palsy, one case had an overhaning screw and one case had recurrent dislocations. (Table 6)

Table 1 Distribution of the studied cases according to Age (Years) and Sex.

		No. = 40
Age (Years)	**Mean ± SD**	26.33 ± 5.26
	Range	15 – 35
Sex	**Female**	16 (40.0%)
	Male	24 (60.0%)
Shoulder side affected	**Left**	11 (27.5%)
	Right	29 (72.5%)
Dominant hand	**Left**	5 (12.5%)
	Right	35 (87.5%)
Duration since first dislocation (months)	**Mean ± SD**	41.80 ± 11.14
	Range	20 – 55
Duration since last dislocation (months)	**Mean ± SD**	4.96 ± 2.24
	Range	2 – 9
Sports activity	**sportive**	10 (25.0%)
	hobby	14 (35%)
	Not sportive	16 (40.0%)
Number of instability	**Mean ± SD**	7.96 ± 1.93
	Range	5 – 11
Occupation	**Hard work**	21 (52.5%)
	Official	11 (27.5%)
	Light worker	8 (20.0%)
Cause of dislocation	**Sport**	24 (60.0%)

	Convulsion	11 (27.5%)
	RTA	5 (12.5%)

Table 2 Distribution of the studied cases according to Return to pre injury level at end of follow up.

	No.	**%**
Not Return pre injury level	11	27.5%
Return to > 50% of pre injury level	9	22.5%
Return to >75% of pre injury level	20	50.0%

Table 3 Distribution of the studied cases according to ROM.

	No. = 40	
	Mean ± SD	**Range**
ROM Pre		
FF	157.63 ± 8.95	145 – 170
ER	67.63 ± 7.87	55 – 80
IR	72.03 ± 5.42	60 – 80
ROM Post 6 Months		
FF	160.50 ± 9.38	145 – 178
ER	72.83 ± 6.84	60 – 80
IR	74.38 ± 6.00	65 – 85

Forward flexion (FF), Exercise Rehabilitation Instructor (ERI), Internal Rotation (IR)

Table 4 Comparison between Pre, and Post 6 Months Regarding Rowe Score.

Rowe score	**No. = 40**		**Test value**	**P-value**	**Sig.**
	Mean ± SD	**Range**			
Pre-Operative	46.93 ± 9.18	30 – 60	–	–	–
Post 6 Months	85.03 ± 7.27	70 – 95	-21.494	0.0001	HS

Table5 Comparison between Pre, and Post 6 Months Regarding VAS Score.

VAS	**No. = 40**		**Test value**	**P-value**	**Sig.**
	Mean ± SD	**Range**			
At rest			–	–	–
Pre Operative	0.80 ± 0.65	0 – 2	2.730	0.009	HS
Post Operative	0.47 ± 0.33	0 – 1			
AT motion			–	–	–
Pre Operative	2.33 ± 0.83	1 – 4	2.767	0.009	HS
Post Operative	1.91 ± 0.70	1 – 3			

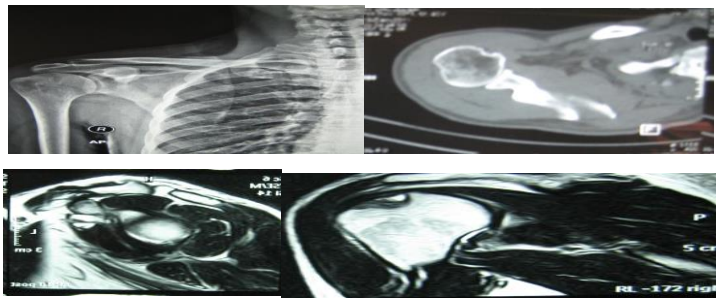
Table 6 Distribution of the studied cases according to Complication.

Complication	**No**	**%**
Stiffness	2	5.0%
Infection Superficial	2	5.0%
Infection Deep	0	0.0%
Non Union	1	2.5%

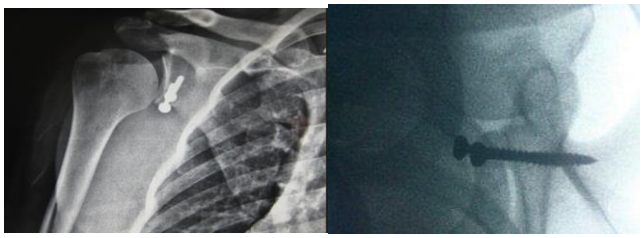
Graft Fracture	0	
Screw related Complication	1	2.5%
Nevrc- Vascular Complication	1	2.5%

Case presentation

Case (1): A 38 year old, right handed, male patient who is a manual worker. He complained of recurrent dislocation (8 episodes) of his right shoulder. He had positive anterior drawer test and positive anterior apprehension test. I.S.IS score of 7, Pre-operative Rowe score was 45 Hills Sachs lesions was 35% and glenoid bone loss of 25%.



A) After 6 months, complete bony union.



B)Post-operative Rowe score was 95 with flexion of 153°, abduction 144° internal rotation 70° external rotation 70°.

C **D** **E**

Different movement of the patients. C) Forward flexion. D) External rotation. E)Internal rotation

Figure1 case 1

Case 2: A 35 year old, male patient. He complained of recurrent dislocation of his right shoulder after bony bankert. He had positive anterior drawer test and positive anterior apprehension test.

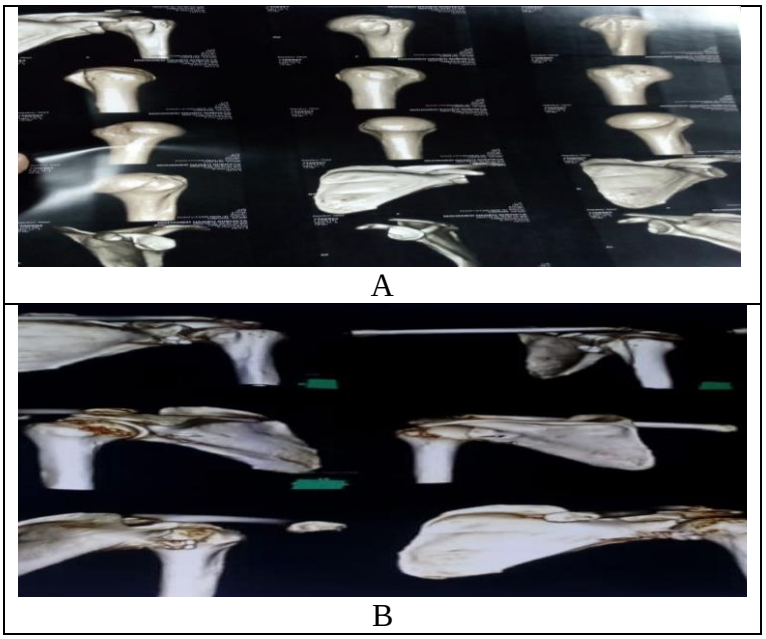


Figure 2 Case 1: A) CT 3D with humeral substraction showing fracture anterior inferior of glenoid patient complain of recurrent shoulder dislocation. B) Postoperative CT 3D showing laterjet procedure for anterior shoulder dislocation bony bankart

DISCUSSION

Our study showed that, age ranged from 15 - 35 with mean value 26.33 ± 5.26. There were 24 males (60%) and 16 females (40%). This agreed with Minkus et al. who reported a male predominance they aimed to analyze the results and complication rate after coracoid transfer as a revision surgery and reported that, mean age was 28 years.

In this study, regarding shoulder side affected, right shoulder was (72.5%). Regarding dominant hand, right hand was (87.5%) **[7]**.

Minkus et al. reported that, the right shoulder was affected in 10 cases and the left shoulder in 19 cases. In 41% (n = 12) the dominant side was affected **[7]**.

Our study showed that, 10 patients (25.0%) cases were sportive, 14 patients (35%) were hobbies, and 16 (40.0%) cases were non sportive.

Lafosse and Boyle reported that, 88% of their cases actively involved in sports **[8]**.

In this study, regarding range of motion, there were no statistically significant difference between Pre-operative, and Post-operative after 6 months regarding FF and IR. There were highly statistically significant difference between Pre-operative, and Post-operative after 6 Months regarding and ER.

Maynou et al. described improved functional outcomes and greater preservation in external rotation in patients who underwent a subscapularis split compared with a tenotomy during the Latarjet procedure **[9]**.

The Latarjet procedure can be performed either with a subscapularis splitting or with a subscapularis tenotomy approach. The subscapularis splitting approach can be more demanding, but it has been noted to preserve subscapularis function and anatomy **[10]**.

In our study, there were highly statistically significant difference between Pre-operative, and Post 6 Months Regarding Rowe Score.

Chillemi et al. shows excellent results in terms of stability after the Latarjet procedure with a minimum follow-up of 24 years; while, the clinical and radiological results may be defined as good overall **[11]**. In their study's series, no recurrent dislocation was observed and only 2 (5%) recurrent subluxations were reported in 2 patients. The mean Rowe score at the final follow-up was 84.5 (range 45 – 100) with 70% of patients (28) reporting an excellent result, 7.5% (3) reporting a good result, 17.5% (7) reporting a fair result and 5% (2) reporting a poor result. This finding is in accordance with the low rate of recurrent instability described in literature and ranging between 0 and 10% [12,13]**.**

Our study showed that, there were highly statistically significant difference between VAS Pre-Operative and Post- Operative.

Minkus et al. stated that, five patients reported about unspecified shoulder symptoms and persisting pain **[7]**.

In our study, regarding the return to pre injury level at end of follow up, the percentage of those who not Return pre injury level was (27.5%), those who return to > 50% of pre injury level was (22.5%) and those who return to >75% of pre injury level was (50%).

Warth et al. found the greatest concern in patients undergoing surgery for anterior shoulder instability was the ability to return to sporting activity **[14]**. In addition, the rate of return to play at the previous level was high in more than 75% of patients. Several studies have compared the results of return to play between the Latarjet procedure and Bankart repairs, with similar results reported between the 2 techniques **[15,16]**.

This study revealed that regarding the complication results, there were 4 (10.0%) cases with Stiffness, 3 (7.5%) cases with Osteoarthritis, two cases with Infection Superficial, Non Union, Graft reabsorption and Nevrc- Vascular Complication and One Cases with Screw related complication and need For 2ry Operation.

An et al. reported that, complications following the Latarjet procedure included infections (0.5%), hardware complications (2.6%), fracture (1.6%), and hematoma (0.3%). in their study, no complications not requiring surgery were described. They concluded that the coracoid transfer procedure can improve shoulder stability with acceptable recurrence rates but is associated with a broad range and significant incidence of complications **[17]**.

CONCLUSION

Open Latarjet procedure is a safe and reliable technique for recurrent anterior shoulder instability. The Latarjet procedure provides good long-term stability although associated with a slight limitation in external rotation.

FUNDING

The study was not funded by any supporting organization.

AVAILABILITY OF DATA AND MATERIALS

All necessary data analyzed during this study are included in this published article. Any additional data could be available from the corresponding author upon request.

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