

LATARJET PROCEDURE FOR RECURRENT SHOULDER ANTERIOR INSTABILITY WITH LESS THAN 25% GLENOID BONE LOSS- ITS FUNCTIONAL OUTCOME: A PROSPECTIVE STUDY.

Orthopaedics

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ABSTRACT

Background: Latarjet procedure for a recurrent anterior shoulder dislocation with more than 25% of bone loss is a standard treatment with good functional outcome. In glenoid bone loss < than 25%, there is no concurrence in the surgery of choice between Bankart repair, Remplissage procedure and Latarjet procedure. This study is aimed to study the functional outcome following Latarjet procedure in recurrent shoulder instability in patients with < than 25% glenoid bone loss and also to assess the instability symptoms and complications following this procedure.

Methods: It is a Clinical, Prospective and Observational study on thirty patients with recurrent anterior dislocation of shoulder, with less than 25% glenoid bone loss treated with Open Latarjet Procedure, at Chettinad Hospital and Research Institute, Kelambakkam, done between Jan 2017 to Dec 2020, with a minimum follow-up of at least 1 year duration. Patients were post-operatively assessed functionally using Constant shoulder score, Rowe scoring system and the Walch- Duplay index score. Clinical instability was also assessed using the Anterior Apprehension and Anterior Drawer Test.

Results: In our study with thirty patients, who underwent Latarjet procedure, Functional outcome of the patients were assessed using the Constant shoulder score, Rowe scoring system and the Walch- Duplay index score. The combined average percentage of Score of Scores of the three scoring systems were 74.46% had Excellent results, 14.42% had Good and 11.12% of patients had Average or Fair results. None of the patients had any instability symptoms post-operatively at the 1 year post-op follow-up. Four patients had superficial Surgical Site Infections and 2 patients had developed mild to moderate shoulder stiffness.

Conclusion: The Latarjet gives confirmationally Excellent to Good functional outcome and aid in the early return to activities of daily living and a fewer failure rate. In patients with Recurrent Anterior Shoulder Dislocation, with even less than 25% Glenoid bone loss, it may be pertinent to primarily consider the osseous option of a coracoid transfer (Latarjet) rather than opt for simpler Open Bankart, Arthroscopic Bankart or an Arthroscopic Remplissage procedure alone. Thus, as a yardstick the bone loss concept, either on the Glenoidal or on the Humeral aspect, alone, need to be the deciding factor. The fact remains that in the athletic or otherwise Recurrent Anterior Shoulder Dislocators, there is also a concomitant humeral component, apart from the apparent and demonstrable Glenoid defect with the "Circle concept".

KEYWORDS

INTRODUCTION:

Recurrent shoulder dislocations have multiple surgical repair option. Soft tissue repair is not the competent procedure, for all the cases of recurrent shoulder dislocation (1). Modified Bristow procedure- The Latarjet procedure is marked for anterior dislocation for shoulder with 40% Glenoid bone defect and for patients who have prior unsuccessful stabilization of shoulder. Latarjet described a procedure in 1954 and in 1958 by Helfet, where the Coracoid process is trans-positioned to the antero-inferior border of the Glenoid for high-risk patients of recurrent dislocation (2, 3). A few surgeons have started to consider, Latarjet procedure following initial shoulder dislocation, without loss of glenoid bone lately (4,5). The patients who have higher demand, the lesser the bone loss permitted. This study is aimed to study the functional outcome following Latarjet procedure in anterior recurrent shoulder instability patients with less than 25% glenoid bone loss, and also to assess the instability symptoms and complications, following this procedure.

MATERIALS AND METHODS:

This particular study was embarked upon to treat both primary and secondary Anterior Shoulder Instability, at Chettinad Hospital and

Research Institute, CHRI-CARE Kelambakkam, Chengalpattu district of Tamilnadu. Our recruitment period was for a period of 36 months (January 2017 – December 2019). However, the study continued till December 2020, so that we have a minimum follow-up period of 12 months.

Our inclusion criteria included:

- 1] Patients of both sexes in the age group 18 – 47 years.
- 2] Anterior shoulder disability arising out of sport injury or RTA or any other accidental falls.

Our exclusion criteria included: 1] Patients who had an additional posterior instability or a multi directional instability, 2] Cases with existing rotator cuff tear and/or pathological biceps tendon conditions. 3] Patients with associated with AC joint disruptions requiring surgical interventions. 4] Patient exhibiting an MRI report with a major labral tear.

Operative procedure:

Coracoid preparation:

Patient was positioned in Beach chair position; Incision was marked along the Deltopectoral interval starting from the 1cm above coracoid

process measuring around 6cm in length ending near the axillary fold. Cephalic vein was identified and retracted Laterally. Anterior deltoid was released to expose the coracoid process. Coracoacromial ligament was erased sub periosteally from the coracoid end. Pectoralis minor insertion was erased sub periosteally from the medial border of the coracoid process leaving behind the coracoid process with the conjoint tendon attached to it. A 90 degrees Oscillating saw was used to osteotomize the coracoid at its base. Periosteum is removed from the under surface of the osteotomised bone block. The length of the bone block was measured and then 2 drill holes made with a 2.5mm drill bits at the centre of the bone block 1 cm apart from each other.

Glenoid preparation:

Following the coracoid osteotomy and preparation, the subscapularis muscle split at the junction of upper 2/3rd and lower 1/3rd and Gelpie's self-retaining retractor was used to visualise the anterior capsule of the shoulder joint. The Anterior capsule is then opened by a vertical incision to visualize the anterior border of the glenoid. The Antero inferior Glenoid defect was freshened to obtain a good bleeding bed. The prepared bone block along with the conjoint tendon was brought through the split Sub scapularis tendon. The under surface of the bone block was positioned to the anterior inferior Glenoid neck and temporarily fixed using a K wire. Two guide wires are passed through the tunnel, previously created at the centre of the bone block at a 15 degrees angle from the glenoid articular surface (Alpha angle). The guide wire was over drilled with 2.5 mm drill bit through the glenoid. 2 appropriately sized 4 mm cannulated partially threaded cancellous screws are used to fix the bone block to the prepared bed of Glenoid. The splint subscapularis tendon along with the conjoint tendon was closed, with absorbable vicryl sutures. Finally, the subcutaneous and skin were closed in layers over a DT.

Rehabilitation and follow-up:

Postoperatively, Patient was discharged on day 3 following the procedure. Suture removal was done on POD day 12. Rehabilitation was designed to secure the construct and to grant bone healing. The operated shoulder was immobilized with the immobilizer for a period of three weeks. Patients were encouraged to do active fingers, hand and elbow movements and isometric deltoid strengthening exercises. External rotation of shoulder and elbow flexion was allowed after 6 weeks post-operatively. Serial X-Rays was taken to observe for bone healing. Active strengthening was started after the healing of coracoid process was seen on the X-Ray. CT scan of the operated shoulder was done at 3 months post-op or later, to confirm the union of the Coracoid process to the Glenoids antero-inferior surface. Patients were followed up at regular intervals for a minimum period of 1 year [range: 12-47 months].

Assessment was done at 6 weeks, 3 months, 6 months and 12 months interval. Constant score, Rowe score and Walch-Duplay Index score was used to assess the functional status of the shoulder post-operatively. Post-operative instability assessment was done using the anterior apprehension and the anterior drawer test done at the end of 1 year.

RESULTS:

The patients included in the study had a mean age of thirty-one years, ranging from 18 years to 47 years. Out of 30 patients there were 24 male patients and 6 female patients who participated in the study. All 30 patients were right hand dominant patients; Right side shoulder was involved in 25 patients and left side shoulder in 5 patients. Constant score for functional outcome at the end of 1 year showed Excellent result in 20 patients, Good in 6 patients and Fair in 4 patients. Rowe scoring and Walch-Duplay was also were used to assess the functional outcome. The combined average percentage of score of scores of the three scoring systems are 74.46% had excellent results, 14.42% had Good and 11.12% of patients had Average or fair results. All the patients had Positive Apprehension and Drawer Test pre-operatively, and was tested negative when, assessed 1 year postoperatively. None of the patients had any instability symptoms post-operatively at the 1 year post-op follow-up. Four patients had superficial SSI and 2 patients had developed shoulder stiffness.

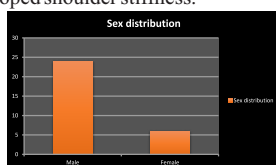


Fig.1 Sex distribution in our study.

Table 1: Side of injury:

Side distribution	Male	Female	Total
Right shoulder injury	20	5	25
Left shoulder injury	4	1	5
Total	24	6	30

Table 2: Sex and age demographic distribution:

Age group	Male	Female	Total
18-22	6	2	8
23-27	3	1	4
28-32	3	1	4
33-37	7	1	8
38-42	4	1	5
43-47	1	0	1
Total	24	6	30

Table 3: Constant score distribution table:

Constant shoulder score	Male	Female	Total (n)	%age
Excellent	18	2	20	66.67
Good	4	2	6	20
Fair	2	2	4	13.33
Poor	0	0	0	0
Total	24	6	30	100

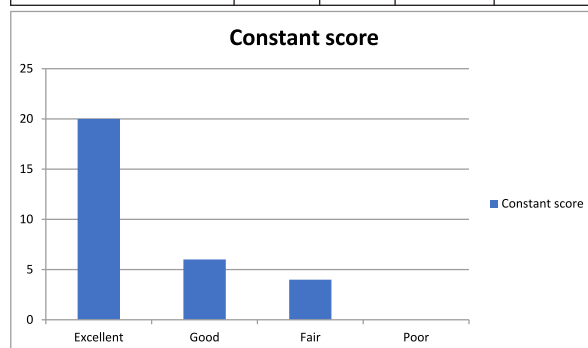


Fig.2 Constant score at the end of 1 year.

Table 4: Rowe score:

Parameters	Male	Female	n	%age
Excellent	20	2	22	73.43
Good	1	3	4	13.33
Average	3	1	4	13.33
Bad	0	0	0	0
Total	24	6	30	100

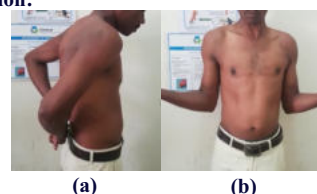
Table 5: Walch-Duplay Index Score distribution of outcomes:

Parameters	Male	Female	n	%age
Excellent	22	3	25	83.3
Good	0	3	3	10.0
Fair	2	0	2	6.7
Poor	0	0	0	0
Total	24	6	30	100

Table 6: Combined "Score of Scores" Distribution of outcomes as percentages:

Parameters	Constant shoulder score (as %age)	Rowe Score (as %age)	Walch-Duplay index score (as %age)	Average %age (as %age)
Excellent	66.7	73.4	83.3	74.46
Good	20.0	13.3	10.0	14.42
Average/Fair	13.3	13.3	6.7	11.12
Poor/Bad	0	0	0	0
Total	100	100	100	100

Case Illustration:



(a)

(b)

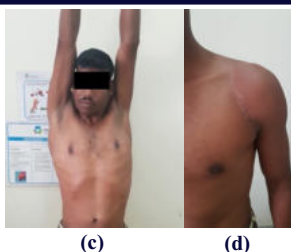


Fig.3 (a,b,c,d)- Post-op Latarjet procedure left shoulder showing Range of movements

Post op Radiographs:

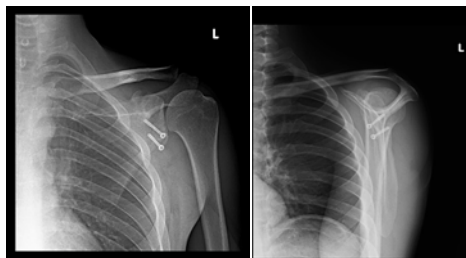


Fig 4: Post op X-Rays – AP and Axial view of left shoulder Postop CT:



Fig.5: Postop CT- at 3 months follow-up showing bony union between coracoid and glenoid with screws in situ.

DISCUSSION:

"Mobility comes at the cost of stability" is most truly said about the shoulder joint. According to Zacchilli MA et al (6); shoulder joint dislocations, are among the most commonly dislocated joints, accounting for as much as 47 per 1 Lakh "person years". In a conservative management scenario, as per Rowe et al (7), there could be a recurrence rate of as high as ninety percent. Earlier failure rates with Bankart type of repair, have since improved dramatically after the additional stability offered by anchor sutures, reports Kandziora F et al (8); Mechanisms, are multiple by which, the coracoid osseous bone transfer surgery of "Latarjet" can extend the Glenoid osseous arc and further the tendon which is conjoint, provides for an additional stability dynamically as well, as documented by the French surgeon Latarjet M et al (9).

A key factor in the recurrent instability of the Gleno humeral joint, is the osseous Glenoid bone loss, as concurred by Burkhart SS (10) and Lo IK et al; (11). Wellmann M et al (12) has reported it to be superior to "Bankart" type of repair, even by studies done Biomechanically. Lo IK et al (11); postulates that the Loss of Osseous Glenoid, gets addressed by the "Latarjet" type of a repair, which is a higher risk factor determining and dictating re-dislocation rates.

The success of the surgical procedures, aid at addressing anterior Humero-Glenoid insufficiency causing anterior instability of shoulder, lies squarely on addressing the AP bony dimensions of the Glenoid cavity (13,14,15). This AGH instability is a feature common in both contact athletic, sporting and other shoulder injuries that have had repetitive injury episodes creating weak anterior shoulder stabilization (14). The problem it creates is, there is shoulder anterior dislocation, and each additional episode, it increases the risk of the

"critical bone loss" at the level of the Glenoid. Hither to, the osseous defect was quantified by CT evaluation pre-operatively and analyzed by the Nyffeler and Gerber (16) best fit circle criteria.

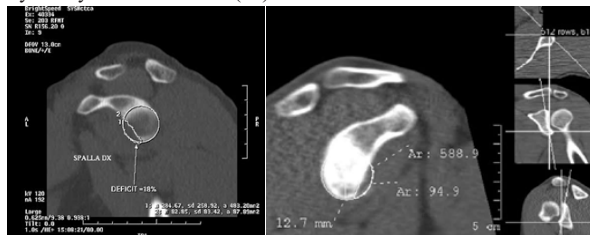


Fig.6 (a),(b)- Understanding the best fit circle concept in a 2D CT. Note that the areas of the best fit circle and the area of the deficit zone are clearly demarcated.

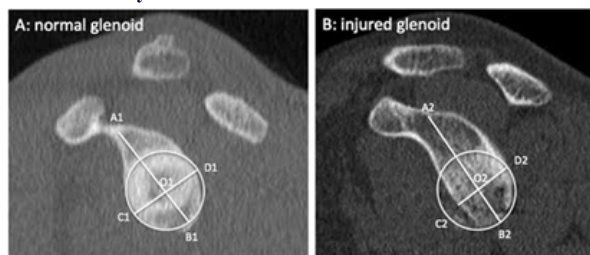


Fig.6 (c)- Measuring the diameters and evaluating the deficit component of the glenoid antero-inferior aspect by CT imaging.

It lays down that when in the lower third Glenoid circle that is drawn, the radius of the circle is shorter than the length of the circle, and then it is interpreted as a clinically significant Glenoid Bone Loss. Here in first 3D or a 2D image CT of the glenoid are to be generated, the defect "D" (Deficit) of the anterior glenoid defect, taking into considerations the zone of coverage by the best fit circle. The surface area of the best fit circle GC was calculated. Then was calculated the surface area of the sector D component of the fuller circle. The formula D (Deficit) sq units divided by GC sq units, multiplied by 100, gave a percentage of the Antero-Inferior Glenoid void or deficiency (14,17). Thus, a percentage loss would have been determined and if this loss were to be twenty-five percent or above, a bony Latarjet procedure would be the ideal surgical option. If it were to be less than this critical bone loss, then non-operative or an arthroscopic Bankart stabilization procedure, were opted for. Many a study of non-operative management for the conservative non-operative group, has shown failure rate as high as 85% (15,18-25). The results have neither been rosy, for arthroscopic repairs with the recurrence rates in the vicinity of around 21% (15,26-28). Thus, there is an awareness to be generated among operating shoulder surgeons that the bone critical loss percentage of the anterior and Inferior Glenoid alone cannot serve as an optimal guiding factor in opting for or otherwise of the bony procedures, like the Latarjet. Despite the so called "sub critical bone loss", the clinico-functional outcomes of soft tissue arthroscopic stabilisation surgeries have been not very encouraging (29). If one were to understand the concept of Glenoid tracking, as we incur a Glenoid bone defect, which increases with episodes of dislocations, the width of the glenoid keeps constantly decreasing and paves the pathway for a Hill-sachs lesions or a defect that can effectively latch on the Glenoid rim (30,31). Now both the humeral head lesions in the form of Hill Sachs and the Glenoid Defect work in tandem to negatively effect the anterior Gleno-Humeral instability. Arciero RA et al (32).

Coracoid transfer should therefore be considered (Latarjet procedure) as a treatment, that is preferable in the Anterior Shoulder Instability cases, despite a CT gauged deficiency reading of less than 25%. This is not just true for cases that have had a failed conservative, failed soft tissue Bankart's repair or a failed Remplissage. This study aims to highlight that Anterior Glenoid Osseus Reconstruction, with the help of coracoid transfer and fixation with dual partially threaded cancellous screws, shall prevent unnecessary failures. Thereby reducing the need for a repeat bony surgical procedure. The whole study aims to not just to focus on the Glenoid Osseus Defect alone, but to understand the pathology of instability being caused also by an invariably co-existent osseus Sach-Hill defect. These 2 defects in combination with the already lax soft tissue structures of the anterior gleno-humeral capsular components, tend to amplify a rather innocuous and a so-called "sub critical" osseus defect on the Glenoid Component.

In our three years study, extending from January 2017 – December 2020, the recruitment of patients stopped by December 2019. Thus, we had a recruitment period of 36 months of patients who complied with our inclusion criteria and they numbered thirty in all. In this compilation we included those patients whose Glenoid Osseus Defect with range from 10- 25%. These cases in the normal course of decision making, would have been deemed fit enough to be considered for either Open or Arthroscopic Bankart's or Remplissage procedure. We however decided to directly intervene surgically upon them with the osseus coracoids transfer option (Latarjet procedure). In order to have a reasonable follow-up period, we had prolonged the study till December 2020. Thus, our study period was for a period of 48 months, while active patient recruitment was for a period of 36 months. Our evaluations were done both by the Constant Shoulder Score, Rowe Scoring System and Walch- Duplay Index Score. Further, at the expiry of 12 months of surgery, we also clinically assessed these patients by the Anterior Apprehension Test, as well as Anterior Drawer Test.

CONCLUSION:

In our study of thirty patients, with a minimum follow up of 12 months (range 12- 47 months, mean :26 months) we were able to demonstrate an Excellent score of 66.7% (n=20), Good score of 20% (n=6) and a Fair score of 13.3% (n=4). None of our patients were categorised as a poor outcome. The highlights of the study, incline us to conclude that the yardstick for measuring the necessity or not of an osseus coracoids transfer procedure (Latarjet), cannot just be the best fit circle defect concept as popularized by the Gerber and Nyffeler (16). One needs to consider in tandem the patho-physiology of the Anterior Shoulder Instability Complex which is not just contributed to by the osseus glenoid but also by the Humeral Head and the Anterior Capsular Complex of the Humero-Glenoid joint.

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