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Orthopaedics

OUTCOME ANALYSIS IN RECURRENT SHOULDER DISLOCATION PATIENTS TREATED BY LATARJET AND MODIFIED BRISTOW TECHNIQUE

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Abstract:

Introduction: Selecting an optimal surgical procedure for patients with anterior glenohumeral instability and associated glenoid bone loss is a complex problem. Among the coracoid transfer procedures (the Modified Bristow and Latarjet), there is little consensus about which of these two techniques is optimal. The purpose is to study the stabilization effects of these procedures in anterior glenohumeral instability and analyze their outcomes.

Methods: Latarjet was performed in fifteen patients and Modified Bristow in fifteen patients. Patients were followed up for mean period of 18 months. The functional outcome was measured with WALCH DUPLAY & Visual analog score.

Results: All thirty patients had bony union. Outcome is found to be excellent in 40% of Latarjet and 40% in Modified Bristow cases. Good outcome is seen in 46.7% Latarjet and 53.3% Modified Bristow. 20% of Latarjet cases developed Grade 1 Humeral arthropathy. Loss of external rotation and abduction is significantly more in Latarjet. Once the follow up is more than a year57 the functional outcome significantly improves. Post operatively three (20%) Mod Bristow cases continued to have positive apprehension. Both groups achieve equal outcome during the 12 to 15 months' period.

Conclusion: The Bristow and Latarjet procedures are equivalent in terms of functional outcome in anterior glenohumeral instability with glenoid bone loss. However, Latarjet outperformed the Bristow procedure in terms of restoring joint stability, even for cases with engaging Hill sach lesion. Therefore, in terms of efficacy, Latarjet will be a preferable procedure in Anterior Glenohumeral instability with significant Glenoid bone loss.

Key words: *Glenohumeral instability, Modified Bristow, Latarjet, Glenoid bone loss*

Introduction

The shoulder joint allows extreme range of motion in the human body. This wide range of motion has developed through the interplay of bony and soft tissue anatomy providing for increased kinematics and thus resulting in increased chances of instability (Fig-01). Shoulder dislocation is the most common form of joint dislocation (31%). With subsequent episodes of dislocation, humeral head, the glenoid, capsule, ligaments and the labrum undergoes progressive alterations[1] (Fig-02). Selecting an optimal surgical procedure for patients with anterior glenohumeral instability and associated glenoid bone loss is a complex problem[2]. Anatomical repairs aim at attaching the torn glenoid labrum to its original position thereby achieving the proper tension in the shoulder complex. e.g.: Bankart repair – Montgomery & Jobe, Inferior capsular shift procedure- Neer. When there is substantial loss of Glenoid width isolated soft tissue repairs have exhibited failure rates as high as 57% to 67%[3]. Balg & Boileau et al.[4] in their study found that the outcome of Bankart repair were affected by Instability Severity Index Score with recurrence rate of 5% for patients with score 3 or less, 10% for patients with score 6 or less and 70% for patients with score more than six and advised open glenoid bone graft procedure for score more than 6. Burkhart & Debeer et al.,[2] in 190 patients with arthroscopic procedures found a recurrence rate of 6.5% to 89% in patients involved in contact sports, glenoid defect more than 25% or an engaging hill sach lesion. Vooset al. in their study had a recurrence rate of 37.5% in patients with glenoid defect more than 25% and a larger hill sach lesion, who had undergone arthroscopic repair. The Non-anatomical repair aims at stabilizing the shoulder girdle by compensating for the capsular and labral tears with or without bony injury, with bony/ soft tissue structures checkrein which prevents the excessive anterior displacement of humeral head thereby stabilising the joint. e.g.:Bristow and Latarjet, Magnuson-Stack - De- Palma and Putti-Platt. Coracoid transfer procedures[5], have shown promising results because of the additive dynamic stabilizing sling effect produced by the repositioned conjoint tendon. Among the coracoid transfer procedures, the Modified Bristow and Latarjet procedures, there is a little consensus about which of these two techniques is optimal. The purpose of this study is to study the stabilization effects of these procedures in anterior glenohumeral instability and analyze their outcomes.

Materials & Methods

This is a retrospective and prospective study conducted at our Institute from July 2014 to September 2016. The patients were included in the study based on the following Inclusion/Exclusion criteria after getting consent of the patient. Inclusion Criteria: Recurrent Anterior shoulder dislocation, Bankart lesion (25-40%)[6], Large Hill sach lesion, ISIS score 6 or more[5]. Exclusion Criteria: Multidirectional instability, Fracture dislocations, Congenital ligament laxity, Neuromuscular disorder, Bankart lesion (< 25% or >40% loss), Hill sach lesion (>40% loss), ISIS score less than 6 [5]. Patients with Recurrent anterior shoulder dislocation are selected in for clinical study as per above criteria. A detailed history regarding name, age, sex, date of first episode of dislocation, age at the time of first episode, mechanism of injury, number of dislocations, residential address, occupational status was recorded. Patients are subjected to routine blood investigations like complete haemogram, renal function tests. X rays of shoulder True anteroposterior view and Stryker notch view taken to demonstrate Glenoid defect and Hill sach lesions. CT scan (Fig-03, 04 & 05) is the investigation of choice as it assesses the extent and the size of the bony lesions, which were under appreciated previously in x-rays. MRI is useful to evaluate labral tears, SLAP tears, HAGL & ALPSA lesions. Patients were randomly allotted for Latarjet and Modified Bristow Procedure. Patients were selected after appropriate radiographs, CT and MRI scans and taken up for surgery. We used shoulder instability severity index and Glenoid bone loss percentage to assign our patients for surgery. All thirty cases were done under general anesthesia with patient in beach chair position. We used Delto pectoral approach (Fig-06) for all cases. Expose the conjoined tendon (Fig-07). In Latarjet technique, the coracoid is sectioned along with the Coracoacromial ligament and osteotomized at its base (Fig-08). Insert the bone block along with the Coracoacromial ligament through the split subscapularis and place it flush to antero-inferior margin of glenoid, keeping the inferior surface of coracoid in contact[7], repair the Coracoacromial ligament with Capsule (Fig-09 & 10). In Modified Bristow technique, the coracoid is osteotomized distal to coracoacromial ligamentsand is fixed with 4mm cancellous screw into the anteroinferior aspect of glenoid, keeping the resected surface of coracoid in contact with glenoid rim (Fig-11). Immobilized in a Shoulder immobiliser[8], with the arm

against the body, drain removal on 2nd postoperative day, intravenous antibiotics for 5 days, from Day 1 Ice and Ball squeeze therapy, from Day 1 to 2 weeks immobilisation in sling or shoulder immobiliser, 2 to 6 weeks start active assisted Forward flexion, Codman pendulum exercises, abduction range of motion exercises, 6 to 8 weeks start external rotation exercises, from8weeks start Isometric shoulder strengthening exercises, can return to activity after 12 weeks and can indulge Non-contact sports after 3months. Periodic radiographs were requested to evaluate the union, screw position and arthritic changes. Post-operative arthropathy was measured using Samilson Prieto grading.[9]

CT scan has been taken to find out union. None had been lost to follow-up. The functional outcome was measured using WALCH DUPLAY score[10] & Visual analog score. Minimum follow up period – 6 months. Maximum follow up period – 5 yrs. The mean follow up was 24 months. In our series, five cases (16%) were in the age group of < 20 yrs., twenty-one cases (70%) were in 20-35 yrs., four cases (13%) were in > 35yrs. Recurrence rate is inversely proportional to the age at the time of initial dislocation and the severity of the injury.[11] Majority of patients in our study fall in the age group between 20 to 35 yrs. with mean age of 28.37 years. In our series twenty-one (70%) cases presented more than one year after first dislocation, with mean duration of 2.30 years. In our series sports injuries account for 17 cases (56.7%), RTA seven cases (23.3%) and fall six cases (20%). Mean duration of surgery for Latarjet = 158 mins. Mean duration of surgery for Modified Bristow = 114 mins.Mean glenoid loss = 26.28%. Twenty-one cases (70%) had associated Hill sach lesion, with six (20%) of them being Engaging lesions.

Results

In our series, twelve cases (40%) had Excellent outcome, fifteen cases (50%) had Good & three cases (10%) had Fair outcome (Table-01).One case presented with post-operative infection[12] and is treated with Antibiotic, to which the organism is sensitive. The infection subsided within a week of starting antibiotics[13]. The same patient developed post op Axillary nerve palsy[14], with weakness of abduction and loss of sensation over upper outer aspect of arm. Patient showed symptomatic improvement in sensation around 3 weeks post operatively. Around 6 weeks he started developing improvement in motor power. Regained motor power of 4 around 3 months. There were no complications related neither to the implant used nor the transferred coracoid process.[15]

Fig -01Fig -02

Fig -03

Fig -04

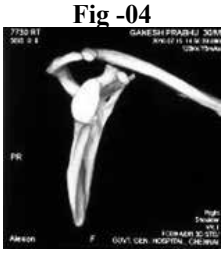


Fig -05

Fig -06

Fig -07

Fig -08

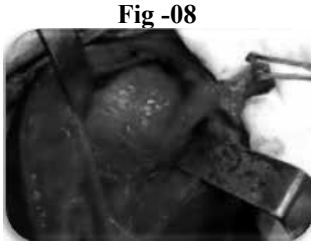


Fig -09

Fig -10

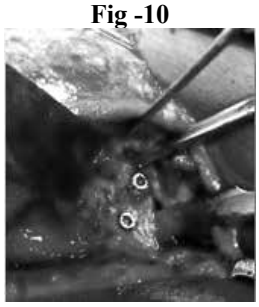


Fig -11

Table 01- Results

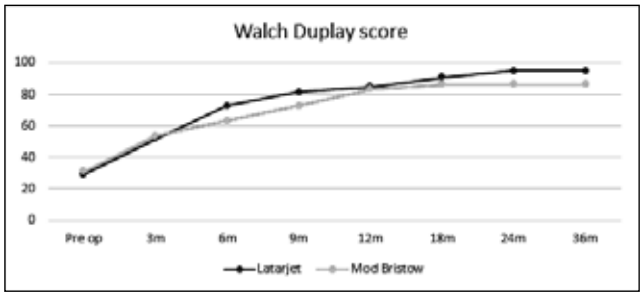
Variable			Excellent	Good	Fair	Total	Significance
Age	<20 yr	Latarjet	1	2	_	3	Not significant
		Mod Bristow	1	1	_	2	
	20-35 yr	Latarjet	3	5	2	10	Not significant
		Mod Bristow	4	6	1	11	
	>35 yr	Latarjet	2	_	_	2	Not significant
		Mod Bristow	1	1	_	2	
Duration of illness	< 1 yr	Latarjet	1	2	1	4	Not significant
		Mod Bristow	2	3	-	5	
	>1 yr	Latarjet	5	5	1	11	Not significant
		Mod Bristow	4	5	1	10	
Side	Right	Latarjet	5	4	1	10	Not significant
		Mod Bristow	5	5	-	10	
	Left	Latarjet	1	3	1	5	Not significant
		Mod Bristow	1	3	1	5	
Duration of surgery	< 2 hr	Latarjet	-	2	-	2	Significant p 0.024
		Mod Bristow	6	7	1	14	
	>2 hr	Latarjet	6	5	2	13	Significant p 0.024
		Mod Bristow	-	1	-	1	

Table – 02

Variable			Excellent	Good	Fair	Total	Significance
Mechanism of injury	Sports	Latarjet	3	5	-	8	Not significant
		Mod Bristow	3	6	-	9	
	RTA	Latarjet	1	2	-	3	Not significant
		Mod Bristow	3	1	-	4	
	Fall	Latarjet	2	-	2	4	Not significant
		Mod Bristow	-	1	1	2	
No of Dislocation	< 20	Latarjet	1	4	1	6	Not significant
		Mod Bristow	1	2	1	4	
	>20	Latarjet	5	3	1	9	Not significant
		Mod Bristow	5	6	-	11	
Hill sach lesions	Yes/ Engaging	Latarjet	7	4	1	12	Not Significant
		Mod Bristow	3	5	1	9	
	No	Latarjet	-	2	1	3	Not Significant
		Mod Bristow	3	3	-	6	
Samilson Prieto grade Arthropathy	Present	Latarjet	3	-	-	3	Significant 0.034
		Mod Bristow	-	-	-	-	
	Absent	Latarjet	3	7	2	12	Significant 0.034
		Mod Bristow	6	8	1	15	

Table – 03

Variable			Excellent	Good	Fair	Total	Significance
Follow up	<1yr	Latarjet	1	6	2	9	Significant 0.038
		Mod Bristow	-	5	1	6	
	>1 yr	Latarjet	5	1	-	6	
		Mod Bristow	6	3	-	9	
Post op Apprehension	Present	Latarjet	-	-	-	-	Significant 0.034
		Mod Bristow	-	2	1	3	
	Absent	Latarjet	6	7	2	15	
		Mod Bristow	6	6	-	12	
Total outcome		Latarjet	6	7	2	15	Not significant
		Mod Bristow	6	8	1	15	



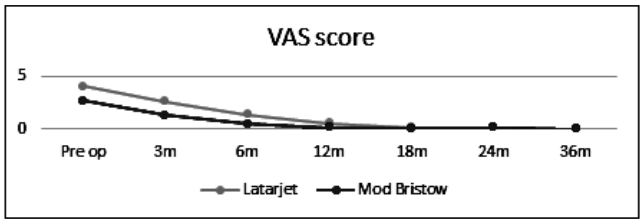


Table – 04

S No	Study (Bristow – Latarjet technique)		Excellent to Good outcome	Follow up (months)
1	Singer et al[43]		93%	246
2	Banas et al[44]		85%	103
3	Hovelius et al[45]		86%	182
4	Pap et al		84%	31
5	Matthes et al[46]		83%	38
6	Our study	Latarjet	86.7%	12
		Mod Bristow	93.3%	15

Table – 05

Study	Recurrence rate
Hovelius et al	5%
Levinge et al	6%
Schroder et al	15.4%
Our study	0%

Table – 06

Procedure	No of cases with Arthropathy
Latarjet	3 (20%)
Mod Bristow	Nil

Table – 07

Study		Loss of Abduction in degrees
Giles et al		6
Pascal boileau et al		2
Our study	Latarjet	8
	Mod Bristow	2

Table – 08

Study		Loss of external rotation in degrees
Levinge et al		6
Torg et al		23
Hovelius		10
Pascal Boileau et al		5
Banas et al		9
Our study	Latarjet	5.16
	Mod Bristow	3.20

Table – 09

Hill sach lesion	
Procedure	Excellent outcome
Latarjet	7 (53%)
Mod Bristow	3 (33%)

Table – 10

Follow up	Procedure	Excellent to Good outcome
< 1 year	Latarjet	7 (77%)
	Mod Bristow	5 (83%)
>1 year	Latarjet	6 (100%)
	Mod Bristow	9 (100%)

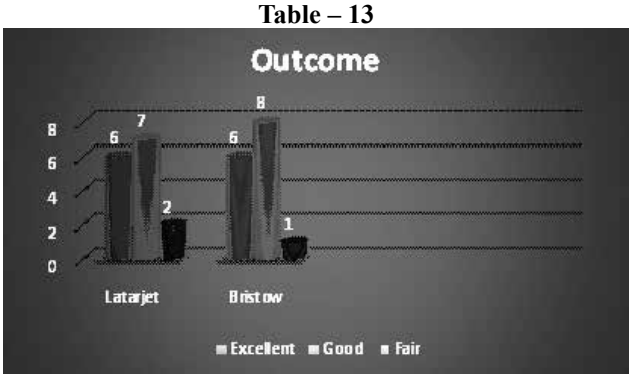
Table – 11

Post-operative Apprehension test	
Procedure	**Present %**
Latarjet	0 %
Mod Bristow	3 (20%)

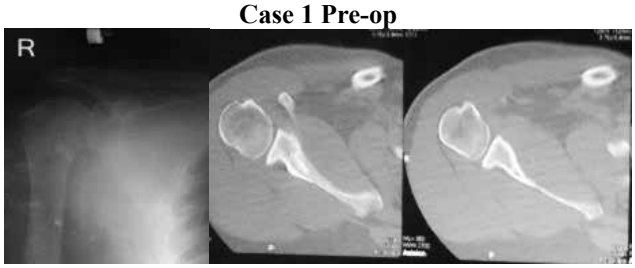
Table – 12

Walch Duplay Score						
Study		**Preop**	**3m post op**	**6m post op**	**12m post op**	**21 m post op**
Edouard et al		55.3	63.3	84.0	86.1	90.8
Our study	Latarjet	29.33	52.0	72.67	85.00	95.00
	Bristow	31.33	53.67	63.33	83.57	86.67

Table – 13



Case 1 Pre-op



Post-op

3 Year Follow Up

Case 2 Pre-op

Post-op

1 Year Follow Up


Case 3 Pre-op



Post-op

2 Year Follow Up


Case 4: Pre-op


Post-Op

3 Year Follow Up


Discussion

The outcome following Latarjet & Modified Bristow surgery for recurrent anterior shoulder dislocation depends on the pre-evaluation, number of previous dislocations, age, sex, associated injuries and finally the experience of the operating surgeon[16]. Mean age of patients was 28.37 years in our study with majority (70%) belonging to the age group of 20 – 35 years.All the affected patients were male (100%)

which is well evidenced by most of the Studies[17]. In 66.7 % of the cases, the dominant side is involved, which in our study was right shoulder[18] (20 patients).Mean number of episodes of recurrent dislocation prior to surgery were 15.5 times(range 15 -60).Mean duration of illness 2.3 years. And the most common mechanism of violence was due to Recreational/sports injury[19] (56.6%), followed by motor vehicle accident (23.3%) and unspecified falls (20%).Mean glenoid bone loss[20] in our series is 26.28. Hill sach lesion is seen in majority (70%) of case. Patients in our series had no recurrence, which was far better when compared to other similar studies. Spoor et al had a recurrence rate of 5%[21]. CT scan was done postoperatively and all thirty patients had bony union (100%) and screw positioning was assessed. Only one patient (3.3%) in our series, who underwent Mod Bristow, the coracoid was fixed above the equator[22] and there is no recurrence in this patient except for the presence of postoperative Apprehension. There is no lateral overhang or too medial positioning of coracoid in our series. In comparison of duration of surgery, Mod Bristow with mean duration of 114.33mins is shorter procedure than Latarjet[23] (158.00 mins), p value 0.024, which is statistically significant. Outcome in our series is based on the Walch Duplay score (Table-02 & 03) and is found to be excellent in 40% of Latarjet cases and 40% of Modified Bristow cases. Good outcome is seen in 46.7% of Latarjet and 53.3% of Modified Bristow cases. Fair outcome of 13.3% and 6.7% respectively. In terms of objective outcome there is no statistical difference between these two procedures[24], with a p value of 0.4. Hovelius et al[25] in his series of 118 shoulders with 15 years follow up, had good/excellent outcome in 86 to 98%.16% incidence of screw migration and 28% incidence of fibrous union (Table-04). Loss of external rotation by 10 degrees. 36% of malposition above equator. Schroder et al in 52 cases found instability in 15.4% with 26.4-year mean follow up & had Good outcome in 70% cases. Yamashitha[26] et al in 126 shoulders reported 90% good results with mean follow up of 41 months. Farzad et al in study of 35cases had 54 % of dominant extremity involvement with excellent results in 31% and good in 69% cases Matthes[27] et al in his series of 29 patients had a mean age of 26 years. Mean number of dislocations being eight. Had an excellent result in 59% good results in 24% and fair in 10%, poor in 7 %. Recurrence rate following surgery is 0% in our series (Table-05). Griesser et al in a meta-analysis of 1904 cases of Bristow-Latarjet found a recurrence rate of 2.9 to 5.8% following Bristow-Latarjet techniques. Balg & Boileu[28] et al in their series had a recurrence rate of 70% in cases of arthroscopic Bankart repair with ISIS score more than six, they recommend Bristow-Latarjet procedures in such cases. 20% of Latarjet cases developed Grade 1 Humeral arthropathy while there are no cases of post op arthropathy[29] in Mod Bristow cases. It is found to be statistically significant with a p value of 0.034. Singer et al[30] 71% arthropathy after Bristow-Latarjet procedure in 14 patients with mean follow up of 20 years. No complications. Loss of external rotation by 20 degrees. They concluded that occurrence of arthropathy depends on multiple factors. Pascal Boileau et al in their series of 70 patients had no arthritis in 91% cases, grade 1 arthritis in 9 % case. Matthes et al in his series of 29 patients had a mean age of 26 years. Mean number of dislocations being eight. No recurrence. Had excellent results in 59%, good results in 24%, fair in 10% and poor in 7 %. Hill sach seen in 10% cases. Grade 1 arthropathy of (10%) 3 cases (Table-06). Screw loosening in 26% cases. Doursounian et al[31] had nonunion rate of 2.9 %. Loss of external rotation is significantly more in Latarjet in comparison to Mod Bristow, p value 0.044. Farzad et al in study of 35 cases had loss of External Rotation of 11 degrees. Banas et al had good and excellent results in 97% cases with mean loss of External Rotation of 9 degrees. There is a statistically significant difference in loss of range of abduction between Latarjet & Mod Bristow procedures, p value 0.005 (Table-07). Pascal Boileau et al in their series of 70 patients had no arthritis in 91% cases, grade 1 arthritis in 9 % case. Mean abduction of 178 degrees. Mean loss of external rotation of 5 degrees (Table-08). Joshua giles et[32] al in their cadaveric study comparing Bristow and Latarjet techniques found no difference in joint stiffness in 0% glenoid bone loss however greater joint stiffness with Latarjet procedure for 15 to 30% glenoid bone loss. Latarjet restored the joint stiffness that was measured in intact state in 91% cases, while Bristow restored stiffness only in 33% cases. They had dislocation rate of 41% in Bristow with 30% glenoid loss cases, while 0 % dislocations with Latarjet. In patients with engaging Hill sach lesions (Table-09), Latarjet gives better results than Mod Bristow[33].Once the follow up is more than a year[34] the functional outcome significantly improves (Table-10) showing similar results with both the techniques. (p value 0.038). Post operatively three (20%) Mod Bristow cases continued to have positive apprehension test[35]

(Table-11) which is significantly higher than Latarjet (0%), p value 0.034. Edouard et al[36] in their series of twenty patients had mean walch duplay score of (55.3) preop, (63) 3mon post op, (84.0) 6mon post op and (90.8) 21 monpost op (Table-12). There is significant difference in terms of recovery in between Latarjet and Mod Bristow patients in the first post-operative year. Both groups achieve equal outcome during the 12 to 15 months' period[37]. There is also significance in terms of post-operative pain, where Latarjet patients continue to have pain little longer than Bristow patients. In our study, the following three factors were taken into account to obtain good results postoperatively;

1. Screw should be placed ideally below the equator anteroinferior aspect of glenoid and it should be within 5-10 mm from the rim (joint space) of glenoid after freshening the ends[38].
2. Adequate postoperative immobilization - period of 2 weeks to promote healing[39].
3. 4mm cannulated cancellous screws of sizes 35 to 40mm were used in our study to get Bicortical purchase[40]

Our study results provide evidence that Bristow- Latarjet procedures effectively restore joint stability in anterior Glenohumeral instability patients with Glenoid deficiency (Table-13). Selection of the patients with proper history, physical examination, radiographs, computed tomograms and MRI is mandatory, with significant importance to the size and site of the bone defect. Surgeons should be aware that these procedures are technically demanding and we recommend experienced orthopaedic surgeons familiar with normal and abnormal anatomy of shoulder. The Bristow and Latarjet procedures are equivalent in terms of functional outcome in anterior glenohumeral instability with glenoid bone loss. Latarjet procedure gives a greater restriction of movement when compared to Modified Bristow procedure. However, Latarjet outperformed the Bristow procedure in terms of restoring joint stability, even for cases with engaging Hill sach lesion. Therefore, in terms of efficacy, Latarjet will be a preferable procedure in coracoid transfer surgeries for Anterior Glenohumeral instability with significant Glenoid bone loss.

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