ORIGINAL ARTICLE

Anatomical Reconstruction of the Glenoid with an Autogenous Tricortical Iliac Crest Bone Graft in Patients with Recurrent Anterior Shoulder Dislocation

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ABSTRACT

Objective: To determine the role of anatomical reconstruction of the glenoid with an autogenous tricortical iliac crest bone graft in patients with recurrent anterior shoulder dislocation in terms of improvement in mean ASES, UCLA and Rowe scores.

Design: Descriptive case series.

Place and Duration of Study: This study was conducted in the Department of Orthopedics, Sir Ganga Ram Hospital, Lahore from October 2014 to September 2015.

Patients and Methods: 30 patients presenting in the orthopedic outpatient department of Sir Ganga Ram Hospital, Lahore with recurrent anterior shoulder dislocation and MRI evidence of Bankart lesion along with glenoid bone loss were included in this study. A written informed consent was taken from every patient.

Results: The mean age of the patients was 40.10±8.23 years and there were 28 (93.3%) male and 2 (6.7%) female patients in the study group. Pre-operative ASES score ranged from 44 to 78 with a mean of 59.63±10.30, UCLA score ranged from 14 to 29 with a mean of 23.50±4.51 and Rowe score ranged from 15 to 40 with a mean of 26.33±6.69. Post-operative ASES score ranged from 75 to 100 with a mean of 89.07±7.91, UCLA score ranged from 30 to 35 with a mean of 33.13±1.46 and Rowe score ranged from 85 to 100 with a mean of 96.00±4.02. The difference between mean pre and post-operative ASES (59.63±10.30 vs. 89.07±7.91; p=.000), UCLA (23.50±4.51 vs. 33.13±1.46; p=.000) and Rowe (26.33±6.69 vs. 96.00±4.02; p=.000) scores was significant. When stratified the data, there was no significant difference in various age (p≥0.05) and gender (p≥0.05) groups.

Conclusion: Anatomical reconstruction of the glenoid with an autogenous tricortical iliac crest bone graft was found to be an effective treatment for patients with recurrent anterior shoulder dislocation irrespective of patient's age and gender.

Keywords: Anatomical Glenoid Reconstruction, Recurrent Anterior Shoulder Dislocation, Autogenous Tricortical Iliac Crest Bone Graft

INTRODUCTION

Shoulder (glenohumeral) joint is the most commonly dislocated joint[1] with a reported incidence of 1.7%[2]. A new onset dislocation is a surgical emergency and failure to reduce with in first 24 hours makes it nearly impossible to achieve a stable closed reduction[3]. Over 90% of dislocations are anterior and most of the patients develop chronic shoulder instability characterized by recurrent dislocation, subluxation, or chronic shoulder pain[4]. Recurrent instability occurs in 50% to 96% of patients ≤20 years and 74% of patients between the ages of 20 and 40 years. This recurrent shoulder instability requires multiple emergency department admissions causing patient discomfort and cost[5].

An underlying cause in patients with recurrent anterior shoulder dislocation is Bankart lesion; injury to the antero-inferior labrum which has been reported in as high as 90% of cases with recurrent shoulder dislocation[6]. Open stabilization of Bankart lesion has been shown to reduce recurrent anterior shoulder dislocation between 0-11% of cases in existing literature[7,8].

Glenoid bone loss may co-exist in some cases and can add to failure of soft tissue reconstruction procedures. There are procedures which involve transfer of Coracoid process in an attempt to cover the bone loss but the success rate is variable and these procedures are frequently associated with risk of loss of motion, development of arthritis, breakage of screws, and resorption or nonunion of the bone graft[9].

Warner et al. for the first time in 2006 described the use of tricortical iliac bone graft in an attempt to restore the bony contour of glenoid and restoration of glenohumeral stability with excellent results[9]. As the evidence was limited and no other international or local published material was available, the purpose of the current study was to repeat this trial and further confirm the safety and efficacy of this procedure.

PATIENTS AND METHODS

30 patients presenting in the orthopedic outpatient department of Sir Ganga Ram Hospital, Lahore with recurrent anterior shoulder dislocation and MRI evidence of Bankart lesion along with glenoid bone loss were included in this study. Those with congenital bony or soft tissue abnormalities and history of previous shoulder surgery were excluded.

All patients were evaluated using the American Shoulder and Elbow Surgeons (ASES) self-assessment score[11], the University of California, Los Angeles (UCLA) score[11] and the Rowe shoulder score[12] before and 6 months after the surgery.

Operative Procedure

Patient was positioned supine with head end elevated at 30^0 to reduce venous pressure. Sandbag placed beneath the medial border of scapula to allow opening up the front of the joint. An anterior 15cm deltopectoral incision was made starting just above the coracoid process. Retracting the deltoid laterally and pectoralis major medially, the short head of biceps and coracobrachialis were identified and traced up to the coracoid process. The tip of the coracoid was osteotomized to detach the two muscles. The coracoid process was drilled and tapped before the osteotomy for reattachment with a screw at the end of the procedure. Beneath the retracted muscles, the subscapularis muscle was exposed with the externally rotating the arm. It was divided about 2cm away from the lesser tuberosity to expose the underlying glenoid. The anterior and inferior part of glenoid was exposed and prepared for the attachment of bone graft over it. (Fig. A)

Ipsilateral iliac crest was exposed and tricortical iliac crest bone graft measuring 1.5 x 2 cm was harvested (Fig. B). This graft was contoured using a small saw and bur so that it fit onto the anterior glenoid adding width and depth to the glenoid surface. 2 to 3 4mm cancellous screws were used to fix the graft in place (Fig C and D). One 6.5mm and one 4mm screws were also used in some cases.

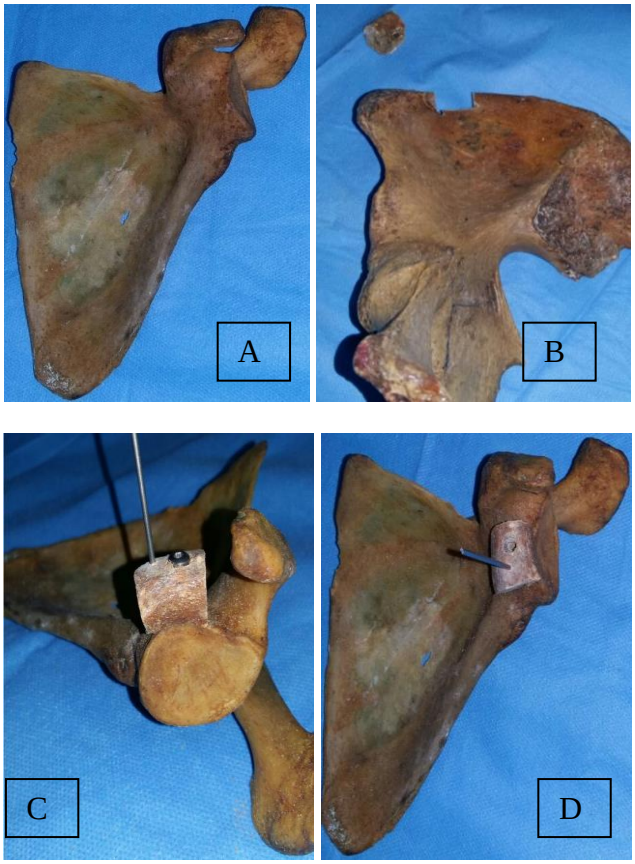

Fig.1 A-D: Different stages of the procedure

After fixation of the graft the coracoid process was reattached with the help of one 4mm cancellous screw. Fig.2

Routine antibiotic cover was given in perioperative period. Patients were discharge home 24 hours after surgery. All the patients assessment were performed by a single consultant and all the surgeries were performed by single orthopedic team to eliminate bias. Confounding variables were controlled by exclusion. All the patients were followed up till 12 postoperative week and ASES, UCLA and Rowe Scores were

assessed (Fig.3). Data was stratified to address effect modifiers i-e age and gender.

Fig. 2: postoperative radiograph

Fig.3: Follow up in Outpatient Department

RESULTS

The age of the patients ranged from 22 years to 55 years with a mean of 40.10±8.23 years. There were 28 (93.3%) male and 2 (6.7%) female patients in the study group. Pre-operative ASES score ranged from 44 to 78 with a mean of 59.63±10.30, UCLA score ranged from 14 to 29 with a mean of 23.50±4.51 and Rowe score ranged from 15 to 40 with a mean of 26.33±6.69 as shown in Table 1.

Characteristics	Participants n=30
Age	40.10±8.23 years
Gender	
• Male	28 (93.3%)
• Female	2 (6.7%)
Pre-Operative ASES Score	59.63±10.30
Pre-Operative UCLA Score	23.50±4.51
Pre-Operative Rowe Score	26.33±6.69

Post-operative ASES score ranged from 75 to 100 with a mean of 89.07±7.91, UCLA score ranged from 30 to 35 with a mean of 33.13±1.46 and Rowe score ranged from 85 to 100 with a mean of 96.00±4.02. The difference between mean pre and post-operative ASES (59.63±10.30 vs. 89.07±7.91; p=.000), UCLA (23.50±4.51 vs. 33.13±1.46; p=.000) and Rowe's (26.33±6.69 vs. 96.00±4.02; p=.000) scores was significant as shown in Table 2. When stratified the data, there was no significant difference in various age (p≥0.05) and gender (≥0.05) groups.

2 out of 30 patients developed lower brachial plexus palsy transiently which recovered over a time period of 8 weeks.

Table 2: Comparison of Mean Pre- and Post- Operative Scores

Score	Pre-Operative	Post-Operative	P value
American Shoulder and Elbow Surgeons (ASES) Score	59.63±10.30	89.07±7.91	0.000*
The University of California, Los Angeles (UCLA) Score	23.50±4.51	33.13±1.46	0.000*
Rowe Shoulder Score	26.33±6.69	96.00±4.02	0.000*

* observed difference was statistically significant

DISCUSSION

There are several factors which stabilize the shoulder joint including but not limited to glenohumeral articulation, labrum, glenohumeral ligaments, rotator cuff, and deltoid muscle. Glenoid labrum deepens the glenoid increasing the stability of joint. In recurrent shoulder dislocations, detachment of labrum (Bankart lesion) results in instability of glenohumeral joint. The area of contact of humeral head with the glenoid is only 30% which mean any decrease in this area of contact can seriously affect the stability of shoulder joint[13]. Glenoid bone loss is identified as underlying cause in many recurrent shoulder dislocations which fail to resolve with soft tissue procedures[13,14]. In the present study restoration of normal glenoid using tricortical iliac crest bone graft was evaluated. The difference between mean

pre and post-operative ASES (59.63±10.30 vs. 89.07±7.91; p=.000), UCLA (23.50±4.51 vs. 33.13±1.46; p=.000) and Rowe's (26.33±6.69 vs. 96.00±4.02; p=.000) scores was significant. Similar difference between mean pre and post-operative ASES (65 vs. 94), UCLA (18 vs. 33) and Rowe's (28 vs. 94) scores was reported previously by Warner et al. in 2006.

Thus Anatomical reconstruction of the glenoid with an autogenous tricortical iliac crest bone graft was found to be an effective treatment for patients with recurrent anterior shoulder dislocation in terms of mean ASES, UCLA and Rowe scores irrespective of patient's age and gender.

There are few very important limitations of our study. First it was done over a limited sample size of 30 cases. Furthermore, it lacked the control group with soft tissue procedure to determine any benefit over the conventional surgical treatment. And most importantly, it lacked the long term follow-up to determine any complications of the procedure especially the occurrence of osteoarthritis. Further studies considering these aspects are therefore recommended in future.

CONCLUSION

Anatomical reconstruction of the glenoid with an autogenous tricortical iliac crest bone graft was found to be an effective treatment for patients with recurrent anterior shoulder dislocation irrespective of patient's age and gender.

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