Modified transglenoid bankart repair for treatment of recurrent traumatic anterior shoulder dislocation (long-term results)

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Background
Bankart lesion is the most common fixed pathology in recurrent traumatic anterior shoulder instability. Modified transglenoid sutures was used with excellent short-term results.
Objectives
The aim of this study was to report the long-term results of the modified transglenoid sutures as regard stability (either dislocation or subluxation), suprascapular nerve affection, scapular muscle affection, suture material and knot problems, and infection related to the procedure.
Patients and methods
33 patients, 29 (87.9%) males and 4 (12.1%) females, were available for long-term follow-up (range between 5 to 11 years). All patients were treated by 2-4 transglenoid sutures and followed-up for more than 5 years according to Rowe score, instability, postoperative infection, scar problem, suprascapular nerve affection, apprehension test for anterior dislocation or subluxation or limitation of shoulder movement.
Results
According to the Rowe score, 27 (81.8%) patients were excellent and good results (score more than 75) while there were 6 (18.2%) patients fair and poor results less than 75 points. One patient suffered shoulder dislocation, two patients suffered subluxation, and one patient postoperative infection. Two (6%) patients only needed second operation.
Conclusion
The transglenoid sutures modified by using nonabsorbable suture material (Ethibond no 5) and passing through two holes in the glenoid, showed good long-term results for treatment of recurrent traumatic anterior shoulder instability.

Keywords:
dislocation, long term, modified, shoulder, transglenoid

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Introduction

Detachment of labrum and capsule from the antero-inferior aspect of the glenoid is known as Bankart lesion. It is considered the most common fixed lesion in recurrent shoulder dislocation [1–3].

Repair of Bankart lesion (either open or arthroscopic) is considered the gold standard for treatment of shoulder instability. Different techniques for repair of the Bankart lesion had been evolved [4,5]. Transglenoid labrum sutures technique was introduced by Caspari in 1988 [6]. Excellent short-term results had been obtained and documented in a study published by Caspari and Savoy [7] in1991. While the documented failure rates ranged between 0 and 49% after that time [8,9]. Kim and colleagues modified the technique by using number 1 PDS sutures with changing the point of the glenoid hole to 2 o'clock in the right side and 10 o'clock in the left side. They obtained good long-term results in nonathletic patients over 30 years in comparison to repair with anchors and they recommended that technique for treatment of recurrent traumatic anterior shoulder dislocation [10].

A modified technique using 2-4 (number 5 Ethibond) labral sutures and 2 holes (at 2 and 4 o'clock in the right side and 8 and 10 o'clock in the left side) in the glenoid was used and excellent short-term results had been obtained [11]. This modification of the technique considered two points of fixation, mass contact between the labrum and anterior glenoid and capsular plication.

The aim of this study was to report the long-term results of the modified transglenoid sutures as regard stability (either dislocation, subluxation), suprascapular nerve

affection, scapular muscle affection, suture material and knot problems, and infection related to the procedure.

Patients and methods

Between January 2006 and July 2012, 45 patients were operated upon by modified technique of transglenoid sutures for treatment of recurrent traumatic anterior shoulder dislocation at Benha University Hospital. 33 patients, 29 (87.9%) males and 4 (12.1%) females, were available for long term follow-up. 18 (54.5%) patients were right shoulder and the other 15 (45.5%) patients were left shoulder. 14 (42.4%) patients were operated in the dominant side while the other 19 (57.6%) were the nondominant side. All patients assigned a written consent for agreement to be included in the study. The mean follow-up period was 7.45 years (range between 5 to 11 years).

Inclusion and exclusion criteria

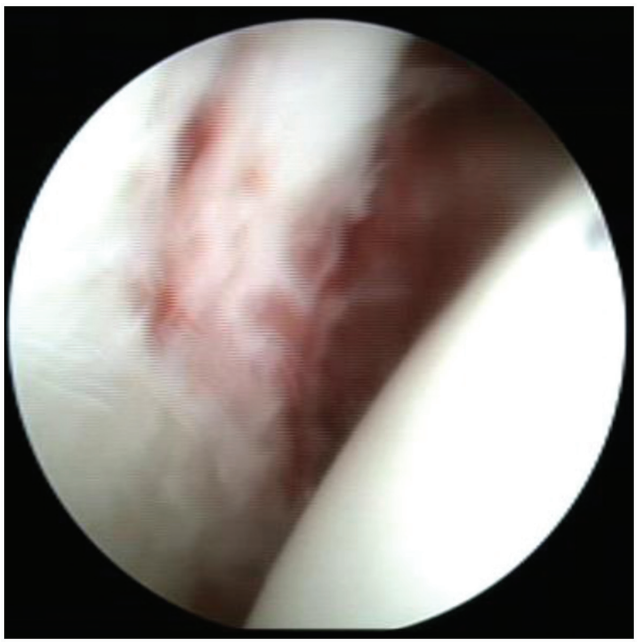
The study included patients with recurrent traumatic anterior or antero-inferior shoulder dislocation more than one time documented by history, radiograph and reduction under general anesthesia in a hospital without fracture of the head or glenoid. Bankart lesion had been documented by MRI for all patients.

The exclusion criteria for the study were patients with history of generalized ligamentous laxity, habitual dislocation, epileptic fits, addicts, glenoid fracture, and large hill sacks impinging over the glenoid as documented by radiograph, MRI, and during arthroscopic examination and previous operation for recurrent shoulder instability.

Operation

All patients were operated upon by the same team. All patients were done in beach chair position under general anesthesia using preoperative third generation cephalosporins as a prophylactic antibiotic before introduction of the arthroscope. Diagnostic shoulder arthroscopy was done through a posterior portal. Anterior superior and anterior inferior portals were done for instruments. Mobilization of the anterior labrum and capsule from the anterior glenoid margin with the dissector and freshening of the anterior edge of the glenoid with the motorized shaver. Two to four labral sutures were done using number 5 Ethibond suture material and the ends of the sutures coming out through the anterior superior and inferior portals. Using the guide pin with eye at the end and drill, two antero - posterior holes were done starting at 2 and 4 o'clock in the right shoulder and 8 and 10 o'clock in the left shoulder and passing the sutures throughout the glenoid from anterior to posterior to merge in the back of the scapula. (Figs. 1, 2) Small incision over the back of the scapula was done for pulling out the sutures and make knots posterior.(Fig. 3) Closure of the portals and posterior skin incision and putting sterile dressing. Arm to chest were used for 3 weeks after the operation. All patients were discharged from the hospital at the same day after the operation and instructions for oral antibiotic and nonsteroidal anti-inflammatory drugs for the first week. Removal of the sutures and dressing of the wounds were done in the outpatient clinic after the first week.

Figure 1



Bankart lesion.

Figure 2

Transglenoid sutures through two holes at 2, 4 o'clock.

Follow-up of the patients

The patient starts pendulous exercises after 3 weeks for one week then passive range of motion for the next 2 weeks. Active range of motion exercises starts 6 weeks after the operation. All patients could return to routine work after 3 months. Return to manual and heavy work and participation in sports were delayed to 6 months after the operation.

Evaluation of the patients

All patients had been evaluated according to the Rowe score [12,13] preoperative and postoperative during the follow-up visits starting 6 months after the operation and then annually till the last visit. All patients had been looked for signs of instability, postoperative infection, scar problem, suprascapular nerve affection, apprehension test for anterior dislocation or subluxation or limitation of shoulder movement.

Figure 3

The posterior skin scar after healing.

Statistics

Statistical analysis was done to compare the mean preoperative and postoperative Rowe scores using Paired-Samples T Test. Level of significance set at *P* less than 0.05. The descriptive analysis and statistical analysis were performed with IBM SPSS Statistics for Windows, Version 22.0 (IBM Corp., Armonk, NY, USA).

Results

The current study included 33 patients suffered recurrent traumatic anterior shoulder dislocation more than one time. Patients who had been available for the long-term follow-up for more than 5 years were included in the study. The mean age of the patients at the time of the operation was 29.1 years (standard deviation 6.9). All patients sustained more than one-time traumatic anterior dislocation of the shoulder and reduced at hospital under general anesthesia. Detachment of the anterior labrum from the anterior inferior glenoid was documented in all patients radiologically by MRI (30 (90.9%) Bankart lesion and other three (9.1%) patients anterior periosteal sleeve detachment of the labrum and capsule). Hill sacks lesion was detected radiologically in 32 (96.9%) patients.

According to the Rowe score, 27 (81.8%) patients were excellent and good results (score more than 75) while there were 4 patients with fair results and the other 2 patients were poor (18.2% fair and poor results less than 75 points).

Comparison between preoperative and post operative Rowe score are detailed in Table 1.

Postoperative complications are detailed in Table 2

Discussion

The current prospective study included 33 patients with a mean age 29 years (range 18-45 years) at the time of operation and they followed-up for 5 to 11 years after the operation. The mean Rowe score had been changed from 33.46 to 90.45 points with high significance rate (less than 0.001). Stability changed from 0 to 44.48 points. Motion and function changed from 13.18 and 20.45 preoperative to 18.48 and 27.12 postoperative

Table 1 Comparison between preoperative and postoperative Rowe score

	Preoperative	Postoperative (last follow up)	Significance
Stability	Mean 0	Mean 44.85 (SD 12.278)	0.000
motion	Mean 13.18 (SD 3.917)	Mean 18.48 (SD 3.85)	0.000
Function	Mean 20.45 (SD 7.0)	Mean 27.12 (SD 6.25)	0.000
Total Rowe score	Mean 33,64 (SD 9.2)	Mean 90.45 (SD 21.9)	0.000

Table 2 Postoperative complications

Complication	Number of patients	
Complete dislocation	1 patient (3%)	after 2 years (new trauma)
Subluxation	1 patients (3%)	Did not affect the daily life
Apprehension test for instability	4 patients (12.1%)	
Limitation of shoulder movement	6 patients (18.18%)	4 patients were mild and 2 patients were moderate
Infection	1 patient (3%)	3 months after the operation
Scar problem	None	
Suprascapular nerve affection	None	
Need for second operation	2 patients (6%)	One patient for removal of sutures and debridement after infection 5 months after the operation and cured without dislocation or subluxation. One patient after recurrence of dislocation 2 years after the operation

Table 3 Comparison between current study and other studies

	Current study	Kim *et al*. 2009[10] (modified group)	Zoffagnini *et al*. 2012[4] (modified group)
Number of patients	33	27	49
Age at time of operation	29.9±6.9	37	35±8
Follow-up period	5-11 years	5-9 years	13±2.2
Number of sutures and its material	2-4 Ethibond (nu 5)	5-8 PDS (nu1-0)	>6 mono filament
Preoperative Rowe score	Mean 33.64	30 (15-44	Not available
Postoperative Rowe score	90.45	90 (35-100)	85±22.6
Failure rates (dislocation and sublaxation)	2 patient (6%)	2 patients (7%)	6 patients (12.5%)
±ve apprehension test	4 patients (12%)	2 patients (7%)	Not available
Infection rates	One patient	no	Not available

respectively. These long-term results are comparative with the long-term results obtained by Kim and colleagues [14] and also the long-term results of open Bankart repair.

Only one patient suffered acute dislocation after exposure to trauma (after 2 years) and he was revised using Latarjet procedure. Another patient suffered from recurrence of subluxation which may be due to relaxation of the sutures, but it did not affect activity of his daily life. Apprehension test during examination was associated with limitation of shoulder movement affect the total Rowe score of four patients and lead them to be considered as fair results although, no one of them proceed to second operation as there was no frank dislocation.

Infection appeared in one patient only, 3 months after the operation and the patient was operated by arthroscopic debridement and removed the suture material. Complete cure was obtained within 6 weeks without dislocation or subluxation. Limitation of shoulder movement was detected in 6 (18.18%) patients (4 patients were mild and the other 2 patients were moderate). They were accompanied with apprehension test (4 patients), subluxation (1 patient) and the 1 dislocation patient. No patient suffered suprascapular nerve affection or scar problem after the operation.

Open bankart repair was considered the gold standard of treatment of recurrent anterior dislocation but limitation of external rotation of the shoulder was the main complication Alentorn-Geli and colleagues [15]. Different arthroscopic techniques developed with the advent of arthroscopic surgery with comparable short-term results ranging from 3 to 11% failure rates. With passing of time, long term results showed high failure rates ranging between 7 to 25%. The original transglenoid technique which was developed by Caspari showed high failure rates (0-49%) Harris and colleagues [2]. Kim and colleagues [10]showed excellent short-term results after modification of the technique. Excellent short-term results were obtained after modification of the transglenoid technique using 2-4 Ethibond suture material and 2 transglenoid holes and the concept of mass contact between the labrum and the glenoid Elbigawi [11]. Few studies in the recent literature which discuss the long-term results of the modified transglenoid sutures are available because of the development and wide use of the suture anchors.

Kim and colleagues [10]compared the long term results of modified transglenoid sutures and repair with suture anchors while Zoffagnini and colleagues [4] compared the long-term results of modified transglenoid and open Bankart repair.

Table 3 compare the results of the current study and the results of the modified sutures groups of both studies.

There is no significant deference between the current study and their results. The failure rates were owed to

relaxation of the sutures and new trauma specially in young patients and failure to address other pathology like large engaging Hill sacks, erosion of the anterior edge of the glenoid (more than 25%), capsular tear and ligaments laxity.

The current study is more superior than the long results of arthroscopic bankart repair with suture anchors. Geli and colleagues [15] reported 5 long term studies (more than 5 years) of arthroscopic Bankart repair with suture anchors and knot tying. The failure rates ranged between 5 and 38%.

The suprascpular nerve is in great risk as it pass over the back of the upper lateral part of the scapula. It enters the supraspinatus fossa by passing under the transverse scapular ligament and gives branches to the supraspinatus muscle. It blends over the scapular neck to pass under the infraspinatus over the back of the scapula. There were no signs of nerve injury detected during the current study. Longo and colleagues described the site of suprascapular nerve in relation to the posterior edge of the glenoid in a cadaveric study. He found that the nerve is located 6-15 mm at 90° internal rotation (mean 12 mm) and 11-23 mm at 90° external rotation (mean 19 mm) Longo and colleagues [16].

Reoperation was done for 2 patients only during this study. One patient who was developed infection related to the sutures and the knot in the back of the scapula and removal of the sutures was done 5 months after the operation. The other patient developed acute shoulder dislocation and recurrence of instability 2 years after the operation. Open Latarjet was done for the patient.

The sex of the patient and the dominance of the hand did not find to affect the results of the operation.

The limitation of the study is the difficulty in follow-up a large number of patients for a long time.

Conclusion

The transglenoid sutures modified by using nonabsorbable suture material (Ethibond number 5) and passing through two holes in the glenoid, show good long-term results for treatment of recurrent traumatic anterior shoulder instability.

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Nil.

Conflicts of interest
There is no conflict of interest.

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