Modified transglenoid sutures for bankart repair for the treatment of recurrent anterior shoulder instability

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Background
Recurrent shoulder dislocation is a challenging orthopedic problem. Bankart lesion is the main pathological abnormality in cases of traumatic anterior shoulder dislocation. Many procedures have been performed for treatment, both open and arthroscopic. Transglenoid sutures were used in the past before the use of the anchors.

Objectives
The aim of this study was to evaluate the results of the modified transglenoid sutures for recurrent anterior shoulder instability.

Patients and methods
Nineteen patients, with a mean age of 25.4 years (range 20–44 years), had been treated by a modified technique using 2–3 labral sutures using #5 PDS sutures and passing the ends of the sutures through two holes in the glenoid, the first at 4 o'clock on the right side (8 o'clock on the left) and the second at 1 o'clock on the right side (11 o'clock on the left), and tied over the soft tissue and the bone bridge through a small posterior skin incision. They were followed up for a mean of 39.2 months (range 24–54 months).

Results
The mean Rowe score was changed from 27.9 preoperatively to 96.8 postoperatively. All patients were satisfied by the final results of the operation. This procedure reduced the cost of the operation.

Conclusion
The transglenoid suture technique with the modification is suitable for the treatment of recurrent traumatic shoulder instability, especially in developing societies. However, this is still a preliminary study and it should be conducted on more patients.

Keywords:
modified, recurrent shoulder dislocation, transglenoid

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Introduction

Traumatic shoulder dislocation is a common injury, especially in young, active patients. In this group of patients, recurrence of dislocation is exceedingly common: 94% in those under the age of 20 years at the time of initial dislocation, and 74% in the 20–40-year age group. The majority of dislocations (95%) are anterior [1,2]. Satisfactory stabilization has been accomplished with open anterior capsulolabral reconstructions such as the Bankart procedure and its modifications [3].

Advances in arthroscopic surgery have yielded new options for dealing with anterior glenohumeral instability with lesser morbidity than the open procedure [4].

Morgan and Bodenstab [5] used two modified pins that pull cephalad onto the bony glenoid labrum–inferior glenohumeral ligament complex. These pins were passed through the neck of the scapula and were used to pull the sutures into the joint, which had been tied anteriorly. The sutures were tied posteriorly over a fascial bridge, anchoring the labrum to the glenoid. Failure rates were between 16.6 and 44% [6,7]. Caspari [8] described the arthroscopic transglenoid multiple suture repair for anterior shoulder instability and developed a suture punch to pass sutures through the tissue. Caspari and Savoie [4] recommended repair of the AIGHL and the labral complex with 5–8 knots of #2 monofilamentous absorbable sutures and one guide pin passing from the point of entry (at 2 o'clock on the right side and 10 o'clock on the left side). They reported 96% satisfactory results without loss of external rotation in their 49 patients.

Kim *et al*. [9] modified the technique of Caspari using suture material #1 PDS and reduced the number of sutures to four or five. They moved the insertion site of the guide pin to 1 o'clock on the right shoulder and to 11 o'clock on the left shoulder.

Arthroscopic transglenoid repairs for chronic anterior unidirectional instability using a combination of the concepts of Morgan and Caspari after modification of some points to have a mass contact and restore the depth of the glenoid labrum.

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Patients and methods

Between 2006 and 2008, 19 patients (18 men and one woman) with Bankart lesion were treated in the Department of Orthopaedics, Benha University Hospital. The average age at the time of operation was 25.4 years (range 20–44 years). The average follow-up was 39.2 months (range 24–54 months). The right side was affected in 13 patients. The dominant extremity was affected in 15 patients and the nondominant extremity in four patients.

All patients gave a history of traumatic shoulder dislocation at least two times, and during the first incidence, it was reduced under general anesthesia in the hospital by an orthopedic surgeon. All patients complained of weakness and fatigue of the affected shoulder. The shoulder apprehension test was positive in all cases. MRI was performed for all patients; it revealed the presence of Bankart lesions in all patients and Hill–Sachs lesion in 18 patients.

Surgical technique

The arthroscopic Bankart procedure using the principles of the technique described by Morgan and Bodenstab [5] and then Caspari [8], with some modifications as per Kim *et al.* [9], was performed.

After induction of general anesthesia, the patient was placed in the beach chair position or the sitting position and fixed to the operative bed. Examination of the affected shoulder was conducted to detect the degree of instability. Antibiotic in the form of 1 g of third-generation cephalosporin was administered to the patient as a prophylaxis. After sterilization and draping, the posterior portal was performed 2 cm distal and 1 cm medial to the posterolateral corner of the acromion, in the soft spot. Systematic arthroscopic examination of the glenohumeral joint was performed using a 30, 4 mm arthroscope. The anterior superior portal was performed using the out–in technique, with the aid of a needle to detect the exact site of the anterior portal. A cannula was introduced in the anterior superior portal.

A rusp was introduced into the joint through the anterior cannula to free the anterior labrum and capsule from the anterior scapular neck. Thereafter, a motorized shaver was introduced to create a fresh bleeding surface on the glenoid neck. An anteroinferior portal was performed with the aid of the needle, 1 cm inferior and lateral to the tip of the coracoid process. A second cannula was inserted in the anteroinferior portal.

A suture passer was used to make two or three sutures in the labrum using PDS through the lowermost part of the anterior labrum to create shifting of the labrum and capsule. One end of each suture was passed through the anterior superior cannula and the other end was passed through the anteroinferior cannula (Fig. 1a).

Two passing pins were used to pass the ends of the sutures through the glenoid in the anterior to posterior direction. The first pin was introduced through the anteroinferior portal in the 4 o'clock point on the right side (8 o'clock point on the left side), 3–4 mm from the edge of the articular cartilage, taking the ends of the sutures posterior. The second pin was introduced through the anterior superior portal in the 1 o'clock point (11 o'clock on the left side) (Fig. 2), taking the ends of the sutures posterior.

The ends of the labral sutures pass through the transglenoid tunnels in the anterior to posterior direction, with no need for tying the sutures in the front as in the Morgan technique [5] (Fig. 1b and c).

A small skin incision was made posteriorly to bring the two ends of the sutures together. As traction was applied to the ends of sutures, the labrum and capsule was seen to be adhered and fixed to the anterior glenoid, with shifting upwards. The ends of the sutures were tied posteriorly over the fascia. The arthroscope was withdrawn and the cannulae were removed. All incisions were sutured and dressed. The arm was immobilized up to the chest for 3 weeks (Fig. 3).

Rehabilitation

After 3 weeks, the patient was trained to perform pendulous exercises for 1 week, then passive range of motion for 2 weeks, and active range of motion for another 3 weeks avoiding external rotation. The patient was allowed to return to work after 3 months, and patients engaged with sports activities returned to their sports after at least 6 months.

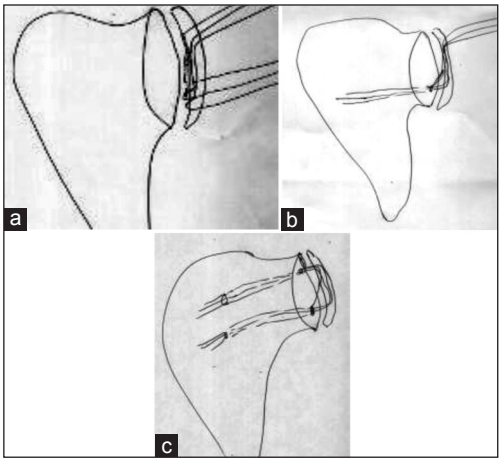
Evaluation

All patients were evaluated preoperatively and postoperatively according to the Rowe functional grading system [10,11]. The Rowe score is a 100-point system composed of 50 points for stability, 20 points for motion, and 30 points for function. According to this scoring system, clinical results are classified into excellent (90–100), good (75–89), fair (51–74), and poor (less than 50) outcomes [12]. Data for every patient were submitted to the score system online to obtain the exact score.

Operative findings

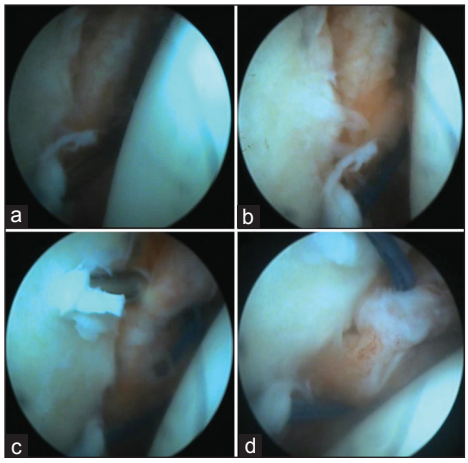
Sixteen patients (84%) revealed Bankart lesions. The other three patients revealed anterior labroligamentous periosteal sleeve avulsion [13]. The Hill–Sachs lesion

Figure 1



(a) Passing labral sutures. (b) One end of the labral suture was passed posteriorly through the first transglenoid tunnel. (c) The other end of the suture was passed through the second transglenoid tunnel.

Figure 2



The technique. (a) The first pin was at 4 o'clock. (b) The first end of the suture passed posteriorly. (c) The second pin was at 1 o'clock. (d) The second end of the suture passing posteriorly.

Figure 3

A postoperative image showing the scar of posterior incision.

was detected in 18 patients. The severity of the Hill–Sachs lesion was graded according to the following dimensions: mild (2 cm long and 0.3 cm deep), moderate (4 cm long and 0.5 cm deep), and severe (4 cm long and 1 cm deep) (Table 1) [9].

Results

The main Rowe score changed from 27.9 (range 15–45) preoperatively to 96.8 postoperatively (range 90–100), and so all patients were graded as excellent (Table 2). All patients were satisfied with the results of the operation. Seven of eight patients who were engaged in heavy work returned to their work, and the other patient changed his work after the operation. The three patients who were practicing sports returned to their sports but without competition.

There were no recurrences of dislocation or subluxation after the operation. Six (31.6%) patients experienced 75% normal external rotation, internal rotation, and elevation. The other 13 (68.4%) patients regained 100% shoulder motion in comparison with the other shoulder.

There were six patients who also experienced mild limitation of function and minimum discomfort, whereas the other 13 patients had no limitation of work or sports with little or no discomfort.

There was a relationship between the dominant hand and early recovery after the operation, as the patients

Table 1 Distribution of the severity of Hill–Sachs lesion

Grades	Number of patients [*n* (%)]
Mild	8 (42)
Moderate	10 (52)
Severe	0 (0)

Table 2 Preoperative and the postoperative Rowe score for the patients and the duration of follow-up

Patients	Pre operative score	Post operative score	Duration of follow-up
1	15	100	54
2	25	100	52
3	25	100	46
4	30	90	45
5	15	90	45
6	35	100	45
7	30	100	44
8	15	100	44
9	30	100	43
10	30	95	38
11	40	95	38
12	40	100	37
13	15	95	35
14	15	90	33
15	45	95	33
16	40	100	32
17	30	90	31
18	15	100	25
19	40	100	24
Main	27.9	96.8	39.2

with dominant hand reached full recovery after 8–15 weeks (mean 12.6 weeks). The patients with the nondominant hand reached full recovery after 11–17 weeks (mean 15 weeks).

There were no reported complications in the 19 patients. No infection had occurred in the postoperative period. No patient suffered from suprascapular nerve affection, and no patient suffered from suture problem posteriorly.

Discussion

The currently accepted standard treatment of anterior glenohumeral instability is the repair of the Bankart lesion. This is carried out by reattaching the anteroinferior labrum to the glenoid labrum [14].

In the current study, arthroscopic transglenoid suture stabilization for the treatment of isolated anterior labral detachments restored stability in all 19 patients (100%). According to the scale of Rowe, all patients had excellent results (a score between 90 and 100) postoperatively. These results are comparable to the results of Caspari and Savoie [4] (96%), Kim *et al*. [9] (87%), and Maki and O'Neill [3] (98%).

There is no relation between the outcome of the transglenoid repair and the level of activity, the number of dislocations, or the severity of the Hill–Sachs lesion and the outcome of the operation.

The outcomes of the transglenoid suture technique, documented by many authors, have a broad range of recurrence rates ranging from 0 to 49% [7,12]. Early reports on the arthroscopic transglenoid technique were encouraging, but subsequent reports have indicated that, especially in young, active patients, it shows relatively poor results compared with open stabilization or arthroscopic suture anchor repair [15–17].

Caspari and colleagues [4,8] recommended repair of the labral complex with 5–8 monofilamentous absorbable sutures, with the entry point of the guide pin at 2 o'clock on the right side and 10 o'clock on the left shoulder and exit through the inferomedial aspect of the infraspinatus fossa.

Kagaya *et al*. [18] modified the Caspari technique and used a combination of absorbable sutures in 27 patients and absorbable plus nonabsorbable sutures in 18 patients, and compared the two techniques. The results were 74% with the absorbable sutures and 94% with the absorbable plus nonabsorbable sutures. Kim and colleagues [9,19] modified the technique and used 4–5 knots of #1 PDS, with the point of entry of the guide at 1 o'clock on the right side and 11 o'clock on the left side and the exit in the superomedial or the center of the infraspinatus fossa, but reported 87% results.

Kim *et al*. [12] believed that the high rates of recurrence after transglenoid sutures resulted from two technical points: the one-point fixation of the sutures and the long distance between the labral sutures and the fixing point to the glenoid. In this work, the two points of fixation created a mass contact between the labrum and the glenoid and restored the labral dips. The modified transglenoid suture technique can reduce the cost of the operation by avoiding the use of anchors. Limitations of this study are the limited number of cases, the short follow-up period, and the fact that the results of the technique for athletes could not be ensured.

Conclusion

The transglenoid suture technique with the modification is suitable for the treatment of recurrent traumatic shoulder instability, especially in developing societies. However, this is still a preliminary study and it should be conducted on more patients.

Acknowledgements

Conflicts of interest

There are no conflicts of interest.

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