

## Brief Report

# Comparison of Bristow procedure and Bankart arthroscopic method as the treatment of recurrent shoulder instability

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### Abstract

**Background:** Anterior shoulder dislocation is the most common major joint dislocation. In patients with recurrent shoulder dislocation, surgical intervention is necessary. In this study, two methods of treatment, Bankart arthroscopic method and open Bristow procedure, were compared.

**Materials and Methods:** This clinical trial survey had been done in the orthopedic department of Alzahra and Kashani hospitals of Isfahan during 2008-2011. Patients with recurrent anterior shoulder dislocation who were candidates for surgical treatment were randomly divided into two groups, one treated by Bankart arthroscopic technique and the other treated by Bristow method. All the patients were assessed after the surgery using the criteria of ROWE, CONSTANT, UCLA, and ASES. Data were analyzed by SPSS software.

**Results:** Six patients (16.22%) had inappropriate condition with ROWE score (score less than 75); of them, one had been treated with Bristow and five with Bankart (5.26 vs. 27.78). Nine patients (24.32%) had appropriate condition, which included six from Bristow group and three treated by Bankart technique (31.58 vs. 16.67). Finally, 22 patients (59.46%) showed great improvement with this score, which included 12 from Bristow and 10 from Bankart groups (63.16 vs. 55.56). According to Fisher's exact test, there were no significant differences between the two groups ( $P = 0.15$ ).

**Conclusion:** The two mentioned techniques did not differ significantly, although some parameters such as level of performance, pain intensity, use of analgesics, and range of internal rotation showed more improvement in Bristow procedure. Therefore, if there is no contraindication for Bristow procedure, it is preferred to use this method.

**Key Words:** Bankart repair, Bristow procedure, coracoid transposition, recurrent anterior instability of the shoulder

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### INTRODUCTION

Shoulder dislocation is the most common major joint dislocation (50%).<sup>[1-6]</sup> Surgical intervention is necessary for the patients suffering from recurrent instability of shoulder joint following the first episode of shoulder dislocation.<sup>[6]</sup> Over time, the rate of dislocation in patients with recurrent shoulder instability increases, and with less severe hit, it happens. Each time the

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patient moves his hand upward and backward or rotates it externally, the anterior dislocation of shoulder may happen. Recurrent shoulder instability is the most common complication of shoulder dislocation.<sup>[7-11]</sup>

Recurrent dislocation occurs commonly in young patients and is especially seen during exercise.<sup>[12]</sup> It mostly happens anteriorly.<sup>[13,14]</sup> Most of these patients are the ones who did not keep their joints immobile enough after the reduction of dislocated shoulder and resumed their state of sport activities rapidly.<sup>[13]</sup> The joint capsule is ruptured every time it dislocates. This rupture repairs spontaneously after joint reduction by enough immobilization of the joint. In cases where the capsule's rupture does not heal, the joint becomes unstable and easily dislocates.<sup>[15]</sup> Several methods have been used to stabilize the shoulder joint.<sup>[16-19]</sup> Two of these techniques are Bankart arthroscopic repair and Bristow open procedure. Nowadays the most popular treatment of shoulder instability with Bankart lesion is the Bankart method of surgery (repair and reconstruction of labrum capsule)<sup>[20-23]</sup> in which the pathologic lesion is repaired anatomically.<sup>[16]</sup> On the other hand, the Bristow surgery (coracoid transfer to the edge of glenoid) of all types of shoulder instability is associated with favorable outcomes.<sup>[24]</sup> In this technique, two mechanisms are used to make the shoulder stable; one is the role of coracoid as the blocker of the bone and the other one is the dynamic buttress of anterior and inferior site of capsule by short head of biceps muscle and brachioradialis muscle. In fact, both methods are useful for stabilizing of isolated chronic shoulder instability.<sup>[16]</sup>

Several studies conducted in different regions of the world disclosed no significant difference between these two methods,<sup>[13,16]</sup> and random studies showed no preference for each of these techniques.<sup>[25]</sup> As these two surgical procedures are performed in our country's medical centers and such a study has not been done on the Iranian population,<sup>[24,26]</sup> it seemed necessary to conduct a study to evaluate the outcome of these techniques and make a better decision.

## MATERIALS AND METHODS

This clinical trial was performed between 2008 and 2011 in Alzahra Hospital and Kashani Hospital of Isfahan. In this survey, we investigated patients over 18 years of age with traumatic recurrent anterior shoulder dislocation and referring to Alzahra and Kashani hospital clinics between the years 2008 and 2011.

Inclusion criteria included suffering from recurrent dislocation of shoulder due to trauma, age over 18 and less than 45, dislocation not healing following

nonsurgical treatments, having limitations in daily life and physical activity, permanent disability with a phobia of dislocation, Bankart lesion in magnetic resonance imaging (MRI),<sup>[16]</sup> and patient's willingness for participating in this study.

Exclusion criteria consisted of failure to follow the patients in order to assess their state of improvement after surgery, multidirectional instability of the shoulder, bone defects, patient's refusal to participate, uncontrollable seizures, and patient's inability to cooperate in mental and physical rehabilitation.

Using simple sampling, 40 patients who referred to Isfahan university clinics and satisfied the inclusion criteria were selected. Then, they were randomly assigned to two groups with 20 patients in each. Before the project, conscious consent forms were obtained from all participants. In the first group, Bankart arthroscopic surgery was used for stabilizing the joint and in the second, Bristow open surgery was used. After surgery, all the patients were estimated by an orthopedic surgery resident using CONSTANT, ASES,<sup>[27]</sup> UCLA,<sup>[28]</sup> and ROWE score, and related forms were filled. Patients' satisfaction was determined with the question "Are you willing to advise others to choose this route of treatment or not?" and by using American Shoulder and Elbow Surgeon's Shoulder Form ASES parameters. All data were collected in data collection forms by a definite orthopedic resident. At the end, all the data were analyzed in version 20 of SPSS. For comparing the mean of quantitative variables before performing the surgery, we used independent *t*-test and for comparing them after surgery, we applied independent *t*-test and two-way analysis of variance (ANOVA). To compare the relative frequency of relapse between the two groups, Chi-square test was used.  $P < 0.05$  was considered significant.

## RESULTS

In this survey, we selected 40 patients with recurrent shoulder dislocation and then randomly divided them into two groups with 20 people in each. In order to treat the first group, we used Bankart arthroscopic method and in the second group, Bristow open surgery was applied. During the study, we excluded three patients as they were unavailable and not coming to our centers, two from Bankart group and one from Bristow group. Finally, these two groups with a population of 18 and 19, respectively, were compared with each other.

The average age of patients was  $29.6 \pm 4.6$  years, with a range of 23-40 years. The mean ages of patients

treated by Bristow and Bankart method were  $30.4 \pm 4.8$  and  $28.6 \pm 4.5$  years, respectively, which was not significantly different according to *t*-test ( $P = 0.26$ ). Bristow and Bankart groups consisted of 19 and 16 men, respectively (100% vs. 88.9%), and according to Fisher's exact test, the sex distribution between these two groups did not differ ( $P = 0.23$ ). There was no significant difference in job and education distribution between groups ( $P > 0.05$ ). The distribution of gender, occupation, and education is presented in Table 1.

**Table 1: Distribution of gender, occupation, and education in the two groups**

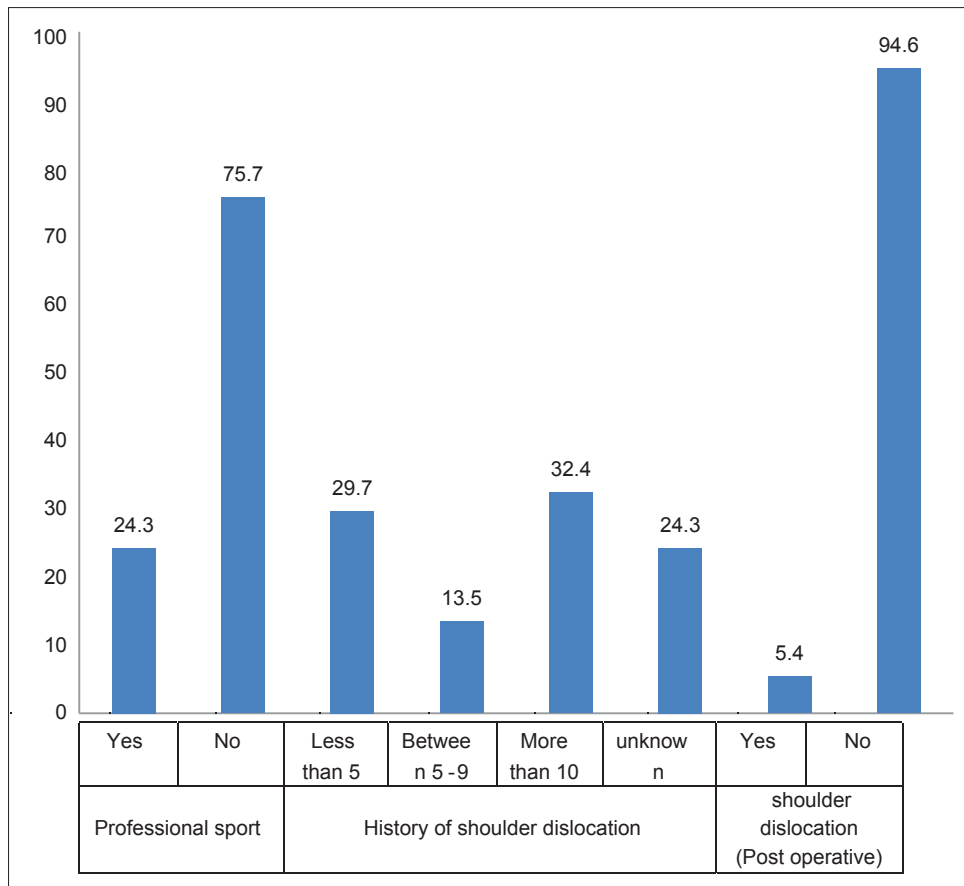
Variable	Groups Levels	Bristow		Bankart		P
		No.	Percentile	No.	Percentile	
Gender	Male	19	100	16	88.9	0.23
	Female	0	0	2	11.1	
Occupation	Laborer	1	6.7	3	18.8	0.06
	Employee	7	46.7	4	25	
	Free jobs	7	46.7	3	18.8	
	Housewife	0	0	1	6.3	
	Student	0	0	5	31.3	
	Undefined	4	21.1	2	11.1	
	Education	Less than diploma	1	5.3	0	
	Diploma	6	31.6	9	44.4	
	Academic degree	12	62.2	10	55.6	

Nine patients were professional athletes in sports such as follows: Wrestling (one patient), boxing (one patient), swimming (two patients), tennis (two persons), volleyball (one patient), and karate (two patients). According to the frequency of dislocation, 11 (29.7%) had dislocation less than 5 times, 5 (13.5%) had dislocation 5-9 times, 12 (32.4%) had shoulder dislocation more than 10 times, and the number of dislocations in 9 patients (24.3%) was unknown.

Two of the (5.5%) investigated patients had shoulder dislocation again after the surgery, one from Bristow group and the other one from Bankart. These results are shown in Figure 1.

The mean duration of hospitalization due to shoulder dislocation was  $2.7 \pm 1.3$  days, with a range of 1-6 days. The mean duration between surgery and returning to work or education in our patients was  $71.4 \pm 31.7$  days, with a range from 40 to 150 days.

The mean duration of hospitalization in Bristow and Bankart groups was  $2.8 \pm 1.5$  and  $2.6 \pm 1.1$  days, respectively. According to *t*-test, there was no significant difference between these two groups ( $P = 0.6$ ).



**Figure 1: Frequency of history of professional sport and shoulder dislocation**

Recovery time in the two groups was  $76.3 \pm 34.2$  and  $65.5 \pm 28.5$  days, respectively, and this variable did not differ significantly between the two groups ( $P = 0.32$ ). The results are shown in Notably, none of the patients in each group required further surgery. In none of the patients treated by Bristow technique, nonunion of Bristow repair, bone and screw displacement, and musculocutaneous nerve defects were seen.

### ROWE score

This score consists of three parameters: stability, mobility, and performance of the patients. The mean ROWE scores for Bristow and Bankart groups were  $87.4 \pm 13$  and  $85 \pm 12.8$ , respectively, and *t*-test showed no significant difference between these two groups ( $P = 0.58$ ). According to the ROWE score<sup>[24]</sup> distribution between the two groups, which is seen in Figure 2, 12 patients from Bristow group and 10 from Bankart were feeling great (63.2% vs. 55.6%). Also, 6 and 3 patients from these groups, respectively, had a good condition (31.6% vs. 16.7%). One patient from Bristow group and five from Bankart group had inappropriate condition (5.3% vs. 27.8%). None of the studied patients were in bad condition. Fisher's exact test revealed no significant difference between these groups ( $P = 0.15$ ).

### CONSTANT score

The mean CONSTANT score in patients treated by Bristow was  $58.7 \pm 6.3$  and in patients who underwent Bankart method was  $50.9 \pm 12.6$ , and *t*-test showed that the difference between the groups was significant ( $P = 0.023$ ).

The parameters measured by this score were pain intensity, daily performance, lifting the limb to the lateral and anterior direction, and internal and external rotation of the joint. The two parameters, limb positioning and lifting the limb to lateral and anterior direction, differed significantly between the two mentioned methods.



Figure 2: Postoperative condition of the patients based on ROWE score

### UCLA score

UCLA score investigates parameters such as performance, active forward flexion, forward flexion power intensity, and patient satisfaction. The mean score in the group that underwent Bristow procedure was  $29.7 \pm 4.5$  and in patients treated by Bankart was  $28.6 \pm 6$ , which did not differ significantly ( $P = 0.5$ ). Considering this score, three patients from Bristow group and two from Bankart ranked excellent (15.8% vs. 11.1%). With this scoring, 11 persons from Bristow and 12 from Bankart seemed to have good condition (57.9% vs. 66.7%), and 5 and 4 patients, respectively, had bad scores (26.3% vs. 22.2%). Fisher's exact test found no significant difference between groups ( $P = 0.99$ ). Figure 3 reveals the UCLA score distribution between Bristow and Bankart groups. Notably, none of the parameters measured by UCLA differed between these two methods of surgery.

### ASES score

The mean score in Bristow group was  $85.5 \pm 8.1$  and in Bankart group was  $76.2 \pm 20.7$ , and the difference was not significant according to *t*-test ( $P = 0.08$ ). Among the ASES parameters,<sup>[22]</sup> night pain, analgesic usage, and narcotic usage were significantly different between the two groups. Also, we found significant differences in the items related to the level of daily activity, such as ability to brush hair and throw the ball over the head. Parameters associated with the amount and range of motion, the amount of active and passive internal rotation, and having scar as a complication were different between groups. In criteria related to instability, the parameters including moving to the anterior position and ability to reproduce the signs were significantly different.

### DISCUSSION

The main objective of this survey was to compare the outcome of Bankart arthroscopic and Bristow open

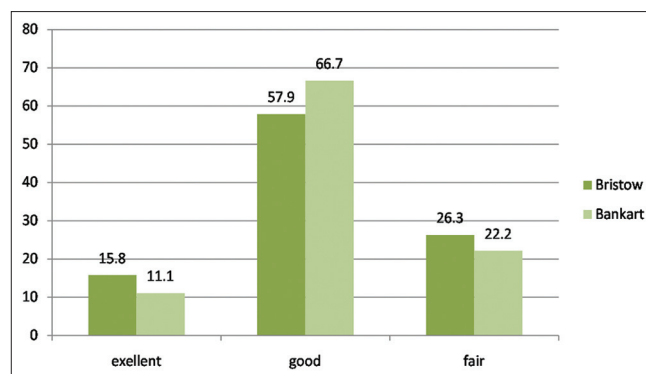


Figure 3: Distribution of UCLA score between Bankart and Bristow groups

procedures as the treatment for anterior shoulder dislocation. As previously mentioned, one of the common problems of the society is recurrent shoulder dislocation, especially in athletes and persons with careers in which more pressure than usual is imposed to this region. Shoulder dislocation requires no surgery by itself, but recurrent shoulder dislocation requires surgery to stabilize the joint.

In this study, we investigated 40 patients with recurrent shoulder dislocation and we randomly divided them into two equal groups of 20 patients each. The first group underwent Bristow procedure and the second group was treated by Bankart arthroscopic surgery. During the study, three patients were excluded due to unavailability and not getting readmitted (one from Bristow group and two from Bankart group). Finally, the population of the two groups became 19 and 18, respectively.

The mean ages of Bristow and Bankart group were  $30.4 \pm 4.8$  and  $28.4 \pm 4.5$  years, respectively, and the difference was not statistically significant. In terms of gender, occupation, and education, the two groups were not significantly different. The confounding effects of demographic variables were controlled and the two groups were comparable.

Based on our results, 24.3% of the patients were professional athletes. Shoulder dislocation occurred in 29.7% of our patients less than 5 times, in 13.5% from 5 to 9 times, in 32.4% for more than 10 times, and in 24.3%, the number of dislocations was undefined. Sport activities, particularly professional sports, are a major cause of shoulder dislocation. While special motions which predispose shoulder to dislocation are performed too many times during these sports, these athletes are prone to recurrent shoulder dislocation. Indeed, in our study, 32.4% of the patients had shoulder dislocation more than 10 times.

Mean duration of hospitalization in Bristow and Bankart groups was  $2.8 \pm 1.5$  days and  $2.6 \pm 1.1$  days, respectively, which did not differ significantly. Recovery time was  $76.3 \pm 34.2$  days in Bristow group and  $65.5 \pm 28.5$  days in Bankart group, which were not significantly different.

Mean ROWE score including stability, mobility, and performance was  $87.4 \pm 13$  in patients who underwent Bristow surgery and  $85 \pm 12.8$  in Bankart group, and no significant difference was seen between the two groups.

In a study conducted in 2000 by Grastman, similar results were obtained and the mean of mentioned score in this study did not differ significantly. Notably,

mobility parameter was different in our study, but the other two parameters were not. There was no significant difference in the two methods for treatment of shoulder dislocation.

CONSTANT score was the other criterion to estimate the efficacy of the method. The mean of this score in Bristow group was  $58.7 \pm 6.3$  and in Bankart group was  $50.9 \pm 12.6$ , and they showed a significant difference. Parameters measured by this score were pain intensity, daily performance, lifting the limb to the lateral and anterior direction, and internal and external rotation of the joint. The two parameters, limb positioning and lifting the limb to lateral and anterior direction, differed significantly between the two mentioned methods. Patients who underwent Bristow open surgery had a favorable condition.

UCLA score investigated parameters such as performance, active forward flexion, forward flexion power intensity, and patient satisfaction. The mean of this score was  $29.7 \pm 4.5$  in Bristow group and  $28.6 \pm 6$  in Bankart group, which were not significantly different.

The mean score in Bristow group was  $85.5 \pm 8.1$  and in Bankart group was  $76.2 \pm 20.7$ , and the difference was not significant. Pain is one the parameters measured by this score. The other parameter is use of analgesics and narcotics to relieve the pain. In our survey, patients treated by Bristow procedure experienced less pain and used less analgesics and narcotics than the patients treated in Bankart group. Among the several investigated criteria by this score, ability to brush hair and throw the ball over the head was more favored in Bristow group. Range of active and passive internal rotation was more in Bristow category. In a study performed by Gerard *et al.* on 79 patients who underwent Bankart arthroscopic procedure, the mean values of UCLA score pre- and postoperatively were  $20.2 \pm 5$  and  $32.4 \pm 4.6$ , respectively. The difference in patients' score before the surgery and 2 years after the surgery was quite significant. Based on this score, in this study, the condition of 34 patients was great 2 years after the surgery, 35 patients had a good situation, 1 patient was not in a favorable condition, and 3 were in poor condition.<sup>[12]</sup>

Another study performed in Sweden by Lennart *et al.* investigated 24 persons treated by Bankart surgery and 30 patients who underwent Bristow procedure. In this study, the recurrence of shoulder dislocation and patients' satisfaction did not differ between the two groups.<sup>[29,30]</sup>

A domestic study conducted in 2006 by MehdiNasab *et al.* investigated 19 patients with recurrent anterior

shoulder dislocation due to trauma. Mean follow-up time in these patients was 7.5 years and none of the patients had relapse. Feeling of instability was seen in three patients. Five patients suffered from mild shoulder pain at the end of the active day. Finally, 15 patients (78.9%) showed good and even excellent improvement. This study concluded that Bristow procedure is accompanied by good outcomes and the postoperative instability rate is low.<sup>[26]</sup>

We found in our study that the two mentioned techniques did not differ significantly, although some parameters such as level of performance, pain intensity, use of analgesics, and range of internal rotation showed more improvement in Bristow procedure. If there is no contraindication for Bristow procedure, it is preferred to use this method of surgery.

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