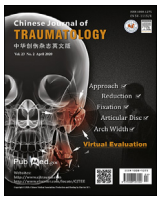
Chinese Journal of Traumatology 23 (2020) 102–106

Contents lists available at ScienceDirect

Chinese Journal of Traumatology

journal homepage: http://www.elsevier.com/locate/CJTEE



Original Article

Similar functional outcome using single anterior portal and standard two portals technique in recurrent dislocation of shoulder

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ARTICLE INFO

Article history:
Received 16 October 2019
Received in revised form
20 December 2019
Accepted 10 January 2020
Available online 24 January 2020

Keywords:
Shoulder joint
Single anterior portal
Bankart lesion

ABSTRACT

Purpose: Recurrent dislocation of shoulder (RDS) is a common injury in high demand professionals, like athletes and military personnel. The treatment for the patients with Bankart lesion is the arthroscopic repair. This present study compares the outcomes of two different techniques of arthroscopic Bankart repair i.e. a standard two anterior portals technique and a single anterior portal technique in patients with RDS.

Methods: Patients with traumatic RDS met the inclusion criteria were managed with Bankart repair using either two anterior portals (Group A) or a single anterior portal (Group B) technique. Patients were evaluated before the intervention and at the mean follow-up of approximately two years using Rowe score, Oxford shoulder score and Tegner activity scale.

Results: The mean age of the patients in Groups A ($n = 34$) and B ($n = 37$) was 29.64 years and 29.05 years respectively ($p = 0.66$). The dominant shoulder was involved in 27 patients in Group A and 22 patients in Group B ($p = 0.069$). The operative time in Group A and B was 68.52 min and 46.35 min, respectively ($p < 0.001$). The complications at follow-up, the mean Rowe score and Oxford score improved significantly in both groups compared with the pre-operative values. However, the final outcome scores were not significantly different between the both groups. The median Tegner's score preoperatively and at follow-up was 7 and 6, respectively in Groups A and B.

Conclusions: Single anterior portal technique is an effective treatment modality, yielding a similar outcome as two anterior portals technique in the management of RDS.

Introduction

The shoulder joint is one of the most mobile joints in the body, which is more commonly associated with dislocation as compared to any other joints.[1,2] Recurrent dislocation of shoulder (RDS) is a common phenomenon especially in young age group, athletes and military personnel.[3,4] Bankart lesion which is a tear of the labrum from the anterior-inferior aspect of the glenoid is considered to be the most common lesion seen in RDS followed by the Hill-Sachs lesion.[5,6] The best treatment modality to prevent reoccurrence and return to pre-injury status is to repair the underlying pathology.[7–9]

There are various treatment modalities for RDS. It has evolved from open repair to arthroscopic management of the underlying defect.[10] With the advent of arthroscopy technique, the treatment of choice shifted to keyhole arthroscopic surgeries.[3,11] However, in the recent past, the type of treatment is found to be associated not only with the type of lesion but also upon the amount of bone loss on the glenoid and humerus side (off-track or on-track lesion).[7–9] The standard treatment for the Bankart lesion or the lesion with minimal bone loss is arthroscopic Bankart repair using one posterior and two anterior portals.[12] However, the creation of two anterior portals is sometimes challenging in small size shoulders especially in the Asian population. Further, it can lead to iatrogenic nerve injuries and breaking of the cannula owing to overcrowding in the portals.[13,14] In the last 5 years, we have been using a single anterior portal instead of the two anterior portals for the Bankart repair. There is limited data available about the arthroscopic

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Peer review under responsibility of Chinese Medical Association.

https://doi.org/10.1016/j.cjtee.2019.12.003

Bankart repair using a single anterior portal. Further, in PubMed, we could only find one technical note and one case series of a similar kind.[15,16] The present work is a comparative study to evaluate the functional outcomes using Rowe score and Oxford score of patients with RDS using the standard two anterior portal and a single anterior portal for Bankart repair.

Methods

Study design

The comparative study was carried out at a tertiary care military hospital. The ethical committee approval was obtained (No.05/09). All the patients with RDS were assessed clinically and radiologically using computer tomography and magnetic resonance imaging. Patients who met the inclusion criteria and willing to join in were included in the study. These patients were operated by a team of surgeons trained in arthroscopy and had more than 10 years experiences of performing shoulder arthroscopy.

The inclusion criteria were: patients diagnosed clinically with traumatic recurrent (anterior) dislocation of the shoulder with Bankart lesion with no or minimal Hill-Sach's lesion requiring Bankart repair, age between 20 and 45 years. The exclusion criteria were: patients with RDS requiring additional procedures like Remplissage or open surgical procedure, associated with Rotator cuff tears or superior labrum anterior posterior lesions, atraumatic multidirectional instabilities, revision instability shoulder surgery, patients operated earlier for any shoulder pathology.

Methodology

Consecutive patients were included in the study and assigned in two groups alternatively. The demographic profile of these patients was listed in Table 1. In Group A, all patients were operated using two standard anterior portals while in Group B patients were operated using one anterior portal technique. The patients were assessed pre-operatively and at the final follow-up using Rowe score,[17] Oxford shoulder score,[18] and Tegner's activity level.[19] Also, these patients were assessed in terms of surgical time and complications in both groups.

Surgical technique

After obtaining informed consent, the patients received operation under general anesthesia in the lateral position. A standard posterior portal was used to visualize the shoulder joint. In Group A, two standard anterior portals were made while in Group B only one anterior portal made (Fig. 1). The initial step in each surgery was an inspection of the shoulder joint, and various lesions were identified (Fig. 2A). In case, if there is any change in the plan regarding the type of management intraoperatively, the patient was excluded from the study.

In Group A, requiring two portals, the medial portal was made just lateral and superior to the coracoid process using outside-in technique and the second (lateral) portal was made mid-way between the coracoid process and anterior acromion tip. The labrum lesion was identified and elevated. The edges of the lesion were freshened. This was followed by the creation of bleeding glenoid surface. A 2.9 mm suture anchor (Smith and Nephew, Mumbai, USA Ltd.TM) placement from the medial portal and into the inferior most part of anterior glenoid was done. This anchor was placed as close as possible to the 5 o'clock position in right or 7 o'clock position in the left shoulder. Two to three more suture anchors were placed in a similar manner superior to the first anchor depending upon the type of lesion.

Table 1
Demographic profile, mode of injury and type of lesions in two groups.

Items	Group A ($n = 34$)	Group B ($n = 37$)	p value
Mean age (year)	29.65 ± 6.16	29.05 ± 5.43	0.66
Gender			
Male	34	36	1.000
Female	0	1	
Side involved			
Right	21	20	0.362
Left	13	17	
Dominant side	27	22	0.069
Non-dominant side	7	15	
Mean number of dislocations	4	4.08	0.369
Mode of injury			
Training	16	21	
Sports	15	13	0.715
Fall	1	2	
Road side accident	2	1	
Type of lesion			
Banlart lesion	34	37	1.000
Hill Sach's lesion	20	25	0.445

In Group B, the basic procedure remained the same, yet only one anterior portal was made which was 1 cm lateral to the medial portal of two anterior portals technique. After preparing the glenoid and labrum in a similar fashion, the suture anchors were placed. A 45° angled suture shuttle was used to pierce the capsule-labrum complex. Further, an ample amount of the suture shuttle was left in the joint and suture shuttle is removed from the cannula (Fig. 2B). The sutures of anchors were passed through the suture

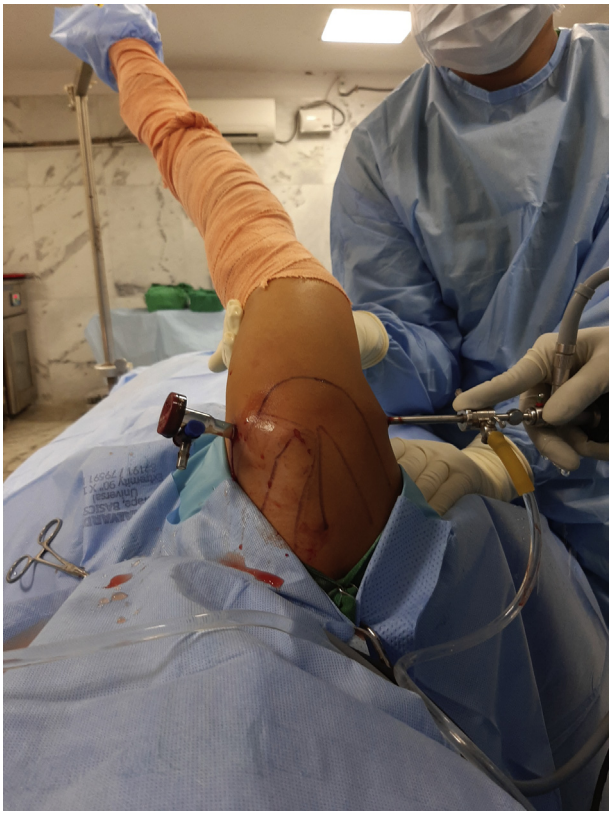

Fig. 1. Lateral position of the patient with one anterior portal and one posterior portal.

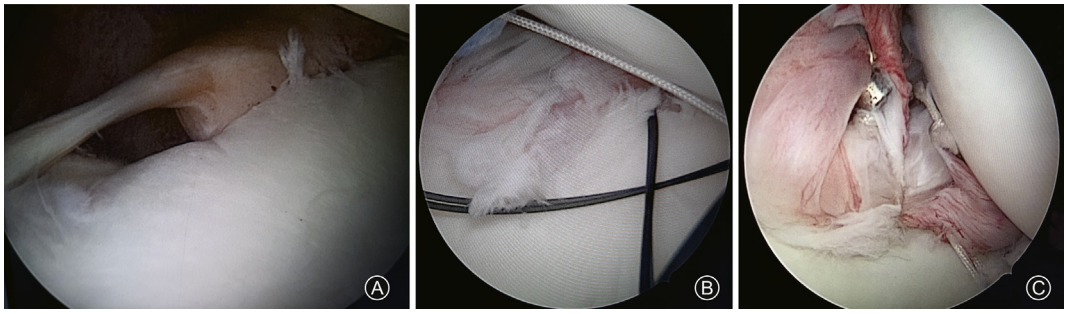

Fig. 2. (A) Identification of lesion, (B) After piercing capsule-labrum complex, ample amount of suture of suture shuttle left in the joint, (C) Repair of the Bankart lesion.

shuttle using suture manipulator and tissue was secured using the sliding and half hitch knots (Fig. 2C). Portal sites were closed after the procedure.

Rehabilitation

The patients in both groups received similar rehabilitation protocol to keep the shoulder in the shoulder immobilizer for four weeks. During this phase, patients were advised to do active movements of the elbow, wrist and fingers. Passive-assisted movement followed by active shoulder movements were started after four weeks as per tolerance of the patient. Gradual muscle strengthening exercises were advised after a period of two months. Return to the same level of activity was advised six to eight months post-operatively, depended upon the progress of the strengthening of the shoulder joint.

Statistical analysis

The statistical analysis was conducted using IBM SPSS Statistics (version 22.0). The categorical variables (gender, side involved, dominant side, mode of injury) were reported as counts and percentages. While the continuous data were given as mean ± SD & range or median and interquartile range, as appropriate. Normality of quantitative data was checked by measures of Kolmogorov Smirnov tests. Independent *t*-test was applied to compare age. The data in the study were skewed data so comparisons for two groups were made by Mann-Whitney test. Comparison of pre-operative and final follow-up was done by Wilcoxon signed rank test. A p value < 0.05 was considered significant.

Results

Seventy-one patients with RDS requiring arthroscopic Bankart's repair were evaluated in the present study. Thirty-four patients were included in Group A while thirty-seven patients were included in group B.

Demographic profile

The mean age of the patients was approximately 29 years in both groups (range 20–45 years) (Table 1). All the patients were male in Group A while one female and 36 male in Group B ($p = 1.000$). In both groups, the involvement of the right shoulder was more common than the left shoulder. Further, the dominant shoulder was more commonly involved as compared to non-dominant side in both groups.

The patients in Group A who were managed at mean of 27.85 (range 13–56) months from date of 1st episode, while patients in Group B were managed at mean of 29.64 (range 09–51) months from date of 1st episode ($p = 0.700$). The mean number of episode of dislocation before surgery, mode of injury and the type of lesions seen arthroscopically are as shown in (Table 1). There is no statistical difference in preoperative data between the two groups.

Surgical details

The operative time (min) in Group A and B was 68.52 ± 9.47 (range 55–90) and 46.35 ± 7.42 (range 35–65), respectively. The operative time was significantly lower in Group B ($p < 0.001$). The mean number of anchors used in Group A and B were 3.11 (range 2–4) and 3.24 (range 2–4) respectively ($p = 0.168$). In Group A, one patient had broken cannula intra-operatively which was removed during surgery, one had traction neuropraxia which was improved with conservative treatment and one patient had dislocation at 36 months during sporting activity. In Group B, two patients had re-dislocation after the surgery in sporting activity. There was no significant differences regarding complications in both groups ($p = 0.665$).

Outcome

The mean follow-up was 28.5 ± 10.73 (range 16–47) months and 29.24 ± 11.02 (16–48) months in Group A and B, respectively ($p = 0.858$). The range of movements of shoulder pre-operatively and at final follow-up is shown in Table 2. At final follow-up, the mean Rowe score improved significantly from pre-operative value of 26.02 ± 4.22 (20–35) to 90.88 ± 11.96 (35–100) in Group A ($p < 0.001$) while in Group B improved significantly from mean pre-operative value of 24.10 ± 5.21 (15–35) to 91.89 ± 12.43 (40–100) ($p < 0.001$) (Table 3). The mean Oxford score in Group A improved significantly from 25.29 ± 2.08 (22–29) to 42.02 ± 4.31 (28–48)

Table 2
Mean pre-operative and final follow-up range of motion shoulder joint.

Groups	Shoulder movement, (degree)	
	Abduction	External rotation
Group A		
Pre-operative	143.7 (130–150)	84.7 (75–95)
Final Follow-up	141.5 (130–150)	79.0 (70–90)
Group B		
Pre-operative	140.7 (125–150)	83.5 (75–95)
Final Follow-up	140.4 (125–150)	77.8 (60–90)

Data present as mean (range).

Table 3
Functional outcome pre-operative and final follow-up.

Items	Mean Rowe score			Mean Oxford score		
	Pre-operative	Final follow-up	#p value	Pre-operative	Final follow-up	#p value
Group A	26.02 ± 4.22 (20–35)	90.88 ± 11.96 (35–100)	<0.001	25.29 ± 2.08 (22–29)	42.02 ± 4.31 (28–48)	<0.001
Group B	24.10 ± 5.21 (15–35)	91.89 ± 12.43 (40–100)	<0.001	24.64 ± 2.39 (19–31)	42.43 ± 3.82 (32–48)	<0.001
*p value	0.122	0.306		0.222	0.694	

*p Comparison of Group A and B.
#P Comparison preoperative-final follow-up.
Data present as mean±SD (range) or p value.

($p < 0.001$) while in Group B, the mean Oxford score improved from the mean value of 24.64 ± 2.39 (19–31) to 42.43 ± 3.82 (32–48) ($p < 0.001$). In Group A, the median Tegner's score pre-operatively was 7 (range 5–8) and 6 (range 3–8) at the final follow-up. In Group B, the mean Tegner's score pre-operatively was 7 ± 0.82 (6–8) and 6 ± 1.18 (3–8) at the final follow-up. However, while comparing both groups at final follow-up, the mean Rowe score ($p = 0.306$), the mean Oxford score (p=0.694), and the median Tegner's score ($p = 0.289$), the difference was not significant.

Discussion

The primary aim of this study was to compare the functional outcome in carefully selected patients of RDS. We have excluded patients with multidirectional instability and patients requiring any additional soft tissue or bony procedure from this study. The mean age of the study group was 29.33 years which is similar to other various studies.[20,21] There were 70 male and 1 female patients in the present study that is probably because of the type of clientele which comes across to our centre being a military orthopaedics centre. However, both the groups were matched in terms of demographic profile (age, gender, side involved etc.), duration of injuries, mode of injury, and type of lesions.

The ranges of shoulder movements were also compared in both groups, pre-operatively and at the final follow-up. The mean Rowe score and Oxford shoulder score were comparable pre-operatively in both the groups and scores improved significantly using both the techniques. However, these scores did not differ significantly at the final follow-up when the two groups were compared. The mean Tegner score was also matched pre-operatively and there was no statistical difference at the time of final follow-up. Thus, these functional outcomes of our study are similar to the other various studies.[3,4,10] Cicek et al.[15] documented improvement in mean Rowe score to 85–90 at the final follow-up in both the groups. Law et al.[22] reported similar kind of functional outcome, loss in external rotation and complication rate.

The mean operative time was less in Group B as compared to Group A and it was statistically significant. It is might be that making another portal and suture handling needed more time, when using a standard two anterior portals.

Three kinds of complications were seen in Group A which included broken cannula during operation, neuropraxic injury and dislocation. Two cases of dislocations were seen in Group B. However, the complication rate was not high in both groups, which is similar to other studies.[23,24]

Arthroscopic Bankart repair is less invasive and associated with a low failure rate. But one of the drawbacks of two portals technique is that these portals can lead to weak rotator interval which may result in a higher instability rate.[25,26] The closure of this interval after repair of the Bankart lesion arthroscopically can lead to restriction of shoulder movements.[27] One portal technique is less invasive as the interval is breached only once. To evaluate the reoccurrence rate between the two techniques, a bigger sample size and studies are required. Another disadvantage of two portals technique is the creation of two portals, which may be difficult and bring to chondral or soft tissue injury in small size shoulder especially in Asian population, but one portal technique has an improvement of it. As compared to the two portals technique, we think that one portal technique is faster but requires more efforts and care in terms of suture handling, where sutures are generally retrieved into another portal at the time of piercing the capsulelabral complex. However, both the techniques have similar outcomes in terms of mid-term functional outcome.

In conclusion, arthroscopic single anterior portal technique is a less invasive, and reproducible technique which has a similar functional outcome and Tegner activity level, compared with two anterior portals arthroscopic technique.

Funding

Nil.

Ethical Statement

Ethical clearance was obtained from the institutional ethics committee of the hospital before the start of the study. Written informed consent was obtained from each patient before the conduct of the study.

Declaration of Competing Interest

The authors declare that they have no conflicts of interest.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.cjtee.2019.12.003.

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