Original Research Article

Comparative study to evaluate open versus arthroscopic surgical management for recurrent anterior instability of the shoulder

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Abstract

Background: Shoulder instability is used to refer to the inability to maintain the humeral head in the glenoid fossa. The ligamentous and muscle structures around the glenohumeral joint, under non-pathological conditions, create a balanced net joint reaction force. The purpose of this study is to perform a both techniques are compared in the repair of the anterior shoulder instability without bone loss. **Material and Methods:** This is a Prospective, open-label and comparative study conducted at Department of Orthopaedics, Subbaiah Institute of Medical Sciences between August 2019 to July 2020. They were divided into two groups according to the surgical treatment: Group A: Patients were treated with either open surgery using suture anchors and capsular shift. Group B: Arthroscopic surgery with suture anchors and suture capsulorrhaphy. **Result:** In our study time of surgery was significantly longer in the arthroscopic surgery group than the open surgery group ($P < 0.05$). Intraoperative blood loss was significantly more in the open surgery group than the arthroscopic surgery group ($P < 0.0001$) and total time of hospital stay was significantly more in the open surgery than the arthroscopic surgery group ($P < 0.05$). Total 3 patients were seen in open surgery, complications such as wound infection and nerve injury.**Conclusion:** Open surgery is more invasive than the arthroscopic surgery, Arthroscopic approaches resulted in better function as reflected by the Rowe scores in the study. But open surgery should be considered for some patient's due to the superior outcomes of long term stability of the shoulder joint.

Keywords: Recurrent anterior shoulder instability, arthroscopic, Open surgery.

Introduction

The term anterior shoulder instability refers to a shoulder in which soft tissue or bony insult allows the humeral head to sublux or dislocate from the glenoid fossa. [1] It is an injury to the glenohumeral joint (GHJ) where the humerus is displaced from its normal position in the center of the glenoid fossa and the joint surfaces no longer touch each other. [2] The GHJ (multi-axial spheroidal joint) is one of the largest and most complex joints in the body. It has the greatest range of movement of any joint, but this leaves it inherently unstable and with the highest chance of dislocation of all the body's joints. [3] The GHJ is formed where the humeral head fits into the glenoid fossa, an irregular oval shape, which is an extension of the scapula, like a ball and socket, although only 25% of the humeral head makes contact with the glenoid fossa at any time. [4] The shoulder is the most commonly dislocated major joint, with a reported incidence of 1.7%. Symptomatic instability following dislocation is common, especially in young, active people. [5] Recurrent instability, occurring in 50% to 96% of patients who first dislocate under the age of 20 years and in 40% to 74% of patients between the ages of 20 and 40 years, limits range of movement of the joint, requires multiple hospital and emergency department admissions for treatment, and often calls for surgical procedures to prevent further dislocation. [6] Prior to arthroscopy, recurrent dislocations were managed by open repair, and the results of this approach, with only a 4% failure rate, were initially published by Dickson and Devas in 1957. [7] There have been many studies documenting low recurrence rates ranging from 0% to 11% after open Bankart stabilization. [8]The high incidence of recurrent dislocation has implications for the individual and for society because chronic instability of the joint may prevent the individual from gaining employment or working at his or her potential. [9] Moreover, with the growth in the number of orthopaedic surgeons specializing in shoulder surgery and sports injuries, as well as the advancement in arthroscopic techniques and sports medicine devices, there has been heightened interest in minimally invasive shoulder surgery for recurrent anterior instability. [10] Thus, the comparison of arthroscopic versus open surgery for recurrent anterior shoulder instability is an area necessitating scrupulous study. Despite the proponents for both methods, it is unclear whether arthroscopic techniques equal the success of open techniques for the treatment of recurrent instability.

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Material and Methods

This is a Prospective, open-label and comparative study conducted at Department of Orthopaedics, Subbaiah Institute of Medical Sciences between August 2019 to July 2020.

Inclusion criteria:

- History and physical examination consistent with a traumatic anterior instability.
- Bankart injury was confirmed by MRI analysis.
- Confirmation of a Bankart lesion (avulsion of the anterior-inferior glenoid labrum) on diagnostic arthroscopy.
- Patient has adequate overall health status to receive surgical treatment.

Exclusion criteria:

- No history of prior shoulder surgery, and Patients with unidirectional anterior instability and a confirmed Bankart lesion were excluded.
- Patients having associated rotator cuff tear, habitual dislocators, and high-risk groups were excluded.
- Refused to participate in the study and pay regular visits to the clinic after the surgery

Group A: Patients were treated with either open surgery using suture anchors and capsular shift

Group B: Arthroscopic surgery with suture anchors and suture capsulorrhaphy as per the surgeon's preference.

Statistical analysis-The collected data was compiled in MS Excel sheet for analysis. Data analysed in Statistical Package for the Social Sciences (SPSS) version 25th was applied. The results expressed as mean, range percentages and using tables as appropriate. Duration of the disease, intraoperative time, haemorrhage, total stay in hospital, time of recurrence dislocation, visual analog scale (VAS) pain scores, and Rowe stability scores before and after the surgery, and the last follow-up were recorded and compared between the two groups using unpaired 't' test. p value <0.05 indicates Statistically significant.

Results

In our study, the most of the recurrent anterior instability of the shoulder were between the age group of 21-40 years i.e., 24 out of 35, followed by 1-20 years, i.e., 9 out of 35 in Group A (open surgery). In Group B (arthroscopic surgery), youngest patients were observed 23 out of 35 were followed by 1-20 years and least were 41-60 years (Table 1).

Table 1: Distribution of age between two groups

Age in years	Group A	Group B
1-20	9	11
21-40	24	23
41-60	2	1
Total	35	35

Table 2: Distribution of gender between two groups by using Fisher's exact test.

Gender	Group A	Group B	p - value
Male	28	29	<0.0001
Female	7	6	
Total	35	35	

In table 2, maximum number of patients were male in both the groups.

Table 3: Distribution of injury between two group

Injury	Group A	Group B
Fall over shoulder	11	13
Bike Accident	9	7
Car Accident	3	2
Sports	7	8
Heavy load lifting	2	3
Working in field	3	2
Total	35	35

In table 3, maximum number of patients were fall over shoulder in both the groups.

Table 4: Distribution of parameters between two group

Parameters	Group A	Group B	p - value
Time (min.) Mean±SD	66.3±7.43	93.1±8.54	<0.05
Haemorrhage (ml)	153.0±13.4	16.1±2.2	<0.0001
Total hospital stays (days)	8.3±1.9	4.1±1.2	<0.05
Infection	2	0	-
Nerve injury	1	1	-

In table 4, time of surgery was significantly longer in the arthroscopic surgery group than the open surgery group ($P < 0.05$). Intraoperative blood loss was significantly more in the open surgery group than the arthroscopic surgery group ($P < 0.0001$) and total time of hospital stay was significantly more in the open surgery than the arthroscopic surgery group ($P < 0.05$). Total 3 patients were seen in open surgery, complications such as wound infection and nerve injury.

Table 5: VAS pain scores were compared between the two groups

Parameters	Group A	Group B	p - value
Before	7.31±1.84	6.72±1.54	>0.05
After	3.9±0.52	2.1±0.41	>0.05
Last	3.1±0.94	2.2±0.83	>0.05

In table 5, VAS pain scores after the surgery was significantly higher in the open surgery group than the arthroscopic surgery group ($P > 0.05$).

Table 6: Row scores were comparted between the two groups

Parameters	Group A	Group B	p - value
Before	39.31±4.32	36.21±3.43	>0.05
After	71.3±7.34	55.4±5.37	<0.05

In table 6, Increase in Rowe score after the surgery was significantly higher in the open surgery group than the arthroscopic surgery group (P <0.05).

Table 7: Recurrent dislocation were comparted between the two groups

No. of instability events	Group A	Group B	p - value
Dislocations	3	3	-
Subluxations	0	4	-
Total	3	7	<0.05

In Table 7, in the open surgery group, there were 3 postoperative dislocations, on the other hand, in arthroscopic surgery 3 postoperative dislocations and 4 symptomatic subluxations. There was significant difference between the open and arthroscopic groups with respect to the postoperative recurrence of instability (P <0.05).

Discussion

Traumatic anterior shoulder instability classically results from a fall or collision with the arm in an externally rotated and abducted position. This may result in the classic Bankart lesion in which the anteroinferior capsulolabral complex detaches from the glenoid, thereby disrupting the primary static stabilizer of the glenohumeral joint in the externally rotated and abducted position. Other pathologies that may also contribute to anterior instability include capsular laxity, rotator interval laxity, a humeral avulsion of the glenohumeral ligament (HAGL), and glenoid bone deficiency either from acute fracture or bony erosion from recurrent instability events. The prevalence of glenoid bone loss has been found in up to 22% of patients after the initial dislocation event, between 0 and 90% of patients with recurrent instability, and up to 89% of patients with recurrent instability after failed stabilization. [11]In open technique, 24 patients with range 21-40 years. In arthroscopic technique, the most of the (23) patient age group was 21-40 years in both the groups. Difference of mean age in two groups was not statistically significant. Thus, age was matched in two groups. There was no statistically significant difference in age distribution between the groups. Lenters TR et al., noted that age between 21 and 30 years was at risk factor for recurrence in a retrospective series of 180 patients, and Zhang AL et al., confirmed these results in a prospective study of 255 patients (257 shoulders) with a 25 year follow up. [12,13]In our study, at the time of dislocation, there is a sex-specific difference in recurrence rate following non-operative treatment with male patients demonstrating a greater than female, recurrence rate well into their middle to late twenties as compared with females, who reach a 50% recurrence rate in their late teens. [14]The operative time was significantly shorter for the arthroscopic surgery compared with the open surgery. In addition, loss of blood and hospital stay is also less for with arthroscopic instability repair compared with open surgery. Similar result noted randomized controlled trials by Fabbriciani et al and Bottoni et al. [15,16] In our study safety of a surgical procedure is often measured by the incidence of surgery related complications. In the current study, there were differences between two groups concerning the incidence of postoperative wound infection. One patient in group experienced dysesthesia after the surgery, which was healed within six months during postoperative follow-up. There were 2 patients in the open surgery group with superficial surgical site infection, all of which were healed with the application of antibiotics and changing of dressing. Damage of vascular or neural structures could also be avoided by sufficient preoperative planning and meticulous surgical manipulation.In our study, open surgery, only 3 patients were dislocation and in arthroscopic surgery 3 patients were dislocations, 4 had recurrence or subluxation. Difference of of dislocation in two groups was statistically significant. This is similar to previous studies. However, with the development of arthroscopic surgical technique, stability of the shoulder can be further enhanced in the future studies. [17]Furthermore, recent data from a study of 3854 active duty military patients who underwent Bankart repair revealed a 4.5% rate of recurrence after arthroscopic stabilization and a 7.7% rate of recurrence after open stabilization[18]. While arthroscopic single-row techniques are commonly employed for primary surgical management in patients with capsulolabral avulsions. Recent cadaveric studies have shown that double-row fixation may better restore normal anatomy. [18] This is true even in the setting of small (25% of loss of the glenoid surface area) osseous Bankart lesions as well. Arthroscopic approaches to shoulder stabilization may benefit from the application of these principles in the clinical setting. [19,20] Possible benefits of arthroscopic stabilization include decreased length of hospital or outpatient surgery center stay, decreased postoperative pain, and improved range of motion (ROM). Initial arthroscopic fixation was performed by staple capsulorrhaphy. Additional methods of arthroscopic stabilization have included transglenoid suturing, and bioabsorbable tack fixation. Newer techniques for arthroscopic stabilization have been developed, including suture anchor fixation and capsular plication, with failure rates very less.

Limitations of the study

1. The current study has a smaller sample size, the large sample size is required for answering the question related to in deep surgical management for recurrent anterior instability of the shoulder.
2. As our study is a single centre study, large multicentre studies will help in the assessment of improved outcome which will be beneficial for our society.
3. Duration of study on long term basis will help in more additional therapeutic benefit along with our primary outcome.

Conclusion

Clinical outcomes after arthroscopic and open stabilization were comparable. Arthroscopic stabilization for recurrent anterior shoulder instability can be performed safely; the clinical outcomes are comparable to those after traditional open stabilization. Open surgery is more invasive than the arthroscopic Bankart surgery, it should still be considered for some patients due to its effect on long term stability of the shoulder joint. However, arthroscopic surgery can still be prioritized to open surgery in many patients since it leads to less hemorrhage, shorter stay in hospital, smaller scarring and less pain after the surgery.

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