Comparison of Outcomes of Open Versus Arthroscopic Stabilization of Recurrent Anterior Shoulder Dislocation

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ABSTRACT

Objective: To compare the outcomes of open versus arthroscopic Bankart procure for stabilization of recurrent anterior shoulder joint dislocation.

Methodology: A single surgeon randomly assigned 24 consecutive patients with recurrent anterior shoulder instability to either arthroscopic or open stabilization. Prior to surgery, MRI arthrogram tests were acquired. These results were contrasted with arthroscopic results. Range of motion, stability, and subjective evaluations such as the Western Ontario Instability Index and ASES were all part of the postoperative examinations at 2nd and 17th week post-operatively.

Results: 90 participants were eligible. Out of these, 66 were not eligible. Twenty-four (twelve in each group) Prior to meeting their assigned surgeon, patients were randomly assigned to either the arthroscopic or the open surgery group after giving their consent to participate. Independent t-test functional score was mean (and SD) for ASES score open surgery 74.33 ± 2.535, for arthroscopic surgery 92.0 ± 3.162, for, ROWE score open surgery 79.58 ± 4.337 and for arthroscopic surgery 95.50 ± 1.44. There is no significant difference in ASES and ROWE score (p= 0.362) and (p= 0.925). The WOSI scores increased significantly from baseline to 2nd week and 17th week postoperatively within each treatment group

Conclusion: After open and arthroscopic stabilization, the clinical results were comparable. In shoulders with anterior instability, preoperative magnetic resonance arthrograms enable an accurate identification of intra-articular abnormalities that correlates well with surgical results. The clinical results of arthroscopic surgery for recurrent anterior shoulder instability are on par with those following conventional surgical stabilization.

Keywords: Open Surgery, Arthroscopic Surgery, Shoulder dislocation, recurrent rate

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INTRODUCTION

Recurrent instability is a complication of traumatic anterior-inferior dislocation of the shoulder in young patients. The incidence of shoulder joint dislocation is 47/100000 person/years. Non operative treatment has shown acceptable results, but recurrent shoulder dislocation has been reported in 90 percent in some patients treated with conservative measures. Recurrent shoulder dislocation commonly results in damage to the capsule and ligaments of the shoulder joint, glenoid and head of humerus[1] and usually treated with arthroscopic capsular repair, labral repair, and arthroscopic or open bone-block techniques.[2,3] Many people still believe that open Bankart repair, in which the anterior glenohumeral ligament and glenoid labrum are rebuilt, is the best procedure for stabilizing the shoulder.[4,5] For many years, the open Bankart repair was the gold standard, with success rates of between 75% and 100%; nevertheless, complications following surgery, such as limitations on external rotation and secondary osteoarthritis, were a cause for worry.[6] Since it first appeared about 30 years ago, arthroscopic Bankart repair has grown in prominence due to improved arthroscopic technology and more experienced doctors[7]. In an effort to prevent the

broad dissection and scarring connected with open surgeries, arthroscopic techniques were created. The alleged benefits include less surgical discomfort, quicker recuperation, and less movement restriction.[8,9]

Transglenoid sutures, bio-absorbable tacks[13], and suture anchors are more modern approaches. The patient was placed in a modified beach chair configuration for open procedures. There was no diagnostic arthroscopy done. The deltopectoral incision measured 5 cm. It was possible to find and medially withdraw the conjoined tendon. The inferior factor of the tendon at its insert on the lesser tuberosity was incised in order to prolong the subscapularis split vertically if necessary for proper exposure.[10] An "T"-shaped arthrotomy was used to enter the shoulder, allowing for complete exposure of the anterior glenoid rim. Any capsulolabral separation (Bankart lesion) should be repaired with sutures, and any capsular redundancy should be sutured together were used to treat shoulder disease.[11,12] The superior portion of the labrum was not particularly assessed or surgically treated. The patient was positioned in the lateral or beach chair position for arthroscopic treatments. Intra-articular pathology was discovered after a diagnostic arthroscopy. The surgeon decided whether to make repairs to related or connected superior labral anterior-to-posterior (SLAP) rips. Arthroscopic tying and suture anchor fixing procedures were used to treat labral detachments. At the surgeon's discretion, arthroscopic suture plication was used to treat capsular redundancy.[13]

Both groups of surgeons positioned the weakest suture anchor as close to the hour of six as possible and moved the capsule labral tissue as judged necessary. Rotator interval repairs were left to the surgeon's judgement rather than being performed on a regular basis.

The results of the arthroscopic and open Bankart operation for recurrent anterior shoulder dislocation should be mixed in the literature. a study comparing open and arthroscopic Bankart repair patients' time to recurrence (TTR) of instability and disease-specific outcome metrics.[14]

The literature has shown that the choice of fixation of recurring anterior shoulder joint dislocation with minimal bone loss (< 20%) depends on the surgeon. There are few studies comparing these two methods in our population, and the results of these studies were not statistically significant. We need more studies to decide, what procedure should be preferred for better results.

METHODOLOGY

Setting: The study was conducted in the Orthopedic department of Jinnah Hospital Lahore.
Study Design: Randomized control trial
Sampling Technique: Non-probability convenient sampling.
Sample Size: The sample size of 24 was calculated by the following formula keeping the power of study equal to 90% and level of significant equal to 95%.

$$n_1 = \frac{\left\{Z_{\alpha/2}\sqrt{2P(1-P)} + Z_{1-\beta}\sqrt{P_1(1-P_1)+P_2(1-P_2)}\right\}^2}{(P_1-P_2)^2}$$

P_1=Prevalence of outcome in the unexposed group
P_2=Prevalence of outcome in the exposed group
$P=(P_1+P_2)/2$

Z1-α/2 is the desired level of significance = 95% = 1.96
Z1-β is the desired power of study = 90% = 1.282
Population Proportion (P1) with excellent ROWE score after open Bankart procedure = 80 %
Population Proportion (P2) with gain in ROWE score after arthroscopic Bankart procedure = 50 %

SAMPLE SELECTION

Inclusion criteria: Both gender, Patients above 18 years of age who are skeletally mature, sustained a post-traumatic anterior dislocation of shoulder of more than 1 episode, Bankart lesion confirmed by Magnetic resonance imaging (MRI).
Exclusion criteria: Shoulder pathologies such as bony Bankart, Revision Bankart, Hill-Sachs lesion involving more than 25% of the humeral head, Habitual dislocations, Rotator cuff tear, SLAP lesion, Multidirectional instability or posterior instability of shoulder, Arthritis of shoulder, Past history of fracture of upper end of humerus. Operated earlier for any shoulder problem

DATA COLLECTION PROCEDURE

Approval was obtained from the hospital research and ethical board before starting the study. All the patients meeting the inclusion criteria presenting through emergency of orthopedic unit of Jinnah hospital Lahore who was diagnosed with recurrent anterior shoulder dislocation on MRI. The indications for surgery was increased levels of pain and reduced function of the shoulder accessed by the consultant orthopedic. Radiological assessment was including standard anteroposterior (scapular plane) and axillary views. The type of surgery perform was decided by one designated surgeon of the team based on the diagnosis of the patient. The patients' outcomes were

assessed by the three-scoring system i.e. American Shoulder and Elbow Surgeons (ASES) Scale, Western Ontario Shoulder Instability (WOSI) score and Rowe score.

Data Analysis Procedure: The data will be entered into SPSS version 25. The same software will be used for analysis. The quantitative data will be represented as means and standard deviations, qualitative data will be presented as frequency. The differences between the pre- and post-operative measurements of active movement, pain and both shoulder function scores, will be tested using the Student's t-test and ANOVA test. A p value of <0.05 was considered significant.

RESULTS

Figure 1, a CONSORT diagram, provides comprehensive information on patient flow throughout the experiment. The eligibility of 90 patients in total was checked. Sixty-six of them were judged to be not eligible. Surgeon assigned a, 24 patients (twelve in each group) who gave their consent to participate randomly assigned to either the arthroscopic or the open group. Both the open group and the arthroscopic group each had twelve patients undergo their respective surgeries. Baseline traits did not significantly differ between groups. (Table III), The mean age (and SD) 21.83 ± 2.839, age range 18-25 years had 20 subjects and 26-32 years had 4 subjects. 21 males and 3 females were participated. Independent t-test functional score was mean (and SD) for ASES score open surgery 74.33 ± 2.535, for arthroscopic surgery 92.0 ± 3.162, for, ROWE score open surgery 79.58 ± 4.337 and for arthroscopic surgery 95.50 ± 1.44. There is no significant difference in ASES and ROWE score (p= 0.362) and (p= 0.925). The WOSI scores significantly increased from baseline to 2nd week and 17th week postoperatively within each group (p = 0.01). The mean (and SD) score of WOSI foropen surgery 73.75 ± 2.66, for arthroscopic surgery 93.42 ± 2.021 although the difference was not significant in arthroscopic and open surgery (p = 0.515) and (p=0.622). Between groups, there were no appreciable differences in the WOSI score changes at each evaluation. No discernible difference between groups in terms of WOSI score was shown at 17th week post-operatively. (Table III).

Table I: Demographics

AGE RANGE		Frequency	Percent	Valid Percent	Cumulative Percent
	18-25 Years	20	83.3	83.3	83.3
	26-32 Years	4	16.7	16.7	100.0
	Total	24	100.0	100.0	
GENDER	Male	21	87.5	87.5	87.5
	Female	3	12.5	12.5	100
	Total	24	100	100	

Table II: T-Tests for functional Outcomes

	Groups	N	Mean	Std. Deviation	Sig
ASES Score Open Surgery	Open Surgery	12	74.33	2.535	0.774
ASES Score Arthroscopic Surgery	Arthroscopic Surgery	12	92.00	3.162	0.362
WOSI Score Open Surgery	Open Surgery	12	73.75	2.667	0.622
WOSI Score Arthroscopic Surgery	Arthroscopic Surgery	12	93.42	2.021	0.515
ROWE Score Open Surgery	Open Surgery	12	79.58	4.337	0.940
ROWE Score Arthroscopic Surgery	Arthroscopic Surgery	12	93.83	1.403	0.925

Table III: Pre and Post OP ROM and pain

Groups		Pre Op	Post Op week 2	Post Op Week 17
Pain	Mean	7.83	2.93	1.25
	Std. Deviation	.718	.718	..452
Abduction	Mean	54.83	145.25	177.25
	Std. Deviation	3.904	3.467	2.050
External Rotation	Mean	13.50	76.67	89.67
	Std. Deviation	1.567	3.627	0.651

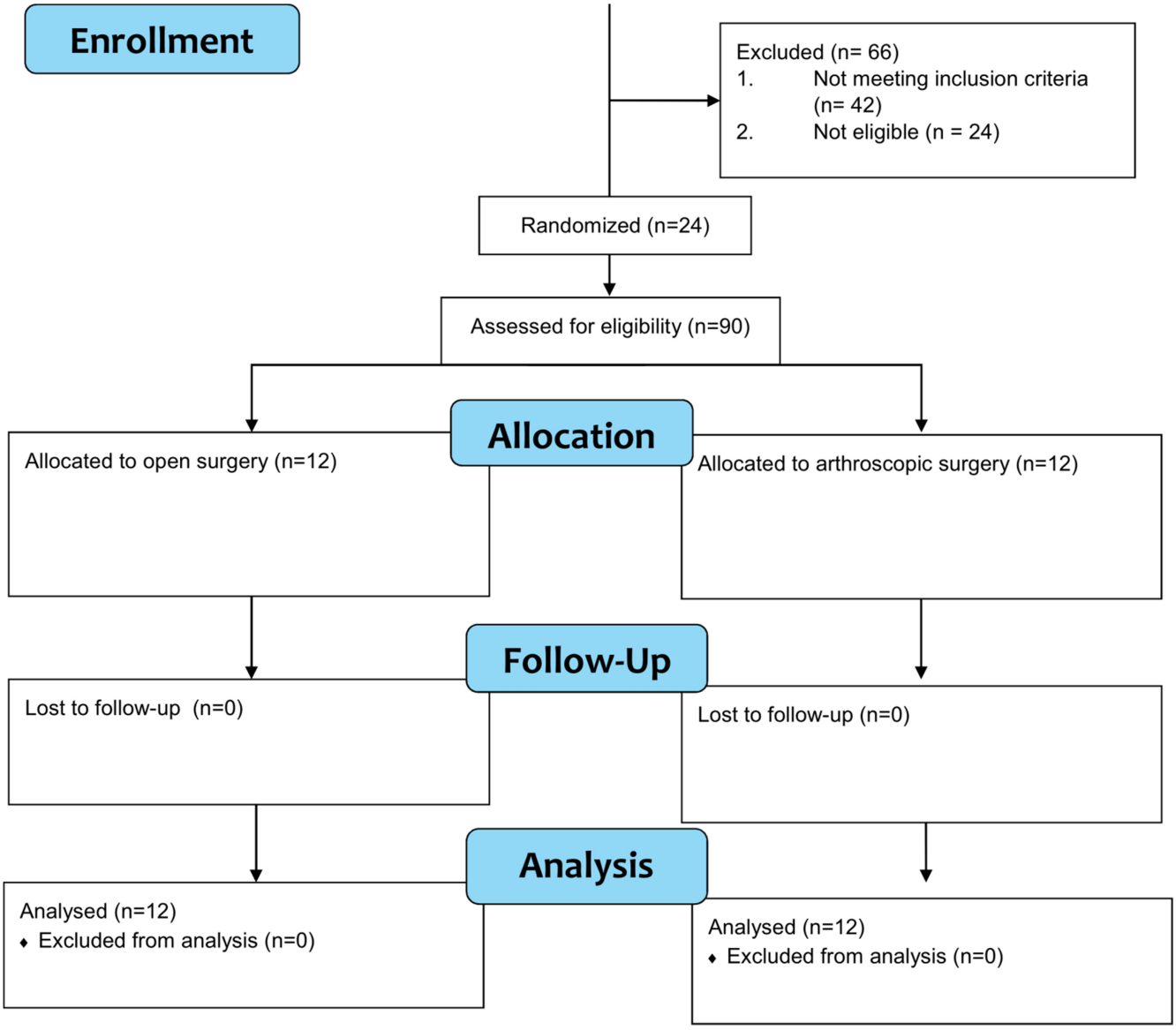

Fig I: Consort Flow Diagram

DISCUSSION

In 2001, Jon Karlsson et al. conducted a study Comparing open versus arthroscopic reconstruction in 117 individuals (119 shoulders) with symptomatic, recurrent anterior post-traumatic shoulder instability. Bio absorbable tacks were used for arthroscopic reconstructions (N = 66), while suture anchors were used for open reconstructions (N = 53). The main conclusion of this study was that, after a follow-up period of between 2 and 5 years, the majority of patients who had both arthroscopic and open techniques had shoulders that were largely functional. Redislocation were more common in the arthroscopic group, but there was no statistically significant difference between the study groups. However, the arthroscopic group had noticeably better outcomes in terms of external rotation. The open group had a recurrence rate of 5 of 48 (10%) while the arthroscopic group had a recurrence rate of 9 of 60 (15%), including both dislocations and subluxations. At follow-up, the arthroscopic group's Rowe and Constant scores were 93 (range: 39 to 100) and 91 (range: 56 to 100), respectively, as opposed to 89 (ranges: 53 to 100 and 57 to 100, respectively) for both scores in the open group. The external rotation in abduction, which was 90° (range, 50° to 135) in the arthroscopic group and 80° (range, 25° to 115°) in the open group, was the sole significant difference. The majority of patients experienced stable shoulders with either technique.

Which is in accordance with our study which stated that there is no significant difference in ASES and ROWE score (p= 0.362) and (p= 0.925). The WOSI scores significantly increased from baseline to 2nd week and 17th week postoperatively within each treatment group (p = 0.01). The mean (and SD) WOSI score for open surgery 73.75 ± 2.66, for arthroscopic surgery 93.42 ± 2.021 although the difference was not significant in arthroscopic and open surgery (p = 0.515) and (p=0.622). Between groups, there were no appreciable differences in the WOSI score changes at each evaluation. No discernible difference between groups in terms of WOSI score was shown at 17th week post-operatively.[15]

In 2014, Mohtadi et al conducted a study on comparison between open and arthroscopic surgery for shoulder dislocation and observed that at baseline, there were no notable variations in the outcome scores. The mean WOSI scores for the open group were 85.2 ± 20.4 and for the arthroscopic group, 81.9 ± 19.8; there was no statistically significant difference between the groups. Additionally, there was no discernible difference in the mean ASES scores, which were 88.2 ± 15.9 for the arthroscopic group and 91.4 12.7 (95% CI = 88.5 to 94.4) for the open group (p = 0.17). At two years, there were noticeably different recurrence rates. At two years, there was no discernible difference in the groups' shoulder motion. Which is in accordance with our study there is no significant difference in ASES and ROWE score (p= 0.362) and (p= 0.925). This is in contrast to previous study that The WOSI scores increased significantly from baseline to 2nd week and 17th week postoperatively within each treatment group (p = 0.01). The mean (and SD) WOSI score for open surgery 73.75 ± 2.66, for arthroscopic surgery 93.42 ± 2.021 although the difference was not significant in arthroscopic and open surgery (p = 0.515) and (p=0.622). The change in WOSI scores at each evaluation did not differ significantly between the groups. WOSI score showed no significant difference between groups at 17th week post-operatively. There was noticeable difference in groups' shoulder movements.[16-18]

In 2006, Yong Girl et al. conducted a study which stated that Although postoperative scores on the visual analogue scale, the Rowe scale, and the Constant scale improved, there was no statistically significant distinction between the arthroscopic and open repair groups. After surgery, 37 athletes (83%) resumed sports activity levels resembling those prior to injury (90% recovery) which is in accordance with our study which stated that The ASES and ROWE scores do not differ significantly (p=0.362 and (p=0.925), respectively). Within each treatment group, the WOSI scores significantly rose from the baseline to the second and 17th weeks postoperatively (p = 0.01). Although there was no statistically significant difference between arthroscopic and open surgery (p = 0.515 and (p=0.622), the mean (and SD) WOSI score for open surgery was 73.75 2.66, and for arthroscopic surgery it was 93.42 2.021. The groups' changes in WOSI scores at each evaluation were not substantially different from one another. At the 17th week after surgery, the WOSI score didn't demonstrate any significant differences between the groups.[9,19]

CONCLUSION

After arthroscopic and open stabilization, the clinical results were comparable. In shoulders with anterior instability, preoperative magnetic resonance arthrograms enable an accurate identification of intra-articular abnormalities that correlates well with surgical results. The clinical results of arthroscopic stabilization for recurrent anterior shoulder instability are on par with those following conventional surgical stabilization.

Conflict of Interest: None

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