International Journal of Research and Review
Volume 11; Issue: 3; March 2024
Website: www.ijrrjournal.com
Systematic Review *E-ISSN: 2349-9788; P-ISSN: 2454-2237*

The Functional Outcome Between Arthroscopic and Open Surgery for Recurrent Anterior Shoulder Instability: A Systematic Review

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DOI: https://doi.org/10.52403/ijrr.20240351

ABSTRACT

Background: It remains unknown if arthroscopic repair of recurrent anterior shoulder instability is as effective as open repair. The aim of this study was to compare the functional outcome between arthroscopic and open repair for recurrent Anterior Shoulder Instability.

Methods: We searched the Cochrane Library, EMBASE, and PubMed extensively for studies comparing open versus arthroscopic repair for recurrent anterior shoulder dislocations until March 1, 2021. The PRISMA guidelines were utilised by two different researchers to assist them in selecting pertinent papers. Because there were few studies, there was no restriction on publication status, open and arthroscopic repair technique, or patient demographics.

Results: For recurrent anterior shoulder dislocations, five randomised controlled trials assessed the use of open repair against arthroscopic surgery. According to these investigations, there is no discernible difference between the two operational strategies. At present, there are no known long-term follow-up data that describe the outcomes of either surgical method. Every inquiry had flaws in the way it was designed, which reduced the reliability of the results.

Conclusion: There is insufficient data from randomised controlled trials to conclude that there is a statistically significant difference between the groups that underwent open repair and those that underwent arthroscopic surgery in terms of redislocation rates, return to activity, and functional outcomes. After arthroscopic surgery, range of motion is slightly better than after open repair. No recommendations regarding the best course of surgery can be given.

Keywords: recurrent anterior shoulder instability; open; arthroscopic; repair.

INTRODUCTION

The shoulder is the most commonly dislocated major joint, with a reported incidence of 1.7%. After dislocation, symptoms of instability are frequently experienced, particularly in young, active individuals. Repeated instability limits joint movement, leading to frequent hospital visits and emergency room admissions for treatment. Surgery is often required to prevent further dislocation. It impacts between 50% and 96% of individuals who experience their initial dislocation before the age of 20, and between 40% and 74% of those aged between 20 and 40. Recurrent dislocations were treated with open repair prior to arthroscopy; Dickson and Devas published the first results of this technique

in 1957, showing just a 4% failure rate. (Bhatia S et al, 2014)

With a reported prevalence in the United States of 23.9 per 100,000 persons annually - double what was previously reported - traumatic anterior shoulder dislocations are widespread.49 Anterior-inferior dislocations account for more than 90% of these acute dislocations. 2014; Boileau P et al. According to reports, the recurrence rate in young, active patients is close to 90%. For young individuals who are physically active, receiving surgery early on improves functional results and lowers the risk of recurrence. (Boileau P et al. 2014) Restoring glenohumeral stability by the restoration of the capsulolabral-ligamentous complex is the main objective of treatment, and surgical intervention lowers the recurrence risk to only 6% to 23%. In the past, open bankart repair was the accepted norm for treatment, with recurrence rates as low as 10%. Open surgery proponents contend that a more secure and anatomical repair can be made. (Delaney RA et al. 2014) However, this technique was bound to cause muscular weakening, subsequent osteoarthritis, and limitation of glenohumeral joint motion, especially external rotation. Over the past 25 years, arthroscopic shoulder stabilisation techniques have seen tremendous change.

Many of the risks associated with open surgery, including infection, ruptures and weakening of the subscapularis, arthrofibrosis, and decreased range of motion, may be prevented using arthroscopic operations.(Dumont GD et al. 2014).

METHODS

Search strategy

This systematic review adhered to the PRISMA guideline. We conducted a thorough literature search utilizing databases such as Pubmed, EMBASE, and the Cochrane Library, focusing on studies comparing Arthroscopic Versus Open Repair for Recurrent Anterior Shoulder Dislocations up to March 1, 2021. The search utilized specific keywords including: 1. "recurrent anterior shoulder instability" AND "open repair"; 2. "recurrent anterior shoulder instability" AND "arthroscopic repair" AND "Functional Outcome"

We limited the search to human studies that were written in English, published within the last ten years, and published. In order to ensure that we did not overlook any pertinent publications, we then went over every article that was cited and included citations for each one.

Inclusion Criteria

The PICO approach (Population, Intervention, Comparison, and Outcome) was used to characterise the inclusion and exclusion criteria of this study (Table 1). Recurrent anterior shoulder instability treated with arthroscopic surgery as opposed to open surgery and the clinical outcome rate as a result were the inclusion criteria. A restriction on patient demographics, the kind of open and arthroscopic repair technique, or publication status was not imposed due to the small number of research.

Quality evaluation

According to the inclusion criteria, each author first selected the relevant studies by looking through the titles and abstracts. Subsequently, every contributor reviewed every paper in the collection of studies. Following a conference, the writers decided which extremely pertinent papers to include in their study. Every author evaluated the quality of the study on their own, and disagreements were settled through discussion.

Each author filled out a form independently to evaluate every inherent component of the studies, such as study quality, variables for which data were sought, and risk of bias assessment. The first author gathered the forms and went through the contents to look for any discrepancies. After that, the writers got together once more to talk about any points of contention.

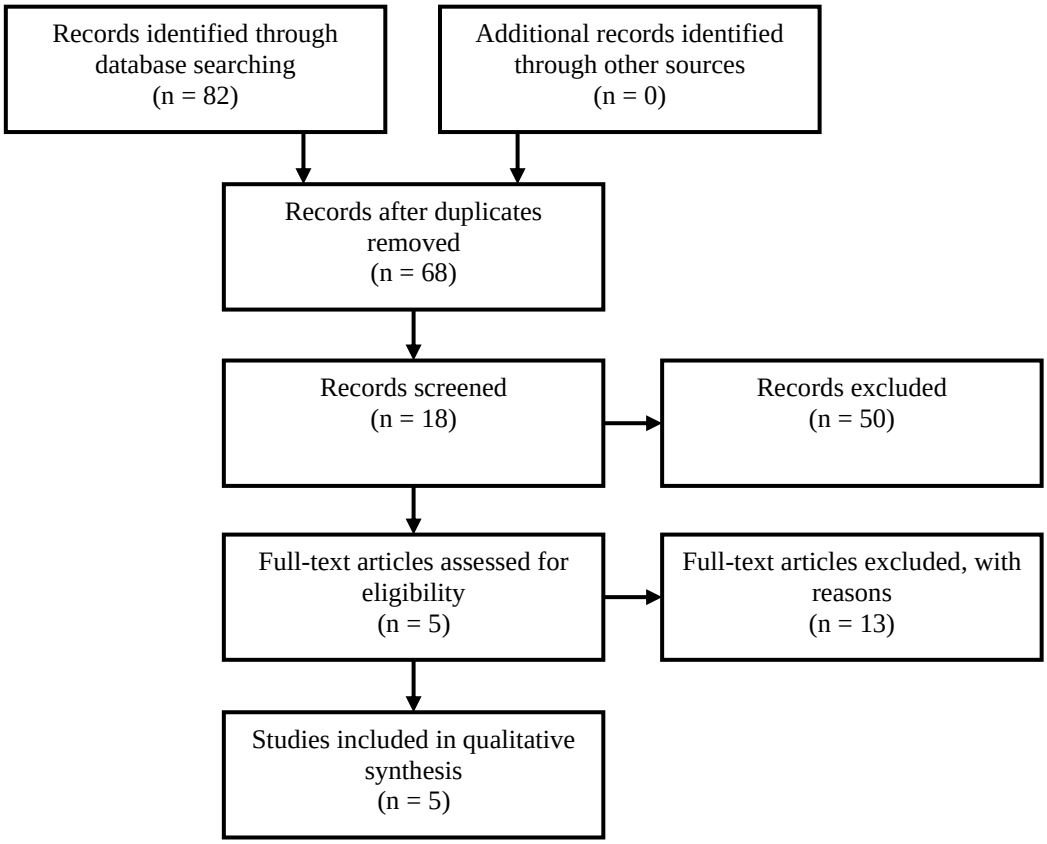

Figure 1: Article selection based on PRISMA Guidelines

RESULT

After removing duplicate results, the computerised search produced 82 records. 77 records in all were discarded after titles and abstracts were screened. Two separate researchers then examined the remaining articles using the full text extraction as a guide. The two authors had previously agreed upon a list of inclusion and exclusion criteria (Table 1), which was used to screen the entire text. Figure 1 illustrates the final five publications that were selected for inclusion in the systematic review.

Ultimately, 789 cases were taken into account for the analysis. Of these individuals, 387 underwent arthroscopic procedures, while 372 underwent open procedures. The mean age ranged from 27.2 ± 9.0 to 47 + 8 years for the arthroscopy group and from 27.8 ± 7.9 to 48 + 7 years for the open method group. In a study conducted by S. Zaffagnini et al., the description of sex characteristics did not adequately clarify the male-to-female ratio. Consequently, determining the ratio of men to women who underwent arthroscopic surgery versus open surgery poses some difficulty.

The follow-up period ranged from 26.9 months to 17 years for the group who underwent arthroscopy, and from 37.4 months to 17 years for the group that underwent open surgery. In one study by Zhu et al., the length of operation was discovered to be lengthier with arthroscopy than with open surgery; for arthroscopy, the mean duration was 122.8 + 41.3 minutes, whereas for open surgery, it was 89.3 + 30.3 minutes. Table 3 describes the characteristics of the patients.

Functional outcomes were evaluated in patients who had undergone open and arthroscopic surgery using scores acquired before and after surgery with different follow-up periods. Each study uses a different score, although all scores correspond to the same operational outcome. Patients who underwent both open

and arthroscopic surgery saw an overall improvement in their ratings, indicating a better functional outcome for them.

There were five trials that directly compared open versus arthroscopic therapy for unilateral anterior shoulder instability that recurred. The findings indicated that there was no statistically notable contrast in recurrent instability, return to activities, or reoperation rate between the two cohorts. Additional data, such as shoulder function, also displayed no statistically significant disparity between the groups.

Table 1: PICO Table Describing Inclusion and Exclusion Criteria

Study Component	Inclusion	Exclusion
Population	Any age Recurrent Anterior Shoulder Instability	Posterior Shoulder Instability Animal Studies Abstracts, editorials, letters Duplicate publications of the same study that do not report on different outcomes Meeting presentations or proceedings
Intervention	Arthroscopic Treatment	
Comparison	Open Surgery	
Outcome	Functional Outcome	

Table 2. Surgical Technique

Author	Surgical Technique		Surgery Duration	
	Arthroscopy	Open	Arthroscopy	Open
Zhu, 2017	Arthroscopic Latarjet	Standard Open Latarjet Technique	122.8 ± 41.3	89.3 ± 30.3
Ernstbrunner et al, 2020	Arthroscopic Bankart repair	Open Latarjet Procedure	NA	NA
S. Zaffagnini, 2012	arthroscopic transglenoid suture Caspari's technique	combined open capsular shift (Bankart)	NA	NA
Nicholas G.H. Mohtadi	Arthroscopic repair	Open repair	NA	NA
Zhang Liang, 2019	Arthroscopic Bankart repair	Open Bankart repair	NA	NA

DISCUSSION

Surgeons put up a variety of theories over a century ago regarding the cause of unstable shoulder. The separation of the anteroinferior labrum from the inferior glenohumeral ligament complex was defined as the Bankart lesion. Bankart successfully restored shoulder instability in patients by using labrum reattachment. The Bankart procedure was the name given to this process.1

It has been shown that the open Bankart surgery is the most effective method for treating shoulder instability. Surgery alone, which reattaches the labrum to the glenoid without rebuilding the inferior glenohumeral ligament complex, may not be sufficient to treat Bankart lesion in conjunction with other shoulder joint injuries such as Hill-Sachs, rotator cuff, SLAP, and bony Bankart lesions.1

Since the 1980s, arthroscopic procedures have been used to restore stability to the shoulder. They were created to prevent extensive incisions that could increase the risk of intraoperative bleeding, tissue injury, and scarring after surgery. With varying degrees of success, suture anchors, transglenoid sutures, bioabsorbable tacks, and shaped anchors have all been utilised in surgery.3. These days, arthroscopic Bankart repair is frequently used in orthopaedic centres to address anterior shoulder instability, primarily because it is a minimally invasive procedure.4 The current study also shows that pain during and after surgery can be reduced using arthroscopic Bankart repair. Nonetheless, the literature currently in publication reports a ratio of 2 to 10% for recurrent shoulder dislocation following arthroscopic Bankart repair. In the current study, the arthroscopy group had 8 patients (2.5%) with repeated shoulder dislocation or subluxation, whereas the open surgery group only had 1 patient who had recurrent shoulder dislocation following surgery. This is comparable to earlier research. Future research may be able to significantly improve shoulder stability, though, as arthroscopic surgery techniques advance.2

Table 3. Baseline Characteristics of Patients

Author	Number of Patients		Age mean ± SD		Gender (M:F)		Follow Up (mean)		Duration of surgery	
	Arthroscopy	Open	Arthroscopy	Open	Arthroscopy	Open	Arthroscopy	Open	Arthroscopy	Open
Zhu, 2017	46	44	32.1 ± 10.3	34.8 ± 11.5	36/10	32 : 12	26.9 months (range, 24.2-36.6 months)	37.4 months (range, 24.7-62.3 months	122.8 ± 41.3	89.3 ± 30.3
Ernstbrunner et al, 2020	36	39	47 + 8	48 + 7	22 /14	30 : 9	13 + 3	11 + 2	NA	NA
S. Zaffagnini, 2012	49	33	35 ±8	38 ± 10	49	33	10-17 year	10-17 year	NA	NA
Nicholas G.H. Mohtadi	98	98	27.2 ± 9.0	27.8 ± 7.9	80/18	80/18	NA	NA	NA	NA
Zhang Liang, 2019	158	188	31.6 ± 8.6	32.2 ± 12.2	102/56	114/74	NA	NA	NA	NA

Table 4: Functional outcome of each study

Author		ROWE		UCLA		WOSI		ASES		Constant-		Walch-Duplay score	
		Before surgery	After surgery	Before surgery	After surgery	Before surgery	After surgery	Before surgery	After surgery	Before surgery	After surgery	Before surgery	After surgery
Zhu, 2017	Arthroscopic vs Open Latarjet	Open (39.8 + 12.1) Arthroscopy (43.9 + 4.8)	Open (97.1 ± 2.5) Arthroscopy (95.4 ± 5.0)	NA	NA	NA	NA	Open (77.6 ± 18.0) Arthroscopy (86.4 ± 11.7)	Open (93.3 ± 9.9) Arthroscopy (93.0 ± 5.0)	Open (89.5 ± 12.30 Arthroscopy (93.1 ± 6.5)	Open (96.5 ± 3.8) Arthroscopy (95.0 ± 4.1)	NA	NA
Ernstbrunner et al, 2020	Arthroscopic Bankart Repair vs Open Latarjet Procedure	NA	NA	NA	NA	NA	NA	NA	NA	NA	Arthroscopic bankart repair (80 ± 7) Open Latarjet (81 ± 9)	NA	arthroscopy bankart (89 ± 14) open latarjet (89 ± 12)

S. Zaffagnini, 2012	arthroscopic transglenoid modified Caspari technique (49) combined open capsularshift (according to O'Brien et al. and Bankart repair (33)	NA	follow-up from 10 to 17 years (mean ; SD) Arthroscopy (85; 22.6) Open (83.2; 24.4)	NA	follow-up from 10 to 17 years (mean ; SD) Arthroscopy (26.4 ; 4.8) Open (26.9 ; 4.2)	NA	NA	NA	NA	NA	follow-up from 10 to 17 years (mean ; SD) Arthroscopy (86.3 ; 16.7) Open (87.4 ; 14.1)	NA	NA
Nicholas G.H. Mohtadi	Arthroscopic vs open surgery	NA	NA	NA	NA	Open (41.7) Arthroscopy (40.6)	Open after 2 years (85.2) Arthroscopy (81.9)	Open (67.3) Arthroscopy (64)	Open after 2 years (85.2) Arthroscopy (81.9)				
Zhang Liang, 2019	NA	Arthroscopy (35.7 ± 7.6) Open (38.6 ± 8.7)	Arthroscopy (54.3 ± 11.8) Open (70.5 ± 12.4)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 5: Characteristics of journals used in the study

No	Reference	Journal	Study Design	Level of Evidence
1	Zhu, 2017	The American Journal of Sports Medicine	Cohort study	Level 3
2	Ernstbrunner et al, 2020	The American Journal of Sports Medicine	Cohort study	Level 3
3	S. Zaffagnini, 2012	Knee Surgery, Sports, Traumatology, Arthroscopy	nonrandomized consecutive patients	Level 3
4	Nicholas G.H. Mohtadi	Journal Of Bone and Joint Surgeryjournal Of Bone And Joint Surgery	Randomized Clinical Trial	Level 3
5	Zhang Liang, 2019	International Journal of Clinical and Experimental Medicine	Clinical Research	Level 3

Anterior shoulder instability is responsible for the vast majority, approximately 96%, of glenohumeral dislocations, often necessitating surgical intervention to restore stability. Various conditions, such as Bankart lesions, superior labral anterior posterior lesions, rotator cuff tears, cartilage disruptions, and glenoid bone deformities, are associated with shoulder dislocations and can influence treatment approaches. Bankart lesions, which involve the separation of the anteroinferior labral complex from the glenoid periosteum, are commonly seen in cases of anterior shoulder instability.

An effective treatment approach for anterior shoulder instability accompanied by a Bankart lesion is anatomical repair of the glenoid capsulolabral complex. Initially performed through open arthrotomy, arthroscopic Bankart repairs and anterior capsulorraphy have become more prevalent due to their perceived advantages over open procedures, including reduced soft tissue damage, shorter surgical duration, decreased hospitalization period, and lower incidence of postoperative complications.7. The primary objection to Bankart repair with arthroscopy, however, is the notable incidence of recurrence observed in the initial reports of shoulder dislocations (12.6%) in contrast to the open approach (3.4%).5 Avulsion of the anterior glenoid rim and irreversible stretching of the anteroinferior capsule, also referred to as a Bankart lesion, may be the cause of recurrent anterior shoulder instability. According to reports, the incidence is up to 60% and is trending upward.4 Determining the optimal surgical approach for substantial glenoid abnormalities and recurrent anterior shoulder instability caused by capsular deficiencies remains challenging. Previously, this debilitating condition was typically addressed through procedures like capsular shift, open Latarjet, or arthroscopic Bankart repair. However, with the increased accessibility of arthroscopy, open surgery is no longer considered the preferred method for treating recurrent anterior shoulder instability; instead, arthroscopic Bankart repair has taken precedence. Since there were no rules and conflicting reports to our knowledge, surgeons had to rely more on their own experience, which led to some misunderstanding and a lack of clarity. Additionally, a number of earlier papers demonstrated that open surgery seemed to yield better outcomes, despite other data indicating the contrary.8

Zhu et al. performed a comparative analysis with 46 patients in the arthroscopic background jet group and 44 patients in the open jet group.11 During a span exceeding two years, every patient received clinical monitoring, encompassing assessments based on Constant-Murley, Rowe, American Shoulder and Elbow Surgeons (ASES) scoring systems, and examination of range of motion. Computed tomography (CT) scans were utilized to assess the placement of the implanted coracoid, screw positioning, and graft resorption. Significantly shorter surgical durations were observed in the open surgery group compared to the arthroscopic group ($P = .003$).10 In neither group did there occur a recurring dislocation. Every patient in both groups tested negative for apprehension. By the time of the final follow-up, no

discernible variation in any of the clinical outcome measures was seen between the open group and the arthroscopic group.
Compared to the open Latarjet treatment, the arthroscopic Bankart repair may have better long-term outcomes for patients over 40 years of age in terms of postoperative glenohumeral arthritis. However, these results are not yet known.8 When compared to the open Latarjet surgery, the Ernstbrunner investigation revealed a noticeably higher rate of redislocation and subluxation.e (9 vs 3; P =.037), and the Bankart group's mean final Subjective Shoulder Value (86% vs 91%; P =.011) was significantly lower.6

CONCLUSION

While an open approach has historically been used to address recurrent anterior shoulder instability, arthroscopic procedures have shown promise in recent times. When treating recurrent anterior shoulder instability, arthroscopic versus open repair did not differ statistically significantly in outcome metrics, according to the minimal RCT evidence that is currently available. More specifically, research comparing the state-of-the-art suture anchor surgical procedures did not reveal statistically significant variations in the rates of recurrence between the two treatment groups. Considering the comparable outcomes of the two groups, variations in the duration of hospitalisation and expenses incurred by the patient and the community indicate that arthroscopic repair is the more prudent course of treatment.

Declaration by Authors

Ethical Approval: Not Required
Acknowledgement: None
Source of Funding: None
Conflict of Interest: The authors declare no conflict of interest.

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How to cite this article: I Putu Indra Yudha Masdika Putra, A. A. Gede Yuda Asmara. The functional outcome between arthroscopic and open surgery for recurrent anterior shoulder instability: a systematic review. *International Journal of Research and Review*. 2024; 11(3): 427-435. DOI: *10.52403/ijrr.20240351*

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