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Review Article

Open versus Arthroscopic Latarjet Procedures for the Treatment of Shoulder Instability

Abdallah Galal Abdelaziz * **Mohamed Ahmed Yahia** **Ahmed Sayed Ahmed Elshamy**

Department of Orthopedic Surgery, Faculty of Medicine for Girls, Al-Azhar University, Cairo, Egypt.

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ABSTRACT

Background: Shoulder instability is a major challenge of daily orthopedic surgery. Different fixation techniques are available. However, each technique has its own advantages and disadvantages. Recently, Latarjet procedures were introduced and gains acceptance with passage of time. However, controversy still exists regards its value. The current work aimed at comparing the score of the clinical outcome, the complications rate, the accuracy of the graft, screw positioning and recurrent dislocation rates between the open and arthroscopic Latarjet techniques by systematic review of the literature.

Methodology: The study adheres to the specific guidelines for conduction of systematic review and meta-analysis. First the keywords were specified for the specific time and data bases. EMBASE, Medline PubMed library, the Cochrane Library Database as well as Google Scholar. All studies published before the end of the year 2022 were included. The following keywords: "Latarjet" Bristow", "Latarjet- Bristow", "Latarjet-Patte", "(Abstract or Title), "Dislocation", (Abstract or Title), "shoulder instability" (Abstract or Title), "Coracoid" (Abstract or Title). "Bone block" (Abstract or Title). And "Transfer" ((Latarjet) OR (Bristow)) OR (Latarjet-Bristow)) OR (Latarjet- Patte)) AND (Dislocation)) OR (shoulder instability)) AND (Bone block)) OR (Coracoid)) AND (Transfer)).

Results and conclusion: Both open and arthroscopic Latarjet procedures can be used to effectively treat shoulder instability with similarly low rates of complications, recurrent instability and need for revision surgery. Arthroscopic Latarjet procedures are associated with less early post- operative pain but require increased operative time. The evidence does not support there being any significant difference in graft or screw positioning between the two techniques. At this time neither procedure shows clear superiority over the other.

Keywords: Shoulder Instability; Arthroscopy; Revision Surgery; Latarjet; Pain.

* Corresponding author
Email: abdallahgalalhegazg@gmail.com

INTRODUCTION

The shoulder is the most commonly dislocated joint and most frequently dislocates anteriorly. The Latarjet is a commonly performed procedure in the treatment of recurrent anterior shoulder instability. This procedure was first characterized in 1954 and modified multiple times since its conception [(1)]**.** In 1954, Latarjet described his treatment for recurrent dislocation of shoulder by transposing the coracoid process on the neck of the scapula and securing it with a screw. The following steps were usually followed: coracoid preparation and osteotomy, subscapularis muscle split, preparation of the anterior glenoid neck and fixation of the coracoid graft to the anterior side of the glenoid with two 3.5-mm cannulated cortical screws [(2)]**.**

The open Latarjet technique addresses anterior shoulder instability with significant bone loss by the triple locking mechanism: bone surface augmentation, subscapularis lowering with the conjoined tendon adding a "muscle lock" or "hammock" effect or "sling effect" and capsular reattachment on the coracoacromial ligament. However, a number of issues regarding the optimal position of the bone block have been identified in association with the open Latarjet procedure [(1)].

A relatively new, minimally invasive technique, which has gained increased popularity amongst physicians, is the arthroscopic Latarjet procedure. This technique was introduced by **Lafosse and Boyle.** who described its early results [(3)]. Although satisfactory outcomes have recently been reported and benefits have been advocated for this technique, such as decreased stiffness, quicker rehabilitation and return to sport activities [(4)]**.**

The high complexity of this operation and the required dexterity still make it a path to be trod with great care as each step is strewn with pitfalls and potentially serious complications [(5)]**.** This procedure classically involves a deltopectoral approach in order to transfer the coracoid process, along with attached soft tissue to the anterior-inferior border of the glenoid. This stabilizes the shoulder through a triple mechanism which uses the conjoint tendon as a sling and the coracoid process as a bony block, while repairing the capsule via fixation to the coracoacromial ligament [(6)]**.**

The purpose of this study was to compare the clinical outcome scores, rates of complication, accuracy of graft, screw positioning and rates of recurrent dislocation between the open and arthroscopic Latarjet procedures by systematically reviewing the literature for comparative studies.

METHODS

This was a systematic review and meta-analysis on human subjects studied in different literatures. Data was collected from different medical websites up to December 2022 to compare between the open and arthroscopic Latarjet procedures as regards the standardized clinical outcome scores, rates of complication, accuracy of graft and screw positioning and rates of recurrent dislocation. The study was performed in the Orthopedic Surgery Department, Faculty of Medicine for girls, Al- Azhar University during the period from January 2021 to 1st December 2022. The study represents literature using the terms "Latarjet", "Dislocation", "shoulder instability", "Coracoid", "Bone block", and "Coracoid Transfer". in the following electronic databases PubMed, Cochrane, Google Scholar, EMBASE, MEDLINE regarding the outcome, possible complications, accuracy of graft and screw positioning and rates of recurrent dislocation.

Participants: Patients underwent either open or arthroscopic Latarjet procedures for shoulder instability.

Search strategy: The search was conducted by using the databases: EMBASE, Medline PubMed library, the Cochrane Library Database as well as Google Scholar. All studies published before the end of the year 2022 were included. The following keywords: "Latarjet" Bristow", "Latarjet- Bristow", "Latarjet-Patte", "(Abstract or Title), "Dislocation", (Abstract or Title), "shoulder instability" (Abstract or Title), "Coracoid" (Abstract or Title). "Bone block" (Abstract or Title). And "Transfer" ((Latarjet) OR (Bristow)) OR (Latarjet-Bristow)) OR (Latarjet- Patte)) AND (Dislocation)) OR (shoulder instability)) AND (Bone block)) OR (Coracoid)) AND (Transfer))

Inclusion criteria: The following studies were included: 1) interventional studies (RCTs or non-RCTs); 2) Studies comparing outcomes and success rates between open and arthroscopic Latarjet methods for anterior shoulder instability; 3) Studies comparing the accuracy of the coracoid bone graft or screw positioning; 3) Studies published in English and included living humans (male or female patients of any age).

Exclusion criteria: The following were the exclusion criteria: 1) non-clinical studies, including cadaver/ biomechanics/basic science; 2) Review articles or non-prognostic studies; 3) Any non-surgical treatment studies; 4) non-comparative studies; 5) Articles with other uncontrolled variables; 6); Languages other than English; 7) Data that couldn't be reliably extracted; 8) Patients with metastasis or myeloma or congenital deformity or systemic diseases affecting results.

Selection of domains of outcomes to be investigated: Domains included the outcome, possible complications, accuracy of graft and screw positioning, rates of recurrent dislocation.

Methods of the review:

Locating and selecting studies: Article abstracts identified using the above search strategy and criteria were viewed. Articles fulfilled the inclusion criteria were retrieved in full. If there was a doubt, a second reviewer evaluated the article and consensus was reached.

Quality assessment of the systematic review: Methodological items for non-randomized studies (MINORS): The items are scored (0): not reported. (1): Reported but inadequate (2): Reported and adequate. The global ideal score being 16 for non-comparative studies and 24 for comparative studies.

Data extraction: Data were independently extracted by use of standardized forms by two reviewers independently and cross-checked, Outcomes from included trials were combined using the systematic review manager software and manually screened for eligibility to be included. The data recorded included general study characteristics such as the name of the lead investigator and year of publication, recruitment period, median duration of follow-up, number of participants, and mean age and sex of the participants. Furthermore, the primary outcome measures and adverse event data or complications were extracted. Radiological outcomes of union, malunion, and nonunion were recorded after extraction from each article, then statistically analyzed for comparison between the two techniques.

Ethical considerations: The study was conducted after approval of the protocol by the Local Research Committee & the Studies Committee as well as the Research Ethics Committee of our University according to the following: 1) The aim, procedures and duration of the study represented in a simple way. 2) Confidentiality of data and results of all study population were preserved by ensuring anonymity of data and minimal access to data by research team only. 3) The Research Ethics Committee are provided for any future inquiry and photos used in the study. 4) Any potential risk attributed to the local lows used and managed promptly by the researcher, in addition only public researched had to be used in this study.

Statistical considerations: This study was conducted in accordance with the **MOOSE (meta- analysis of observational studies in epidemiology)** and **PRISMA (preferred reporting items for systematic reviews and meta-analyses)** flowchart were produced based on the search results and the inclusion/exclusion criteria. We studied the risk of bias for each study using (Cochrane collaboration tool for assessing the risk if bias).

Evidence of publication bias were sought using the funnel plot method: A funnel plot is the simplest scatter plot of the intervention effect estimates from individual studies against some measure of each study's size or precision.

Statistical Methods: Outcomes from included trials were combined using the systematic review manager software and manually screened for eligibility to be included. Data were collected in an Excel master sheet, coded, entered and analyzed using EPI-INFO medical statistical package and computer medical software SPSS version 23 (Chicago, Inc. USA). Outcomes from included trials were combined using the systematic review manager software and manually screened for eligibility to be included. PRISMA flowchart was produced based on the search results and the inclusion/exclusion criteria. To facilitate the assessment of possible risk of bias for each study, information was collected using the (Cochrane collaboration tool for assessing the risk of bias). After pooling of the collected data from the desired search studies, the relative risk of each of the intended outcome measures of interest was calculated and comparison between the literatures was estimated.

The phase of analysis of data: Data were presented as Mean ± SD for quantitative variables & number and percentage for qualitative variables. Data were coded, entered and analyzed by computer software package (version 10). Categorical data were compared using chi-square and calculated. The significance level was considered at P-value <0.05 for ANOVA and t-student test was used to differentiate between two different variables. Binary outcomes were presented as proportion and 95% CI. Estimates from included studies were pooled using the restricted maximum-likelihood (RML) random-effects method (REM).

RESULTS

Studies identification and inclusion

Searches conducted in the PubMed, Medline, Embase and Cochrane Library, yielded a total of 312 articles. After removing duplicates, 295 literatures remained. Based on the titles and abstracts review, 238 irrelevant articles were excluded and 23 articles not retrieved. 34 full-text articles were assessed for eligibility. However, 22 articles were excluded based on the previously established exclusion criteria (2 cadaveric study, 4 systemic reviews, 1 non-English,1 review article, 10 wrong intervention, and 4 other biomechanical study without available data). Then full text article assessed for eligibility. Finally, 12 studies were included in this systematic review and meta-analysis. The details of selection process were listed in the next chart.

Methodological assessment of study quality

I. Newcastle–Ottawa Scale

Methodological quality assessment of the 12 included studies is presented in Table 2. Among the observational studies, the Newcastle– Ottawa Scale includes the selection, comparability, assessment of outcome. The scores of all 12studies were all good, indicating a low risk of bias. In Figure 2: The different estimation bias (selection bias, attrition bias, performance bias, detection, and reporting bias) showing low risk of bias of the included studies.

Age differences: of the included 12 studies there were 978 in open group and 399 in the arthroscopic group. The overall estimate indicated that the pooled mean differences was -0.22 (P=0.81), suggesting that the difference was statistically insignificant between Open and arthroscopic groups.

Gender differences: of the included 12 studies there were 1025 cases identified males and females in whole studies. The overall estimate indicated that the pooled OR was 21.23 (P=0.002), suggesting that the difference was statistically significant between sex in Open and arthroscopic groups.

Follow up of the included ten studies the overall mean differences were 9.69 (P=0.0001), suggesting that the difference was statistically significant between follow up time in Open and arthroscopic Latarjet groups.

Complications: In Tables 3, 4, nine studies [7-10, 12-16] reported postoperative complications. On the whole, 34 (26.9%) complications on the open Latarjet procedure and were reported and 92 (73%) complications by arthroscopic surgery were reported in 12 included studies. The major complications reported after arthroscopic Latarjet surgery included recurrent dislocations, graft fracture, hardware removal, screw complications/ irritation, delayed failure, nerve injury. No heterogeneity among studies (P=0.34, I2=12%) was found. The overall estimate indicated that the pooled OR was 0.23 (95%CI=0.13–0.40, P=0.34), suggesting that the difference was not statistically significant between open and arthroscopic Latarjet procedures.

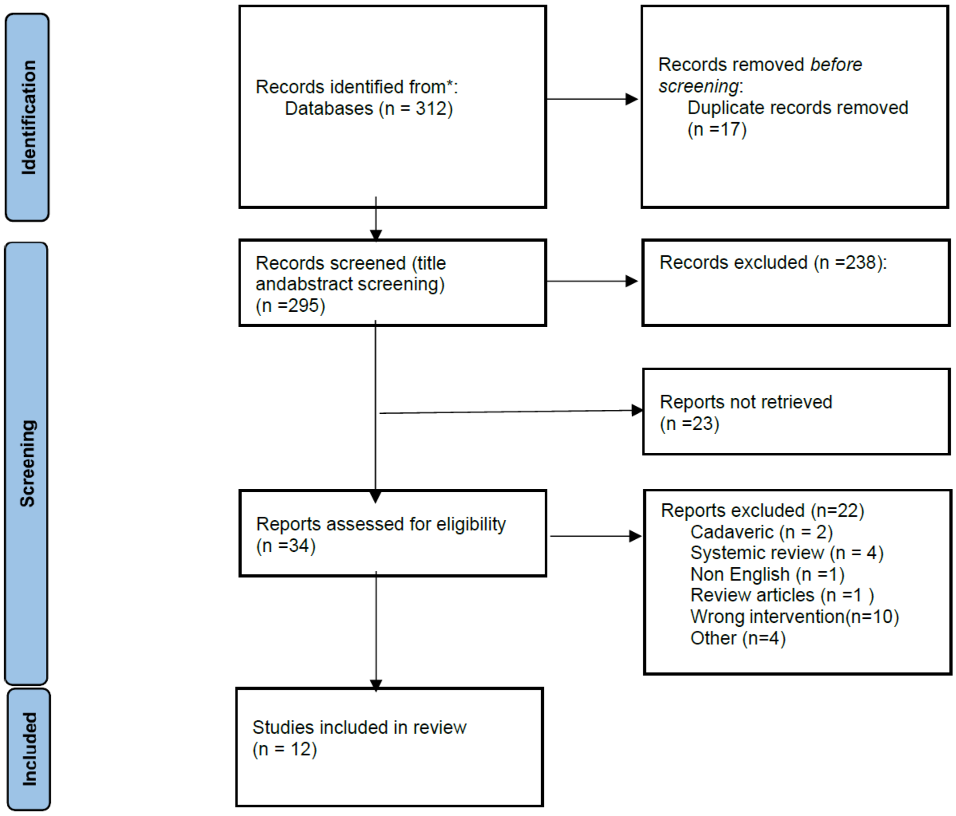

Figure (1): PRISMA flow diagram: identification, review and selection of articles included in the systematic review.

Table (1): Characteristics of study included

Authors	Year	Study design	Surgery	GRAFT	sample size
P. Teissier *et al.*, [7]	2022	Retrospective	Arthroscopic Open	coracoid	95 69
Daniel *et al*., [8]	2021	Prospective	Arthroscopic Open	coracoid	28 216
P. Moroder *et al.* [9]	2022	Prospective	Arthroscopic Open	coracoid	102 234
KS Min *et al*., [10]	2022	Retrospective	Arthroscopic Open	coracoid	28 95
Paul RW *et al*., [11]	2022	RCT	Arthroscopic Open	suture- button fixation	21 69
A. Christian *et al*., [12]	2022	Retrospective	Arthroscopic Open	Not mentioned	23 103
Castricini *et al.* [13]	2020	Prospective	Arthroscopic Open	Not mentioned	23 46
P. Boileau *et al.* [14]	2019	Retrospective	Arthroscopic Open	Not mentioned	20 33
Berte B, *et al*., [15]	2022	RCT	Arthroscopic Open	Not mentioned	50 28
M. Bodine *et al.* [16]	2022	RCT	Arthroscopic Open	Not mentioned	102 23
J. Ali *et al.* [17]	2020	Prospective	Arthroscopic Open	suture- button fixation	28 21
M. Alfaraidy *et al*., [18]	2023	Retrospective	Arthroscopic Open	Not mentioned	25 50

Table (2). Newcastle–Ottawa Scale

Authors	Selection				Comparability	Outcome			Total Score
	exposed cohort	non-exposed cohort	Ascertainment of exposure	outcome of		Assessment of outcome	follow-up		
Daniel *et al.*, (8)	*	*	*	*	*	*	*	*	Good
P. Moroder *et al.*, (9)	*	*	*	*	*	*	*	*	Good
KS Min *et al.* (10)	*	*	*	*	*	*	*	*	Good
Paul RW *et al.* (11)	-	-	-	-	-	-	-	-	-
A. Christian *et al.*, (12)	*	*	*	*	*	*	*	*	Good
Castricini *et al.*, (13)	*	*	*	*	*	*	*	*	Good
P. Boileau *et al.* (14)	*	*	*	*	*	*	*	*	Good
Berte *et al.* (15)	-	-	-	-	-	-	-	-	-
M. Bodine *et al.* (16)	-	-	-	-	-	-	-	-	-
J. Ali *et al.* (17)	*	*	*	*	*	*	*	*	Good
M. Alfaraidy *et al.* (18)	*	*	*	*	*	*	*	*	Good
P. Teissier *et al.* (7)	*	*	*	*	*	*	*	*	Good

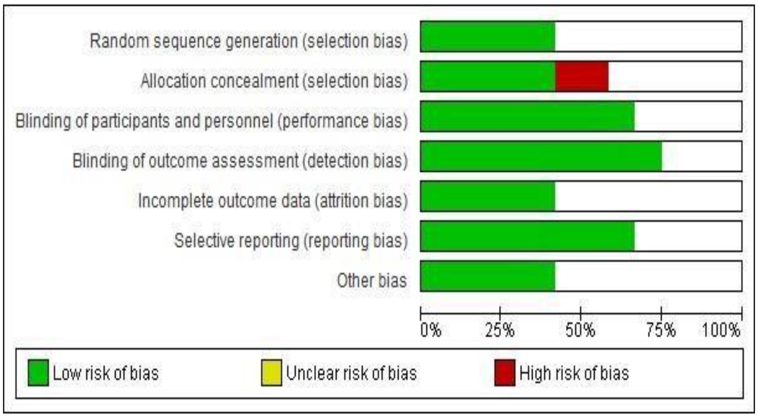

Figure (2): Risk of bias.

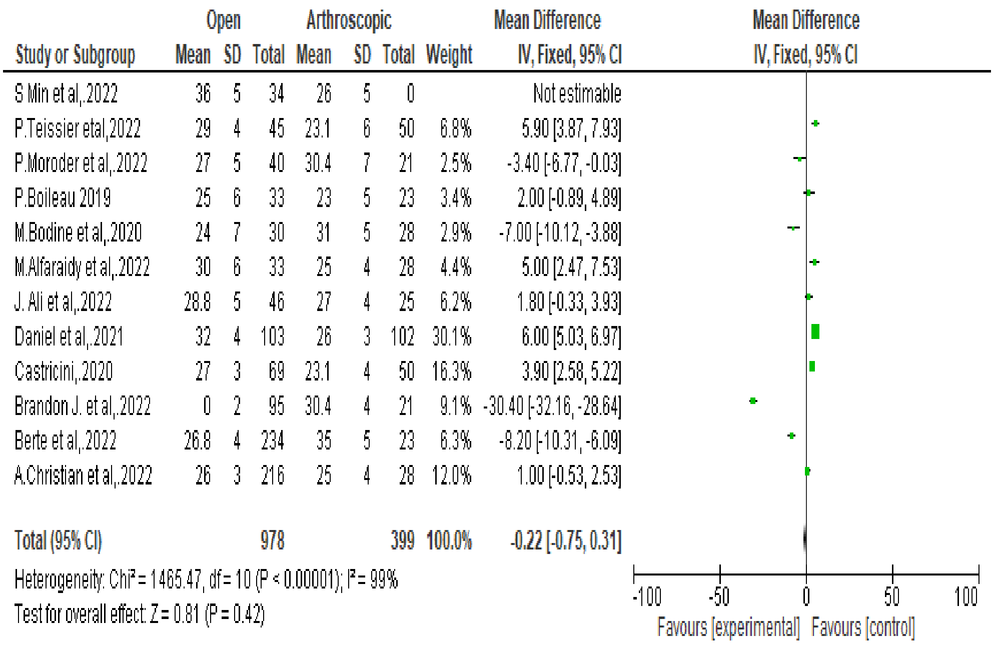

Figure (3). Forest plot of comparison: age difference between open and arthroscopic Latarjet procedure

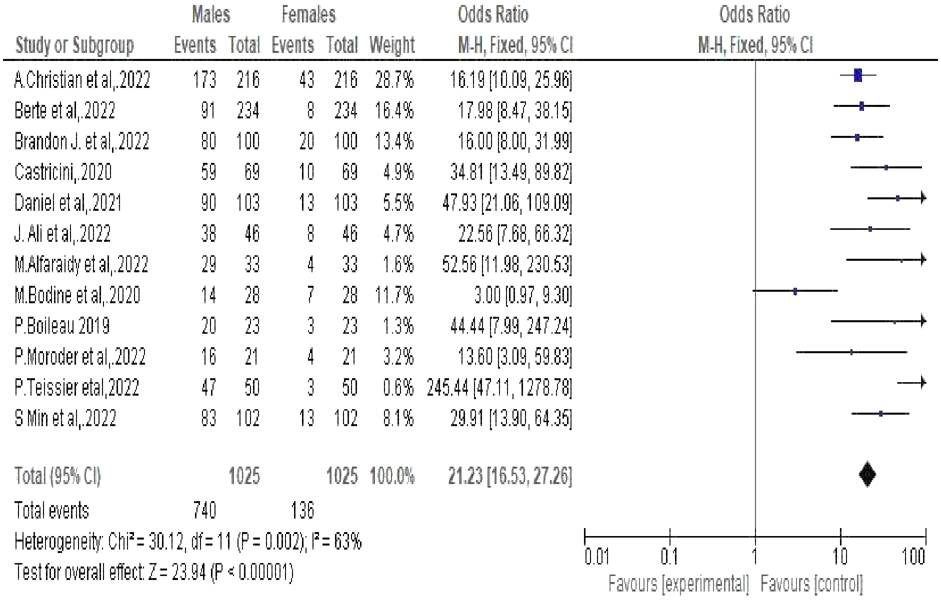

Figure 4. Forest plot of comparison: Gender differences in the included studies

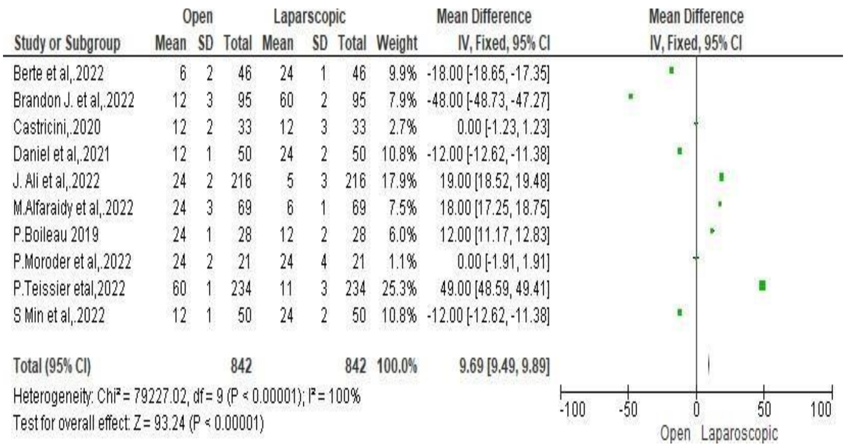

Figure (5): Forest plot of comparison: Follow up differences between open and arthroscopic Latarjet procedure.

Table (3): Major complications After open and arthroscopic Latarjet procedures

Authors	Surgery	dislocations/ recurrent surgery	Graft fracture	Hardware removal	Backout/ bending of the screw	Delayed failure	Nerve injury
P. Teissier *et al.* (7)	Arthroscopic Open	5 5	3 1	4 0	3 0	1 1	2 0
Daniel *et al.*, (8)	Arthroscopic Open	1 1	0 0	0 0	1 0	0 0	2 0
P. Moroder *et al.*, (9)	Arthroscopic Open	5 4	5 1	0 0	0 0	0 0	3
KS Min *et al.*, (10)	Arthroscopic Open	0 0	0 0	0 0	1 0	0 0	0 0
A. Christian *et al.*, (12)	Arthroscopic Open	1 0	0 0	0 0	0 0	0 0	0 0
Castricini *et al.*, (13)	Arthroscopic Open	0 0	0 0	0 0	0 0	0 0	3 1
P. Boileau *et al.* (14)	Arthroscopic Open	2 0	1 0	0 0	0 0	0 0	0 0
Berte *et al.* (15)	Arthroscopic Open	3 1	0 0	0 0	0 0	0 0	0 0
M. Bodine *et al.* (16)	Arthroscopic Open	2 1	0 0	0 0	0 0	1 1	1 0

Table (4): Minor complications After open and arthroscopic Latarjet procedures

Authors	surgery	Non union	Excessive fluid	Infection	Mal-position	Vascular injury	subluxation	Hematoma	Scapular dyskinesis
P. Teissier *et al*. [7]	Arthroscopic Open	1 0	1 0	1 0	0 1	0 1	0 0	0 0	0 0
Daniel *et al.* [8]	Arthroscopic Open	1 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
P. Moroder *et al.* [9]	Arthroscopic Open	1 0	0 0	1 0	0 0	0 0	0 1	0 0	0 0
KS Min *et al.* [10]	Arthroscopic Open	1 0	0 0	0 0	0 0	0 0	2 1	0 1	3 1
A. Christian *et al.* [12]	Arthroscopic Open	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
Castricini *et al.* [13]	Arthroscopic Open	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
P. Boileau *et al.* [14]	Arthroscopic Open	3 1	0 0	0 0	0 0	0 0	0 0	0 0	0 0
Berte *et al.* [15]	Arthroscopic Open	0 0	0 0	0 0	0 0	0 0	0 0	3 1	0 0
M. Bodine et al. [16]	Arthroscopic Open	0 0	0 0	16 1	0 0	0 0	2 2	0 0	0 0

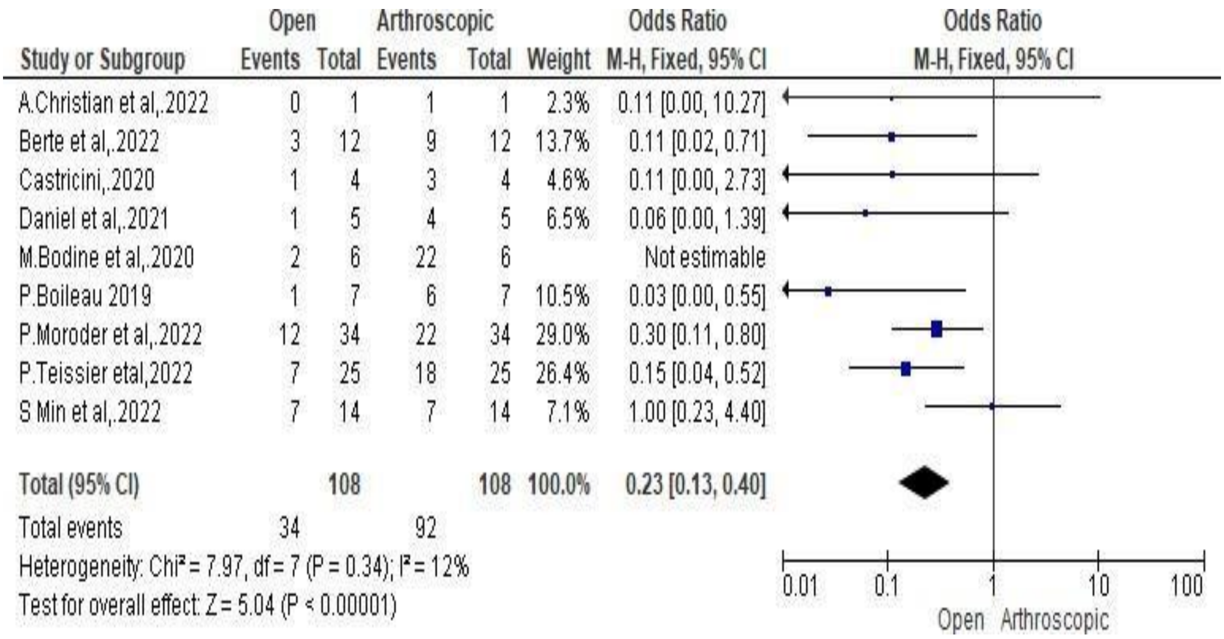

Figure 6. Forest plot: complications of both open and Latarjet groups.

DISCUSSION

An acceptance and satisfactory outcomes have been reported for Latarjet methods. In addition, the benefit of such procedures was advocated. These included reduction of stiffness, rapid rehabilitation and early return to sports and activities. However, the associated high complexity of this procedure and the needed dexterity still make it a path to be trod with great care as each step is strewn with pitfalls and possibly grave complications [19].

This technique classically includes a deltopectoral method to transfer the coracoid process, along with the attached soft tissue to the anterior-inferior border of the glenoid. This led to stabilization of the shoulder through a triple mechanism "uses the conjoint tendon as a sling and the coracoid process as a bony block, while repairing the capsule via fixation to the coracoacromial ligament". So, controversies still exist regarding the optimal orientation, the graft size and positioning when Latarjet procedure was performed. For example, it was reported that, the Latarjet technique involves transfer of the entire horizontal pillar of the coracoid was associated with better restored glenohumeral joint stiffness in comparison to the Bristow technique where only transfer of coracoid tip was performed. The Latarjet is a well-established treatment with good evidence for the favorable long-term outcomes. The rates of redislocation after a successful Latarjet technique are estimated to be 4 to 5%.

The technological advances have made an arthroscopic approach is a possibility for the Latarjet procedure. **Lafosse *et al.*** [4] has suggested that the arthroscopic approach provides some advantages such as placement of the bone graft with more accuracy, quick recovery of the function, reduced stiffness, and cosmetic benefits.

Despite few cases of recurrent dislocation in both surgical techniques, the theorized disadvantages of the arthroscopic include high cost, longer operative time, and higher rate of complication stemming from challenging fixation of the graft [20]**.** This may somewhat be explained by the complexity and more prolonged learning curve of arthroscopic Learjet's procedure [4]. However, there no consensus currently exists on whether the arthroscopic or open Latarjet methods offers overall superior outcomes and/or complication rates.

The current work aimed at comparing the clinical outcome scores, complication rates, accuracy of graft and screw positioning and recurrent dislocation rates between open and arthroscopic Latarjet methods. The systematic review of literature was used to achieve this aim. Results revealed no clear superiority of one approach over the other. This was based on the differences in complication rates, and rate of recurrence or stability. However, and importantly, both methods showed excellent clinical outcomes with lower rates of recurrent instability. Both methods led to equivalent rates of total recurrent instability and dislocations. Thus, the revisions due to recurrences are comparable between both methods.

In **Hurley *et al.*** [20] study who conduct a systemic review and metanalysis reported that there were no significant differences regarding the recurrence rate. However, their finding may be underpowered due to a trend toward lower recurrence in the open approach. However, there was a reduction of persistent apprehension in the open Latarjet method. This may be , translated to a higher rate of return to sport, particularly among athletes complaining of collision [21].

Several manuscripts reported superiority for individual standardized outcome scores either open or arthroscopic methods. However, these findings were not consistent across manuscripts. Patients being treated with arthroscopic approach have lower pain scores in the first two weeks after surgery. However, these scores become equivalent to the open method by one month [22]**.**

The average operative time was longer for the arthroscopic than open approach. However, no statistical analysis exists to discover if there was a significant difference. This was imaginable due to measurement errors not being reported. However, the studies noted a significant drop-in surgery time with the arthroscopic approach with increased learning curve of the surgeon [23]**.**

Of importance, studies did not present a comment on surgeon experience with each method before to the start of the studies. This may affect the results if surgeons were more experienced with one approach than the other.

The arthroscopic technique did not show better positioning of the bone block or screws irrespective of the theoretical improved visualization at the graft placing. This is of crucial importance given the known value of the coracoid graft positioning and leading to better biomechanical stability of the shoulder [10]. In addition, screws with divergence more than 10 degrees are associated with a higher risk of the suprascapular nerve injury.

Biomechanical studies showed that the best graft position is at 4 o'clock with more superior placement. However, the inferior positioning is associated with a higher risk of recurrence and non-union. There was no significant difference in graft positioning could be found between the methods and it was in accordance with the previous literature [20].

The position of the screws used for graft fixation must be carefully considered for prevention of complications. As the upper screw exit is positioned approximately 4mm away from suprascapular nerve, the angle between the screw and glenoid surface should be selected between 10 and 28^{o} to guard against nerve injury. **Ali *et al.*** [17] reported a significantly lower angle in patients with open surgery. The angle remains in accepted values irrespective of significant reduction.

The resorption of the graft is one of commonest complications after coracoid transfer. Its reported incidence is up to 63.9% [21]. However, graft resorption was considered of limited clinical importance for recurrence of instability. It is more common in patients with larger glenoid bone loss and after arthroscopic than open surgery. However, the current work showed higher incidence of graft resorption after open than arthroscopic surgery. There was a significant association between graft resorption and positive apprehension test after surgery. However, graft resorption effects on other functional outcome are of insignificant clinical importance.

The arthroscopic approach for Latarjet method is associated with higher rate of complications than the open approach (29 vs. 11 %). The commonest complications were material migration, graft non-union and recurrent instability [24].

Lafosse *et al.* [4] reported an 11% complication rate at end of follow up (at 2-years after surgery). The excellent results were reported for 91% of patients and no recurrence registered. However, authors warned against the steep learning curve and the various risks related to this approach.

To reduce complications, some authors reported a significant reduction by supervision on beginners in hip arthroscopy [25], another field notorious for its steep learning curve.

Longo *et al.* [26] conducted a systematic review and reported a 6 % and 3% recurrence rate in the open and arthroscopic approaches, respectively. However, the overall complication rate was 15% and 17 %, respectively. However, current results showed contradictory results, where short-term complications in were higher among the arthroscopic group mainly due to proficiency with this method had not been fully attained [27]. In addition, persistent apprehension in this group may be due to the lack of capsular repair in the arthroscopic approach [28] and the lack of thick anterior scarring process in the open method. Associated anterior soft tissue maneuvers may therefore help with provision of more stability. In a systematic review of **Griesser *et al.*** [28]**,** even though a significant difference in complication rate could not be recognized, they still found a lower rate of reoperations with arthroscopic Latarjet as well as increased external rotation loss. The present systematic review showed similar rates of reoperation and external rotation in both groups.

The major complications after arthroscopic Latarjet approach comprised recurrent dislocations, graft fracture, hardware removal, screw-related complications, delayed failure, and nerve injury. No heterogeneity among studies (P=0.34, I2=12%) was found. The overall estimate indicated that the pooled OR was 0.23 (95%CI=0.13–0.40, P=0.34), suggesting that the difference was not significant between open and arthroscopic Latarjet approaches.

In addition, both arthroscopic and open Latarjet methods had relatively low and comparable rates of major post- operative complications, recurrent instability and need for revision surgery. We are unable to give a comment on whether there was a significant difference in complication rates due to the low overall events and the low number of included studies. **Hurley *et al.*** [20] conclusions are in line with the findings of our review, as both procedures provide significant improvement in clinical outcomes with comparable complications rate. However, **Hurley *et al.*** [20] does not include all the available studies on the topic. In addition, they included retrospective studies, which increases the heterogeneity and decreases precision of estimates.

In another systemic review done in 2018 which included only 8 studies and showed the same results regarding the clinical outcomes and complication rate. However, we added more recent studies and included all the comparative studies [29].

In **Horner et al.** study, there was no significant difference in the total complications rate or in the rates of reoperations between both approaches, which may elevate concerns over complications due to the technical complexity of the arthroscopic procedure [22].

To reduce the conversion from arthroscopic to open approaches, the surgeon need 10 surgeries and 20 surgeries were required to obtain similar operative times [24].

The required learning curve suggested that, the arthroscopic approach may be recommended to be only performed in high-volume centers with more experienced arthroscopists. This confirmed by higher complication rates from low-volume shoulder centers even in routine techniques. The potential benefit of arthroscopic intervention includes low postoperative pain [30]. However, **Marion *et al.*** [30] found no significant differences in the postoperative consumption of narcotics despite the improved pain levels with arthroscopic procedures.

The cost-effectiveness of the arthroscopic techniques remains an issue, as a recent cost-effectiveness analysis by **Randelli *et al.*** [31] demonstrated that the open methods cost approximately €1040, and the arthroscopic methods cost up to €2400. The direct costs of the arthroscopic methods are nearly double than the open surgery but arthroscopic advantages like smaller incisions, reduced post-operative pain, faster healing, quicker functional recovery and better cosmoses may justify the higher costs of the arthroscopic approaches [31].

This study has numerous strengths, for example, the rigorous methodology. Specifically, a broad search strategy searching multiple databases was used to guarantee that as much of the relevant literature was involved as possible. The screening was done in duplicate to limit reviewer bias. However, the study had limitation like the quality of evidence available on the topic. Specifically, there currently exists no randomized trials comparing both Latarjet approaches.

In **Conclusion**, both Latarjet approaches (open and arthroscopic) can be used to manage shoulder instability effectively. Both had low complication, recurrence of instability and the need for revision surgery. Arthroscopic Latarjet approaches had low early post- operative pain but need increased operative time. The evidence does not support there being any significant difference in graft or screw positioning between the two approaches. At this time neither procedure demonstrates evident superiority over the other.

Conflict of interest and financial disclosure: none

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