International Journal of Research and Review
[Indexed, Peer-Reviewed Journal]
Volume 12; Issue: 9; September 2025
Website: www.ijrrjournal.com
Review Paper *E-ISSN: 2349-9788; P-ISSN: 2454-2237*

Comparative Outcomes of Bristow vs. Latarjet Procedures in the Treatment of Anterior Shoulder Instability: A Systematic Review

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DOI: https://doi.org/10.52403/ijrr.20250935

ABSTRACT

Background: Anterior shoulder instability is a common condition in athletes, particularly those involved in contact sports. The Bristow and Latarjet procedures are widely used surgical options for patients with significant glenoid bone loss; however, direct comparisons between these techniques remain limited.

Objective: To compare the clinical and biomechanical outcomes of the Bristow and Latarjet procedures in the treatment of anterior shoulder instability.

Methods: A systematic review was conducted according to PRISMA 2020 guidelines. Electronic searches were performed in PubMed, Scopus, and the Cochrane Library. Studies comparing Bristow and Latarjet procedures were included. Data on study design, population, surgical technique, follow-up, and clinical outcomes were extracted and synthesized narratively.

Results: Four studies met the inclusion criteria, comprising one randomized controlled trial, two retrospective studies, and one cadaveric biomechanical study. Latarjet demonstrated superior early bone union and joint stability, particularly in the presence of glenoid bone loss, but was also associated with higher graft resorption and increased rates of postoperative subluxation and pain. Bristow showed slower bone union but fewer complications in some cases. Functional outcomes (ASES, WOSI) improved in both groups, with no significant differences in long-term scores.

Discussion: This systematic review highlights the key differences between the Bristow and Latarjet procedures for anterior shoulder instability. The Latarjet procedure offers faster bone union and better short-term range of motion, but is associated with higher graft resorption and postoperative morbidity. Conversely, Bristow has lower complication rates but slower union, suggesting that the choice between procedures should depend on patient-specific factors, such as bone defect size and activity level. Further research is needed to refine indications and improve long-term outcomes.

Conclusion: Both Bristow and Latarjet procedures are effective for managing anterior shoulder instability. Latarjet may be preferred in cases with substantial bone loss requiring immediate stabilization, while Bristow may be suitable for patients with lower complication risk. Further randomized studies are needed to guide surgical decision-making and optimize patient outcomes.

Keywords: Latarjet Procedure, Bristow Procedure, Anterior Shoulder Instability

INTRODUCTION

Anterior shoulder instability is a prevalent condition, particularly in athletes involved in contact sports, where the recurrent dislocation of the shoulder joint can lead to significant functional impairment. The management of this condition is crucial, as it not only affects the individual's ability to perform daily activities but also their participation in high-performance sports. Among various surgical techniques, the Bristow and Latarjet procedures are the most commonly employed to treat anterior shoulder instability, especially in patients with significant glenoid bone loss.[1,2]

The Bristow procedure, first described in 1958, involves the transfer of the coracoid process to the anterior glenoid with the attached conjoined tendon, aiming to restore joint stability by creating a dynamic sling effect.[3] On the other hand, the Latarjet procedure, a modification of the Bristow technique, offers a more robust approach by positioning the coracoid process horizontally and securing it with two screws, which has been shown to restore anterior shoulder stability more effectively, particularly in patients with bone loss.[4]

Despite both procedures being highly regarded, the choice between them often depends on the degree of bone loss and the technical demands of the procedure. Several biomechanical studies have suggested that the Latarjet procedure is superior in terms of joint stability, particularly when there is substantial anterior glenoid bone loss.[5] However, clinical evidence regarding the direct comparison of the Bristow and Latarjet procedures remains limited. While both surgeries have been reported to have low reinjury rates and high rates of return to sport, differences in clinical outcomes, such as bone union, graft resorption, and the extent of functional recovery, are still unclear.[6,7]

This systematic review aims to compare the outcomes of the Bristow and Latarjet procedures, with a focus on the effectiveness in terms of bone union, bone resorption, and overall clinical outcomes.

METHODS

This study was designed as a systematic review following the PRISMA 2020 guidelines to ensure methodological transparency and reproducibility. A comprehensive electronic literature search was conducted across three major databases: PubMed, Scopus, and the Cochrane Library. The Boolean search strategy used was as follows: ("Bristow" OR "Latarjet") AND ("shoulder instability" OR "coracoid transfer"). The search was restricted to studies published in English, from inception up until the final date of review. The flow of study identification and selection is shown in Figure 1 (PRISMA Flow Chart).

All retrieved records were imported into a reference management system, where duplicate entries (n = 38) were removed. Title and abstract screening were independently conducted by two reviewers on 278 unique records, followed by a full-text review of 51 potentially eligible articles. Any discrepancies during the selection process were resolved through discussion and, if necessary, consultation with a third reviewer. Ultimately, four studies met all eligibility criteria and were included in the final synthesis (Figure 1). From each included study, data were extracted regarding the first author, year of publication, country, study design, total sample size, type of surgical intervention, comparator group, outcome measures, and length of follow-up.

Risk of bias assessment was performed according to the methodological design of each included study. For randomized controlled trials, the Cochrane Risk of Bias 2.0 (RoB 2.0) tool was utilized. For non-randomized comparative studies, the ROBINS-I (Risk of Bias in Non-randomized Studies of Interventions) tool was applied. The findings from the bias assessment are summarized in Table 1.

Table 1. Risk of Bias Study

Study	Study Design	Risk of Bias Tool	Overall Risk of Bias
Belangero et al., 2021	Randomized Controlled Trial	RoB 2.0	Low
Tanaka et al., 2022	Retrospective Cohort Study	ROBINS-I	Moderate
Willemot et al., 2018	Retrospective Case Series	ROBINS-I	Serious
Giles et al., 2014	Biomechanical Cadaveric Study	NA	NA

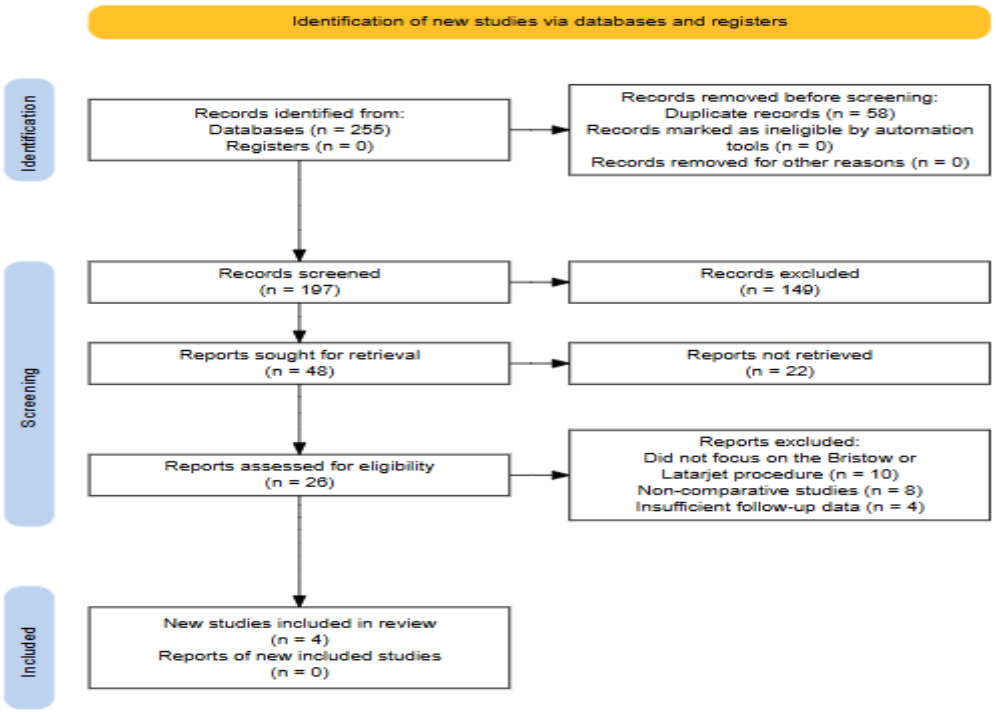

Figure 1. PRISMA Flow Chart

RESULTS

A total of 255 studies were initially identified through electronic database searches. After removing 58 duplicate records, 197 unique studies remained for screening. Titles and abstracts were reviewed, leading to the exclusion of 149 studies and the selection of 48 articles for full-text retrieval. Of these, 22 could not be accessed, leaving 26 full-text articles assessed for eligibility. Based on predefined inclusion and exclusion criteria, 22 studies were excluded 10 did not focus on the Bristow or Latarjet procedures, 8 were non-comparative, and 4 lacked sufficient follow-up data. Ultimately, 4 studies were included in the final systematic review. The detailed selection process is illustrated in Figure 1 (PRISMA Flow Chart).

Study Characteristic

Table 2. summarizes the key characteristics of four studies comparing the Bristow and Latarjet procedures for treating anterior shoulder instability. Tanaka et al. (2022) conducted a retrospective cohort study in Japan involving rugby players and found differences in bone union and resorption, with Latarjet having higher bone union but more resorption. Willemot et al. (2018), a retrospective case series from Belgium, analyzed failure mechanisms in patients undergoing revision surgery, identifying non-union and resorption as the most common causes. Giles et al. (2014) performed a biomechanical cadaveric study in Canada showing that the Latarjet procedure provided superior joint stability, especially with increasing glenoid bone loss. Lastly, Belangero et al. (2021) conducted a prospective randomized controlled trial in Brazil among high-demand athletes, reporting significant improvements in function with both procedures and an early postoperative range of motion advantage for the Latarjet technique.

Table 2. Study Characteristic

No	Author (Year)	Study Design	Location	Population	Sample Size	Surgical Technique	Follow-up Duration	Key Outcomes
1	Tanaka et al. (2022)	Retrospective cohort (Level 3)	Japan	Rugby players with anterior shoulder instability	Bristow: 66 shoulders; Latarjet: 35 shoulders	Open Bristow vs. Open Latarjet	Bristow: mean 74 months; Latarjet: mean 64 months	Bone union, bone resorption, return to play, ASES, Rowe scores, pain, subluxation
2	Willemot et al. (2018)	Retrospective case series	Belgium	Patients undergoing revision after failed Bristow or Latarjet	26 patients (Bristow: 5; Latarjet: 21)	Bristow / Latarjet (failed cases)	Mean 43.7 months post-revision	Failure mechanisms: non-union (42.3%), resorption (23.1%), malposition (15.4%), fracture (19.2%)
3	Giles et al. (2014)	Biomechanical cadaveric study	Canada	Cadaveric shoulders (simulated instability and bone loss)	8 fresh-frozen shoulders	Simulated Bristow vs. Latarjet	Not applicable (lab study)	Glenohumeral joint stiffness and stability in 0%, 15%, and 30% glenoid bone defects
4	Belangero et al. (2021)	Prospective RCT (Level II)	Brazil	High-demand athletes with anterior instability	41 shoulders (Bristow: 19; Latarjet: 22)	Bristow vs. Latarjet	Mean 5 years	ASES, ASORS, WOSI, VAS scores; no redislocations; return to sport; early ROM advantage with Latarjet

Table 3. Main Outcome

No	Author (Year)	Procedure Compared	Main Outcomes Measured	ASES (Mean ± SD / Range)	Rowe Score	WOSI (Mean ± SD / Range)	Key Findings
1.	Belangero et al. (2021)	Bristow vs. Latarjet	ASES, ASORS, WOSI, VAS, ROM, RTP, complications	79.1 (66–95); pre-op: 41 (15–75)	Not reported	52.6 (18–77); pre-op: 122 (46–185)	No redislocations. Both groups showed significant improvement. Latarjet superior in early passive ROM (4–8 wks), but no diff at 5 yrs in ASES, ASORS, WOSI, RTP.
2.	Tanaka et al. (2022)	Bristow vs. Latarjet	Bone union, resorption, ASES, Rowe, RTP, subluxation, pain post-RTP	Improved (no exact value), no significant difference between groups	Improved (no exact value), no significant difference	Not reported	Latarjet had higher union rate (97.1%) vs Bristow (50% at 3 mo), but more resorption (100% vs 6.1%). Subluxation & post-RTP pain more common in Latarjet.
3.	Willemot et al. (2018)	Failed Bristow/Latarjet (revision)	Failure mechanism, WOSI, Subjective Shoulder Score, arthritis progression	Not reported	Not reported	709.3 ± 412.5. SSS: 60.2% ± 19.6	Most failures due to non-union (42.3%), resorption (23.1%). Mean WOSI 709.3, SSS 60.2%. Only 46% returned to pre-revision sport level. 53.8% had degenerative arthritis.
4.	Giles et al. (2014)	Bristow vs. Latarjet (cadaveric)	Biomechanical: joint stiffness, dislocation under load	Not applicable	Not applicable	Not applicable	Latarjet provided significantly better joint stiffness and stability in 15%–30% glenoid defects. No difference in 0% defect. Latarjet restored stability in 11/12 cases.

Clinical Outcome

Table 3 summarizes the main clinical outcomes, including ASES, Rowe, WOSI scores, bone union, resorption, and complications. Belangero et al. (2021) reported significant improvements in both groups, with Latarjet showing superior early ROM but no long-term differences in ASES or WOSI scores. Tanaka et al. (2022) found Latarjet had a higher bone union rate (97.1%) but more graft resorption (100%) and greater subluxation and post-RTP pain compared to Bristow. Willemot et al. (2018) identified non-union (42.3%) and resorption (23.1%) as leading causes of failure in revision cases, with poor WOSI (709.3) and SSS (60.2%) outcomes. Giles et al. (2014) showed biomechanically that Latarjet provided superior joint stiffness and stability in 15–30% glenoid defects, though no difference was found with intact glenoid.

DISCUSSION

This systematic review aimed to compare the clinical and biomechanical outcomes of the Bristow and Latarjet procedures in the treatment of anterior shoulder instability. The four included studies revealed important distinctions between these two commonly used coracoid transfer techniques, particularly in terms of bone union, graft resorption, functional recovery, complications, and joint stability.

One of the most notable findings is the difference in bone union rates between the two procedures. Tanaka et al. (2022) reported a significantly higher rate of early bone union with the Latarjet procedure (97.1%) compared to the Bristow procedure (50% at 3 months), supporting its mechanical advantage in achieving graft fixation.[7] However, this benefit was counterbalanced by a 100% incidence of graft resorption in the Latarjet group, compared to only 6.1% in the Bristow group. This suggests that while Latarjet achieves earlier union, it may be more prone to long-term morphological changes of the transferred coracoid, potentially impacting long-term stability or hardware integrity.[8]

In terms of functional outcomes, both procedures were effective in improving clinical scores. Belangero et al. (2021) demonstrated comparable improvements in ASES and WOSI scores at five-year follow-up, with no cases of redislocation in either group.[6] However, Latarjet was associated with superior early postoperative range of motion (ROM) at 4 to 8 weeks, suggesting a faster short-term recovery, which may be advantageous in athletic populations. Conversely, Tanaka et al. reported increased rates of subluxation (14%) and persistent pain after return to play (26%) in the Latarjet group compared to Bristow (3% for both), indicating that the Latarjet procedure may carry a higher risk of postoperative morbidity in some patients, despite its biomechanical advantages.[7,8]

From a failure analysis perspective, Willemot et al. (2018) provided insight into complications requiring revision. In this study, non-union (42.3%) and graft resorption (23.1%) were the most common failure mechanisms following either procedure, highlighting the importance of technical precision during graft placement and fixation.[9] Functional recovery following revision was limited, with mean WOSI scores of 709.3 and only 46% of patients returning to their pre-revision level of sport. Furthermore, more than half of the patients developed degenerative changes, emphasizing the long-term consequences of failed primary stabilization.

Biomechanically, the cadaveric study by Giles et al. (2014) confirmed that the Latarjet procedure offers superior joint stiffness and resistance to dislocation in cases with 15–30% glenoid bone loss.[10] In contrast, the Bristow procedure was less effective in restoring anterior stability under similar defect conditions. However, both techniques showed similar performance in shoulders with no glenoid bone loss, indicating that the choice of procedure may need to be tailored to the extent of osseous deficiency.

Collectively, these findings highlight the nuanced differences between Bristow and

Latarjet procedures. The Latarjet technique may be preferred in cases requiring rapid bone union or in the presence of significant bone loss, where biomechanical reinforcement is critical.[11] However, the higher rates of graft resorption, pain, and subluxation may necessitate careful patient selection and postoperative monitoring. Meanwhile, the Bristow procedure, though associated with slower union, appears to have a lower complication burden in some studies and may offer comparable long-term outcomes in selected populations.[12]

The heterogeneity in study design, outcome measures, and follow-up duration across the included studies poses limitations for direct meta-analysis. Only one randomized controlled trial (Belangero et al., 2021) was identified, while the others were retrospective or biomechanical in nature. Furthermore, variations in surgical technique (open vs. arthroscopic), rehabilitation protocols, and definitions of clinical success add complexity to interpreting these results.

Future research should aim for larger, multicenter randomized controlled trials with standardized outcome reporting and long-term follow-up to better delineate the indications, risks, and advantages of each procedure. Until then, surgeons must rely on individualized clinical judgment, balancing the patient's activity level, bone defect size, and risk tolerance when choosing between Bristow and Latarjet.

Limitations and Future Directions

This review has several limitations. Only four studies were included, limiting the generalizability of the findings. The heterogeneity in study design, populations, surgical techniques, and outcome measures prevented a formal meta-analysis. Inconsistent reporting of functional scores and varying follow-up durations also posed challenges for direct comparison. Additionally, one study was biomechanical and did not assess clinical outcomes. Future research should focus on conducting high-quality, multicenter randomized controlled trials with standardized protocols and long-term follow-up. Studies should also evaluate patient-specific factors, graft integrity, and postoperative complications. Imaging-based assessments and consensus on outcome reporting are essential to improve comparability across future investigations.

CONCLUSION

This systematic review highlights the distinct clinical and biomechanical differences between the Bristow and Latarjet procedures in treating anterior shoulder instability. While both techniques are effective in restoring function and preventing redislocation, the Latarjet procedure is associated with higher bone union rates and improved biomechanical stability in cases with significant glenoid bone loss. However, this comes at the cost of increased graft resorption, postoperative subluxation, and pain. The Bristow procedure, though slower in achieving bone union, may present fewer complications and comparable long-term outcomes in selected populations. Given the limited number of comparative studies and heterogeneity in methodology, further high-quality, randomized controlled trials are needed to establish clear surgical guidelines. Until then, the choice of procedure should be tailored to individual patient factors such as bone defect size, sport participation level, and risk of recurrence.

Declaration by Authors

Ethical Approval: Not required
Acknowledgement: None
Source of Funding: None
Conflict of Interest: No conflicts of interest declared.

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How to cite this article: N. Indra Tri Cahyadi, Made Bramantya Karna, A.A Gde Yuda Asmara, Stedi Adnyana Christian. Comparative outcomes of Bristow vs. Latarjet procedures in the treatment of anterior shoulder instability: a systematic review. *International Journal of Research and Review*. 2025; 12(9): 329-335. DOI: *https://doi.org/10.52403/ijrr.20250935*

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