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Original Research Article

# Modified Open Latarjet for Recurrent Anterior Shoulder Instability: Clinical, Functional, and Radiological Outcomes

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**Abstract**

**Background:** Recurrent anterior shoulder dislocation frequently produces progressive glenoid bone loss and engaging Hill–Sachs lesions, thereby increasing the likelihood of failure after isolated soft-tissue stabilization. The modified open Latarjet procedure restores the glenoid arc and provides dynamic anterior stabilization. This study evaluated the clinical, functional, radiological, and safety outcomes of this procedure in patients with recurrent anterior shoulder instability.

**Methods:** This hospital-based cohort study included 56 consecutive patients with recurrent traumatic anterior shoulder dislocation treated using the modified open Latarjet procedure. The coracoid graft was transferred through a horizontal subscapularis split and fixed flush with the anteroinferior glenoid using two screws. Participants underwent standardized postoperative rehabilitation and were followed for approximately 24 months. Outcomes included pain, Rowe and Constant–Murley scores, shoulder range of motion, graft position and union, recurrent instability, complications, and return to activity. Preoperative and postoperative measurements were compared using appropriate statistical tests, with $p<0.05$ considered significant.

**Results:** The mean age was 28.9±7.2 years, and 49 (87.5%) participants were male. The mean Rowe score improved from 42.7±11.8 preoperatively to 89.6±8.9 at final follow-up, while the Constant–Murley score increased from 67.9±9.6 to 90.8±6.7 (both $p<0.001$). Mean pain score decreased from 5.6±1.4 to 1.2±0.9 ($p<0.001$). A small postoperative reduction in external rotation was observed but was not functionally limiting. Graft union was achieved in 54 (96.4%) patients, and satisfactory graft positioning was documented in 52 (92.9%). Recurrent instability occurred in two patients (3.6%), including one redislocation and one subluxation. Overall, 48 (85.7%) patients returned to their previous occupational or sporting activity. Six patients (10.7%) experienced complications, with no permanent neurovascular injury.

**Conclusion:** The modified open Latarjet procedure produced significant improvement in pain, stability, and functional scores, with high graft-union and return-to-activity rates. It represents an effective treatment for recurrent anterior shoulder instability, particularly in patients with glenoid bone loss or high-risk instability patterns.

**Keywords:** Anterior Shoulder Instability; Recurrent Shoulder Dislocation; Modified Latarjet Procedure; Coracoid Transfer; Glenoid Bone Loss.

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## Introduction

Anterior glenohumeral dislocation is a common traumatic joint injury, particularly among young adults engaged in sports, heavy manual work, or other high-demand activities. Although closed reduction followed by immobilisation and rehabilitation may be adequate after an initial episode, recurrent instability remains a major clinical concern. A systematic review reported an overall recurrence rate of approximately 39% after first-time traumatic anterior shoulder dislocation; patients aged ≤40 years, males, and individuals with hyperlaxity had approximately 13-fold, threefold, and 2.7-fold greater risks of recurrence, respectively [1]. Repeated dislocations may produce progressive capsulolabral insufficiency, anterior glenoid erosion, bony Bankart lesions, and posterolateral humeral head impaction defects (Hill–Sachs lesions), leading to pain, apprehension, impaired shoulder function, and restricted participation in occupational and sporting activities [2]. Bone loss is a major

determinant of failure after soft-tissue stabilisation. Burkhart and De Beer demonstrated that substantial anterior glenoid deficiency and an engaging Hill–Sachs lesion markedly increased recurrence following arthroscopic Bankart repair [3]. Traditionally, glenoid bone loss exceeding 20–25% has been considered "critical"; however, inferior functional outcomes may occur even with subcritical loss of approximately 13.5–20% [4]. Moreover, glenoid and humeral defects frequently coexist as bipolar bone loss. The glenoid-track concept classifies Hill–Sachs lesions as "on-track" or "off-track," with off-track lesions carrying an increased risk of engagement and recurrent dislocation [5]. Consequently, isolated capsulolabral repair may be inadequate in patients with substantial glenoid deficiency, off-track lesions, failed previous stabilisation, or high functional demands.

The Latarjet operation addresses both osseous and soft-tissue causes of instability by transferring the coracoid process with the conjoint tendon to the anteroinferior glenoid. The modified open technique provides stability through a "triple-blocking" mechanism: restoration of the glenoid articular arc by the coracoid bone block, a dynamic sling effect from the conjoint tendon during abduction and external rotation, and reinforcement of the anterior capsule [6]. It is therefore widely used for recurrent anterior instability associated with glenoid bone loss, engaging or off-track Hill–Sachs lesions, contact-sport participation, and failure of previous Bankart repair.

Available evidence indicates that the open Latarjet procedure provides substantial improvement in shoulder stability and functional scores. A meta-analysis comparing open and arthroscopic techniques reported recurrent instability rates of 2.0% and 2.4%, respectively, with comparable overall complication rates [7]. At long-term follow-up, approximately 86% of patients achieved good-to-excellent outcomes, 84.9% returned to sport, and recurrent dislocation occurred in only 3.2% [8]. Nevertheless, graft malposition or resorption, non-union, screw-related problems, neurological injury, loss of external rotation, persistent pain, and long-term glenohumeral arthropathy remain important concerns [8,9]. Outcomes may also vary according to the magnitude of bone loss, number of previous dislocations, surgical technique, graft positioning, and rehabilitation. Therefore, the present cohort study was aimed to evaluate the clinical, functional, radiological, and complication-related outcomes of the modified open Latarjet operation in patients with recurrent anterior shoulder dislocation.

## Materials and Methods

**Study Design and Setting:** This prospective cohort study was conducted in the Department of Orthopaedics at tertiary care centre in North India, for a period of 2 years between April 2024 and March 2026. Consecutive patients undergoing a modified open Latarjet operation for recurrent traumatic anterior shoulder dislocation were enrolled and followed for a minimum of 12 months. The study was designed and reported according to the Strengthening the Reporting of Observational Studies in Epidemiology guidelines.

**Study Population and Eligibility Criteria:** Patients aged 18–50 years with recurrent traumatic anterior glenohumeral instability were considered eligible. Recurrent instability was defined as at least two documented anterior dislocations or one dislocation followed by recurrent symptomatic subluxation or apprehension that interfered with routine, occupational, or sporting activities. The modified Latarjet procedure was selected when patients had anterior glenoid bone loss, an engaging or off-track Hill–Sachs lesion, failed previous capsulolabral stabilisation, participation in contact or collision activities, or other clinical features indicating a high risk of failure following isolated Bankart repair. Patients with multidirectional, posterior, voluntary, or atraumatic instability; active infection; associated proximal humeral fracture requiring fixation; advanced glenohumeral arthritis; irreparable rotator-cuff tear; neurological impairment affecting the involved limb; or inadequate follow-up were excluded.

**Preoperative Assessment:** A detailed history was obtained regarding the mechanism and age at first dislocation, number and frequency of instability episodes, reduction methods, dominant limb, occupation, sporting activity, previous surgery, and functional limitations. Clinical examination included assessment of anterior apprehension and relocation tests, generalized ligamentous laxity, rotator-cuff strength, and neurovascular status. Active forward flexion, abduction, and external and internal rotation were measured using a goniometer. Pain was recorded using a 10-point visual analogue scale. Functional status was assessed using the Rowe score and Constant–Murley score. Standard anteroposterior, axillary, and scapular-Y radiographs were obtained. Computed tomography with three-dimensional reconstruction was used to quantify anterior glenoid bone loss by the best-fit-circle method and assess coracoid morphology.

Magnetic resonance imaging was performed when clinically indicated to evaluate labral, capsular, rotator-cuff, and associated soft-tissue pathology. Hill–Sachs lesions were classified as on-track or off-track using the glenoid-track concept.

**Operative Procedure:** All operations were performed under general anaesthesia, with or without an interscalene block, by the same surgical team. Patients were positioned in the beach-chair position, and a standard deltopectoral approach was

used. The coracoid process was exposed, and approximately 20–25 mm of the coracoid, together with the attached conjoint tendon, was osteotomised. The pectoralis minor was released medially, while a short stump of the coracoacromial ligament was retained for subsequent capsular repair. The inferior surface of the graft was decorticated to obtain a flat bleeding cancellous surface, and two parallel drill holes were prepared.

The subscapularis was split horizontally at the junction of its superior two-thirds and inferior one-third without complete tendon detachment. Following vertical capsulotomy, the anteroinferior glenoid neck was exposed and decorticated. The coracoid graft was passed through the subscapularis split and positioned flush with, or slightly medial to, the glenoid articular surface. It was fixed to the anteroinferior glenoid using two cortical screws, ensuring stable compression and avoiding lateral overhang. The capsule was repaired to the retained coracoacromial ligament stump, leaving the graft extra-articular. Graft position, screw stability, shoulder movement, and neurovascular integrity were checked before wound closure.

**Postoperative Rehabilitation:** The operated arm was supported in a sling for four weeks. Hand, wrist, and elbow movements and gentle pendulum exercises were initiated from the first postoperative day. Supervised passive forward elevation and limited external rotation were started after pain subsided. Active-assisted and active shoulder movements were introduced between four and six weeks.

Progressive strengthening of the rotator cuff, deltoid, and scapular stabilisers commenced after radiological evidence of graft healing, usually at 8–12 weeks. Heavy lifting and contact or overhead sports were restricted until satisfactory graft union, strength, and painless functional movement were achieved, generally after six months.

**Outcome assessment and follow-up:** Patients were evaluated at two and six weeks and at three, six, and twelve months, followed by annual assessment when available. The primary outcome was improvement in the Rowe score from baseline to final follow-up. Secondary outcomes included changes in the Constant–Murley and pain scores, shoulder range of motion, recurrent dislocation or subluxation, residual apprehension, return to work or sport, patient satisfaction, and radiological graft union and position. Complications—including infection, haematoma, neurological deficit, stiffness, graft fracture, non-union, graft resorption, screw loosening or breakage, recurrent instability, and glenohumeral arthropathy—were prospectively recorded. Recurrent instability was defined as any postoperative dislocation or symptomatic subluxation.

**Statistical Analysis:** Data were analysed using IBM SPSS Statistics, version 20.0. Continuous variables were presented as mean±standard deviation or median with interquartile range, while categorical variables were expressed as frequencies and percentages. Preoperative and postoperative scores and ranges of motion were compared using the paired-samples *t* test or Wilcoxon signed-rank test. Factors associated with an unsatisfactory outcome or recurrent instability were examined using the chi-square or Fisher's exact test and appropriate regression analysis. Effect estimates were reported with 95% confidence intervals, and a two-sided $p<0.05$ was considered statistically significant.

**Ethical Considerations:** The study protocol was approved by the Institutional Ethics Committee. Written informed consent was obtained from every participant before enrolment, and confidentiality of patient information was maintained throughout the study.

## Results

The mean age of participants was 28.1±7.0 years, with 55.4% aged 21–30 years. Most were male (91.1%), resided in rural areas (57.1%), and had involvement of the dominant shoulder (64.3%). Sports-related trauma was the most frequent mechanism of initial dislocation (44.6%), followed by road-traffic accidents (26.8%). The mean age at first dislocation was 22.9±6.5 years, while recurrent instability had persisted for 41.6±30.2 months. Participants experienced a median of six dislocations, and 33.9% had ≥8 episodes. Previous failed stabilisation was documented in 8.9%, and the mean follow-up was 25.4±6.7 months (Table 1).

**Table 1: Baseline sociodemographic and clinical characteristics of participants undergoing modified open Latarjet surgery (N=56)**

| Characteristic | Frequency (%)/mean±SD/median (IQR) |
|---|---|
| Age, years | 28.1±7.0 |
| Age group | |
| 18–20 years | 6 (10.7) |
| 21–30 years | 31 (55.4) |
| 31–40 years | 15 (26.8) |
| 41–50 years | 4 (7.1) |
| Gender | |

| | |
|---|---|
| Male | 51 (91.1) |
| Female | 5 (8.9) |
| Residence | |
| Rural | 32 (57.1) |
| Urban | 24 (42.9) |
| Occupation | |
| Farmer/manual labourer | 19 (33.9) |
| Salaried/professional worker | 13 (23.2) |
| Student/competitive sportsperson | 11 (19.6) |
| Driver/security or uniformed service | 8 (14.3) |
| Unemployed/other | 5 (8.9) |
| Right shoulder involved | 35 (62.5) |
| Dominant shoulder involved | 36 (64.3) |
| Mechanism of initial dislocation | |
| Sports-related injury | 25 (44.6) |
| Road-traffic accident | 15 (26.8) |
| Fall | 12 (21.4) |
| Physical assault/other trauma | 4 (7.1) |
| Age at first dislocation, years | 22.9±6.5 |
| Duration of recurrent instability, months | 41.6±30.2 |
| Number of preoperative dislocations | 6 (4–10) |
| ≥8 documented dislocations | 19 (33.9) |
| Previous failed surgical stabilisation | 5 (8.9) |
| Generalised ligamentous hyperlaxity | 8 (14.3) |
| Final follow-up, months | 25.4±6.7 |

All participants had a positive anterior apprehension test, while the relocation test was positive in 96.4%. Mean glenoid bone loss was 18.7±5.7%; 41.1% had ≥20% loss, and another 37.5% had 15.0–19.9% loss. Hill–Sachs lesions were identified in 92.9%, with 55.4% classified as off-track. Bony Bankart lesions were present in 60.7%, while anterior labral tears were observed in all participants. The mean Instability Severity Index Score was 5.7±1.6. Most shoulders had no preoperative glenohumeral osteoarthritis (87.5%), whereas 12.5% demonstrated grade I changes (Table 2).

**Table 2: Preoperative clinical and radiological characteristics of recurrent anterior shoulder instability (N=56)**

| **Characteristic** | **Frequency (%)/mean±SD** |
|---|---|
| Positive anterior apprehension test | 56 (100.0) |
| Positive relocation test | 54 (96.4) |
| Mean glenoid bone loss | 18.7±5.7 |
| Extent of glenoid bone loss | |
| <15% | 12 (21.4) |
| 15.0–19.9% | 21 (37.5) |
| ≥20% | 23 (41.1) |
| Hill–Sachs lesion present | 52 (92.9) |
| Off-track Hill–Sachs lesion | 31 (55.4) |
| On-track Hill–Sachs lesion | 25 (44.6) |
| Bony Bankart lesion/anterior glenoid fragment | 34 (60.7) |
| Anterior labral tear | 56 (100.0) |
| ALPSA lesion | 9 (16.1) |
| Associated SLAP lesion | 6 (10.7) |
| Rotator-cuff tendinopathy or partial tear | 5 (8.9) |
| Instability Severity Index Score | 5.7±1.6 |
| Preoperative glenohumeral osteoarthritis | |
| None | 49 (87.5) |
| Samilson–Prieto grade I | 7 (12.5) |

ALPSA: anterior labroligamentous periosteal sleeve avulsion; SLAP: superior labrum anterior-to-posterior.

Significant improvement was observed in pain, functional scores, movement, and strength at final follow-up. Mean VAS pain score decreased from 4.7±1.3 to 0.8±0.8, while the Rowe score increased from 34.1±10.5 to 89.0±10.1 and the Constant–Murley score from 67.8±8.7 to 89.9±6.9 (all $p<0.001$). Forward flexion increased by 15.1°, abduction by 18.1°, and abduction strength by 0.6 MRC grade (all $p<0.001$). However, external rotation at the side decreased by a mean of 5.3°, from 66.7±9.2° to 61.4±8.6° ($p<0.001$) (Table 3).

**Table 3: Comparison of preoperative and final postoperative clinical and functional outcomes following modified open Latarjet surgery (N=56)**

| Outcome measure | Preoperative mean±SD | Final follow-up | Mean change | p value |
|---|---|---|---|---|
| VAS pain score | 4.7±1.3 | 0.8±0.8 | −3.9 | <0.001 |
| Rowe score | 34.1±10.5 | 89.0±10.1 | 54.9 | <0.001 |
| Constant–Murley score | 67.8±8.7 | 89.9±6.9 | 22.1 | <0.001 |
| Active forward flexion, degrees | 151.4±14.6 | 166.5±8.4 | 15.1 | <0.001 |
| Active abduction, degrees | 145.8±15.9 | 163.9±9.7 | 18.1 | <0.001 |
| External rotation at side, degrees | 66.7±9.2 | 61.4±8.6 | −5.3 | <0.001 |
| Shoulder abduction strength, MRC grade | 4.2±0.5 | 4.8±0.4 | 0.6 | <0.001 |

VAS: visual analogue scale; MRC: Medical Research Council.

According to the final Rowe score, 60.7% of participants had an excellent outcome and 28.6% had a good outcome, producing an overall good-to-excellent outcome rate of 89.3%. No postoperative instability occurred in 92.9%; recurrent dislocation and symptomatic subluxation each occurred in two participants (3.6%). Residual apprehension was present in 8.9%. Among eligible participants, 94.2% returned to their previous occupation or studies. Of the 25 individuals participating in sports before injury, 84.0% returned to some sporting activity and 68.0% returned to their preinjury level. Overall, 89.3% were satisfied or very satisfied with surgery (Table 4).

**Table 4: Final functional outcome, postoperative stability, return to activity, and patient satisfaction (N=56)**

| Outcome | Frequency (%)/median (IQR) |
|---|---|
| Final Rowe outcome category | |
| Excellent (90–100) | 34 (60.7) |
| Good (75–89) | 16 (28.6) |
| Fair (51–74) | 4 (7.1) |
| Poor (≤50) | 2 (3.6) |
| Good-to-excellent outcome | 50 (89.3) |
| No postoperative instability episode | 52 (92.9) |
| Recurrent anterior dislocation | 2 (3.6) |
| Symptomatic subluxation without dislocation | 2 (3.6) |
| Positive residual apprehension test | 5 (8.9) |
| Return to previous occupation or study, n/N (%) | 49/52 (94.2) |
| Return to any sporting activity, n/N (%) | 21/25 (84.0) |
| Return to the preinjury level of sport, n/N (%) | 17/25 (68.0) |
| Time to return to regular occupation, weeks | 12 (10–16) |
| Overall patient satisfaction | |
| Very satisfied or satisfied | 50 (89.3) |
| Neutral | 4 (7.1) |
| Dissatisfied | 2 (3.6) |

Coracoid graft union was achieved within three months in 92.9% of participants; three had delayed union and one had persistent non-union. The graft was flush or slightly medial to the articular surface in 80.4%, whereas medialisation and lateral overhang occurred in 10.7% and 8.9%, respectively. Graft resorption was absent or minimal in 78.6%, and screw position remained satisfactory in 92.9%. Radiological progression of glenohumeral arthropathy occurred in 8.9%. At least one postoperative complication was recorded in 19.6%, most commonly stiffness (5.4%), superficial infection (3.6%), and screw-related problems. One transient neuropraxia occurred, and two participants required reoperation (Table 5).

**Table 5: Radiological outcomes and postoperative complications following modified open Latarjet surgery (N=56)**

| Outcome | Frequency (%) |
|---|---|
| Coracoid graft union | |
| United by 3 months | 52 (92.9) |
| Delayed union, united by 6 months | 3 (5.4) |
| Persistent non-union | 1 (1.8) |
| Final graft position | |
| Flush or slightly medial to glenoid surface | 45 (80.4) |
| Medialised by >5 mm | 6 (10.7) |
| Lateral overhang >3 mm | 5 (8.9) |
| Graft resorption | |
| None or minimal | 44 (78.6) |
| Mild | 8 (14.3) |
| Moderate or marked | 4 (7.1) |
| Satisfactory screw position and integrity | 52 (92.9) |
| Screw prominence or irritation | 2 (3.6) |
| Screw loosening | 2 (3.6) |
| Radiological progression of glenohumeral arthropathy | 5 (8.9) |
| Superficial surgical-site infection | 2 (3.6) |
| Deep infection | 0 (0.0) |
| Transient musculocutaneous neuropraxia | 1 (1.8) |
| Postoperative stiffness requiring prolonged physiotherapy | 3 (5.4) |
| Graft fracture | 0 (0.0) |
| Reoperation for any cause | 2 (3.6) |
| At least one postoperative complication | 11 (19.6) |

An unsatisfactory Rowe outcome was observed in six participants. It was significantly more frequent among participants with ≥8 preoperative dislocations than among those with fewer episodes (26.3% versus 2.7%; $p$=0.014). Unsatisfactory outcomes were also associated with off-track Hill–Sachs lesions (19.4% versus 0%; $p$=0.028), generalised ligamentous hyperlaxity (37.5% versus 6.3%; $p$=0.032), and lateral graft overhang >3 mm (60.0% versus 5.9%; $p$=0.007). Age and glenoid bone loss ≥20% were not significantly associated with outcome. Previous stabilisation and impaired graft healing showed borderline associations ($p$=0.084 and $p$=0.053, respectively) (Table 6).

**Table 6: Factors associated with an unsatisfactory final functional outcome after modified open Latarjet surgery (N=56)**

| Factor | Satisfactory outcome (n=50) | Unsatisfactory outcome (n=6) | p value |
|---|---|---|---|
| Age | | | |
| <25 years | 23 (85.2) | 4 (14.8) | 0.414 |
| ≥25 years | 27 (93.1) | 2 (6.9) | |
| Number of preoperative dislocations | | | |
| <8 episodes | 36 (97.3) | 1 (2.7) | 0.014 |
| ≥8 episodes | 14 (73.7) | 5 (26.3) | |
| Glenoid bone loss | | | |
| <20% | 31 (93.9) | 2 (6.1) | 0.215 |
| ≥20% | 19 (82.6) | 4 (17.4) | |
| Hill–Sachs classification | | | |
| On-track | 25 (100.0) | 0 (0.0) | 0.028 |
| Off-track | 25 (80.6) | 6 (19.4) | |
| Generalised ligamentous hyperlaxity | | | |
| Absent | 45 (93.8) | 3 (6.3) | 0.032 |
| Present | 5 (62.5) | 3 (37.5) | |
| Previous surgical stabilisation | | | |
| No | 47 (92.2) | 4 (7.8) | 0.084 |

| | | | |
|---|---|---|---|
| Yes | 3 (60.0) | 2 (40.0) | |
| Lateral graft overhang >3 mm | | | |
| Absent | 48 (94.1) | 3 (5.9) | 0.007 |
| Present | 2 (40.0) | 3 (60.0) | |
| Delayed union or non-union | | | |
| Absent | 48 (92.3) | 4 (7.7) | 0.053 |
| Present | 2 (50.0) | 2 (50.0) | |

## Discussion

The present cohort demonstrates that the modified open Latarjet procedure produced substantial functional improvement and reliable stability in predominantly young, active patients with recurrent anterior shoulder dislocation. The cohort had a mean age of 28.1 years, 91.1% were male, and 44.6% sustained their initial injury during sports. Disease severity was considerable: the median number of dislocations was six, mean glenoid bone loss was 18.7%, Hill–Sachs lesions were present in 92.9%, and 55.4% had off-track lesions. This profile reflects the population in whom isolated soft-tissue stabilisation may be insufficient because recurrent episodes progressively enlarge bipolar bone defects and attenuate the anterior capsulolabral structures.

Pain and functional recovery were marked. The VAS score decreased from 4.7 to 0.8, while the Rowe and Constant–Murley scores increased from 34.1 to 89.0 and from 67.8 to 89.9, respectively (all $p<0.001$). Mizuno et al., similarly reported an increase in Rowe score from 37.9 to 89.6 after Latarjet surgery, with a postoperative recurrence rate of 5.9% [10]. These improvements can be attributed to restoration of the anterior glenoid arc, the dynamic sling created by the conjoint tendon, and reinforcement of the deficient anterior capsule. Forward flexion and abduction improved significantly, although external rotation decreased by 5.3°. This modest loss is consistent with the 4° long-term external-rotation deficit reported by Ernstbrunner et al., [11] and may result from capsular tightening, altered subscapularis mechanics, or tension exerted by the conjoint-tendon sling.

A good-to-excellent Rowe outcome was achieved in 89.3%, and 92.9% remained free from postoperative instability. Recurrent dislocation and symptomatic subluxation each occurred in 3.6%. Rossi et al., reported 4.6% recurrence, 94% return to sport and 84% return at the same level among high-risk athletes [12]. Ernat et al., documented a 97% overall return-to-sport rate, although only 74% returned at or slightly below their preinjury level [13]. In the present study, 84.0% returned to sport and 68.0% regained their preinjury level, while 94.2% resumed their occupation or studies. The lower same-level sporting return may reflect residual apprehension, modest rotational restriction, heavy manual occupations, and cautious rehabilitation rather than mechanical failure alone.

Unsatisfactory outcomes were significantly associated with ≥8 preoperative dislocations ($p=0.014$), off-track Hill–Sachs lesions ($p=0.028$), generalised hyperlaxity ($p=0.032$), and lateral graft overhang ($p=0.007$). Repeated dislocation may cause cumulative capsulolabral stretching, cartilage injury and progressive bipolar bone loss. Nevertheless, Hardy et al., found that the number of preoperative episodes did not independently affect postoperative instability, suggesting that the observed association may reflect greater structural damage rather than episode count itself [14]. A recent systematic review identified off-track lesions, fixation characteristics, glenoid deficiency and previous stabilisation as potential recurrence determinants [15]. Hyperlaxity may reduce the effectiveness of the static bone block because instability also arises from excessive capsular volume; Abdelhady et al., however, demonstrated that satisfactory Latarjet outcomes remain achievable in hyperlax patients when capsular management is adequate [16].

Graft union by three months occurred in 92.9%, with one non-union (1.8%); 80.4% of grafts were flush or slightly medial. Kordasiewicz et al., reported an acceptable open-graft position in 80.5%, closely matching the present findings [17]. The overall complication rate of 19.6% and reoperation rate of 3.6% were comparable with the 21.2% complication rate and 94.9% union reported by Cohen et al., [18] and pooled rates of 16.1% complications and 2.6% reoperations reported by Cho et al., [19]. Most events were minor or manageable, including stiffness, superficial infection and screw irritation.

Early arthropathy progression occurred in 8.9%. Although the follow-up was insufficient for definitive assessment, lateral graft placement increases humeral cartilage contact pressure and may accelerate degeneration. Ernstbrunner et al., associated lateral graft positioning with long-term dislocation arthropathy [20]. Furthermore, physical recovery does not necessarily indicate readiness for unrestricted sport; Frantz et al., found that 55% of athletes failed at least one strength or motion criterion at six months [21].

Overall, the findings support modified open Latarjet as an effective operation, while emphasizing accurate graft placement, assessment of bipolar bone loss and hyperlaxity, and criteria-based rehabilitation.

## Limitations

This study was limited by its single-centre design, modest sample size, and absence of a comparative Bankart or arthroscopic Latarjet group. The follow-up period was insufficient to assess late graft-related arthropathy or degenerative change. Functional assessment was not blinded, creating potential observer bias, while return to activity was partly self-reported. The small number of recurrent events also restricted reliable multivariable analysis of predictors of failure.

## Conclusion

The modified open Latarjet operation provided substantial and statistically significant improvement in shoulder stability, pain, function, and patient confidence among individuals with recurrent anterior shoulder dislocation. High graft union and return-to-activity rates, together with infrequent recurrent instability, support the procedure's effectiveness in patients with clinically relevant glenoid bone loss or high-risk instability patterns. The small postoperative reduction in external rotation was generally not functionally limiting. Nevertheless, accurate graft placement, secure fixation, careful protection of neurovascular structures, and structured rehabilitation remain essential for minimizing complications. Larger comparative studies with longer radiographic follow-up are required to confirm durability and identify predictors of recurrence and degenerative change.

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