

## Functional Outcome of Latarjet Procedure in Recurrent Shoulder Dislocation in Adults

### Authors:

Dr. Soham Gohil<sup>1</sup>, Dr. Janak Rathod<sup>2</sup>, Dr. Prabhav Tijoriwala<sup>3</sup>, Dr. Jay Rathod<sup>4</sup>, Dr. Pratik Rakholiya<sup>5</sup>

<sup>1,4</sup>Third Year Resident, Department of Orthopaedic, Surat Municipal Institute of Medical Education and Research (SMIMER), Surat, Gujarat.

<sup>2</sup>Professor & Head of the Department, Department of Orthopaedic, Surat Municipal Institute of Medical Education and Research (SMIMER), Surat, Gujarat.

<sup>3</sup>Associate Professor, Department of Orthopaedic, Surat Municipal Institute of Medical Education and Research (SMIMER), Surat, Gujarat.

<sup>4</sup>Third Year Resident, Department of Orthopaedic, Surat Municipal Institute of Medical Education and Research (SMIMER), Surat, Gujarat

<sup>5</sup>Second Year Resident, Department of Orthopaedic, Surat Municipal Institute of Medical Education and Research (SMIMER), Surat, Gujarat.

### Corresponding Author:

Dr. Soham Gohil\*, Third Year Resident, Department of Orthopaedic, Surat Municipal Institute of Medical Education and Research (SMIMER), Surat, Gujarat.

<https://doi.org/10.5281/zenodo.21697065>

Received: 10 July 2026, Accepted: 26 July 2026, Online First: 31 July 2026

### ABSTRACT

**Background:** Recurrent anterior shoulder dislocation is a common orthopaedic condition affecting young, active individuals and is frequently associated with glenoid bone loss and Hill-Sachs lesions. In patients with significant osseous defects, the Latarjet procedure has emerged as the preferred surgical treatment because it restores shoulder stability through bone augmentation and the dynamic sling effect of the conjoint tendon. **Objectives:** To evaluate the functional outcomes, radiological findings, return to activity, and postoperative complications following the Latarjet procedure in adults with recurrent anterior shoulder dislocation. **Materials and Methods:** This prospective observational study was conducted in the Department of Orthopaedics at a tertiary care teaching hospital over 18 months (November 2024 to May 2026). A total of 30 adult patients with recurrent anterior shoulder instability associated with significant glenoid bone loss underwent the standard open Latarjet procedure. Preoperative evaluation included detailed clinical examination, radiographs, 3D computed tomography for assessment of glenoid bone loss, and magnetic resonance imaging for associated soft tissue injuries. Patients were followed at 6 weeks, 3 months, 6 months, and 12 months. Functional outcome was assessed using the Modified University of California Los Angeles (UCLA) Shoulder Score. Secondary outcomes included range of motion, return to pre-injury activity, recurrent instability, and postoperative complications. **Results:** The study population was predominantly male (90%), with most patients aged 25–30 years (43.3%). Trauma was the most common mechanism of injury (83.3%), and 86.7% of patients had experienced more than five episodes of shoulder dislocation before surgery. Fifty percent of patients had 15–20% glenoid bone loss, while 43.3% had bone loss greater than 20%. Progressive improvement was observed in all components of the Modified UCLA Shoulder Score throughout follow-up. At 12 months, 73.3% of patients achieved excellent and 26.7% achieved good functional outcomes. Full return to pre-injury activity was achieved in 76.7% of patients. No recurrent instability or redislocation was observed. Only one patient (3.3%) developed transient axillary nerve neuropraxia, and overall patient satisfaction was 100%. **Conclusion:** The Latarjet procedure provides excellent functional recovery, reliable shoulder stability, high patient satisfaction, and a low complication rate in adults with recurrent anterior shoulder dislocation associated with significant glenoid bone loss. It remains an effective and dependable surgical option for restoring shoulder function and preventing recurrent instability.

**Keywords:** Recurrent anterior shoulder dislocation, Latarjet procedure, Glenoid bone loss, Shoulder instability, Modified UCLA score, Functional outcome, Coracoid transfer.

## INTRODUCTION

Recurrent anterior shoulder dislocation is the most common form of glenohumeral instability, accounting for approximately 95% of all shoulder dislocations. It primarily affects young, active individuals, particularly males involved in contact sports, heavy manual labor, and high-energy trauma. Following an initial traumatic anterior dislocation, recurrent instability frequently develops due to disruption of the capsulolabral complex, associated osseous defects of the glenoid, and engaging Hill-Sachs lesions. The risk of recurrence is influenced by patient age, activity level, extent of bone loss, and adequacy of the initial treatment. Recurrence rates after conservative management have been reported to range from 40% to 90%, particularly in patients younger than 25 years participating in competitive sports or physically demanding occupations. [1]

The shoulder joint possesses the greatest range of motion among all joints in the human body but sacrifices inherent stability because of its shallow glenoid socket and reliance on dynamic and static stabilizers. The labrum, capsule, glenohumeral ligaments, rotator cuff muscles, and surrounding musculature collectively contribute to maintaining joint stability. Traumatic anterior dislocation commonly results in a Bankart lesion involving detachment of the anteroinferior labrum, while repeated episodes progressively increase glenoid bone loss and enlarge Hill-Sachs defects, making recurrent instability increasingly difficult to manage using soft tissue repair alone. [2]

Advances in imaging have significantly improved preoperative assessment of recurrent shoulder instability. Three-dimensional computed tomography (3D-CT) has become the gold standard for quantifying glenoid bone loss, while magnetic resonance imaging (MRI) provides valuable information regarding associated soft tissue injuries such as Bankart lesions, capsulolabral tears, Hill-Sachs lesions, and rotator cuff pathology. Accurate assessment of glenoid bone deficiency is essential because bone loss exceeding approximately 15–20% substantially increases the risk of failure following isolated arthroscopic Bankart repair. [3,4]

Several surgical procedures have been described for the treatment of recurrent anterior shoulder instability, including arthroscopic Bankart repair, remplissage, Eden-Hybinette procedure, distal tibial allograft reconstruction, and the Latarjet procedure. Among these, the Latarjet procedure has emerged as the preferred surgical option in patients with significant glenoid bone loss, engaging Hill-Sachs lesions, failed

previous stabilization surgery, contact athletes, and individuals with high functional demands. [5]

The Latarjet procedure, first described by Michel Latarjet in 1954, involves transfer of the coracoid process with its attached conjoint tendon to the anteroinferior glenoid rim. This technique restores shoulder stability through a "triple-blocking mechanism": (1) augmentation of the deficient anterior glenoid with the coracoid bone graft, (2) dynamic sling effect produced by the conjoint tendon during abduction and external rotation, and (3) repair or reinforcement of the anterior capsule. This combination effectively prevents recurrent anterior translation while preserving shoulder motion. [6]

Long-term studies have consistently demonstrated excellent clinical outcomes following the Latarjet procedure, with recurrence rates generally below 5%, high rates of return to sports and occupational activities, restoration of shoulder stability, and sustained improvement in functional scores. Nevertheless, complications such as graft malposition, graft nonunion, hardware irritation, infection, neurovascular injury, and postoperative osteoarthritis remain potential concerns, emphasizing the importance of meticulous surgical technique and appropriate patient selection. [7,8]

Recent systematic reviews have shown that the open Latarjet procedure provides superior stability compared with isolated Bankart repair in patients with substantial glenoid bone loss. Although arthroscopic techniques continue to evolve, the open Latarjet remains the benchmark procedure for managing complex recurrent anterior shoulder instability because of its reproducible outcomes and excellent long-term survivorship. [9,10]

The present prospective observational study was therefore undertaken to evaluate the functional outcomes of the Latarjet procedure in adults with recurrent anterior shoulder dislocation associated with glenoid bone loss. The study assessed postoperative shoulder function using the Modified University of California Los Angeles (UCLA) Shoulder Score, evaluated recovery of range of motion, return to pre-injury activities, radiological findings, and postoperative complications, thereby providing comprehensive evidence regarding the effectiveness and safety of this widely accepted stabilization procedure.

## MATERIALS AND METHODS

### Study Design and Setting

This prospective observational study was conducted in the Department of Orthopaedics at a tertiary care teaching hospital to evaluate the functional outcomes

and complications following the Latarjet procedure in patients with recurrent anterior shoulder instability associated with glenoid bone loss. The study was carried out over a period of 18 months from November 2024 to May 2026. Consecutive eligible patients who underwent the Latarjet procedure during the study period were enrolled after obtaining written informed consent.

### Study Population

Adult patients presenting with recurrent anterior shoulder instability and fulfilling the eligibility criteria were included in the study.

### Inclusion Criteria

- Age  $\geq 18$  years.
- Recurrent anterior shoulder instability.
- Presence of significant glenoid bone loss.
- Presence of Hill-Sachs lesion.
- Failed previous arthroscopic or open Bankart repair.

### Exclusion Criteria

- Posterior shoulder instability.
- Atraumatic multidirectional shoulder instability.
- Associated rotator cuff tear.
- Voluntary shoulder dislocators or subluxators.
- Connective tissue disorders causing generalized ligamentous laxity.

### Sample Size

All eligible patients undergoing the Latarjet procedure during the study period were included consecutively until completion of the study duration.

### Preoperative Evaluation

A comprehensive clinical and radiological evaluation was performed in all patients before surgery.

### Clinical Assessment

The following parameters were documented:

- Demographic details (age, sex, occupation, dominant limb)
- Mechanism of injury
- Duration of symptoms
- Number of previous dislocation episodes
- History of previous shoulder surgery
- Clinical examination
- Apprehension test
- Relocation test
- Range of motion including:
  - Forward flexion
  - External rotation
  - Internal rotation

- Motor strength graded using the Medical Research Council (MRC) grading system (0–5)
- Neurovascular examination of the affected upper limb

### Radiological Assessment

All patients underwent standardized imaging investigations including:

- Anteroposterior (AP) radiograph
- Axillary view
- Scapular Y-view radiograph
- Three-dimensional Computed Tomography (3D CT) scan for quantification of glenoid bone loss using the best-fit circle method
- Magnetic Resonance Imaging (MRI) for evaluation of associated soft tissue injuries including:
  - Bankart lesion
  - Hill-Sachs lesion
  - Capsulolabral injury
  - Rotator cuff pathology

### Surgical Technique

All procedures were performed under general anesthesia using the standard open Latarjet procedure with the patient in the beach-chair position.

### Surgical Steps

Patient Positioning

- Beach-chair position after induction of general anesthesia.
- Small scapular support placed posteriorly.
- Entire upper limb prepared and draped free.

### Surgical Exposure

- Deltopectoral approach through a 4–7 cm incision.
- Identification of the cephalic vein.
- Exposure of the coracoid process.

### Coracoid Bone Block Preparation

- Release of the coracoacromial ligament.
- Detachment of the pectoralis minor tendon.
- Osteotomy of the coracoid process.
- Preparation and decortication of the graft.
- Drilling of two parallel fixation holes.

### Subscapularis Split and Capsulotomy

- Horizontal split of the subscapularis tendon between the superior two-thirds and inferior one-third.
- Vertical capsulotomy at the anteroinferior glenoid.

### Preparation of Glenoid

- Exposure of the anterior glenoid neck.

- Removal of fibrous tissue and damaged labrum.
- Decortication of the anterior glenoid surface.

### Bone Block Fixation

- Positioning of the coracoid graft flush with the anteroinferior glenoid rim.
- Fixation using two AO malleolar screws placed bicortically.
- Care taken to avoid lateral overhang of the graft.

### Closure

- Repair of the remnant coracoacromial ligament to the capsule.
- Layer-wise wound closure.
- Sterile dressing applied.

### Postoperative Rehabilitation

Postoperative management was standardized for all patients.

- Shoulder immobilization using a universal shoulder immobilizer for 2–3 weeks.
- Passive range-of-motion exercises initiated after pain control.
- Active-assisted and active exercises commenced gradually.
- Progressive muscle strengthening exercises initiated after adequate healing.
- Return to occupational activities and sports permitted according to functional recovery.

### Follow-up Protocol

Patients were reviewed at the following intervals:

- Preoperative baseline
- 6 weeks
- 3 months
- 6 months
- 12 months

At every follow-up visit, patients underwent:

- Clinical examination
- Assessment of shoulder range of motion
- Functional outcome assessment
- Radiographic evaluation when indicated
- Documentation of complications

### Outcome Measures

#### Primary Outcome

Functional outcome was assessed using the Modified University of California Los Angeles (UCLA) Shoulder Score, a 35-point scoring system comprising:

- Pain (10 points)
- Function (10 points)
- Active forward flexion (5 points)
- Strength of forward flexion (5 points)
- Patient satisfaction (5 points)

The scores were interpreted as:

| Modified UCLA Score | Functional Outcome |
|---------------------|--------------------|
| 34–35               | Excellent          |
| 28–33               | Good               |
| 21–27               | Fair               |
| ≤20                 | Poor               |

### Secondary Outcomes

The following postoperative outcomes were evaluated:

- Range of motion
- Recurrent shoulder instability
- Shoulder redislocation
- Infection
- Hematoma
- Neurological complications
- Hardware-related complications
- Graft-related complications
- Overall patient satisfaction

### Data Collection

Data were recorded using a structured case record form that included:

- Demographic characteristics
- Clinical findings
- Imaging findings
- Operative details
- Functional scores
- Postoperative complications
- Follow-up observations

### Statistical Analysis

Data were entered into Microsoft Excel and analyzed using IBM SPSS Statistics version 26.0 (IBM Corp., Armonk, NY, USA).

Continuous variables were expressed as mean  $\pm$  standard deviation (SD) or median with interquartile range (IQR) depending on data distribution. Categorical variables were presented as frequency and percentage.

Preoperative and postoperative functional outcomes were compared using the paired t-test for normally distributed continuous variables or the Wilcoxon signed-rank test for non-parametric data. Categorical variables were analyzed using the Chi-square test or Fisher's exact test whenever appropriate. A p-value  $<0.05$  was considered statistically significant.

### Ethical Approval

The study protocol was reviewed and approved by the Institutional Ethics Committee (IEC) of Surat Municipal Institute of Medical Education and Research (SMIMER), Surat, Gujarat.

The study was conducted in accordance with the Declaration of Helsinki (2013 revision).

### Informed Consent

Written informed consent was obtained from all participants before enrollment in the study.

Confidentiality and anonymity of all participants were maintained throughout the study.

This observational study did not require prospective clinical trial registration according to institutional policy.

## Clinical Trial Registration

### RESULTS AND OBSERVATIONS;

A total of 30 patients with recurrent anterior shoulder instability underwent the Latarjet procedure during the study period. The demographic characteristics, clinical profile, operative details, functional outcomes, and postoperative complications are presented below.

**Table 1. Demographic Characteristics of the Study Population (n=30)**

| Variable                 | Number | Percentage (%) |
|--------------------------|--------|----------------|
| <b>Gender</b>            |        |                |
| Male                     | 27     | 90.0           |
| Female                   | 3      | 10.0           |
| <b>Age Group (years)</b> |        |                |
| <25                      | 7      | 23.3           |
| 25–30                    | 13     | 43.3           |
| 31–35                    | 4      | 13.3           |
| >35                      | 6      | 20.0           |

Observation: The study population was predominantly male (90%). The majority of patients (43.3%) belonged to the 25–30 years age group.

**Table 2. Occupation and Mechanism of Injury (n=30)**

| Variable                   | Number | Percentage (%) |
|----------------------------|--------|----------------|
| <b>Occupation</b>          |        |                |
| Labour                     | 16     | 53.3           |
| Athlete                    | 10     | 33.3           |
| Heavy weight lifter        | 3      | 10.0           |
| Gymnast                    | 1      | 3.3            |
| <b>Mechanism of Injury</b> |        |                |
| Trauma                     | 25     | 83.3           |
| Heavy overhead work        | 5      | 16.7           |

Observation: More than half of the patients were labourers (53.3%). Trauma was the most common mechanism of injury (83.3%).

**Table 3. Preoperative Clinical Characteristics and Operative Details (n=30)**

| Variable                         | Number (%) |
|----------------------------------|------------|
| <b>Preoperative Dislocations</b> |            |
| >5 episodes                      | 26 (86.7)  |
| <5 episodes                      | 4 (13.3)   |
| <b>Operative Time</b>            |            |
| 90 minutes                       | 12 (40.0)  |
| 100–110 minutes                  | 12 (40.0)  |
| 120–130 minutes                  | 6 (20.0)   |
| <b>Estimated Blood Loss</b>      |            |
| 60–70 mL                         | 13 (43.3)  |
| 70–80 mL                         | 17 (56.7)  |

Mean operative time: 102.3 ± 12.1 minutes

Mean blood loss: 70 ± 6.5 mL

Observation: Most patients (86.7%) had experienced more than five episodes of shoulder dislocation before surgery. The average operative time was approximately 102 minutes with minimal blood loss.

**Table 4. Modified UCLA Shoulder Score Components During Follow-up**

| Follow-up | Pain | Function | Forward Flexion | Strength | Satisfaction |
|-----------|------|----------|-----------------|----------|--------------|
| 6 weeks   | 4.33 | 5.33     | 3.87            | 4.73     | 4.80         |
| 3 months  | 6.87 | 7.47     | 4.77            | 4.73     | 4.93         |

|                  |      |      |      |      |      |
|------------------|------|------|------|------|------|
| <b>6 months</b>  | 9.33 | 9.07 | 4.97 | 4.93 | 5.00 |
| <b>12 months</b> | 9.67 | 9.43 | 5.00 | 5.00 | 5.00 |

Observation: Progressive improvement was observed in all components of the Modified UCLA score throughout follow-up, with near-normal values achieved at 12 months.

**Table 5. Functional Outcome According to Modified UCLA Score**

| Follow-up        | Fair      | Good       | Excellent  |
|------------------|-----------|------------|------------|
| <b>6 weeks</b>   | 30 (100%) | 0          | 0          |
| <b>3 months</b>  | 0         | 30 (100%)  | 0          |
| <b>6 months</b>  | 0         | 19 (63.3%) | 11 (36.7%) |
| <b>12 months</b> | 0         | 8 (26.7%)  | 22 (73.3%) |

Observation: Functional recovery improved steadily over time. At final follow-up, 73.3% of patients achieved an excellent outcome and the remaining 26.7% had good outcomes.

**Table 6. Radiological Findings and Glenoid Bone Loss (n=30)**

| Variable                         | Number | Percentage (%) |
|----------------------------------|--------|----------------|
| <b>Glenoid Bone Loss</b>         |        |                |
| <15%                             | 2      | 6.7            |
| 15–20%                           | 15     | 50.0           |
| >20%                             | 13     | 43.3           |
| <b>Plain Radiograph Findings</b> |        |                |
| No bony abnormality              | 19     | 63.3           |
| Bony Bankart lesion              | 11     | 36.7           |

Observation: Half of the patients demonstrated 15–20% glenoid bone loss on CT scan. Plain radiographs were normal in most patients, emphasizing the importance of advanced imaging.

**Table 7. Surgical Characteristics and Recovery (n=30)**

| Variable                             | Number | Percentage (%) |
|--------------------------------------|--------|----------------|
| <b>Incision Length</b>               |        |                |
| 6 cm                                 | 9      | 30.0           |
| 7 cm                                 | 2      | 6.7            |
| 8 cm                                 | 12     | 40.0           |
| 9 cm                                 | 7      | 23.3           |
| <b>Return to Pre-injury Activity</b> |        |                |
| Full return                          | 23     | 76.7           |
| Partial return                       | 7      | 23.3           |
| No return                            | 0      | 0              |

Observation: An 8-cm incision was most commonly used. More than three-fourths of patients returned fully to their pre-injury activity level by one year.

**Table 8. Complications and Final Outcome (n=30)**

| Variable                   | Number | Percentage (%) |
|----------------------------|--------|----------------|
| No complication            | 29     | 96.7           |
| Axillary nerve neuropraxia | 1      | 3.3            |
| Recurrent instability      | 0      | 0              |
| Patient satisfied          | 30     | 100            |

Observation: Only one patient developed transient axillary nerve neuropraxia. No recurrent instability was observed, and all patients reported satisfaction with the surgical outcome.

**Table 9. Association Between Occupation and Return to Activity**

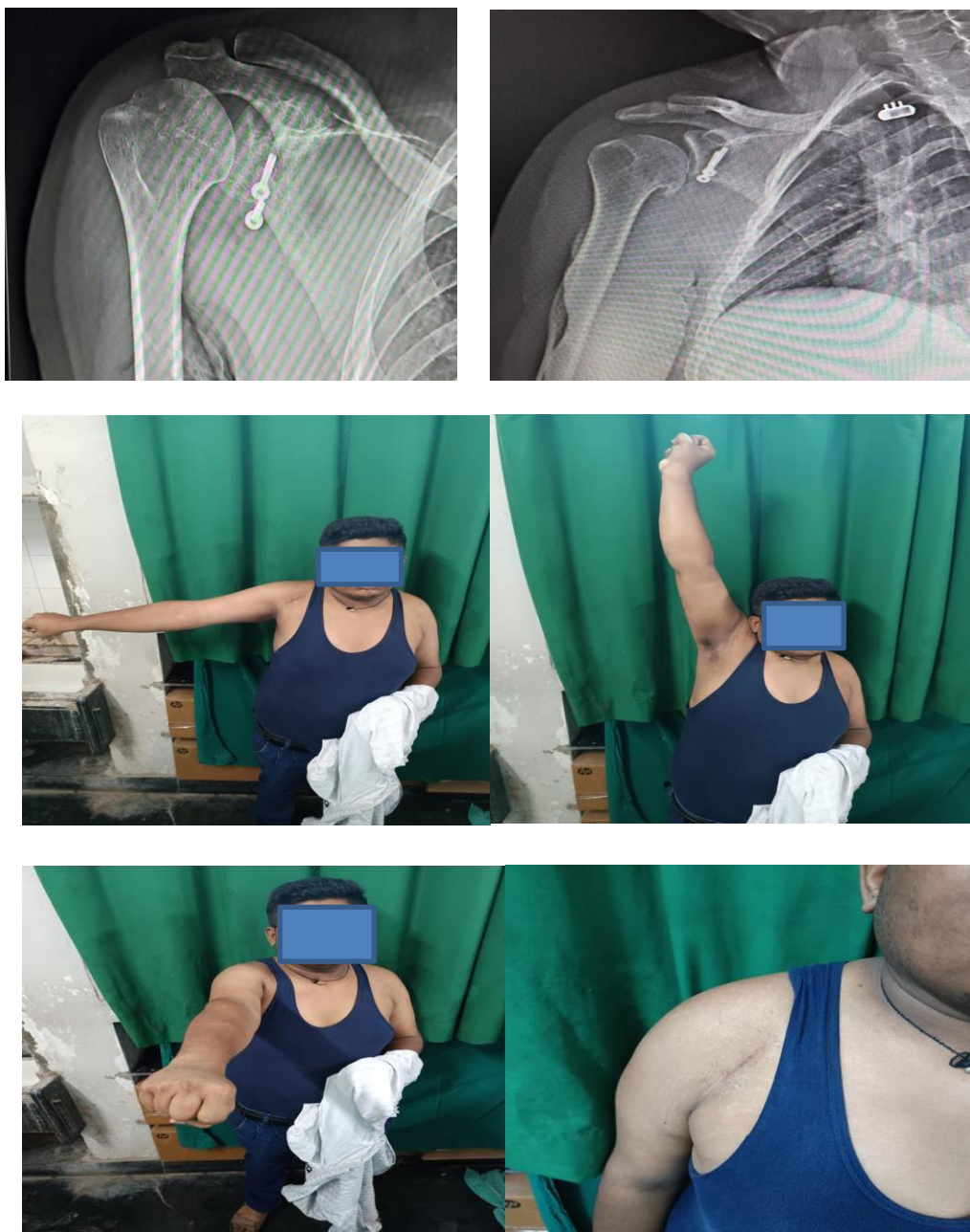
| Occupation          | Full Return | Partial Return | Total |
|---------------------|-------------|----------------|-------|
| Labour              | 11          | 5              | 16    |
| Athlete             | 9           | 1              | 10    |
| Heavy weight lifter | 3           | 0              | 3     |
| Gymnast             | 0           | 1              | 1     |

Observation: Full return to activity was achieved by 90% of athletes and all heavy weight lifters, whereas five labourers and one gymnast achieved only partial return.

**Table 10. Clinical Correlation Between Preoperative Factors and Final Outcome**

| Variable                                           | Excellent | Good       | Total    |
|----------------------------------------------------|-----------|------------|----------|
| <b>Mechanism of Injury</b>                         |           |            |          |
| <b>Trauma</b>                                      | 18        | 7          | 25       |
| <b>Heavy overhead work</b>                         | 4         | 1          | 5        |
| <b>Number of Dislocations vs Glenoid Bone Loss</b> |           |            |          |
| <b>&gt;5 dislocations</b>                          | <15%: 1   | 15–20%: 14 | >20%: 11 |
| <b>&lt;5 dislocations</b>                          | <15%: 1   | 15–20%: 1  | >20%: 2  |

Observation: Excellent functional outcomes were achieved irrespective of the mechanism of injury. Patients with more than five dislocations were more likely to have greater glenoid bone loss.



## DISCUSSION

Recurrent anterior shoulder instability remains one of the most challenging conditions encountered in orthopedic practice because repeated dislocations progressively damage both soft tissues and osseous stabilizers of the glenohumeral joint. The Latarjet procedure has become the preferred treatment for patients with significant glenoid bone loss owing to its

ability to restore stability through both static and dynamic mechanisms. The present prospective study evaluated the functional outcomes of the Latarjet procedure in 30 adult patients and demonstrated excellent clinical improvement, high patient satisfaction, low complication rates, and absence of recurrent instability during one-year follow-up.

The study population predominantly consisted of young adult males (90%), with the majority belonging to the 25–30-year age group. This demographic profile is consistent with previous reports indicating that recurrent anterior shoulder instability is considerably more common among young men because of greater participation in contact sports, manual labor, and high-energy trauma. Robinson et al. similarly reported that recurrence is highest among young active males following traumatic shoulder dislocation. [11]

Trauma was identified as the principal mechanism of injury in 83.3% of patients, while labourers constituted more than half of the study population. These findings reflect the high incidence of shoulder instability among individuals performing physically demanding activities. Similar occupational and sports-related injury patterns have been documented by Burkhart and De Beer, who emphasized the association between repetitive overhead activity, traumatic instability, and progressive glenoid bone loss. [12]

A notable finding of the present study was that 86.7% of patients had experienced more than five previous dislocation episodes before surgery. Repeated instability episodes contribute to cumulative glenoid bone erosion, enlargement of Hill-Sachs lesions, capsular stretching, and eventual failure of isolated soft tissue repair. Consistent with this observation, our radiological assessment demonstrated that nearly half of the patients had 15–20% glenoid bone loss, while 43.3% exhibited bone loss exceeding 20%. Itoi et al. demonstrated that glenoid defects greater than approximately 20–25% significantly compromise shoulder stability and markedly increase failure rates following Bankart repair. [13]

Progressive improvement in shoulder function was observed throughout follow-up. The Modified UCLA Shoulder Score demonstrated steady improvement in pain relief, function, active forward flexion, muscle strength, and patient satisfaction from six weeks to twelve months. At final follow-up, 73.3% of patients achieved excellent outcomes, while the remaining patients achieved good results. These findings closely resemble those reported by Hurley et al., whose systematic review demonstrated consistently excellent functional outcomes and high patient satisfaction following the Latarjet procedure. [14]

No recurrent instability or redislocation occurred during the follow-up period. This excellent stability likely reflects the triple-blocking mechanism of the Latarjet procedure, which combines restoration of glenoid bone stock with the dynamic sling effect of the conjoint tendon and capsular reinforcement. Long-term studies by Hovelius et al. have similarly demonstrated recurrence rates below 5% after open Latarjet, confirming its durability in managing recurrent anterior instability. [15]

Radiological evaluation highlighted the importance of advanced imaging. While plain radiographs were normal in many patients, three-dimensional CT

accurately quantified glenoid bone loss and guided surgical decision-making. Modern orthopedic practice strongly recommends CT-based assessment because conventional radiographs frequently underestimate osseous defects. MRI further facilitates evaluation of associated soft tissue injuries including Bankart lesions, Hill-Sachs defects, and rotator cuff pathology, thereby enabling comprehensive preoperative planning.

More than three-fourths of patients returned completely to their pre-injury occupational or sporting activities within one year, indicating successful restoration of shoulder stability and function. Athletes demonstrated particularly favorable recovery, consistent with previous studies reporting return-to-sport rates exceeding 80–90% following the Latarjet procedure. Restoration of confidence in shoulder stability represents an important determinant of successful return to high-demand activities.

The operative characteristics observed in the present study were also satisfactory. Mean operative time was approximately 102 minutes, while estimated blood loss remained minimal at approximately 70 mL. These findings compare favorably with published literature describing the open Latarjet as a technically demanding but reproducible procedure with acceptable operative duration and limited intraoperative blood loss when performed by experienced surgeons.

Postoperative complications were uncommon. Only one patient developed transient axillary nerve neuropraxia, which resolved without permanent neurological deficit, and no graft-related complications, infections, hardware failure, or recurrent instability were encountered. Neurovascular injury remains one of the recognized complications of the Latarjet procedure because of the proximity of the musculocutaneous and axillary nerves; however, meticulous surgical technique substantially reduces this risk. Recent meta-analyses have similarly reported low complication rates in experienced centers.

The principal strengths of the present study include its prospective design, standardized surgical technique, structured rehabilitation protocol, objective functional assessment using the Modified UCLA Shoulder Score, and comprehensive clinical and radiological follow-up. Nevertheless, certain limitations should be acknowledged. The sample size was relatively small, follow-up duration was limited to one year, and there was no comparison group undergoing alternative stabilization procedures such as arthroscopic Bankart repair. Longer-term randomized comparative studies are required to evaluate graft remodeling, development of osteoarthritis, and sustained functional outcomes.

Overall, the findings of the present study support the growing body of evidence that the Latarjet procedure provides reliable restoration of shoulder stability, excellent functional recovery, high patient satisfaction, and a very low recurrence rate in adults with recurrent anterior shoulder instability associated with glenoid

bone loss. Careful patient selection, accurate preoperative assessment of bone loss, meticulous surgical execution, and structured rehabilitation remain essential for achieving optimal long-term outcomes.

### Strengths of the Study

- The study employed a **prospective observational design**, minimizing recall bias and enabling systematic follow-up.
- A **standardized open Latarjet surgical technique** and uniform postoperative rehabilitation protocol were used for all participants, ensuring consistency in treatment.
- Functional outcomes were assessed using the **Modified University of California Los Angeles (UCLA) Shoulder Score**, a validated and widely accepted assessment tool.
- Comprehensive preoperative evaluation included **clinical examination, radiography, three-dimensional computed tomography (3D-CT), and magnetic resonance imaging (MRI)**, allowing accurate assessment of glenoid bone loss and associated lesions.
- Clinical, radiological, and functional outcomes were evaluated over a **12-month follow-up period**, providing reliable short-term outcome data.
- The study demonstrated **excellent functional recovery, absence of recurrent instability, high patient satisfaction, and a low complication rate**, supporting the effectiveness of the Latarjet procedure in adults with recurrent anterior shoulder dislocation.

### Limitations of the Study

The present study has several limitations that should be considered while interpreting the findings. First, the study was conducted at a **single tertiary care center**, which may limit the generalizability of the results to other healthcare settings and populations. Second, the **sample size was relatively small (n = 30)**, which may have reduced the statistical power to detect less common complications or subgroup differences. Third, the **follow-up period was limited to 12 months**, preventing assessment of long-term outcomes such as graft remodeling, hardware-related complications, development of glenohumeral osteoarthritis, and recurrent instability beyond one year. Fourth, the study employed a **prospective observational design without a control or comparison group**, making it difficult to directly compare the outcomes of the Latarjet procedure with alternative surgical techniques such as arthroscopic Bankart repair or remplissage. Finally, all surgeries were performed at a single institution using a standardized surgical technique; therefore, the findings may not fully reflect outcomes achieved in different clinical settings or by surgeons with varying levels of experience. Further multicenter

studies with larger sample sizes, longer follow-up, and comparative designs are recommended to validate these findings and establish long-term efficacy and safety.

### CONCLUSION

The present study demonstrated that the Latarjet procedure is a safe and effective surgical treatment for recurrent anterior shoulder dislocation associated with significant glenoid bone loss in adults. The procedure resulted in progressive improvement in pain relief, shoulder function, range of motion, muscle strength, and patient satisfaction, with 73.3% of patients achieving excellent and 26.7% achieving good functional outcomes at one-year follow-up. No cases of recurrent instability or redislocation were observed, and postoperative complications were minimal, with only one transient axillary nerve neuropraxia. Most patients successfully returned to their pre-injury level of activity, highlighting the procedure's ability to restore shoulder stability and function. Overall, the Latarjet procedure provides reliable clinical outcomes with a high success rate and should be considered the treatment of choice for patients with recurrent anterior shoulder instability associated with significant glenoid bone loss.

### Funding

The authors received no external funding for this study.

### Conflict of Interest

The authors declare that they have no competing interests.

### Author Contributions

Dr. Soham Gohil contributed to the study conceptualization, data collection, patient follow-up, data interpretation, and preparation of the manuscript. Dr. Janak Rathod supervised the study, contributed to the study design, critically reviewed the manuscript, and provided overall guidance. Dr. Prabhav Tijoriwala participated in the study methodology, data analysis, interpretation of results, and manuscript editing. Dr. Jay Rathod assisted in literature review, data collection, and manuscript revision. Dr. Pratik Rakholiya contributed to patient data collection, follow-up assessments, and data management. All authors read, critically revised, and approved the final version of the manuscript and agreed to be accountable for all aspects of the work.

### Data Availability

The datasets generated and analyzed during the current study are available from the corresponding author upon reasonable request.

## Acknowledgements

The authors thank the Department of Orthopaedics, SMIMER, Surat, and all study participants for their cooperation.

## Abbreviations

| Abbreviation | Full Form                                                   |
|--------------|-------------------------------------------------------------|
| AP           | Anteroposterior                                             |
| CT           | Computed Tomography                                         |
| 3D-CT        | Three-Dimensional Computed Tomography                       |
| MRI          | Magnetic Resonance Imaging                                  |
| UCLA         | University of California, Los Angeles                       |
| MRC          | Medical Research Council                                    |
| ROM          | Range of Motion                                             |
| IEC          | Institutional Ethics Committee                              |
| SD           | Standard Deviation                                          |
| IQR          | Interquartile Range                                         |
| SPSS         | Statistical Package for the Social Sciences                 |
| CI           | Confidence Interval                                         |
| AO           | Arbeitsgemeinschaft für Osteosynthesefragen (AO Foundation) |
| CTRI         | Clinical Trials Registry-India (if applicable)              |

## REFERENCES

1. Hovelius L, Rahme H. Primary anterior shoulder dislocation: long-term prognosis. *Scand J Med Sci Sports*. 2016;26(5):495–501.
2. Zacchilli MA, Owens BD. Epidemiology of shoulder dislocations. *J Bone Joint Surg Am*. 2010;92(3):542–549.
3. Sugaya H, Moriishi J, Dohi M, et al. Glenoid rim morphology in recurrent anterior instability. *J Bone Joint Surg Am*. 2003;85:878–884.
4. Itoi E, Yamamoto N, Kurokawa D, Sano H. Bone loss in anterior shoulder instability. *Curr Rev Musculoskelet Med*. 2013;6:88–94.
5. Burkhart SS, De Beer JF. Traumatic glenoid bone defects and failure of arthroscopic Bankart repair. *Arthroscopy*. 2000;16(7):677–694.
6. Latarjet M. Treatment of recurrent dislocation of the shoulder. *Lyon Chir*. 1954;49:994–997.
7. Shah AA, Butler RB, Romanowski J, et al. Short-term complications of the Latarjet procedure. *J Bone Joint Surg Am*. 2012;94:495–501.
8. Griesser MJ, Harris JD, McCoy BW, et al. Complications and reoperations after Bristow-Latarjet procedures: a systematic review. *J Shoulder Elbow Surg*. 2013;22:286–292.
9. An VV, Sivakumar BS, Phan K, Trantalis J. A systematic review and meta-analysis of clinical and patient-reported outcomes following the Latarjet procedure. *Sports Med Arthrosc Rev*. 2016;24:1–9.
10. Hurley ET, Matache BA, Wong I, et al. Outcomes of the Latarjet procedure for anterior shoulder instability: systematic review. *Am J Sports Med*. 2020;48(9):2317–2323.
11. Robinson CM, Dobson RJ. Anterior instability of the shoulder after trauma. *J Bone Joint Surg Br*. 2004;86:469–479.
12. Burkhart SS, De Beer JF. Traumatic glenoid bone defects in recurrent shoulder instability. *Arthroscopy*. 2000;16(7):677–694.
13. Itoi E, Lee SB, Berglund LJ, et al. Quantitative assessment of glenoid bone loss. *J Bone Joint Surg Am*. 2000;82:35–46.
14. Hurley ET, Fat DL, Farrington SK, et al. Clinical outcomes following the Latarjet procedure: a systematic review. *Am J Sports Med*. 2020;48:2317–2323.
15. Hovelius L, Sandström B, Olofsson A, et al. The Latarjet procedure for recurrent anterior shoulder instability: long-term follow-up. *J Shoulder Elbow Surg*. 2011;20:1095–1101.