ISSN: 0975-3583,0976-2833 VOL 16, ISSUE 4, 2025

OUTCOMES OF ARTHROSCOPIC STABILIZATION IN ANTERIOR SHOULDER INSTABILITY: A CLINICAL STUDY

Dr. K.C.Mathew [1] , Dr. Sukaash AJ [2]

1. Professor and HOD, Department of Orthopeadics,Sree Mookambika Institute of Medical Sciences College Kanyakumari, Tamil Nadu, India.

2. Junior Resident, Department of Orthopeadics,Sree Mookambika Institute of Medical Sciences College Kanyakumari, Tamil Nadu, India.

Corresponding Author: Dr. Sukaash AJ,Junior Resident , Department of Orthopeadics,Sree Mookambika Institute of Medical Sciences College Kanyakumari, Tamil Nadu, India.

Abstract

Background Anterior shoulder instability is a common condition, particularly among young and active individuals, often resulting from traumatic dislocations where the humeral head displaces anteriorly from the glenoid cavity. This instability not only affects shoulder function but also increases the risk of recurrent dislocations, long-term joint damage, and functional impairment. The shoulder's extensive range of motion comes at the cost of decreased intrinsic stability, making it susceptible to instability following traumatic events.

Materials and methods: This prospective observational study was conducted at a tertiary medical college and hospital, involving 40 patients diagnosed with recurrent anterior shoulder instability. Patients were enrolled based on specific inclusion and exclusion criteria to ensure a homogeneous study population. The inclusion criteria consisted of individuals aged 19 to 50 years with a history of recurrent shoulder dislocation,

Results: A total of 40 patients with recurrent anterior shoulder instability were included in the study, all of whom underwent arthroscopic Bankart repair. Among them, 22 patients had engaging Hill-Sachs lesions and subsequently received an additional remplissage procedure. The mean age of the participants was 28.6 years (range: 19-50 years), with 32 males and 8 females. The mean follow-up period was six months.

Conclusion: Arthroscopic Bankart repair, with or without remplissage, is an effective surgical approach for managing recurrent anterior shoulder instability. Our study demonstrated significant improvements in functional outcomes, high patient satisfaction, and a low recurrence rate, particularly in patients who underwent the combined procedure. While remplissage resulted in a slight reduction in external rotation, this did not significantly impact overall function or return to activity.

Introduction

ISSN: 0975-3583,0976-2833 VOL 16, ISSUE 4, 2025

Anterior shoulder instability is a common condition, particularly among young and active individuals, often resulting from traumatic dislocations where the humeral head displaces anteriorly from the glenoid cavity.(1) This instability not only affects shoulder function but also increases the risk of recurrent dislocations, long-term joint damage, and functional impairment. The shoulder's extensive range of motion comes at the cost of decreased intrinsic stability, making it susceptible to instability following traumatic events. The most frequently associated lesions in anterior shoulder instability include Bankart and Hill-Sachs lesions.(2,3) A Bankart lesion involves detachment of the anteroinferior labrum from the glenoid rim, weakening the static stabilizers of the shoulder.(4) Meanwhile, a Hill-Sachs lesion is a compression fracture of the posterolateral humeral head occurring when it impacts the glenoid during dislocation.(5) Engaging Hill-Sachs lesions, which interact with the glenoid during shoulder movements, significantly contribute to recurrent instability.

Surgical intervention is often necessary to restore stability and function, particularly in cases of recurrent dislocations. Arthroscopic Bankart repair is the gold standard for treating anterior shoulder instability as it restores the integrity of the capsulolabral complex through a minimally invasive approach.(6) In patients with engaging Hill-Sachs lesions, an additional remplissage procedure is performed to convert the intra-articular defect into an extra-articular one by tenodesis of the infraspinatus tendon and posterior capsule, preventing engagement with the glenoid and reducing the risk of redislocation.(7) Studies have shown that arthroscopic Bankart repair significantly improves functional outcomes and facilitates a high rate of return to sports.(8) A systematic review indicated that while this procedure provides excellent long-term functional results, recurrent instability remains a concern, particularly in high-demand athletes. However, the risk of redislocation and revision surgery is significantly reduced when Bankart repair is combined with remplissage in patients with significant humeral head defects.

The remplissage procedure has been introduced to enhance the effectiveness of Bankart repair in cases where Hill-Sachs lesions contribute to instability. Clinical studies have demonstrated that this combined approach reduces the incidence of recurrent instability compared to isolated Bankart repair.(9) Furthermore, patients who undergo remplissage report high satisfaction rates

ISSN: 0975-3583,0976-2833 VOL 16, ISSUE 4, 2025

and improved functional outcomes in long-term follow-ups, with only a minimal loss of external rotation. Comparative studies between arthroscopic and open Bankart repairs suggest that both techniques yield favourable results; however, the arthroscopic repair is often preferred due to its minimally invasive nature, reduced morbidity, and comparable efficacy. In cases of anterior shoulder instability with subcritical glenoid bone loss, a combined arthroscopic Bankart repair with remplissage has shown similar recurrence rates and functional outcomes as the Latarjet procedure, making it a viable alternative to more invasive surgeries.(10)

The evolving approach to arthroscopic management of anterior shoulder instability highlights the significance of patient-specific surgical strategies. While Bankart repair remains highly effective for restoring shoulder stability, the addition of remplissage provides a critical advantage in cases with engaging Hill-Sachs lesions. Studies emphasize the importance of proper surgical techniques, including adequate capsulolabral elevation and optimal suture anchor placement, in achieving successful outcomes. As research advances, the refinement of arthroscopic techniques continues to enhance patient recovery, reduce recurrence rates, and improve long-term functional outcomes, making it a preferred approach in the management of anterior shoulder instability.

Methods

This prospective observational study was conducted at a tertiary medical college and hospital, involving 40 patients diagnosed with recurrent anterior shoulder instability. Patients were enrolled based on specific inclusion and exclusion criteria to ensure a homogeneous study population. The inclusion criteria consisted of individuals aged 19 to 50 years with a history of recurrent shoulder dislocation, confirmed Bankart lesions or Bankart with Hill-Sachs lesions on magnetic resonance imaging (MRI), and those who consented to undergo arthroscopic Bankart repair with or without remplissage. Exclusion criteria included patients with significant glenoid bone loss (>20%), previous shoulder surgeries, concomitant rotator cuff tears, multidirectional instability, or neuromuscular disorders affecting shoulder function.

ISSN: 0975-3583,0976-2833 VOL 16, ISSUE 4, 2025

All patients underwent a detailed preoperative evaluation, including a comprehensive clinical history, physical examination, and radiological assessment. Functional scoring was conducted using the American Shoulder and Elbow Surgeons (ASES) score, the Quick Disabilities of the Arm, Shoulder, and Hand (DASH) score, and the ROWE score to establish baseline shoulder function. Standard radiographs and MRI scans of the shoulder were obtained to evaluate glenoid and humeral head bone defects and to classify the lesions. The decision to perform remplissage in addition to Bankart repair was based on the presence of engaging Hill-Sachs lesions on dynamic arthroscopic assessment.

Surgical procedures were performed under general anesthesia with the patient in the lateral decubitus position. Standard posterior, anterior, and anterolateral arthroscopic portals were established. Diagnostic arthroscopy was initially performed to assess the extent of the labral tear, glenoid bone loss, and humeral head defects. In cases without significant Hill-Sachs engagement, isolated Bankart repair was performed using suture anchors placed at the anteroinferior glenoid rim to reattach the capsulolabral complex. For patients with engaging Hill-Sachs lesions, an additional remplissage procedure was carried out, wherein the infraspinatus tendon and posterior capsule were anchored into the defect using two suture anchors, converting the intra-articular lesion into an extra-articular one.

Postoperatively, patients were immobilized in an abduction sling for four weeks, followed by a structured rehabilitation program. Passive range of motion (ROM) exercises were initiated at two weeks, with active-assisted ROM allowed at four weeks. Strengthening exercises commenced at six weeks, and full return to sports and overhead activities was permitted at approximately six months, depending on individual recovery and functional assessment.

Clinical and functional outcomes were assessed at three and six months postoperatively using the ASES, Quick DASH, and ROWE scores. Postoperative radiographs were obtained to evaluate implant positioning and ensure healing. Complications, including redislocation, persistent pain, stiffness, or implant failure, were documented. Statistical analysis was

ISSN: 0975-3583,0976-2833 VOL 16, ISSUE 4, 2025

performed using appropriate tests to compare preoperative and postoperative scores, with significance set at $p<0.05$.

Results

A total of 40 patients with recurrent anterior shoulder instability were included in the study, all of whom underwent arthroscopic Bankart repair. Among them, 22 patients had engaging Hill-Sachs lesions and subsequently received an additional remplissage procedure. The mean age of the participants was 28.6 years (range: 19-50 years), with 32 males and 8 females. The mean follow-up period was six months.

Demographic and Baseline Characteristics

Table 1 summarizes the demographic and baseline characteristics of the study population. The majority of the patients (65%) were involved in contact sports or physically demanding occupations. The most common mechanism of initial injury was a traumatic dislocation due to sports (55%), followed by accidental falls (25%) and motor vehicle accidents (20%).

Table 1: Baseline Characteristics of Study Participants

Characteristic	**Bankart Repair (n=18)**	**Bankart + Remplissage (n=22)**	**Total (n=40)**
Mean Age (years)	27.8 ± 6.4	29.3 ± 7.1	28.6 ± 6.8
Male/Female Ratio	15/3	17/5	32/8
Dominant Shoulder Affected (%)	60%	68%	65%
Mechanism of Injury			
- Sports	10 (56%)	12 (55%)	22 (55%)

ISSN: 0975-3583,0976-2833 VOL 16, ISSUE 4, 2025

- Fall	5 (28%)	5 (23%)	10 (25%)
- Motor Vehicle Accident	3 (16%)	5 (22%)	8 (20%)

Functional Outcomes

Postoperative functional scores significantly improved in both groups compared to their preoperative scores. The mean ASES, Quick DASH, and ROWE scores improved notably at three months and six months. Patients who underwent additional remplissage had slightly lower external rotation but showed no significant difference in overall functional outcomes compared to those who had only Bankart repair.

Table 2: Functional Outcome Scores (Preoperative vs. Postoperative)

Outcome Score	Preoperative	3 Months Post-op	6 Months Post-op	p-value (Pre-op vs. 6 Months)
ASES Score	45.2 ± 8.1	72.8 ± 9.3	86.5 ± 6.7	<0.001
Quick DASH Score	52.3 ± 7.8	28.5 ± 5.9	14.8 ± 4.2	<0.001
ROWE Score	34.6 ± 6.5	68.2 ± 7.6	91.4 ± 5.8	<0.001

Range of Motion and External Rotation Limitation

External rotation was slightly reduced in patients who underwent remplissage, but the difference was not clinically significant. Forward flexion, abduction, and internal rotation showed similar improvements across both groups.

Table 3: Postoperative Range of Motion (Degrees)

ISSN: 0975-3583,0976-2833 VOL 16, ISSUE 4, 2025

Motion	Bankart Repair	Bankart + Remplissage	p-value
Forward Flexion	165° ± 8.5°	162° ± 9.2°	0.28
Abduction	160° ± 7.9°	157° ± 8.4°	0.31
External Rotation @ 90° Abduction	90° ± 5.2°	86.6° ± 6.1°	0.04
Internal Rotation	T8 level	T9 level	

Complications and Recurrence

There was only one case (2.5%) of recurrent instability at six months, occurring in a patient who underwent Bankart repair alone. No redislocations were observed in the remplissage group. No patients developed significant stiffness or required reoperation.

Table 4: Complications and Recurrence Rates

Complication	Bankart Repair (n=18)	Bankart + Remplissage (n=22)	Total (n=40)
Redislocation (%)	1 (5.6%)	0 (0%)	1 (2.5%)
Persistent Pain (%)	2 (11%)	3 (14%)	5 (12.5%)
External Rotation Limitation (%)	0 (0%)	4 (18%)	4 (10%)
Infection (%)	0 (0%)	0 (0%)	0 (0%)

Discussion

Arthroscopic management of anterior shoulder instability has evolved significantly, with procedures like the Bankart repair and the addition of the remplissage technique gaining

ISSN: 0975-3583,0976-2833 VOL 16, ISSUE 4, 2025

prominence. These surgical interventions aim to restore shoulder stability, prevent recurrence, and optimize functional outcomes for patients with recurrent anterior shoulder instability.

The Bankart repair focuses on reattaching the detached anterior-inferior labrum to the glenoid rim, thereby restoring the capsulolabral complex's integrity. This procedure addresses the primary lesion responsible for recurrent instability. However, in cases where a Hill-Sachs lesion—a compression fracture of the posterolateral humeral head—engages with the glenoid, the risk of recurrence increases. To mitigate this, the remplissage technique is employed, converting the intra-articular Hill-Sachs defect into an extra-articular lesion by tenodesing the infraspinatus tendon and posterior capsule into the defect. This combined approach aims to enhance shoulder stability, particularly in patients with engaging Hill-Sachs lesions.

Our study evaluated 40 patients with recurrent anterior shoulder instability, all undergoing arthroscopic Bankart repair. Among them, 22 patients with engaging Hill-Sachs lesions received an additional remplissage procedure. The primary outcomes assessed included functional scores—American Shoulder and Elbow Surgeons (ASES) score, Quick Disabilities of the Arm, Shoulder, and Hand (DASH) score, and ROWE score—range of motion (ROM), recurrence rates, and patient satisfaction.

Postoperative assessments at three and six months demonstrated significant improvements in functional scores across both groups. Patients reported enhanced shoulder function and a return to pre-injury activity levels. These findings align with existing literature, where studies have reported favorable outcomes following arthroscopic Bankart repair with or without remplissage. For instance, a meta-analysis by Ahmed et al. highlighted that the addition of remplissage to Bankart repair resulted in a lower recurrence rate compared to Bankart repair alone.(11)

Regarding ROM, our study observed a slight reduction in external rotation in patients who underwent the remplissage procedure compared to those with only Bankart repair. Specifically, the mean external rotation was 86.6° in the remplissage group versus 90° in the Bankart-only group. This minor decrease aligns with findings from other studies, which have reported similar reductions in external rotation post-remplissage. However, this slight limitation did not significantly impact overall shoulder function or patient satisfaction. A study by Cho et al.

ISSN: 0975-3583,0976-2833 VOL 16, ISSUE 4, 2025

reported that while there was a minor loss of external rotation in patients undergoing remplissage, it did not adversely affect functional outcomes or return to sport.(12)

The recurrence rate in our cohort was notably low, with only one patient (2.5%) experiencing postoperative instability. This patient belonged to the Bankart-only group, suggesting that the addition of remplissage may contribute to reducing recurrence rates in patients with engaging Hill-Sachs lesions. Patient satisfaction in our study was high, with the majority expressing contentment with their surgical outcomes. The significant improvements in functional scores and the low recurrence rates likely contributed to this positive perception.

Our study's findings reinforce the efficacy of arthroscopic Bankart repair, with or without remplissage, in managing recurrent anterior shoulder instability. The addition of remplissage appears particularly beneficial for patients with engaging Hill-Sachs lesions, as it contributes to lower recurrence rates without significantly compromising shoulder function. However, it is essential to consider each patient's unique pathology and functional demands when deciding on the surgical approach. Further research with larger sample sizes and longer follow-up periods would be valuable in substantiating these findings and refining patient selection criteria.

Conclusion

Arthroscopic Bankart repair, with or without remplissage, is an effective surgical approach for managing recurrent anterior shoulder instability. Our study demonstrated significant improvements in functional outcomes, high patient satisfaction, and a low recurrence rate, particularly in patients who underwent the combined procedure. While remplissage resulted in a slight reduction in external rotation, this did not significantly impact overall function or return to activity. These findings reinforce the importance of addressing both labral and bony defects to optimize stability and minimize the risk of redislocation.

Recommendations

Based on our findings, we recommend that arthroscopic Bankart repair be considered the first-line surgical approach for patients with recurrent anterior instability, with remplissage reserved

ISSN: 0975-3583,0976-2833 VOL 16, ISSUE 4, 2025

for those with engaging Hill-Sachs lesions to reduce recurrence risk. Proper preoperative assessment, including MRI and arthroscopic evaluation, is crucial in determining the necessity of remplissage. Additionally, rehabilitation protocols should be tailored to balance stability and mobility, particularly in athletes requiring a high range of motion. Future studies with larger cohorts and longer follow-up periods are warranted to further refine surgical indications and optimize patient outcomes.

References:

1. Zhang M, Yang Z, Zhang B, Liu T, Yun X. Treatment of anterior shoulder instability: a bibliometric analysis. J Orthop Surg Res [Internet]. 2022 Dec 1 [cited 2025 Mar 18];17(1):1–11. Available from: https://josr-online.biomedcentral.com/articles/10.1186/s13018-022-02913-z

2. Di Giacomo G, De Vita A. Anterior Shoulder Instability. Orthop Trauma [Internet]. 2024 [cited 2025 Mar 18];1103–16. Available from: https://link.springer.com/chapter/10.1007/978-3-031-30518-4_88

3. Dumont GD, Russell RD, Robertson WJ. Anterior shoulder instability: A review of pathoanatomy, diagnosis and treatment. Curr Rev Musculoskelet Med [Internet]. 2011 Dec 2 [cited 2025 Mar 18];4(4):200–7. Available from: https://link.springer.com/article/10.1007/s12178-011-9092-9

4. Spiegl UJA, Ryf C, Hepp P, Rillmann P. Evaluation of a treatment algorithm for acute traumatic osseous Bankart lesions resulting from first time dislocation of the shoulder with a two year follow-up. BMC Musculoskelet Disord [Internet]. 2013 Oct 25 [cited 2025 Mar 18];14(1):1–8. Available from: https://bmcmusculoskeletdisord.biomedcentral.com/articles/10.1186/1471-2474-14-305

5. Provencher MT, Frank RM, LeClere LE, Metzger PD, Ryu JJ, Bernhardson LTA, et al. The Hill-Sachs lesion: Diagnosis, classification, and management. Journal of the American Academy of Orthopaedic Surgeons. 2012 Apr;20(4):242–52.

6. Panzram B, Kentar Y, Maier M, Bruckner T, Hetto P, Zeifang F. Mid-Term to long-Term results of primary arthroscopic Bankart repair for traumatic anterior shoulder instability: A retrospective study. BMC Musculoskelet Disord [Internet]. 2020 Mar 27 [cited 2025 Mar 18];21(1):1–10. Available from: https://bmcmusculoskeletdisord.biomedcentral.com/articles/10.1186/s12891-020-03223-3

ISSN: 0975-3583,0976-2833 VOL 16, ISSUE 4, 2025

7. Freshman R, Lurie B, Garcia G, Liu J. Understanding the Remplissage: History, Biomechanics, Outcomes, and Current Indications. Current Reviews in Musculoskeletal Medicine [Internet]. 2024 Jul 1 [cited 2025 Mar 18];17(7):282–91. Available from: https://link.springer.com/article/10.1007/s12178-024-09900-3

8. Akhtar M, Saeed A, Baig O, Asim M, Tokhi I, Aamer S. Arthroscopic Bankart repair using a single anterior working portal technique: a systematic review and meta-analysis. Int Orthop [Internet]. 2024 Oct 1 [cited 2025 Mar 18];48(10):2709–18. Available from: https://link.springer.com/article/10.1007/s00264-024-06291-5

9. Randelli PS, Compagnoni R, Radaelli S, Gallazzi MB, Tassi A, Menon A. Arthroscopic remplissage is safe and effective: clinical and magnetic resonance results at a minimum 3 years of follow-up. Journal of Orthopaedics and Traumatology [Internet]. 2022 Dec 1 [cited 2025 Mar 18];23(1):1–10. Available from: https://jorthoptraumatol.springeropen.com/articles/10.1186/s10195-021-00624-5

10. Li L, Zeng B, Ding M, Wan S, Lin K, Tian Z. Latarjet procedure versus iliac crest autograft transfer for anterior shoulder instability: a systematic review and meta-analysis of comparative studies. J Orthop Surg Res [Internet]. 2025 Dec 1 [cited 2025 Mar 18];20(1):1–14. Available from: https://josr-online.biomedcentral.com/articles/10.1186/s13018-024-05425-0

11. Ahmed AF, Polisetty TS, Wang C, Halayqeh S, Sharma S, Miller AS, et al. Higher return to sport and lower revision rates when performing arthroscopic Bankart repair with remplissage for anterior shoulder instability with a Hill-Sachs lesion: a meta-analysis. J Shoulder Elbow Surg [Internet]. 2024 Aug 1 [cited 2025 Mar 18];33(8):1836–46. Available from: https://pubmed.ncbi.nlm.nih.gov/38499236/

12. Neoral P, Obhlídal M, Ml D, … RKAC, 2022 undefined. Arthroscopic Bankart Repair with Remplissage for Anterior Instability: Functional Outcomes, Risk of Failure. europepmc.orgP Neoral, M Obhlídal, DR Ml, R Kalina, K Langová, J GalloActa Chirurgiae Orthopaedicae et Traumatologiae Cechoslovaca, 2022•europepmc.org [Internet]. [cited 2025 Mar 18]; Available from: https://europepmc.org/article/med/36594687