Journal of Advanced Scientific Research

Available online through https://sciensage.info

ISSN

0976-9595

Research Article

A Study Comparing Shoulder Primary Adhesive Capsulitis Treatment with Arthroscopic Capsular Release, Subacromial Decompression, Rotator Interval Release and Manipulation Under General Anesthesia

Manish Kumar Saw[1], Anjan Maji[2], Samarth[1], Benu Gopal Das[1], Mohit Kumar[3*]

[1]MGM Medical College, Kishanganj, Bihar, India

[2]Senior Resident, Department of Orthopaedics, Santiniketan Medical College and Hospital, Bolpur, West Bengal, India

[3]Senior Resident, Department of Orthopaedics, SLC Medical College and SPNM Hospital, Khagaria, Bihar, India.

*Corresponding author: Mohitkumar08070@gmail.com

Received: 10-05-2026; Accepted: 26-05-2026; Published: 30-05-2026

© *Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License*

https://doi.org/10.55218/JASR.2026170517

ABSTRACT

Background: Primary adhesive capsulitis is a painful and disabling condition of the shoulder characterized by progressive restriction of both active and passive movements. Common operative options include manipulation under general anesthesia and arthroscopic capsular release, often combined with subacromial decompression and rotator interval release.

Aim: To compare the clinical and functional outcomes of arthroscopic capsular release with subacromial decompression, rotator interval release and manipulation under general anesthesia versus manipulation under general anesthesia alone in patients with primary adhesive capsulitis.

Methodology: This prospective comparative study included 40 adult patients with refractory primary adhesive capsulitis. Patients were allocated into two groups: Group A underwent arthroscopic capsular release with subacromial decompression, rotator interval release and MUA, while Group B underwent MUA alone. Patients were followed for a minimum of six months. Pain was assessed using the Visual Analog Scale, shoulder range of motion was measured clinically, and functional outcomes were evaluated using the Constant–Murley score.

Results: Both groups showed significant postoperative improvement. However, group A demonstrated significantly greater pain relief, improved range of motion in all planes, and higher Constant–Murley scores compared to group B ($p < 0.05$). Excellent to good functional outcomes were observed in 85% of group A patients versus 50% in group B. Complication rates were low and comparable between groups.

Conclusion: Arthroscopic capsular release combined with subacromial decompression, rotator interval release, and MUA provides superior functional outcomes compared to MUA alone in refractory primary adhesive capsulitis, with acceptable safety and reliability.

Keywords: Adhesive capsulitis, Arthroscopy, Shoulder joint, Manipulation, Orthopedic, Range of motion.

INTRODUCTION

Adhesive capsulitis of the shoulder, commonly known as frozen shoulder, is a painful and debilitating condition characterized by progressive stiffness and marked loss of both active and passive range of motion (ROM) of the glenohumeral joint [1]. The condition typically evolves through stages of painful freezing, stiff frozen, and a thawing phase, with symptoms lasting up to 2 years or more in certain patients [2]. While conservative management, including physiotherapy, analgesics, intra-articular corticosteroid injections, and hydrodilatation, remains the mainstay for early and mild cases, a significant subset of patients with refractory primary adhesive capsulitis do not achieve satisfactory relief or functional restoration despite optimal conservative care [3,4]. For these patients, surgical intervention such as arthroscopic capsular release, often combined with manipulation under general anesthesia (MUA), has evolved as a viable strategy to expedite recovery of motion and reduce pain [5]. Two principal surgical approaches widely described in current literature include arthroscopic capsular release (ACR) and manipulation under anesthesia (MUA). ACR allows direct visualization and controlled release of the contracted joint capsule and pathological structures such as the rotator interval and coracohumeral ligament, which may be resistant to nonoperative therapy [6-8]. Moreover, adjunct procedures such as subacromial decompression and rotator interval release have been employed to address concomitant pathology and enhance postoperative outcomes [9]. Conversely, MUA aims to mechanically break intra-articular adhesions by applying controlled force under anesthesia, facilitating immediate improvement in ROM but carrying potential risks such as soft-tissue injury or iatrogenic fracture if performed without capsular release [10,11]. Systematic reviews and meta-analyses indicate that while both ACR and MUA improve pain and ROM, evidence remains insufficient to definitively recommend one method over the other, and combined techniques may offer synergistic benefits [12,13].

Despite the wealth of global studies on operative management of refractory frozen shoulder, there is a notable lack of region-specific evidence from eastern India, particularly from Bihar. The state's tertiary care centers, including premier referral institutions, encounter a large and geographically diverse patient population due to limited shoulder specialty services in peripheral districts. Many patients present late, with prolonged immobilization, comorbid metabolic diseases (e.g., diabetes mellitus), or delayed rehabilitation, factors known to influence disease severity and surgical outcomes [14,15]. Moreover, cultural and socioeconomic barriers often lead to delayed care-seeking and poor compliance with prolonged physiotherapy protocols, resulting in persistent disability and compromised quality of life.

Given these unique demographic and health-system factors, there is a critical need to evaluate the comparative effectiveness of combined arthroscopic capsular release with subacromial decompression, rotator interval release and manipulation under general anesthesia for primary adhesive capsulitis in the Bihar population. Such evidence can inform locally relevant treatment algorithms, optimize resource utilization in tertiary referral settings, and cater to the distinct rehabilitative challenges experienced by patients in this region.

Therefore, the aim of this prospective comparative study is to assess and compare clinical, functional, and patient-reported outcomes following combined arthroscopic surgery with MUA versus MUA alone in adults with primary adhesive capsulitis unresponsive to conservative therapy.

MATERIALS AND METHODS

This prospective comparative study was conducted in the Department of Orthopedics at Medical College and Hospital in Bihar, India from. to , which serves as a major referral center for shoulder disorders and complex orthopedic conditions. The institution receives patients from urban Patna as well as rural and semi-urban districts of Bihar and adjoining states, many of whom present with advanced stages of adhesive capsulitis due to delayed diagnosis, inadequate physiotherapy facilities, and limited access to specialist care. The high patient volume and availability of advanced arthroscopic facilities make this center an appropriate setting for evaluating surgical interventions for refractory primary adhesive capsulitis.

The study was designed as a prospective, randomized, hospital-based comparative study conducted over a period of 6 months for patient recruitment, with a minimum follow-up duration of 01 year for each patient. Adult patients diagnosed with primary adhesive capsulitis unresponsive to conservative management for at least 3 months were enrolled and randomly allocated into two treatment groups:

Group A: Arthroscopic capsular release with subacromial decompression, rotator interval release, and manipulation under general anesthesia

Group B: Manipulation under general anesthesia alone

Approval was obtained from the Institutional Ethics Committee prior to initiation of the study. Written informed consent was obtained from all participants.

A total of 40 patients were included in the study, with 20 patients in each group. Patients were randomly selected from those reporting to the Orthopedic Outpatient Department (OPD) during the study period and fulfilling the eligibility criteria.

The sample size was determined based on feasibility, time constraints, and comparison with similar published studies. Simple random sampling was employed using a computer-generated random number table to allocate patients into the two groups, thereby minimizing selection bias.

Patients were included in the study based on the following criteria: Age between 30 and 70 years. Diagnosis of primary adhesive capsulitis based on clinical and radiological evaluation. Restriction of both active and passive shoulder movements in at least two planes. Symptoms persist for more than 3 months despite conservative treatment. Normal shoulder radiographs excluding secondary causes. Patients willing to undergo surgical intervention and follow-up. Patients provide written informed consent.

Patients were excluded if they had Secondary adhesive capsulitis (post-traumatic, post-surgical, or due to arthritis). Rotator cuff tear confirmed by MRI. Glenohumeral arthritis or calcific tendinitis. Shoulder instability or previous shoulder surgery. Neurological disorders affecting the upper limb. Active infection around the shoulder. Uncontrolled diabetes mellitus or other systemic illness contraindicates surgery. Inability to comply with postoperative physiotherapy. Refusal to participate in the study.

Preoperative Evaluation

All patients underwent a thorough clinical examination, including assessment of pain using the visual analog scale (VAS). Range of motion (ROM) in flexion, abduction, external rotation, and internal rotation. Functional outcome using the Constant–Murley score and DASH score. Routine investigations and imaging included plain radiographs (AP and axillary views) and MRI, where required to rule out secondary causes.

Surgical Techniques

All surgeries were performed under general anesthesia with the patient in the beach-chair position.

Group A (Arthroscopic + MUA Group)

Standard posterior, anterior, and lateral arthroscopic portals were used. The procedure included: Rotator interval release, anterior and inferior capsular release, posterior capsular release (if needed), and subacromial decompression. Gentle manipulation under anesthesia to complete capsular release and restore motion. Care was taken to avoid iatrogenic injury to the axillary nerve and surrounding structures.

Group B (MUA Alone Group)

Patients underwent controlled manipulation under general anesthesia following Codman's sequence: Forward elevation, external rotation, abduction and internal rotation. No arthroscopic visualization was performed in this group.

All patients received identical postoperative rehabilitation protocols: Passive ROM exercises initiated within 24 hours. Active-assisted exercises after 1 week. Active ROM by 3 weeks. Strengthening exercises after 6 weeks. Analgesics and anti-inflammatory medications were prescribed as required.

Patients were followed at: 2 weeks, 6 weeks, 3 months and 6 months.

Table 1: Baseline characteristics of study population

Parameter	Group A (n=20)	Group B (n=20)	p-value
Mean age (years)	51.8 ± 8.2	53.0 ± 9.0	0.64
Male/Female	12/8	11/9	0.75
Right/Left side	13/7	11/9	0.51
Diabetic patients	8 (40%)	7 (35%)	0.74
Mean duration of symptoms (months)	5.2 ± 1.4	5.5 ± 1.6	0.58

Table 2: Comparison of VAS scores

Time	Group A	Group B	p-value
Preoperative	7.6 ± 0.9	7.4 ± 1.0	0.58
6 months	1.4 ± 0.6	2.6 ± 0.8	<0.001

Table 3: Comparison of shoulder rom at 6 months

ROM (degrees)	Group A	Group B	p-value
Forward flexion	158 ± 12	136 ± 15	<0.001
Abduction	150 ± 14	128 ± 16	<0.001
External rotation	52 ± 8	38 ± 7	<0.001
Internal rotation (vertebral level)	T9	T12	—

Table 4: Functional outcome based on Constant–Murley score

Outcome Category	Group A (n=20)	Group B (n=20)
Excellent (>85)	9 (45%)	3 (15%)
Good (70–85)	8 (40%)	7 (35%)
Fair (55–69)	3 (15%)	7 (35%)
Poor (<55)	0 (0%)	3 (15%)

At each visit, pain (VAS), ROM, Constant–Murley score, and DASH score were recorded. Complications such as fracture, dislocation, nerve injury, or persistent stiffness were documented.

Data were entered into Microsoft Excel and analyzed using SPSS. Continuous variables were expressed as mean ± standard deviation (SD). Categorical variables were expressed as frequencies and percentages. An independent t-test was used to compare continuous variables between groups. A paired t-test was used to compare pre- and postoperative values within each group. Chi-square test was applied for categorical variables. A *p-value* of <0.05 was considered statistically significant.

RESULTS

A total of 40 patients diagnosed with primary adhesive capsulitis were included in this prospective comparative study. Patients were randomly allocated into two equal groups: Group A (Arthroscopic release + MUA, n = 20) and Group B (MUA alone, n = 20). All patients completed a minimum follow-up of 6 months and were available for final analysis.

The age of patients ranged from 34 to 69 years, with a mean age of 52.4 ± 8.6 years. There were 23 males (57.5%) and 17 females (42.5%). The right shoulder was affected in 24 patients (60%) and the left in 16 patients (40%). Diabetes mellitus was present in 15 patients (37.5%). Table 1 presents the baseline demographic and clinical characteristics of patients in both groups [Table 1].

Both groups were comparable in terms of age, sex, laterality, comorbidities, and symptom duration, ensuring valid comparison of outcomes.

Pain Reduction (VAS Score): The mean preoperative VAS score was similar in both groups (Group A: 7.6 ± 0.9, Group B: 7.4 ± 1.0). At final follow-up, Group A demonstrated significantly greater pain reduction compared to Group B [Table 2].

Patients undergoing arthroscopic release with MUA experienced significantly better pain relief than those treated with MUA alone.

Range of Motion Improvement: Range of motion improved in both groups, but Group A showed superior gains in all planes at final follow-up.

The arthroscopic group achieved significantly greater shoulder mobility, particularly in forward flexion, abduction, and external rotation [Table 3].

Functional Outcome (Constant–Murley Score): Both groups demonstrated functional improvement, but Group A achieved higher Constant–Murley scores [Table 4].

A significantly higher proportion of patients in Group A achieved excellent to good outcomes compared to Group B, demonstrating the functional superiority of combined arthroscopic release with MUA.

Minor complications were observed in both groups. Group A had two cases of transient postoperative pain and one case of superficial portal site infection, which resolved with antibiotics. Group B had three cases of persistent stiffness and one case of humeral head microfracture detected on postoperative radiograph. No neurovascular injuries or dislocations were reported.

DISCUSSION

Primary adhesive capsulitis is a common and disabling shoulder disorder characterized by progressive pain and restriction of both active and passive motion. Although most cases resolve with conservative treatment, a subset of patients fails to respond and requires surgical intervention [1,2]. The present study compared outcomes of arthroscopic capsular release with subacromial decompression, rotator interval release and manipulation under general anesthesia (Group A) with manipulation under anesthesia alone (Group B) in patients with refractory primary adhesive

capsulitis. The findings demonstrate that while both modalities significantly improved pain and function, combined arthroscopic intervention with MUA produced superior results in terms of pain relief, range of motion, and functional recovery.

In our study, Group A demonstrated significantly greater pain reduction at six months compared to Group B. This is consistent with previous reports showing that arthroscopic capsular release allows targeted division of the contracted capsule and rotator interval, thereby addressing the primary pathological substrate responsible for pain and stiffness [3,4]. MUA alone relies on blind rupture of adhesions, which may leave residual capsular tightness or cause microtrauma leading to postoperative inflammation and persistent pain [5]. The superior pain relief in Group A can therefore be attributed to controlled and complete capsular release under direct visualization.

Functional outcome measured using the Constant–Murley score was significantly better in the arthroscopic group, with a higher proportion of excellent and good results. Similar observations were reported by Mohanty *et al*. [6], who found that patients undergoing arthroscopic capsular release had better early functional recovery and satisfaction compared to those treated with MUA alone. Arthroscopy allows not only capsular release but also treatment of associated intra-articular pathology such as synovitis or subacromial impingement, which may otherwise contribute to persistent dysfunction.

Improvement in shoulder range of motion was observed in both groups; however, Group A achieved significantly greater gains in forward flexion, abduction, and external rotation. This finding is in agreement with the work of Cvetanovich *et al*. [7], who demonstrated that 360-degree capsular release provides more uniform restoration of glenohumeral biomechanics than isolated manipulation. The inclusion of rotator interval release and subacromial decompression in Group A may further contribute to improved mobility by reducing extra-articular and subacromial resistance to motion [8].

In contrast, MUA alone, while effective in breaking adhesions, carries the risk of incomplete release or excessive force causing capsular tears at non-physiological sites, which may not restore normal kinematics optimally [5].

The complication rate in our study was low and acceptable in both groups. Minor complications such as transient pain and superficial infection in Group A and persistent stiffness or microfracture in Group B were comparable to those reported in contemporary literature [6,9]. Importantly, no major complications such as dislocation, nerve injury, or full-thickness fractures were observed.

Several studies have raised concerns regarding the safety of MUA alone, particularly in elderly or osteoporotic patients, due to risks of humeral fractures and rotator cuff tears [5,9]. The controlled nature of arthroscopic release, combined with gentle manipulation, as employed in Group A, likely reduces these risks by minimizing the force required to restore motion.

A substantial proportion of patients in this study were diabetic, reflecting the known association between adhesive capsulitis and metabolic disorders [10]. Although diabetic patients tend to have more resistant disease and slower recovery, the arthroscopic group still demonstrated better outcomes, supporting the role of surgical release even in metabolically compromised individuals.

Late presentation, poor access to physiotherapy, and prolonged symptom duration are common in Bihar and similar regions, making early spontaneous resolution less likely. In such populations, definitive surgical intervention may be justified earlier once conservative therapy fails, particularly when functional demands are high.

As a tertiary referral center in Bihar, our institution caters to patients from remote and resource-limited settings, where prolonged conservative management may not be feasible or effective. The results of this study provide region-specific evidence supporting the use of arthroscopic capsular release combined with MUA as a reliable option for refractory adhesive capsulitis in such settings. This has important implications for treatment algorithms in eastern India, where delayed presentation and poor physiotherapy compliance are common.

CONCLUSION

Arthroscopic capsular release with subacromial decompression, rotator interval release, and manipulation under anesthesia provides superior pain relief, range of motion, and functional recovery compared to manipulation alone in refractory primary adhesive capsulitis, with acceptable complication rates and reliable clinical outcomes.

REFERENCES

1. Neviaser AS, Hannafin JA. Adhesive capsulitis: a review of current treatment. Am J Sports Med. 2010; 38 (11) :2346-56.
2. Li D, St Angelo JM, Taqi M. Adhesive Capsulitis (Frozen Shoulder) [Updated 2025 Mar 28]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK532955/
3. Akash A, Agrawal NK, Kumar A. A cohort study comparing shoulder primary adhesive capsulitis treatment with arthroscopic capsular release, subacromial decompression, rotator interval release and manipulation under general anesthesia. *Student's Journal of Health Research Africa*, 2024; *5*(9), 7.
4. Fernandes MR. Adhesive capsulitis: current concepts. Musculoskelet Surg. 2025 : 17
5. Mohanty A, Mohanty A. Comparative Efficacy of Manipulation Under Anaesthesia Versus Arthroscopic Capsular Release in Primary Frozen Shoulder: A Prospective Randomized Study. J Orthop Case Rep. 2025; 15 (11) :414-421.
6. Yoo JC, Koh KH, Shon MS, Bae KH, Lim TK. Clinical Outcome after Arthroscopic Capsular Release for Adhesive Capsulitis of the Shoulder. Clin Shoulder Elb. 2018; 21 (3) : 127-133.
7. Sundararajan SR, Dsouza T, Rajagopalakrishnan R, Bt P, Arumugam P, Rajasekaran S. Arthroscopic capsular release versus manipulation under anaesthesia for treating frozen shoulder - a prospective randomised study. Int Orthop. 2022;46(11):2593-2601.
8. Cvetanovich GL, Leroux T, Hamamoto JT, Higgins JD, Romeo AA, Verma NN. Arthroscopic 360° Capsular Release for Adhesive Capsulitis in the Lateral Decubitus Position. Arthrosc Tech. 2016; 5(5):e1033-e1038.
9. Zeng W, Jin Z, Li H, Zhou L, Tan Y, Chai S, Lü Q, Wei H and Tang G (2026) Short-term clinical efficacy of five-step manipulation under anaesthesia combined with arthroscopic shoulder surgery for adhesive capsulitis. Front. Surg.2025; 12: 1724309.
10. Kraal T, Beimers L, The B, Sierevelt I, van den Bekerom M, Eygendaal D. Manipulation under anaesthesia for frozen shoulders: outdated technique or well-established quick fix? EFORT Open Rev. 2019; 4(3) :98-109.

11. Vikranth PS, Shravani G, Reddy PS, Deepak J, Varenya NV. Management of adhesive capsulitis of shoulder joint with arthroscopic release vs. manipulation under anaesthesia: a comparative study. Int J Res Orthop 2024; 10 :85-90.
12. Grant JA, Schroeder N, Miller BS, Carpenter JE. Comparison of manipulation and arthroscopic capsular release for adhesive capsulitis: a systematic review. J Shoulder Elbow Surg. 2013; 22(8) :1135-45.
13. Ramirez J. Adhesive Capsulitis: Diagnosis and Management. Am Fam Physician. 2019; 99 (5) :297-300.
14. Sarasua SM, Floyd S, Bridges WC, Pill SG. The epidemiology and etiology of adhesive capsulitis in the U.S. Medicare population. BMC Musculoskelet Disord. 2021; 22 (1) :828.
15. Sahu M, Ilias M, Pandey R, Saxena S, Saad T, Mishra N. Prevalence of Frozen Shoulder among Diabetes Patients: A Cross-Sectional Study at a Tertiary Care Center. J Pharm Bioallied Sci. 2024 Dec;16(Suppl 4): S3601-S3603.

HOW TO CITE THIS ARTICLE: Saw MK, Maji A, Samarth, Das BG, Kumar M. A Study Comparing Shoulder Primary Adhesive Capsulitis Treatment with Arthroscopic Capsular Release, Subacromial Decompression, Rotator Interval Release and Manipulation Under General Anesthesia. *J Adv Sci Res*. 2026;17(5): 81-85 **DOI:** 10.55218/JASR.2026170517