

FUNCTIONAL OUTCOME OF ARTHROSCOPIC ROTATOR CUFF TENDON TEAR OF SHOULDER JOINT: A PROSPECTIVE OBSERVATIONAL STUDY FROM A TERTIARY CARE CENTRE IN NORTHEAST INDIA.

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Abstract

Introduction: Rotator cuff tears are a major cause of shoulder pain, weakness, and functional limitation. Arthroscopic rotator cuff repair has become the preferred surgical approach because of its minimally invasive nature and ability to address associated intra-articular pathology. However, outcome data from Indian tertiary care centres remain limited.

Objective: To evaluate the functional outcomes and complications following arthroscopic repair of rotator cuff tendon tears.

Methodology: A prospective observational study was conducted in the Department of Orthopaedics, Silchar Medical College and Hospital, Assam. Thirty-six patients aged 18-60 years with clinically and MRI-confirmed rotator cuff tears who had failed conservative treatment underwent arthroscopic repair using suture anchors. Functional outcomes were assessed preoperatively and post operatively using the Visual Analogue Scale(VAS), QuickDASH, American Shoulder and Elbow Surgeons (ASES) score, Modified UCLA score, and Constant-Murley score. Patients were followed for 12 weeks after surgery.

Results: Arthroscopic repair resulted in significant improvement in pain, shoulder function, and range of motion. Progressive improvement was observed across all functional scores during follow-up. Most patients achieved good to excellent functional outcomes by 12 weeks. Complications were infrequent and were managed conservatively without compromising overall recovery.

Conclusion: Arthroscopic rotator cuff repair provides effective pain relief, improved shoulder mobility, and satisfactory short-term functional outcomes. The minimally invasive approach combined with structured rehabilitation supports early return to daily activities and represents a reliable treatment option for symptomatic rotator cuff tears.

Keywords: Arthroscopic Rotator Cuff Repair, Rotator Cuff Tear, Shoulder Arthroscopy, Functional Outcome, ASES Score, Constant-Murley Score, QuickDASH, Visual Analogue Score

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INTRODUCTION:

Rotator cuff tears (RCTs) are among the most common causes of chronic shoulder pain and dysfunction, accounting for a substantial proportion of shoulder-related outpatient consultations. The prevalence of RCTs increases with advancing age, reaching over 30% in individuals older than 60 years and more than 50% in those over 80 years. Although many tears remain asymptomatic, symptomatic lesions frequently result in pain, weakness, reduced range of motion, impaired quality of life, and loss of occupational productivity [1]. The pathogenesis of rotator cuff

tears is multifactorial, involving intrinsic tendon degeneration, age-related changes, repetitive microtrauma, vascular insufficiency, and extrinsic mechanical impingement. Systemic factors such as diabetes mellitus, smoking, obesity, and hyperlipidaemia further impair tendon healing and increase susceptibility to tendon degeneration. Chronic tears are often associated with tendon retraction, muscle atrophy, and fatty infiltration, all of which adversely affect reparability and postoperative functional recovery [2 - 4]. Accurate diagnosis requires careful correlation of clinical examination with imaging findings. While history and special clinical tests provide important

diagnostic clues, magnetic resonance imaging (MRI) remains the reference standard for evaluating tear size, tendon quality, retraction, muscle atrophy, and associated intra-articular pathology. These factors are critical in surgical planning and prognostication. Management depends on patient age, functional demand, symptom severity, tear characteristics, and response to conservative treatment. Initial treatment typically consists of activity modification, analgesics, physiotherapy, and selected subacromial corticosteroid injections. Although many patients with partial-thickness or degenerative tears experience symptomatic improvement with non-operative management, persistent pain, progressive weakness, traumatic tears, and failure of structured rehabilitation often necessitate surgical repair [5]. Advances in arthroscopic techniques have fundamentally changed the surgical management of rotator cuff pathology. Compared with conventional open or mini-open repair, arthroscopic repair offers superior visualisation of both glenohumeral and subacromial structures while minimising soft tissue disruption. The technique facilitates simultaneous management of associated lesions involving the biceps tendon, labrum, and subacromial space through a minimally invasive approach. Additional advantages include reduced postoperative pain, improved cosmetic outcomes, shorter hospital stay, earlier rehabilitation, and lower rates of deltoid morbidity [6]. Several validated patient-reported outcome measures—including the American Shoulder and Elbow Surgeons (ASES) score, Constant–Murley score, University of California Los Angeles (UCLA) score, Quick Disabilities of the Arm, Shoulder and Hand (QuickDASH), and Visual Analogue Scale (VAS)—have consistently demonstrated significant improvements following arthroscopic repair [7]. Nevertheless, postoperative outcomes are influenced by multiple factors including patient age, tear size, chronicity, tendon quality, muscle fatty infiltration, medical comorbidities, surgical technique, and compliance with rehabilitation protocols [8]. Despite improvements in surgical instrumentation and fixation methods, tendon re-tear and incomplete structural healing remain important challenges, particularly in large and chronic tears. Most published evidence regarding arthroscopic rotator cuff repair originates from high-income countries with advanced arthroscopic infrastructure and established rehabilitation programmes. Comparable prospective data from Indian tertiary care institutions remain relatively limited, particularly from Northeast India, where differences in healthcare access, patient demographics, occupational demands, and rehabilitation compliance may influence postoperative outcomes. Regional outcome data are therefore essential to

determine whether internationally reported results are reproducible within the Indian healthcare setting. The present prospective observational study was undertaken to evaluate the short-term functional outcomes of arthroscopic rotator cuff repair performed at a tertiary care teaching hospital in Northeast India. Functional recovery was assessed using validated clinical outcome measures, including VAS, ASES, Constant–Murley, UCLA, and QuickDASH scores. In addition, postoperative complications and early clinical outcomes were evaluated to determine the effectiveness and safety of arthroscopic repair in this patient population.

STUDY OBJECTIVE:

To evaluate pain relief, functional recovery, shoulder function, and early postoperative complications following arthroscopic repair of rotator cuff tears using validated clinical outcome measures in patients treated at a tertiary care centre.

MATERIALS AND METHODS:

Study Design: This prospective observational study was conducted in the Department of Orthopaedics, Silchar Medical College and Hospital, Assam, India, after obtaining approval from the Institutional Ethics Committee. The study was carried out over the approved study period, and all participants provided written informed consent before enrolment. The study adhered to the ethical principles outlined in the Declaration of Helsinki.

Study Population: Patients presenting with symptomatic rotator cuff tears who attended the outpatient department and subsequently underwent arthroscopic rotator cuff repair were screened for eligibility. A total of 36 consecutive patients fulfilling the inclusion criteria were enrolled.

Inclusion Criteria:

- Age between 18 and 60 years.
- Clinically suspected rotator cuff tear confirmed by MRI.
- Persistent shoulder pain and functional limitation despite an adequate trial of conservative treatment.
- Partial-thickness or full-thickness reparable rotator cuff tears.
- Willingness to undergo surgery and comply with the postoperative rehabilitation programme.

Exclusion Criteria:

- Irreparable massive rotator cuff tears.
- Advanced glenohumeral osteoarthritis.
- Previous surgery on the affected shoulder.
- Shoulder infection.

- Associated fractures around the shoulder.
- Neurological disorders affecting shoulder function.
- Patients unwilling or unable to complete follow-up.

Preoperative Evaluation: A detailed history was obtained, including age, sex, occupation, hand dominance, duration of symptoms, mechanism of injury, previous treatment, and associated medical comorbidities. Clinical examination included assessment of:

- Tenderness
- Active and passive range of motion
- Muscle strength
- Special tests for rotator cuff pathology
- Neurovascular status

Routine laboratory investigations were performed for anaesthetic fitness. Standard shoulder radiographs and MRI were obtained in all patients to determine tear morphology, tendon retraction, muscle quality, and associated intra-articular lesions (**Figure 1**).

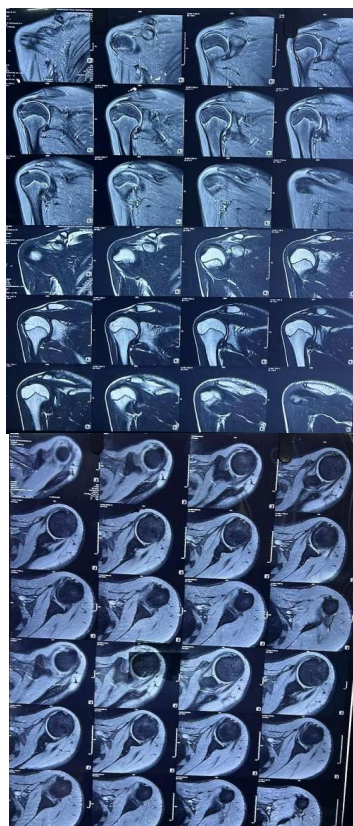


Figure 1: Pre-Operative MRI

Surgical Technique: All procedures were performed arthroscopically under general anaesthesia with an interscalene block. Patients

were positioned in Lateral Decubitus position (**Figure 3**).

A standard posterior portal was established for diagnostic glenohumeral arthroscopy (**Figure 2**). After systematic evaluation of the joint, additional anterior and lateral portals were created under direct visualisation.

Associated lesions involving the long head of the biceps tendon, labrum, or subacromial bursa were identified and managed as indicated.

Subacromial bursectomy was performed to improve visualisation. Where necessary, limited acromioplasty was undertaken in patients with significant mechanical impingement.

The torn rotator cuff tendon was carefully mobilised. The greater tuberosity footprint was prepared using an arthroscopic burr until punctate bleeding bone was visualised, thereby facilitating tendon-to-bone healing.

Repair was performed using suture anchors placed at the anatomical footprint. Sutures were sequentially passed through the tendon and securely tied to achieve anatomical reduction without undue tension (**Figure 4**). Stability of the repair was confirmed arthroscopically through passive shoulder motion before closure.

Portals were closed using interrupted sutures, sterile dressing was applied, and the arm was immobilised in an arm sling.



Figure 2 and Figure 3: Portals and Positioning of patient

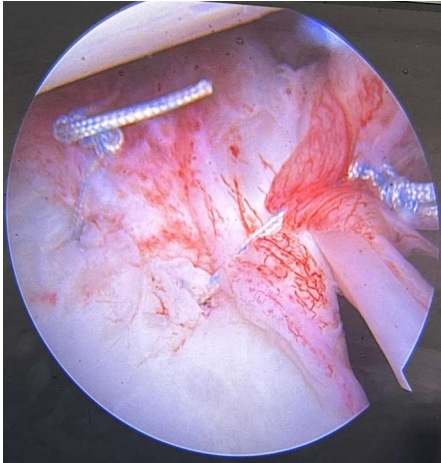


Figure 4: Intra-operative Figure

Postoperative Rehabilitation: A structured rehabilitation protocol was followed for all patients.

Phase I (0–3 weeks)

- Arm sling immobilisation
- Pendulum exercises
- Elbow, wrist, and hand mobilisation
- Pain control and oedema reduction

Phase II (3–6 weeks)

- Passive shoulder mobilisation
- Gradual assisted range-of-motion exercises
- Scapular stabilisation exercises

Phase III (6–12 weeks)

- Active range-of-motion exercises
- Progressive strengthening of the rotator cuff and periscapular muscles
- Functional rehabilitation

Patients were advised to avoid heavy lifting and overhead activities until adequate healing had occurred.

Outcome Measures: Patients were evaluated preoperatively and at scheduled postoperative follow-up visits.

Clinical outcomes were assessed using validated scoring systems:

- Visual Analogue Scale (VAS) for pain
- American Shoulder and Elbow Surgeons (ASES) score
- Constant–Murley Score
- Modified UCLA Shoulder Score

- Quick Disabilities of the Arm, Shoulder and Hand (QuickDASH)

Range of motion was measured using a standard goniometer, while postoperative complications such as stiffness, infection, repair failure, neurovascular injury, and persistent pain were documented.

Statistical Analysis: Data were entered into Microsoft Excel and analysed using SPSS version 25.0 (IBM Corp., USA). Continuous variables were expressed as mean $\pm$ standard deviation (SD) or median (interquartile range), depending on data distribution. Categorical variables were summarised as frequencies and percentages. Preoperative and postoperative functional scores were compared using the paired Student's t-test for normally distributed data or the Wilcoxon signed-rank test where appropriate. A two-sided p value of <0.05 was considered statistically significant.

Outcome Variables:

Primary Outcome

- Improvement in functional shoulder outcome following arthroscopic rotator cuff repair, assessed using validated scoring systems.

Secondary Outcomes

- Pain reduction
- Improvement in range of motion
- Postoperative complications
 - Early functional recovery





Figure 5: Post Operative Range of Motion (12 weeks)

RESULTS:

A total of 36 patients with symptomatic MRI-confirmed rotator cuff tears underwent arthroscopic rotator cuff repair and completed the scheduled 12-week follow-up. Functional outcomes, pain scores, range of motion, and postoperative complications were analysed.

Patient Characteristics: The study population comprised adults with rotator cuff tears requiring surgical intervention. Right shoulder involvement predominated, occurring in 24 patients (66.7%), while the left shoulder was affected in 12 patients (33.3%). Degenerative tears represented the most common mechanism of injury, followed by traumatic injuries, whereas sports-related injuries were least frequent. Diabetes mellitus was the commonest medical comorbidity, present in 27.8% of patients, followed by hypertension (22.2%) and dyslipidaemia (13.9%). Approximately one-quarter of patients had no documented comorbidity.

Tear Characteristics:

MRI demonstrated a spectrum of reparable tears:

Table 1: Degree of tear based on MRI

Type of Tear	Frequency (n)	Percent (%)
Medium Full Thickness (1-3 cm)	12	33.3
Partial Thickness (<50%)	6	16.7
Partial Thickness (>50%)	8	22.2
Small Full Thickness (<1 cm)	10	27.8
Total	36	100.0

Pre-Operative Functional Status:

Patients demonstrated substantial functional impairment before surgery. The mean preoperative scores were:

Table 2: Pre-operative Scoring

Outcome measure	Mean +/- SD
VAS Pain	6.89 +/- 2.15
QuickDASH	60.64 +/- 14.23
ASES	39.44 +/- 14.54
Constant-Murley	35.42 +/- 10.15

Post-Operative Functional Outcomes:

Significant improvements were observed across all validated outcome measures at the 12 week follow-up

Table 3: Post-Operative Scoring

Outcome measure	12 weeks follow-up
VAS Pain	Markedly reduced
QuickDASH	Markedly reduced
ASES	72.39 +/- 14.05
Constant-Murley	70.36 +/- 12.02

Both the ASES score and Constant-Murley Score improved indicating clinically meaningful early recovery following arthroscopic repair.

Functional Outcome Categories: By 12 weeks:

- **Excellent:** 14 patients (38.9%)
- **Good:** 16 patients (44.4%)
- **Fair:** 4 patients (11.1%)
- **Poor:** 2 patients (5.6%)

Overall, **83.3%** of patients achieved a **good** or **excellent** outcome following arthroscopic repair.

Pain as well as Range of Motion improved substantially after surgery.

Complications: The procedure demonstrated a favourable safety profile.

Table 4: Post-Operative Complications

Complication	Frequency (%)
None	26 (72.2)
Shoulder stiffness	4 (11.1)
Persistent pain	3 (8.3)
Superficial infection	2 (5.6)
MRI confirmed retear	1 (2.8)

No major neurovascular complications or procedure related mortality occurred. Most complications were managed conservatively without adversely affecting overall functional recovery.

DISCUSSION:

The present prospective observational study evaluated the short-term clinical and functional outcomes of arthroscopic rotator cuff repair in patients with symptomatic rotator cuff tears treated at a tertiary care teaching hospital in Northeast India. The principal findings of the study were that arthroscopic repair resulted in significant improvement in pain, shoulder function, and overall functional status within 12 weeks of

surgery. More than four-fifths of patients achieved good-to-excellent functional outcomes, while the incidence of complications remained low, supporting the effectiveness and safety of arthroscopic repair in appropriately selected patients. Rotator cuff tears are a leading cause of shoulder pain and disability, particularly among middle-aged and older adults. Progressive tendon degeneration, repetitive overhead activity, and traumatic injuries contribute to tendon failure, resulting in pain, weakness, and restricted shoulder motion. When conservative treatment fails, arthroscopic repair has become the preferred treatment because it restores tendon anatomy while minimizing soft tissue trauma and facilitating early rehabilitation.

Functional Improvement Following Arthroscopic Repair: A major finding of the present study was the significant improvement in validated functional outcome scores following surgery. Patients demonstrated marked improvement in ASES, Constant-Murley, QuickDASH, UCLA, and VAS scores throughout the follow-up period.

The improvement observed in the ASES and Constant-Murley scores indicates successful restoration of shoulder function and pain relief. The substantial reduction in QuickDASH scores further indicates improvement in activities of daily living. This is particularly relevant in the Indian population, where many patients perform manual labour requiring repetitive overhead activity and shoulder strength. Early restoration of shoulder function therefore has important socioeconomic implications by facilitating return to work and improving quality of life.

Pain Relief: Pain relief represented one of the earliest and most consistent improvements following surgery. The significant reduction in VAS scores observed during follow-up reflects successful tendon fixation, removal of inflamed subacromial tissue, and restoration of normal shoulder biomechanics. Reduction of postoperative pain is clinically important because it allows patients to participate more effectively in supervised rehabilitation, which directly influences long-term functional recovery. Early pain control also reduces dependence on analgesics and improves patient satisfaction following surgery.

Range of Motion Recovery: Patients demonstrated progressive improvement in shoulder range of motion during postoperative rehabilitation. Recovery of forward flexion, abduction, and external rotation paralleled improvements in functional outcome scores, suggesting that restoration of mobility contributed substantially to improved shoulder function. Early controlled

mobilisation after arthroscopic repair promotes collagen alignment, reduces postoperative stiffness, and improves tendon healing without compromising repair integrity. Compliance with the structured rehabilitation protocol likely contributed to the favourable outcomes observed in this study (Figure 5).

Comparison with Published Literature: The functional improvements observed in this study are consistent with the growing body of international literature supporting arthroscopic rotator cuff repair. Several prospective studies have demonstrated significant postoperative improvement in ASES, Constant–Murley, UCLA, and QuickDASH scores following arthroscopic repair using suture anchors [9–13].

Although direct comparison between studies should be interpreted cautiously because of differences in patient selection, tear characteristics, rehabilitation protocols, and duration of follow-up, the magnitude of functional improvement observed in the present study is comparable to that reported in previously published series.

Importantly, our findings suggest that excellent early clinical outcomes can be achieved even in a resource-constrained tertiary care setting when surgery is performed using standard arthroscopic techniques followed by structured rehabilitation.

Complications: The overall complication rate in the present study was low. Postoperative shoulder stiffness represented the most frequent complication, followed by persistent pain and superficial wound infection. Only one patient demonstrated structural repair failure during the study period.

Fortunately, most cases respond well to physiotherapy and gradual mobilisation without requiring revision surgery.

The absence of major neurovascular injury or deep infection further demonstrates the safety of arthroscopic techniques when performed by experienced surgeons using standard operative principles.

Clinical Implications: The present study has important clinical implications for orthopaedic practice in India.

First, arthroscopic repair provides predictable pain relief and functional recovery even within the first three postoperative months.

Second, satisfactory outcomes can be achieved in a government-funded tertiary care institution despite resource limitations, provided that appropriate patient selection, meticulous surgical technique, and supervised rehabilitation are followed.

Third, the use of validated functional outcome scores enables objective assessment of postoperative recovery and facilitates comparison with international literature.

Finally, early restoration of shoulder function may reduce disability, improve return to work, and enhance quality of life among economically active patients.

Strengths of the Study: The present study possesses several strengths:

- Prospective study design.
- Uniform surgical technique performed at a single tertiary care centre.
- Standardised postoperative rehabilitation protocol.
- Use of multiple internationally validated functional outcome measures (ASES, Constant–Murley, UCLA, QuickDASH, and VAS).
- Complete follow-up of all enrolled patients.

These factors improve the internal validity and clinical applicability of the findings.

Limitations: Despite encouraging results, certain limitations should be acknowledged.

The study included a relatively small sample size of 36 patients, limiting statistical power and subgroup analyses. Follow-up was restricted to 12 weeks, preventing evaluation of long-term tendon healing, repair integrity, recurrent tears, and sustained functional improvement. The absence of a comparison group managed conservatively or by open repair limits direct assessment of comparative effectiveness. In addition, postoperative MRI was not routinely performed in all patients; therefore, structural healing could not be correlated with functional outcomes.

Future multicentre studies with larger sample sizes, longer follow-up, and imaging-based assessment of tendon healing are required to validate these findings.

CONCLUSION:

Arthroscopic rotator cuff repair resulted in significant improvement in pain relief, shoulder function, range of motion, and patient-reported functional outcomes in this prospective cohort of patients with symptomatic rotator cuff tears. Significant postoperative improvements were observed across all validated outcome measures, including VAS, ASES, Constant–Murley, QuickDASH, and UCLA scores. More than 80% of patients achieved good-to-excellent functional outcomes, while postoperative complications were infrequent and predominantly minor.

These findings support arthroscopic rotator cuff repair as a safe, reliable, and effective treatment option for repairable rotator cuff tears when combined with meticulous surgical technique and a structured rehabilitation programme. Although the present study demonstrates encouraging short-term outcomes, larger multicentre studies with longer follow-up are required to evaluate tendon healing, repair durability, and long-term functional recovery.

Ethical Approval: The study was approved by the Institutional Ethics Committee of Silchar Medical College and Hospital. All procedures were conducted in accordance with the ethical standards of the institutional committee and the principles of the Declaration of Helsinki.

IHEC/IAEC Approval number and date: SMC/ETHICS/M3/2024/63

Informed Consent: Written informed consent was obtained from all participants before enrolment in the study.

Conflict of Interest: The authors declare that they have no conflict of interest.

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Author Contributions

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- Conceptualization
- Study Design
- Methodology
- Supervision
- Critical review and editing of manuscript
- Final approval of the version to be published

Dr. Rudradeep Choudhury

- Data Collection
- Patient recruitment
- Literature review
- Data curation
- Formal analysis
- Manuscript drafting
- Preparation of tables and figures
- Incorporation of revisions

Dr. Tridip Bharali

- Methodology
- Supervision
- Data interpretation
- Critical revision of manuscript for important intellectual content

Dr. Faruk Ahmed Choudhury

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Data Availability: The datasets generated and analysed during the current study are available from the corresponding author on reasonable request.

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