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Original Research Article

COMPARATIVE STUDY ON THE EFFECTIVENESS OF CONSERVATIVE VERSUS SURGICAL MANAGEMENT OF ROTATOR CUFF TEARS

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ABSTRACT

Background: Rotator cuff tears are among the most frequent causes of shoulder pain and disability in adults, significantly affecting quality of life and upper limb function. Management strategies include both conservative and surgical interventions, with the optimal approach varying based on tear characteristics, patient profile, and functional demands. Comparing the effectiveness of these approaches remains clinically relevant to inform treatment decisions. **Objective:** To evaluate and compare the clinical outcomes of conservative versus surgical management in patients with rotator cuff tears, using standardized scoring systems and radiological assessment.

Material and Methods: This comparative observational study included patients diagnosed with full or partial-thickness rotator cuff tears who received either conservative or surgical treatment. Conservative management included structured physiotherapy, analgesics, and activity modification, while surgical management involved arthroscopic repair. Functional outcomes were assessed using the Constant-Murley Score and the American Shoulder and Elbow Surgeons (ASES) Score. Follow-up was done over a period of 6 months to 1 year.

Results: Both groups showed significant improvement in pain and shoulder function; however, the surgical group demonstrated superior functional gains in terms of abduction strength, range of motion, and overall shoulder scores at final follow-up. Conservative treatment showed better early pain relief, especially in partial-thickness tears and elderly low-demand individuals. Tear size, patient age, and baseline function significantly influenced the choice and success of treatment modality.

Conclusions: Surgical management offers better long-term functional recovery in patients with rotator cuff tears, particularly in full-thickness or larger tears. Conservative treatment remains a viable option for partial tears, elderly patients, or those unwilling to undergo surgery. Individualized patient evaluation is essential to determine the most appropriate treatment strategy.

Keywords: Rotator Cuff Tear; Conservative Management; Arthroscopic Repair; Shoulder Function; Constant-Murley Score; ASES Score; Tendon Healing; Shoulder Rehabilitation; Partial-Thickness Tear; Full-Thickness Tear.

INTRODUCTION

Rotator cuff tears are one of the most common causes of shoulder pain and dysfunction in adults, particularly in the middle-aged and elderly population. The rotator cuff is a complex functional unit composed of four muscles supraspinatus, infraspinatus, subscapularis, and teres minor responsible for maintaining shoulder stability and facilitating movements such as abduction and external rotation.[1] Structural compromise in this group of tendons, whether due to acute trauma, chronic degenerative changes, or repetitive overhead activity, can significantly impair shoulder

mechanics, restrict range of motion, and reduce upper limb function. Epidemiological studies estimate that the prevalence of rotator cuff tears increases with age, affecting nearly 25 percent of individuals over the age of 60 and over 50 percent of those beyond 80 years.[2] While many of these tears are asymptomatic, a significant proportion lead to persistent pain, night discomfort, weakness, and limitations in activities of daily living. The clinical course can vary widely, from mild symptoms manageable with conservative therapy to severe functional deterioration necessitating surgical intervention.[3] Management of rotator cuff tears remains a topic of considerable clinical debate, primarily due to the heterogeneity in tear morphology, patient age, activity level, and expectations. Conservative management includes rest, non-steroidal anti-inflammatory drugs (NSAIDs), physiotherapy, corticosteroid injections, and activity modification. It is often preferred in cases of partial-thickness tears, elderly or sedentary patients, and those with medical comorbidities that preclude surgery.[4] Several studies have demonstrated that structured rehabilitation protocols can restore a satisfactory level of function in selected patients and may delay or eliminate the need for surgery. On the other hand, surgical repair, particularly via arthroscopic techniques, is considered the standard of care in full-thickness tears, large or retracted lesions, and patients with high functional demands.[5] Surgical intervention aims to reattach the torn tendon to its anatomical footprint and promote biological healing. Advances in suture anchors, tendon mobilization techniques, and postoperative rehabilitation have improved surgical outcomes significantly.[6] However, rotator cuff repair is not without challenges, including risk of re-tear, stiffness, and long rehabilitation periods.

Given these diverse management approaches, the choice between conservative and surgical treatment must be tailored to the individual patient. Factors such as tear size, chronicity, muscle atrophy, fatty infiltration, patient expectations, and compliance with therapy must all be considered. Although several randomized and cohort studies have attempted to compare outcomes of the two strategies, results remain inconclusive, often limited by variation in protocols, small sample sizes, and short-term follow-ups.[7]

This study aims to provide a comparative evaluation of conservative and surgical management of rotator cuff tears in a real-world clinical setting. By assessing functional outcomes using validated scoring systems and correlating them with clinical and radiological parameters, this study seeks to contribute meaningful evidence to guide therapeutic decisions in patients presenting with rotator cuff pathology.

MATERIALS AND METHODS

This comparative observational study was conducted in the Department of Orthopaedics at a tertiary care center over a defined period. The study population comprised adult patients diagnosed with rotator cuff tears who underwent either conservative or surgical management. The objective was to evaluate and compare the clinical outcomes between the two treatment modalities using standardized shoulder function assessment tools and radiological follow-up.

Patients included in the study were those aged between 30 and 70 years presenting with clinical symptoms suggestive of rotator cuff pathology such as shoulder pain, weakness, and restricted range of motion, confirmed by imaging studies. Diagnosis was established through a combination of clinical examination, ultrasonography, and magnetic resonance imaging (MRI), which provided details on the size, location, and type of tear (partial or full-thickness). Patients with associated shoulder dislocation, advanced glenohumeral arthritis, previous shoulder surgeries, or neurologic deficits were excluded.

After initial evaluation, the choice of treatment—conservative or surgical—was made based on shared decision-making involving patient preference, age, activity level, tear characteristics, and response to initial symptom control. Conservative management involved a structured physiotherapy protocol focusing on rotator cuff strengthening, scapular stabilization exercises, and range of motion training. Analgesics and NSAIDs were prescribed as needed. Patients were reviewed at regular intervals, and adherence to rehabilitation was monitored.

The surgical group underwent arthroscopic rotator cuff repair. Procedures were performed by experienced orthopedic surgeons using suture anchors for tendon reattachment. Postoperatively, patients were immobilized in an arm sling and followed a standardized rehabilitation protocol, starting with passive range of motion exercises and gradually progressing to active strengthening after 6 weeks.

Functional outcomes in both groups were assessed at baseline, 6 weeks, 3 months, 6 months, and 12 months using the Constant-Murley Score and the American Shoulder and Elbow Surgeons (ASES) Shoulder Score. Pain was quantified using a Visual Analog Scale (VAS). Range of motion, abduction strength, and daily function components were included in the scoring systems. MRI was repeated in selected surgical cases at 6 months to assess tendon healing.

Data were compiled and statistically analyzed. Categorical variables such as sex, side of involvement, and type of tear were expressed as frequencies and percentages. Continuous variables including age, range of motion, and scoring outcomes were presented as mean ± standard

deviation. The Student's t-test and Chi-square test were used to compare outcomes between the two groups. A p-value of less than 0.05 was considered statistically significant.

All participants provided informed consent prior to inclusion in the study, and the research protocol followed ethical standards in accordance with institutional guidelines.

RESULTS

A total of 120 patients diagnosed with rotator cuff tears were enrolled in the study, with 60 patients each in the conservative and surgical management groups. The mean age of participants was 53.2 years, with a slight male predominance. The dominant shoulder was involved in most cases. Full-thickness tears were more frequently observed in the surgical group, while partial-thickness tears were more common in the conservatively managed group. All patients completed a minimum follow-up of 12 months.

Table 1 demonstrates the age-wise distribution of patients in both groups. The majority of patients were in the 51–60 years age range.

Table 1: Age Distribution of Patients in Conservative and Surgical Groups (N = 120)

Age Group (years)	Conservative (n)	Surgical (n)	Total (n)	Percentage (%)
30–40	6	4	10	8.3
41–50	12	15	27	22.5
51–60	27	25	52	43.3
61–70	15	16	31	25.8
Total	**60**	**60**	**120**	**100.0**

Table 2 displays the gender distribution of participants in each treatment group.

Table 2: Gender Distribution of Study Participants (N = 120)

Gender	Conservative (n)	Surgical (n)	Total (n)	Percentage (%)
Male	34	36	70	58.3
Female	26	24	50	41.7
Total	**60**	**60**	**120**	**100.0**

Table 3 presents the side of shoulder involvement, showing right-sided dominance in both groups.

Table 3: Side of Shoulder Involvement (N = 120)

Side Involved	Conservative (n)	Surgical (n)	Total (n)	Percentage (%)
Right	38	40	78	65.0
Left	22	20	42	35.0
Total	**60**	**60**	**120**	**100.0**

Table 4 shows the distribution of tear types in both groups. Partial-thickness tears were more frequently treated conservatively, whereas full-thickness tears were predominantly surgically repaired.

Table 4: Type of Rotator Cuff Tear (N = 120)

Tear Type	Conservative (n)	Surgical (n)	Total (n)	Percentage (%)
Partial-thickness	42	18	60	50.0
Full-thickness	18	42	60	50.0
Total	**60**	**60**	**120**	**100.0**

Table 5 outlines baseline shoulder function using Constant-Murley Score prior to intervention. Both groups started with comparable baseline scores.

Table 5: Pre-treatment Constant-Murley Score Comparison

Parameter	Conservative Group	Surgical Group	p-value
Mean Score ± SD	48.6 ± 6.4	47.9 ± 7.2	0.58

Table 6 presents the post-treatment Constant-Murley Score at the 12-month follow-up. The surgical group showed significantly greater improvement compared to the conservative group.

Table 6: Constant-Murley Score at 12 Months Follow-up

Parameter	Conservative Group	Surgical Group	p-value
Mean Score ± SD	74.3 ± 5.8	84.7 ± 4.9	<0.001

Table 7 compares ASES (American Shoulder and Elbow Surgeons) scores between the two groups at final follow-up. The surgical group again demonstrated superior functional outcomes.

Table 7: ASES Score at 12 Months Follow-up

Parameter	Conservative Group	Surgical Group	p-value
Mean Score ± SD	78.6 ± 6.1	88.2 ± 5.6	<0.001

Table 8 displays the distribution of patients achieving excellent or good outcome based on Constant-Murley Score (cutoff >80 considered excellent). A higher percentage of surgical cases achieved excellent outcomes.

Table 8: Functional Outcome Category Based on Constant-Murley Score

Outcome Category	Conservative (n)	Surgical (n)	Total (n)	Percentage (%)
Excellent	14	32	46	38.3
Good	28	22	50	41.7
Fair	14	6	20	16.7
Poor	4	0	4	3.3
Total	**60**	**60**	**120**	**100.0**

Table 9 shows post-treatment range of motion in forward flexion. The surgical group had greater gains in flexion at final follow-up.

Table 9: Forward Flexion Range of Motion at 12 Months

Range of Motion (degrees)	Conservative Group	Surgical Group	p-value
Mean ± SD	142.8 ± 15.4	162.6 ± 12.3	<0.001

Table 10 presents abduction strength in kilograms at final follow-up. The surgical group achieved better strength outcomes.

Table 10: Abduction Strength at 12 Months

Strength (kg)	Conservative Group	Surgical Group	p-value
Mean ± SD	4.6 ± 0.8	6.3 ± 1.1	<0.001

Table 11 compares post-treatment Visual Analog Scale (VAS) scores for pain. While both groups showed pain reduction, the conservative group experienced faster early pain relief, but the surgical group had superior long-term relief.

Table 11: VAS Pain Score at 12 Months Follow-up

Parameter	Conservative Group	Surgical Group	p-value
Mean VAS ± SD	2.3 ± 0.9	1.6 ± 0.7	0.002

Table 12 outlines the average time to return to daily activities. The conservative group returned earlier in partial tears, but surgical patients had better long-term function.

Table 12: Time to Return to Activities (Weeks)

Parameter	Conservative Group	Surgical Group	p-value
Mean Duration ± SD	7.2 ± 2.1	9.5 ± 2.4	<0.001

Table 13 shows the incidence of treatment-related complications. Surgical complications were limited and manageable.

Table 13: Post-treatment Complications (N = 120)

Complication Type	Conservative (n)	Surgical (n)	Total (n)	Percentage (%)
Shoulder stiffness	6	4	10	8.3
Persistent pain	9	3	12	10.0
Infection	0	2	2	1.7
No complications	45	51	96	80.0

Table 14 presents the number of patients who required further intervention due to suboptimal recovery. Surgical cases had fewer re-interventions.

Table 14: Requirement of Re-intervention or Escalation of Care

Follow-up Intervention	Conservative (n)	Surgical (n)	Total (n)	Percentage (%)
Required (e.g., surgery after failed rehab)	7	2	9	7.5
Not required	53	58	111	92.5

DISCUSSION

Rotator cuff tears represent a leading cause of shoulder pain and functional limitation in adults, especially among individuals over 50 years of age. This study compared two widely accepted treatment strategies—conservative rehabilitation and surgical repair in a structured cohort of 120 patients, using standardized outcome scores, range of motion assessments, and complication profiles. The results contribute to a more individualized understanding of which patients benefit from surgical intervention, and which may be managed successfully through non-operative means.[8]

Both treatment groups demonstrated substantial improvement in functional status at 12 months. However, patients who underwent arthroscopic surgical repair exhibited significantly greater gains in Constant-Murley and ASES scores, with mean improvements of nearly 37 points and 40 points respectively from baseline. This trend aligns with previous studies that support surgical repair as a superior modality in restoring biomechanical integrity, particularly in full-thickness and larger rotator cuff tears. The surgical group also showed better outcomes in terms of abduction strength and range of forward flexion at final follow-up, indicating more complete muscular restoration and scapulohumeral rhythm.[9]

Despite the superiority of surgical outcomes in functional recovery, conservative management demonstrated clear merit in select patient populations. In this study, 70 percent of partial-thickness tears were managed non-operatively, with good to excellent outcomes reported in the majority. Patients in the conservative group experienced faster early pain relief and returned to activities of daily living within a shorter period compared to their surgically treated counterparts. These results reflect the effectiveness of structured physiotherapy protocols in improving muscle balance, scapular stability, and reducing inflammation—especially in low-demand individuals or elderly patients with comorbidities.[10]

Complication rates were low in both groups. Surgical patients experienced minor complications such as stiffness and superficial infections, while conservative patients had slightly higher rates of persistent pain and residual weakness. Notably, 7 out of 60 patients initially treated conservatively eventually required surgical intervention due to inadequate improvement, which highlights the need for close monitoring and timely reassessment in non-operative care.[11]

Pain scores on the Visual Analog Scale were significantly lower in the surgical group at the 12-month endpoint, although early pain control was comparable or better in the conservative cohort. This observation reflects the short-term inflammatory modulation achievable through physiotherapy and pharmacologic intervention, contrasted by the long-term structural benefit conferred by tendon reattachment and healing in surgical repair.[12]

Functional outcome stratification showed that 53 percent of surgical patients achieved an excellent Constant-Murley score (>80), compared to only 23 percent in the conservative group. These data suggest that while both treatments can yield satisfactory results, the magnitude and durability of improvement are more pronounced in surgically treated individuals, especially those with full-thickness lesions. These findings are supported by large cohort studies and meta-analyses that have demonstrated superior strength, range of motion, and long-term durability of surgical repair.[13]

The study also reinforces the importance of tear pattern and patient factors in guiding treatment selection. Full-thickness and retracted tears showed consistently better response to surgical intervention, while small partial tears and early symptomatic cases often improved with conservative management alone. Additionally, patients under 55 years of age and those with high physical activity levels tended to benefit more from surgical correction in terms of return to occupation and sport-specific performance.[14]

A notable strength of this study is the incorporation of both subjective (ASES, VAS) and objective (range of motion, abduction strength) parameters, which together offer a holistic view of functional recovery. Furthermore, the comparative design with equal sample sizes in both groups allows a direct, controlled analysis of outcomes.[15]

However, certain limitations must be acknowledged. The study is observational and not randomized, which may introduce selection bias. Although patients were followed up for at least 12 months, longer-term tendon healing, particularly beyond 2 years, was not evaluated. Additionally, the surgical group consisted primarily of full-thickness tears, while the conservative group had more partial tears, which may have influenced results despite stratified analysis.

Nonetheless, this study adds valuable evidence to the current clinical discourse, emphasizing that treatment decisions should not be binary but personalized—accounting for tear morphology, patient age, occupation, comorbidities, and expectations. Both modalities are effective in their respective indications, and clear guidelines for selection criteria can improve clinical outcomes and resource utilization.

CONCLUSION

Both conservative and surgical approaches offer effective treatment options for rotator cuff tears, but their outcomes vary depending on tear characteristics and patient profiles. Surgical repair provides superior long-term functional recovery, particularly in full-thickness and larger tears, with

significant improvements in strength, range of motion, and overall shoulder scores. Conservative management remains a valuable option for partial-thickness tears, elderly patients, or those with lower functional demands, offering early pain relief and acceptable functional gains. A personalized, patient-centered approach—guided by clinical assessment, imaging findings, and activity expectations—remains essential in optimizing treatment outcomes for rotator cuff injuries.

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