

**ORIGINAL RESEARCH**

# Assessment of Functional Outcomes Among Patients Who Underwent Open Rotator Cuff Repair

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**ABSTRACT**

**Background:** The most frequently reported issue among patients with a rotator cuff tear is shoulder pain. The development of progressive and degenerative changes plays a crucial role in the origin and progression of rotator cuff injuries. These degenerative alterations become more pronounced as individuals age, emerging as a significant factor in the occurrence of rotator cuff injuries, particularly among the elderly population. **Methods:** A cross-sectional study spanning one year was undertaken for the current research. The study cohort consisted of 100 patients undergoing open rotator cuff repair surgery, all of whom presented with either partial or full-thickness rotator cuff tears. **Results:** The study involved 100 participants with an average age of 46 years, comprising 52% male (n=52) and 48% female (n=48) patients. Regarding the side and severity of rotator cuff tear, 62% (n=62) exhibited right-sided rotator cuff tears. Within this group, 61.3% (n=38) had complete tears, while 38.7% (n=24) had partial tears on the right side. Additionally, 38% (n=38) of the participants presented with left-sided rotator cuff tears, with 52.6% (n=20) having complete tears and 47.4% (n=9) experiencing partial tears on the left side. **Conclusion:** In conclusion, a substantial majority of the study participants with rotator cuff tears exhibited a significant increase in the Constant Murley score after six months of treatment through open rotator cuff repair, with statistically significant results.

**Keywords:** Open rotator cuff repair, Rotator cuff tear, Functional outcome

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**INTRODUCTION**

A multitude of operative techniques have been extensively explored and documented for the treatment of patients suffering from rotator cuff tears. The prevailing and often primary symptom in the majority of these cases is shoulder pain.<sup>1</sup> Within the realm of academic and clinical investigations, a spectrum of operative procedures has been reported for addressing rotator cuff tears. These encompass diverse methodologies such as open repair, complete arthroscopic rotator cuff repair (ARCR), and arthroscopically assisted mini-open rotator cuff repair (MRCR). A global perspective is evident in several studies that have undertaken a comprehensive comparison of various modalities employed in the treatment of rotator cuff tears.<sup>2</sup> Among the commonly utilized approaches are open repair of rotator cuff tears, complete arthroscopic rotator cuff repair, and arthroscopically assisted mini-open rotator cuff repair. These modalities have been scrutinized with a specific

focus on evaluating and comparing the functional outcomes associated with each method. In essence, the wealth of research in this field underscores the ongoing pursuit of refining and optimizing the surgical management of rotator cuff tears, with a keen emphasis on understanding the nuanced differences in outcomes across different operative techniques. The etiopathogenesis, as elucidated in previous studies, underscores the progressive and degenerative nature of rotator cuff tears, with an escalating incidence correlated with advancing age.<sup>3</sup> This cascade of degenerative changes occasionally manifests as partial rotator cuff tears, a condition that may subsequently evolve into complete rupture of the rotator cuff. The imperative for rotator cuff tear repair positions it as a highly prevalent operative procedure for addressing pathology within the shoulder joint.

Nevertheless, the decision to pursue surgical interventions for chronic rotator cuff tears is reserved for cases where conservative non-operative treatments

prove ineffective in alleviating symptoms. Noteworthy among the array of operative procedures for rotator cuff repair are traditional open repair, complete arthroscopic rotator cuff repair, and arthroscopically assisted mini-open rotator cuff repair. While traditional open repair and arthroscopically assisted mini-open rotator cuff repair remain fixtures in many medical centers, there is a discernible trend toward the increased adoption of complete arthroscopic rotator cuff repair for managing rotator cuff tears. Recent studies have brought to light a progressive shift in the paradigm of arthroscopic operative procedures for rotator cuff repair. These procedures are not only applied to address smaller tears but are increasingly being harnessed to confront larger rotator cuff tears.<sup>4</sup> Furthermore, the versatility of these arthroscopic techniques extends to the mobilization of retracted tears, signifying a dynamic evolution in the landscape of surgical approaches to effectively manage and treat rotator cuff pathology. This ongoing transformation underscores the commitment to refining and advancing surgical strategies to enhance outcomes in the realm of rotator cuff tear management.

#### **MATERIALS AND METHODS**

The study, conducted over a one-year period, was designed as a cross-sectional investigation focusing on a cohort of 100 patients ranging from 30 to 65 years of age. The primary inclusion criteria involved individuals who had undergone surgical intervention for rotator cuff repair due to either partial or full-thickness rotator cuff tears. To ensure specificity, patients with fractures around the shoulder joint were deliberately excluded from the study. Ethical clearance was obtained from the institutional ethics committee, underscoring the commitment to ethical research practices. The demographic information of the participants, comprising details such as age, sex, body mass index (BMI), the side and degree of tear, as well as their hypertensive and diabetic status, was meticulously captured using a pre-designed Performa. To gauge the pre-operative and post-operative shoulder function, the Constant and Murley scoring system was employed, providing a standardized framework for assessment. The surgical procedure, executed with precision, involved a series of steps aimed at repairing the rotator cuff tear. Commencing with the scrubbing of the shoulder, a carefully planned incision lateral to the anterior acromion toward the coracoid was executed following surface markings. The infiltration of adrenaline served a dual purpose, acting as a vasoconstrictor to minimize bleeding during the procedure. The subsequent surgical steps included the elevation of a deltoid muscle flap, resection of the coracoacromial ligament, removal of bursal adhesions and soft tissues from the acromial undersurface, and the meticulous identification of the rotator cuff tear.

The mobilization of the cuff, facilitated by the use of a blunt probe or finger, was crucial in releasing adhesions both inside and outside the joint. The meticulous incision of the capsule, if required, was executed for optimal tendon mobilization. The subsequent steps involved the creation of a trough along the greater tuberosity using an osteotome, beveling the proximal edge with a rasp, and the application of ethibond sutures via a single-row technique. Thorough debris removal from the subacromial space and the subsequent suturing of the deltoid with periosteum ensured a comprehensive surgical outcome. The meticulous attention to hemostasis was a crucial aspect of the procedure. Postoperatively, the arm was immobilized in a 30-degree abduction splint, a vital component of the recovery strategy. Patients were instructed to wear the splint continuously for six weeks, with exceptions during physiotherapy sessions and bathing routines. The follow-up protocol included assessments at three and six months post-surgery, focusing on functional outcomes such as pain relief, strength, the ability to perform routine activities, and overall patient satisfaction.

To ascertain the statistical significance of the findings, tests such as the chi-square test and t-test were applied at a 95% confidence interval. A p-value less than 0.05 was considered indicative of a statistically significant association, providing a robust foundation for the study's conclusions. This methodological rigor aimed to not only evaluate the surgical intervention's effectiveness but also to contribute meaningful insights into the nuanced aspects of postoperative recovery and functional improvement in patients with rotator cuff tears.

#### **RESULTS**

The study cohort comprised 100 patients within the age range of 30 to 65 years, all undergoing open rotator cuff repair for either partial or full-thickness rotator cuff tears. Among the participants, the average age was 46 years, with a gender distribution of 52% male (n=52) and 48% female (n=48). The average body mass index (BMI) of the study group was 26.4 kg/m<sup>2</sup>.

In terms of the side and degree of rotator cuff tear, 62% (n=62) of patients presented with a right-sided rotator cuff tear. Among these, 61.3% (n=38) had a complete tear on the right side, while 38.7% (n=25) had a partial tear. On the left side, 38% (n=38) of patients had a rotator cuff tear, with 52.6% (n=20) having a complete tear and 47.4% (n=18) having a partial tear. This demographic breakdown provides a comprehensive overview of the characteristics of the study population, offering valuable insights into the distribution of rotator cuff tears based on side and severity.

**Table 1: Distribution of study subjects according to the study parameters**

Age	Mean 46 Years
Sex	
Male	52 patients (52 %)
Female-	48 patients (48 %)
Body Mass Index(kg/m <sup>2</sup> )	Mean -26.4 kg/m <sup>2</sup>
Side and degree of tear	
Right side	62 patients (62 %)
Complete	38 (61.3%)
Partial	24 (38.7%)
Left side	38 patients (38 %)
Complete	20 (52.6%)
Partial	18 (47.4%)

In the context of the current study, a comprehensive assessment of all study participants was conducted to evaluate the effectiveness of open rotator cuff repair. The mean preoperative Constant score was determined to be  $35.41 \pm 7.83$ , with individual scores ranging from a minimum of 18.7 to a maximum of 49.1. This baseline evaluation provided a snapshot of the participants' shoulder function and overall clinical status before undergoing surgical intervention. As the study progressed, follow-up evaluations were performed at the 3-month and 6-month post-surgery intervals. At the 3-month follow-up, the mean Constant score exhibited a noticeable improvement, reaching  $62.42 \pm 7.98$ , with scores ranging from 42.7 to 78.6. This mid-term assessment aimed to capture the early impact of the surgical intervention on shoulder function and patient outcomes. Continuing the longitudinal evaluation, the 6-month post-surgery follow-up revealed a further enhancement in the mean Constant score to  $76.68 \pm 8.24$ . The individual scores at this stage ranged from a minimum of 58.9 to a maximum of 92.4, indicating a substantial improvement in shoulder function and overall clinical outcomes over the course of the study.

To establish the statistical significance of these improvements, a paired sample t-test was employed to compare the preoperative Constant-Murley score with the postoperative Constant-Murley score after the 6-month follow-up. The analysis yielded a significant association, as indicated by a t-value of 31.352 and a p-value less than 0.05. This statistical significance underscores the robust and positive impact of the open rotator cuff repair on the Constant-Murley score, signifying an overall improvement in shoulder function and patient well-being. In essence, the expanded interpretation of the study findings emphasizes the substantial and statistically significant enhancement in the Constant score over the study period, highlighting the efficacy of open rotator cuff repair in achieving positive clinical outcomes for patients with partial and full-thickness rotator cuff tears.

**Table 2: Preoperative and 6 months postoperative constant score wise distribution of study subjects**

	Mean	Std. deviation	t score	P value
Pre-op CS	35.41	7.83	31.352	<0.05
Post-op CS (after 6 months)	76.68	8.24		

## DISCUSSION

The present study, encompassing a cohort of 100 patients aged between 30 and 65 years, who underwent surgery for rotator cuff repair, provided a detailed demographic overview. The average age of the participants was 46 years, with a balanced gender distribution of 52% male and 48% female. The average body mass index (BMI) for the study group was recorded at  $26.4 \text{ kg/m}^2$ . These demographic characteristics mirror findings from analogous studies in the existing literature, reinforcing the consistency of these patterns in populations undergoing rotator cuff repair.<sup>5</sup> Drawing a parallel, Savio A et al conducted a study involving 52 patients undergoing open rotator cuff repair, reporting a similar gender distribution with 53.8% males and 46.2% females. Furthermore, they observed that a significant proportion of participants fell within the age bracket of 51-60 years (42.3%), followed by 35.8% in the 41-50 years age group. Likewise, Vikram D et al, in their study involving 44 patients undergoing open rotator cuff repair, identified a predominance of males, with the highest representation in the age group of 51-60 years, followed by the 41-50 years age group.

Examining the specifics of rotator cuff tears in the present study, it was noted that 62% of patients exhibited a right-sided rotator cuff tear, with 61.3% classified as complete tears and 38.7% as partial tears. Additionally, 38% of patients presented with a left-sided rotator cuff tear, with 52.6% having a complete tear and 47.4% a partial tear. These observations align closely with the outcomes reported by Vamsinath P et al<sup>6</sup> in their study on rotator cuff repair patients, where the majority had partial thickness rotator cuff tears (59.1%), and 40.9% had full-thickness tears. Importantly, they also found that 81.8% of study participants had traumatic tears, while 18.2% had degenerative tears. Expanding on these consistent findings across multiple studies reinforces the significance of understanding demographic and clinical characteristics in the context of rotator cuff repair. These collective insights contribute to a more nuanced and comprehensive understanding of the patient profile associated with rotator cuff injuries, aiding clinicians in tailoring effective management strategies based on these demographic and clinical parameters. The findings of the present study align with those reported by Khoo S et al in their investigation of patients undergoing rotator cuff repair. Khoo S et al observed that the majority of their study participants presented with right-sided shoulder pathologies, and a significant proportion exhibited

full-thickness rotator cuff tears. This parallelism in results highlights the consistency of clinical patterns across diverse studies, reinforcing the prevalence of specific characteristics within populations undergoing rotator cuff repair. In the current study, a comprehensive assessment of all participants was conducted, revealing a mean preoperative Constant score of  $35.41 \pm 7.83$ , with individual scores ranging from a minimum of 19.7 to a maximum of 49.1. This initial evaluation served as a baseline for understanding the participants' shoulder function before the surgical intervention. Subsequent follow-up assessments at 3 months and 6 months post-surgery demonstrated a notable improvement in the mean Constant scores, reaching  $62.42 \pm 7.98$  and  $76.68 \pm 8.24$ , respectively. The range of scores reflected the spectrum of individual responses, with the lowest score recorded at 58.9 and the highest at 92.4. The application of statistical tests, specifically the paired sample t-test, revealed a significant association between the preoperative and postoperative Constant-Murley scores after the 6-month follow-up, with a t-value of 31.352 and a p-value of  $<0.05$ . This statistical significance emphasizes the substantial improvement in the Constant-Murley score over the study duration, particularly at the 6-month post-surgery follow-up. Comparisons with the study conducted by N Prasad et al, which focused on 42 patients undergoing open rotator cuff repair, revealed similar trends. N Prasad et al reported that participants with massive rotator cuff tears exhibited a less statistically significant increase in postoperative Constant scores compared to those with moderate and small tears.<sup>7</sup> Furthermore, they noted that patients aged more than 60 years experienced less statistically significant improvement in postoperative Constant scores compared to those aged less than 60 years. Despite these variations, the postoperative Constant score significantly improved from the preoperative score among all study participants, showcasing a consistent trend of improvement. A comparable study by Matthias A et al involving 23 patients undergoing open rotator cuff repair echoed these findings. They reported mean relative Constant scores at 85% compared to 83% at 3 years. Notably, participants with an intact repair demonstrated better results than those with failed reconstruction, as evidenced by the mean absolute Constant score ( $p = 0.015$ ) and mean relative Constant score ( $p = 0.002$ ).

In summary, the convergence of results across these studies underscores the effectiveness of open rotator cuff repair in improving shoulder function, as reflected in the consistent enhancement of the Constant-Murley scores. These findings contribute to the broader understanding of the outcomes associated with rotator cuff repair and provide valuable insights for clinicians managing patients with rotator cuff tears.

## CONCLUSION

The study concluded that most participants with rotator cuff tears were male, predominantly with right-sided tears, and were in the post-middle age group. There was a significant increase in Constant-Murley scores six months post-surgery. Open rotator cuff repair, particularly when combined with acromioplasty, emerged as an effective treatment for both partial and complete rotator cuff tears.

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