

## A PROSPECTIVE STUDY ON UNSUPERVISED REHABILITATION PROTOCOL AFTER ROTATOR CUFF REPAIR.

Rashmiranjan Mohanty<sup>a,\*</sup>, Arpita Jena<sup>b</sup>, Ranjan Kumar Mohanty<sup>c</sup>

<sup>a</sup>Assistant Professor, Department of Orthopaedics, PRM Medical College, Baripada, Odisha, India

<sup>b</sup>Assistant Professor, Department of Anesthesiology, SCB Medical College, Cuttack, Odisha, India

<sup>c</sup>Assistant Professor, Department of Cardiology, SCB Medical College, Cuttack, Odisha, India

### Abstract

#### Background

The postoperative rehabilitation following rotator cuff repair yields favourable outcomes; however, it necessitates a significant investment of both time and financial resources. The primary aim of this study was to evaluate the efficacy of a home-based rehabilitation protocol in the management of patients who underwent rotator cuff repair.

#### Methods

The present study utilized a prospective design to investigate a group comprising 84 individuals who underwent surgical intervention for the purpose of rotator cuff repair. The participants were provided with detailed instructions regarding the exercise protocol, which they diligently executed within the confines of their individual residences.

#### Results

The average duration of follow-up was 14 months. The Visual Analogue Score (VAS) for pain demonstrated a significant improvement, with the preoperative mean of 7.3 decreasing to a follow-up mean of 1.2. Additionally, the Disability of the Arm, Hand, and Shoulder (DASH) score, assessed in a sample of 52 patients, exhibited notable enhancement, as the preoperative mean of 33.1 decreased to a follow-up mean of 4.4. Furthermore, an improvement in the range of motion was observed in a group of 78 patients. A total of 74 patients achieved complete reintegration into the workforce within a three-month timeframe.

#### Conclusion

Given that the patients are engaging in postoperative rehabilitation within the confines of their own residences, this approach serves to diminish financial burdens, mitigate time constraints associated with travel, and minimize susceptibility to external influences.

#### Recommendation

Limit home-based rehabilitation to well-evaluated cases without substantial tears, emphasizing optimal repair procedures for complex cases. Implement remote monitoring tools to track patient progress, ensuring adherence and early identification of potential issues. Conduct a thorough cost-benefit analysis to assess the economic advantages of home-based rehabilitation, considering reduced financial burdens and time constraints.

**Keywords:** Motion, Mini open repair, Rotator cuff, Unsupervised rehabilitation

Submitted: 2023-12-01 Accepted: 2023-12-02

**Corresponding Author:** Rashmiranjan Mohanty

Assistant Professor, Department of Orthopaedics, PRM Medical College, Baripada, Odisha, India

Email: [mohantyrashmi11@gmail.com](mailto:mohantyrashmi11@gmail.com)

### Introduction

Rotator cuff tears are frequently encountered in both geriatric populations and among individuals involved in athletic pursuits. Degenerative tears manifest a heightened prevalence within the geriatric population, while traumatic tears are commonly observed in youthful individuals or athletes. The management of these lacerations typically involves the utilization of either arthroscopic repairs or mini-open repair techniques, both of which have been shown to yield positive results [1, 2].

The implementation of postoperative rehabilitation measures is a crucial aspect of the management of such tears [3]. Supervised physiotherapy is a standard recommendation, whereby patients adhere to scheduled sessions with a therapist at a clinic or receive home visits from the therapist. A study evaluating the efficacy of a video-based supervised therapy has yielded promising results [4].

However, the incorporation of a therapist, whether via face-to-face or telemedicine modalities, may lead to a rise in treatment expenditures [5]. The temporal efficiency of

the treatment regimen is compromised as a result of the prolonged duration necessitated by the combined travel and therapy sessions. Within the current global pandemic landscape, there is a concomitant rise in the vulnerability to potential exposure. Nevertheless, in the absence of adequate supervision during the rehabilitation phase, there exists a potential risk of compromising the reparative measures [6].

The implementation of a streamlined domiciliary rehabilitation regimen, independently carried out by individuals, confers a multitude of noteworthy advantages, encompassing diminished financial burden, enhanced temporal efficacy, and mitigated susceptibility to extrinsic influences. A recommended home-based rehabilitation protocol for rotator cuff repairs should prioritize the avoidance of any stress on the repair site, while concurrently maintaining the range of motion. The main objective of the present study is to assess the outcomes of a domiciliary-based rehabilitation program carried out independently by individuals in the comfort of their own homes.

## Materials and Methods

### Study design and Criteria

The study involved a group of patients who underwent surgical intervention for rotator cuff repair utilizing a mini-open incision technique. A rotator cuff tear, also known as a complete tear of the supraspinatus, infraspinatus, or both muscles, manifests as full-thickness damage. The diagnosis was established through the utilization of a comprehensive clinical evaluation in conjunction with magnetic resonance imaging (MRI). Patients who gave their consent for participation were included in this study. The study excluded patients presenting with partial tears of the rotator cuff, those who had undergone additional concurrent procedures, or individuals with a history of previous shoulder surgeries.

### Study size

During the allocated research duration, a total of 124 subjects underwent surgical intervention for the purpose of rotator cuff repair. Among the entire patient group, a total of 84 individuals satisfied the predetermined criteria for inclusion and were subsequently enrolled in the present investigation.

### Participants

The study group comprised 38 male individuals and 46 female individuals. The average age of the patients was 60 years. The dominant side was seen to be impaired in a total of 38 cases. A total of 8 individuals were engaged in physically demanding occupations, specifically in the fields of construction and farming. The remaining 76 individuals exhibited a sedentary lifestyle. The average duration of symptoms reported by participants was four months, with a range of 1 to 8 months. The modes of injury observed in the study encompassed blunt trauma, falls from standing height, falls from elevated heights, and cases where no specific cause could be identified, which

were observed in a total of nine patients. Pain was reported as the primary concern in all 84 patients. The study revealed that all 84 individuals exhibited weakness in their rotator cuff when subjected to resistance testing. All 84 individuals exhibited a degree of limited range of motion in comparison to the contralateral side.

Normal radiographs were reported in a total of 78 individuals. Proximal migration of the humeral head was observed in three patients. The findings of the magnetic resonance imaging (MRI) examination demonstrated a total rupture of the supraspinatus muscle in a group of 80 subjects. A group of four subjects presented with a concurrent rupture in the supraspinatus and infraspinatus muscles. No patient was observed to present with a unilateral tear of the infraspinatus muscle. The magnetic resonance imaging (MRI) findings demonstrated cuff edge retraction in a collective of 64 patients, exhibiting a maximum extent of up to two centimetres. Furthermore, a total of 12 patients demonstrated cuff edge retraction measuring above two centimetres. A total of eight patients exhibited no signs of retraction.

### Bias

There was a chance that bias would arise when the study first started, but we avoided it by giving all participants the identical information and hiding the group allocation from the nurses who collected the data.

### Ethical considerations

The ethical aspects of the research were carefully thought out to preserve patient privacy and confidentiality.

### Results

The mean duration of follow-up was 14 months. The Visual Analog Scale (VAS) score exhibited a notable enhancement during the postoperative phase. Preceding the intervention, the average Visual Analog Scale (VAS) score was recorded as 7.1, while subsequent to the intervention, the average VAS score exhibited a reduction to 1.1. The DASH (Disabilities of the Arm, Shoulder, and Hand) score was assessed in a group of 52 individuals. In this group of 52 individuals, the Disability of the Arm, Shoulder, and Hand (DASH) score exhibited a notable improvement.

The preoperative mean DASH score was 33.1 while the mean DASH score at follow-up was 4.3. An improvement in the range of motion was observed in a total of 78 patients. The active abduction of the patient demonstrated improvement following the surgical procedure. Prior to the operation, the mean active abduction was recorded at 97 degrees, with a range of 45 to 135 degrees. Subsequently, after the operation, the mean active abduction increased to 136 degrees. The measurement of forward flexion, taken at a 95-degree angle in the scapular plane, demonstrated improvement following the surgical procedure.

The preoperative mean value was recorded as 97 degrees. In contrast, the postoperative mean value increased to

137 degrees. The measurement of external rotation was conducted with the elbow positioned adjacent to the body and flexed at a 90-degree angle. The preoperative average for external rotation was 8 degrees, with a range of 0 to 30 degrees. Following the surgical procedure, the average for external rotation improved to 35 degrees, with a range of 0 to 50 degrees. The strength of the cuff was found to be within normal limits in a total of 78 patients.

There were three instances of unsuccessful outcomes, accounting for a prevalence rate of 7%. A notable occurrence of pronounced rigidity was observed in the patient during the postoperative phase. The patient exhibited a refusal to undergo any form of medical intervention and persisted in adherence to the established protocol. The patient exhibited a reduction of motion by less than 50 percent in comparison to the contralateral side during the one-year follow-up assessment, accompanied by a manifestation of moderate pain. Two patients presented with the occurrence of a re-tear in the surgically repaired rotator cuff.

The patient experienced persistent mild to moderate pain during the postoperative period. The magnetic resonance imaging (MRI) conducted at the three-month mark revealed the presence of a tear at the site where the tendon had undergone surgical repair. The option of undergoing revision surgery was presented to them; however, they declined to proceed with the recommended intervention. The patients were lost to follow-up approximately six months after the surgical procedure.

Both patients presented with significant retracted tears measuring greater than 3 centimeters. The subsequent repair procedure was performed under tension. A total of 74 patients achieved successful reintegration into the workforce within a four-month timeframe. The two patients presenting with re-tears exhibited an inability to resume occupational activities involving the affected arm during the most recent follow-up assessment. One patient who experienced treatment failure exhibited the development of stiffness, while the other two patients who achieved favorable outcomes underwent a change in their occupational pursuits.

**Table 1: Summary of the study**

Aspect	Preoperative Value	Postoperative value
Follow-Up Duration	-	14months
Visual Analog Scale (VAS) Score	7.1	1.1
DASH Score (52 Individuals)	33.1	4.3
Range of Motion Improvement (78 patients)	-	-
Active Abduction (degrees)	97 (45-135)	136
Forward Flexion	97	137
External Rotation	8	35
Unsuccessful outcomes	-	3 cases
Pronounced Rigidity	-	Observed
Reduction of motion	-	Observed
Moderate Pain	-	Present
Retear Occurrence	-	Present
MRI finding at 3 months	Tear	-
Decision on revision surgery	Declined	-
Follow-up status		
Retracted tears	-	Present
Successful Workforce	-	74 patients
Occupational Impact of Patients with Retear	-	Unable to resume

## Discussion

Rehabilitation protocols that are patient-driven have demonstrated favorable outcomes in meticulously selected individuals undergoing rotator cuff repairs. Patients have the capacity to attain a range of motion exceeding 90 percent. The current study demonstrated a notable enhancement in the DASH score and VAS score. A total of 88% of the patients successfully resumed their previous occupational activities within a three-month period following the surgical intervention. Three patients exhibited signs of failure. This is likely attributable to a reparative procedure performed under tension.

The tears observed in this case were of considerable size and would likely have benefited from a comprehensive repair procedure. Additionally, it is recommended that

supervised therapy be implemented to ensure that excessive strain is not placed on the repaired area. In contrast, additional patients exhibited favorable outcomes with regard to their occupational reintegration and enhancement of their range of motion. The aforementioned patients exhibited favorable and stable outcomes subsequent to the successful resolution of a tear, which was meticulously repaired without inducing any tension.

In their systematic review, Baumgarten et al. have reached the conclusion that there exists insufficient evidence to support the identification of an optimal rehabilitation protocol for rotator cuff surgery [7]. The studies incorporated in the analysis failed to exhibit any discernible advantage of a supervised protocol in comparison to an unsupervised protocol. It is imperative

to acknowledge, nonetheless, that the aforementioned studies demonstrated inherent limitations in their experimental design, thereby necessitating prudence when interpreting the outcomes. The outcomes of supervised programs in shoulder rehabilitation have been demonstrated by various authors. In a randomized controlled trial conducted by Holmgren et al, it was observed that a supervised program integrating progressive strengthening exercises and scapular stabilizers exhibited superior outcomes subsequent to arthroscopic acromioplasty, in comparison to home-based programs [8].

The study demonstrated an enhanced functional score, although no statistically significant differences were observed in the pain scores. Additionally, a comparative analysis of the associated expenses was not conducted. Subsequent investigations have yielded comparable outcomes between the aforementioned rehabilitation modalities. In a controlled clinical study conducted by Andersen et al, involving a group of 43 patients, no statistically significant differences were observed [9].

The observed disparities did not reach statistical significance, even in comparative analyses conducted for cuff repairs [10, 11]. In a study conducted by Song et al, it was observed that supervised therapy and home therapy yielded differential outcomes in terms of SANE scores, range of motion, and pain relief. Specifically, the researchers discovered that the SANE scores were significantly higher in the supervised therapy group compared to the home therapy group [12].

However, no significant differences were observed between the two groups in terms of range of motion and pain relief. The rehabilitation protocol was initiated following a period of four weeks of immobilization. The current investigation implemented a rehabilitation protocol in which the initiation of exercises occurred one-week post-surgery. In the systematic review and meta-analysis conducted by Longo et al [11], it was observed that there was no discernible distinction in the Visual Analog Scale (VAS) scores and outcomes when comparing supervised and unsupervised rehabilitation following rotator cuff repair.

The present investigation facilitated patients in acquiring knowledge of the rehabilitation protocol and executing it within the confines of their own residences. The initiation of this condition occurred within a seven-day period following the surgical procedure. Early rehabilitation in cases of massive tears is cautioned against. The deficiencies observed in the present group were similarly observed in patients presenting with substantial tears accompanied by tension at the repair site. One potential drawback associated with the home-based unsupervised rehabilitation protocol is the possibility of patients engaging in excessive activities, which may inadvertently result in harm to the repaired tendon. This can be mitigated through meticulous patient selection for a home-based protocol. Smaller tears, when subjected to a stable repair, facilitate optimal rehabilitation.

A substantial laceration accompanied by a challenging mending process will experience advantageous outcomes through the implementation of a closely monitored regimen. In the current investigation, it was observed that two out of the three instances of failure exhibited substantial tears, and the subsequent repair procedure was conducted under tension. The patients would have derived considerable advantages from a more optimal repair procedure and closely monitored therapeutic interventions. Another potential drawback may arise if the patient engages in insufficient activity. This may result in musculoskeletal rigidity and impaired physiological performance. Thoroughly monitoring the patient's condition and assessing the advancement can effectively mitigate the occurrence of this complication.

In brief, the application of a domiciliary exercise regimen for individuals who have undergone surgical repair of the rotator cuff has exhibited positive results when administered to patients who have undergone thorough evaluation and careful selection. The implementation of this intervention exhibits the potential to generate cost and time efficiencies. The utilization of a stable repair configuration is deemed advantageous in instances characterized by small tears and minimal retraction. This approach enables the implementation of home-based protocols. Unsupervised home-based rehabilitation is contraindicated for patients presenting with large or retracted tears, as well as those who have undergone repair procedures that may lead to tension.

## Conclusion

The findings of this study support the efficacy of patient-driven rehabilitation protocols in individuals undergoing rotator cuff repairs. The positive outcomes include a notable enhancement in the Disabilities of the Arm, Shoulder, and Hand (DASH) score, improved Visual Analog Scale (VAS) scores, and a high rate of successful reintegration into previous occupational activities within a three-month period post-surgery. However, a subset of patients, particularly those with large tears and tension in the repair procedure, exhibited signs of failure, highlighting the importance of careful patient selection and optimal repair procedures.

The study emphasizes the need for comprehensive repair procedures for substantial tears, cautioning against performing repairs under tension. The observed discrepancies in rehabilitation outcomes from various studies underscore the complexity of identifying an optimal rehabilitation protocol. While some studies show the superiority of supervised programs, others find no significant differences between supervised and unsupervised rehabilitation.

## Limitations

The study acknowledges limitations such as the absence of a control group and insufficient regulation of patients' adherence to the home-based program. Despite these limitations, the application of a domiciliary exercise regimen for post-rotator cuff surgery patients, when

carefully evaluated and selected, shows promise, offering potential cost and time efficiencies.

## Recommendations

While home-based rehabilitation can be effective for well-selected individuals, caution is advised for patients with large or retracted tears, as well as those with repair procedures under tension. Further research with controlled designs and meticulous patient monitoring is warranted to refine rehabilitation protocols and optimize outcomes for individuals undergoing rotator cuff repairs.

## Acknowledgement

We are thankful to the patients; without them the study could not have been done. We are thankful to the supporting staffs of the hospital who were involved in patient care of the study group.

## List of Abbreviations

VAS- Visual Analogue Score  
DASH- Disability of the Arm, Hand, and Shoulder  
MRI- magnetic resonance imaging  
SANE- Single Assessment Numeric Evaluation

## Source of Funding

The study was not funded.

## Conflict of interest

The authors report no conflicts of interest in this work.

## References

1. Beaudreuil J, Dhénain M, Coudane H, Mlika-Cabanne N. Clinical practice guidelines for the surgical management of rotator cuff tears in adults. *Orthopaedics & Traumatology: Surgery & Research*. 2010 Apr 1;96(2):175-9.
2. Huisstede BM, Koes BW, Gebremariam L, Keijsers E, Verhaar JA. Current evidence for the effectiveness of interventions to treat rotator cuff tears. *Manual therapy*. 2011 Jun 1;16(3):217-30.
3. Hayes, K., Ginn, K.A., Walton, J.R., Szomor, Z.L. and Murrell, G.A., 2004. A randomized clinical trial evaluating the efficacy of physiotherapy after rotator cuff repair. *Australian journal of Physiotherapy*, 50(2), pp.77-83.
4. Roddey, T.S., Olson, S.L., Gartsman, G.M., Hanten, W.P. and Cook, K.F., 2002. A randomized controlled trial comparing 2 instructional approaches to home exercise instruction following arthroscopic full-thickness rotator cuff repair surgery. *Journal of Orthopaedic & Sports Physical Therapy*, 32(11), pp.548-559.
5. Bükler NA, Akkaya S, Akkaya N. Comparison of the results of supervised physiotherapy program and home-based exercise program in patients treated with arthroscopic-assisted mini-open rotator cuff repair. *Eklemler Hastalıkları Cerrahisi*, 2011; 22(3): 134-139.
6. Lee BG, Cho NS, Rhee YG. Effect of two rehabilitation protocols on range of motion and healing rates after arthroscopic rotator cuff repair: aggressive versus limited early passive exercises. *Arthroscopy: The Journal of Arthroscopic & Related Surgery*. 2012 Jan 1;28(1):34-42.
7. Baumgarten KM, Vidal AF, Wright RW. Rotator cuff repair rehabilitation: a level I and II systematic review. *Sports health*. 2009 Jan;1(2):125-30.
8. Holmgren T, Öberg B, Sjöberg I, Johansson K. Supervised strengthening exercises versus home-based movement exercises after arthroscopic acromioplasty: a randomized clinical trial. *Journal of Rehabilitation Medicine: official journal of the UEMS European Board of Physical and Rehabilitation Medicine*. 2012;44(1):12-8.
9. Andersen NH, Sojbjerg JO, Johannsen HV, Sneppen O. Selftraining versus physiotherapist-supervised rehabilitation of the shoulder in patients treated with arthroscopic subacromial decompression: a clinical randomized study. *J Shoulder Elbow Surg* 1999; 8: 99-101.
10. Lisiński P, Huber J, Wilkosz P, Witkowska A, Wytrzążek M, Samborski W, Zagłoba A. Supervised versus uncontrolled rehabilitation of patients after rotator cuff repair-clinical and neurophysiological comparative study. *The International journal of artificial organs*. 2012 Jan;35(1):45-54.
11. Longo UG, Berton A, Risi Ambrogioni L, Lo Presti D, Carnevale A, Candela V, Stelitano G, Schena E, Nazarian A, Denaro V. Cost-effectiveness of supervised versus unsupervised rehabilitation for rotator-cuff repair: systematic review and meta-analysis. *International journal of environmental research and public health*. 2020 Apr;17(8):2852.
12. Song SJ, Jeong TH, Moon JW, Park HV, Lee SY, Koh KH. Short-term Comparison of Supervised Rehabilitation and Home-based Rehabilitation for Earlier Recovery of Shoulder Motion, Pain, and Function after Rotator Cuff Repair. *Clinics in Shoulder and Elbow*. 2018 Mar;21(1):15.



## Publisher details

Page | 6

**Publishing Journal: Student's Journal of Health Research Africa.**  
**Email: [studentsjournal2020@gmail.com](mailto:studentsjournal2020@gmail.com) or [admin@sjhresearchafrica.org](mailto:admin@sjhresearchafrica.org)**



**(ISSN: 2709-9997)**

**Publisher: SJC Publisher Company Ltd**  
**Category: Non-Government & Non-profit Organisation**  
**Contact: +256775434261(WhatsApp)**  
**Email: [admin@sjpublisher.org](mailto:admin@sjpublisher.org)**  
**Website: <https://sjpublisher.org>**  
**Location: Wisdom Centre Annex, P.O. BOX. 113407 Wakiso, Uganda, East Africa.**