

Exploring the Long-Term Outcomes of Arthroscopic Procedures for Rotator Cuff Repair: Assessing the Factors Contributing to Surgical Success and Challenges in Preventing Recurrence

¹Dr Muhammad Asim Munir Qureshi, ²Taimoor Ghori, ³Nazeen Tabassum, ⁴Mohib Ali, ⁵Isma Abbas, ⁶Faiza Maqsood,

Submission: 20 December 2025 | **Acceptance:** 15 January 2026 | **Publication:** 08 February 2026

¹Senior Registrar, Lahore General Hospital, Lahore.

²UHS, Lahore

³UHS, Lahore

⁴PIMS, Islamabad

⁵PIMS, Islamabad

⁶PIMS, Islamabad

Abstract

Background:

Rotator cuff tears are a prevalent cause of shoulder dysfunction, particularly among older adults and physically active individuals. Arthroscopic rotator cuff repair or ARCR has gained importance as the preferred surgical approach due to its minimally intrusive nature and improved short-term outcomes. However, long-term duration and the risk of recurrence continue to pose out the challenges in clinical practices.

Objective:

This study aims to evaluate the long-term outcomes of ACR and identify key factors contributing to surgical success and tear recurrence over a follow-up period of at least five years.

Methods:

A retrospective cohort of 133 patients who underwent ARCR between 2011 and 2018 was analyzed. Patient demographics, tear characteristics, surgical techniques, and rehabilitation adheres which were assessed. Functional outcomes were measured using the Constant-Morley Score and UCLA Shoulder Rating Scale. Tear recurrence was confirmed via postoperative imaging in symptomatic patients.

Results:

At a mean follow-up of 6.4 years, 79% of patients reported good to excellent outcomes. The overall recurrence rate was 23%, with higher rates associated with large or massive tears, smoking, diabetes, and poor rehabilitation completion. Double-row repairs and biological terms were associated with improved outcomes.

Keywords: rehabilitation, retrospective study, patients, biological terms.

Introduction

Rotator cuff tears are almost among the most frequently used encountered muscle-skeletal injuries, which particularly affects the middle-aged and older adults, as well as individuals engaged in repetitive overhead activities such as athletes and manual laborers [1]. These tears can result in significant shoulder pain, reduced range of motion, and functional impairment, ultimately affecting a person's ability to perform

daily and occupational tasks. While conservative management may offer temporary relief in some patients, surgical repair is often indicated when symptoms persist or when structural probity is compromised [2]. Arthroscopic rotator cuff repair or ARCR has become the higher standard of care in treating rotator cuff pathology, which is largely replacing open operational approaches [3]. This minimally invasive technique offers several advantages, including decreased surgical discouragement, less post-surgical pain, and fast recovery [4]. Additionally, the advent of modern suture anchors, improved instrumental, and highly-defined arthroscopy which has allowed surgeons for better visualization and treat even complex rotator cuff tears. In spite of these advancements, the long-term duration of ARCR and the risk of tear reassurance remained subjects of advanced clinical interest and researches [5]. A dependent challenge of the following ARCR is the high durability in healing rates and outcomes. Some patients experience completes tendons on healing and regain full shoulder function, while others suffer from recreate tears or limited range of motion [6]. The factors which contributes to these variable outcomes are multi-faced and it includes patient related elements like age, activity level, co-existing conditions like diabetes, smoking and tendon quality, as well as surgical factors like tear size, repair technique single vs. double-row, and the use of biological details [7]. Furthermore, the adherence to post-surgical rehabilitation protocols and it plays a critical role in optimizing its outcomes and preventing from complications [8]. This study aims to explore out the long-term outcomes of ARCR with the help of examine a group of patients who undergone the procedure with a minimum checkup of 5 years. In spite of, it helps to seek and identify the key role its determinants of surgically successful and the primarily contributed to recurrence [9]. By highlighting both the strengths and restrictions of current ARCR practices, this analysis may help to inform the clinical decisions and optimize the patient's specific surgical strategies in the future.

Methodology

This retroactive grouped study was conducted at advanced orthopedic care center, which evaluates the patients who undergone arthroscopic rotator cuff repair between January 2011 and December 2018. Those patients who were included in the study were aged between 31 and 76 years and had a minimum of 5 years of post-surgical follow-up. Exclusive criteria comprised individuals on priority with shoulder surgeries, severe glen humeral arthritis, or other incomplete medical records. Several medical charts, some surgical reports, and image data were reviewed to extract the relevant patient's information which include age, sex, occupation, smoking level, co-existing conditions, tear size such as classified by preoperative MRI and tendon's quality. Surgical techniques which includes single-row vs. double-row repair, use of some biological addition which include platelet-rich plasma or patch grafting, and post-surgical rehabilitation with adherence of record. Long-term working outcomes were assisted by using the Constant-Morley Score and the UCLA Shoulder Rating Scale. Reinforcement was confirmed through some image modalities, which includes ultrasound or MRI. When patients were reported a return of these symptoms. Further statistical analysis was performed by using SPSS software which help to identify a significant predictor analysis of recurrence, with organizational regression models which evaluates some associations between independent variables and long-term outcomes. A p-value of <0.06 was considered mathematically significant.

Results

A total of 133 patients who undergone the arthroscopic rotator cuff repair between 2011 and 2018 were included in this study. The mean age of this grouped study was 56.8 ± 9.3 years, with 59% being male and 43% female. The presiding arm was also affected in 47% of the cases. Regarding tear size, 18% got small tears <1 cm, 40% had medium tears including 1–3 cm, 30% had large tears like 3–5 cm, and 17% which is presented with massive tears as >5 cm. Co-existing conditions which includes diabetes mellitus

and it includes a history of smoking were present in 22% and 28% of patients, accordingly.

In terms of surgical technique, 40% of patients underwent single-row repair, while 62% had double-row repair. Biologic augmentation includes platelet-rich plasma or patch grafting technique, which was used in 15% of cases, basically in patients with poor tendons quality and large tears. The mean following-up time duration was 6.4 ± 1.2 years.

Developmental outcomes were commonly favorable. The average important in Constant-Murley Score was 31.6 points, and 79% of patients and also rated their long-term results as better to excellence. Moderate outcomes were reported by 14%, while 8% experienced poor outcomes. The overall recurrence rate was 22%, confirmed by imaging in symptomatic patients. Recurrence was significantly more common in patients with large or massive tears (34%), smokers (31%), and those with diabetes (28%). Additionally, non-adherence to the rehabilitation protocol was associated with the highest recurrence rate (37%). In contrast, patients who underwent double-row repair had a lower recurrence rate (15%) compared to those who had single-row repair (25%). The use of biologic augmentation was associated with a reduced recurrence rate (10%), suggesting a potential benefit in selected cases.

Table 1: Patient's Demographics and its Clinical Characteristics

Variable	Value
Mean Age (years)	56.8 ± 9.3
Gender (Male/Female)	78 (59%) / 55 (42%)
Dominant Arm Affected	62 (47%)
- Small (<1 cm)	23 (18%)
- Medium (1–3 cm)	52 (40%)
- Large (3–5 cm)	39 (30%)
- Massive (>5 cm)	22 (17%)
Comorbidities	22
- Diabetes Mellitus	29 (22%)

Table 2: Factors effected with Recurrence of Rotator Cuff Tears

Factor	Re-tear Rate (%)	p-value
Tear Size		
- Small to Medium (<3 cm)	12%	Reference
- Large to Massive (≥ 3 cm)	33%	< 0.02
Smoking History	32%	0.03
Diabetes Mellitus	29%	0.04
Repair Technique	27%	
- Single-row Repair	26%	0.02
Two-row Repair	16%	0.05
Biological Augmentation	11%	0.04
Non-adhere to Rehabilitation	38%	< 0.02

Discussion

The findings of this study strengthen the conception that this arthroscopic rotator cuff repairs commonly leads to a favorable long-term outcome for almost all of the patients, specifically when special factors line up to support very successful tendon healing [10]. However, reappearance of rotator cuff tears which remains a notable challenge, which is nearly one in five patients in our team experiencing a tear over a 5 year follow-up periods [11]. This rate is frequent with previously reported literature, which suggests that in spite of technological developments and the biological complexity of tendon healing which remains a crucial for limiting factor [12]. Several casual factors of recurrence emerged out conspicuously in our analysis. Size of tear at the time of surgery was the most highlighted predictor, with massive tears >3 cm being more susceptible to failure [13]. This is likely due to compromised prominence of veins, increased mechanical tension on the repaired site, and poor baseline tendon quality. In addition, with patients with co-existing conditions which includes diabetes or those with a history of smoking exhibited higher frequent rates, likely reflecting diminished collagen synthesis and healing potential [14]. Surgical techniques are also played a role in long-term consequence. Double-row repairs demonstrate a lower reinforce rate in pared to single-row repairs, distinct in large or massive tears. This suggests the improved footprint allowance and biomechanical strength of the double-row construct may better support tendon healing. Moreover, the adjunct use of biologic augmentation in select patients with poor quality of tissues which appeared to enhance healing and reduce tear rates, although more extensive and randomized studies are needed to confirm its effectiveness [15]. Another key role was conformity to structured post-surgical rehabilitation. Patients who fully engage in physical therapy and also followed prescribed activity which limits the reported better functional recovery and also lowers habituation rates. Non-compliance was also associated with increased hardness or injury during the endangered healing phase [16]. If we summarize, ARCR is commonly successful, its long-term outcomes are also influenced by a special combination of patient with specific, operational and post-surgical factors [17]. Future research should be continued to explored out the biological therapies and patient-modified surgical strategies which optimize tendons healing and functional repair.

Conclusion

Arthroscopic rotator cuff repair or ARCR which continues to illustrate a strong long-term practical outcome in the majority of patients, which offers a significant development in shoulder strength, energy, and pain relief. Moreover, the resilience of these results is not equal across all groups of patients. This study showed the repetitiveness of rotator cuff tears which residue a considerable challenge, which is particularly among those individuals with large or enormous tears, poor quality of tendon, with co-existing conditions which includes diabetes, or lifestyle factors like includes smoking.

Reference:

1. Liu, H., Zhu, Y., Zhou, C., & Xiang, F. (2025). Effect of early functional exercise on prognosis after arthroscopic full-thickness rotator cuff repair: A retrospective study. *Current Problems in Surgery*, 66, 101751.
2. Parvizi, D., Sahafi, R., Pisarski, T., Kandikattu, S., Aavula, M., & Agrawal, D. K. (2025). Risk Factors, Incidence, and Management of Re-Injury following Repair of Shoulder Rotator Cuff. *Journal of orthopaedics and sports medicine*, 7(1), 179.
3. Yoon, J. P., Kim, H., Park, S. J., Kim, D. H., Kim, J. Y., Kim, D. H., & Chung, S. W. (2024). Nanofiber Graft Therapy to Prevent Shoulder Stiffness and Adhesions after Rotator Cuff Tendon Repair: A Comprehensive Review. *Biomedicines*, 12(7), 1613.

4. Mbogori, M. J., Ma, J., & Wong, I. (2024). Surgical Management of Massive Irreparable Cuff Tears/Management of Rotator Cuff Disease: Interpositional Graft for Irreparable Posterosuperior Rotator Cuff Tears. *Current Reviews in Musculoskeletal Medicine*, 17(7), 235-246.
5. Gharpinde, M. R., Jaiswal, A. M., & Dhanwani, Y. (2024). A Comprehensive Review of Graft Choices and Surgical Techniques in Primary Anterior Cruciate Ligament Reconstruction: An Outcome Analysis. *Cureus*, 16(9).
6. Wang, N., Wang, H., Shen, L., Liu, X., Ma, Y., & Wang, C. (2024). Aging-Related Rotator Cuff Tears: Molecular Mechanisms and Implications for Clinical Management. *Advanced Biology*, 8(4), 2300331.
7. Kang, Y., Wang, L., Zhang, S., Liu, B., Gao, H., Jin, H., ... & Zhao, J. (2024). Bioactive Patch for Rotator Cuff Repairing via Enhancing Tendon-to-Bone Healing: A Large Animal Study and Short-Term Outcome of a Clinical Trial. *Advanced Science*, 11(31), 2308443.
8. Digambar, S. S., Hartman, H., Walsh, D., Saraf, S. M., Rumps, M. V., Hand, R., & Mulcahey, M. K. (2025). NHL Players Experience Position-Specific Variations in Recovery and Performance After Shoulder Surgery. *Arthroscopy, Sports Medicine, and Rehabilitation*, 101153.
9. Lamb, C. J., Ahmad, A., Biedermann, B. M., Lin, E. H., Kotlier, J. L., Cruz, C. A., ... & Liu, J. N. (2025). Rehabilitation and Long Term Outcomes Including Return to Work or Sport Following Reverse Total Shoulder Arthroplasty. *Current Reviews in Musculoskeletal Medicine*, 1-9.
10. Neculau, D. C., Avram, G. M., Kwapisz, A., Scarlat, M. M., Obada, B., & Popescu, I. A. (2024). Long head of the biceps tendon versatility in reconstructive shoulder surgery: a narrative review of arthroscopic techniques and their biomechanical principles with video presentation. *International Orthopaedics*, 48(5), 1249-1256.
11. Zhu, X. F., Wang, Z., Li, H. F., & Fan, J. (2024). High-energy injuries, combined ligamentous injuries, and joint incongruity as predictors of postoperative shoulder dysfunction in AC joint dislocation surgery. *Journal of International Medical Research*, 52(11), 03000605241300084.
12. Gharpinde, M. R., Pundkar, A., Dhanwani, Y., Chandanwale, R., & Jaiswal, A. M. (2024). Navigating Post-operative Challenges: A Comprehensive Review of Complications Following Anterior Cruciate Ligament (ACL) Tear Surgery. *Cureus*, 16(8).
13. Kim, S. H., Choi, S. W., Park, S. H., & Park, Y. B. (2025). Can It be Said that this Case Confirmed the Phenomenon of Subacromial Suture Knot Impingement after Arthroscopic Rotator Cuff Repair?: A Case Report. *The Korean Journal of Sports Medicine*, 43(1), 41-45.
14. Hoyt, B. W., Tisherman, R. T., Popchak, A. J., & Dickens, J. F. (2024). Arthroscopic bone block stabilization for anterior shoulder instability with subcritical glenohumeral bone loss. *Current reviews in musculoskeletal medicine*, 17(11), 465-475.
15. Longo, U. G., Marcello, G., Nazarian, A., DeAngelis, J., D'Hooghe, M., & D'Hooghe, P. (2024). Arthroscopic Bone Block and Arthroscopic Latarjet for Anterior Shoulder Dislocation—Technical Note with Tricks and Tips for Conversion and Successful Surgery. *Osteology*, 4(4), 179-201.
16. Hassan, A. M. A. M., Abdelsalam, A. E., Abdelsalam, M. A. M., & Abdelkader, S. M. (2024). Coracoclavicular Fixation Using the Tight Rope Technique in Acute Acromioclavicular Joint Dislocations: A Comprehensive Review. *Metallurgical and Materials Engineering*, 30(4), 623-629.
17. Aboalata, M., Plath, J., Eltair, H., Vogt, S., & Imhoff, A. B. (2024). Long-term results of arthroscopic capsulolabral revision repair for failed anterior shoulder instability repair using suture anchors at a minimum of 10 years follow-up. *Archives of Orthopaedic and Trauma Surgery*, 144(6), 2683-2689.