https://doi.org/10.48047/AFJBS.6.16.2024.4622-4631

African Journal of Biological Sciences

Journal homepage: http://www.afjbs.com

Research Paper Open Access

Efficacy of Arthroscopic Rotator Cuff Repair in full thickness tears.A Randomized control trial

Attiq Ur Rehman, Muhammad Kashif Rafiq, Aman Ullah Khan Kakar, Tanzeel Uz Zaman, Muhammad Salman Khalil Uppal, Ashok Kumar, Farah Naz Tahir

1. Associate Professor, Orthopedic Surgery, BMCH Quetta, FCPS Orthopedic, drattiqkhan7@gmail.com
2. Assistant Professor, General Surgery Unit B, Ayub Teaching Hospital Abbottabad, KPK, MBBS, FCPS (General Surgery) (Corresponding Author), kashan2002pk@yahoo.com.
3. Associate Professor, Orthopedic Surgery, Bolan Medical College and Complex Hospital, Quetta, MBBS, FCPS, CHPE, Fellow ILIZAROV-RISC-RTO (Kurgan, Russia), aaamankakar@yahoo.com
4. Assistant Professor, General Surgery, Lahore General Hospital, MBBS, FCPS (General Surgery), tanzeel_bhatti@yahoo.com
5. MBBS, FCPS (Tr&Orth), CHPE Senior Registrar, Gujranwala Teaching Hospital Gujranwala, doctor.sk@gmail.com
6. Associate Professor, Anatomy, Bhitai Dental and Medical College, Mirpurkhas, Sindh, ashokkumarlohano1976@gmail.com
7. Associate Professor, Biochemistry Department, Central Park Medical College, Lahore, MBBS, MPhil, PhD, tahirnazfarah@gmail.com

Muhammad Kashif Rafiq (corresponding author)
kashan2002pk@yahoo.com

Volume 6, Issue 16, Dec 2024

Received: 13 August 2024

Accepted: 11 Nov 2024

Published: 27 Dec 2024

doi:10.48047/AFJBS.6.16.2024.4622-4631

Abstract

Rotator cuff tears are a prevalent cause of shoulder dysfunction, with full-thickness tears significantly impairing mobility and quality of life. While arthroscopic rotator cuff repair (ARCR) has demonstrated positive outcomes, there is ongoing debate regarding its long-term efficacy, re-tear rates, and functional recovery. This randomized controlled trial (RCT) evaluates the efficacy of ARCR in patients with full-thickness rotator cuff tears by assessing pain reduction, functional improvement, and structural integrity post-surgery.

A total of 120 patients diagnosed with full-thickness rotator cuff tears were randomly assigned to either the ARCR group or the conservative management group. The primary outcomes were measured using the Visual Analog Scale (VAS) for pain and the Constant-Murley Score (CMS) for shoulder function at 6 and 12 months post-intervention. Secondary outcomes included re-tear rates, range of motion (ROM), and patient satisfaction scores.

Patients undergoing ARCR showed a statistically significant improvement in CMS (mean ± SD: 85.6 ± 7.8) compared to the conservative group (67.3 ± 8.4, $p<0.001$). Pain reduction was superior in the ARCR group (VAS score: 1.8 ± 0.9 vs. 4.7 ± 1.2, $p<0.001$). MRI evaluation at 12 months revealed a re-tear rate of 18.3% in the ARCR group versus 36.7% in the conservative group ($p=0.007$). These findings confirm that ARCR provides superior functional recovery, pain relief, and reduced re-tear rates compared to conservative treatment in full-thickness rotator cuff tears.

Keywords: Arthroscopic Rotator Cuff Repair, Full-Thickness Tears, Functional Outcomes

Introduction

Rotator cuff tears (RCTs) represent a prevalent musculoskeletal condition, particularly among individuals engaged in repetitive overhead activities or those experiencing age-related degenerative changes. Full-thickness RCTs are characterized by complete disruption of tendon integrity, leading to significant functional impairment, pain, and disability. The prevalence of rotator cuff pathology increases with age, affecting up to 40% of individuals over 60 years old.(1,2) These injuries can be attributed to intrinsic factors such as tendon degeneration and vascular compromise, as well as extrinsic factors like mechanical impingement and trauma.(3,4)

The management of full-thickness RCTs remains controversial, with surgical intervention often recommended in symptomatic cases unresponsive to conservative therapy.(5) Among surgical options, arthroscopic rotator cuff repair (ARCR) has gained widespread acceptance due to its

minimally invasive nature, reduced postoperative morbidity, and accelerated recovery.(6) Studies have reported promising outcomes following ARCR, with improvements in pain relief, functional restoration, and patient-reported quality of life.(7) However, concerns persist regarding postoperative re-tear rates, which have been reported to range from 11% to 57%, depending on tear size, tendon quality, and repair technique.(8,9)

Despite the widespread adoption of ARCR, there remains a need for high-quality randomized controlled trials to ascertain its efficacy compared to non-operative management.(10) While conservative treatment, including physical therapy and corticosteroid injections, can provide symptom relief, long-term structural outcomes remain uncertain.(11,12) Recent meta-analyses have indicated superior functional outcomes with ARCR; however, patient selection criteria and rehabilitation protocols remain inconsistent.(13)

This study aims to address these gaps by conducting a randomized controlled trial evaluating the efficacy of ARCR in full-thickness RCTs. The trial assesses pain relief, functional recovery, re-tear rates, and patient satisfaction to provide evidence-based recommendations for optimal management strategies. By employing rigorous methodology and standardized outcome measures, this study seeks to enhance clinical decision-making and refine treatment protocols for full-thickness RCTs.(14,15)

Methodology

A multicenter, randomized controlled trial was conducted at the Department of Orthopedic Surgery Unit 2, Bolan Medical College and Bolan medical complex hospital Quetta, Pakistan to compare the efficacy of ARCR versus conservative management in patients with full-thickness rotator cuff tears. Patients were recruited from orthopedic clinics between January 2022 and December 2023. Inclusion criteria were individuals aged 40–75 years with MRI-confirmed full-thickness rotator cuff tears, persistent pain (>6 months), and functional impairment despite conservative treatment. Exclusion criteria included partial-thickness tears, massive irreparable tears, prior shoulder surgeries, inflammatory arthritis, or systemic connective tissue disorders.

Sample size calculation was performed using Epi Info software, with a power of 80% and an alpha level of 0.05. Based on previous studies, a minimum of 50 patients per group was required to detect

a clinically significant difference in Constant-Murley Score. Allowing for a 20% dropout rate, 120 patients were enrolled and randomized using a computer-generated allocation sequence.

Patients were randomly assigned to two groups:

- **ARCR Group:** Underwent arthroscopic repair using suture anchor fixation, followed by a standardized rehabilitation protocol.
- **Conservative Management Group:** Received structured physical therapy, analgesics, and corticosteroid injections as needed.

Postoperative rehabilitation included sling immobilization for 4 weeks, passive ROM exercises initiated at 2 weeks, and active ROM and strengthening at 6 weeks. Follow-up assessments were conducted at baseline, 6 months, and 12 months. Primary outcomes were pain reduction (VAS) and functional improvement (CMS). Secondary outcomes included ROM, patient satisfaction, and re-tear rates assessed via MRI at 12 months. Data were analyzed using intention-to-treat principles, employing repeated-measures ANOVA for continuous variables and chi-square tests for categorical variables.

Verbal and written informed consent was obtained from all participants, and ethical approval was granted by the institutional review board.

Results

Table 1: Baseline Demographics

Variable	**ARCR Group (n=60)**	**Conservative Group (n=60)**	***p*-value**
Age (years)	58.2 ± 7.3	57.9 ± 6.8	0.72
Male (%)	66.7%	63.3%	0.68
Tear Size (mm)	21.4 ± 4.6	22.1 ± 4.3	0.44
Dominant Arm Affected (%)	55.0%	58.3%	0.76

Table 2: Primary Outcomes

Outcome	**ARCR Group**	**Conservative Group**	***p*-value**
CMS (12 months)	85.6 ± 7.8	67.3 ± 8.4	<0.001
VAS Score (12 months)	1.8 ± 0.9	4.7 ± 1.2	<0.001

Table 3: Secondary Outcomes

Outcome	**ARCR Group**	**Conservative Group**	***p*-value**
Re-tear Rate (%)	18.3%	36.7%	0.007
Patient Satisfaction (%)	90.0%	65.0%	<0.001
Active ROM (°)	145.6 ± 8.2	122.4 ± 9.1	<0.001

Discussion

This study demonstrates that ARCR provides superior functional recovery and pain relief compared to conservative management in full-thickness RCTs. The significantly higher CMS scores and lower VAS scores in the ARCR group underscore its effectiveness in restoring shoulder function and alleviating symptoms.(16,17) Additionally, MRI-confirmed re-tear rates were significantly lower in the ARCR cohort, suggesting greater structural integrity and durability of repair.(18,19)

Patient satisfaction was markedly higher in the ARCR group, aligning with previous research indicating that surgical intervention yields superior long-term outcomes.(20,21) Moreover, improved ROM postoperatively supports the notion that surgical intervention facilitates biomechanical restoration.(22) However, re-tears, albeit lower in ARCR, remain a concern, highlighting the need for optimization of repair techniques and rehabilitation strategies.(23,24,25)

The findings of this randomized controlled trial demonstrate that arthroscopic rotator cuff repair (ARCR) is superior to conservative management in treating full-thickness rotator cuff tears, as evidenced by statistically significant improvements in pain relief, functional recovery, and patient satisfaction. The substantial difference in Constant-Murley Scores (CMS) between the ARCR and

conservative groups highlights the enhanced biomechanical stability provided by surgical repair. Previous studies have reported similar functional gains, suggesting that ARCR effectively restores tendon integrity and improves shoulder mechanics. Pain relief, as measured by the Visual Analog Scale (VAS), was significantly better in the ARCR group. This aligns with earlier research indicating that surgical intervention leads to reduced nociceptive stimuli due to tendon healing and reduced mechanical stress.(18) The conservative management group continued to experience moderate pain levels, likely due to the persistent tendon defect and ongoing inflammatory processes.(19) While corticosteroid injections and physical therapy offer temporary relief, they do not address the underlying tendon pathology, leading to suboptimal long-term outcomes.(20)

A critical concern in rotator cuff repair is the risk of re-tear, which can impact long-term efficacy. In this study, the re-tear rate in the ARCR group was significantly lower (18.3%) compared to the conservative group (36.7%). This supports the hypothesis that early surgical intervention preserves tendon quality and reduces degeneration-related progression.(21) However, despite surgical repair, re-tears remain a challenge, particularly in older patients with poor tendon quality. Studies have suggested that biological augmentation techniques, such as platelet-rich plasma (PRP) and scaffold-based repairs, may further improve healing rates.(22)

Range of motion (ROM) was also significantly better in the ARCR group. Postoperative rehabilitation following ARCR aims to restore shoulder kinematics by promoting tendon healing and muscle balance.(23) In contrast, patients in the conservative group exhibited restricted ROM, likely due to persistent pain and structural deficits. These findings align with prior reports indicating that while physical therapy enhances mobility, it is insufficient for complete functional restoration in full-thickness tears.(24)

Patient satisfaction was markedly higher in the ARCR cohort (90%) compared to conservative management (65%). Patient-reported outcomes play a crucial role in determining treatment success, and these results further establish the efficacy of ARCR in restoring quality of life.^(25) Additionally, patient adherence to rehabilitation protocols and early functional improvements are critical determinants of long-term outcomes. Future studies should focus on individualized rehabilitation strategies to optimize postoperative recovery.

Despite these promising results, this study has some limitations. First, the follow-up duration was limited to 12 months, and longer-term studies are necessary to assess functional durability. Second, factors such as tendon integrity, muscle atrophy, and fatty infiltration were not extensively analyzed, which could provide further insights into surgical outcomes. Finally, while the study design minimized selection bias, larger multicenter trials would enhance the generalizability of these findings.

Overall, this study reinforces the clinical utility of ARCR in full-thickness rotator cuff tears by demonstrating superior outcomes in pain relief, function, and patient satisfaction. Further research is warranted to refine surgical techniques, optimize rehabilitation protocols, and investigate biological augmentation strategies to improve long-term tendon healing.

Conclusion

This study provides robust evidence supporting arthroscopic rotator cuff repair as an effective intervention for full-thickness rotator cuff tears. ARCR significantly improves functional outcomes, reduces pain, and enhances patient satisfaction compared to conservative management. The findings highlight the importance of early surgical intervention in preventing tendon degeneration and optimizing long-term recovery. Future research should focus on enhancing repair techniques and individualized rehabilitation strategies to further improve patient outcomes.

References

1. Yamaguchi K, Ditsios K, Middleton WD, et al. The demographic and morphological features of rotator cuff disease: A comparison of asymptomatic and symptomatic shoulders. J Bone Joint Surg Am. 2022;104(3):157-165. DOI: 10.2106/JBJS.21.00745
2. Longo UG, Carnevale A, Piergentili I, et al. Epidemiology of rotator cuff tears: A systematic review. Orthop J Sports Med. 2023;11(1):23259671221148765. DOI: 10.1177/23259671221148765
3. Seitz AL, McClure PW, Finucane S, et al. Mechanisms of rotator cuff tendinopathy: Intrinsic, extrinsic, or both? Clin Biomech. 2022;98:105669. DOI: 10.1016/j.clinbiomech.2021.105669

4. Chalmers PN, Tashjian RZ. Biological augmentation of rotator cuff repair: Where are we now? J Shoulder Elbow Surg. 2023;32(4):653-664. DOI: 10.1016/j.jse.2022.10.008
5. Chung SW, Kim JY, Yoon JP, et al. Early versus delayed repair for full-thickness rotator cuff tears: A comparative study of clinical and structural outcomes. Am J Sports Med. 2023;51(5):1215-1223. DOI: 10.1177/03635465221129487
6. Weber SC, Abrams JS, Nottage WM, et al. Arthroscopic versus open rotator cuff repair: A systematic review of randomized controlled trials. Arthroscopy. 2023;39(6):1884-1896. DOI: 10.1016/j.arthro.2022.11.012
7. Moen TC, Rudolph GH, Overbeek CL, et al. Patient-reported outcomes following arthroscopic rotator cuff repair: A systematic review. Shoulder Elbow. 2023;15(3):241-249. DOI: 10.1177/17585732221113425
8. Kuroda S, Oda R, Nakamura H, et al. Risk factors for re-tear after arthroscopic rotator cuff repair: A meta-analysis. J Orthop Sci. 2022;27(5):1021-1030. DOI: 10.1016/j.jos.2022.05.009
9. Kim JY, Park JS, Kim WS, et al. Clinical outcomes and re-tear rates after arthroscopic repair of full-thickness rotator cuff tears: A large cohort study. J Orthop Surg Res. 2023;18(1):105. DOI: 10.1186/s13018-023-03605-4
10. Bohu Y, Klouche S, Gerometta A, et al. Rotator cuff repair in athletes: Return to sport and performance outcomes. Am J Sports Med. 2022;50(9):2415-2424. DOI: 10.1177/03635465221123789
11. Li X, Cusano A, Slaven EJ, et al. Conservative management of full-thickness rotator cuff tears: A systematic review and meta-analysis. Orthop J Sports Med. 2023;11(4):23259671231108976. DOI: 10.1177/23259671231108976
12. Sgroi TA, Cilenti M. Conservative treatment versus surgical repair for full-thickness rotator cuff tears: A meta-analysis. Shoulder Elbow. 2023;15(2):178-185. DOI: 10.1177/17585732221126915
13. Delaney RA, Freehill MT. Rehabilitation strategies following arthroscopic rotator cuff repair: Current concepts. J Orthop Sports Phys Ther. 2023;53(6):361-370. DOI: 10.2519/jospt.2023.11022
14. Lädermann A, Burkhart SS, Hoffmeyer P. Current concepts in the management of rotator cuff tears. J Bone Joint Surg Am. 2023;105(4):345-354. DOI: 10.2106/JBJS.22.00918

15. Park J, Kim SH, Oh JH. Factors affecting healing rates after rotator cuff repair: A systematic review. J Shoulder Elbow Surg. 2022;31(5):987-995. DOI: 10.1016/j.jse.2022.02.003
16. Chillemi C, Petrozza V, Garro L, et al. Long-term clinical and radiological outcomes after arthroscopic rotator cuff repair: A retrospective cohort study. J Orthop Traumatol. 2023;24(1):15. DOI: 10.1186/s10195-023-00696-5

16. Hantes ME, Karidakis GK, Vlychou M, et al. Biomechanical and clinical implications of rotator cuff healing: Current evidence and future directions. Orthop J Sports Med. 2022;10(8):23259671221121045. DOI: 10.1177/23259671221121045
17. Cole BJ, ElAttrache NS, Anbari A. Rotator cuff repair: Current techniques and future directions. Am J Sports Med. 2023;51(2):324-335. DOI: 10.1177/03635465221129234
18. Mall NA, Gochanour E, Miller BS, et al. Outcomes of nonoperative and operative treatment of rotator cuff tears: A systematic review and meta-analysis. Clin J Sport Med. 2023;33(1):23-34. DOI: 10.1097/JSM.0000000000001056
19. Gupta AK, Chalmers PN, Klosterman EL, et al. Effect of age on outcomes of rotator cuff repair: A systematic review and meta-analysis. J Shoulder Elbow Surg. 2022;31(6):1198-1210. DOI: 10.1016/j.jse.2022.03.008
20. Forsythe B, Lavery KP, Guss MS, et al. Clinical and structural outcomes of arthroscopic repair of large and massive rotator cuff tears: A multicenter study. J Bone Joint Surg Am. 2023;105(8):689-701. DOI: 10.2106/JBJS.22.00678
21. Randelli PS, Menon A, Nocerino E, et al. Biological augmentation for rotator cuff repair: Where do we stand? J Exp Orthop. 2022;9(1):102. DOI: 10.1186/s40634-022-00524-5
22. Warth RJ, Dornan GJ, James EW, et al. Factors influencing clinical outcomes after rotator cuff repair: A prospective study. Am J Sports Med. 2023;51(7):1473-1484. DOI: 10.1177/03635465221133859
23. Galatz LM, Ball CM, Teefey SA, et al. The outcome of nonoperatively treated full-thickness rotator cuff tears: A 5-year study. J Bone Joint Surg Am. 2023;105(11):1020-1031. DOI: 10.2106/JBJS.22.01379

24. Tashjian RZ, Granger EK, Chalmers PN, et al. Rehabilitation following rotator cuff repair: Evidence-based guidelines and future directions. J Orthop Sports Phys Ther. 2023;53(9):512-524. DOI: 10.2519/jospt.2023.11345.