ORIGINAL ARTICLE

Eastern Journal of Medicine

East J Med 27(4): 601-606, 2022
DOI: 10.5505/ejm.2022.69586

The Effect of Age on Clinical, Functional and Quality of Life Outcomes After Arthroscopic Rotator Cuff Repair in Female Patients

Sinan Oguzkaya[1*], Gokay Eken[2], Ensar Turko[3], Erdal Uzun[4]

[1]*Şarkışla Devlet Hastanesi, Ortopedi Ve Travmatoloji Bölümü, Sivas, Türkiye*
[2]*Bursa Acıbadem Hastanesi, Ortopedi Ve Travmatoloji Bölümü, Bursa, Türkiye*
[3]*Şarkışla Devlet Hastanesi, Radyoloji Bölümü, Sivas, Türkiye*
[4]*Erciyes Üniversitesi Tıp Fakültesi, Ortopedi Ve Travmatoloji Anabilim Dalı, Kayseri, Türkiye*

ABSTRACT

In the literature, the effects of age and gender on rotator cuff repair (RCR) have been evaluated separately in many studies. In our study, we aimed to analyze the outcomes of female patients above and below the age of 60. A total of 55 female patients who received arthroscopic rotator cuff repair (ARCR) between 2018 and 2020 were examined retrospectively. The patients were classified according to their age as Group 1 (<60 years) (n=21) and Group 2 (≥60 years) (n=34). From patient records, the dominant side, the body mass index, etiology of the rupture, and the duration of the symptoms were recorded. The American Shoulder and Elbow Surgeons (ASES) score, Constant-Murley (CM) score, Visual Analog Scale (VAS), and SF-36 Health Survey (SF-36) score were used in the evaluation of clinical, functional and quality of life measurements.

Preoperative and postoperative CM, VAS, and ASES scores did not differ between groups (P>0.05). The preoperative SF-36 values were similar between the two groups (P> 0.05). Emotional problems, energy, social function, pain and overall health change domains of SF-36 were higher in Group 1 (P <0.05).

Clinical and functional outcomes are not affected by age, whereas emotional problems, energy, social function, pain and overall health domains become worse in patients over 60 years of age.

Keywords: Rotator cuff repair; arthroscopic rotator cuff repair; age; functional result.

Introduction

Rotator cuff tears (RCTs) cause disability, pain, weakness, and therefore influence the patient's quality of daily life (1). The prevalence of rotator cuff disease is approximately 10% in people under 20 years old, 54% in people over 60 years, and 62% in over 80 years of age (2). The incidence of RCTs usually increases with advancing age (3). Older age and comorbidities may reduce the healing capacity at the tendon-bone interface (4). In studies which aimed to analyze the relation between gender and outcomes after RCR, it was reported that female patients experienced worse pain, function, frustration, depression, and anxiety before and after surgery (5-7). A study showed that the female patients had worse Constant-Murley (CM) and the Simple Shoulder Test (SST) (8). In the literature, the effects of age and gender on cuff repair have been evaluated separately in many studies. In our study, we aimed to evaluate the outcomes of female patients under and over the age of 60. We hypothesized that lower functional and clinical outcomes would related to increased age in female gender.

Materials and Methods

This multicenter study was started after ethical board approval. Prospectively collected data of 190 female patients who underwent ARCR between 2018 and 2020 were evaluated retrospectively. After the inclusion and exclusion criteria applied, 55 female patients participated.

Inclusion Criteria were; patients over 18 years of age, full-thickness RCR, patients who failed to nonoperative treatment for three months, and at least 12 months follow-up period postoperatively. Exclusion Criteria were; patients younger than 18

***Corresponding Author:** Dr. Ensar Türko, Sarkısla Public Hospital, Department of Radiology, 58030, Sivas, Turkey
Mail: ensarturko@hotmail.com, Phone: +90 346 512 14 77
ORCID ID: Sinan Oguzkaya: 0000-0003-3032-5714, **Gokay Eken:** 0000-0001-9447-4749, **Ensar Turko:** 0000-0001-7989-5668, **Erdal Uzun:** 0000-0002-5456-3699
Received: 20.06.2021, **Accepted:** 20.03.2022

years old, partial cuff tears, massive tears, open cuff repair, degenerative changes in the shoulder, history of surgery from the ipsilateral shoulder, presence of subscapularis tear, or infraspinatus tear.

Clinical and Radiologic Evaluation: Female patients younger than 60 years were classified as Group 1(n=21), and female patients who were 60 years old or older were classified as Group 2 (n=34). From the patients' records, the dominant side, the body mass index, whether the rupture was acute or chronic, and the duration of the symptoms were recorded.

Tears were classified according to Goutallier classification and tear size was recorded from the MRI findings.

The classification of tears was made according to DeOrio and Cofield (9). The ASES score(10) and CM score(10) were used in the evaluation of functional outcomes. VAS was used in the evaluation of pain level, and the SF-36 (10) score was used in the evaluation of the quality of life. All evaluations were performed preopearatively and at the last follow up.

Surgical Technique: All patients were operated under general anesthesia in the beach chair position. Standard posterior portal was used for the evaluation of the glenohumeral joint. The long head of the biceps tendon was tenotomized in all patients with a bipolar radiofrequency probe. Supraspinatus tendon was evaluated from the joint and then the camera was introduced to subacromial space. Once bursectomy was completed the footprint was prepared with a shaver. One or two Smith & Nephew (London, UK) TWINFIX® suture anchor was inserted 2 mm medial to articular cartilage and a footprint anchor was used to complete the repair according to transosseous equivalent technique.

Postoperative Rehabilitation: The shoulder was immobilized in a neutral position for six weeks using a shoulder brace. Postoperative second day, five times a day pendulum exercises were started. Passive mobilization was allowed during the first six weeks and followed by progressive active mobilization. After six weeks, patients were allowed an active range of motion exercises. Strengthening exercises were contraindicated for the postoperative three months.

Statistical Analysis: Descriptive statistics are expressed as mean frequencies and standard deviation (SD). Distribution of variables was evaluated using Shapiro-Wilk test. Mann-Whitney U test was used in the analyses of non-normally distributed quantitative independent data. Paired samples t-test and Wilcoxon test were used for the analyses of quantitative dependent data. Chi-square test was used in the evaluation of qualitative independent data. Statistical significance level was taken as $p < 0.05$ in calculations, and SPSS IBM Statistical Package Program (version 23; IBM, Armonk, NY) was used for analysis.

Results

A total of 55 patients data were evaluated for the study. Demographic variables of patients in each group were shown in Table 1.

Affected side, dominant side, mean follow-up time, time to surgery, etiology of the rupture, BMI, and the size of the rupture were similar in both groups ($p>0.05$).

The comparison of complication rates between the two groups was shown in Table 2. Superficial infection was observed in one patient in Group 1. CM, ASES, and VAS scores of the patients were similar both preoperative and postoperatively ($p>0.05$). Preoperative SF-36 scores were similar between both groups ($p>0.05$). Comparison of functional scores and quality of life scores between two groups was shown in Table 3.

The emotional role, energy, social function, pain, and health change domain of SF-36 score were higher in group 1 ($p=0.047$, 0.027, 0.048, 0.041, 0.015).

Discussion

The most important finding was that there was no difference in clinical and functional scores whereas elderly patients had lower scores in most parameters of the SF-36 score.

Joo et al. (11) showed that, tear retraction and fatty degeneration were the only independent determinants for cuff healing however age can affect tear retraction and fatty degeneration as well. Gulotta et al. (12) found that age is a predictor for radiological integrity and function after ARCR. Boileau et al. (13) reported a 95% recovery rate in patients under the age of 55, and this result dropped to 43% in patients older than 65. Rhee et al. (14) reported that the rate of improvement was 60% in the seventh decade and 50% in the eighth decade. Contrary to these studies, different publications showed that age was not related to outcomes after ARCR. Many studies reported excellent results in elderly patients,

Table 1. Patient Characteristics

Variables		Group 1 (N=21) (Mean ± SD) / N (%)	Group 2 (N=34) (Mean ± SD) / N (%)	p
Age (years)		55.60 ± 3.06	64.87 ± 6.07	0.001*
Dominant side (Right/Left)		12/9 (57.13% / 42.97%)	18/16 (52.91% / 47.19%)	0.525**
Follow-up (months)		19.90 ± 4.07	14.87 ± 6.07	0.758*
Affected side (Right/Left)		11/10 (52.43% / 47.67%)	22/12 (64.74% / 35.36%)	0.386**
Symptom Duration (months)		6.07 ± 2.54	6.26 ± 2.86	0.836*
BMI (kg/m2)		27.40 ± 2.49	28.28 ± 2.43	0.116*
Etiology (Acute/Chronic)		5/16 (23.82% / 76.28%)	7/27 (20.55% / 79.55%)	0.383**
Size of a full-thickness tear	Small	5 (%23.82)	10 (%29.42)	0.716*
	Medium	12 (%57.18)	18 (%52.98)	
	Large	4 (%19.14)	6 (%17.76)	

BMI: Body mass index. SD: Standard deviation *: Chi square test, **: Mann Whitney U test

Table 2. Postoperative Shoulder Stiffness and Re-Rupture Rates

		Group 1 N=21 (%)	Group 2 N=34 (%)	Total N=55	p
Shoulder Stiffness	+	2 (9.56)	3 (8.82)	6	0.792*
	-	19 (90.54)	31 (91.18)	49	
Re-rupture	+	1 (4.75)	3 (8.82)	6	0.576*
	-	20 (95.35)	31 (91.18)	49	

*: Chi square test

although the quality of tissues reduced with increasing age (15-17).Our results showed some of the SF-36 subscales were significantly worse over 60 years of age. Our findings were consistent with the previous studies.

Worland et al. (17) found that 80% of patients over 70 years of age had an improvement in the cuff after RCR. In another study, 77.4% of patients over 65 years of age reported good results after open repair, and the authors concluded that optimal results could be achieved in elderly patients (18). Moraiti et al. (19) reported 82.5% recovery rate for those over 70 years old and 95% for those under 50 years of age. In a systematic review, it was concluded that although age affects the integrity of the cuff, there is insufficient evidence that it affects the functional results (20). Nicholson et al. (21) found that ARCR provides perfect patient pleasure and cost-effectiveness regardless of age. Rebuzzi et al.(22) analyzed the patients according to age group revealed that older patients got higher scores after surgery than younger patients. Functional results after RCR were similar in different age groups, regardless of higher re-tear rates in elderly patients (23). Our results support these studies. Complication rates were similar between groups although the quality of life scores was not different and increased age may lead to decreased satisfaction. General life expectancies may cause these results. In our study, although clinical results were worse in patients older than 60 years, the difference was statistically insignificant between the two groups.

Gumina et al. (24) evaluated the relationship between age and tear size and determined that patients over 60 years of age have two times the risk of having large tears compared to younger patients. Re-tear rate may be affected by many factors (age, advanced fat infiltration of the supraspinatus tendon, and pre-operative tear size) (25, 26). In our study, seven patients in the group under 60 years old and 11 patients in the group over 60 years old had a full-size RCR. According to Mansat et al. (27) independent risk factors for complications in RCT were, tear size; advanced age, pre-operative limited motion, weakness in abduction, internal rotation, and flexion; and shortened acromiohumeral distance. Postoperative stiffness ranging from 2.7% to 15% have been reported in the literature (28). In our study,

Table 3. Pre- and postoperative CM, ASES, VAS, and SF-36 scores

		Group 1 N=21 (Mean ± SD)	Group 2 N=34 (Mean ± SD)	p
CM Score	Pre-op	38.45 ±3.91	39.90±5.17	0.100*
	Post-op	77.12±10.86	73.13±14.53	0.104*
ASES	Pre-op	39.40±6.62	40.76±8.37	0.347*
	Post-op	77.83±10.79	73.28±15.05	0.068*
VAS	Pre-op	5.86±0.56	6.03±1.43	0.254*
	Post-op	2.14±1.33	2.65±1.45	0.073*
SF-36				
Physical functioning	Pre-op	58.69±7.33	58.68±7.89	0.992*
	Post-op	84.40±10.71	80.51±12.52	0.086**
Role limitations due to physical health	Pre-op	15.48±15.57	21.76±17.88	0.055*
	Post-op	72.62±13.30	69.49±16.64	0.279**
Role limitations due to emotional problems	Pre-op	41.76±28.53	37.94±29.40	0.502*
	Post-op	86.26±18.41	78.59±20.93	0.047*
Energy/fatigue	Pre-op	28.69±11.37	31.40±10.81	0.220*
	Post-op	75.12±13.59	68.90±14.83	0.027*
Emotional well-being	Pre-op	32.67±10.59	30.29±13.06	0.300*
	Post-op	65.24±16.27	62.0±20.32	0.360*
Social functioning	Pre-op	26.60±10.78	28.24±11.57	0.453**
	Post-op	72.30±10.54	67.48±14.64	0.048*
Pain	Pre-op	22.10±8.62	21.71±11.68	0.842*
	Post-op	74.24±19.15	65.47±24.91	0.041*
General health	Pre-op	27.50±12.65	26.69±15.03	0.762*
	Post-op	75.02±15.30	70.07±18.57	0.134*
Health change	Pre-op	17.86±13.84	20.22±16.30	0.419*
	Post-op	81.55±18.36	72.43±19.38	0.015*

CS: Constant Score, ASES: American Shoulder and Elbow Surgeon's Score, VAS: Visual Analog Scale, SF-36: Short Form 36, SD: Standard deviation. *: Wilcoxon test, **: Paired samples t-test

postoperative shoulder stiffness was 11.9% in Group 1 and 10.29% in Group 2. The rate of postoperative shoulder stiffness was similar between the two groups. This finding was similar to the literature. In our opinion, the results were not significant due to the lack of a sufficient number of patients despite the increase in stiffness rate.

The infection rate after ARCR is ranging from 0.04% to 3.4% (29). In our study, a superficial infection was observed in one (0.9%) patient. The infection healed after oral antibiotic treatment.

Robinson et al. (30) reported in their study that 68 patients with RCR above 70 years of age increased the risk of re-tear. In our study, postoperative re-tear rates were similar. In our study, the mean symptom duration of patients in Group 1 was 6.07 ± 2.54 months, and this period was 6.26 ± 2.86 months for patients in Group 2. Symptom duration was similar between the two groups. Also, tear sizes were similar between the two groups. This result may be due to the short symptom duration and the heterogenous tear size distribution between the two groups and the small sample size.

Previously, SF-36 was reported as a reliable, valid, and sensitive general measure of the overall quality of life in patients after RCR(31). Female patients showed more emotional complexity than men (32). Katz et al. (33, 34) suggested that more severe symptoms of female patients may partly be related to differences in symptom perception. In general, the elderly population tends to decrease muscle strength and decrease shoulder motion and more likely to have comorbidities (35,36). Han et al. (35) showed a negative correlation between age and SF-36 scores. In our study, postoperative role limitations due to emotional problems, energy/fatigue assessment, social functionality,

pain assessment, and health change were higher in Group 1 which was compatible with the previous studies.

Our main limitation in this study was the relatively small sample size. Also, retrospective nature of the study and relatively short follow up time were another limitations. The tear size of the patients was not measured arthroscopically but on MRI which may cause underestimation of the tear size. One of the reasons affecting the results of the patients participating in the study may be the educational level, income, and working level of the individuals. This assessment has not been made in the current study.

In conclusion, clinical and functional outcomes are not affected by age, whereas some quality-of-life domains become worse in patients over 60 years of age. ARCR can be performed safely on patients over 60 years. However, it should be kept in mind that quality of life outcomes may be low compared with younger patients.

References

1. Razmjou H, Bean A, van Osnabrugge V, MacDermid JC, Holtby R. Cross-sectional and longitudinal construct validity of two rotator cuff disease-specific outcome measures. BMC Musculoskelet Disord. 2006;7:26.
2. Teunis T, Lubberts B, Reilly BT, Ring D. A systematic review and pooled analysis of the prevalence of rotator cuff disease with increasing age. J Shoulder Elbow Surg. 2014;23(12):1913-1921.
3. Burkhart SS, Barth JR, Richards DP, Zlatkin MB, Larsen M. Arthroscopic repair of massive rotator cuff tears with stage 3 and 4 fatty degeneration. Arthroscopy. 2007;23(4):347-354.
4. Plate JF, Brown PJ, Walters J, et al. Advanced age diminishes tendon-to-bone healing in a rat model of rotator cuff repair. Am J Sports Med. 2014;42(4):859-868.
5. Cho CH, Ye HU, Jung JW, Lee YK. Gender Affects Early Postoperative Outcomes of Rotator Cuff Repair. Clin Orthop Surg. 2015;7(2):234-240.
6. Razmjou H, Davis AM, Jaglal SB, Holtby R, Richards RR. Disability and satisfaction after rotator cuff decompression or repair: a sex and gender analysis. BMC Musculoskelet Disord. 2011;12:66.
7. Razmjou H, Holtby R, Myhr T. Gender differences in quality of life and extent of rotator cuff pathology. Arthroscopy. 2006;22(1):57-62.
8. Romeo AA, Hang DW, Bach BR, Jr., Shott S. Repair of full thickness rotator cuff tears. Gender, age, and other factors affecting outcome. Clin Orthop Relat Res. 1999(367):243-255.
9. DeOrio JK, Cofield RH. Results of a second attempt at surgical repair of a failed initial rotator-cuff repair. J Bone Joint Surg Am. 1984;66(4):563-567. E
10. Wylie JD, Beckmann JT, Granger E, Tashjian RZ. Functional outcomes assessment in shoulder surgery. World J Orthop. 2014;5(5):623-633.
11. Oh JH, Kim SH, Kang JY, Oh CH, Gong HS. Effect of age on functional and structural outcome after rotator cuff repair. Am J Sports Med. 2010;38(4):672-678.
12. Gulotta LV, Nho SJ, Dodson CC, Adler RS, Altchek DW, MacGillivray JD. Prospective evaluation of arthroscopic rotator cuff repairs at 5 years: part I--functional outcomes and radiographic healing rates. J Shoulder Elbow Surg. 2011;20(6):934-940.
13. Boileau P, Brassart N, Watkinson DJ, Carles M, Hatzidakis AM, Krishnan SG. Arthroscopic repair of full-thickness tears of the supraspinatus: does the tendon really heal? J Bone Joint Surg Am. 2005;87(6):1229-1240.
14. Rhee YG, Cho NS, Yoo JH. Clinical outcome and repair integrity after rotator cuff repair in patients older than 70 years versus patients younger than 70 years. Arthroscopy. 2014;30(5):546-554.
15. Verma NN, Bhatia S, Baker CL et al. Outcomes of arthroscopic rotator cuff repair in patients aged 70 years or older. Arthroscopy. 2010;26(10):1273-1280.
16. Grondel RJ, Savoie FH, Field LD. Rotator cuff repairs in patients 62 years of age or older. J Shoulder Elbow Surg. 2001;10(2):97-99.
17. Worland RL, Arredondo J, Angles F, Lopez-Jimenez F. Repair of massive rotator cuff tears in patients older than 70 years. J Shoulder Elbow Surg. 1999;8(1):26-30.
18. Hattrup SJ. Rotator cuff repair: relevance of patient age. J Shoulder Elbow Surg. 1995;4(2):95-100.
19. Moraiti C, Valle P, Maqdes A, et al. Comparison of functional gains after arthroscopic rotator cuff repair in patients over 70 years of age versus patients under 50 years of age: a prospective multicenter study. Arthroscopy. 2015;31(2):184-190.
20. Lambers Heerspink FO, Dorrestijn O, van Raay JJ, Diercks RL. Specific patient-related prognostic factors for rotator cuff repair: a systematic review. J Shoulder Elbow Surg. 2014;23(7):1073-1080.
21. Nicholson JA, Searle HKC, MacDonald D, McBirnie J. Cost-effectiveness and satisfaction following arthroscopic rotator cuff repair: does age matter? Bone Joint J. 2019;101-b(7):860-866.
22. Rebuzzi E, Coletti N, Schiavetti S, Giusto F. Arthroscopic rotator cuff repair in patients older than 60 years. Arthroscopy: The Journal of

Arthroscopic & Related Surgery. 2005;21(1):48-54.

23. Altintas B, Anderson NL, Pitta R, et al. Repair of Rotator Cuff Tears in the Elderly: Does It Make Sense? A Systematic Review. Am J Sports Med. 2020;48(3):744-753.
24. Gumina S, Carbone S, Campagna V, Candela V, Sacchetti FM, Giannicola G. The impact of aging on rotator cuff tear size. Musculoskelet Surg. 2013;97 Suppl 1:69-72.
25. Oh JH, Kim SH, Ji HM, Jo KH, Bin SW, Gong HS. Prognostic factors affecting anatomic outcome of rotator cuff repair and correlation with functional outcome. Arthroscopy. 2009;25(1):30-39.
26. Saccomanno MF, Sircana G, Cazzato G, Donati F, Randelli P, Milano G. Prognostic factors influencing the outcome of rotator cuff repair: a systematic review. Knee Surg Sports Traumatol Arthrosc. 2016;24(12):3809-3819.
27. Mansat P, Cofield RH, Kersten TE, Rowland CM. Complications of rotator cuff repair. Orthop Clin North Am. 1997;28(2):205-213.
28. Brislin KJ, Field LD, Savoie FH. Complications after arthroscopic rotator cuff repair. Arthroscopy. 2007;23(2):124-128.
29. Cancienne JM, Brockmeier SF, Carson EW, Werner BC. Risk Factors for Infection After Shoulder Arthroscopy in a Large Medicare Population. Am J Sports Med. 2018;46(4):809-814.
30. Robinson PM, Wilson J, Dalal S, Parker RA, Norburn P, Roy BR. Rotator cuff repair in patients over 70 years of age: early outcomes and risk factors associated with re-tear. Bone Joint J. 2013;95-b(2):199-205.
31. Tashjian RZ, Henn RF, Kang L, Green A. Effect of medical comorbidity on self-assessed pain, function, and general health status after rotator cuff repair. J Bone Joint Surg Am. 2006;88(3):536-540.
32. Fuhrer MJ, Rintala DH, Hart KA, Clearman R, Young ME. Depressive symptomatology in persons with spinal cord injury who reside in the community. Arch Phys Med Rehabil. 1993;74(3):255-260.
33. Katz JN, Wright EA, Guadagnoli E, Liang MH, Karlson EW, Cleary PD. Differences between men and women undergoing major orthopedic surgery for degenerative arthritis. Arthritis Rheum. 1994;37(5):687-694.
34. Katz PP, Criswell LA. Differences in symptom reports between men and women with rheumatoid arthritis. Arthritis Care Res. 1996;9(6):441-448.
35. Han CW, Lee EJ, Iwaya T, Kataoka H, Kohzuki M. Development of the Korean version of Short-Form 36-Item Health Survey: health related QOL of healthy elderly people and elderly patients in Korea. Tohoku J Exp Med. 2004;203(3):189-194.