

QUALITY OF LIFE IN PATIENTS WHO HAVE UNDERGONE REVERSE SHOULDER ARTHROPLASTY

QUALIDADE DE VIDA DE PACIENTES SUBMETIDOS À ARTROPLASTIA REVERSA DO OMBRO

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ABSTRACT

Objective: To evaluate the health-related quality of life (HRQoL) of patients who have undergone reverse shoulder arthroplasty (RSA) for rotator cuff arthropathy (RCA). **Methods:** A retrospective study with 35 patients who underwent RSA from August 2007 to July 2015. We collected clinical data and applied the 36-item Short Form Health Survey (SF-36). **Results:** Of the 35 patients, 29 (82.9%) were female, and mean age was 75.71 years, ranging from 50 to 89 years. The dominant side was frequently affected (68.6%), and most of the cases were Hamada type 3 (57.1%). The Mackenzie approach was used in 30 patients (85.7%). Physical and mental HRQoL was not associated with severity of RCA before RSA. Lower scores for Physical Functioning, Role Physical, Bodily Pain, and Physical Component Summary (PCS) were associated with other orthopedic comorbidities. Vitality, Role Emotional, Mental Health, and Mental Component Summary (MCS) were significantly higher in patients without depression. Orthopedic comorbidity and depression predicted lower PCS and longer follow-up time predicted better PCS scores. Depression was also a predictor of the MCS. **Conclusion:** Patients who had undergone RSA for RCA had good HRQoL. Longer follow-up time was associated with better HRQoL. Good results were maintained over the follow-up period. **Level of evidence II, retrospective study.**

Keywords: Rotator Cuff Tear Arthropathy. Shoulder. Arthroplasty. Quality of Life.

RESUMO

Objetivo: Avaliar a qualidade de vida relacionada à saúde (QVRS) de pacientes com artropatia do manguito rotador (AMR) submetidos à artroplastia reversa do ombro (ARO). **Métodos:** Estudo retrospectivo com 35 pacientes submetidos à ARO, de agosto de 2007 a julho de 2015. Foram coletados dados clínicos, e foi aplicado o questionário 36-Item Short-Form Health Survey (SF-36). **Resultados:** Dos 35 pacientes, 29 (82,9%) eram mulheres, e a média de idade foi de 75,71 anos, variando de 50 a 89 anos. O lado dominante foi frequentemente afetado (68,6%). A maioria dos casos foi Hamada tipo 3 (57,1%). A abordagem Mackenzie foi utilizada em 30 pacientes (85,7%). A QVRS física e mental não foi associada à gravidade da AMR antes da ARO. Pontuações menores de Capacidade Funcional, Aspectos Físicos, Dor e Componente de Saúde Física (CSF) foram associadas a outras comorbidades ortopédicas. Vitalidade, Aspectos Emocionais, Saúde Mental e Componente de Saúde Mental (CSM) foram significativamente maiores nos pacientes sem depressão. Comorbidades ortopédicas e depressão foram preditores de menor PCS, e maior tempo de seguimento foi preditor de CSF. Depressão também foi preditor do CSM. **Conclusão:** Pacientes submetidos à ARO por AMR apresentaram boa QVRS. Maior tempo de acompanhamento foi associado à melhor QVRS. Bons resultados foram mantidos durante o acompanhamento. **Nível de evidência II, estudo retrospectivo.**

Descritores: Artropatia de Ruptura do Manguito Rotador. Ombro. Artroplastia. Qualidade de Vida.

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INTRODUCTION

Rotator cuff arthropathy (RCA) is defined as the combination of glenohumeral arthritis and extensive rupture of the rotator cuff tendons.¹ RCA affects approximately 4% of the population with rotator cuff rupture.² In RCA, patients present pain, weakness, muscular atrophy, reduction of strength, deficits in the shoulder active and passive

movement. Posterosuperior and extensive anterosuperior ruptures of the rotator cuff lead to progressive loss of abduction force, anterior elevation and external rotation and eventually pseudoparalysis.³ Although there are a few other operative possibilities, the RSA seems to be an effective treatment in cases of RCA, allowing considerable clinical and functional improvement.⁴

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Health-related quality of life is a multidimensional and polysemic concept that usually comprises subjective assessments of positive and negative aspects of an individual's physical and mental health as well as aspects of self-perceived well-being related to or affected by diseases and treatments.⁵ Some studies report improvement of health-related quality of life (HRQoL) and functionality after RSA.⁶ However, most of them present a short follow-up period and did not evaluate the predictors of functional results after RSA. There are studies with long follow-up periods for cases with total shoulder prosthesis,⁷ but any study evaluated RSA. We aimed to evaluate the health-related quality of life and its predictors in patients submitted to RSA for RCA.

MATERIALS AND METHODS

Study design and population

We conducted a retrospective study. From August 2007 to July 2015, we performed 51 RSA in 38 patients with RCA refractory to conservative treatment. We used the ARROW® (FH France) prosthesis in all cases. Three patients were lost during follow-up. Thirty-five patients were available for final follow-up. Clinical data were collected and the 36-item Short Form Health Survey (SF-36)⁸ was applied during patient evaluation. The inclusion criteria were: follow-up greater than 2 years; RCA as the underlying disease; Hamada score greater than or equal to three^{9,10} and age greater than 50 years. (Figure 1)

The Hamada classification^{9,10} is a radiographic classification of extensive rotator cuff lesions. Such classification was mainly based on the acromiohumeral interval (AHI). In Grade 1 of Hamada, the AH1 was more than 6 mm, and in Grade 2, the AH1 was 5 mm or less. In Grade 3, acetabulization (a concave deformity of the acromion undersurface) was added to the Grade 2; In Grade 4, narrowing of the glenohumeral joint was added to the Grade 3 characteristics. Grade 5 comprised instances of humeral-head collapse with evident signs of avascular collapse and necrosis of the humeral head, representing the maximum degree of RCA evolution.

We used one of the two commonly approach in RSA, the Mackenzie approach (anterior-superior) or deltopectoral approach.¹¹ The minimum follow-up time was two years and the maximum was 10 years, mean of 5.25 years. There was no loss of follow-up due to

natural death in this sample. We did not have any cases of patients undergoing reverse arthroplasty as a follow-up of another previous arthroplasty, and cases of patients undergoing reverse arthroplasty associated with muscle transfer.¹²

HRQoL instrument

We applied the SF-36 questionnaire to all included patients. The 36-Item Short Form Health Survey (SF-36) is a generic HRQoL instrument composed of eight domains: physical functioning (PF), role limitations due to physical problems (RP), bodily pain (BP), general health perceptions (GH), vitality (VT), social functioning (SF), role limitations due to emotional problems (RE), and mental health functional capacity (MH). The SF-36 scores were normalized by QualityMetric Health Outcomes™ Scoring Software 4.5, transforming scores to a mean of 50 and standard deviation of 10. The eight domains were aggregated into Physical Component Summary and the Mental Component Summary scores. The normalization process enables comparisons among the scales of the respective domain or summaries component scale.^{5,8} The license was obtained by the Optum's PRO Core and Executing License Agreement: @QM043387. Cronbach's Alpha coefficient was used to evaluate the internal consistency. We considered values under 0.60 to 0.70 as satisfactory¹³ and higher than 0.70 as ideal.

Statistical analysis

We described mean, standard deviation, and range for the continuous variables, whereas categorical variables were described by frequencies and proportions. We used Mann-Whitney non-parametric tests to compare the SF-36 means differences among different groups. The chi-square test was used to evaluate the association of two categorical variables. Data were analyzed by using the Statistical Package for the Social Sciences 22 (SPSS).

Ethical procedures

The study was approved by the Ethics Review Board of São Paulo Hospital, Federal University of São Paulo under the Certificate of Presentation of Ethical Appreciation (number 2.795.825) in accordance with the Declaration of Helsinki 2013 and the National Council Resolution 466/12 and. All participants were informed and signed a consent form approved by the Ethics Board.

RESULTS

Our study enrolled 35 patients; 29 (82.9%) females and 6 (17.1%) males, and mean age 75.7 years, ranging from 50 to 89 years. The dominant side was frequently affected (68.6%), most of the cases were Hamada 3 (57.1%) followed by Hamada type 4 (42.9%). Mackenzie approach was used in 30 (85.7%) patients, while the deltopectoral approach, in 5 (14.3%) patients. The minimum follow-up time was two years and the maximum was 10 years, mean of 5.25 years. There was no loss of follow-up due to natural death in this sample. Of the 35 surgeries, five intra-operative RSA complications were observed: one acromial fracture, two glenoid fractures, one fracture on the humeral side, and a compressive injury of the axillary nerve. The cases were treated with immobilization, fixation and associated corticosteroid therapy. All cases presented resolution after 60 days. The means of HRQoL domains of these patients did not differ from those without any intra-operative complications ($P > 0.05\%$). Table 2 shows the eight normalized SF-36 domains, physical and mental components summaries, and Cronbach's Alpha coefficient. Physical Functioning, Role Physical and Role Emotional were below average, but within the standard deviation. All SF-36 domains had reliability above the desirable Cronbach's Alpha (≥ 0.6). HRQoL was also evaluated in both physical and mental aspects, considering severity of RCA. According to Hamada classification (3 or 4), there were no statistical differences in means of SF-36

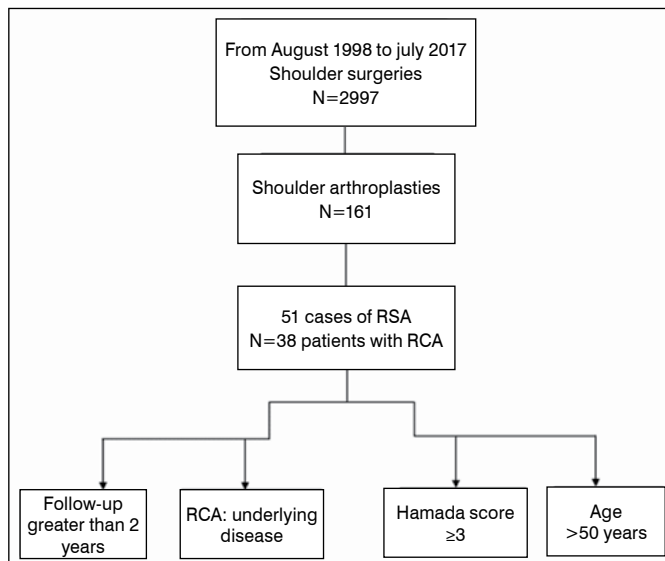


Figure 1. Flow chart of the selection of 35 patients with rotator cuff arthropathy, submitted to reverse shoulder arthroplasty from August 2007 to July 2015, Salvador, Bahia 2018.

Table 1. Characteristics of 35 patients submitted to reverse shoulder arthroplasty between August 2007 and July 2015, Salvador, Bahia, Brazil, 2018.

Characteristics	
Sex N (%)	
Female	29 (82.9)
Age Mean (Min – Max)	75.7 (50 - 89)
Dominance N (%)	
Dominant	24 (68.6)
Non-dominant	11 (31.4)
Hamada N (%)	
Hamada 3	20 (57.1)
Hamada 4	15 (42.9)
Surgical Approach N (%)	
Deltopectoral	5 (14.3)
Mackenzie	30 (85.7)
Follow-up time Mean, Years (Min – Max)	5.25 (2 a 10)

Table 2. Mean, Standard deviation, and internal reliability of the eight SF-36v2 domains of the 35 patients submitted to ARS, Salvador, Bahia, Brazil, 2018.

SF-36 Domains	Mean ± SD	Cronbach's Alpha
Physical Functioning (PF)	47.55 ± 10.26	0.91
Role Physical (RP)	46.28 ± 12.36	0.92
Bodily Pain (BP)	52.26 ± 8.36	0.74
General Health (GH)	55.40 ± 7.09	0.68
Vitality (VT)	61.67 ± 8.41	0.78
Social Functioning (SF)	52.14 ± 6.86	0.61
Role Emotional (RE)	45.75 ± 12.64	0.88
Mental Health (MH)	53.83 ± 10.99	0.77
Physical Component Summary (PCS)	50.01 ± 7.66	-
Mental Component Summary (MCS)	54.05 ± 9.03	-

domains and its physical ($P=0.227$) and mental ($P=0.400$) components summaries between the two groups. We stratified the sample in two groups according to the age: less than 75 years of age and equal to or greater than 75 years, and no statistical significance was also observed in both physical (PCS, $P=0.805$) and mental (MCS, $P=0.730$) component summaries. No statistical differences in PCS ($P=0.268$) and MCS ($P=0.831$) mean scores were observed between patients followed up for less than five years and patients followed up for five years or more.

We analyzed the SF-36 physical domains and the Physical Component Summary according to the presence or absence of other orthopedic comorbidities, which were not related to RSA surgery. PF ($P = 0.007$), RP ($P = 0.001$), BP ($p = 0.008$), and PCS ($P=0.001$) were significantly higher in patients without other orthopedic impairment (Table 3).

We also evaluated SF-36 mental health domains and the Mental Component Summary according to the occurrence of new cases of depression during the follow-up period. VT ($P = 0.025$), RE ($P = 0.029$), MH (0.003), and MCS ($p = 0.003$) were significantly higher in patients without depression (Table 4).

The association of predictor variables with the SF-36 physical and mental components was explored using multivariate linear regression analysis. (Table 5) Having other orthopedic comorbidity ($P = 0.0001$), depression ($P = 0.001$), and longer follow-up time ($P = 0.041$) were predictors of the Physical Component Summary Score. The variable depression ($P = 0.002$) was a good predictor of the Mental Component Summary ($P = 0.002$).

Table 3. Mean, Standard deviation of the SF-36 physical domains and physical component summary according to presence or absence of other orthopedic comorbidity in 35 patients submitted to ARS, Salvador, Bahia, Brazil, 2018.

SF-36 domains	With other orthopedic comorbidity N=11	Without other orthopedic comorbidity N=24	P*
Physical Functioning (PF)	41.12 ± 8.95	50.50 ± 9.59	0.007
Role Physical (RP)	34.38 ± 8.63	51.74 ± 9.73	0.001
Bodily Pain (BP)	46.98 ± 6.35	54.68 ± 8.15	0.008
General Health (GH)	54.33 ± 5.83	55.89 ± 7.66	0.451
Vitality (VT)	60.88 ± 7.84	62.03 ± 8.80	0.684
Physical Component Summary (PCS)	42.31 ± 4.67	53.54 ± 6.00	0.001

*Mann-Whitney test.

Table 4. Mean, Standard deviation of the SF-36 mental health domains and mental component summary according to the depression in 35 patients submitted to ARS, Salvador, Bahia, Brazil, 2018.

SF-36 domains	Depression N=5	No depression N=30	P*
Vitality (VT)	53.31 ± 6.12	63.03 ± 7.99	0.025
Social Functioning (SF)	53.88 ± 4.85	51.85 ± 7.16	0.664
Role Emotional (RE)	32.16 ± 13.73	48.01 ± 11.15	0.029
Mental Health (MH)	39.08 ± 9.32	56.29 ± 9.32	0.003
Mental Component Summary (MCS)	43.08 ± 4.03	52.77 ± 8.32	0.003

*Mann-Whitney test.

Table 5. Results of a multiple linear regression equation having PCS and MCS as the dependent variables in 35 patients submitted to reverse shoulder arthroplasty between August 2007 and July 2015, Salvador, Bahia, Brazil, 2018.

Variables	PCS* (R ² = 48%)		
	B	EPB	P*
Constant	52.14	1.852	.0001
Other orthopedic comorbidity	-14.08	1.773	.0001
Depression	-.284	2.315	.001
Surgical time	-8.07	.307	.041
Variables	MCS** (R ² = 25%)		
	B	EPB	P*
Constant	55.88	1.447	0.0001
Depression	-12.80	3.830	0.002

The numbers in columns are regression coefficients (B), standard errors (SE_B) and P values. *PCS- Physical Component Summary; ** Mental Component Summary.

DISCUSSION

Reverse shoulder arthroplasty has been widely used in the last decade, however, there are few reports of quality of life after this surgery. In our study, physical and mental HRQoL was not associated with severity of RCA before RSA, nor either with age. Decreases in Physical Functioning, Role Physical, Bodily Pain and Physical Component Summary were associated with other orthopedic comorbidities, not related to RSA. Vitality, Role Emotional, Mental Health, and Mental Component Summary were significantly higher in patients without depression. Multivariate linear regression showed that having other orthopedic comorbidities and depression were predictors of lower Physical Component Summary (PCS) scores and longer follow-up time was a good predictor of PCS scores. Depression was also a predictor of the Mental Component Summary scores. Solved intra-operative RSA complications did not interfere in HRQoL during follow-up evaluation.

HRQoL comprises patients' subjective assessments of physical and mental health related to or affected by diseases and treatments.⁵ Considering patients' integrality, we opted for the use of the 36-Item Short Form Health Survey questionnaire (SF-36), which is widely used for health-related quality of life outcomes and allowed us to evaluate not only physical aspects of HRQoL but also the mental ones.⁸ Furthermore, all SF-36 domains presented good reliability, being above the desirable Cronbach's Alpha (≥ 0.6).¹³ There are some concerns about the use of the reverse prostheses in elderly patients related to the decreases in prosthesis duration, functionality and health-related quality of life outcomes.¹⁴⁻¹⁷ Our data showed no statistically significant differences between patients with less than 75 years of age and equal to or greater than 75 years in both PCS ($P=0.805$) and MCS ($P=0.730$) SF-36 component summaries. These data corroborate with a previous report,¹⁴ showing good outcomes in terms of function, satisfaction and quality of life recovery in elderly submitted to RSA. Age above 70 years has been reported as a predictor of decreased return to sports activities.¹⁸ The scientific literature reports the association of advanced age and comorbidities with RSA complications and low functional outcome.¹⁴ Satisfaction with treatment was associated with decreasing in pain and improvements in shoulder range of motion, and strength⁷ in 320 total shoulder surgeries (TSS). We found associations of other orthopedic comorbidities with lower HRQoL Physical Functioning ($P = 0.007$), Role Physical ($P = 0.001$), Bodily Pain ($p = 0.008$) and PCS ($P=0.001$), but not with age as we reported before. HRQoL improvement after RSA⁶ has been reported in studies with shorter follow-up time and no predictors of HRQoL were described. In our study, multivariate linear regression analysis evidenced that having other orthopedic comorbidities ($P = 0.0001$) and depression ($P = 0.001$) were predictors of lower PCS, while higher follow-up

time ($P = 0.041$) was predictors for higher PCS. Depression ($P = 0.002$) was a predictor of MCS ($P = 0.002$). Health-related quality of life indicators did not differ significantly - PCS ($P=0.268$) and MCS ($P=0.831$) - according to the time (<5 ; ≥ 5 years) elapsed after surgery. HRQoL scores were similar to the general population even in those with higher time of RSA follow-up. However, multivariate linear regression identified longer follow-up time as a predictor of higher Physical Component Summary score ($P=0.041$). These findings are in accordance with a previous report⁶ that in a five-year follow-up period found similar functionality and health-related quality of life between patients who had undergone RSA and healthy controls that were followed up for less than five years. Physical (PCS, $P=0.227$) and Mental (MCS, $P=0.400$) Component Summaries did not differ significantly according to RSA severity (Hamada 3 and Hamada 4). Retrospective design, case series, and small sample size are some limitations of this study. Further, it was not possible to evaluate the SF-36 questionnaire and degree of physical activity preoperatively. However, our study was carried out with the casuistic of only one surgeon, we used the same prostheses brand in all patients and all patients had the same underline disease. Our sample is relevant for the homogeneity of included cases and time of follow-up. Patients submitted to RSA for RCA presented good health-related quality of life, considering both mental and physical SF-36 scores. Lower Physical Functioning, Role Physical, Bodily Pain and Physical Component Summary scores were associated with other orthopedic comorbidities. Lower Vitality, Role Emotional, Mental Health and Mental Component Summary scores were associated with depression. Having other orthopedic comorbidity and depression were predictors of lower Physical Component Summary and longer follow-up time was a predictor of PCS scores. Depression was also a predictor of the Mental Component Summary.

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