GOIANA JOURNAL OF MEDICINE

DOI: 10.29327/2396527.65.65-3

ISSN 0034-9585

SCIENTIFIC ARTICLE - ORIGINAL ARTICLE

CLINICAL-FUNCTIONAL EVALUATION OF PATIENTS WITH ROTATOR CUFF RUPTURES UNDERGOING ARTHROSCOPIC REPAIR WITHOUT ACROMYOPLASTY

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ABSTRACT

Objective: to evaluate clinal and functional results from patients with rotator cuff tear who underwent arthroscopic procedure without acromioplasty.

Methods: Retrospective study with prospective data collection in patients surgically treated with arthroscopic procedure without acromioplasty, in a tertiary orthopedic hospital, due to rotator cuff injuries. The range of motion (ROM) of the operated shoulder was measured. Also, four instruments were utilized for functional evaluation: Western Ontario Rotator Cuff (WORC) Index, Elbow Society (ASES) Shoulder Index, Simple Shoulder Text (SST) e Subjective Shoulder Value (SSV). The Visual Analog Scale (VAS) measured pain in three distinct ments: at rest, during movimentation of the shoulder and during sleep.

Results: Clinical and functional results of 10 patients have been evaluated. The average score observed in VAS was 1.33 at rest, 3.33 at movement and 1.44 during sleep. In the functional evaluation, the average scores were 8.7 in SST, 80 in ASES and 74.44 in SSV. The results in ROM have shown good clinical evolution following the procedure.

Conclusion: Patients with full thickness rotator cuff tears operated through videoarthroscopy without acromioplasty have shown good results in pain, function and range of motion evaluation following the procedure.

Keywords: Arthroscopy; Rotator Cuff Injuries; Rotator Cuff Tear Arthropathy; Shoulder Pain; Shoulder.

INTRODUCTION

Rotator cuff tears and their clinical repercussions, such as shoulder pain, can be treated conservatively or surgically. In conservative therapy, analgesics, hormonal or non-hormonal anti-inflammatories, and functional rehabilitation are used, with satisfactory results possible[1]. However, cases refractory to this treatment receive surgical indication. Generally, a more invasive approach is also considered necessary when a partial tear exceeding 50% of the patient's tendon thickness is observed on magnetic resonance imaging[2].

When choosing the appropriate treatment for each patient, it is necessary to consider the natural course of tendon rupture and data from randomized studies involving patients who received conservative or surgical treatment. There is no doubt that non-surgical treatment has its place in the scenario of

rotator cuff tears, especially in the case of small, degenerative partial tears, or irreparable tears[3].

However, it should be emphasized that surgical repair of the rotator cuff presents good clinical results, with significant improvement in pain, range of motion, strength, and quality of life, although imaging results, paradoxically, are not always as good[3].

The surgical technique most commonly used today for rotator cuff tears is arthroscopic video-assisted surgery, as it is less invasive than open surgery and has better results regarding postoperative pain, recovery time, morbidity, and aesthetics[4].

Usually, it is recommended to perform subacromial decompression, i.e., acromioplasty, concomitantly with arthroscopy in cases of massive and irreparable rotator cuff tears[4]. Acromioplasty is a surgical arthroscopy of the acromion, in which decompression of the subacromial space is performed to prevent compression of the involved structures[5], a procedure that therefore involves resection of part of the acromion[6]. However, poor-quality rotator cuff muscles, due to tears caused by severely degenerated tendons, may favor re-tear of the repaired tendon with arthroscopic acromioplasty[4].

Thus, the usefulness of acromioplasty is questioned not only in cases of degenerated tendons but also in situations where decompression is performed in isolation, such as in subacromial impingement syndrome, as indicated by some randomized studies and literature reviews[7,8,9,10].

The aim of this study is to quantify the improvement that patients obtained with the arthroscopic procedure performed without acromioplasty, both at the clinical and functional levels.

METHODS

This is a cross-sectional study with patients undergoing arthroscopic treatment of rotator cuff tears at a private tertiary orthopedic hospital located in a city with a population of 1.5 million inhabitants, from October 2021 to November 2022.

The sample consists of consecutive convenience patients with chronic rotator cuff injuries operated on by videoarthroscopy without acromioplasty.

Patients over 18 years old, operated on by the same surgeon; with rotator cuff tears operated on by videoarthroscopy without acromioplasty; minimum follow-up of 01 year were included.

Patients with other shoulder morbidities, rotator cuff tears operated on by open surgery; undergoing rotator cuff surgery associated with acromioplasty were excluded.

Data were collected through the application of a clinical-demographic questionnaire and the functional instruments Western Ontario Rotator Cuff (WORC) Index, American Shoulder and Elbow Surgeons (ASES) Shoulder Index, Simple Shoulder Test (SST), and Subjective Shoulder Value (SSV). Additionally, characterization of pain at rest, during movement, and at night was collected using the Visual Analog Scale. The questionnaire and instruments were individually applied by the researchers in the office or at the patient's home. Range of motion (ROM) assessment consisted of evaluating active and passive shoulder mobility in the upright position using a digital goniometer (Kaptron, Model 360). Researchers who assessed ROM received appropriate training. The shoulder movements measured were: forward flexion, external rotation with 0° abduction, external rotation with 90° abduction, internal rotation in adduction, and internal rotation with 90° abduction. All instruments were collected at a single time point by the study researchers.

The Visual Analog Scale (VAS) is a scale where the patient marks a point on a horizontal or vertical line of 10 centimeters, indicating their shoulder pain at 3 moments: at rest, during movement, and while sleeping. In all cases, the closer to 10, the more intense the pain. Pain intensity is categorized as follows: between 0 and 2 is mild pain, between 3 and 7 is moderate pain, and between 8 and 10 is severe pain[11].

In 2003, Kirkley introduced the English version of the Western Ontario Rotator Cuff Index (WORC), a self-administered instrument specific for rotator cuff pathologies. Its purpose is to assess the quality of life of patients with shoulder complaints due to rotator cuff diseases. It contains 21 items in the form of a Visual Analog Scale (VAS), divided into five domains: physical symptoms (six items), sports and recreation (four items), work (four items), lifestyle (four items), and emotions (three items). All items represent aspects of quality of life that can be particularly influenced by rotator cuff injuries. These domains are based on the World Health Organization's (WHO) definition of health.

Each item is scored on a VAS from zero to 10 cm (the higher the score, the greater the negative impact on quality of life), leading to a minimum score of zero and a maximum score of 2100 (worst possible). In a more clinically understandable format, the maximum score can be expressed as a percentage by subtracting the total score from 2100 and dividing by 2100, resulting in a final score ranging from zero (worst possible) to 100 (best possible)[12].

The American Shoulder and Elbow Surgeons Standardized Shoulder Assessment Form (ASES) is divided into 2 sections: one administered by the researcher and another self-administered by the patient. The second section consists of one item related to pain and 10 items related to function. The "pain" item is assessed using a VAS. The other 10 function items are assessed using a four-point Likert scale. The total score ranges from 0 to 100, with higher scores indicating better shoulder function and less pain[13].

The Simple Shoulder Test (SST) is a standardized instrument developed to systematically document shoulder function, assessing functional limitations of the affected shoulder that impair the individual's activities of daily living. It is a questionnaire consisting of 12 yes-or-no questions about the function of the affected shoulder. The questionnaire was designed based on common complaints that patients present to professionals. SST scores for each dimension are calculated by taking the mean of the response alternatives for each question, following the formula: Total Score = $\Sigma y/x$, where y = response for each question in the dimension and x = number of questions for that dimension. This calculation yields a value on the Likert scale of the test for all subscales, regardless of the number of items in each subscale[14].

The Subjective Shoulder Value (SSV) is defined as a subjective assessment by the patient of the affected shoulder expressed as a percentage in relation to a completely normal shoulder, which would have a value of 100%. In other words, the closer to 100%, the closer the shoulder is to normality[15].

The primary outcomes of the study were pain at rest, during movement, and at night, assessed by the Visual Analog Scale as described above, as well as shoulder function, assessed using the SST, ASES, SSV, and WORC instruments. The secondary outcome was range of motion, assessed by digital goniometry.

Regarding the independent variables, we have:

- Age: in years;
- Gender: male/female;
- Affected side: right/left;
- Dominance: right/left;
- Trauma: yes/no;
- Follow-up time in months.

The characterization of demographic profile, clinical data, range of motion, pain, and functional assessment was performed using absolute frequency, relative frequency, mean and standard deviation, median, minimum, and maximum. The distribution of demographic and clinical profiles according to age group was tested using Pearson's chi-square test. The normality of the data was checked using the Shapiro-Wilk test. The reliability and internal consistency of the WORC, SST, and ASES were calculated using Cronbach's alpha. Data were analyzed using the Statistical Package for the Social Sciences (IBM Corporation, Armonk, USA) version 26.0. The significance level adopted was 5% ($p < 0.05$).

The study was approved by the Ethics Committee of HUGO, CAAE No. 02396212.3.0000.0033. All participants signed the informed consent form and agreed to participate in the study.

RESULTS

Out of a total of 33 patients who were the subjects of the study, we were unable to contact 20 for the proper evaluation; two refused to participate in the study; and one was undergoing arthroscopic revision. In the end, the sample consisted of 10 patients.

The demographic and clinical data of the studied sample are in Table 1.

The data regarding the postoperative range of motion of the patients in the studied sample are in Table 2. The values are in degrees, ranging from 0° to 180° in active forward flexion (AFF) and passive forward flexion (PFF), and from 0° to 90° in the other movements.

Regarding active internal rotation in adduction postoperatively, we found that 60% of patients could reach the thoracic spine with their thumb. For passive internal rotation in adduction, the rate of patients who could reach the thoracic spine with their thumb postoperatively was 70%.

The characterization of pain after the procedure is in Table 3. The Visual Analog Scale (VAS) allows the patient to quantify pain, with scores ranging from zero (no pain) to 10 (worst possible pain).

The postoperative characterization of shoulder functional assessment using the instruments is in Table 4. The WORC values are in percentage and range from 0% (worst possible function) to 100% (best possible function). The SST values range from zero (worst possible function) to 12 (best possible function). The ASES values range from zero (worst possible function) to 100 (best possible function). The SSV values range from 0% (worst possible function) to 100% (best possible function).

Table 1. Characterization of demographic and clinical profile (n = 10).

	Age group		Total	*p**
	< 60	≥ 60		
Demographic profile				
Gender				
Female	1 (25.0)	3 (50.0)	4 (40.0)	0.42
Male	3 (75.0)	3 (50.0)	6 (60.0)	

	Age group		Total	*p**
	< 60	≥ 60		
Demographic profile				
Side				
Right	4 (100.0)	5 (83.3)	9 (90.0)	0.38
Left	0 (0.0)	1 (16.7)	1 (10.0)	
Clinical data				
Trauma				
No	2 (50.0)	2 (33.3)	4 (40.0)	0.59
Yes	2 (50.0)	4 (66.7)	6 (60.0)	
Time from symptoms to surgery(months)				
≤ 10	1 (25.0)	2 (33.3)	3 (30.0)	
> 10	1 (25.0)	2 (33.3)	3 (30.0)	0.87
Not informed	2 (50.0)	2 (33.3)	4 (40.0)	
Follow-up time (months)				
≤ 100	1 (25.0)	3 (50.0)	4 (40.0)	
> 100	1 (25.0)	2 (33.3)	3 (30.0)	0.52
Not informed	2 (50.0)	1 (16.7)	3 (30.0)	

*Pearson's chi-square; n, absolute frequency; %, relative frequency

Table 2. Postoperative characterization of range of motion in patients from the study sample (n = 10).

	Mean	Standard deviation	Median	Minimum	Maximum
AAE	148.60	39.29	155.00	56.00	180.00
PAE	168.30	26.52	180.00	110.00	195.00
AERA1	51.00	29.06	48.50	13.00	90.00
PERA1	69.50	22.21	75.50	29.00	90.00
AERA2	61.02	34.86	75.50	0.00	90.00
PERA2	84.20	10.72	90.00	64.00	99.00
AIRA	55.22	21.59	47.50	30.00	90.00
PIRA	71.40	21.74	70.50	39.00	102.00

*AAE, active anterior elevation; PAE, passive anterior elevation; AERA1, active external rotation in adduction; PERA1, passive external rotation in adduction; AERA2, active external rotation in abduction; PERA2, passive external rotation in abduction; AIRA, active internal rotation in abduction; PIRA, passive internal rotation in abduction.

Table 3. Characterization of pain after (n = 10).

	Mean	Standard Deviation	Median	Minimum	Maximum
VAS at rest	1.20	2.30	0.00	0.00	7.00
VAS during movement	3.00	2.58	3.00	0.00	7.00
VAS at night	1.50	2.37	0.00	0.00	7.00

*VAS, Visual Analog Scale

Table 4. Postoperative characterization of shoulder functional assessment using the instruments employed (n = 10).

	Cronbach	Mean	Standard deviation	Median	Minimum	Maximum
WORC	0.92	60.98	21.53	60.37	30.05	95.16
SST	0.73	8.70	2.67	9.00	4.00	12.00
ASES	0.72	80.00	14.72	80.84	51.67	96.67
SSV		76.00	19.55	80.00	50.00	100.00

*WORC, Western Ontario Rotator Cuff Index; SST, Simple Shoulder Text; ASES, Elbow Society Shoulder Index; SSV, Subjective Shoulder Value.

DISCUSSION

The present study demonstrates that patients with complete rotator cuff tears undergoing arthroscopic surgery without acromioplasty showed mild postoperative pain at night and at rest, and moderate pain with movement, as well as good function and range of motion in the operated shoulder.

In this study, the mean value obtained on the Visual Analog Scale (VAS) at rest was 1.33, indicating mild-intensity pain. Similarly, a prospective randomized study with an average follow-up of 7.5 years found a mean of 1.18 for this same question[16]. Another study showed mild-intensity pain (using a different pain scale) after 24 weeks of follow-up[17].

Regarding the VAS, this study also obtained a mean of 1.44 for nighttime pain and 3.33 for pain during movement. Thus, it can be inferred that, although nighttime and resting pain are of mild intensity, pain during movement is moderate. Patients may therefore experience some discomfort when mobilizing the operated shoulder, which is, however, minimized when at rest and during sleep, contributing to their quality of life.

The pain on the VAS during movement has a mean of 3.33, indicating moderate-intensity pain, and the study by Singh also showed moderate-intensity pain (using a different pain scale) with shoulder activity above head level[17].

The nighttime pain on the VAS has a mean of 1.44, indicating mild-intensity pain. The study by Singh also reported mild-intensity nighttime pain (using a different pain scale) after 24 weeks of follow-up[17].

The mean score obtained on the Simple Shoulder Test (SST), as previously shown in the results, was 8.7, indicating good shoulder functionality. The study by Waterman also showed a high mean on the SST, reaching a value of 9.28, which indicates, in line with the present study, good function of the operated shoulder[16].

The mean score on the Elbow Society Shoulder Index(ASES) was 80 out of 100, as shown in Table

4, indicating good shoulder functionality. The study by Waterman, which had a mean follow-up of 7.5 years (similar to the present study), found a mean ASES score of 85.36 out of 100, a value very close to that of this research[16]. Another study with a 2-year follow-up had an ASES score of 91.5 out of 10018.

The value of the Western Ontario Rotator Cuff Index (WORC), as indicated in Table 4, was, on average, 60%, which indicates a result equal to 60% of the full functional capacity of the operated patients' rotator cuffs. The study by Herring showed that after 5 years, the average WORC result was greater than 90% out of 100%[19]. Another study by Alkhatib obtained a WORC score between 75% and 80% for patients with an 11-year follow-up[20]. Therefore, in the present study, the postoperative WORC score was relatively lower compared to the studies mentioned.

The SSV had a mean of 74% in the present study, while another study by Kim obtained an SSV around 90%[21]. Collin found an SSV of 73%, a value very close to that of this study[22].

Regarding the limitations of the study, we can mention that the sample size is small (n = 10). Additionally, despite having a prospective objective, the study has a retrospective nature, which includes a memory bias due to the long-term follow-up. This has a greater impact considering that most evaluated patients were elderly, as there is a physiological memory loss that accompanies the aging process. Another factor inherent to aging is the impairment of comprehension capacity, which may have influenced the study results to some extent, as some older patients were confused by some questions in the applied instruments and required researchers to clarify the issues. Furthermore, it is worth mentioning that the sampling is a convenience type, consecutive, which may have caused a selection bias in the studied sample.

Clinical studies in general bring difficulties for researchers regarding sample selection. In this specific study, as it is an evaluation after several years of the procedure, we had difficulty in obtaining a sample group with a more expressive number of participants. In many cases, patients were not interested in undergoing the evaluation, either because they were satisfied with the postoperative shoulder or because they were avoiding close contact with people outside their family circle during the pandemic period. Thus, in some cases, we had to insist until the patient was willing to participate in the evaluation. In other cases, however, not even insistence was enough, and patients refused to participate. Many of the patients who underwent the procedure in question had changed their phone numbers, and therefore, we could not contact them, which greatly affected the number of participants in the sample. Additionally, we had to make an effort when we found a patient willing to collaborate with the study, offering to go to their homes so that they would not need to travel to the private tertiary orthopedic hospital. In one case, we even traveled to another municipality about 80 kilometers from the hospital to conduct the evaluation of one of the study's patients.

CONCLUSION

The present study demonstrates that patients with complete rotator cuff tears who underwent videoarthroscopic surgery without acromioplasty showed mild nocturnal and resting pain postoperatively, and moderate pain with movement, as well as good function and range of motion of the operated shoulder.

ACKNOWLEDGEMENTS

We would like to first thank God, whom we believe is the motivating force behind our pursuit of purpose in the medical field. May our medical practice be guided by Him, and may He empower us to be not only physicians of men but also of souls. We are grateful to the faculty of the School of Medicine at

Universidade Federal de Goiás (FM-UFG), who so diligently guided our first steps toward a medical career. To all the staff at Hospital das Clínicas of Universidade Federal de Goiás (HC-UFG). To all our family and friends. And a special thank you to our teacher and advisor, Dr. Marcos Rassi Fernandes.

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Library Review - Romulo Arantes
Spell Check: Dario Alvares
Received: 24/01/24. Accepted: 02/04/24. Published in: 26/04/24.