



Original Article

Rotator cuff injury in patients over the age of 65 years: evaluation of function, integrity and strength[☆]



Marco Antonio de Castro Veado^{a,b}, Eric Fontes Prata^{a,c,*}, David Correia Gomes^{a,c}

^a Hospital Mater Dei, Belo Horizonte, MG, Brazil

^b Faculdade de Ciências Médicas de Minas Gerais (FCMMG), Belo Horizonte, MG, Brazil

^c Hospital Felício Rocho, Belo Horizonte, MG, Brazil

ARTICLE INFO

Article history:

Received 8 July 2013

Accepted 29 May 2014

Available online 16 June 2015

Keywords:

Shoulder joint/surgery

Rotator cuff

Arthroscopy

ABSTRACT

Objective: To retrospectively evaluate the results from patients who underwent arthroscopic treatment for rotator cuff injuries, among those aged over 65 years, observing integrity, function and strength.

Methods: Thirty-five shoulders were operated between July 2005 and July 2010, and 28 shoulders were re-evaluated regarding elevation strength and external rotation, using a digital dynamometer. Integrity was evaluated by means of ultrasound examinations. The patients, whose mean age was 70.54 years (ranging from 65 to 82 years), were followed up for a minimum of 26 months and mean of 51.18 months (ranging from 26 to 82 months). To evaluate function, the UCLA score, the Simple Shoulder Test (SST) and a visual analog scale (VAS) for pain were used.

Results: In analyzing the ultrasound scans, it was observed that the integrity of the rotator cuff was maintained in 75% of the cases at the end of the follow-up, along with the improvement in the UCLA score, which evolved from 17.46 to 32.39, i.e. excellent and good results in 89.28%. The mean SST and VAS indices were 9.86 and 1.5 respectively.

Conclusion: Arthroscopic surgery to repair rotator cuff injuries in patients over the age of 65 years leads to improved function and pain relief, with maintenance of the integrity of the repair. The data on muscle strength were inconclusive.

© 2014 Sociedade Brasileira de Ortopedia e Traumatologia. Published by Elsevier Editora Ltda. All rights reserved.

Lesão do manguito rotador em pacientes maiores de 65 anos: avaliação da função, integridade e força

RESUMO

Objetivo: Avaliar retrospectivamente os resultados dos pacientes submetidos ao tratamento artroscópico das lesões do manguito rotador em pacientes acima de 65 anos e observar a integridade, a função e a força.

Palavras-chave:

Articulação do ombro/cirurgia

[☆] Work developed at Hospital Governador Israel Pinheiro and at Hospital Mater Dei, in Belo Horizonte, MG, Brazil.

* Corresponding author.

E-mail: ericprata@gmail.com (E.F. Prata).

<http://dx.doi.org/10.1016/j.rboe.2015.06.004>

2255-4971/© 2014 Sociedade Brasileira de Ortopedia e Traumatologia. Published by Elsevier Editora Ltda. All rights reserved.

Bainha rotadora
Artroscopia

Métodos: Foram operados 35 ombros entre julho de 2005 e julho de 2010 e 28 ombros reavaliados quanto à força de elevação e de rotação externa com um dinamômetro digital. A integridade foi avaliada por exame de ultrassonografia. Os pacientes, com média de 70,54 anos (variação de 65 a 82), foram seguidos por no mínimo 26 meses (variação de 26 a 82), com seguimento médio de 51,18 meses. Para a avaliação da função foi usado o escore da UCLA, o Simple Shoulder Test e a escala analógica visual da dor.

Resultados: Na análise da ultrassonografia observou-se a manutenção da integridade do manguito rotador em 75% dos casos no fim do seguimento, bem como a melhoria da pontuação no escore UCLA, que passou de 17,46 para 32,39; ou seja, 89,28% de excelentes e bons resultados. A média dos índices SST e EAV foi 9,86 e 1,5 respectivamente.

Conclusão: A cirurgia artroscópica para reparo da lesão do manguito rotador em pacientes maiores de 65 anos leva a uma melhoria da função e um alívio da dor, com manutenção da integridade do reparo. As informações sobre força muscular foram inconclusivas.

© 2014 Sociedade Brasileira de Ortopedia e Traumatologia. Publicado por Elsevier Editora Ltda. Todos os direitos reservados.

Introduction

The incidence of rotator cuff injuries in the general population is between 5% and 33%, while among individuals over the age of 65 years it is approximately 25%.¹ It tends to increase with aging and reaches 50% of individuals over the age of 80 years.^{1,2}

At the beginning of the 1990s, there was a trend toward more conservative approaches toward rotator cuff lesions among the elderly. However, great technological advances have made it possible for surgeons to achieve better functional results in this age group.^{2,3}

The advantages of arthroscopic repair are its low surgical impact, the possibility of maintaining the integrity of the deltoid and a less painful postoperative period.⁴ The factors contraindicating surgical repair among the elderly include the generally larger injuries in this age group, with worse tissue quality and slower healing response than in individuals aged 50–70 years.² Moreover, elderly people have a tendency to present greater numbers of comorbidities (diabetes mellitus, rheumatoid arthritis and renal diseases), which may interfere with surgical recovery.^{2,5}

A large variety of studies have analyzed the short-, medium- and long-term functional results from rotator cuff surgery.^{6–8} Here, we evaluated the more advanced age group through questionnaires on functional capacity, ultrasound examinations and muscle strength measurements, with the aim of analyzing the results following arthroscopic repair of the rotator cuff in patients over the age of 65 years, in relation to function, strength and integrity.

Material and methods

Between June 2005 and July 2010, 35 consecutively selected shoulders in individuals of the specified age, with a clinical diagnosis of rotator cuff injury that had been confirmed by means of magnetic resonance imaging, were treated surgically. The surgical procedures were performed under arthroscopic viewing by the same surgeon.

The inclusion criteria were that the patients should be over the age of 65 years at the time of the surgery; the procedure was performed under arthroscopic viewing and the minimum postoperative follow-up period was 24 months. The following were exclusion criteria in this study: lesions larger than 5 cm with retraction as far as the glenoid, associated lesions (SLAP, Bankart, etc.), previous surgery on the same shoulder, presence of glenohumeral arthrosis, follow-up of less than 24 months, refusal to participate in the study and failure to adhere to the protocol that had been established or incorrect following of this protocol.

Among the 28 patients who were operated, 8 had injuries that were considered small, 12 had medium-sized injuries and 8 had large injuries.

The patients were evaluated by two independent examiners who did not take part in the procedures, using the University of California at Los Angeles (UCLA) score before the operation and then, after the operation, reassessment using the UCLA score along with the Simple Shoulder Test (SST) and a visual analog scale (VAS).^{9,10} The integrity of the tendons was investigated by means of ultrasound examinations performed by the same examiner, using a Toshiba device with a 7.5 MHz linear transducer.^{3,11} Elevation strength and external rotation were also measured by a single examiner using a dynamometer (IDO Isometer Shoulder Muscle Strength Gauge, United Kingdom). After discarding the lowest of the three measurements, the average of the higher two measurements was used (Figs. 1 and 2). The results were analyzed statistically using Levene's test for equality of variance and the t-test for equality of means.

The patients were positioned in lateral decubitus and were operated under general anesthesia and brachial plexus block. Anterior, lateral and posterior portals were used and a complete inventory of the glenohumeral joint was routinely made.

Following this, bursectomy was performed to identify the size of the lesion and the tendons involved. In all the cases, economical debridement of the edges of the lesion was performed and the zone for reinsertion of the rotator cuff in a juxta-articular position was prepared. The tendons were reinserted using 5 mm titanium anchors in a single row, with nonabsorbable threads that maintained separations of 1 cm



Fig. 1 – Measurement of elevation strength: patient standing up, with the upper limb abducted and internally rotated.

between them. Acromioplasty was performed when the sub-acromial space was found to be greatly reduced by a curved or hooked acromion, or in situations of fibrillation of the coracoacromial ligament. The long head of the biceps was tenotomized in three patients (10, 23 and 24), and no tenodesis was performed. During the postoperative period, the repair was protected through use of a Velpeau sling for six weeks. Self-administered passive exercises for the shoulder



Fig. 2 – Measurement of external rotation strength: patient standing up, with the elbow against the body.

were started four weeks after the surgery and, after use of the sling had been withdrawn, the patients were referred for physiotherapeutic rehabilitation. Exercises against resistance were started only after the third month. Among the 28 patients evaluated, 6 (21.42%) were male and 22 (78.58%) were female; their ages ranged from 65 to 82 years, with a mean of 70.54. The dominant side was affected in 18 patients (64.28%).

Results

The preoperative mean UCLA score result was 17.46 and the postoperative mean was 32.39, i.e. 89.28% of the results were excellent or good. The mean result from the Simple Shoulder Test was 9.86; the worst result (score of 4) was from the oldest patient in the study (82 years of age), who presented renewed tearing of the supraspinatus, measuring 2 cm on postoperative ultrasound performed 27 months after the treatment, and an UCLA score of 13 (Table 1).

This patient also presented the lowest elevation strength: the weight lifted was 1.08 kg. The mean elevation strength was 4.64, from evaluating the left operated side.

The worst result on the analog pain scale was 8, relating to patient 19. However, on evaluating this patient's ultrasound, it was observed that the rotator cuff was intact and, from the physical examination, it was perceived that this case involved cervical pain that had irradiated to the shoulder.

Patient 14 also presented only a fair result (UCLA 26). Although this patient's strength was preserved and there was no recurrence of the lesion, pain continued to be present, with functional impairment (Table 2).

From evaluating the postoperative ultrasound, renewed tearing was detected in 7 (25.9%) of the patients who returned for control examinations. In six cases, the lesion was less than 1 cm in length. Only in the most elderly patient was the lesion 2 cm. All of the other patients had good or excellent UCLA scores.

The statistical analyses applied did not show significance, probably because of the small sample size.

Discussion

In treating symptomatic lesions of the rotator cuff that have not responded to conservative treatment based on analgesics, gains in range of motion and muscle strengthening, surgical treatment deserves to be taken into consideration.^{2,7,11,12}

A decision to implement surgery needs to be made by evaluating the patient's functional incapacity in day-to-day activities, together with important information from magnetic resonance imaging, which makes it possible to assess the degree of retraction of a tendon and the existence of any fatty degeneration in the muscle belly.¹³⁻¹⁵

Many patients over the age of 65 years are known to be still performing activities with high functional demands and would benefit from repair to allow them to continue their activities, even though these demands are lower than those of young patients.

Many people may consider that the changes that occur in tendons with advancing age lead to limitation of the capacity

Table 1 – Description of patients' sex, age and length of follow-up and comparison between pre- and postoperative UCLA scores.

Patients	Sex	Age at the time of surgery	Length of follow-up (months)	Preoperative UCLA score	Postoperative UCLA score
1	F	72	35	34	35
2	F	65	47	22	35
3	F	82	27	13	13
4	F	71	48	18	32
5	F	72	63	17	35
6	F	68	64	12	26
7	F	65	66	19	30
8	F	76	30	14	34
9	F	66	50	22	35
10	M	77	31	23	35
11	F	71	68	11	35
12	M	71	53	12	35
13	F	69	57	26	35
14	F	71	55	17	26
15	F	67	62	11	28
16	M	71	60	18	35
17	F	65	64	10	30
18	F	73	46	19	35
19	F	67	82	16	29
20	F	65	44	16	35
21	F	65	44	16	35
22	M	67	26	23	34
23	M	78	34	15	35
24	M	73	63	11	34
25	F	74	68	17	32
26	F	72	38	19	35
27	F	74	38	19	35
28	F	68	50	25	34
Means	6M, 22F	70.54	51.18	17.46	32.39

for healing and that when repairs are made, the rehabilitation requires greater effort.^{5,16}

In the light of these difficulties encountered in the tendons of the rotator cuff of this group of patients over the age of 65 years, some authors have performed decompression and simple debridement of complete tears of the rotator cuff that did not respond to conservative treatment.¹⁶⁻²⁰ Since reconstruction of the rotator cuff is increasing showing results that are better than those from simple debridement, performing debridement alone can no longer be justified.^{2,4,6,7,21,22} In the studies by Gartsman¹⁹ and Grondel et al.,²³ the same conclusion was reached: pain relief and functional improvement were only temporary if simple debridement was performed.

In our study, we found that the postoperative UCLA score was higher in 27 out of the 28 patients re-evaluated. The measurements of elevation strength and external rotation that were made using the dynamometer produced results that did not allow us to come to a conclusion, with regard to comparing the operated and non-operated sides, because there was some disparity in the values.

Patients who presented renewed tearing sometimes had greater strength than on the non-operated side. Since we did not evaluate the integrity of the tendon on the non-operated side, these results might be explained by the possible existence of lesions in these unevaluated shoulders.

Postoperative complications from arthroscopic repairs on rotator cuff lesions, such as stiffness, infection, sympathetic reflex dystrophy, deep vein thrombosis and death, do not have high prevalence in the literature,²⁴ and our study corroborates

this information. There was no anchor failure, but renewed tearing of the rotator cuff with lesions of up to 3cm was observed in seven of the 27 patients who were re-evaluated by means of ultrasound examinations. In these patients, the postoperative UCLA and SST gave good results.

The options for performing surgery on the tendons of the rotator cuff include open repair, mini-open repair and purely arthroscopic repair. The decision on which type of repair to perform will depend on the surgeon's familiarity with these types and his preferences. The advent of the totally arthroscopic repair technique has enabled surgery with smaller incisions (access through portals), lower aggression toward soft tissues, maintenance of the integrity of the deltoid muscle and its acromial insertion, reduction of postoperative pain and morbidity and the possibility of correcting intra-articular pathological conditions.^{4,6,20,25,26}

One limitation of our study was the lack of a control group. We considered that the minimum length of follow-up of 24 months was adequate, given that previous studies found that the maximum time taken for healing to be achieved was six to nine months after the surgery²⁷ and that after a 12-month period, no further changes relating to healing were observed.^{28,29}

During the operation, the rotator cuff was completely reconstructed and debridement was not performed in any of the cases. The results from this study suggest that if a lesion can be completely repaired at the time of the surgery, functional improvements can be expected in the patients, independent of the age group.

Table 2 – VAS, SST and elevation and rotation strength results according to the side operated.

Patients	VAS	SST	Side operated/dominant side	Right-side elevation strength	Left-side elevation strength	Right-side rotation strength	Left-side rotation strength
1	0	12	R/R	4.6	5.7	5.23	5.44
2	0	11	L/R	2.35	6	3	5.1
3	6	4	L/R	3.52	1.08	4.16	2.95
4	1	11	R/R	2.51	1.65	3.11	1.99
5	0	11	R/R	4.02	4.03	5.37	5.21
6	5	4	R/R	1.01	1.66	2.93	3.8
7	5	8	L/R	1.92	2.31	3.45	3.79
8	2	9	L/R	3.48	2.23	3.69	3.03
9	0	12	L/R	6.97	6.24	5.66	7.24
10	0	12	R/R	3.12	3.14	3.68	4.02
11	0	12	R/R	2.71	3.01	3.02	3.95
12	0	12	R/R	5.02	5.31	5.67	5.45
13	0	7	R/R	3.5	3.54	4.3	4.18
14	5	6	L/L	3.52	4.02	5.64	4.87
15	6	8	R/R	5.54	5.47	4.48	4.67
16	0	12	R/R	4.29	3.87	4.81	4.05
17	2	9	L/R	3.95	3.02	4.69	4.21
18	0	11	L/R	4.02	4.03	5.37	5.21
19	8	6	R/R	2.67	2.82	3.59	5.05
20	0	12	L/R	5.82	4.46	4.39	4.68
21	0	12	R/R	5.82	4.46	4.39	4.68
22	0	10	L/R	6.08	3.07	6.32	1.97
23	0	11	R/R	4.37	3.8	6.2	5.6
24	1	12	R/R	4.11	3.83	6.02	5.71
25	1	10	R/L	5.02	5.31	6.87	6.89
26	0	12	R/R	4.64	4.78	5.24	5.06
27	0	11	R/R	3.56	4.01	4.98	5.2
28	0	9	R/R	4.57	4.12	6.25	5.89
Means	1.50	9.86		4.06	3.82	4.73	4.64

We performed ultrasound examinations on 27 out of the 28 patients and considered that this was an important additional factor in this study, which made it possible to examine the integrity of the rotator cuff. It is known that renewed tearing of the rotator cuff after the operation does not necessarily lead to a poor result,^{2,3,30,31} and we also observed this. Choosing surgery gives patients the possibility of improving their painful symptoms and achieving functional improvement, and the data obtained suggest that surgical indications are valid, despite frequent occurrences of renewed tearing.

Conclusion

The repairs on rotator cuff lesions among patients over the age of 65 years performed by means of arthroscopy produced major clinical improvements, based on pain relief, function and integrity of the repair. The information regarding strength was inconclusive.

Conflicts of interest

The authors declare no conflicts of interest.

REFERENCES

- Milgrom C, Schaffer M, Gilbert S, van Holsbeeck M. Rotator-cuff changes in asymptomatic adults. The effect of age, hand, dominance, and gender. *J Bone Joint Surg Br.* 1995;77(2):296-8.
- Djahangiri A, Cozzolino A, Zanetti M, Helmy N, Rufibach K, Jost B, et al. Outcome of single-tendon rotator cuff repair in patients aged older than 65 years. *J Shoulder Elbow Surg.* 2013;22(1):45-51.
- Yamaguchi K, Ditsios K, Middleton WD, Hildebolt CF, Galatz LM, Teefey SA. The demographic and morphological features of rotator cuff disease. A comparison of asymptomatic and symptomatic shoulders. *J Bone Joint Surg Am.* 2006;88(8):1699-704.
- Veado MA, Castilho RS, Maia PE, Rodrigues AU. Estudo prospectivo e comparativo dos resultados funcionais após reparo aberto e artroscópico das lesões do manguito rotador. *Rev Bras Ortop.* 2011;46(5):546-52.
- Brewer BJ. Aging of the rotator cuff. *Am J Sports Med.* 1979;7(2):102-10.
- Nho SJ, Brown BS, Lyman S, Adler RS, Altchek DW, MacGillivray JD. Prospective analysis of arthroscopic rotator cuff repair: prognostic factors affecting clinical and ultrasound outcome. *J Shoulder Elbow Surg.* 2009;18(1):13-20.
- Zumstein M, Jost B, Hempel J, Hodler J, Gerber C. The clinical and structural long-term results of open repair of massive tears of the rotator cuff. *J Bone Joint Surg Am.* 2008;90(11):2423-31.

8. Zingg PO, Jost B, Sukthankar A, Buhler M, Pfirrmann CW, Gerber C. Clinical and structural outcomes of nonoperative management of massive rotator cuff tears. *J Bone Joint Surg Am.* 2007;89(9):1928-34.
9. L'Insalata JC, Warren RF, Cohen SB, Altchek DW, Peterson MG. A self-administered questionnaire for assessment of symptoms and function of the shoulder. *J Bone Joint Surg Am.* 1997;79(5):738-48.
10. Kirkley A, Griffin S, Dainty K. Scoring systems for the functional assessment of the shoulder. *Arthroscopy.* 2003;19(10):1109-20.
11. Yamaguchi K, Tetro AM, Blam O, Evanoff BA, Teeffey SA, Middleton WD. Natural history of asymptomatic rotator cuff tears: a longitudinal analysis of asymptomatic tears detected sonographically. *J Shoulder Elbow Surg.* 2001;10(3):199-203.
12. Lashgari CJ, Yamaguchi K. Natural history and nonsurgical treatment of rotator cuff disorders. In: Norris TR, editor. *Orthopaedic knowledge update.* Illinois: AAOS; 2002. p. 155-62.
13. Sher JS, Uribe JW, Posada A, Murphy BJ, Zlatkin MB. Abnormal findings on magnetic resonance images of asymptomatic shoulders. *J Bone Joint Surg Am.* 1995;77(1):10-5.
14. Thomazeau H, Boukobza E, Morcet N, Chaperon J, Langlais F. Prediction of rotator cuff repair results by magnetic resonance imaging. *Clin Orthop Relat Res.* 1997;(344):275-83.
15. Scheibel M, Lichtenberg S, Habermeyer P. Reversed arthroscopic subacromial decompression for massive rotator cuff tears. *J Shoulder Elbow Surg.* 2004;13(3):272-8.
16. Verma NN, Bathia S, Baker CL, Cole BJ, Boniquit N, Nicholson GP, et al. Outcomes of arthroscopic rotator cuff repair in patients aged 70 years or older. *Arthroscopy.* 2010;26(10):1273-80.
17. Rockwood CA Jr. Management of patients with massive rotator cuff defects by acromioplasty and rotator cuff debridement. *Orthop Trans.* 1986;10:622.
18. Montgomery TJ, Yergler B, Savoie FH. Management of rotator cuff tears: a comparison of arthroscopic debridement and surgical repair. *J Shoulder Elbow Surg.* 1994;3(1):70-8.
19. Gartsman GM. Massive irreparable tears of the rotator cuff: results of operative debridement and subacromial decompression. *J Bone Joint Surg Am.* 1997;79(5):715-21.
20. Weber SC. Arthroscopic debridement and acromioplasty versus mini-open repair in the management of significant partial thickness tears of the rotator cuff. *Orthop Clin North Am.* 1997;28(1):79-82.
21. Miyazaki NA, Santos PD, Saito RY, Kussakawa D, Checchia SL. Acromioplastia artroscópica e reparo das lesões do manguito rotador por mini-incisão. *Rev Bras Ortop.* 1999;34(7):415-20.
22. Cole BJ, McCarty LP 3rd, Kang RW, Alford W, Lewis PB, Hayden JK. Arthroscopic rotator cuff repair: prospective functional outcome and repair integrity at minimum 2-year follow-up. *J Shoulder Elbow Surg.* 2007;16(5):579-85.
23. Grondel RJ, Savoie FH 3rd, Field LD. Rotator cuff repairs in patients 62 years of age or older. *J Shoulder Elbow Surg.* 2001;10(2):97-9.
24. Brislin KJ, Field LD, Savoie FH. Complications after arthroscopic rotator cuff repair. *Arthroscopy.* 2007;23(2):124-8.
25. Severud EL, Ruotolo C, Abbott DD, Nottage WM. All-arthroscopic versus mini-open cuff repair: a long term retrospective outcome comparison. *Arthroscopy.* 2003;19(3):234-8.
26. Miyazaki AN, Fregoneze M, Santos PD, Silva LA, Sella GV, Santos RM, et al. Avaliação dos resultados de reoperações dos pacientes com lesões do manguito rotador. *Rev Bras Ortop.* 2011;46(1):45-50.
27. Wolfgang GL. Surgical repair of tears of the rotator cuff of the shoulder: factors influencing the result. *J Bone Joint Surg Am.* 1974;56(1):14-26.
28. Hawkins RJ, Misamore GW, Hobeika PE. Surgery for full thickness rotator cuff tears. *J Bone Joint Surg Am.* 1985;67(9):1349-55.
29. Abrams JS. Arthroscopic rotator cuff repair. In: Norris TR, editor. *Orthopaedic knowledge update.* Illinois: AAOS; 2002. p. 471-8.
30. 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.
31. Galatz LM, Griggs S, Cameron BD, Iannotti JP. Prospective longitudinal analysis of postoperative shoulder function: a ten-year follow-up study of full-thickness rotator cuff tears. *J Bone Joint Surg Am.* 2001;83(7):1052-6.