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Original article

Quality of life and functional capacity of patients with adhesive capsulitis: identifying risk factors associated to better outcomes after treatment with nerve blocking

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ABSTRACT

Introduction: The objectives of this study were to assess the quality of life and functional capacity of adhesive capsulitis patients at the beginning and end of procedure and to identify risk factors associated to better outcomes after treatment with nerve blocking.
Methods: A prospective cohort study was performed. Inclusion criteria were clinical signs of adhesive capsulitis and disease changes on shoulder imaging exams. The short form of World Health Organization Quality of life and Disabilities of the Arm, Shoulder and Hand questionnaires were administered at the beginning and end of treatment. A score of 55 points or more on the Constant index was used for discontinuation of treatment. We used the Wilcoxon test for paired samples. Multiple regression analysis of Poisson was carried out using exposure variables with $p < 0.20$ in the univariate analysis and the satisfactory quality of life and better functional capability as outcomes. The significance level was 5%.
Results: 43 patients were evaluated. For the comparison between medians values at the beginning and end of treatment (physical domain: 46.43–67.86; psychologic domain: 66.67–79.17; social domain: 66.67–75; environment domain: 62.5–68.75; DASH: 64.16–38.33), p was <0.05. Aging (physical/psychologic/DASH), higher educational level (physical/environment/DASH), less severity (only physical) and fewer nerve blocking (only psychologic) were these independent risk factors.
Conclusions: Quality of life and functional capacity of the patients improve at the end of procedure. Older patients and higher education levels are the risk factors most associated to satisfactory quality of life and better functional capacity after treatment with nerve blocking.

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Qualidade de vida e capacidade funcional de pacientes com capsulite adesiva: identificação de fatores de risco associados a melhores desfechos após tratamento com bloqueio de nervo

Palavras-chave:
Qualidade de vida
Bloqueio de nervo
Avaliação de desfecho
Capsulite adesiva
Ombro

RESUMO

Introdução: Os objetivos deste estudo foram avaliar a qualidade de vida e a capacidade funcional de pacientes com capsulite adesiva no início e no fim do procedimento de bloqueio de nervo e identificar fatores de risco associados a melhores desfechos após o tratamento.
Métodos: Fez-se um estudo de coorte prospectiva. Os critérios de inclusão foram sinais clínicos de capsulite adesiva e alterações da doença nos exames de imagem do ombro. Administrou-se a forma abreviada do questionário *World Health Organization Quality of Life* e o questionário *Disabilities of the Arm, Shoulder and Hand* no início e no fim do tratamento. Foi usada uma pontuação de 55 pontos ou mais no índice de Constant para descontinuar o tratamento. Usou-se o teste de Wilcoxon para amostras pareadas. Aplicou-se a análise de regressão múltipla de Poisson com variáveis de exposição com $p < 0,20$ na análise univariada. Usou-se a qualidade de vida satisfatória e a melhor capacidade funcional como desfechos. O nível de significância foi de 5%.
Resultados: Avaliaram-se 43 pacientes. Na comparação entre os valores medianos no início e no fim do tratamento (Domínio Físico: 46,43 a 67,86; Domínio Psicológico: 66,67 a 79,17; Domínio Social: 66,67 a 75; Domínio Ambiental: 62,5 a 68,75; DASH: 64,16 a 38,33), o p foi $< 0,05$. O envelhecimento (Físico/Psicológico/DASH), a maior escolaridade (Físico/Ambiental/DASH), a menor gravidade (apenas Físico) e a menor quantidade de bloqueios de nervo (apenas Psicológico) foram fatores de risco independentes.
Conclusões: A qualidade de vida e a capacidade funcional dos pacientes melhoram no fim do procedimento. Pacientes mais idosos e uma maior escolaridade são os fatores de risco associados à qualidade de vida satisfatória e à melhor capacidade funcional depois do tratamento com bloqueio de nervo.

Introduction

Outcome measurement is an essential component for defining the effectiveness of clinical practice. In the orthopedic and rheumatologic community, there has been an increased interest in outcome measures that capture the patient's own perspective of their clinical status. These include the analysis of quality of life (QoL) and functional capacity (FC) constructs, health indicators that are widely accepted in medical interventions.[1–3]

The short form of the World Health Organization Quality of Life questionnaire (WHOQOL-BREF) is a generic, multidimensional and multicultural QoL measure. It may be used with patients with psychological and physical disorders as well as with healthy individuals.[4,5] One limitation of this questionnaire is that it does not address all relevant QoL impairment issues. Another instrument, the Disabilities of the Arm, Shoulder and Hand Questionnaire (DASH), evaluates FC and reflects the impact of symptoms and physical function on patients with chronic upper-limb musculoskeletal disorders.[6] The inclusion of at least one generic and one specific questionnaire in studies evaluating shoulder disorders has been recommended since they complement each other.[7,8]

Most studies of adhesive capsulitis patients deal with symptoms of the disease. These studies analyze treatment results using pain, strength and range-of-motion scales. The use of these conventional clinical methods can lead to an incomplete health assessment.[9] However, an analysis of these outcomes (QoL and FC) can provide complementary information and help characterize affected individuals' perception of life in different dimensions, since nothing is known about the simultaneous use of the WHOQOL-BREF and DASH in this disease, unless the correlation between the instruments.[10] Treatment of adhesive capsulitis is a challenge since most patients have partial response, chronic evolution and functional limitation. Physical rehabilitation and measures to treat pain and inflammation/adhesion are insufficient suggesting that there is a relevant psychosocial component. The objectives of this study were to evaluate the QoL and FC of adhesive capsulitis patients at the beginning and end of procedure and to identify the risk factors associated with satisfactory quality of life and better functional capacity after treatment with nerve blocking.

Materials and methods

Participants

A prospective cohort study was performed with adhesive capsulitis patients. Participants were selected during routine visits at a specialized clinic from August/2010 to February/2012.

Adults and elderly patients were considered to have adhesive capsulitis if they had constant and prolonged pain lasting over 4 weeks, limitation on active and passive shoulder range of motions, anterior elevation to 130°, external rotation to 50° and internal rotation to L5.[11]

Inclusion criteria were clinical signs of adhesive capsulitis, presence of disuse osteopenia in shoulder radiographies (true AP, axillary and scapular view) and volumetric reduction of the articular capsule associated with obliteration of the axillary recess in nuclear magnetic resonance of the shoulder in the preceding 30 days.

Exclusion criteria were age less than 24 years, concomitant diseases such as complete lesion of the rotator cuff, instability, glenohumeral arthrosis and locked dislocation of the shoulder; motor sequelae of stroke (hemiplegia or paresis), history of breast surgery in the preceding three months; chemotherapy or radiotherapy treatment; bilateral adhesive capsulitis involvement, previous surgery on the affected shoulder; diagnosis of decompensated diabetes or glycosylated hemoglobin greater than 7% in the preceding 30 days; or subacromial infiltration or suprascapular nerve blocking (SSNB) in the 15 days prior to recruitment.

Assessment tools

The WHOQOL-BREF and DASH instruments were filled out by the patients included in the study at the beginning and end of treatment in a private setting with no one else present. The questionnaires were self-applied and patients spent an average of 15 min per instrument. Immediately after the patient was included in the study, weekly treatment of adhesive capsulitis with SSNBs was started.

The final evaluation was carried out when the Constant–Murley score was greater than or equal to 55 points. This clinical method evaluates pain (15 points), daily life activities (20 points), active joint mobility (40 points) and shoulder strength (25 points).[12] This parameter was used to decide whether or not the nerve blocking should be continued and was applied at the beginning of each weekly patient visit.

SSNB technique

The SSNBs were performed by only one trained physician with posterior access according to the Dangoisse technique[13] on an outpatient basis without the aid of a peripheral nerve stimulator or imaging techniques. We used 8 mL of bupivacaine chlorhydrate 0.5% with epinephrine bitartrate 1:200,000, without the association of corticoids.

Data collection

Exposure variables were treated according to predetermined categories: age in years at the time of recruitment, gender (male/female), education (greater than/less than or equal to eight years of formal educational level), marital status (unmarried/married), pain at the time of recruitment (mild or moderate/severe),[12] disease classification (primary/secondary),[14] disease severity at time of recruitment (not severe/severe),[14] disease duration (less than or equal to three/more than three months), and number of nerve blocking (less than three/greater than or equal to three). Other variables were also considered: the side of the affected shoulder (right/left), dominance (right-handed/left-handed), and sleep (unaffected/affected).[12]

Endpoints

Outcome variables were QoL and FC. The two instruments mentioned above, WHOQOL-BREF and DASH, were used for the evaluation. WHOQOL-BREF includes 26 general QoL questions and is composed of physical, psychological, social relationship and environmental domains. The final score for each domain can vary from zero to one hundred, where zero corresponds to a worse general state of health and a hundred to a better health status.[4] DASH is an instrument with good internal consistency which uses 30 questions to evaluate the FC of patients with upper-limb disorders. The higher the score, the greater the functional disability.[6]

This study was approved by the Dr. Henrique Santillo Research Ethics Committee/GO on 6/23/2010 under number 0014.0.177.000-10.

Statistical analysis

Data were entered into a Microsoft Office Excel spreadsheet and analyzed using the Statistical Package of Social Sciences (IBM – SPSS 20.0) and STATA 12.0. Cronbach's coefficient of reliability was used to assess the instruments' internal consistency.

Exposure variables and other variables were presented as absolute numbers and frequencies. Each patient's DASH and WHOQOL-BREF domain scores were calculated at both the beginning and end of treatment. DASH scores and scores on each of the WHOQOL-BREF domains were transformed into a scale of zero to 100.

The medians, interquartile intervals and minimum and maximum values for the DASH and WHOQOL-BREF domain scores were calculated because of their non-normal distribution. To compare the distribution of scores (medians) at the beginning and end of treatment, the Wilcoxon test for paired samples was used. Box-plot graphs for the DASH and WHOQOL-BREF domain scores were constructed using the median and interquartile intervals.

To identify variables associated with satisfactory quality of life and better functional capacity, univariate analysis was performed using the chi-square or Fisher exact test, where appropriate.

All outcome variables were dichotomized. Initially each patient's median on the questions was calculated to dichotomize the values on each domain of the WHOQOL-BREF between satisfactory and unsatisfactory. If a patient's median was equal to or greater than four, his QoL was considered satisfactory. To dichotomize the DASH scores, each patient's median on the questions was calculated. If the median was less than three, the patient was considered to have better FC.

All exposure variables that had a p value < 0.20 were included in the Poisson multivariate regression model with robust adjustment. The incidence rate ratios (IRRs) were estimated using the respective confidence intervals of 95% and significance levels.

Table 1 – Clinical and sociodemographic data of the study population (*n* = 43).

Variables	*n*	%
Age		
>50	29	67.4
≤50	14	32.6
Sex		
Male	20	46.5
Female	23	53.5
Educational level		
>08 years	26	60.5
≤08 years	17	39.5
Marital status		
Married	11	25.6
Unmarried	32	74.4
Side		
Right	18	41.9
Left	25	58.1
Dominance		
Right handed	41	95.3
Left handed	02	4.7
Classification		
Primary	15	34.9
Secondary	28	65.1
Pain		
Light/moderate	22	51.2
Severe	21	48.8
Sleep		
Affected	04	9.3
Unaffected	39	90.7
Severity		
Non severe	37	86
Severe	06	14
Disease duration		
≤03 months	13	30.2
>03 months	30	69.8

For all statistical analyses, the significance level was set at 5%.

Results

A total of 47 patients participated in the study. It was not possible to calculate four patients' quality of life and functional capacity scores at the end of treatment, so they were excluded from the study. Thus, the final sample consisted of 43 patients.

The average age was 54.7 years, ranging from 40 to 75, and 23 (53.5%) of the participants were female. Most (60.5%) had more than eight years of formal educational level. The secondary form of the disease occurred in 65.1% of cases, with hypothyroidism and diabetes mellitus occurring in 11.6% and 4.7% of the cases respectively (Table 1).

The internal consistency of the DASH and WHOQOL-BREF was assessed at the beginning and end of treatment. On the WHOQOL-BREF, Cronbach's alpha was calculated for the domains, the questions and each domain individually, as shown in Table 2. The Cronbach coefficient values obtained for the questions and for the domains showed satisfactory internal consistency for both the WHOQOL-BREF and the DASH. When assessed individually, the social relationships domain had the lowest values.

Table 2 – WHOQOL-BREF and DASH Cronbach coefficient (*n* = 43).

	Cronbach's α	Items numbers
WHOQOL-BREF		
26 questions		
Initial	0.91	26
Final	0.91	
Domains		
Initial	0.90	24
Final	0.90	
Physical domain		
Initial	0.85	7
Final	0.68	
Psychologic domain		
Initial	0.73	6
Final	0.82	
Social domain		
Initial	0.62	3
Final	0.70	
Environment domain		
Initial	0.77	8
Final	0.80	
DASH		
Initial	0.95	30
Final	0.96	

Table 3 – Median, minimum and maximum values and interquartile interval of the DASH and WHOQOL-BREF scores at the beginning and end of treatment for patients with adhesive capsulitis (*n* = 43).

Domains	Minimum–maximum	Median	Interquartile interval
Physical			
Initial	11–86	46.43	28.57–60.71
Final	36–93	67.86	60.71–78.57
Psychologic			
Initial	25–88	66.67	50.00–79.17
Final	25–96	79.17	62.50–83.33
Social			
Initial	17–100	66.67	58.33–83.33
Final	25–100	75.00	66.67–83.33
Environment			
Initial	19–91	62.50	50.00–71.88
Final	22–94	68.75	56.25–75.00
DASH			
Initial	16–100	64.16	50.00–74.16
Final	5–85	38.33	30.00–57.50

The median, interquartile intervals and DASH and WHOQOL-BREF domains minimums and maximums values at the beginning and end of treatment are shown in Table 3. QoL improved in all WHOQOL-BREF domains after treatment when compared to the pre-SSNB assessment. There was also

Table 4 – Univariate analysis of associated risk factors associated with WHOQOL-BREF domains and DASH (*n* = 43).

Variables of exposure	Total	PD		PsD		SD		ED		DASH	
		QoL+	*p*	QoL+	*p*	QoL+	*p*	QoL+	*p*	FC+	*p*
Sex											
Male	20	16	0.056	15	0.935	17	1.000	12	0.954	13	0.158
Female	23	12		17		19		14		10	
Age											
>50	29	23	0.008	26	0.002	25	0.665	20	0.101	18	0.104
≤50	14	05		06		11		06		05	
Marital status											
Married	11	07	1.000	09	0.698	09	1.000	08	0.480	07	0.434
Unmarried	32	21		23		27		18		16	
Educational l.											
> 8 years	26	20	0.045	21	0.295	23	0.407	19	0.036	17	0.053
≤ 8 years	17	08		11		13		07		06	
Disease d.											
≤3 months	13	11	0.096	09	0.709	10	0.655	08	0.925	08	0.486
>3 months	30	17		23		26		18		15	
Severity											
Not severe	37	26	0.161	28	0.637	31	1.000	23	0.666	20	1.000
severe	06	02		04		05		03		03	
Classification											
Primary	15	11	0.408	11	1.000	12	0.680	10	0.543	09	0.531
Secondary	28	17		21		24		16		14	
N° of SSNB											
<3	25	19	0.078	22	0.031	22	0.427	15	0.941	15	0.313
≥3	18	09		10		14		11		08	
Pain											
Light/moderate	22	17	0.087	16	0.795	19	0.698	13	0.850	12	0.887
Severe	21	11		16		17		13		11	

PD, physical domain; PsD, psychological domain; SD, social domain; ED, environment domain; QoL+, satisfactory quality of life; FC+, better functional capacity; l., level; d., duration; N°, number; SSNB, suprascapular nerve blocking.

a significant increase in the functional capacity of the affected shoulder as measured on the DASH ($p < 0.001$).

After dichotomization of outcomes, univariate analysis identified exposure variables associated with satisfactory QoL in each domain of the WHOQOL-BREF and better FC on the DASH. Only the social domain did not obtain variables for inclusion in the Poisson multivariate regression model (Table 4).

Older patients were independently associated with satisfactory QoL on the physical and psychological WHOQOL-BREF domains. Higher educational levels were predictive of higher scores on the physical and environmental domains. Physical domain questions 3, 10, 17 and 18 were those that contributed most to high QoL scores among persons over 50 while questions 3, 4 and 18 were the largest contributors to the scores of those with more than 8 years of educational level. These two factors also favored increased FC in the affected shoulder as measured by the DASH. Fewer nerve blocking contributed to better QoL scores only in the psychological domain and a diagnosis of not severe adhesive capsulitis resulted in higher scores only in the physical domain of WHOQOL-BREF (Table 5).

Table 5 – Poisson multivariate regression analysis of the risk factors for the DASH and WHOQOL-BREF domains (*n* = 43).

	IRR[a]	CI 95%[b]	*p*
Physical domain[c]			
Age > 50 years	1.40	1.20–1.61	0.000
Not severe capsulitis	1.37	1.13–1.68	0.002
Educational level > 8 years	1.19	1.01–1.40	0.041
Disease duration ≤ 3 months	1.19	0.99–1.43	0.063
Psychological domain[d]			
Age > 50 years	1.46	1.25–1.70	0.000
Number of nerve blocking < 3	1.34	1.15–1.57	0.000
Environment domain[d]			
Age > 50 years	1.21	1.00–1.48	0.053
Educational level > 8 years	1.28	1.05–1.54	0.012
DASH[d]			
Age > 50 years	1.21	1.01–1.45	0.040
Educational level > 8 years	1.21	1.00–1.45	0.048

[a] Incidence rate ratio.
[b] Confidence interval.
[c] Adjusted for sex and pain.
[d] Adjusted for sex.

Discussion

The comprehension of the QoL of patients with adhesive capsulitis is still limited even though the disease is relatively common. The present study showed better quality of life and functional capacity of these patients after treatment with SSNB. Age above 50 years and higher education were the main factors associated with satisfactory QoL and better FC.

The present study confirmed the findings of Baums et al., who found that the physical QoL domain of adhesive capsulitis patients was compromised before surgical release.[15] This result makes sense because, in addition to chronic pain, adhesive capsulitis patients frequently experience changes in sleep patterns and the ability to perform daily activities.[16] The results of our study confirmed that scores on all QoL domains increased significantly after treatment. The smallest difference in scores at the beginning and end of treatment was in the social domain, as also reported by Lorbach et al.,[17] suggesting that adhesive capsulitis does not greatly impact interpersonal relationships. The DASH scores showed significant disability at the time of recruitment and increase of FC over the study period in the shoulder affected by adhesive capsulitis, corroborating the results of Hsieh et al.[18] and Buchbinder et al.[19]

The relationship between age and QoL has been relatively controversial. A year after a traffic accident and in cases of testicular cancer, respectively, Khati et al.[20] and Fleer et al.,[21] found that younger individuals had higher QoL scores while studies of patients with mental disorders and oral diseases found higher QoL scores among older subjects.[22,23] These results suggest that the variability in the association between age and QoL is probably dependent on the type of health problem and the cultural sensitivity differences of the QoL assessment tool.[24–26] In Brazil, less experience in coping with disabilities and/or financial losses may mean that younger individuals have more difficulty adapting to their new condition.[27] It is also reasonable to assume that those with higher educational levels would not miss out on opportunities because of the disease and that their adaptation to temporary disability would be facilitated by better access to health information.

Having fewer than three nerve blocking was associated with higher scores in the psychological domain, possibly because successive invasive procedures have the potential to increase patient anxiety. Also it is possible that people with better psychological outcomes needed less intervention, because they were more satisfied with their condition. It is indispensable to mention that the psychologic status and profile of human being is an important factor of improvement.[28] Less severity of adhesive capsulitis patients resulted in higher scores in the physical domain of WHOQOL-BREF, probably because lower limitation of shoulder movements facilitated the ability to perform daily activities, as well as work capacity and satisfaction during sleep.[16]

As chronological age increases, people become less active and gradually less able to perform everyday activities.[29,30] However, an objective evaluation of FC does not always coincide with the individual's perception of his disability as measured by the DASH. In this study, older patients reported better shoulder FC than younger patients, perhaps because they had more resources available to adapt to or accept disease-imposed limitations. The association between low education levels and the lowest FC could be explained by inadequate ways of coping with their disability.[31]

Among the limitations of the study, the convenience sample may not be truly representative of all patients with adhesive capsulitis and may have been insufficient to detect all associations. Risk factors such as comorbidities and other forms of treatment were not analyzed in this study. On the other hand, all patients in this study were given a complete clinical evaluation by the same orthopedic surgeon and adhesive capsulitis was confirmed by imaging (radiography and magnetic resonance). One of the strengths of the study is its prospective design and the use of QoL and FC assessment tools translated into and validated for Portuguese, which allows comparisons with different cultures.

This study provided evidence for an association of sociodemographic characteristics with improved quality of life and functional capacity in patients with adhesive capsulitis. These results can contribute to a broader view of the health of these patients and may prove useful for professionals who follow individuals receiving the same type of therapy used in this research.

There is an association between sociodemographic data in improving the outcomes studied. This information may be useful to professionals who use the SSNBs in the treatment of this disease, which need to pay attention to these variables to obtain better clinical results. Subjective evaluation of the constructs QoL and FC expands the knowledge of professional beyond the merely clinical perspectives, understanding how the patients think, feel and act in the presence of adhesive capsulitis. The care of these patients with the appreciation of its subjectivity and its related factors gain new nuances, since the physician who attends them must recognize that different individuals do not give importance to the same things and therefore must approach them individually. We really recommend a population-based study with probability sampling techniques to address all variables of the present research.

Conclusions

The QoL and FC of adhesive capsulitis patients improve at the end of SSNB procedure. Older age and more educational level are the main risk factors associated with a satisfactory quality of life and increased functional capacity of the shoulder after treatment with nerve blocking.

Conflicts of interest

The authors declare no conflicts of interest.

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