

Maria Eduarda da Rosa¹
Cláudia Tiemi Mituuti¹
Ana Carolina de Assis Moura Ghirardi¹

Correlation between the Voice Handicap and Swallowing Quality of Life in patients with laryngeal cancer submitted to chemoradiotherapy

Correlação da desvantagem vocal e qualidade de vida em deglutição de pacientes com câncer de laringe submetidos à quimiorradioterapia

Keywords

Chemoradiotherapy
Radiation Effects
Swallowing Disorders
Voice
Quality of Life

Descritores

Quimiorradioterapia
Efeitos de Radiação
Transtornos de Deglutição
Voz
Qualidade de Vida

ABSTRACT

Purpose: To verify the correlation between the voice handicap and swallowing quality of life in individuals submitted to chemoradiotherapy for laryngeal cancer treatment. **Methods:** Cross-sectional, observational and quantitative study. Fourteen male individuals diagnosed with laryngeal cancer were submitted to exclusive chemoradiotherapy treatment. The individuals completed the Voice Handicap Index (VHI) and the Swallowing Quality of Life (SWAL-QOL) questionnaires. Data were submitted to descriptive and inferential analysis using Spearman's Correlation Test to verify possible correlations among the scores of these instruments. Values of $p \leq 0.05$ were considered statistically significant. **Results:** No significant correlation was found between the total VHI and overall SWAL-QOL scores. However, there was significant correlation between the domain *Functional* of the VHI and the domains *Fatigue* and *Social* of the SWAL-QOL, between the domain *Organic* in the VHI and the SWAL-QOL domain *Social*, and total VHI score and SWAL-QOL domain *Swallowing as a burden*. Furthermore, chemoradiotherapy treatment had a greater impact on the voice than on the swallowing for the studied individuals. **Conclusion:** The data showed a significant correlation between voice handicap and the impact of quality of life involving swallowing in individuals with laryngeal cancer submitted to chemoradiotherapy. This may affect individuals' emotional and social aspects, impacting their overall quality of life.

RESUMO

Objetivo: Verificar a correlação entre desvantagem vocal e a qualidade de vida em deglutição de pacientes que foram submetidos ao tratamento quimiorradioterápico para câncer de laringe. **Método:** Estudo transversal, observacional e quantitativo do qual participaram 14 indivíduos do gênero masculino diagnosticados com câncer de laringe, que, para tratamento, fizeram uso exclusivo de quimiorradioterapia. Aplicaram-se os instrumentos Índice de Desvantagem Vocal e Protocolo de Qualidade de Vida em Deglutição SWAL-QoL. Fez-se análise descritiva e, em seguida, aplicou-se o teste de Correlação de Spearman para verificar se havia correlação entre os escores dos instrumentos aplicados. Foram considerados estatisticamente significativos os valores de $p \leq 0,05$. **Resultados:** Não houve correlação significativa entre os domínios total do IDV e global do SWAL-QoL, porém houve correlação significante entre os domínios "Funcional" do IDV e os domínios "Fadiga" e "Social" do Swal-Qol; domínio "Orgânico" do IDV com o domínio "Social" do SWAL-QoL; escore total do IDV, com o domínio de "Deglutição como um fardo" do SWAL-QoL. Além disso, foi possível observar que o tratamento quimiorradioterápico ocasionou maior impacto em relação à voz do que em relação à deglutição para os pacientes estudados. **Conclusão:** Os dados demonstraram correlação significante entre a desvantagem vocal e o impacto da qualidade de vida em deglutição de pacientes com câncer de laringe submetidos à quimiorradioterapia, podendo afetar seu estado emocional e sua socialização, piorando assim, sua qualidade de vida de modo geral.

Correspondence address:

Ana Carolina de Assis Moura Ghirardi
Departamento de Fonoaudiologia,
Centro de Ciências da Saúde,
Universidade Federal de Santa Catarina
– UFSC
Campus Universitário Reitor
João David Ferreira Lima, s/n,
Trindade, Florianópolis (SC), Brasil,
CEP: 88040-900.
E-mail: carolina.ghirardi@ufsc.br

Study carried out at the Departamento de Fonoaudiologia, Universidade Federal de Santa Catarina – UFSC - Florianópolis (SC), Brazil.

¹ Curso de Fonoaudiologia, Universidade Federal de Santa Catarina – UFSC - Florianópolis (SC), Brasil.

Financial support: nothing to declare.

Conflict of interests: nothing to declare.

Received: March 16, 2017



This is an Open Access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION

Laryngeal cancer is considered to be one of the most common tumors in the head and neck region, accounting for approximately 25% of malignant tumors in this area and 2% of all malignancies⁽¹⁾.

One study⁽²⁾ reports good results in the treatment of the disease with the preservation of the laryngeal organ through combined treatments of radiotherapy and chemotherapy without compromising the results in terms of survival time. However, preservation of the larynx does not always constitute a treatment that completely protects all its functions (breathing, phonation and swallowing) since individuals may present specific alterations in communication and swallowing⁽²⁾, which may lead to worsening of the quality of life.

Chemoradiotherapy treatment for individuals with malignant tumors of the head and neck causes important oral complications, among them mucositis, fibrosis, neuropathy and, mainly, xerostomia⁽³⁾. In addition to possible burns and/or fibrosis of the tissues of this region, the treatment can cause several difficulties for communication and swallowing of the individual, which consequently may decrease their social insertion⁽⁴⁾.

The quality of life of patients after treatment of head and neck cancer has been a subject researched by several health professionals, including Speech-language Pathology (SLP) therapists, who must ensure that there are services available in the post-treatment period that not only address the physical need, but also the emotional and psychosocial need of the patient⁽⁵⁾.

Nonetheless, one study reports that survival and disease control are the primary goals in cancer treatment, often failing to take into account the opinions and perceptions of individuals regarding the consequences of the disease, medical treatment and changes in the functions performed by the affected organ⁽⁶⁾.

The larynx is an organ of the respiratory system that has, among its main functions, phonation and protection of the lower airways in the swallowing process. Thus, swallowing and voice are related by the sharing of muscle groups and structures involved in these processes and may be affected by the therapeutic option for the treatment of laryngeal cancer. As a result, the objective of this study was to correlate voice handicap and quality of life in swallowing of individuals submitted to chemoradiotherapy treatment for laryngeal cancer.

METHODS

The current study was carried out at *Polydoro Ernani de São Thiago* University Hospital (HU/UFSC) and in the Oncology Research Center - (CEPON) from August to October 2016, after approval of the Research Ethics Committee, with Certificate of Presentation for Ethical Appreciation (CAAE) number 51479915.7.0000.0121. It is a cross-sectional, observational and quantitative study whose population was composed of individuals with laryngeal cancer who, for the treatment, exclusively used chemoradiotherapy and had previously finished treatment. The participation of the individuals was voluntary and confirmed by the signing of an informed consent form. Initially, a survey was carried out with the analysis of medical

records of patients with laryngeal cancer to verify whether the individuals fulfilled the inclusion criteria of the study. Thirty-two records were analyzed, excluding three that had the following exclusion criteria: surgery to remove tumors in the laryngeal region; history of neurological changes; previous SLP therapy to treat the sequelae of chemoradiotherapy and the presence of tracheostomy. After analysis, the individuals were contacted and fourteen agreed to participate in the study.

Procedures

The individuals who agreed to participate and fulfilled the inclusion criteria of the study were received at the SLP outpatient clinic of the *Polydoro Ernani de São Thiago* University Hospital (HU/UFSC) and Oncology Research Center (CEPON), in which the Voice Handicap Index (VHI), translated and validated for Brazilian Portuguese⁽⁷⁾ and the Swallowing Quality of Life (SWAL-QOL) protocol, also translated and adapted to Brazilian Portuguese⁽⁸⁾ were applied.

The individuals answered a short questionnaire that presented items of identification that were taken from medical records and items answered by the individuals themselves. This questionnaire contained the following information: name; age; gender; symptoms for seeking a specialist for diagnosis; type of tumor; number of radiotherapy and chemotherapy sessions; treatment end date; other diseases, such as chronic obstructive pulmonary disease, hypertension, diabetes and neurological, among others.

In order to analyze the responses to the VHI instrument, four scores were calculated, one a total composite score and three referring to the domains *Emotional* (E), *Functional* (F) and *Organic* (O), by means of simple summation, separating responses by domain and final score. The questionnaire had a five-point Likert scale, which should be marked according to the frequency of occurrence of each statement: always, almost always, sometimes, almost never or never. The total disadvantage can reach 120 points, and the maximum score of each domain can reach 40; thus, the higher the result obtained in this protocol, the worse the perceived disadvantage of the individual. For the analysis, scores from 0 to 40 points were considered mild, from 40 to 60 points considered moderate, and a total score of 60 or more corresponded to severe disadvantage⁽⁹⁾.

The SWAL-QOL protocol is an important self-assessment instrument that addresses the quality of life related to swallowing. It consists of 44 questions encompassing 11 domains: *Swallowing as a burden*, *Desire to eat*, *Feeding duration*, *Frequency of symptoms*, *Food selection*, *Communication*, *Fear of eating*, *Mental health*, *Social*, *Sleep*, *Fatigue*. The questionnaire presents a five-point Likert scale, which should be marked according to the frequency of occurrence of each statement: always, often, sometimes, a little or never. Responses are converted to a score ranging from 0 to 100, where 0 is the worst score and 100 is the best. After the conversion, the values of each response within each domain were summed for each individual and the result divided by the number of questions of the referenced domain analyzed, resulting in the value of the domain score. To obtain the overall score of the questionnaire, the values of each response of all domains were summed and the resulting value was divided by the total number of questions, the result being considered as its overall value⁽⁸⁾. There were also four supplementary questions covering whether or not there is an

alternative route of feeding, consistency of food and liquids, and self-assessment of health in general. For the analysis of the results, scores ranging from 0 to 49 were considered as having a moderate impact, ranging from 50 to 70 as having a discrete impact and scores from 71 to 100 as without impact on the quality of life related to swallowing⁽⁹⁾.

All individuals in the study were assisted by the researcher in responding to questions. The researcher applied the instruments, read, and when necessary, explained the questions in which it was felt there was difficulty in understanding and recorded the responses reported by the individuals. Although the instruments are self-applicable, this procedure was adopted in order to standardize the way data was collected, taking into consideration that some of the individuals had a low educational level.

Statistical methods

In order to verify whether there was a correlation between VHI and SWAL-QOL, a descriptive analysis of frequency, percentage and quantity of categorical variables was done, using mean of the findings, maximum and minimum of the scores found, and exploratory where Spearman's rank correlation coefficient test was applied in order to verify both the correlation between the instruments used and the number of radiotherapy and chemotherapy sessions performed by the individuals in the study, as well as the correlation between the total scores and the isolated domains of the instruments. For this analysis, the SPSS software version 13.0 was used, and only those values where $p \leq 0.05$ were considered significant, the values found as: weak correlation, when the value of $r \leq 0.49$; moderate

when the r value is 0.5 to 0.69; and strong correlation when the value found for r is between 0.7 and 1. The values found may be positive or negative. Negative values represent inversely proportional values and positive values are proportional values.

RESULTS

Table 1 presents the categorical variables of the present study. The sample consisted of 14 individuals, all males with mean age of 60 years. All were reported to be former smokers and 85.71% reported frequent alcohol use.

Regarding the stage of the tumor, three individuals were diagnosed with T1, ten with T2 and one with T3. The symptoms presented as the main complaint for a specialist's search at the time of diagnosis was difficulty speaking, presented by seven individuals, followed by difficulty speaking and eating and discomfort to eat, with three individuals and dyspnea reported by one individual. The individuals in the study performed 35 radiotherapy sessions on average, with a mean dose of 2 Gy per application. Chemotherapy treatment lasted, on average, 3.5 sessions.

All individuals reported feeding orally without using an alternative route for feeding. Regarding food consistency, 64.28% of the individuals reported eating soft foods, namely, foods that are easy to chew, such as cooked foods, canned fruits, cooked vegetables and cream soups. Additionally, 28.57% reported consuming pasty foods, such as those put through the blender or processed, and only 7.15% reported a normal diet with a wide variety of foods, including the most difficult to chew, such as meat, carrots, bread, salad and popcorn. Regarding liquid consistencies, all individuals in the study reported no restrictions.

Table 1. Descriptive analysis of the categorical and numerical variables of characterization of individuals with laryngeal cancer submitted to chemoradiotherapy. Florianópolis, 2016 (N = 14)

Variables	N	%	Min – Max	Mean
Age			45 – 70	60
Radiotherapy sessions			33 – 36	34.9
Chemotherapy sessions			2 – 7	3.5
Male gender	14	100		
Ex-smoker	14	100		
Consume alcohol frequently	12	85.71		
Education level				
Complete secondary education	9	64.28		
Incomplete primary education	4	28.57		
Complete post-secondary education	1	7.15		
Tumor staging				
Tumor - stage t1	3	21.42		
Tumor - stage t2	10	71.42		
Tumor - stage t3	1	7.15		
Main complaint for seeking a specialist				
Difficulty to speak	7	50		
Difficulty to speak and eat	3	21.42		
Discomfort when eating	3	21.42		
Dyspnea	1	7.15		
Food consistency				
Soft	9	64.28		
Pasty	4	28.57		
Normal	1	7.15		
Liquid without restriction	14	100		

*mean dosage of radiation: 2 Grays (Gy) per session

Table 2 shows the total score and per domains of VHI and SWAL-QOL instruments.

Table 3 shows the results of the correlation analysis between the radiotherapy and chemotherapy sessions and the scores on VHI and SWAL-QOL instruments.

Table 2. Descriptive analysis of the scores of VHI and SWAL-QOL instruments applied to individuals with laryngeal cancer submitted to chemoradiotherapy. Florianópolis, 2016 (N = 14)

Domain	Min-Max	Mean	SD
VHI - E	13 – 24	19.34	3.89
VHI - F	15 – 29	20.33	3.79
VHI - O	17 – 32	25.74	4.94
VHI - Total	47 – 80	66.13	10.26
SWQ - Burden	25 – 62.5	45.53	14.38
SWQ – Desire	0 – 75	41.66	20.41
SWQ – Time	0 – 50	24.10	19.28
SWQ – Frequency	33.5 – 87.5	60.39	18.62
SWQ – Food selection	25 – 100	62.5	18.98
SWQ – Communication	25 – 75	50.89	13.39
SWQ – Fear	37.5 – 87.5	60.71	16.52
SWQ – Mental health	40 – 75	62.85	13.54
SWQ – Social	50 – 80	66.78	12.34
SWQ – Sleep	25 – 100	49.10	22.17
SWQ – Fatigue	16.66 – 100	39.40	24.05
SWQ – Overall	30.98 – 64.88	51.30	8.12

Captions: VHI = Voice Handicap Index; SWQ = SWAL-QOL protocol

Table 3. Correlation between vocal disadvantage and swallowing quality of life and radiotherapy and chemotherapy sessions of individuals with laryngeal cancer submitted to chemoradiotherapy. Florianópolis, 2016 (N = 14)

	Radiotherapy sessions	Chemotherapy sessions
VHI - E	p 0.007* r 0.677	p 0.667 r -0.126
VHI - F	p 0.698 r -0.113	p 0.993 r -0.002
VHI - O	p 0.224 r 0.346	p 0.708 r 0.109
VHI - Total	p 0.128 r 0.426	p 0.590 r 0.157
SWQ - Burden	p 0.161 r -0.395	p 0.741 r -0.096
SWQ – Desire	p 0.912 r 0.032	p 0.667 r 0.126
SWQ – Time	p 0.750 r -0.093	p 0.879 r -0.044
SWQ – Frequency	p 0.636 r -0.138	p 0.945 r -0.020
SWQ – Food selection	p 0.951 r 0.017	p 0.831 r 0.062
SWQ – Communication	p 0.486 r 0.202	p 0.985 r 0.005
SWQ – Fear	p 0.598 r 0.154	p 0.491 r -0.200
SWQ – Mental health	p 0.817 r 0.067	p 0.884 r -0.042
SWQ – Social	p 0.824 r 0.065	p 0.250 r 0.329
SWQ – Sleep	p 0.889 r 0.040	p 0.149 r -0.405
SWQ – Fatigue	p 0.148 r 0.407	p 0.993 r -0.002
SWQ – Overall	p 0.700 r 0.113	p 0.812 r -0.698

*p ≤ 0.05

Captions: r = Spearman's rank correlation coefficient test; VHI = Voice Handicap Index; SWQ = SWAL-QOL protocol

Table 4. Correlation between total scores and by domains of VHI and SWAL-QOL instruments applied to individuals with laryngeal cancer submitted to chemoradiotherapy. Florianópolis, 2016 (N = 14)

Domain SWAL- QOL	VHI - E	VHI - F	VHI - O	VHI - Total
Burden	p 0.152	p 0.658	p 0.293	p 0.047*
	r -0.404	r - 0.130	r -0.303	r -0.539
Desire	p 0.699	p 0.374	p 0.728	p 0.962
	r 0.113	r 0.258	r 0.102	r -0.014
Time	p 0.406	p 0.392	p 0.188	p 0.079
	r -0.241	r -0.248	r - 0.373	r -0.485
Frequency of symptoms	p 0.188	p 0.819	p 0.345	p 0.271
	r -0.374	r 0.067	r 0.273	r -0.316
Food selection	p 0.877	p 0.707	p 0.780	p 0.903
	r -0.046	r 0.111	r -0.082	r -0.036
Communication	p 0.214	p 0.428	p 0.109	p 0.408
	r 0.354	r 0.231	r 0.447	r 0.241
Fear	p 0.685	p 0.151	p 0.735	p 0.679
	r 0.119	r -0.405	r -0.100	r -0.121
Mental health	p 0.500	p 0.835	p 0.312	p 0.807
	r 0.197	r 0.061	r 0.292	r 0.072
Social	p 0.584	p 0.043*	p 0.026*	p 0.095
	r -0.160	r - 0.547	r -0.590	r -0.464
Sleep	p 0.625	p 0.528	p 0.473	p 0.972
	r 0.144	r -0.184	r 0.209	r 0.010
Fatigue	p 0.942	p 0.010*	p 0.244	p 0.134
	r -0.022	r -0.663	r -0.333	r -0.421
Overall	p 0.821	p 0.105	p 0.311	p 0.087
	r -0.677	r -0.451	r - 0.291	r -0.473

* $p \leq 0.05$

Captions: Spearman's rank correlation coefficient; VHI = Voice Handicap Index; SWQ = SWAL-QOL protocol

It may be noted that the number of radiotherapy sessions had moderate correlation with the score of the *Emotional* domain of the VHI instrument. Thus, the greater the number of radiotherapy sessions, the worse the individual was in this domain of the VHI. There was no significant correlation between the number of radiotherapy sessions and the total score and SWAL-QOL specific domains, that is, the number of radiotherapy sessions did not interfere in individuals' swallowing quality of life. The chemotherapy sessions were not correlated to the scores in the indices used in this study.

Table 4 shows the correlation between total and per-domain scores of VHI and SWAL-QOL.

As can be seen in Table 4, there was a moderate correlation between: the domain *Functional* of the VHI and the SWAL-QOL domains *Fatigue* and *Social*; domain *Organic* of the VHI with the domain *Social* of SWAL-QOL; total score of the VHI with the SWAL-QOL domain *Swallowing as a burden*. The domain *Emotional* of the VHI had no correlation with the specific domains or total SWAL-QOL score.

The SWAL-QOL overall score did not show a statistically significant correlation with the isolated or total VHI domains ($p = 0.087$; $r = -0.473$).

DISCUSSION

The study population was composed of males with a mean age of 60 years, similar to other studies with groups of individuals

with laryngeal cancer^(9,10). There was also a frequent reference to alcohol consumption, in addition to all individuals reporting smoking habit in the past. These are notoriously the main causes of tumors of the head and neck⁽¹⁰⁾.

It is known that the use of chemoradiotherapy is recommended for stage T1 and T2 tumors, and that tumors T3 and T4 usually receive surgical management associated with other treatment⁽¹¹⁾. The present study investigated only the individuals submitted to chemoradiotherapy. It was observed that one individual had a laryngeal T3; however, being over 70 years old, he was given the option of performing chemoradiotherapy treatment.

As much as the larynx is preserved, chemoradiotherapy may affect its functions due to the aggressiveness of the treatment. We observed in the present study a relation of the domain *Emotional* of VHI in relation to the greater number of radiotherapy sessions performed. The issues in this domain refer to frustration in general communication situations, as well as the perception of disadvantage generated by dysphonia and the fact of being asked to repeat utterances.

It can be seen that the consequences of radiotherapy go beyond physical voice issues and reflect individuals' frustration with their communication⁽¹²⁾.

Chemotherapy is chosen as an adjunct treatment that, concurrently with radiotherapy, exacerbates the negative effects on speech, daily life activities and quality of life⁽³⁾. Chemotherapy medications, in turn, can cause a series of discomforts and side effects that interfere with the individual's quality of life⁽¹⁰⁾.

In the present study, no relevant data regarding chemotherapy were obtained, which may have occurred since, for this type of cancer, the number of chemotherapy sessions is relatively small compared to those of radiotherapy or the treatment of other types of tumors, which causes greater impact on individuals' lives⁽⁴⁾.

Chemoradiotherapy treatment can cause a number of problems that can affect swallowing^(4,10,13), causing individuals to adapt their diet in a way that allows them to eat effectively, supplying their nutritional needs. However, in the present study, it was noted that only one individual follows a diet considered normal (Table 1) It is believed that since the study included only individuals who had already finished their treatment with chemoradiotherapy, they were already adapted to the dietary modifications demonstrated in the questionnaire, which were imposed by their condition and, therefore, there was no correlation between the results of SWAL-QOL and chemotherapy and radiotherapy sessions.

In the total VHI score, a mean of 66.13 was observed, which may be a significantly severe disadvantage, even when compared to total laryngectomized individuals^(9,12). This result shows that a significant vocal alteration occurs for individuals with laryngeal cancer submitted to chemoradiotherapy, a fact that makes them feel a great disadvantage in relation to other individuals.

When verifying the isolated domains of the VHI, it was noted that the domain *Emotional* was the least affected in the individuals, and it was noted that the greatest disadvantage was found in the domain *Organic*, similar to studies^(9,12,14) who used the same instrument in individuals with laryngeal cancer, but who underwent surgery to remove the tumor.

It is believed that this finding was due to the underlying disease and the sequelae of the chemoradiotherapy treatment that lead to vocal changes. The consequences of radiotherapy, such as mucositis and tissue necrosis lead to stiffness of the larynx, making the voice appear harsher and sometimes breathy, which can lead to greater effort to speak and lead to changes in the voice and it's worsening at the end of the day. These issues are addressed in the domain *Organic* of the VHI instrument and were mostly reported as "always", demonstrating individuals' difficulties in dealing with their vocal limitations on a day-to-day basis.

In studies that applied the SWAL-QOL instrument in laryngectomy individuals^(9,15), the domains with the lowest scores were: *Communication*, *Eating duration*, *Desire to eat*, *Social*, and *Food selection*, showing moderate impact. The domains *Fear*, *Fatigue*, *Burden*, *Frequency of symptoms*, *Mental health* and *Sleep* represented a degree considered discreet or presented a score that was not considered to have an impact on the quality of life related to swallowing^(9,15).

In the present study, the SWAL-QOL instrument resulted in a serious impact of swallowing-related quality of life in the domains *Time to eat*, *Fatigue*, *Desire to eat*, *Swallowing as a burden* and *Sleep*. This can be explained by the fact that the individuals are altered by the lesion and treatment, necessitating a longer time to eat, which may make eating unpleasant and cause fatigue, thus reducing the desire to eat.

In the domains *Communication*, *Frequency of symptoms*, *Fear of eating*, *Selection of food*, *Social* and *Mental health*, results classified as moderate impact were found, which may be justified by the fact that the individuals presented a high level of vocal disadvantage and therefore presented deficient communication. The domains of *Frequency of symptoms*, *Fear of eating* and *Selection of food* are related, since the higher frequency of symptoms, the greater fear of eating and the greater difficulty in selecting which foods should be consumed, thus for this reason they may be represented by the same degree of impact. The domain *Social* and *Mental health* were also classified as being of moderate impact, which may be related to treatment issues and their sequels, which lead to worsening of mental health and social interaction of individuals⁽¹⁶⁾.

In the overall SWAL-QOL result, a mean of 51.30 was obtained, showing a moderate impact of quality of life in relation to swallowing, which has also been reported in studies^(9,15) with individuals with laryngeal cancer submitted to surgery to remove the tumor.

Some authors^(9,12,15) reported isolated results obtained with the VHI and SWAL-QOL instruments in individuals with laryngeal cancer submitted to total laryngectomy, in which they presented moderate changes in both instruments in relation to the total score. In the present study, the means of these scores were considered to be of a severe impact for VHI and moderate in SWAL-QOL.

In a study of preventive speech therapy in individuals with head and neck cancer submitted to chemoradiotherapy, the authors verified that after 6 years of treatment, xerostomia, especially in oropharyngeal cancer, and problems with solid swallowing were the most reported in the SWAL-QOL protocol. In addition, in this period, half of the individuals perceived their voice differently from the beginning of the treatment, verified by VHI⁽³⁾. In a validation study of voice, speech, swallowing and quality of life questionnaires, the authors applied, among others, the VHI and SWAL-QOL protocols in individuals treated for laryngeal cancer submitted to different treatments and found that vocal disadvantage and quality of life had an association with quality of life in health⁽¹⁷⁾.

When correlating the results of the instruments used, a moderate correlation was found between the domain *Functional* of the VHI with the domains *Fatigue* and *Social* of SWAL-QOL. The questions asked in the domain *Functional* of the VHI can be considered as social in scope since they report whether the individual speaks less on the telephone, tends to avoid a group of people and tries to talk less with friends, neighbors and relatives. Questions from the domain *Social* of SWAL-QOL assess whether the individual feels excluded, leaves the family to eat because of their swallowing problem, whether the swallowing problem makes their life difficult, in addition to leisure time activities and whether the role with family and friends changed due to their swallowing problem. It can be noted that vocal and swallowing difficulties are present in these individuals, making them tend to isolate themselves, avoiding to relate to their peers^(6,9).

The domain *Fatigue* of SWAL-QOL inquires as to whether the individual feels tired, weak and exhausted, which can occur due to the treatment and staging of the disease, but also often

by the routine that is created during that period with medical consultations and daily radiotherapy. This fatigue may limit the functionality of communication and create barriers, since when tired, the individual may emit a weaker, more breathy voice and articulate in a way to make it difficult for others to understand⁽²⁾, which can impact the domain *Functional* of the VHI.

In the domain *Organic* of the VHI, which covers questions of how the individual's relationship is with their voice during the day, asking if this varies, whether effort is made to make it better, and if the individual does not have the air to speak, it was possible to find a moderate correlation with the domain *Social* of SWAL-QOL, which asks social questions, previously reported, concerning the individual's problem of swallowing. It is again observed how much the individuals of the present study feel at a vocal disadvantage in relation to the others, and how much the swallowing problem affects them equally in social scope, another fact that contributes to the increase of their social isolation.

There was a moderate correlation of the total VHI score with the SWAL-QOL domain *Swallowing as a burden*, which may be justified by the fact that speech and swallowing functions are performed by the same organ affected by the disease and which may lead to worsening of vocal quality and swallowing⁽¹⁸⁾, thus affecting communication and quality of life of the individuals.

There was no significant correlation of the domain *Emotional* of the VHI with the isolated domains and overall score of the SWAL-QOL. This finding may be related to the fact that the individuals have already adapted and accepted their new vocal and swallowing condition. Even without having found a statistically significant correlation of the domain *Emotional* with another factor of the SWAL-QOL, and since it is the lowest mean score of the VHI in the present study, it can be seen that the social function of the individuals is affected, noted in the worst scores (domains *Organic* and *Functional*), which may affect or be affected by the individual's emotional state.

There was no significant correlation of the SWAL-QOL overall score with total VHI score ($p = 0.087$; $r = -0.473$). However, it is believed that with a larger sample the value could be statistically significant, since what was found in the present study was a VHI of severe degree and a moderate impact in relation to the swallowing quality of life.

Post-treatment quality of life studies for laryngeal cancer^(2,12,18) found that there is a significant worsening in the quality of life of individuals with laryngeal cancer, both for those who underwent surgical treatment and those submitted to chemoradiotherapy, as those individuals treated with chemoradiotherapy showed a greater negative impact on quality of life when compared to individuals who underwent surgery. This may be due to the fact that the individual expects much more from a treatment that will preserve the organ and its functions, thinking that the impact will not be so great, and during treatment, the individual realizes that the functions actually remain but must be adapted to the new post-treatment chemoradiotherapy condition, covering all its consequences.

However, it is known that individuals submitted to SLP therapy after cancer treatment have a significant improvement in their health-related quality of life and also in the self-perception of communicative function⁽¹⁹⁾. In addition, the literature has shown positive functional results from preventive SLP rehabilitation and continuity after treatment⁽³⁾. Thus, it is important to study the cases of individuals submitted to chemoradiotherapy, since these individuals also present treatment sequelae that may affect their quality of life.

The small number of individuals characterizes a limitation of the present study, as well as the fact that it was not possible to perform an individualized analysis that related the dose of radiotherapy to the individual results. It is believed that future studies carried out with a greater number of individuals will contribute to a better understanding of the direct consequences of radiotherapy in voice and swallowing, from the point of view of the individual and also of the speech-language pathologist.

Therefore, new research in the area of speech-language disorders related to chemoradiotherapy for tumors of the head and neck is proposed, since in this study important alterations were found in the voice handicap index and quality of life related to the swallowing of individuals. As the research was carried out from the point of view of the individual, it is suggested the elaboration of studies that clinically evaluate the voice and swallowing of individuals with laryngeal cancer submitted to chemoradiotherapy for more objective results be from the perspective of the speech-language pathologist.

It is also important to continue the studies that consider the individual's vision regarding the impacts caused by laryngeal cancer and its treatment, as well as studies that seek to clinically evaluate and correlate the findings in individuals with laryngeal cancer submitted to chemoradiotherapy, since the mere preservation of the laryngeal structure does not guarantee the full maintenance of its functions and, consequently, the quality of life of the patient.

CONCLUSION

With the present study, it can be concluded that even without a statistically significant correlation between overall VHI and SWAL-QOL domains, there is a significant correlation between vocal disadvantage and the impact of swallowing quality of life in individuals with cancer of larynx submitted to chemoradiotherapy, expressed by the correlations present between the domains *Functional* of the VHI and the domains *Fatigue* and *Social* of SWAL-QOL, the domain *Organic* of the VHI with the domain *Social* of SWAL-QOL, and total VHI score with the SWAL-QOL domain *Swallowing as a burden*. In addition, it was possible to observe that chemoradiotherapy treatment had a greater impact in relation to voice than in relation to swallowing for the individuals studied.

ACKNOWLEDGEMENTS

The authors thank the teams of Speech-Language Pathology and Radiology of the Oncology Research Center - CEPON

– Florianópolis, Brazil for administrative assistance and availability during the data collection period.

REFERENCES

1. INCA: Instituto Nacional de Câncer. Câncer - tipo: laringe [Internet]. 2016 [citado 25 Outubro 2016]. Disponível em: <http://www2.inca.gov.br/wps/wcm/connect/tiposdecancer/site/home/laringe>
2. Campos RJDS, Leite ICG. Qualidade de vida e voz pós-radioterapia: repercussões para a fonoaudiologia. *Rev CEFAC*. 2010;12(4):671-7. <http://dx.doi.org/10.1590/S1516-18462010005000038>.
3. Kraaijenga SAC, Van der Molen L, Jacobi I, Hamming-Vrieze O, Hilgers FJM, Van den Brekel MWM. Prospective clinical study on long-term swallowing function and voice quality in advanced head and neck cancer patients treated with concurrent chemoradiotherapy and preventive swallowing exercises. *Eur Arch Otorhinolaryngol*. 2015;272(11):521-531. <http://dx.doi.org/10.1007/s00405-014-3379-6>. PMID:25381096.
4. Paula JM, Sawada NO. Qualidade de vida relacionada à saúde de pacientes com câncer em tratamento radioterápico. *Rev Rene*. 2015;16(1):106-13. <http://dx.doi.org/10.15253/2175-6783.2015000100014>.
5. Heijnen BJ, Speyer R, Kertscher B, Cordier R, Koetsenruijter KWJ, Swan K, et al. Dysphagia, speech, voice, and trismus following radiotherapy and/or chemotherapy in patients with head and neck carcinoma: review of the literature. *BioMed Res Int*. 2016;2016:6086894. <http://dx.doi.org/10.1155/2016/6086894>. PMID:27722170.
6. Lima MAG, Barbosa LNF, Sougey EB. Avaliação do impacto na qualidade de vida em pacientes com câncer de laringe. *Rev SBPH*. 2011;14(1)
7. Costa T, Oliveira G, Behlau M. Validation of the Voice Handicap Index: 10 (VHI-10) to the Brazilian Portuguese. *Codas*. 2013;25(5):482-5. <http://dx.doi.org/10.1590/S2317-17822013000500013>. PMID:24408554.
8. Portas J, Guedes RLV. Protocolo de qualidade de vida em deglutição. In: Carvalho V, Barbosa EA. *Fononcologia*. Rio de Janeiro: Revinter, 2012. cap. 10, p. 169-92.
9. Barros APB, Portas JG, Queija DS, Lehn CN, Dedivitis RA. Autopercepção da desvantagem vocal (VHI) e qualidade de vida relacionada à deglutição (SWAL-QOL) de pacientes laringectomizados totais. *Rev Bras Cir Cabeça Pescoço*. 2007;36(1):32-7.
10. Trivedi NP, Swaminathan DK, Thankappan K, Chatni S, Kuriakose MA, Iyer S. Comparison of quality of life in advanced laryngeal cancer patients after concurrent chemoradiotherapy vs total laryngectomy. *Otolaryngol Head Neck Surg*. 2008;139(5):702-7. <http://dx.doi.org/10.1016/j.otohns.2008.06.002>. PMID:18984267.
11. Rossi VC, Fernandes FL, Ferreira MAA, Bento LR, Pereira PSG, Chone CT. Larynx cancer: quality of life and voice after treatment. *Braz J Otorhinolaryngol*. 2014;80(5):403-8. <http://dx.doi.org/10.1016/j.bjorl.2014.07.005>. PMID:25303815.
12. Silveira MH, Dedivitis RA, Queija DS, Nascimento PC. Quality of life in swallowing disorders after nonsurgical treatment for head and neck cancer. *Int Arch Otorhinolaryngol*. 2015;19(1):46-54. PMID:25992151.
13. Oliveira IB, Augusti ACV, Siqueira DM. Avaliação de voz e qualidade de vida após laringectomiasupracricóide. *ACR*. 2013;18(4):353-60.
14. Queija DS, Portas JG, Dedivitis RA, Lehn CN, Barros APB. Swallowing and quality of life after total laryngectomy and pharyngolaryngectomy. *Braz J Otorhinolaryngol*. 2009;75(4):556-64. [http://dx.doi.org/10.1016/S1808-8694\(15\)30496-1](http://dx.doi.org/10.1016/S1808-8694(15)30496-1). PMID:19784426.
15. Maciel CTV, Leite ISG, Soares RC, Campos RJDS. Análise da qualidade de vida dos pacientes com câncer de laringe em hospital de referência na região sudeste do Brasil. *CEFAC*. 2013;15(4):932-40. <http://dx.doi.org/10.1590/S1516-18462013000400022>.
16. Rinkel RNPM, Verdonck-de Leeuw IM, Van den Brakel N, de Bree R, Eerenstein SEJ, Aaronson N, et al. Patient-reported symptom questionnaires in laryngeal cancer: voice, speech and swallowing. *Oral Oncol*. 2014;50(8):759-64. <http://dx.doi.org/10.1016/j.oraloncology.2014.05.009>. PMID:24954064.
17. Freire ME, Sawada NO, França IS, Costa SF, Oliveira CD. Health-related quality of life among patients with advanced cancer: an integrative review. *Rev Esc Enferm USP*. 2014;48(2):357-67. <http://dx.doi.org/10.1590/S0080-6234201400002000022>. PMID:24918897.
18. Tuomi L, Johansson M, Lindell E, Folkestad L, Malmerfors M, Finizia C. Voice range profile and health-related quality of life measurements following voice rehabilitation after radiotherapy; a randomized controlled study. *J Voice*. 2017;31(1):9-16. <http://dx.doi.org/10.1016/j.jvoice.2016.03.012>. PMID:27091469.
19. Galbiatti AL, Padovani-Junior JA, Maníglia JV, Rodrigues CD, Pavarino EC, Goloni-Bertollo EM. Head and neck cancer: causes, prevention and treatment. *Braz J Otorhinolaryngol*. 2013;79(2):239-47. <http://dx.doi.org/10.5935/1808-8694.20130041>. PMID:23670332.

Author contributions

MER: Idealization of the study, bibliographic review, data collection, data analysis, final writing of the article; *CTM*: idealization and methodological delineation of the study, bibliographic review, data analysis, final writing of the article; *ACAMG*: idealization and methodological design of the study, bibliographic review, data analysis, final writing of the article.