Association between trismus and dysphagia-related quality of life in survivors of head and neck cancer in Brazil

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Objectives. The aim of this study was to evaluate the association between trismus and other radiation-associated conditions with dysphagia-related quality of life in patients who have undergone radiotherapy of the head and neck.

Study Design. This cross-sectional study included 88 patients who had squamous cell carcinoma of the oral cavity, oropharynx, hypopharynx, or larynx and had been treated with 3-dimensional (3-D) conformal radiotherapy, which had been completed at least 3 months earlier. Clinical data were obtained from medical records. Trismus, hyposalivation, and radiation caries were evaluated clinically. Dysphagia-related quality of life (DRQoL) was investigated by using the M. D. Anderson Dysphagia Inventory (MDADI). Binary logistic regression was performed to determine associations between DRQoL and both demographic and clinical variables.

Results. The mean total MDADI score was 67.33 ± 15.47, and the physical domain was the most affected (60.28 ± 19.00). Patients with cancer of the mouth and oropharynx had worse scores ($P = .001$). Trismus was associated with poorer DRQoL in all domains of the MDADI ($P = .001$) and with a greater chance of moderate to profound swallowing limitation ($P = .024$).

Conclusions. Trismus and tumors located in the mouth and oropharynx were associated with poor swallowing function, exerting a negative impact on DRQoL. (Oral Surg Oral Med Oral Pathol Oral Radiol 2019;128:235−242)

According to global estimates, cancer in the upper aerodigestive tract (lips, oral cavity, oropharynx, hypopharynx, larynx, and esophagus) is reported to be the fifth most common form of cancer in the world.[1,2] In Brazil, the annual incidence of cancer of the oral cavity and larynx for 2018 and 2019 is estimated to be 14,700 and 7670 cases, respectively.[3] There has been an increase in the incidence of oropharyngeal cancer worldwide because of human papillomavirus infections.[4] In most cases, these tumors are only diagnosed in advanced stages.[5]

The choice of the best treatment depends on the histologic type, location, and clinical stage of the tumor and often includes radiotherapy,[6] which aims to treat malignant tumors with minimal harm to adjacent healthy tissues.[7] Nonetheless, this form of therapy can result in significant acute and late side effects,[8] such as reduction in salivary flow, dysphagia, trismus, radiation caries, and osteoradionecrosis.[9,10]

More than half the patients with head and neck cancer experience some degree of dysphagia during treatment.[11−13] Late dysphagia, although prevalent, is often underreported.[9,14,15] Impaired swallowing has a considerable impact on the health of patients with cancer,[16] and aspiration, in particular, is a serious occurrence that can lead to severe pneumonia and even death.[17] Consequently, dysphagia exerts a negative impact on quality of life.[18−21]

Some authors have demonstrated an association between the radiation dose and both dysphagia and limited mouth opening.[22] A recent study found that trismus was significantly associated with aspiration in patients treated with concomitant radiotherapy and chemotherapy for advanced tumors in the head and neck region.[23]

Different assessment tools exist for the evaluation of dysphagia.[14,23] The M. D. Anderson Dysphagia Inventory (MDADI) is a validated questionnaire that was developed specifically for the evaluation of dyphagia-related quality of life (DRQoL) in patients who have undergone treatment for head and neck cancer.[24] The questionnaire is composed of 20 items distributed

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Received for publication Jan 18, 2019; returned for revision May 10, 2019; accepted for publication May 14, 2019.

2212-4403/$-see front matter
https://doi.org/10.1016/j.oooo.2019.05.009

Statement of Clinical Relevance

Trismus and tumors located in the mouth and oropharynx are associated with dysphagia and poor swallowing function, exerting a negative impact on the quality of life of patients who have undergone radiotherapy for the treatment of head and neck cancer.

among 4 subscales: global, emotional, functional, and physical. Lower scores denote poorer swallowing function and poorer DRQoL.

Although previous studies have demonstrated an association between dysphagia and trismus,[22,23] to the best of our knowledge, no study has evaluated, by using the MDADI, the association between trismus and limitation of swallowing function, with consideration of confounding variables. The aim of the present study was to evaluate the association between radiation-associated complications, clinical and sociodemographic factors, and DRQoL in patients who have undergone 3-dimensional (3-D) conformal radiotherapy for the treatment of head and neck squamous cell carcinoma.

MATERIAL AND METHODS

Study design and participants

An observational, analytical, quantitative, cross-sectional study, conducted between April 2016 and May 2017, included patients in follow-up after treatment for squamous cell carcinoma of the oral cavity, oropharynx, hypopharynx, or larynx at the Santa Maria University Hospital, a public health network referral center for the treatment of head and neck cancer. The hospital is located in southern Brazil and serves a population of more than 1 million people. Male and female patients 18 years of age or older who had any stage of head and neck cancer, had been treated with radiotherapy with or without concomitant chemotherapy, had concluded treatment at least 3 months earlier, and were in a clinically appropriate condition to undergo the proposed procedures were invited to participate in the study.

The sample size was estimated by using results from a previous study that found a difference between the mean MDADI scores of individuals with cancer of the oral cavity or oropharynx (58.1 ± 30.6) and individuals with hypopharyngeal or laryngeal cancer (78.1 ± 16.8) on the MDADI emotional domain, which was the domain that required the largest sample size.[24] Considering a 95% confidence interval and 90% power, a minimum of 66 participants was needed for the study, to which 25% was added for the multivariate analysis and to compensate for possible refusals, leading to a sample of 88 participants.

This study received approval from the Human Research Ethics Committee of the Federal University of Santa Maria (certificate No. 51958915.6.0000.5346/1.387.994). All volunteers who agreed to participate signed a statement of informed consent.

Data collection

Sociodemographic data were obtained directly from the participants, and medical data were collected from patient records. The physical examinations were performed by 2 examiners who had undergone training and calibration exercises. Using a millimeter ruler, maximum mouth opening measurements were taken and recorded. Trismus was recorded when the distance between the incisors was 35 mm or less.[25] In edentulous or partially edentulous patients who wore dentures, this measurement was taken with the dentures in place.

Stimulated salivary flow was determined by using the method proposed by Navazesh and Kumar.[26] Hyposalivation was recorded when stimulated salivary flow was less than 0.5 mL/min.[27] Xerostomia was evaluated subjectively on the basis of an affirmative answer to the following question: "Does your mouth generally feel dry?"[28]

For the evaluation of radiation caries, the examiners were trained and calibrated with the use of images on a computer screen. Each examiner evaluated 20 images and marked "yes" or "no" on a spreadsheet. The evaluations of the images were repeated a second time after a 30-day interval. Intraexaminer and intraexaminer agreements were determined by using the kappa coefficient, which ranged from 0.79 to 1.00.

DRQoL was evaluated by using the MDADI,[24] which was developed specifically for the assessment of DRQoL in patients who have undergone treatment for head and neck cancer. The questionnaire has been translated into the Portuguese language and validated.[29]

Statistical analysis

Data were analyzed descriptively, and the Shapiro-Wilk and Kolmogorov-Smirnov tests were used to determine the normality of the data. Comparisons of the means on the MDADI subscales and the clinical and demographic variables was performed by using the Mann-Whitney test and the Student t test, with the level of significance set at 5% ($P < .05$).

For statistical purposes, age, time elapsed since the end of radiotherapy, tumor location, tumor stage, total radiation dose, and type of treatment were dichotomized. Age, dose, and time elapsed were dichotomized by the median. Tumor location was dichotomized as mouth/oropharynx or hypopharynx/larynx. Stage was dichotomized as initial (stages I and II) or advanced (stages III and IV) by using the *AJCC Cancer Staging Manual,* 7th edition.[30] Type of treatment was dichotomized as radiotherapy with or without concomitant chemotherapy. The variable "comorbidities" considered individuals who had some comorbidity that could reduce salivary flow, such as diabetes mellitus, Sjögren syndrome, or hypothyroidism, and individuals who took medications that cause xerostomia, such as antihypertensive agents or antidepressants. The MDADI scores were stratified on each subscale to evaluate the degree of swallowing limitation: 0−20 = profound;

21−40 = severe; 41−60 = moderate; 61−80 = mild; and 81−100 = minimal.[31]

Binary logistic regression models were run to estimate odds ratios with regard to swallowing limitation and DRQoL in relation to the clinical and demographic variables. For such, values of 60 or lower were considered moderate to profound deficiency for each subscale.[31] The categorical variables age, time elapsed since the end of treatment, radiation dose, tumor location, stage, type of treatment, trismus, hyposalivation, and comorbidities, were evaluated in the crude model. Only those with a *P* value less than 0.20 in the crude model were incorporated into the adjusted model.

The data were analyzed by using the Statistical Package for the Social Sciences v. 21.0 (SPSS Inc., Chicago, IL).

RESULTS

Ninety-eight patients were considered eligible, and of those, 88 were evaluated (response rate: 89.8%). Data on trismus were not collected from 4 patients. The nonparticipation of some patients who met the inclusion criteria and the lack of data on some patients resulted from their inability to remain for the evaluation because of the restraints of their public transportation schedules. Mean mouth opening of the 84 patients analyzed was 32.93 mm (±9.84). Half the study patients had trismus. Mean age was 62.74 years (±9.71), and the mean radiation dose received by the patients was 63.01 Gy (±9.58). A complete description of the sample is provided in Table I.

The worst score of the MDADI was found in the physical domain (mean 60.28 ± 19.00), followed by the global (66.63 ± 27.01), functional (71.16 ± 17.30), and emotional (73.29 ± 17.90) domains. Table II shows the degree of swallowing limitation according to MDADI domains. Moderate to profound limitation was found in 45 (51.1%), 37 (42%), 26 (28.4%), and 24 (27.2%) participants in the physical, global, emotional, and functional domains, respectively.

In the comparison of the mean MDADI scores according to the clinical and demographic variables, patients with trismus were found to have lower mean scores in all domains. Likewise, a reduction in DRQoL was found among patients who had cancer of the mouth/oropharynx, as demonstrated by scores in all MDADI domains. Patients 62 years of age or younger had lower scores on the global domain (*P* =.014). Individuals who had completed treatment more than 22 months earlier had better DRQoL, with significantly higher scores in the global domain (*P* = .015), physical domain (*P* = .043), and mean total MDADI scores (*P* = .049). Patients who had advanced-stage tumors had poorer global domain (*P* = .019), physical domain (*P* = .018), and total MDADI (*P* = .006) scores. Patients with hyposalivation had poorer mean scores in the global (*P* = .006), physical (*P* = .013), and functional (*P* = .041) domains. Patients with comorbidities and those who took medications that caused xerostomia had lower mean scores in the functional domain (*P* = .036) (Table III). No association was found between radiation caries and DRQoL.

Table I. Demographic and clinical characteristics of patients studied

	N	%
Gender		
Female	15	17.0
Male	73	83.0
Skin color		
White	77	87.5
Non-white	11	12.5
Location of tumor		
Mouth/oropharynx	52	59.1
Hypopharynx	5	5.7
Larynx	31	35.2
Stage		
I	15	17.0
II	13	14.8
III	25	28.4
IV	35	39.8
Type of treatment		
RT	6	6.8
Surgery + RT	17	19.3
Surgery + RT + CT	33	37.5
RT + CT	32	36.4
Xerostomia		
No	6	6.8
Yes	82	93.2
Dentition		
Dentate	7	8.0
Partially edentulous	60	68.2
Edentulous	21	23.9
Radiation caries		
No	45	51.1
Yes	22	25.0
Not applicable	21	23.9
Trismus*		
No	42	50
Yes	42	50
Hyposalivation		
No	19	21.6
Yes	69	78.4
Total	**88**	**100**

*Missing data.CT, chemotherapy; RT, radiotherapy.

The patients were also asked about their perceptions regarding difficulties with mouth opening before radiotherapy. Only 13.6% of the participants answered "yes" to this question. Those who reported having difficulty with mouth opening before radiotherapy had lower MDADI scores in all domains, but the results were only significant for the functional domain and the total MDADI score (see Table III). A significant association was also found between the patients who reported having difficulty with mouth opening before

Table II. Degree of swallowing limitation according to M. D. Anderson Dysphagia Inventory (MDADI) domain

*Swallowing limitation**		*Global N (%)*	*Emotional*	*Physical*	*Functional*	*Total*
Profound	**(0–20)**	9 (10.2)	0 (0.0)	2 (2.3)	1 (1.1)	0 (0.0)
Severe	**(21–40)**	22 (25.0)	4 (4.5)	10 (11.4)	3 (3.4)	4 (4.5)
Moderate	**(41–60)**	6 (6.8)	21 (23.9)	33 (37.5)	20 (22.7)	24 (27.3)
Mild	**(61–80)**	32 (36.4)	38 (43.2)	33 (37.5)	41 (46.6)	40 (45.5)
Minimal	**(81–100)**	19 (21.6)	25 (28.4)	10 11.4)	23 (26.1)	20 (22.7)

*According to criteria proposed by Chen et al. (2009).[31]

radiotherapy and those who exhibited trismus during the objective posttreatment evaluation ($P = .002$). No statistically significant difference was found between the reported difficulty with mouth opening before radiotherapy and tumor location or stage

Table IV shows the results of the binary logistic regression models. In the crude model, patients with trismus had 4.55 greater odds of moderate to profound swallowing limitation ($P = .003$). The location of the primary tumor in the hypopharynx/larynx had a protective effect, with 85% lower odds of moderate to profound swallowing limitation ($P = .001$). After adjusting for possible confounding variables, individuals with trismus ($P = .024$) and those who had a primary tumor located in the mouth/oropharynx ($P = .010$) had greater odds of exhibiting moderate to profound swallowing limitation.

DISCUSSION

Previous studies have demonstrated the negative impact of trismus on overall quality of life in patients with head and neck cancer[32,33] and have reported an association between trismus and dysphagia.[23] Limited mouth opening is related to chewing difficulty, which consequently has a negative impact on swallowing. This study's findings showed the association between trismus and limited swallowing function with the use of the MDADI, and we demonstrated that trismus increases the odds of moderate to profound swallowing limitation by approximately 3-fold, thus adding further information on this topic to the literature.

Dysphagia is a common side effect of oncologic treatment and exerts a significant effect on patients, compromising the nutritional status and quality of life of survivors of head and neck cancer.[16] Dysphagia can be evaluated objectively, through clinical examinations, and subjectively, by using questionnaires.[14,23,24] Previous studies have compared the results of both types of evaluation and found significant associations between the objective and subjective assessments of swallowing.[20,34] Although there is no "gold standard" questionnaire for assessing DRQoL in patients with head and neck cancer,[29] the MDADI is a specific instrument that is easy to administer and less distressing to patients, thus facilitating patient adherence. The questionnaire also facilitates provision of more precise answers,[35] and, thus, the choice of this questionnaire for the present study is justified.

We compared our results with data from previous studies involving a control group and found that the mean scores in the MDADI domains in the present investigation were very similar to those found in groups of patients with malignant tumors.[24] More than half the sample population exhibited moderate to profound swallowing limitation in the physical domain of the MDADI, which portrays the self-perception of the patient regarding his or her swallowing difficulty.[24] The findings of this study demonstrated greater impact compared with data reported by Chen et al.[31], who evaluated DRQoL in a geriatric population with no history of head and neck cancer and minimal health care needs. Although this may suggest that the assessment tool employed has the power to capture the specific changes that impact the quality of life of patients with cancer, it should also be considered that the patient's awareness of his or her malignant disease may influence the answers.[24]

In the bivariate analysis, tumor stage, hyposalivation, location of the primary tumor, and trismus were associated with a poorer DRQoL in more than one MDADI domain. However, the analysis of these clinical variables in the multivariate model led to the loss of significance for the associations with tumor stage and hyposalivation as well as a reduction in the effect measure of trismus and tumor location on swallowing function. Nonetheless, the association between a tumor located in the mouth/oropharynx and poorer swallowing function was maintained, reflecting a poorer quality of life, which is in agreement with the findings of previous studies.[16,24,36] This suggests that swallowing function seems to be associated with distinct factors.

The act of swallowing involves the coordinated activity of the mouth, pharynx, larynx, and esophagus. It is a complex process[37] and involves the muscles of mastication and swallowing as well as the cranial nerves.[14] Dysphagia in oncology patients is generally associated with the location of the primary tumor, which can directly affect the structures involved in

Table III. Mean M. D. Anderson Dysphagia Inventory (MDADI) domain scores according to demographic and clinical variables

Variables	*MDADI*				
	Global Mean (± SD)	*Emotional*	*Physical*	*Functional*	*Total*
Age (years)					
≤62	60.48 (27.13)	70.61 (19.05)	57.65 (19.95)	70.41 (19.41)	64.77 (15.82)
>62	74.36 (25.11)	76.66 (15.96)	63.59 (17.43)	72.10 (14.41)	70.55 (14.59)
P value	**.014***	.203*	.146†	.939*	.082†
Time since radiotherapy					
≤22 months	60.00 (26.59)	72.04 (14.98)	56.19 (17.79)	71.27 (16.76)	64.09 (12.94)
>22 months	73.26 (26.06)	74.54 (20.51)	64.37 (19.48)	71.05 (18.02)	70.58 (17.18)
P value	**.015***	.410*	**.043**†	.850*	**.049**†
Dose (Gy)					
≤66	68.16 (27.43)	69.92 (18.80)	61.48 (18.67)	67.57 (17.68)	66.11 (16.03)
>66	64.74 (27.29)	78.16 (14.86)	59.01 (19.65)	75.16 (15.70)	69.08 (14.52)
P value	.515*	**.042***	.555†	**.030***	.380†
Location					
Mouth/oropharynx	58.85 (26.39)	69.35 (18.11)	55.72 (19.31)	67.04 (18.94)	62.85 (15.59)
Hypopharynx/larynx	77.87 (24.05)	78.98 (16.19)	66.87 (16.69)	77.11 (12.64)	73.82 (12.94)
P value	**.001***	**.012***	**.003***	**.012***	**.001**†
Stage					
Initial (I and II)	76.43 (23.76)	78.33 (17.30)	66.96 (19.35)	74.71 (19.20)	73.87 (15.31)
Advanced (III and IV)	62.06 (27.40)	70.94 (17.83)	57.16 (18.17)	69.50 (16.24)	64.28 (14.69)
P value	**.019***	.067*	**.018***	.078*	**.006**†
Chemotherapy					
No	73.04 (28.67)	72.75 (18.22)	66.41 (20.40)	71.91 (21.70)	70.42 (17.46)
Yes	64.36 (26.25)	73.48 (17.93)	58.11 (18.15)	70.89 (15.65)	66.25 (14.70)
P value	.167*	.691*	.068*	.674*	.270†
Trismus					
No	74.84 (25.99)	78.09 (18.25)	66.30 (18.14)	75.57 (17.78)	72.38 (14.74)
Yes	58.10 (25.30)	68.09 (16.22)	53.21 (16.82)	66.19 (16.27)	61.43 (13.67)
P value	**.003***	**.005***	**<.001***	**.007***	**.001**†
Hyposalivation					
No	82.10 (17.51)	77.89 (14.92)	68.41 (13.88)	78.63 (15.35)	73.02 (12.77)
Yes	62.37 (27.70)	72.02 (18.54)	58.04 (19.68)	69.10 (17.34)	65.77 (15.86)
P value	**.006***	.226*	**.013***	**.041***	.070†
Comorbidities					
No	70.95 (23.87)	77.06 (15.81)	63.50 (17.78)	75.19 (16.06)	70.63 (13.78)
Yes	62.68 (29.29)	69.85 (19.14)	57.34 (19.79)	67.48 (17.74)	64.33 (16.44)
P value	.218*	.130*	.129†	**.036***	.056†
Radiation caries					
No	68.07 (27.97)	75.99 (17.40)	63.05 (19.29)	73.20 (15.13)	68.29 (16.11)
Yes	66.36 (25.74)	71.36 (17.45)	57.27 (17.74)	69.64 (20.35)	66.16 (13.69)
P value	.703*	.516*	.242†	.572*	.596†
Difficulty opening mouth before RT					
No	67.88 (27.39)	74.86 (18.19)	61.14 (18.99)	73.05 (17.29)	68.90 (15.47)
Yes	60.00 (25.58)	66.11 (12.78)	54.58 (19.09)	61.33 (12.57)	59.00 (12.05)
P value	.263*	.063*	.270†	**.010***	**.038**†
Total	66.63 (27.01)	73.29 (17.90)	60.28 (19.00)	71.16 (17.30)	67.33 (15.47)

Bold represent statistically significant values.
*Mann-Whitney test.
†Student *t* test.
RT, radiotherapy.

chewing and swallowing, and dysphagia can be a consequence of the effect of radiation on these tissues. The mechanism behind the development of dysphagia in patients who have undergone radiation is not yet fully understood, but radiotherapy is known to cause harm to the muscles involved in swallowing, leading to an acute inflammatory response with edema that subsequently progresses to fibrosis during the repair process, atrophy, or even sensory loss, resulting in late dysphagia.[9,14] This explains the association between trismus

Table IV. Association between swallowing limitation evaluated by mean total M. D. Anderson Dysphagia Inventory (MDADI) score and clinical variables

Clinical variables	*Crude OR (95% CI)*	*P**	*Adjusted OR (95% CI)*	*P†*
Tumor location				
Mouth/oropharynx	1.0	**.001**	1.0	**.010**
Hypopharynx/larynx	0.15 (0.05−0.48)		0.20 (0.06−0.68)	
Stage				
Initial (I and II)	1.0	.061	–	–
Advanced (III and IV)	2.86 (0.95−8.58)			
Time since radiotherapy				
≤ 22 months	1.0	.172	–	–
> 22 months	0.53 (0.21−1.32)			
Hyposalivation				
No	1.0	.102	–	–
Yes	3.03 (0.80−11.43)			
Trismus				
No	1.0	**.003**	1.0	**.024**
Yes	4.55 (1.65−12.51)		3.401 (1.18−9.88)	

Bold represent statistically significant values.
*Crude binary logistic regression.
†Adjusted binary logistic regression.
(−) variables not maintained in final model.
CI, confidence interval; *OR,* odds ratio.

and dysphagia found in the present study because radiation affects anatomic structures involved in both mouth opening and swallowing.

Curiously, the patients in the present study who had received doses higher than 66 Gy had higher MDADI scores in the emotional and functional domains, even though the difference in the mean total MDADI scores was not statistically significant. With regard to the radiation dose and the location of the primary tumor, the mean radiation dose was slightly higher among patients who had tumors in the hypopharynx/larynx. These patients also had slightly higher MDADI scores, but the difference was not statistically significant. Indeed, considering the small sample size, this association may have occurred by chance. Moreover, no evaluation of the specific dose administered to the structures involved in chewing and swallowing was performed in the present study; rather, only the total dose received was considered, which may explain our findings conflicting with data reported in the literature showing a positive dose−dyphagia relationship.[22]

An association was found between DRQoL and time elapsed since the completion of treatment because quality of life seemed to improve with time in the global and physical domains, as did the mean total MDADI score. However, in the multivariate analysis, in which the odds of functional swallowing limitation were evaluated on the basis of the mean total MDADI scores, this association lost its significance in both the crude and adjusted models. The literature offers conflicting information in this regard. Chen et al.[24] found that patients who had completed treatment more than 24 months earlier had higher MDADI scores in the global domain compared with those who had completed treatment less than 24 months earlier, reflecting improved quality of life and chewing function over time. In contrast, some studies supported the notion that dysphagia is reduced in the course of the first 6 months, after problems related to the acute toxicity of radiotherapy are overcome, but these improvements are either minimal or do not persist after 12 months.[23,36] Other authors even suggested that chronic dyphagia worsens over time, especially in patients who resorted to using a feeding tube, because of atrophy caused by disuse of the muscles of mastication and swallowing.[23]

As the sample of the present study was composed mostly of edentulous or partially edentulous individuals, more than half the sample population did not exhibit radiation caries, and no association was found between radiation caries and DRQoL. This suggests that dysphagia is associated with factors that affect the muscles of mastication and swallowing rather than the quality of the dentition per se.

This study has some limitations that need to be considered. Because of the cross-sectional design of the study, the values before and after radiotherapy could not be compared. Although our results are in line with those of other studies, without previous data on the study participants, a more accurate analysis of the data and the establishment of a causal relationship were not possible. Another limitation concerns xerostomia (subjective assessment), which was only evaluated with a "yes/no" question, precluding a better interpretation of this variable with regard to the different degrees of xerostomia. However, unlike most

studies, the present study quantified salivary flow, enabling an objective evaluation of hyposalivation. An important limitation was the lack of data on trismus. Missing data can be disastrous if they affect a large portion of the measurements. However, only 4 patients failed to appear for the measurement of maximum mouth opening as a result of the restraints of their public transportation schedules. Also, because of the cross-sectional design of this study, it was not possible to measure mouth opening or evaluate swallowing in the patients before radiotherapy. However, this bias was partially avoided with the investigation of subjective assessments of mouth opening before radiotherapy. Patients who answered "yes" to this question also had lower mean total MDADI scores and trismus after treatment. No statistically significant difference was found between the reported difficulty in mouth opening before radiotherapy and tumor location or stage. Despite this, we assume that this difficulty may actually be associated with a primary tumor close to the muscles and structures involved in chewing and swallowing, making it difficult to open the mouth even before radiotherapy, as suggested by Van der Molen et al.[22] According to those authors, patients who demonstrate functional problems before beginning treatment are at greater risk of developing dysphagia or trismus even when using intensity modulated radiotherapy (IMRT).

Compared with conventional radiotherapy, IMRT has fewer side effects and less impact on quality of life.[23,38] Despite its known advantages over 3-D conformal radiotherapy, IMRT is not yet widely employed in the developing countries mainly because of the technical challenges related to the training of health care professionals and the limited financial resources available for the acquisition and implementation of more advanced technologies in radiotherapy at public health care services.[39]

CONCLUSIONS

This study adds important knowledge regarding the association of trismus and location of the primary tumor on swallowing function and DRQoL. It is important to note that the odds ratio does not imply cause and effect; it only suggests that there is an association. Such knowledge can assist in the identification of patients who are more likely to have dysphagia and in the institution of interdisciplinary preventive interventions during treatment for cancer as well as long-term preventive/curative interventions, with the aim of minimizing the negative impacts of dysphagia on the nutritional status and quality of life of patients. Trismus and tumors located in the mouth and oropharynx were associated with dyphagia and with poor swallowing function, exerting a negative impact on the quality of life of patients having undergone radiotherapy for the treatment of head and neck cancer.

DISCLOSURE

This study was partially supported by the research incentive fund (FIPE) of the University of Santa Maria. We thank the Federal University of Santa Maria for the partial funding of this study through the Research Incentive Fund.

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