Original Article

Artigo Original

Correlation between swallowing-related quality of life and videofluoroscopy after head and neck cancer treatment

Associação entre os achados do questionário de disfagia M. D. Anderson e a videofluoroscopia da deglutição após tratamento do câncer de cabeça e pescoço

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Keywords

Swallowing
Deglutition Disorders
Questionnaires
Mouth Neoplasms
Quality of Life
Retrospective Studies

ABSTRACT

Introduction: The use of symptom-specific questionnaires on head and neck cancer (HNC), together with objective swallowing measures, can be sensitive to changes in quality of life (QoL) resulting from dysphagia, but this tool is not broadly used as a complement to clinical evaluations. **Purpose:** To analyze the correlation between the M. D. Anderson Dysphagia Inventory (MDADI) questionnaire and videofluoroscopy (VF) in patients treated for head and neck cancer. **Methods:** This is a retrospective study with review of clinical data, VF and MDADI results. The study sample was composed of adult patients (>18 y.o.) treated for tumors at the oral cavity, oropharynx, hypopharynx, and larynx, regardless of treatment type. For the VF examination, swallowing of 5 and 20 ml of nectar-thick liquids were considered. The Mann-Whitney nonparametric test was applied to evaluate the correlations between the MDADI and VF. **Results**: Thirty-nine patients, mostly men (87.18%), with mean age of 61 years participated in the study. Most patients (16) presented oral cavity tumors (41.03%). Twenty-two patients were in advanced clinical stage (IV). Surgery was the most prevalent treatment (41.03%). Approximately half of the participants (20) received oral feeding. The total mean (TM) on the MDADI was 63.36. Comparison between VF and MDADI data showed significant correlation between TM, emotional domain (ED), and physical domain (PD) with penetration during the swallowing of 5 ml. Penetration and aspiration with 20 ml determined worse QoL on the global (p=0.018 and p=0.0053), emotional (p=0.0012 and p=0.027) and physical (p=0.0002 and p=0.0051) domains, and TM (p=0.0023 and p=0.0299), respectively. The presence of stasis did not determine worse QoL. **Conclusion:** Patients treated for HNC who presented penetration/aspiration showed worse QoL on the emotional and physical domains of the MDADI.

Descritores

Deglutição
Transtorno da Deglutição
Questionário
Neoplasias de Cabeça e Pescoço
Qualidade de Vida
Estudos Retrospectivos

RESUMO

Introdução: A utilização de questionários sintoma-específicos no câncer de cabeça e pescoço (CCP) em conjunto com avaliações objetivas da deglutição pode ser sensível às mudanças na qualidade de vida (QV) decorrentes da disfagia, porém é uma ferramenta pouco utilizada como complemento de avaliações clínicas. **Objetivo:** analisar a associação entre o questionário de disfagia M. D. Anderson (MDADI) com a videofluoroscopia (VF) da deglutição em pacientes tratados do CCP. **Método:** Estudo retrospectivo, com revisão de prontuários, dados da VF e do questionário de disfagia MDADI. Foram incluídos indivíduos maiores de 18 anos, tratados do câncer de cavidade oral, orofaringe, hipofaringe e laringe, independentemente do tratamento curativo. Para o exame de VF, foram consideradas as deglutições de 5 e 20 ml na consistência néctar. O teste não paramétrico de Mann-Whitney foi utilizado para avaliar a associação entre o questionário MDADI e a VF. **Resultados**: Casuística de 39 indivíduos, predomínio de homens, 34 (87,18%), e média de idade de 61 anos. Prevalência de câncer de cavidade oral, 16 (41,03%). Vinte e dois (56,4%) possuíam estádio clínico IV. Cirurgia isolada foi o tratamento mais prevalente, 16 (41,03%). Vinte indivíduos (51,28%) se alimentavam por via oral. A média total (MT) do MDADI foi de 63,36. Na correlação da VF com o MDADI, observou-se associação significante entre MT, domínio emocional (DE) e domínio físico (DFis) com penetração para 5 ml. Penetração e aspiração com 20 ml determinou prejuízo para questão global (p=0,018 e p=0,0053), DE (p=0,0012 e p=0,027), DFis (p=0,0002 e p=0,0051) e MT (p=0,0023 e p=0,0299), respectivamente. A presença de estase não determinou piora da QV. **Conclusão:** Pacientes tratados do CCP que apresentam penetração/aspiração demonstram impacto na qualidade de vida nos DE e DFis.

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Received: July 17, 2015

Accepted: June 15, 2016

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Financial support: nothing to declare.
Conflict of interests: nothing to declare.

INTRODUCTION

The swallowing and communication (voice and speech) functions and quality of life measures are important parameters for the assessment and control of the effectiveness of various forms of treatment for head and neck tumors[1]. In this sense, some studies indicate the need for assessing the quality of life of cancer patients for a good understanding of the degree of improvement and/or stabilization, or even worse, obtained with therapeutic procedures[2].

There are studies describing the association of dysphagia with the decline in quality of life during oncological treatment[3-7]. In head and neck cancer, this association has been studied through the application of symptom-specific quality of life questionnaires[8-13], considered effective in assessing the impact of the disease in affected individuals. These can complement the findings of objective exams and also contribute to a better understanding of the impact of treatment in the lives of individuals[2,14,15].

Quality of life questionnaires can cover several types of diseases considered generic; and there are those who analyze the specific consequences of a disease, encompassing the aspects of mental and social functions to specific symptoms as swallowing[16]. Questionnaires for the analysis of quality of life in swallowing most commonly used are the MD Anderson Dysphagia Inventory (MDADI)[8,17] and the Quality of Life in Swallowing Disorders (SWAL-QOL) questionnaire[18-20]. The latter assesses the impact of swallowing changes due to the pathologies of various etiologies on quality of life[18,19]. The MDADI, developed by Chen et al.[8] and validated for Portuguese by Guedes et al.[17] evaluates how patients perceive the results of their swallowing function after treatment of head and neck cancer and to swallowing changes that affect the quality of life of these individuals.

Dysphagia is a frequent sequela of head and neck cancer and its treatment and the MDADI is effective to evaluate the perceived quality of life related to dysphagia patients when used in conjunction with the detailed assessments of swallowing physiology, such as videofluoroscopy[10].

McHorney et al.[21] developed a study with 386 dysphagic patients in order to verify the association between videofluoroscopic swallowing measures and the SWAL-QOL and SWAL-CARE questionnaires. The researchers observed a significant correlation between the two questionnaires and the results of bolus flow measures, such as oral transit time and total swallowing time. The authors found worse outcomes for evaluations with the semi-solid consistency and also observed that individuals with increased bolus transit time during the process of swallowing had worse quality of life.

Thus, the study of quality of life related to swallowing assists in knowledge of the real impact of the changes arising from dysphagia that affects the physical and social well-being of the individual[20].

As previously observed, a single study was found that associates the physiological evaluation of swallowing with symptom-specific quality of life in swallowing. This same study consisted of a heterogeneous sample for several pathologies. However, there are no studies that make this association in a sample consisting only of patients treated for head and neck cancer using a specific instrument in swallowing for this type of pathology, which underscores the importance of the joint use of these tools in clinical practice.

Therefore, the aim of this study was to analyze the association between the questionnaire results for quality of life in the MDADI with videofluoroscopy swallowing results (stasis, penetration and aspiration) in patients undergoing treatment for head and neck cancer. It was expected that individuals who have worse results on swallowing videofluoroscopy exam (stasis, penetration and aspiration) present worse results related to quality of life.

METHODS

This retrospective study was approved by the Institution Research Ethics Committee of a cancer hospital under number 1797/13 and carried out through the data collection of medical records and data sheets filled in with information regarding demographics (name, age, date of birth and gender), clinical-pathological (medical diagnosis, staging, primary lesion site, treatment with surgery and/or radiotherapy and chemotherapy, reconstruction, neck dissection) and therapeutic variables (type of feeding, use of feeding tube, when the questionnaire and/or tracheostomy was applied and videofluoroscopy results) of each patient.

The cases selected for study were treated at the speech-language pathology outpatient clinic undergoing videofluoroscopy and responding to the MDADI prior to examination, 18 years or older, irrespective of gender, treated for cancer of the oral cavity, oropharynx, hypopharynx and larynx, irrespective of curative treatment. Excluded from the study were non-literate individuals due to the self-applicative condition of the questionnaire and those with deficits in the understanding and/or expression of the language, identified through medical diagnosis of disease or neurological alteration described in the medical record.

A) Swallowing videofluoroscopy assessment

Swallowing videofluoroscopy assessment was conducted in the Department of Imaging by a radiologist and an experienced speech-language pathologist in the area, followed by routine referrals of outpatients after clinical evaluation. Analyzes of swallowing videofluoroscopy exams were performed by a single researcher.

The examination was performed in a room shielded to X-rays, using radiological equipment GE®, model *Prestilix* 1600X. For recording the identity of each individual and of each procedure performed, the tests were recorded on DVDR 3380.

The patients were positioned seated laterally and the focal point of the fluoroscopic image was defined anteriorly to the lips, superiorly to the hard palate, posteriorly to the posterior wall of the pharynx and inferiorly to the bifurcation of the airway and esophagus (seventh cervical vertebra).

For this study, 5 mL and 20 mL swallows of thickened liquid consistency (nectar) in side view were considered. Barium

contrast used was *opti-bar*® diluted with water according to the manufacturer's specifications (66.7%). When necessary, pharyngeal cleaning maneuvers, postural maneuvers and airway protection requested by the speech-language pathologist were used during the exam. All patients with an alternative feeding pathway were in rehabilitation at the time of evaluation, therefore the offer of a greater volume of thickened liquid (20mL) during the exam was considered safe.

The following qualitative variables were considered:

1) Stasis

Stasis was considered with the presence of apparent residue in any pharyngeal structure after the first swallow. For this study, only the presence or absence of stasis was considered, but the classification carried out during the analysis of exams was based on scales.

Considered in the oral cavity was the presence of residue greater than 25% to the anterior and lateral sulcus region, lateral floor of mouth, hard and soft palate, reconstruction and structure remnant[22]. The scale proposed by Paulon, that uses the barium line as a benchmark, was used for oral tongue, tongue base and posterior pharyngeal wall[23].

For quantification of stasis in the vallecula and pyriform sinus structures, the scale developed by Eisenhuber et al.[24] was used. It considers the total height of the structure, with a discrete degree represented by less than 25% of the height of the structure; moderate degree greater than 25% but less than 50% and severe degree when stasis exceed 50% of the height of the structure.

In this study, the presence and absence of residue located at arytenoid and the upper esophageal sphincter was considered, subjectively taking into account the region of contact of each structure.

2) Penetration and aspiration

In accord with Logemann[22], penetration was considered when entry of food in the larynx did not exceed the vocal folds and reach the trachea, and aspiration the entry of food in the larynx below the vocal folds level. The presence or absence of these changes were considered for analysis, following the Rosenbek et al.[25] scale.

B) Quality of life assessment

The version of the MDADI translated and validated for the Portuguese language by Guedes et al.[17] was used and the analysis of the questionnaire was carried out as explained in the study.

According to Chen et al.[8], limitation on swallowing was demonstrated by the MDADI total mean in the following ranges: 0-20: deep limitation; 21-40: severe limitation; 41-60: moderate limitation; 61-80: average limitation; 81-100: minimum limitation.

The MDADI was applied in routine clinical care of the Speech-Language Pathology Department in quiet rooms by speech-language pathologists not responsible for the patients rehabilitation.

C) Statistical analysis

Descriptive analysis was performed, in which the distribution of absolute and relative frequency for qualitative variables and the main summary measures (mean, standard deviation, median, minimum and maximum values) for quantitative variables were presented.

The nonparametric Mann-Whitney *U* test was used to evaluate the association of each aspect studied by the MDADI with the characteristics assessed in videofluoroscopy. The level of significance adopted was 5% and the free software R version 3.0.1 was used in analyzes.

RESULTS

The study population consisted of 39 individuals, mostly males (n=34; 87.18%), mean age of 61 years (SD ± 15 years). The most prevalent tumor location was in the oral cavity in 16 patients (41.03%), while 22 patients (56.4%) had clinical stage IV of the disease. Isolated surgery was the most prevalent treatment with 16 cases (41.03%); 5 subjects (12.82%) had tracheostomy at the time of videofluoroscopy and 20 patients were orally fed exclusively (51.28%) (Table 1).

As benchmark to swallowing videofluoroscopy, the mean time between the exam and the end of the last treatment was 22.33 days (SD = 49.29). It was verified that for the thickened liquid consistency, the structures with higher occurrence of stasis for the volumes of 5 mL and 20 mL were, respectively: vallecula - 24 (61.54%) and 29 (74.35%); tongue base - 18 (46.16%) and 19 (48.72%); upper esophageal sphincter - 15 (38.46%) and 16 (41.02%); pyriform sinus - 15 (38.46%) and 16 (41.03%). Penetrations were more frequent with the intake of greater volumes (20 mL) in 19 subjects (48.72%). The presence of aspiration was detected in 10 cases (25.64%), while 9 (23.08%) had silent aspiration for both volumes (Figures 1 and 2).

According to the findings of the MDADI, a mean total of 63.36 was observed and the lowest scores were shown for the physical domain (57.77) and overall question (53.33) (Table 2).

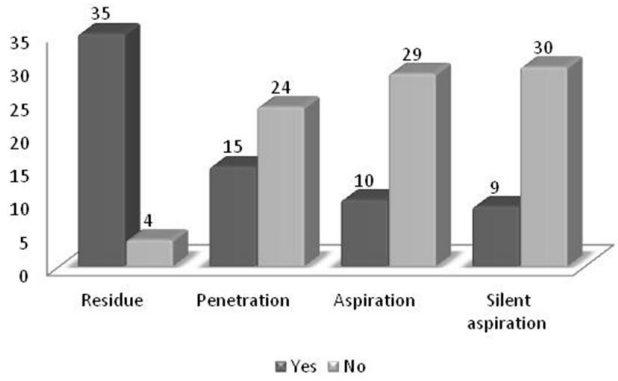

Figure 1. Characterization of the results of swallowing videofluoroscopy for the presence of stasis and penetration/aspiration for volume of 5 mL (N = 39)

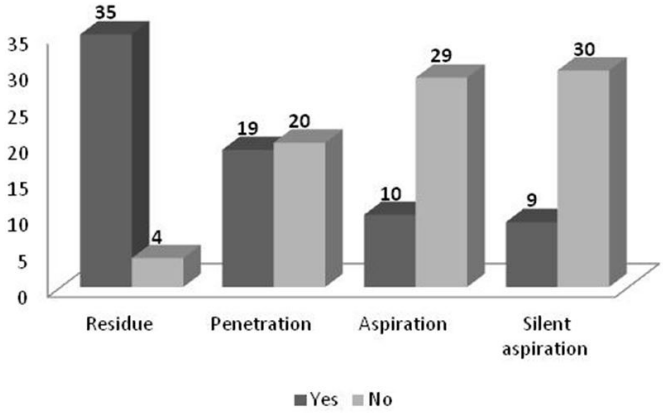

Figure 2. Characterization of the results of swallowing videofluoroscopy for the presence of stasis and penetration/aspiration for volume of 20 mL (N = 39)

Table 1. Demographic data regarding gender, age, diagnosis and treatment (N=39)

Variable	Category	N(%)/measures
Gender	Male	34 (87.18)
	Female	5 (12.82)
Age	Mean (SD)	61 (15)
	Median	63
	min:max	21:91
Primary lesion site	Oral Cavity	16 (41.03)
	Oropharynge	10 (25.64)
	Hypopharynx	5 (12.82)
	Larynge	8 (20.51)
Staging (T)	1	6 (15.38)
	2	13 (33.33)
	3	7 (17.95)
	4	13 (33.33)
Staging (N)	0	20 (51.28)
	1-2	17 (43.59)
	*	2 (5.13)
Staging (M)	0	33 (84.61)
	X	4 (10.26)
	*	2 (5.13)
Clinical stage	I	5 (12.8)
	II	6 (15.4)
	III	6 (15.4)
	IV	22 (56.4)
Treatment	S	16 (41.03)
	RT	4 (10.26)
	CT	2 (5.13)
	S+RT	6 (15.38)
	RT+CT	6 (15.38)
	S+RT+CT	5 (12.82)
Neck dissection	No	19 (48.72)
	Yes	20 (51.28)
Reconstruction	No	18 (46)
	Myocutaneous	8 (21)
	Microsurgical	13 (33)
Traqueostomy	No	34 (87.18)
	Yes	5 (12.82)
Enteral feeding	No	20 (51.28)
	Yes	19 (48.72)

*undetermined
Caption: SD - standard deviation; min:max - minimum:maximum; T - primary tumor; N - regional lymph nodes; M - Distant metastasis; S - surgery; RT - radiotherapy; CT - chemotherapy

Table 2. Characterization of the findings of the questionnaire MDADI by domain

Domain	Mean* ± SD	Median	Min-max
Overall Question:	53.33 ± 25.68	40	20 -100
Functional domain	68 ± 17.82	72	24-100
Emotional domain	64.47 ± 16.49	66.6	36.7-100
Physical domain	57.77 ± 15.09	57.5	20-97.5
Mean total	63.36 ± 14.70	64.47	35.3-95.3

*When closer to the maximum value, the worse the quality of life
Caption: SD = standard deviation

However, impairment in functional aspect was not detected, which showed better scores with a median of 72.

In Tables 3 and 4, cross-referenced data between the MDADI and swallowing videofluoroscopy assessment was found. When swallowing smaller volumes, the most frequent change was penetration, which had significant association with mean total and the emotional and physical domains of the questionnaire.

Individuals who presented penetration and aspiration with 20 mL of thickened liquid had an impact on the global, total mean, and almost all domains of the MD Anderson Dysphagia Questionnaire except the functional domain. No significant association was presented with the parameters analyzed by videofluoroscopy. The presence of stasis, irrespective of volume, showed no significant correlation with the domains of the questionnaire.

The distribution of responses, with respect to the domains of the MDADI had statistical correlation with videofluoroscopy, as described in Tables 5 and 6.

DISCUSSION

This study evaluated the association between the measures found in the objective assessment of swallowing with the domains of the MDADI.

According to McHorney et al.[21], biological and pathophysiological measures are not synonymous of human functioning and well-being. This would explain the existence of cases where change is observed on the biological level, but not the presence of complaints and minimal symptoms, which would be linked to measures of well-being. However, what can we expect from individuals with changes in the biological level who report changes in the level of well-being?

According to these same authors, disturbances in the level of well-being may be an indication that something is not good, thus the need for thorough research both in the physical aspect, which includes the body and biological, and also the emotional sphere: psychic and social. The need for investigation of the individual as a whole arises from clinical characteristics to the quality of life in general.

Considering the hypothesis that the presence of alterations as stasis in pharyngeal recesses, penetration and/or aspiration when

Table 3. Relationship between the domains of MDADI and fluoroscopy to the volume of 5 mL of thickened liquid (nectar)

Domain	Videofluoroscopy		N	Mean (SD)	P*
	5 ml	Category			
Overall	Stasis	No	4	65 (19.1)	0.2791
		Yes	35	52 (26.2)	
	Penetration	No	24	59.2 (26)	0.0719
		Yes	15	44 (22.9)	
	Aspiration	No	29	55.9 (25.8)	0.2701
		Yes	10	46 (25)	
	Silent aspiration	No	30	56.7 (25.8)	0.1232
		Yes	9	42.2 (23.3)	
Functional	Stasis	No	5	70 (16.8)	1.0000
		Yes	35	67.8 (18.1)	
	Penetration	No	24	71.5 (16.6)	0.2405
		Yes	15	62.4 (18.8)	
	Aspiration	No	29	69.4 (17.6)	0.5395
		Yes	10	64 (18.7)	
	Silent aspiration	No	30	69.6 (17.4)	0.3842
		Yes	9	62.7 (19.3)	
Emotional	Stasis	No	4	59.9 (11.2)	0.4716
		Yes	35	65 (17)	
	Penetration	No	24	69 (16.5)	**0.0426***
		Yes	15	57.3 (14.2)	
	Aspiration	No	29	66.8 (16.7)	0.1557
		Yes	10	57.6 (14.6)	
	Silent aspiration	No	30	67.1 (16.5)	0.0763
		Yes	9	55.6 (13.9)	
Physical	Stasis	No	4	57.8 (9.2)	0.9079
		Yes	35	57.8 (15.7)	
	Penetration	No	24	62.1 (16.8)	**0.0075***
		Yes	15	50.8 (8.3)	
	Aspiration	No	29	60.9 (14.7)	**0.0298***
		Yes	10	48.7 (12.8)	
	Silent aspiration	No	30	60.9 (14.5)	**0.0171***
		Yes	9	47.4 (12.9)	
Mean total	Stasis	No	4	62.5 (7.1)	0.9079
		Yes	35	63.5 (15.4)	
	Penetration	No	24	67.5 (14.8)	**0.0315***
		Yes	15	56.7 (12.2)	
	Aspiration	No	29	65.7 (14.6)	0.1266
		Yes	10	56.6 (13.5)	
	Silent aspiration	No	30	65.9 (14.4)	0.0596
		Yes	9	55 (13.3)	

*Nonparametric Mann-Whitney test, p <0.05

an ineffective swallowing is identified increases the chances that the patient diagnosed and treated for head and neck cancer will present a reduction in their quality of life, this study detected a total mean of 63.36 in the MDADI questionnaire, reflecting a mean reduction in the quality of life due to swallowing changes in the vast majority of individuals in the sample. The overall question showed the worse score (53.33), that is, the majority of individuals reported that their swallowing limits their daily activities.

In comparison between MDADI data to videofluoroscopy, 14 out of 40 associations were significant. The volume of 20 mL was the one that most evidenced swallowing deficits, with penetration and aspiration the most commonly observed intercurrences. In addition, this bolus quantity was the one that presented the most statistically significant associations between the results of the questionnaire and videofluoroscopy. According to Steele and Miller[26], boluses in larger volumes favor a greater driving force of the tongue and reduce the time for the onset of the pharyngeal stage of swallowing. Conversely, this may increase the amount of residue in the oral cavity and the number of swallows[13].

The presence of these residues in the airway affects the swallowing of the patient and consequently may have an impact on their quality of life, which agrees with the findings of this study in which a large number of individuals who had penetration with 20 mL in the videofluoroscopy exam related "swallowing is a great effort" (13 cases - 68%). Additionally, swallowing large volumes can identify increased risk of penetration/aspiration[21], increase the probability of the appearance of pulmonary complications and lead the individual to death.

Therefore, patients who need to perform several swallows to clear a single bolus do not benefit from higher volumes, requiring the offer of smaller boluses[22]. These data agree with the results found for the domains physical and emotional of

Table 4. Relationship between the domains of MDADI and fluoroscopy to the volume 20 mL of thickened liquid (nectar)

Domain	Videofluoroscopy		N	Mean (SD)	P*
	20 ml	Category			
Overall	Stasis	No	4	70 (25.8)	0.1704
		Yes	35	51.4 (25.3)	
	Penetration	No	20	63 (26.2)	**0.0180**
		Yes	19	43.2 (21.4)	
	Aspiration	No	29	60 (25.6)	**0.0053**
		Yes	10	34 (13.5)	
	Silent aspiration	No	30	56.7 (25.8)	0.1232
		Yes	9	42.2 (23.3)	
Functional	Stasis	No	4	79 (8.9)	0.1497
		Yes	35	67.7 (18.2)	
	Penetration	No	20	72.8 (17.7)	0.0688
		Yes	19	62.9 (17)	
	Aspiration	No	29	70.1 (17.4)	0.2794
		Yes	10	62 (18.6)	
	Silent aspiration	No	30	69.6 (17.4)	0.3842
		Yes	9	62.7 (19.3)	
Emotional	Stasis	No	4	64 (14.0)	1.0000
		Yes	35	64.5 (16.9)	
	Penetration	No	20	72.4 (15.9)	**0.0012**
		Yes	19	56.1 (12.8)	
	Aspiration	No	29	67.9 (16.1)	**0.0271**
		Yes	10	54.5 (13.8)	
	Silent aspiration	No	30	67.1 (16.5)	0.0763
		Yes	9	55.6 (13.9)	
Physical	Stasis	No	4	55.1 (8.8)	0.5941
		Yes	35	58.1 (15.7)	
	Penetration	No	20	66 (14)	**0.0002**
		Yes	19	49.2 (11)	
	Aspiration	No	29	61.2 (15.4)	**0.0051**
		Yes	10	47.9 (8.9)	
	Silent aspiration	No	30	60.9 (14.5)	**0.0171**
		Yes	9	47.4 (12.9)	
Mean total	Stasis	No	4	66 (6.8)	0.6601
		Yes	35	63.1 (15.4)	
	Penetration	No	20	70.4 (14.3)	**0.0023**
		Yes	19	56 (11.3)	
	Aspiration	No	29	66.4 (14.6)	**0.0299**
		Yes	10	54.6 (11.7)	
	Silent aspiration	No	30	65.9 (14.4)	0.0596
		Yes	9	55 (13.3)	

*Nonparametric Mann-Whitney test, $p < 0.05$

the MDADI, in which among those with 20 mL penetration, 17 cases (89%) reported limiting their feeding due to difficulty in swallowing. In individuals where the presence of aspiration was identified, 9 (47%) reported do not leave home because of swallowing problems.

It is worth noting that the choice to use only the nectar consistency for the analysis of this study was made since it is the consistency that is initially tested in videofluoroscopy exams conducted at the site of this study, as it is considered that for patients treated for head and neck cancer, this consistency offers less risk of aspiration of the content offered.

When the intake of the bolus occurred with a smaller 5 mL volume, few significant associations were observed between the data from the MDADI and videofluoroscopic evaluation, with penetration being the most prevalent swallowing change. Impacts were evidenced in total mean and in the domains physical and emotional.

When observing the mean time between the end of the last treatment and the completion of the videofluoroscopic exam, we see that the exam was performed in less than a month after treatment. Considering that in the initial months the effects of treatment of head and neck cancer are more acute, a reduction in the sensitivity of the aerodigestive tract can be found and the patient does not perceive the presence of residue in the region, producing no effects on quality of life. This would justify the absence of a significant correlation between the presence of stasis and the quality of life data.

This data also agrees with the statement of McHorney et al.[21] about the existence of patients who have changes at the biological level, but have no complaints and symptoms that would be linked to measures of well-being.

It should be stressed that much of the sample of this study consisted of tumors located in the oral cavity region, in an advanced state (IV) and surgically treated. Some authors agree

Table 5. Correlation between the responses of the emotional domain MDADI and Fluoroscopy (p <0.05)

Questions		Penetration 5 ml		p	Penetration 20 ml		p	Aspiration 20 ml		p
		no	yes		no	yes		no	yes	
I am ashamed of my eating habits	1+2	3 (12)	4 (27)		2 (10)	5 (26)		4 (14)	3 (30)	
	3	1 (4)	2 (13)	0.50	1 (5)	2 (11)	0.29	2 (7)	1 (10)	0.45
	4+5	21 (83)	9 (60)		17 (85)	12 (63)		23 (79)	6 (60)	
Other people get irritated because of my swallowing problem	1+2	1 (4)	3 (20)		2 (10)	2 (11)		2 (7)	2 (20)	
	3	3 (12)	1 (7)	0.26	1 (5)	3 (16)	0.53	4 (14)	0 (0)	0.26
	4+5	20 (83)	11 (73)		17 (85)	14 (74)		23 (79)	8 (80)	
I am sad because of my swallowing problem	1+2	12 (50)	9 (60)		8 (40)	13 (68)		14 (48)	7 (70)	
	3	2 (8)	2 (13)	0.61	2 (10)	2 (11)	0.15	4 (14)	0 (0)	0.33
	4+5	10 (42)	4 (27)		10 (50)	4 (21)		11 (38)	3 (30)	
I stopped going out to eat due to my swallowing problem	1+2	3 (12)	8 (53)		2 (10)	9 (47)		6 (21)	5 (50)	
	3	1 (4)	1 (7)	**0.01**	1 (5)	1 (5)	**0.03**	2 (7)	0 (0)	0.17
	4+5	20 (83)	6 (40)		17 (85)	9 (47)		21 (72)	5 (50)	
I have low self-esteem due to my swallowing problem.	1+2	6 (25)	5 (33)		3 (15)	8 (42)		7 (24)	4 (40)	
	3	0 (0)	3 (20)	**0.04**	1 (5)	2 (11)	0.10	2 (7)	1 (10)	0.55
	4+5	18 (75)	7 (47)		16 (80)	9 (47)		20 (69)	5 (50)	
I feel insecure when I eat	1+2	13 (54)	12 (80)		10 (50)	15 (79)		15 (52)	10 (100)	
	3	2 (8)	1 (7)	0.23	1 (5)	2 (11)	0.056	3 (10)	0 (0)	**0.02**
	4+5	9 (38)	2 (13)		9 (45)	2 (11)		11 (38)	0 (0)	

Caption: 1 + 2 - Agree; 3 - No opinion; 4 + 5 - Disagree

Table 6. Correlation between the responses of the physical domain MDADI and fluoroscopy (p <0.05)

Questions		Penetration 5 ml		p	Penetration 20 ml		P	Aspiration 5 ml		p	Aspiration 20 ml		p	Silent aspiration 5 ml		p	Silent aspiration 20 ml		p
		no	yes		no	yes		no	yes		no	yes		no	yes		no	yes	
I have lost weight due to my swallowing problem.	1+2	11 (46)	10 (67)	0.35	9 (45)	12 (63)	0.09	13 (45)	8 (80)	0.14	15 (52)	6 (60)	0.57	14 (45)	7 (78)	0.24	15 (52)	6 (60)	0.57
	3	1 (4)	1 (7)		0 (0)	2 (11)		2 (7)	0 (0)		1 (3)	1 (10)		2 (7)	0 (0)		1 (3)	1 (10)	
	4+5	12 (50)	4 (27)		11 (55)	5 (26)		14 (48)	2 (20)		13 (45)	3 (30)		14 (47)	2 (22)		13 (45)	3 (30)	
It is harder to swallow at the end of the day	1+2	1 (4)	5 (33)	**0.05**	0 (0)	6 (32)	**0.02**	4 (14)	2 (20)	0.89	2 (7)	4 (40)	**0.04**	4 (13)	2 (22)	0.79	2 (7)	4 (40)	**0.04**
	3	3 (12)	1 (7)		2 (10)	2 (11)		3 (10)	1 (10)		3 (10)	1 (10)		3 (10)	1 (11)		3 (10)	1 (10)	
	4+5	20 (83)	9 (60)		18 (90)	11 (58)		22 (76)	7 (70)		24 (83)	5 (50)		23 (77)	6 (67)		24 (83)	5 (50)	
People ask me, "Why can´t you eat this?"	1+2	8 (33)	9 (60)	0.25	5 (25)	12 (63)	**0.02**	13 (45)	4 (40)	0.93	10 (34)	7 (70)	0.12	13 (43)	4 (44)	0.60	10 (34)	7 (70)	0.12
	3	2 (8)	1 (7)		1 (5)	2 (11)		2 (7)	1 (10)		3 (10)	0 (0)		3 (10)	0 (0)		3 (10)	0 (0)	
	4+5	14 (58)	5 (33)		14 (70)	5 (26)		14 (48)	5 (50)		16 (55)	3 (30)		14 (47)	5 (56)		16 (55)	3 (30)	
I feel like I am able to swallow a lot of different foods	1+2	14 (58)	8 (53)	0.95	11 (55)	11 (58)	0.77	15 (52)	7 (70)	0.33	17 (59)	5 (50)	0.72	16 (53)	6 (67)	0.41	17 (59)	5 (50)	0.72
	3	3 (12)	2 (13)		2 (10)	3 (16)		5 (17)	0 (0)		3 (10)	2 (20)		5 (17)	0 (0)		3 (10)	2 (20)	
	4+5	7 (29)	5 (33)		7 (35)	5 (26)		9 (31)	3 (30)		9 (31)	3 (30)		9 (30)	3 (33)		9 (31)	3 (30)	
I limit my diet because of my difficulty in swallowing	1+2	14 (58)	13 (87)	0.1	10 (50)	17 (89)	**0.01**	18 (62)	9 (90)	0.24	18 (62)	9 (90)	0.08	19 (63)	8 (89)	0.33	18 (62)	9 (90)	0.08
	3	1 (4)	1 (7)		1 (5)	1 (5)		2 (7)	0 (0)		1 (3)	1 (10)		2 (7)	0 (0)		1 (3)	1 (10)	
	4+5	9 (38)	1 (7)		9 (45)	1 (5)		9 (31)	1 (10)		10 (34)	0 (0)		9 (30)	1 (11)		10 (34)	0 (0)	
Swallowing takes a great effort	1+2	7 (29)	12 (80)	**0.01**	6 (30)	13 (68)	**0.047**	11 (38)	8 (80)	0.06	11 (38)	8 (80)	0.06	11 (37)	8 (89)	**0.02**	11 (38)	8 (80)	0.06
	3	2 (8)	0 (0)		1 (5)	1 (5)		2 (7)	0 (0)		2 (7)	0 (0)		2 (7)	0 (0)		2 (7)	0 (0)	
	4+5	15 (62)	3 (20)		13 (65)	5 (26)		16 (55)	2 (20)		16 (55)	2 (20)		17 (57)	1 (11)		16 (55)	2 (20)	
I take more time to eat because of my swallowing problem	1+2	16 (67)	12 (80)	0.51	13 (65)	15 (79)	0.57	20 (69)	8 (80)	0.64	20 (69)	8 (80)	0.41	21 (70)	7 (78)	0.71	20 (69)	8 (80)	0.41
	3	1 (4)	1 (7)		1 (5)	1 (5)		2 (7)	0 (0)		1 (3)	1 (10)		2 (7)	0 (0)		1 (3)	1 (10)	
	4+5	7 (29)	2 (13)		6 (30)	3 (16)		7 (24)	2 (20)		8 (28)	1 (10)		7 (23)	2 (22)		8 (28)	1 (10)	
I cough when I try to drink fluids	1+2	9 (38)	6 (40)	0.53	7 (35)	8 (42)	0.12	10 (34)	5 (50)	0.46	11 (38)	4 (40)	0.20	10 (33)	5 (56)	0.37	11 (38)	4 (40)	0.20
	3	1 (4)	2 (13)		0 (0)	3 (16)		3 (10)	0 (0)		1 (3)	2 (20)		3 (10)	0 (0)		1 (3)	2 (20)	
	4+5	14 (58)	7 (47)		13 (65)	8 (42)		16 (55)	5 (50)		17 (59)	4 (40)		17 (57)	4 (44)		17 (59)	4 (40)	

Caption: 1 + 2 - Agree; 3 - No opinion; 4 + 5 - Disagree

that treatment of oral cavity cancer, depending on the structures that were resected and whether or not adjuvant therapy with radiation, can have harmful effects for swallowing[27,28]. Changes such as reduced mouth opening, the strength and breadth of tongue movement and the sensitivity of the oral cavity can affect the handling and propulsion of the bolus into the pharynx, thus the efficiency of swallowing and increase the risk of aspiration.

We can verify for this study that for the ingestion of lower volumes, the perception of the bolus in the oral cavity may be reduced, as patients may find themselves more worried about the performance of their swallowing, thus disrupting the sequence of bolus transport events from the mouth to the esophagus. Some of the more punctuated questionnaire data can confirm the supposition above, as in the domain physical, the individuals who had penetration and aspiration with 5 mL, 12 (80%) and 8 (89%), respectively, reported making an effort when swallowing.

Despite a reduced casuistry, the population of this study was homogeneous, as all the individuals analyzed had a diagnosis of head and neck cancer. These patients had some swallowing changes evident in the videofluoroscopy exam, and a significant number of subjects 10 (25.64%) presented the entry of food below the vocal folds. Different results were found in a survey conducted by McHorney et al.[21] with a heterogeneous population that evidenced a reduced number of aspiration. Only 16 subjects (5%) had visible residual below the vocal folds in swallowing liquid and 9 (3%) patients presented aspiration with semi-solid.

It was possible to verify from this study that through videofluoroscopy and the MDADI, individuals with penetration and aspiration have a worse quality of life. In this sense, assessments of quality of life with symptom-specific questionnaires in patients with head and neck cancer that present dysphagia can provide important information inherent to the aspects of function and patient well-being, and when used in conjunction with data found in clinical and objective assessments, offers an arsenal of information that helps the healthcare team to determine the best form of treatment and understand the impact of the treatment for head and neck cancer in swallowing[1,8,17].

The main limitation of this study was the small sample size, what made not possible to conduct a multivariate analysis of the studied variables.

CONCLUSION

Treated patients of head and neck cancer who present penetration/aspiration demonstrate impact on quality of life in the domains emotional and physical. The presence of residue in pharyngeal recesses (stasis) had no impact on quality of life.

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Authors contributions

MAS participated as principal investigator, collected medical record data, wrote much of the article and organized the database; CBB and SACL performed the swallowing videofluoroscopy exams and assisted in the review and correction of the article; LDASS assisted in the idealization, review and article correction; ANG guided the student during the monograph development process and helped to correct all article data; RLVG guided the student during the monograph development process, data of quality of life questionnaires and was responsible for the submission process; ALNF was responsible for the studies statistics; ECA guided the student during the development of the monograph and assisted in the correction of the article.