
SWALLOW FUNCTION AND PERCEPTION OF DYSPHAGIA IN PATIENTS WITH HEAD AND NECK CANCER

Barbara Roa Pauloski, PhD,¹ Alfred W. Rademaker, PhD,²
Jerilyn A. Logemann, PhD,¹ Cathy L. Lazarus, PhD,¹ Lisa Newman, ScD,³
Annette Hamner, MA,³ Ellen MacCracken, MS,⁴ Joy Gaziano, MS,⁵ Linda Stachowiak, MS⁵

¹ Communication Sciences and Disorders, Northwestern University, 2299 N. Campus Drive, Evanston, Illinois 60208-3540. E-mail: pauloski@merle.it.northwestern.edu

² The Robert H. Lurie Comprehensive Cancer Center, Northwestern University Medical School, Chicago, Illinois

³ Otolaryngology–Head and Neck Surgery, University of Tennessee College of Medicine, Memphis, Tennessee

⁴ Otolaryngology–Head and Neck Surgery, University of Chicago Hospitals, Chicago, Illinois

⁵ Otolaryngology–Head and Neck Surgery, H. Lee Moffitt Cancer Center, Tampa, Florida

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Abstract: *Background.* The relationship between subjective complaints of dysphagia and objective measures of swallow function in patients with cancers of the oral cavity, pharynx, or larynx, treated with radiotherapy ± chemotherapy has not been well documented in the literature.

Methods. Swallowing function in 132 patients with various lesions was evaluated using videofluoroscopy and analyzed by patient complaint of dysphagia grouping.

Results. Patients with complaints of dysphagia demonstrated significantly worse swallow function as indicated by lower oropharyngeal swallow efficiency (OPSE), longer transit times, larger residues, and more swallows with aspiration. Patients with

complaints of dysphagia also tended to take less of their nutrition by mouth and less variety of food consistencies in their diet compared with those without complaint.

Conclusions. Patients were able to perceive decrements in their swallowing function as dysphagia and may have limited their oral intake in response to that perception. The ability to accurately perceive swallowing function may be useful for self-monitoring changes in dysphagia status during a course of swallow therapy. © 2002 Wiley Periodicals, Inc. *Head Neck* 24: 555–565, 2002

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Patients with cancer of the head and neck may report a complaint of dysphagia before and after treatment for their disease.^{1–6} Before treatment, patients with oral, pharyngeal, or laryngeal lesions demonstrate swallow function that is significantly different from that of control subjects;⁷ treated head and neck cancer patients also demonstrate impaired swallowing function that is

Correspondence to: B. R. Pauloski

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well documented in the literature.⁸⁻²⁵ Although these studies indicate that patients with head and neck cancer experience a disruption in swallowing function, it is unclear how patients perceive these differences. Research investigating the relationship between subjective and objective assessment of dysphagia on patients without cancer has yielded conflicting results. Patients with primary brain tumor were likely to have an impairment of swallowing function assessed with videofluoroscopy that was out of proportion to their swallowing complaints.²⁶ Patients treated with diverticulectomy and cricopharyngeal myotomy for Zenker's diverticulum demonstrated more objective radiographic abnormalities on barium esophagrams than their subjective complaints of dysphagia would suggest.²⁷ In a study of patients with duodenal ulcerations treated with proximal selective vagotomy, no differences were found in manometric examination of the lower esophageal sphincter between patients with and without complaint of dysphagia.²⁸ However, a number of studies have found a relationship between subjective complaints of dysphagia and objectively assessed swallowing function. One study found that a swallowing questionnaire was predictive of swallowing function assessed with the modified barium swallow in a group of patients with progressive supranuclear palsy.²⁹ In another study, patients who were poststroke and demonstrated silent aspiration on videofluoroscopy had fewer subjective complaints of dysphagia.³⁰ Using a timed swallowing test in neurologic populations, researchers found that swallowing speed was significantly slower in patients who perceived a swallowing problem.^{31,32} Studies of patients with Sjögren's syndrome indicate that those with greater subjective ratings of dysphagia had more abnormalities in the pharynx and esophagus during the swallow as measured with videofluoroscopy or manometry.^{33,34} The few studies that have investigated subjective complaints of dysphagia and objective measurement of swallow function in patients with head and neck cancer also offer conflicting results. Patients treated

surgically for oropharyngeal or hypopharyngeal cancer who had worse scores on a swallowing questionnaire had more motility and pharyngeal pressure disturbances as assessed by videofluoroscopy and manometry.³⁵ Patients with xerostomia after treatment with radiotherapy for head and neck cancers had a significantly greater degree of dysphagia as measured from a visual analog scale and longer pharyngeal transit times during videofluoroscopic assessment of the swallow than did matched control subjects.³⁶ However, an investigation of patients treated with radiotherapy for cancers of the nasopharynx found that more patients had abnormal pharyngeal contraction as viewed with videofluoroscopy than had complaints of dysphagia.³⁷ The purpose of this study was to investigate the relationship between patients' complaint of dysphagia and their actual swallowing function as assessed objectively with the modified barium swallow (videofluoroscopy) in patients with cancers of the oral cavity, pharynx, or larynx, treated with radiotherapy ± chemotherapy.

METHODS AND MATERIALS

Subjects. One hundred thirty-two patients with cancer of the oral cavity, pharynx, or larynx who were enrolled in one of two prospective studies designed to document the natural history of swallow function after treatment with primary radiotherapy ± chemotherapy served as subjects for this study. Seventy-nine percent (79%) of the patients were men, whereas 21% were women. The patients ranged in age from 36 to 80 years and had an average age of 60 (SD, 9).

Table 1 presents a summary of the patients by site of lesion and disease stage. Sixty-three percent of the patients had tumors in the pharynx. These included lesions in the nasopharynx, oropharynx, and hypopharynx. Eight percent of the patients had oral cavity lesions, whereas 23% had laryngeal tumors. These proportions reflect the study protocols available rather than the incidence of head and neck cancer sites. Most of the patients (73%) had advanced stage IV disease.

Table 1. Patients distributed by site of disease and disease stage.

Site	Stage I	Stage II	Stage III	Stage IV	Total
Oral cavity	0	1	1	8	10
Pharynx	0	3	15	65	83
Larynx	2	3	10	16	31
Unknown	0	0	0	8	8
Total	2	7	26	97	132

Data Collection and Reduction. All procedures were approved by the institutional review board for studies involving human subjects at each participating institution.

Subjects were examined at five points in time: before their cancer treatment with chemoradiotherapy, and 1, 3, 6, and 12 months after treatment completion. Swallowing function was examined at each of the five evaluation points using the modified barium swallow procedure with videofluoroscopy.³⁸ Each subject completed one to two swallows each of 1 mL, 3 mL, 5 mL, and 10 mL of barium liquid and 3 cc of barium paste mixed with chocolate pudding. Fluoroscopic data were recorded on three-fourths inch or one-half inch videotape at 30 frames per second. During the study, the fluoroscopy tube was focused on the lips anteriorly, the cervical vertebrae posteriorly, the soft palate superiorly, and the bifurcation of the esophagus and airway inferiorly.

At each evaluation point, subjects also were asked to estimate the amount of their nutrition that they take orally and to indicate which of the following food consistencies they were currently eating: thin liquids, thick liquids, pastes/purées, soft masticated, crunchy masticated. They were also asked to respond to the question: "Do you experience problems with swallowing?"

Data reduction was completed according to methods described previously.¹⁸ Videotapes of the swallow studies were viewed in slow motion and frame-by-frame to obtain timing information to compute the following swallowing measures:

1. Oral transit time (OTT)—the time it takes the bolus to move through the oral cavity, measured from the first backward movement of the bolus until the head of the bolus passes the

point where the ramus of the mandible crosses the tongue base.

2. Pharyngeal transit time (PTT)—the time required for the bolus to move through the pharynx, measured from the time the head of the bolus passes the ramus of the mandible until the tail of the bolus leaves the cricopharyngeal region.

The following observations were also made from the swallow studies: approximate percent oral residue after the first swallow on a bolus (ORES); approximate percent pharyngeal residue after the first swallow on a bolus (PRES); and approximate percent aspirated (ASP) before, during, or after the first swallow of a bolus.

Oropharyngeal swallow efficiency (OPSE) was calculated from the swallowing measures and observations. OPSE, defined as the approximate percent of the bolus swallowed into the esophagus divided by oropharyngeal transit time, is a global measure that describes the interaction of speed of movement of the bolus and the safety and efficiency of the mechanism in clearing material from the oropharynx.^{39–41} This index is a convenient measure for comparing various clinical populations that may have different impairments in the oropharyngeal swallow.⁴¹

Table 2 summarizes normative values^{42,43} by bolus size and consistency for the swallowing measures examined in this study. These data are presented as an aid for interpreting the level of swallow function in the study patients.

Data Analysis. The swallow measures examined in this study were chosen because of their likelihood of impacting on a patient's perception of

Table 2. Normative values (means and standard deviations in parentheses) by bolus size and consistency for the swallowing measures examined in this study.^{42,43}

Swallow measure	1-mL liquid	3-mL liquid	5-mL liquid	10-mL liquid	Paste
Oropharyngeal swallow efficiency	95.38 (29.25)	98.25 (25.05)	100.54 (25.80)	98.94 (23.76)	80.07 (32.68)
Oral transit time (s)	0.41 (0.30)	0.36 (0.22)	0.33 (0.20)	0.32 (0.20)	0.57 (0.72)
Pharyngeal transit time (s)	0.75 (0.32)	0.71 (0.22)	0.72 (0.28)	0.72 (0.16)	0.93 (0.63)
Approximate oral residue (%)	0.37 (2.03)	0.55 (1.86)	0.90 (3.08)	1.76 (5.15)	2.46 (6.02)
Approximate pharyngeal residue (%)	0.57 (1.60)	0.80 (1.72)	1.21 (2.26)	1.39 (2.99)	1.47 (2.66)
Approximate amount aspirated (%)	By definition, a normal swallow has no aspiration				

Table 3. Comparison of mean age (standard error), number (percent) of patients at each disease stage, and percent nutrition taken orally by swallow complaint group at pretreatment evaluation.

	No Complaint	Complaint	<i>p</i> Value
Number of cases	53	56	
Age	60.3 (1.3)	60.0 (1.1)	0.87
Stage			0.75
II	4 (7%)	3 (5%)	
III	12 (23%)	10 (18%)	
IV	37 (69%)	43 (77%)	
			.01*
Oral /Intake			
≤50%	0	7 (13%)	
>50%	53 (100%)	49 (87%)	
All consistencies in diet?			.003*
No	12 (23%)	29 (52%)	
Yes	40 (77%)	27 (48%)	

**p* ≤ .05.

swallowing function. Impaired bolus transit and clearance are likely to affect the time it takes a subject to eat, whereas aspiration should elicit a cough in a larynx with intact sensation.

Swallow studies were grouped by whether the patient reported a complaint of dysphagia at a particular evaluation point. Statistical analyses were used to determine whether there were significant differences in the swallow outcome measures as a result of complaint of dysphagia grouping (ie, no complaint vs complaint). Swallowing data from all evaluation points were pooled in this analysis; because the patients included in this study were at different stages of follow-up, not all subjects are equally represented at each of the evaluation points. OPSE, OTT,

PTT, ORES, and PRES were compared between groups by mixed model repeated measures analysis of variance using PROC MIXED in SAS.⁴⁴ The occurrence of aspiration (yes, no), disease stage (II–IV), oral intake (≤50%, >50%), and the ability to eat all consistencies in the diet (yes, no) were compared between complaint groups using Fisher's exact test.⁴⁵ Age was compared between groups using the independent sample *t* test.⁴³

RESULTS

Table 3 presents group demographics before treatment with radiotherapy ± chemotherapy. Before treatment, patients divided by no complaint versus complaint of dysphagia did not differ

Table 4. Significance of main effect of group for oropharyngeal swallow efficiency (OPSE). Means (SEM) and significance of main effect of complaint category are reported separately by bolus type. All evaluation points are pooled for this analysis.

Bolus type		No complaint	Complaint	<i>p</i> Value
1-mL liquid	No. of evaluations	86	153	
	No. of swallows	219	371	
		76.2 (3.1)	61.9 (2.5)	<.001*
3-mL liquid	No. of evaluations	101	176	
	No. of swallows	259	429	
		83.4 (2.6)	69.5 (2.0)	<.001*
5-mL liquid	No. of evaluations	82	122	
	No. of swallows	203	297	
		89.9 (2.5)	78.2 (2.2)	<.001*
10-mL liquid	No. of evaluations	82	124	
	No. of swallows	206	284	
		87.6 (2.5)	81.4 (2.1)	.06
3-cc paste	No. of evaluations	106	166	
	No. of swallows	281	397	
		71.3 (3.2)	55.8 (2.5)	<.001*

**p* ≤ .05.

Table 5. Significance of main effect of group for oral transit time (OTT) in seconds. Means (SEM) and significance of main effect of complaint category are reported separately by bolus type. All evaluation points are pooled for this analysis.

Bolus type		No complaint	Complaint	<i>p</i> Value
1-mL liquid	No. of evaluations	86	161	
	No. of swallows	220	396	
		0.38 (0.03)	0.46 (0.03)	.06
3-mL liquid	No. of evaluations	101	177	
	No. of swallows	262	434	
		0.35 (0.02)	0.40 (0.02)	.04*
5-mL liquid	No. of evaluations	82	124	
	No. of swallows	205	301	
		0.29 (0.02)	0.33 (0.02)	.08
10-mL liquid	No. of evaluations	83	125	
	No. of swallows	208	290	
		0.28 (0.02)	0.30 (0.01)	.59
3-cc paste	No. of evaluations	106	171	
	No. of swallows	283	412	
		0.49 (0.06)	0.70 (0.05)	.004*

**p* ≤ .05.

significantly on age or stage of disease, indicating a comparable distribution of patients in each group. Patients did differ on their percent of oral intake by dysphagia complaint status, with significantly more patients with complaint of dysphagia taking less than 50% of their nutrition by mouth. They also differed in the percentage of patients who were able to eat all food consistencies in their diet, with significantly more of those without complaint of dysphagia able to eat a full diet.

Tables 4 through 9 summarize the least squares means, standard errors, and significance test results for the swallow outcome measures by swallow complaint group and bolus type. Data

from all evaluation points were used for these analyses. Table 4 demonstrates the results for oropharyngeal swallow efficiency (OPSE). Patients with complaint of dysphagia had significantly lower swallow efficiencies on 1 mL, 3 mL, and 5 mL liquid boluses and paste boluses than did patients with no swallow complaints.

Oral transit time is summarized in Table 5. Patients with complaint of dysphagia had significantly longer oral transit times on 3-mL liquid boluses and the paste bolus than did those patients without complaint.

Table 6 displays the results for pharyngeal transit time. On the 1 mL and 3 mL liquid

Table 6. Significance of main effect of group for pharyngeal transit time (PTT) in seconds. Means (SEM) and significance of main effect of complaint category are reported separately by bolus type. All evaluation points are pooled for this analysis.

Bolus type		No complaint	Complaint	<i>p</i> Value
1-mL liquid	No. of evaluations	88	156	
	No. of swallows	224	382	
		0.85 (0.05)	1.00 (0.04)	.02*
3-mL liquid	No. of evaluations	101	178	
	No. of swallows	263	439	
		0.82 (0.03)	0.91 (0.03)	.03*
5-mL liquid	No. of evaluations	83	125	
	No. of swallows	206	302	
		0.78 (0.02)	0.83 (0.02)	.14
10-mL liquid	No. of evaluations	82	126	
	No. of swallows	208	289	
		0.79 (0.02)	0.83 (0.02)	.12
3-cc paste	No. of evaluations	106	169	
	No. of swallows	283	405	
		0.99 (0.07)	1.01 (0.05)	.88

**p* ≤ .05.

Table 7. Significance of main effect of group for approximate percent oral residue (ORES). Means (SEM) and significance of main effect of complaint category are reported separately by bolus type. All evaluation points are pooled for this analysis.

Bolus type		No complaint	Complaint	<i>p</i> Value
1-mL liquid	No. of evaluations	88	162	
	No. of swallows	228	413	
		2.79 (1.38)	6.60 (1.17)	.04*
3-mL liquid	No. of evaluations	101	181	
	No. of swallows	267	449	
		2.81 (0.66)	3.68 (0.48)	.29
5-mL liquid	No. of evaluations	83	125	
	No. of swallows	211	305	
		2.53 (0.42)	3.25 (0.35)	.19
10-mL liquid	No. of evaluations	83	126	
	No. of swallows	213	296	
		4.72 (0.66)	4.20 (0.54)	.54
3-cc paste	No. of evaluations	106	172	
	No. of swallows	287	418	
		4.04 (1.31)	7.92 (1.11)	.03*

**p* ≤ .05.

boluses, patients with complaint of dysphagia had significantly longer pharyngeal transit times than did those patients without complaint.

For approximate percent oral residue after the first swallow of a bolus (Table 7), patients with swallow complaint had significantly greater oral residues on 1-mL liquid boluses and the paste bolus than did patients without swallow complaint.

Approximate percent pharyngeal residue after the first swallow of a bolus is summarized in Table 8. For all bolus types except the 10-mL liquid bolus, patients with complaint of dyspha-

gia had significantly greater pharyngeal residue than did patients with no swallow complaints.

Table 9 presents results for the percent of swallows with aspiration on the first swallow of a bolus. Patients with complaint of dysphagia had a significantly larger percentage of swallows with aspiration on all bolus types than did patients without swallow complaint.

The percent of oral intake of nutrition and the ability to eat all food consistencies in the diet also differed significantly, depending on complaint status (Table 10). Only 5.5% of the patients with no complaint of dysphagia took ≤ 50% of their nutrition by mouth, whereas 26.6% of the pa-

Table 8. Significance of main effect of group for approximate percent pharyngeal residue (PRES). Means (SEM) and significance of main effect of complaint category are reported separately by bolus type. All evaluation points are pooled for this analysis.

Bolus type		No complaint	Complaint	<i>p</i> Value
1-mL liquid	No. of evaluations	88	164	
	No. of swallows	228	417	
		4.56 (0.82)	12.4 (0.84)	<.001*
3-mL liquid	No. of evaluations	101	181	
	No. of swallows	267	451	
		4.33 (1.05)	10.88 (1.01)	<.001*
5-mL liquid	No. of evaluations	83	126	
	No. of swallows	211	308	
		4.52 (0.61)	8.54 (0.56)	<.001*
10-mL liquid	No. of evaluations	83	127	
	No. of swallows	213	299	
		5.96 (1.03)	8.55 (0.84)	>.054
3-cc paste	No. of evaluations	106	174	
	No. of swallows	286	421	
		5.73 (1.42)	12.28 (1.28)	<.001*

**p* ≤ .05.

Table 9. Significance of main effect of group for percent of swallows with aspiration. Percent and significance of main effect of complaint category are reported separately by bolus type. All evaluation points are pooled for this analysis.

Bolus type		No complaint	Complaint	<i>p</i> Value
1-mL liquid	No. of evaluations	88	164	
	No. of swallows	227	417	
		2%	17%	<.001*
3-mL liquid	No. of evaluations	101	180	
	No. of swallows	267	449	
		3%	22%	<.001*
5-mL liquid	No. of evaluations	83	126	
	No. of swallows	211	308	
		3%	17%	<.001*
10-mL liquid	No. of evaluations	83	127	
	No. of swallows	213	298	
		6%	16%	<.001*
3-cc paste	No. of evaluations	106	174	
	No. of swallows	285	421	
		4%	8%	.02*

**p* ≤ .05.

tients with a complaint of dysphagia took ≤ 50% of their nutrition by mouth. In addition, 71.3% of the patients with no complaint of dysphagia were able to eat all food consistencies, whereas only 33.2% of those with a complaint of dysphagia were able to eat all food consistencies.

To see whether the ability to accurately perceive dysphagia varied by site of tumor, the percent of swallows with aspiration and oral intake and diet consistencies were analyzed separately for the patients with oral cavity, pharyngeal, or laryngeal tumors. Table 11 summarizes the results for percent swallows with aspiration. Patients with oral cavity tumors tended to have very little aspiration overall and did not differ significantly by complaint group. However, patients with pharyngeal or laryngeal tumors with complaint of dysphagia had a significantly larger percentage of swallows with aspiration on most bolus types than did patients without swallow complaint.

Table 12 summarizes oral intake and diet consistencies by complaint group for patients with differing sites of tumor. Patients with oral cavity lesions did not differ significantly on the percent of nutrition taken orally or the number of food consistencies in their diet by complaint group. Significantly more patients with complaint of dysphagia with either pharyngeal or laryngeal tumors took <50% of their nutrition orally and limited the variety of food consistencies in their diet.

DISCUSSION

This study examined the swallowing function of patients with head and neck cancer treated with radiotherapy ± chemotherapy in relation to their perception of swallowing function. Patients with complaints of swallowing dysfunction had lower swallow efficiencies, longer oral and pharyngeal transit times, greater oral and pharyngeal resi-

Table 10. Number (percent) of patients in each complaint category reported by percent nutrition taken orally and consistencies in diet. All evaluation points are pooled for this analysis.

	No complaint	Complaint	<i>p</i> Value
Oral Intake			
No. of evaluations	109	207	
≤50%	6 (5.5%)	55 (26.6%)	
>50%	103 (94.5%)	152 (73.4%)	<.001*
All consistencies in diet?			
No. of evaluations	108	202	
No	31 (28.7%)	135 (66.8%)	<.001*
Yes	77 (71.3%)	67 (33.2%)	

**p* ≤ .05.

Table 11. Significance of main effect of group for percent of swallows with aspiration by site of tumor. Percent and significance of main effect of complaint category are reported separately by bolus type. All evaluation points are pooled for this analysis (n=number of swallows).

Bolus type	No complaint	Complaint	p value
Oral cavity			
1-mL liquid	4% (n = 24)	8% (n = 24)	.99
3-mL liquid	0% (n = 25)	5% (n = 19)	.43
5-mL liquid	0% (n = 21)	0% (n = 18)	NA
10-mL liquid	0% (n = 15)	0% (n = 17)	NA
3-cc paste	0% (n = 25)	0% (n = 15)	NA
Pharynx			
1-mL liquid	1% (n = 112)	18% (n = 276)	<.001*
3-mL liquid	5% (n = 135)	22% (n = 318)	<.001*
5-mL liquid	2% (n = 103)	15% (n = 194)	<.001*
10-mL liquid	4% (n = 107)	14% (n = 189)	.005*
3-cc paste	5% (n = 147)	6% (n = 279)	.53
Larynx			
1-mL liquid	2% (n = 83)	23% (n = 88)	<.001*
3-mL liquid	1% (n = 95)	30% (n = 80)	<.001*
5-mL liquid	5% (n = 74)	26% (n = 70)	<.001*
10-mL liquid	4% (n = 77)	29% (n = 66)	<.001*
3-cc paste	1% (n = 95)	18% (n = 89)	<.001*

*p ≤ .05.

Abbreviation: NA = not applicable.

dues, and more swallows with aspiration than did those patients who did not have any complaints of dysphagia. Patients with complaints of dysphagia also tended to take less of their nutrition by mouth and were less able to eat all food consistencies compared with those without complaint.

The results of this study indicate that patients with head and neck cancer treated with radiotherapy ± chemotherapy were able to perceive decrements in their swallowing function as dysphagia. This observation is consistent with reports from other investigators that objective measurement of swallow function in noncancer populations was related to their perception of dysphagia.²⁹⁻³⁴ Although it is logical that pa-

tients with complaints of dysphagia would actually demonstrate impaired swallowing function on videofluoroscopy, this relationship has not been documented for patients treated with primary radiotherapy ± chemotherapy for cancers of the oral cavity, pharynx, or larynx. The fact that patients with swallow complaints in this study also tended to take less of their nutrition by mouth and were eating fewer food consistencies suggests that they were limiting their oral intake in response to their perception of impaired swallowing. Although it is possible that after their cancer treatment patients were limiting the amount and type of oral intake based on the recommendation of their swallowing clinician,

Table 12. Number (percent) of patients in each complaint category reported by percent nutrition taken orally and consistencies in diet by tumor site. All evaluation points are pooled for this analysis (n = number of evaluations).

	No complaint	Complaint	p value
Oral intake ≤ 50%			
Oral cavity	22.2% (n = 9)	44.4% (n = 9)	.62
Pharynx	1.8% (n = 56)	28.2% (n = 142)	<.001*
Larynx	5.4% (n = 37)	24.4% (n = 41)	.03*
Not all consistencies in diet			
Oral cavity	55.6% (n = 9)	88.9% (n = 9)	.29
Pharynx	27.3% (n = 55)	70.5% (n = 139)	<.001*
Larynx	27.0% (n = 37)	61.5% (n = 39)	.003*

patients were still able to perceive their swallowing dysfunction, because this behavior was present before treatment when patients had not yet had a videofluoroscopic analysis of swallow function. The notion that patients treated with radiotherapy \pm chemotherapy for cancers of the head and neck are able to accurately perceive their swallowing function is useful in the rehabilitation setting, where it may be applied to self-monitoring changes in dysphagia status during a course of swallow therapy, thereby assisting clinicians in determining the most appropriate time to refer the patient for additional videofluoroscopic studies of swallowing function.

The presence of aspiration significantly discriminated patients with and without swallow complaint on all bolus types. Patients with complaints of dysphagia had a significantly greater percentage of swallows with aspiration on all liquid bolus volumes and on paste boluses than did those who did not have a complaint of dysphagia. This result suggests that complaint of dysphagia may act as a reliable indicator of aspiration. However, as many as 51% of patients demonstrate silent aspiration on videofluoroscopy after treatment for head and neck cancer.⁴⁶ Although complaint of dysphagia may be an excellent indicator of aspiration in those patients who cough or clear their throat in response, it is possible that patients with silent aspiration may not perceive a swallowing disorder unless they also perceive difficulty with some other aspect of the swallow such as bolus motility or clearance. Data on the extent of silent aspiration were not available for the patients in this study.

It is interesting that pharyngeal function seemed to have more of an impact on complaint of dysphagia than did oral function. Approximate percent pharyngeal residue significantly discriminated patients with and without complaint on all boluses but the 10-mL liquid, whereas oral residue differed on only the 1-mL liquid bolus and the paste bolus. This observation is supported by a study of similar patients before treatment for head and neck cancer;⁷ patients with tumors of the pharynx were significantly more likely to report complaints of dysphagia than were patients with tumors in the oral cavity. Patients may appropriately perceive pharyngeal clearance problems as a greater risk for aspiration than problems in the oral cavity and therefore label themselves as having a swallowing problem.

Differences in complaint of dysphagia and its relation to objective swallow measures by site of tumor were also observed in this study. Patients with tumors in the oral cavity did not differ by complaint group on the percentage of swallows with aspiration, amount of nutrition taken orally, or the variety of food consistencies included in their diet. This result may reflect the smaller number of patients with oral cavity lesions available for this investigation. Although not significant, the data follow the trend for those patients with complaint of dysphagia to have more swallows with aspiration, less oral intake, and fewer food consistencies in the diet. If a larger number of patients with oral cavity lesions were studied, these differences might become significant. However, the differing results by site of tumor may reflect actual functional differences. Patients with oral cavity tumors experienced little aspiration regardless of their dysphagia complaint group. Because these patients did not aspirate, they may have felt it unnecessary to limit their oral intake or reduce the variety of food consistencies in their diet. This observation is consistent with reports in the literature that patients with treated tumors in the oral cavity do not tend to have aspiration as a problem.⁴⁷⁻⁴⁹ It is more likely that they experience difficulty with bolus transport and clearance from the oral cavity. Such problems may cause a patient with an oral cavity tumor to cite a swallowing problem, yet not be of a nature that would limit the patient in their oral intake. These differences in perception of dysphagia by site of tumor highlight the multidimensional nature of perception. An area for future research may include multivariate testing to see which combination of objective swallow measures has the strongest relationship with patient complaint of dysphagia.

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