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Evaluation of Oropharyngeal Dysphagia in Patients with Laryngeal Cancer

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Abstract

Background: Oropharyngeal dysphagia is a frequent and clinically relevant consequence in laryngeal cancer patients due to tumor-associated structural alteration and functional restriction related to therapy. It negatively impacts nutritional status, airway protection, and quality of life, which warrants complications that arise from its delayed identification and assessment.

Aims: The objective of this study was to determine the prevalence and severity of oropharyngeal dysphagia in patients with laryngeal cancer using Gugging Swallowing Screen (GUSS) and examine association between demographic and clinical characteristics.

Methods: This descriptive cross-sectional study was conducted in Al-Forat Al-Awsat Oncology Center, Al-Najaf City, Iraq from January to May 2025. A purposive sample was used of 68 laryngeal cancer cases. Demographic, clinical details were noted through structured questionnaire and GUSS. Data analysis was carried out using SPSS version 22 and utilizing descriptive and inferential statistics at a $p \leq 0.05$ level of significance.

Results: Moderate dysphagia was the most common level (44.1%) and mean GUSS score represented overall moderate swallowing dysfunction. Statistical relationships were found between dysphagia severity and age, BMI, time since cancer diagnosis, modality of treatment, radiotherapy technique and number of radiotherapy fractions ($p < 0.05$).

Conclusions: Oropharyngeal dysphagia is common laryngeal cancer patients occurring in the majority of cases and highly associated with demographic and treatment factors. Regular swallowing assessment and early multidisciplinary intervention are recommended to prevent complications and enhance recovery of these patients.

Keywords: Laryngeal Cancer, Dysphagia, Swallowing ability, GUSS

Introduction

Oropharyngeal dysphagia (OD) Oropharyngeal dysphagia is a complex, multifactorial disorder with abnormal initiation of the swallow and unsafe bolus transfer from the oral cavity through the pharynx into the esophagus. While OD may result from neurologic, structural, and iatrogenic etiologies (Martin-Gonzalez et al., 2023). It spans from patients with laryngeal cancer before to after oncologic treatment represents a cohort presenting

particular clinical challenges that are becoming more apparent in the current literature. The OD in this population is not a simple symptom, but an important functional disability that impacts negatively on the nutritional status, pulmonary safety, tolerance to the treatments and patient's general quality of life (Yildiz et al., 2022; Martin-Gonzalez et al., 2023).

Laryngeal cancer is one of the most common head and neck cancers, with larynx having a key function in protection of airway, phonation and swallowing. Disease burden and sequelae of its treatment including surgery, chemoradiotherapy and radiotherapy induced fibrosis interfere with the complex interactions of swallowing biomechanics leading to poor laryngeal elevation, reduced pharyngeal clearance, and ineffective airway protection (Brisson-McKenna et al., 2023). The clinical implications of dysphagia in these patients are considerable with aspiration, malnutrition, prolonged hospital stay and even death all now being associated with disordered swallowing physiology. Therefore, the evaluation of OD in patients with laryngeal cancer still remains not only a diagnostic necessity but also a determinant of prognosis (Martin-Gonzalez et al., 2023).

The pathophysiology of dysphagia in head and neck cancer like laryngeal carcinoma is documented to involve a complex spectrum of disorders with respect to both sensory and motor functions during swallowing. Dysphagia is common following radiochemotherapy due to development of dysmotility, neurotoxicity, mucositis and treatment-induced fibrosis of the oropharyngeal/laryngeal complex. These changes may result in an inability for laryngeal elevation, reduced opening of the upper oesophageal sphincter and compromised pharyngeal motility and are associated with a higher risk of aspiration (Baijens et al., 2021). Moreover, there is evidence suggesting that the presence of sensory neuropathies such as laryngopharyngeal sensory neuropathy may alter protective reflexes compromising the (Sroussi et al., 2017).

The prevalence and extent of OD in HNC patients are global; however, varying estimates have been reported, due to factors such as tumor localization, cancer stage, and treatment modality. Quantitative measurement by dynamometry on the highly sensitive HNC-6 grooved plastic transducer with an LCD digital display, and also clinical scoring of swallowing were poorly correlated, but showed that 70% of such laryngeal cancer patients perceived subjective or clinical dysphagia (Yildiz et al., 2022), findings consistent with large series studies on head and neck cancer. In contrast, investigations comparing MP on a tumor subsite basis have demonstrated strikingly greater gradients of increased prevalence with oropharyngeal and hypopharyngeal tumors (and indeed clinically significant swallowing compromise is also the case for laryngeal cancer when there is invasion by the tumor to structures critical in safe swallowing). These findings reinforce the idea that OD should not be considered only as a secondary endpoint, but also as a deep clinical outcome of laryngeal cancer treatment (Martin-Gonzalez et al IDictionary 2023).

Recent publications in the last decade support examination of dysphagia well beyond these factors. Objective instrumental assessments, such as video fluoroscopic swallowing study (VFSS) and fiberoptic endoscopic evaluation of swallowing (FEES), are increasingly available to measure objectively the physiological swallow impairment, contribute to clinicians' management decision-making or risk stratification for aspiration (Yıldız et al., 2022). Quantitative ratings for pharyngeal residue, tongue base retraction and airway protection, were correlated with functional tokens and enteral feeding. There assessment methods have augmented our knowledge of dysphagia pathophysiology and impacted the design of targeted rehabilitation interventions (Yildiz et al., 2022).

Nature of nonsurgical and surgical therapies involved in laryngeal cancer have significant impact on deglutition. Organ-economical approaches like chemoradiotherapy in some extent result in somewhat improvement of disease control and survival but are associated with late dysphagia due to RT-induced fibrosis and sensory deficiency (Brisson-McKenna et al., 2023). How-ever, the influence of an operation such as a partial laryngectomy is variable and depends on the degree of structural preservation or technique of reconstruction. Preliminary work suggests that dysphagia outcomes may be improved with minimally invasive techniques and innovative methods of reconstruction compared to traditional open excision, however, robust comparative data are lacking (Li et al., 2023).

The clinical significance of OD is far-reaching. Malnutrition, dehydration, medical comorbidities and decreased tolerability to oncologic treatments occurs secondary to dysphagia. Aspiration pneumonia, a consequence of impaired airway protection, remains one of the leading causes of nononcological mortality in head and neck cancer (HNC) cohorts. Furthermore, the relevance to psychosocial aspects as loss of food pleasure, social isolation and QOL detriment further highlights the importance for an early detection and

adoption of a MDT strategy that includes swallowing rehabilitation, nutritional supplementation and tailored treatment planning (Martin-Gonzalez et al.

The purpose of this study is to evaluate the prevalence and severity of oropharyngeal dysphagia in patients with laryngeal cancer according to Gugging Swallowing Screen (GUSS). The study also aimed to investigate the relationship between dysphagia and certain demographic and clinical variables including age, sex, BMI, duration of cancer, modality of treatment received, radiotherapy technique for irradiation of cervical lymph nodes and the parameters related to treatment.

Methods and Materials

Study Design

A descriptive cross-sectional study was conducted to assess oropharyngeal dysphagia in patients suffering with laryngeal cancer. This choice was made to enable the evaluation of swallowing function characteristics and their relationship with demographic and clinical variables at a single time-point.

Study Setting and Duration

This research project was carried out in Al-Forat Al-Awsat Oncology Center, Al-Najaf City, Iraq. Data were collected for five months, between January 2025 and May 2025, during which all patients who presented to the center for follow-up or diagnostic evaluation of malignancy was included in this cross-sectional study.

Study Population and Sample Size

The patient cohort comprised of patients with laryngeal carcinoma. The study included sixty six patients. Non-probability purposive sampling was used to recruit patients who satisfied the study inclusion criteria and could pass a swallow assessment.

Statistical power considerations were used to determine sample size sufficiency. Power analysis demonstrated that a small sample size was adequate to detect clinically significant associations at $\alpha=0.05$ and 95% confidence interval. The 66 individuals who participated in the study were considered to be a satisfactory sample size for increased statistical power with reduced type II error.

Eligibility Criteria

Patients were eligible if they had a pathological diagnosis of laryngeal carcinoma, had an age ≥ 18 years and could participate in the swallowing assessment. Patients with severe cognitive dysfunction, unstable medical condition, or unable to cooperate in the test of swallowing screening were excluded from study.

Ethical Considerations

The study was conducted after ethical approval had been granted by the appropriate institutional ethics committee. All participants gave their written informed consent prior to enrollment. All the patients received clear explanation of study objectives, procedures, potential benefits and right to withdrawal at any time without influencing their medical management. All information on the participants was confidential and anonymous in the study.

Study Instrument

A structured instrument for assessment was developed after thorough review of the literature. The device had three main elements intended to measure key study variables. The former one included age, sex, marital status, educational level and cigarette smoking history. In the second dimension: clinical related information of laryngeal carcinoma including stage, length of disease, treatment modality and comorbidity. The third part was the Gugging Swallowing Screen (GUSS), which a standardized and validated screening instrument for oropharyngeal swallowing function. The GUSS measures both indirect and direct swallowing function, with the capacity to classify dysphagia severity. The tool provided objective, consistent and systematic measurement of dysphagia and its association to demographic and clinical factors in patients with laryngeal cancer.

Assessment of Dysphagia (GUSS)

GUSS were performed as a standardized dysphagia screening test. It has two backbone elements:

Indirect Swallowing Test (Preliminary Assessment):

In waking this phase assesses swallowing in the absence of oral intake and includes assessment of arousal, voluntary cough/throat clear, saliva swallow, drooling of saliva and voice post-saliva.

Direct Swallowing Test:

This phase evaluates the efficiency of swallowing with graduated food consistencies and examines deglutition, coughing, drooling, and changes in voice quality. The test is realised in three stages: on liquids (water), semi-solids and solids. Swallow was assessed after each consistency as being normal, delayed or absent.

Data Collection Procedure

Primary source data were obtained from face-to-face interviews and in-clinic observations. Demographic and clinical information was obtained by patient interview

and from medical records, respectively, as was dysphagia using trained personnel with the GUSS. All measurements were standardized for reliability and consistency.

Statistical Analysis

Data analysis Statistical Package of the Social Sciences (SPSS) (version 22) software was used to analyze the data. For demographic and clinical characteristics, descriptive statistics were performed, and for both bivariate inferential statistics with dysphagia and selected variables was used. A p-value < 0.05 was considered as significant.

Results

The demographic profile showed that the majority of patients were aged ≥ 55 years (52.9%), signifying that laryngeal cancer was more common in the older population, possibly a result of sustained exposure to known risk factors such as tobacco and environmental carcinogens. Males represented the great majority of the study cohort (88.2%), which indicates male preponderance in laryngeal cancer. In terms of body mass index, there were a higher number of normal BMI (32.4%) and overweight patients with the majority percent falling underweight which may be due to disease-related dysphagia and malnutrition. These findings emphasise the value of demographic profiling in relation to the clinical picture for dysphagia in individuals following laryngeal cancer (table 1).

Table 1. Demographic data of patients participated in the study

Demographic Data	Groups (n=68)	Frequency	Percent
Age/Years	**25 – 34**	4	5.9
	35 – 44	10	14.7
	45 – 54	18	26.5
	≥ 55	36	52.9
Gender	**Male**	60	88.2
	Female	8	11.8
BMI	**Underweight**	14	20.6
	Normal	22	32.4
	Overweight	20	29.4
	Obese	12	17.6

Analysis of the clinical features showed that for most cases, the duration of cancer was 1–5 years (50.0%), and indicating most of them were diagnosed and treated shortly. With regard to treatment modality, concurrent chemoradiotherapy was the most commonly performed (44.1%) as according to the recent clinical practice guidelines for managing laryngeal cancer especially those in advanced stage. In the case of radio-therapy, IMRT was the most frequent (44.1%), revealing a trend for advanced radiation therapy techniques focused on organ preservation and reduced toxicity. Furthermore, most patients received 4–6 months of radiotherapy (29.4%), and 41.2% also did not receive chemotherapy, which may be a surrogate for localized disease or surgical-based approach. These profiles of morbidity indicate the diversity of previous treatment experiences, which could have a major impact on swallowing and oropharyngeal dysphagia (table 2).

Table 2. Clinical data of patients participated in the study

Clinical Data	Rating and Intervals	Frequency	Percent
Duration of Cancer / Years	**< 1**	**26**	**38.2**
	1-5	**34**	**50**
	> 5	**8**	**11.8**
Type of Treatment	**Surgical**	**12**	**17.6**
	Chemotherapy	**10**	**14.7**
	Radiotherapy	**16**	**23.5**
	Combined	**30**	**44.1**
Types of Radiotherapy	**None**	**22**	**32.4**
	IMRT	**30**	**44.1**
	3D	**16**	**23.5**
Number of Session of radiotherapy/ months	**None**	**22**	**32.4**
	1 – 3	**18**	**26.5**
	4 – 6	**20**	**29.4**
	10+	**8**	**11.8**
Number of Session of chemotherapy/ months	**None**	**28**	**41.2**
	1	**16**	**23.5**
	2	**14**	**20.6**
	4	**10**	**14.7**

The outcome of dysphagia in the present study showed the largest number of patients belonging to the moderate group (44.1%), implying impairment of swallowing function among laryngeal cancer patients (table 3). Among the study cohort, 20.6% were found to have severe dysphagia, representing a clinically significant risk for aspiration and malnutrition. The average GUSS score (13.6) represents moderate dysphagia as an overall prevalence of moderate swallowing impairment was observed in this study group. These results emphasize the high prevalence of dysphagia in patients with laryngeal cancer and demonstrate the importance of performing regular screening for swallowing function combined with early rehabilitation treatment in order to avoid complications, and also to improve patients' functional level. The statistical scoring was as follows: 1) Severe dysphagia (score = 9 and below) 2) moderate dysphagia (score from 10 to 14), mild dysphagia (score from 15 to19); normal swallowing ability in the range of (20 or meaner total out of scores).

Table 3. Assessment of Dysphagia among patients participated in the study

Dysphagia Levels	Frequency	Percent	Overall Mean	Overall Assessment
Sever	**14**	**20.6**	**13.6**	**Moderate Dysphagia**
Moderate	**30**	**44.1**		
Mild	**16**	**23.5**		
Normal	**8**	**11.8**		
Total	**14**	**20.6**		

The analysis revealed that age had a significant relationship with dysphagia severity ($\chi^2 = 9.84$, $p = 0.020$) such that older participants were more likely to exhibit greater levels of swallowing dysfunction. This observation could be explained by the combined impact of our progressing treatment, age-related comorbidities and effects of long lasting exposure to oncological treatments. On the contrary, gender was not related with dysphagia ($p = 0.166$) indicating that swallowing function is determined mainly by clinical and physiological factors rather than subjective characteristics associated sex. Dysphagia and body mass index (BMI) were found significantly associated with each other ($\chi^2 = 8.47$, $p = 0.037$), indicating nutritional status is a determinant factor of swallowing function. The higher prevalence of a dysphagia complaint was particularly seen in patients with abnormal BMI at the lower end: underweight, highlighting the association between nutritional deprivation and swallowing dysfunction in patients diagnosed with laryngeal cancer (table 4).

Table 4. Association between dysphagia and the patients' clinical data

Demographic Data	Chi-square value	df	p-value
Age/Years	**9.84**	**3**	**0.020***
Gender	**1.92**	**1**	**0.166**
BMI	**8.47**	**3**	**0.037***

There was a statistically significant correlation between the severity of dysphagia and cancer duration ($\chi^2 = 7.26$, $p = 0.026$), indicating that longer disease duration is associated with higher degrees of swallowing impairment. There was also a statistically significant association between dysphagia and treatment ($\chi^2 = 12.84$, $p = 0.005$); patients who were receiving more than one type of treatment showed higher rates of dysphagia, probably reflecting the combined effect of anatomical and functional damage on swallowing function. Additionally, types of radiotherapy were significantly correlated with dysphagia ($\chi^2 = 9.91$, $p = 0.007$), suggesting that the method of treatment affects swallowing function. The amount of days receiving radiotherapy sessions was also correlated strongly to dysphagia severity ($\chi^2 = 10.37$; $p = 0.016$), indicating the role of radiation in a dose- and duration-dependant fashion on oropharyngeal tissues. On the other hand, we found no statistically significant correlation between dysphagia and chemotherapy sessions ($p = 0.373$), implying that chemotherapy itself may produce less direct effect on swallowing function than radiotherapy-associated variables. These findings reinforce the central importance of treatment-associated factors in relation to incidence and severity of dysphagia for laryngeal cancer patients (table 5).

Table 5. Association between dysphagia and the patients' clinical data

Clinical Data	Chi-square value	df	p-value
Duration of Cancer / Years	**7.26**	**2**	**0.026***
Type of Treatment	**12.84**	**3**	**0.005***
Types of Radiotherapy	**9.91**	**2**	**0.007***
Number of Session of radiotherapy/ months	**10.37**	**3**	**0.016***
Number of Session of chemotherapy/ months	**3.12**	**3**	**0.373**

Discussion

In line with epidemiological trends of head and neck cancers, the present study showed a significant association between dysphagia and age ($p = 0.020$), indicating that older patients presented more severe levels of dysphagia. This is consistent with broader evidence demonstrating that being older increases the risk of having a swallowing difficulty owing to age-related

changes in physiology and reduced ability to compensate (SEER-Medicare analysis (2-y prevalence) older age/related diagnoses). There was no statistically significant association between sex and a dysphagia diagnosis (p = 0.166), which is in line with the few large registry analyses that found that men outnumber women among prevalent patients with dysphagia, but there are no consistent sex differences for severity of dysphagia after adjustment for other factors in some adjusted data (e.g., SEER-Medicare data). In our series, the overrepresentation of male sex (88.2%) in line with the known higher laryngeal cancer incidence in males might be explained by more frequent practice of risk habits (tobacco and alcohol consumption).

The correlation between BMI and dysphagia (p = 0.037) indicates that nutritional status might affect or serve as an indicator of the swallowing function in this group. Lower BMI groups (underweight) may worsen swallowing dysfunction because of the reduced muscle mass, weakened strength of swallowing musculature and malnutrition, in line with previous findings that dysphagic patients often present severe loss of weight and poor nutritional state (Salvioni et al., 2021).

The findings of the present study are in concurrence with those reported by Abd-Zaid et al. (2023) to study the frequency of trismus—Restricted mouth opening 1 year) was associated with higher severity of dysphagia (p = 0.026). This is probably due to the sequelae cumulative result of all the treatments, and local tissue changes over time that affect the upper aerodigestive tract. Furthermore, dysphagia can be late-onset and invade subgroups at risk for several years after RT, which suggests the need for longer-term follow-up (Miller et al., 2025)

The treatment was a significant factor for dysphagia (p = 0.005). Patients treated with multimodal therapy (e.g. surgery and chemoradiotherapy) had higher rates of moderate or severe dysphagia than treatment modalities used in isolation. This is consistent with the literature in which multimodality treatment, and particularly chemoradiotherapy increases the risk of swallowing dysfunction by synergistic mucosal and neuromuscular toxicity (Gómez et al., 2025). Radiation induced fibrosis, neuromuscular damage and loss of tissue elasticity are the pathophysiologic causes leading to persistent dysphagia (Yildiz et al., 2022)

The modality of radiotherapy treatment was also related to the degree of dysphagia (p = 0.007). IMRT patients were seen to have better swallowing, in comparison with patients who did not receive radiotherapy and those treated using conventional 3D. This is similar to findings that IMRT can avoid some important swallowing structures (pharyngeal constrictors, supraglottic larynx) and decrease the amount of dysphagia compared with older radiation techniques, although dysphagia continues to be a major morbidity even when using modern therapy technique (Gómez et al., 2025)

Moreover, the amount of radiotherapy sessions showed a significant relationship with dysphagia (p = 0.016), indicating dose–response, where multiple treatment courses are likely to result in cumulative tissue damage contributing to higher levels of dysphagia. This finding is consistent with previous longitudinal studies suggesting that long or high-dose PRT may be associated with long-term dysphagia (Miller et al., 2025). Notably, the dysphagia was not significantly associated with the number of chemotherapy cycles (p = 0.373). Although mucositis and acute swallowing dysfunction are clearly treatment-related, the sole effect of chemotherapy may be less predictive than one would expect for long-term OPD compared with radiation-induced structural deformities (López-Fernández et al., 2024; Gómez et al., 2025)

A moderate dysphagia prevalence we found is supported by current studies in the literature reporting frequenciesofdysphagiathatrangebetween40 and 60% amongst HNC patients including pre- as well as post-treatment. These larger studies are often a mix of tumor sites; however, our results underline the message that even within laryngeal cancer cohorts, considerable rates of dysphagia are apparent. Longitudinal studies suggest that dysphagia may be a chronic rather than an acute treatment complication therefore, monitoring and interventions over time are warranted (Bhethanabotla et al., 2025)

Although many other dysphagia studies encompass a wider head and neck cancer population, our findings detail how important clinical variables—namely radiation techniques and multimodal therapies—impact on swallowing impairment for patients with laryngeal cancer. These associations have been endorsed in consensus guidelines that encourage identification of risk factors and early screening for rapid initiation of rehabilitation (Kuhn et al., 2023)

Consideration of the validated relationship between dysphagia and clinical characteristics should also play a role in scheduling individuals for an early swallowing screen in older than 55 years age range, longer duration since first treatment, as well as combined or extensive radiation-based therapy plans (Alayón et al., 2024). Regular and validated GUSS or another equivalent screening will allow early referrals to a speech language pathologist (SLP) as well as nutrition support services, thus reducing complications such as aspiration pneumonia and malnutrition, that have major

repercussions on morbidity/ mortality and « quality of life ». (Martin- Gonzalez et al 2023).

Although the present study offers significant insight, it is cross sectional in design and causal inference is problematic. Future prospective and longitudinal studies using objective instrumental measurements (e.g., video fluoroscopy) might help us understand the progression of dysphagia. Furthermore, the inclusion of quality-of-life evaluations would help put into perspective the functional implications of dysphagia beyond impression in clinic.

Conclusion

Dysphagia is a common and morbid problem in patients with laryngeal carcinoma. Age, nutritional status, duration of cancer and radiotherapy-related variables significantly predicted the severity of dysphagia. These results underscore the importance of early and on-going dysphagia monitoring, care plan development, and supportive services to maximize functional outcomes in this population.

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