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AN EVALUATION OF SWALLOWING FUNCTION IN HEAD AND NECK CANCER PATIENTS AFTER CANCER TREATMENT

ORIGINAL ARTICLE

ABSTRACT

Purpose: Evaluation of swallowing and feeding types are essential in patients with head and neck cancer (HNC). This study aimed to evaluate the swallowing function of patients treated for HNC.

Methods: One hundred fifty-seven patients with HNC who were referred for swallowing disorder were included. Descriptive information including age, gender, weight, height, diagnosis, and feeding type was recorded. Videofluoroscopic swallowing study (VFSS) was performed to assess swallowing function. Penetration and aspiration severity was determined using the Penetration and Aspiration Scale (PAS).

Results: The mean age was 54.16±12.90 years, of which 66.9% was male. The 23.6% of patients were treated for oropharyngeal cancer, 17.2% for nasopharyngeal cancer, and 59.2% for hypopharyngeal cancer. The 26.75% of patients underwent surgery, and 25.5% received chemoradiotherapy, and 45.9% underwent surgery combined with chemoradiotherapy. The mean PAS score for liquid was 4.96±2.93, and the mean PAS score for pudding was 3.76±3.05 according to the VFSS. While only liquid aspiration was 70.1%, aspiration in liquid and pudding was 37.2%. A significant difference was found between referral and recommended feeding types (p=0.003). No difference was detected in terms of PAS score for liquids, PAS score for pudding, and recommended feeding type according to received treatment types (p>0.05).

Conclusion: More than half of the patients had airway aspiration, and their referral feeding type was not appropriate. Therefore, swallowing function should be evaluated in patients with HNC, and appropriate feeding type should be determined in an early period.

Key Words: Chemotherapy; Dysphagia; Head and Neck Cancer; Radiotherapy; Surgery.

BAŞ VE BOYUN KANSERLİ HASTALARDA KANSER TEDAVİSİ SONRASI YUTMA FONKSİYONUNUN DEĞERLENDİRİLMESİ

ARAŞTIRMA MAKALESİ

ÖZ

Amaç: Baş ve boyun kanserlerinde yutmanın ve beslenme şeklinin belirlenmesi önemlidir. Bu çalışmanın amacı, baş ve boyun kanseri (BBK) tedavisi almış hastaların yutma fonksiyonlarının değerlendirilmesi idi.

Yöntem: Çalışmaya yutma bozukluğu şikâyeti ile başvuran 157 BBK'lı hasta dahil edildi. Hastaların yaş, cinsiyet, boy, vücut ağırlığı, tanı ve beslenme şekli gibi tanımlayıcı bilgileri kaydedildi. Yutma fonksiyonunun değerlendirilmesi için videofloroskopik yutma çalışması (VFYÇ) yapıldı. Penetrasyon ve aspirasyon şiddetini belirlemede Penetrasyon ve Aspirasyon Skalası (PAS) kullanıldı.

Sonuçlar: Yaş ortalaması 54,16±12,90 yıl olan hastaların % 66,9'u erkekti. Hastaların % 23,6'sı orofarengeal kanser, % 17,2'si nazofarengeal kanser ve % 59,2'si hipofarengeal bölge kanseri için tedavi edilmişti. Hastaların % 26,7'si cerrahi tedavi, % 25,5'i kemoradyoterapi ve % 45,9'u cerrahi ve kemoradyoterapi tedavisini birlikte almıştı. Hastaların VFYÇ'ye göre ortalama PAS sıvı skoru 4,96±2,93 ve kıvamlı skoru 3,76±3,05 idi. Sadece sıvı aspirasyonu % 70,1 iken, kıvamlı gıdalarda aspirasyon % 37,2 idi. Başvuru beslenme şekli ile önerilen beslenme şekli arasında istatistiksel olarak anlamlı fark bulundu (p=0,003). Uygulanan tedavi tipine göre sıvı PAS skoru, kıvamlı PAS skoru ve önerilen beslenme şekli açısından anlamlı fark bulunamadı (p>0,05).

Tartışma: BBK'lı hastaların yarısından fazlasında havayolu aspirasyonu olduğu ve mevcut beslenme şekillerinin uygun olmadığı tespit edildi. Bu nedenle, BBK'lı hastalarda yutma fonksiyonu değerlendirilmeli ve erken dönemde doğru beslenme şekli belirlenmelidir.

Anahtar Kelimeler: Kemoterapi; Disfaji; Baş ve Boyun Kanserleri; Radyoterapi; Cerrahi.

INTRODUCTION

Swallowing disorder is defined as a problem that occurs during bolus propulsion from mouth to the stomach. Swallowing disorders may be seen in 60-75% of patients with head and neck cancer (HNC) due to the primary effects of the disease and/or secondary effects of treatments (1). The main treatment approaches for HNC are surgery, radiotherapy, chemotherapy and/or their combinations. Although significant improvements have been achieved in organ preservation techniques, secondary effects of treatments such as mucositis, damages in bones, ligaments and/or muscles, pain, and fatigue have not been eliminated (2). Tissue loss is the main reason for swallowing disorders in patients who received surgical intervention while chemoradiotherapy deteriorates swallowing function by affecting swallowing muscles directly.

Reduced oral motor control, delayed swallowing reflex, insufficient laryngeal elevation, dysfunction in the cricopharyngeal sphincter, and airway aspiration are common problems seen in patients with HNC (3). Swallowing disorders may result in intensive usage of medication and repeated hospitalization due to malnutrition, dehydration, and recurrent lung infection (4). There are many compensation techniques to reduce the risk of aspiration by providing safe and efficient swallowing. Postural adjustments, swallowing maneuvers, therapeutic exercises, and adjustments in bolus volume, viscosity, taste, and temperature according to the needs of patients are the methods to provide safe and efficient swallowing (5). If compensation methods do not prevent problems like penetration and aspiration, it is necessary to determine the appropriate feeding type. Appropriate feeding type provides sufficient nutritional gains, prevents adverse complications of swallowing disorders, and increases the quality of life of both patients and their caregivers (6-10).

Two critical issues should be evaluated to determine appropriate feeding type, including swallowing safety and swallowing efficiency. When there is an increased risk of dysphagia and a requirement for nutritional intake due to insufficient food intake, patients could be fed by either parenteral and enteral feeding types (i.e., nasogastric tube, percutaneous endoscopic gastrostomy) (11). The most common used feeding types in HNC are nasogastric tube feeding, or percutaneous endoscopic gastrostomy feeding (12,13). Nasogastric tube feeding is selected for patients who require short-term enteral feeding for 2 to 3 weeks. For patients who require long-term nutritional requirement for more than four weeks, the percutaneous endoscopic gastrostomy feeding could be recommended (14). If the problem in airway protection is seen only in liquid consistency, thickening the liquid foods could be preserved and recommended to continue oral feeding (15,16). Therefore, evaluation swallowing function and determination the appropriate feeding type in an early period in patients with HNC are necessary to prevent complications of swallowing problem such as malnutrition, dehydration, and recurrent lung infection. This study aimed to evaluate swallowing function of patients treated for HNC, and define their present swallowing profile.

METHODS

This study was carried out at Hacettepe University, Faculty of Physical Therapy and Rehabilitation. Hacettepe University Non-Interventional Clinical Research Ethics Committee has approved the study protocol Ethical Approval Number: GO16/169-03). Patients who were diagnosed with HNC and having complaints about swallowing difficulty and referred for a swallowing evaluation were included in the study. Patients who had swallowing problems due to other medical reasons, had a history of neurological impairments and restrictions to perform videofluoroscopic swallowing study (VFSS) were excluded from the study. A written informed consent form was obtained from all patients who participated in the study.

Descriptive information including age, gender, height, weight, and diagnosis was recorded. Received cancer treatments and referral feeding types of the patients, including oral feeding, liquid modified oral feeding, and non-oral feeding, were noted.

The VFSS was performed to evaluate the

Table 1: Descriptive Information of the Patients.

Characteristics	Mean±SD	min-max
Age (years)	54.16±12.90	18-85
Height (cm)	167.10±9.29	140-192
Weight (kg)	66.44±15.40	35-108
Diagnosis	**n**	**%**
Oropharyngeal Region	37	23.6
Nasopharyngeal Region	27	17.2
Hypopharyngeal Region	93	59.2
Treatment Types		
Surgical Intervention	45	28.7
Chemoradiotherapy	40	25.5
Surgical Intervention and Chemoradiotherapy	72	45.9

swallowing function of the patients. Patients were evaluated with VFSS in sitting position by lateral aspect to monitor the oral cavity, pharynx, larynx, and just below the upper esophageal sphincter in front of the X-ray machine (Siemens, Sireskop CX 2000 model, no:792AXD05213, Germany). All images were full resolution, continuous, and recorded at 30 frames per second. The 5 mL liquid and pudding consistency of food mixed with barium sulfate was used during swallowing evaluation (17). Penetration and aspiration severity in liquid and pudding consistency was determined using the Penetration Aspiration Scale (PAS) (18). The PAS is an ordinal scale ranging between 1 and 8, which has adequate intra- and inter-rater reliability. The PAS score 1 shows normal airway protection without penetration and aspiration during swallowing. Scores between 2 and 5 are considered as penetration, which means that food enters the larynx but do not pass below the vocal folds, and scores between 6 and 8 are considered as aspiration, which means that the food passes below the vocal folds. When penetration or an aspiration was detected, impairment of the safety of swallowing was considered. Inter-rater reliability of the scale is established, and it is reported to be a reliable scale and has high clinical applicability for each age group and in all consistencies (19). We have determined the recommended feeding types (oral, liquid modified oral or non-oral feeding) of the patient according to the results of the VFSS.

Statistical Analysis

Power analysis was performed using G*Power (G*Power Ver. 3.0.10, Franz Faul, Universität Kiel, Germany) (20). The smallest sample size with 0.5 effect size, 5% type I error, 90% statistical power conditions was calculated as 150 patients with HNC. Statistical analysis was performed using SPSS software, version 15 (IBM SPSS Statistics version 15.0, IBM Corp. Chicago, IL, USA). The descriptive data were given as frequencies and percentage. Quantitative data were calculated as mean or median, standard deviations, upper and lower values. The difference in referral and recommended feeding type were compared using the Chi-Square test. Differences between the PAS scores of the patients and differences between recommended feeding type according to treatment types were analyzed using Kruskal-Wallis test. Type-1 error level was set at 0.05 for statistical significance.

RESULTS

The 157 patients with HNC were included in the study, of which 66.9% (n=105) were males. Descriptive information is shown in Table 1.

The mean PAS score for liquid consistency was 4.96±2.93 (1-8), and the mean PAS score for pudding consistency was 3.76±3.05 (1-8) (Table 2). The 70.1% of the patients had aspiration in liquid consistency, and 37.2% of patients had aspiration in pudding consistency.

Feeding types of patients are presented in Table 3. During admission, 69.4% of patients had oral feeding, 1.3% had liquid modified feeding, and 29.3% had non-oral feeding. After VFSS, oral feeding was recommended to 43.9% of patients, liquid modified feeding to 7.6% of patients,

Table 2: The Penetration and Aspiration Scale Scores of the Patients.

Consistency	Mean±SD	min-max
Liquid	4.96±2.93	1-8
Pudding	3.76±3.05	1-8

and non-oral feeding to 48.4% of patients. A significant difference was found between referral and recommended feeding types (p=0.003). No difference was detected in terms of PAS score for liquids (p=0.100), PAS score for pudding (p=0.215), and recommended feeding type (p=0.947) according to received treatment types.

DISCUSSION

We found that more than half of the HNC patients had airway aspiration, and referral feeding type is inadequate. Frequency and severity of aspiration in liquid consistency were higher than that of pudding consistency. Referral feeding types was inappropriate in most of the HNC patients. Swallowing disorders are seen in various forms due to the adverse effects of the tumor and received treatments in patients with HNC (21,22). Airway aspiration is the unsafe symptom of impaired swallowing function requiring the changes of feeding types (21). Therefore, it is essential to evaluate swallowing function and recommend the appropriate feeding type in patients with HNC in an early period. In this study, aspiration in liquid consistency was detected in 70.1% of patients and in pudding consistency in 37.20% of patients who received various treatments due to the HNC. While there was a difference between referral and recommended feeding types of the patients, there was no difference in terms of airway aspiration and recommended feeding types according to received treatment types.

According to our findings, the frequency and severity of aspiration in liquid consistency were higher than aspiration in pudding consistency after cancer treatment. In a study by Darlene et al., airway aspiration was detected in 64% of HNC patients, and there was no difference in terms of frequency of aspiration between food consistencies (23). Another study of Lisa et al., which was conducted in 30 patients with HNC, found a higher incidence of aspiration in liquid consistency compared to pudding consistency (24). The reason for the variability between study results is considered as the differences in characteristics of included patient population and treatment.

There was a difference between feeding types during admission and the recommended feeding types after the VFSS. While the percentage of oral feeding during admission was 69.2% (recommended) after VFSS, the percentage of oral feeding decreased to 43.7%. The percentage of non-oral feeding increased from 29.4% to 48.4% after VFSS. These results showed that 40 patients with airway aspiration continued to feed by orally until the VFSS was performed. This finding was significant because inappropriate feeding types may cause severe complications, including malnutrition, dehydration, and aspiration pneumonia in patients with HNC (25,26). In the literature, studies have also suggest that HNC patients with swallowing disorders in HNC should undergo percutaneous endoscopic gastrostomy in the early period to provide sufficient nutritional status (27,28). Therefore, it is necessary to evaluate swallowing function accurately in an early period

Table 3: Feeding Types of the Patients During Admission to Clinic and Recommendation After Videofluoroscopic Swallowing Study.

Feeding Type	At Admission/Referral	Recommendation After VFSS	p§
	n (%)	n (%)	
Oral Feeding	109 (69.4)	69 (43.9)	**<0.001***
Liquid Modified Oral Feeding	2 (1.3)	12 (7.6)	
Non-Oral Feeding	46 (29.3)	76 (48.4)	

*p<0.05. §Chi-Square test. VSS: Videofluoroscopic Swallowing Study.

after treatment in patients with HNC.

Swallowing disorder is a symptom, which may occur as a result of a disease or its treatment. Regardless of the cause of the swallowing disorder, impairments, and presence of any situation that affects airway safety should be determined by swallowing evaluation, and necessary changes in feeding types should be considered (29). In our study, there was no difference between penetration aspiration severity and recommended feeding type according to received treatment types in patients with HNC. Approximately a quarter of the patients included in our study underwent surgery, a quarter of the patients received chemoradiotherapy, and half of the patients underwent surgery combined with chemoradiotherapy. Our study included all treatment types, and each treatment type may affect swallowing function. Swallowing disorder is a result of tissue loss after the surgical intervention while chemoradiotherapy deteriorates swallowing function by directly affecting swallowing muscles in patients with HNC (2,30,31). In all treatment option, airway protection mechanisms may deteriorate, and treatments may result in airway aspiration. Thus, airway aspiration could be seen in patients with HNC regardless of treatment options, and changes in feeding types may be required.

We did not include pre-treatment swallowing evaluations of patients, which is a limitation of the study. Regular follow-ups could monitor the results of the changes in feeding types before and after treatment in patients with HNC. As a result of our study, a reduction in the symptoms of patients with swallowing disorders may be achieved by the transition to appropriate and correct feeding type. Long-term follow-up studies are needed to support this conclusion.

In conclusion, various degrees of swallowing disorders could be seen at diagnosis, during, and after treatment in patients with HNC. Airway aspiration is the symptom of swallowing disorder, which causes the highest rate of morbidity and mortality. In patients with airway aspiration, feeding type may need to be changed. More than half of the patients with HNC had airway aspiration, and their feeding types were not appropriate. Some patients with HNC continued to feed orally despite having airway aspiration or feed non-orally, although swallowing safety was sufficient. Therefore, it is crucial to evaluate swallowing function at the earliest period even before the treatment and decide appropriate and correct feeding type in patients with HNC.

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Conflict of Interest: The authors declare no conflict of interest.

Ethical Approval: The study protocol was approved by Hacettepe University Non-Interventional Clinical Research Ethics Board (Approval Date: 31.05.2016 and Approval Number: GO16/169-03).

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