

Swallowing Dysfunction and its Impact on Patients Undergoing Oncological Treatment

Sharjeel Chaudhry
Zarina Ehtesham

Dow University of Health Sciences, Pakistan.
Dow University of Health Sciences, Pakistan.

The effectiveness of head and neck cancer HNC treatments has increased tumour survival, response, and loco-regional control. Treatment escalation does, however, also result in late early and early toxicities. One underrated symptom of HNC patients is dysphagia. Aspiration, dehydration, pneumonia, and malnutrition can all result from swallowing difficulties. About one-third of individuals with dysphagia required therapy for pneumonia. Undiagnosed dysphagia significantly lowers the quality of life, increased death, and caused severe morbidity. In this article, we emphasise the definition, underlying causes, and prognostic factors of dysphagia while also outlining some keys. Better symptoms and cancer therapy may result from a proper evaluation.

Introduction

Loco-regional control rates and tumour response have increased as a result of advancements in head and neck cancer (HNC) therapy. Moreover, mortality is still high despite advancements in treatment and diagnostic methods. Altered fractionation radiotherapy (RT) or chemoradiotherapy (CRT) treatment escalation leads to significant late and early pharyngeal and mucosal toxicities but is related to better outcomes. A sign of HNC that is underdiagnosed in patients is oropharyngeal dysphagia. Dysphagia frequently results from structural, iatrogenic, neuromuscular, and neurological dysfunction. Dysphagia must not be disregarded because it can significantly lower the quality of life (QoL) [1]. As a result of poor swallowing, dehydration, malnutrition, and also aspiration pneumonia may ensue. Depending on the structures connected with the tumour and the types of treatments used, swallowing difficulties are frequently predictable [2]. A proper pre-treatment preference, for individuals who are most at risk for dysphagia might enhance therapeutic and functional outcomes. The cure is typically the priority for the individual suffering from head and neck cancer.

Due to its temporary nature, acute dysphagia is frequently thought to be less concerning. However, it is a well-known cause of malnutrition, which results in substantial a worse quality of life, morbidity, and higher mortality. Additionally, higher acute toxicity may intensify late consequences like lymphedema and fibrosis, which would worsen dysphagia. To limit late dysphagia, avoid malnutrition, and offer aspiration, it is critical for doctors to be aware of the relationships between the middle of late and acute toxicities and to be able to identify patients who are at risk for severe acute dysphagia. A comprehensive dosage administration of radiation therapy (RT) and chemotherapy (CT) may promote compliance with the therapeutic regimen with adequate care and diagnosis throughout the treatment [3]. We have now evaluated the pertinent literature in terms of definition, physiology and aetiology, predictive factors, and supporting measures for palliative therapy to achieve the goal and also provide a conclusion.

Definition, Physiology, and Causes

The inability or discomfort of swallowing medications, food, or liquids is referred to as dysphagia. The oesophageal or oropharyngeal phases of swallowing can both experience dysphagia. "The pharyngeal receptors, the swallowing centre in the brainstem and the cranial nerves (V, VII, IX

sensory, IX motor, X, and XII) for chemical stimuli, pressure, water, and touch all work together to maintain a normal pattern of normal swallowing, which is a coordinated and complicated process requiring neurological regulation. The four stages of a typical swallow are the oral preparation, the oral stage, the pharyngeal stage, and the oesophageal stage” Brook., (2020) [4]. The food is mashed and combined with saliva to produce a bolus during the swallowing phase of the oral preparation. The bolus travels to the throat during the oral phase. The pharyngeal phase is when the swallowing reflex is activated. This causes the larynx to close to prevent aspiration, the pharyngeal constrictors to contract from superior to inferior, the epiglottis to invert and the laryngeal opening and the cricopharyngeal to relax to allow the bolus of food to travel into the oesophagus Shu-Ching., (2019) [5]. The bolus is moved into the stomach at the last stage by the oesophageal muscles’ movement known as peristalsis. Dysphagia can be caused by a malfunction in any of these processes. Furthermore, the carotid sheath and the pharyngeal structures must be flexible in the prevertebral space and spine region for neck movement and swallowing to occur. In essence, the pharynx is a muscular tube that is hanging from the base of the skull. This pharyngeal expansion and movement that is necessary are made possible by the fat in the para- pharyngeal regions and retropharyngeal. The entrance of substance into the larynx that does not go behind the vocal folds is referred to as penetration. Although they are not included in the definition, the quantity of substance, the depth of penetration, and whether all or a portion is afterwards evacuated are all potentially important factors that should be studied. Material moving below the vocal folds is referred to as aspiration. Dysphagia can be brought on by a variety of swallowing- related changes that can impair the physiological processes at each of the previously mentioned steps. Normal physiology may be hampered by an injury to a neurological impairment or anatomical structures. Improper movement of the vestibule, supraglottic larynx and epiglottis, prevertebral space changes, structural dissoluteness of the oral cavity, decreased pharyngeal peristalsis, and other impairments of neurological and muscular are among the most frequent abnormalities [6]. After head and neck cancer therapy, each of these damage types contributes contrastingly and to variable degrees to dysphagia.

Aspiration, which generally has an unimpaired reflex of cough, can be caused by abnormalities of the swallow. The causes of aspiration can be categorised as those that happen before, in the middle, and after the process of swallowing [7]. In individuals with head and neck cancer, aspiration after swallowing occurs as a result of intemperate remnants entering the larynx through damaged areas, as opposed to the neurological aspiration that normally happens before or during swallowing. Certain swallowing issues can result from structural and neurological dysfunction.

Although all of these issues may occur simultaneously in head and neck cancer patients, structural impairment typically predominates as a result of structural damage involving the muscles or nerves or connected to the use of specific drugs. Xerostomia can be brought on by asthma medications, anticholinergic drugs, vasoconstrictors or steroids. “The central nervous system can be depressed by hypnotic agents, antipsychotics, sedatives, antidepressants, and anti-anxiety agents. Additionally, extra-pyramidal symptoms like mouth and facial dyskinesias are possible with several antipsychotics. The neuromuscular junction may be blocked by antibiotics or penicillamine like erythromycin and aminoglycosides” (Table 1)[8].

Parameter of Interest	Head and Neck Cancer	Neurological Damage
Saliva	Xerostomia or Dry Mouth	Drooling, Excess
Mastication	Edentulous	Weak or Awkward
Aspiration	Often After Swallowing	Before or During Swallowing
Taste	Altered or Reduced Taste	Intact Structures
Oral Containments	Intact	Problematic
Swallowing Movements	Reduced	Reduced and delayed
Anatomic Structures	Altered by Fibrosis	Normal Unless Paresis

Table 1. Correlations with Head and Neck Cancer Treatment or Neurologic Damage.

Correlations with head and neck cancer treatment or neurologic damage

Myopathy that is drug-induced can be brought on by lipid-lowering or corticosteroid medications.

Factors Predictive of Dysphagia

The probability of late and acute dysphagia is predicted by the T and N stage, the main location, the kind of treatment, “the extent of the treated region, and patient characteristics (baseline swallowing function, performance status [1], smoking and alcohol misuse, age, lean mass, and gender). All forms of therapy, including CRT, surgery and organ sparing protocols, cause aspiration and swallowing issues” [9]. As a result, we may divide the variables that predict dysphagia into three categories: treatment-related, patient-related, and tumour-related. Dysphagia risk is predicted by patient variables such as lean mass, baseline swallowing performance, PS, alcohol abuse and smoking, gender and age. The severe swallowing difficulty is linked to progressive T and N stages [10]. It is debatable whether the severity and incidence of late and acute dysphagia are better associated with a distinct initial tumour location. Before treatment, aspiration is more common in patients with larynx or hypopharynx cancer; the worse baseline function may explain a greater risk of swallowing impairment in individuals.

Dysphagia after Surgery

Patients with head and neck cancer who have surgery run the risk of developing dysphagia if neck fascia is removed or if cartilage, muscles, nerves or bones (neurological structure and swallowing anatomical structures) are removed or damaged. The degree, size and location of surgical resection of the lesion all affect how severe the swallowing deficiency is. In several publications, the significance of the anatomical area of excision has been emphasised. Less prognostic than the excised area is the size of the lesion that was removed [11]. As a result, for specific procedures such as arytenoid cartilage and base of the tongue resections, dysphagia may be precisely anticipated. Even though robotic surgery has improved results, some reconstructions only serve cosmetic rather than functional goals (tissue flaps have no motor function resulting in the loss of propulsive force). Surgery-related issues, such as nerve function disruption, may impair swallowing ability [12]. Furthermore, dependency and aspiration on gastrostomy tubes are also markedly increased by neck dissection. Potential reasons for swallowing difficulties include nerve injury, oedema, pain and scarring as a result of neck dissection.

Dysphagia after RT or CRT

Dysphagia still poses a potentially fatal risk to head and neck cancer patients receiving CRT or RT, even though contemporary RT regimens are meant to protect normal tissue and maintain function and structure. Dysphagia gets exacerbated as a result of radiation on the swallowing arrangement and different dosage fractionation. Structures that are aspiration or dysphagia related, whose destruction is a result of therapy, have been found by [13]. The glottic larynx and, the supraglottic larynx are examples of dysphagia or aspiration-related structures.

According to [14], anatomical reasons and the food consistency of dysphagia are related. Dysphagia from solid food is caused by injury to the superior PCM. Pharyngeal clearance requires cricopharyngeal opening and laryngeal elevation, which may cause the patient to self-regulate the viscosity and quantity of consumed food. Aspiration may result if the airway is not sufficiently closed at the supraglottic larynx. This information enables a link between a particular swallowing structure failure and a few inexplicable weight losses in early-stage head and neck cancer.

Palliative Treatment

Palliative care seeks to reduce symptoms while enhancing the quality of life. If there are unsettling signs, such as nausea or pain, it can be taken at any stage of the disease. Even if advanced cancer cannot be treated, palliative care can aid a patient to live more comfortably and longer. A vital part of the all-encompassing care provided to cancer patients is palliative care. Its clinical approach is founded on the principle of enhancing the quality of life for individuals suffering from cancer and their families who are dealing with serious diseases. This multidisciplinary speciality seeks to develop goals of treatment by reducing symptom burden, treating spiritual and psychological anguish, and improving knowledge of the condition and prognosis.

Dysphagia can cause weight loss, malnutrition, and reduced eating habits. "In 5 to 71% of head and neck cancer patients, severe weight loss occurs that is unintentional, with an average loss of 6 to 12% of pre-treatment body weight" [15]. Weight loss can be linked to an energy imbalance, which includes increased energy expenditure due to changed metabolism and or lower energy intake via reduced food consumption. Although there is a lot of interest in the treatment and prevention of mucositis and discomfort brought on by swallowing, there is still no gold standard. Most patients might experience considerable pain that needs strong analgesics, both from the tumour and from the therapy. Opioids enhance changes in gastrointestinal motility, and they can also lead to reduced food intake [16]. Managing individuals suffering from terminal cancer includes the palliative therapy of dysphagia. More than half of cancer patients are diagnosed with no curative options due to the typical late onset of symptoms in this disease. Palliative care seeks to lessen symptoms to enhance the quality of life for those who are ill. The major symptoms are dysphagia brought on by concurrent weight loss and oesophageal lumen blockage.

Manage cancer-related symptoms, assist patients with advance care planning, and talk with them about their end-of-life desires [17]. To provide specialised and primary palliative care as effectively as possible, we must create a model that increases the efficiency of healthcare resources and specifies the essential skill sets. The improvement of high-quality patient care and improved triage of the refractory and complex palliative care requirements to palliative care professionals will result from education in fundamental palliative care concepts for all levels of providers and learners in oncology [18]. Oncologists who pursue both pieces of training in palliative care can act as ambassadors since they are adept at bridging the gap and comprehending the subtleties of both fields.

In conclusion, in the management of head and neck cancer, dysphagia is an issue that is becoming more widely acknowledged. QoL is impacted, as is survival. An assessment of nutritional status and swallowing function before treatment is required to guarantee that CRT and RT individuals get appropriate therapy. Routine diagnostic treatments and swallowing examinations before, during, and after therapy should be part of a new multidisciplinary standard in the head and neck cancer treatment approach. According to data gathered during the current comprehensive article, surgery CRT or RT may impede swallowing. For the psychological, emotional, and physical well-being of patients with progressive cancer, palliative care is crucial. Its positive synergistic impact on overall survival while enhancing patient quality of life and satisfaction outcomes justifies its inclusion in routine oncologic treatment. To satisfy the needs of a rising cancer disease, ongoing, focused research is required to assess the growth and integration of high-quality services of palliative care. To aid patients in better understanding and coping with their illnesses, including but not limited to when such illnesses are terminal, medical oncology and other specialities, including interventional radiology, must integrate primary palliative care skills into the practice. They must also collaborate with specialist palliative care physicians.

References

References

1. Garas G, Roland NJ, Lancaster J, Zammit M, Manon VA, Davies K, Jones TM, De M, Holsinger FC, Prestwich RJD, Fleming JC. Novel Strategies for Managing Retropharyngeal Lymph Node Metastases in Head and Neck and Thyroid Cancer with Transoral Robotic Surgery (TORS). *Annals of Surgical Oncology*. 2022; 29(12)[DOI](#)
2. Carmignani I, Locatello LG, Desideri I, Bonomo P, Olmetto E, Livi L, Le Saec O, Coscarelli S, Mannelli G. Analysis of dysphagia in advanced-stage head-and-neck cancer patients: impact on quality of life and development of a preventive swallowing treatment. *European archives of oto-rhino-laryngology: official journal of the European Federation of Oto-Rhino-Laryngological Societies (EUFOS): affiliated with the German Society for Oto-Rhino-Laryngology - Head and Neck Surgery*. 2018; 275(8)[DOI](#)
3. Frowen J, Hughes R, Skeat J. The prevalence of patient-reported dysphagia and oral complications in cancer patients. *Supportive Care in Cancer: Official Journal of the Multinational Association of Supportive Care in Cancer*. 2020; 28(3)[DOI](#)
4. Brook I. Late side effects of radiation treatment for head and neck cancer. *Radiation Oncology Journal*. 2020; 38(2)[DOI](#)
5. Chen S. Oral Dysfunction in Patients With Head and Neck Cancer: A Systematic Review. *The journal of nursing research: JNR*. 2019; 27(6)[DOI](#)
6. Kristensen MB, Isenring E, Brown B. Nutrition and swallowing therapy strategies for patients with head and neck cancer. *Nutrition (Burbank, Los Angeles County, Calif.)*. 2020; 69[DOI](#)
7. Drareni K, Dougkas A, Giboreau A, Laville M, Souquet P, Bensafi M. Relationship between food behavior and taste and smell alterations in cancer patients undergoing chemotherapy: A structured review. *Seminars in Oncology*. 2019; 46(2)[DOI](#)
8. Silver N, Dourado J, Hitchcock K, Fullerton A, Fredenburg K, Dziegielewski P, Danan D, Tighe P, Morris C, Amdur R, Mendenhall W, Fillingim RB. Chronic opioid use in patients undergoing treatment for oropharyngeal cancer. *The Laryngoscope*. 2019; 129(9)[DOI](#)
9. Amézaga J, Alfaro B, Ríos Y, Larraioz A, Ugartemendia G, Urruticoechea A, Tueros I. Assessing taste and smell alterations in cancer patients undergoing chemotherapy according to treatment. *Supportive Care in Cancer: Official Journal of the Multinational Association of Supportive Care in Cancer*. 2018; 26(12)[DOI](#)
10. El Mobadder M, Farhat F, El Mobadder W, Nammour S. Photobiomodulation Therapy in the Treatment of Oral Mucositis, Dysphagia, Oral Dryness, Taste Alteration, and Burning Mouth Sensation Due to Cancer Therapy: A Case Series. *International Journal of Environmental Research and Public Health*. 2019; 16(22)[DOI](#)
11. Kusiak A, Jereczek-Fossa BA, Cichońska D, Alterio D. Oncological-Therapy Related Oral Mucositis as an Interdisciplinary Problem-Literature Review. *International Journal of Environmental Research and Public Health*. 2020; 17(7)[DOI](#)
12. Baird BJ, Sung CK, Beadle BM, Divi V. Treatment of early-stage laryngeal cancer: A comparison of treatment options. *Oral Oncology*. 2018; 87[DOI](#)
13. Rwigema JM, Langendijk JA, Paul van der Laan H, Lukens JN, Swisher-McClure SD, Lin A. A Model-Based Approach to Predict Short-Term Toxicity Benefits With Proton Therapy for Oropharyngeal Cancer. *International Journal of Radiation Oncology, Biology, Physics*. 2019; 104(3)[DOI](#)
14. Taberna M, Gil Moncayo F, Jané-Salas E, Antonio M, Arribas L, Vilajosana E, Peralvez Torres E, Mesía R. The Multidisciplinary Team (MDT) Approach and Quality of Care. *Frontiers in Oncology*. 2020; 10[DOI](#)
15. Greco E, Simic T, Ringash J, Tomlinson G, Inamoto Y, Martino R. Dysphagia Treatment for Patients With Head and Neck Cancer Undergoing Radiation Therapy: A Meta-analysis Review. *International Journal of Radiation Oncology, Biology, Physics*. 2018; 101(2)[DOI](#)
16. Kuwada K, Kuroda S, Kikuchi S, Yoshida R, Nishizaki M, Kagawa S, Fujiwara T. Clinical Impact of Sarcopenia on Gastric Cancer. *Anticancer Research*. 2019; 39(5)[DOI](#)
17. Einarsson S, Laurell G, Tiblom Ehrsson Y. Experiences and coping strategies related to food

and eating up to two years after the termination of treatment in patients with head and neck cancer. *European Journal of Cancer Care*. 2019; 28(2)[DOI](#)

18. Grote M, Maihöfer C, Weigl M, Davies-Knorr P, Belka C. Progressive resistance training in cachectic head and neck cancer patients undergoing radiotherapy: a randomized controlled pilot feasibility trial. *Radiation Oncology (London, England)*. 2018; 13(1)[DOI](#)