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The Management and Review of the Contents on Oral Cancer

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Abstract*: 2018 is expected to have 51,540 new cases of oral cavity and pharyngeal cancer, or around 3-5% of all cancer cases in the United States. That is expected to translate into around 10,030 deaths in that time frame. There are about twice as many instances in males than in women (37,160 cases in men, 14,380 cases in women). Between 2006 and 2010, the incidence rates for men remained unchanged, while the rates for women decreased by 0.9% year. A multidisciplinary strategy is required for the treatment of oral tongue cancer, including radiation oncologists, medical oncologists, surgical oncologists, speech therapists, physical rehabilitation, and social workers or psychologists for emotional support. In this review research, we will discuss the current therapeutic options for these complex malignancies.*

Keywords: Oral Cancer, Tongue Cancer, Management, Treatment, Epidemiology Diagnosis, Prevention

I. INTRODUCTION

To begin with 2018 is expected to have 51,540 new cases of oral cavity and pharyngeal cancer, or around 3-5% of all cancer cases in the United States. That is expected to translate into around 10,030 deaths in that time frame. There are about twice as many instances in males than in women (37,160 cases in men, 14,380 cases in women). Between 2006 and 2010, the incidence rates for men remained unchanged, while the rates for women decreased by 0.9% year. Incidence rates among Black people decreased by more than 2% between 2005 and 2014, whereas those among White people increased by more than 1% over the same period. The primary cause of this increase was a rise in the incidence of a certain subset of oropharyngeal cancers that are associated with HPV infection.

The mortality rate has been falling over the last three decades; for men and women, it decreased by 1.2% and 2.1% yearly, respectively, between 2006 and 2010. 2018 is expected to see 17,110 new instances of oral tongue cancer, according to projections. Out of these, 4,620 will affect women and 12,490 will affect men (meaning that women will make up one-third of the cases). It is anticipated that 2,510 people would die from oral tongue cancer in 2018 (1750 males and 760 women) (Table 1). Most head and neck cancers exhibit evidence of metastatic disease at the time of diagnosis; 10% of patients have distant metastatic sickness, and 43% of cases contain regional nodal involvement.

Due to common risk factors, patients with head and neck cancer often develop second primary tumors. These newly identified cancers occur at an annual incidence of 3-7% and affect 50-75% of those who have the lungs or upper aerodigestive tract as their site of origin.

Tongue arrangement

The tongue consists of a thick mucous membrane that covers almost all of the muscular mass. It is located in the oropharynx and oral cavity. The tongue aids in mastication, deglutition, articulation, and oral hygiene, but its primary function is taste perception. This versatile organ is intricately innervated by five cranial nerves.

The embryonic roots of the tongue are apparent during four weeks of gestation. Language derivatives are the outcome of the first branchial arch's emergence. It causes one median swelling (known as the tuberculum impar) and two lateral lingual swellings. The two lateral lingual swellings cover the tuberculum impar and ultimately come together to form the front two thirds of the tongue. Parts of the second, third, and fourth branchial arches give rise to the base of the tongue. The occipital somites, which generate myoblasts, are the source of the intrinsic muscle of the tongue.

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The tongue has three macroscopic surfaces: the tip, body, and base, arranged from front to back. The term "tip" refers to the front, pointed, and highly mobile portion of the tongue. The tongue's body, which has dorsal (superior) and ventral (inferior) surfaces, is found after the tip. The body is divided into left and right halves by the median sulcus of the tongue. The tongue's base and body are separated by the terminal sulcus, a V-shaped groove. At the end of this sulcus lies the foramen cecum, a segment of the proximal thyroglossal duct. At the base of the tongue are the lingual tonsils, which make up the lowest part of Waldeyer's ring.

The tongue's body has a unique surface appearance due to the lingual papillae, which are lamina propria extensions coated with epithelium. Lingual papillae come in four different varieties: foliate, filiform, fungiform, and circumvallate (vallate). The circumvallate papillae are the prominent, flat papillae with troughs around them. A few circumvallate papillae, located just in front of the terminal sulcus, may be counted eight or twelve. The lingual lipase released by the von Ebner lingual gland ducts penetrates the surrounding troughs to initiate the lipolysis process. On the lateral side of the tongue are little mucosal folds called folate papillae. The long, thin filiform papillae are the most common kind of papillae seen in the tongue. They cover the whole surface of the tongue, although they play no part in taste perception. Fungiform papillae are the kind of papillae that have a mushroom-like appearance. They are more abundantly distributed on the tongue's lateral surfaces and tip. On the human tongue, there are 200–300 fungiform papillae.

Each circumvallate, foliate, and fungiform papilla has 250, 1000, and 1600 taste buds, each of which is innervated by a multiple nerve fiber. All taste receptors can distinguish between the five different flavor attributes: umami, acidic, bitter, sweet, and salt. The taste bud is composed of an edge cell, a basal cell, and a taste receptor. When a taste molecule binds to a taste receptor, the receptor cell depolarizes, resulting in an influx of calcium ions and the release of an unidentified neurotransmitter. After depolarization, the afferent neural pathway is determined by the location of the stimulated taste bud. The anterior two thirds of the tongue are where the chorda tympani branch of the facial nerve (cranial nerve VII) is active. Through the lingual-tonsillar branch, the posterior part of the tongue transmits taste information to the glossopharyngeal nerve.

The tongue is composed of four intrinsic and four extrinsic muscles. The muscles of the tongue are separated on each side by a fibrous lingual septum. The extrinsic muscles are named for their origin outside and location inside the tongue, while the intrinsic muscles are situated within the organ's substance and do not encroach on bone. While intrinsic muscles often alter the structure of the tongue even when they do not function alone, extrinsic muscles alter the location of the tongue. The tongue's extrinsic muscles are the genioglossus, hyoglossus, styloglossus, and palatoglossus. The pharyngeal plexus supplies the motor innervation of the palatoglossus, whereas the hypoglossal nerve innervates all other tongue muscles.

The lingual artery supplies blood to the tongue and floor of the mouth by its dorsal lingual, sublingual, and deep lingual branches. The lingual veins receive the venous drainage from the tongue and then merge with the facial and retromandibular veins to create the common face vein.

The oral cavity is the most frequent site of genesis for malignant epithelial neoplasms in the head and neck area because it is constantly exposed to poisons that are swallowed and breathed. The front two thirds of the tongue are most often affected by malignant tumors in the oral cavity. Alcohol, cigarettes, and betel nuts all contain compounds that have been linked to mouth cancer. The human papillomavirus (HPV) is not as strongly linked to mouth cancer as it is to oropharyngeal tumors. Primary oral cancers may originate from submucosal soft tissue, surface epithelium, microscopic salivary glands, or dento-alveolar tumors. We will concentrate our study on squamous cell neoplasms since they account for over 90% of malignancies in the oral cavity.

The investigation of illness trends

Men are significantly more likely than women to develop malignant neoplasms of the tongue, with 66–95% of cases resembling those in the rest of the oral cavity. The incidence has been fluctuating because to the rise in female smoking rates, and it differs by gender based on the anatomic site. Currently, there is a 3:1 gender ratio. Aging has been associated with a higher incidence of tongue and oral cavity cancer, especially beyond the age of fifty. While younger people could potentially encounter this, most people experience this between the ages of 50 and 70.

The incidence of oral cancer varies significantly by geography. Asia has the greatest rate of this illness, and there are more risk factors there as well, such as chewing betel nut and using snuff, which is smokeless tobacco. It is believed that the high prevalence of alcohol and snuff use among males in American cities. Snuff (smokeless tobacco) use has been linked to an increased risk of oral cavity cancer in rural American women.

Justifications and protective elements

Tobacco usage is a significant risk factor for the development of tongue squamous cell carcinoma (SCC). For all types of head and neck cancer, including tongue cancer, the three primary risk factors are chewing tobacco, smoking cigarettes, cigars, or pipes, and using snuff. There is a correlation between cigarette usage and 85% of cases of head and neck cancer. Moreover, exposure to secondhand smoking increases the risk of developing head and neck cancer.

Cigarette smoking is a significant risk factor for oral cancers, according to epidemiologic research. The main difference between smoking a cigar and a cigarette is that the former modifies the cancers' typical anatomical placement. Furthermore, there is a connection between the use of smokeless tobacco and a higher risk of mouth cancer. The main cause of SCC in the oropharynx and oral cavity in Taiwan, China, India, and other regions of Southeast Asia is chewing snuff. This is particularly true when combined with betel that contains areca nuts.

Alcohol by itself is a risk factor for the development of tongue and oral cavity cancer, even though it is not as potent a carcinogen as cigarettes. Individuals who use tobacco and alcohol have a multiplicative increase in risk that is between thirty and thirty-six times higher for smokers and heavy drinkers. It seems that these risk variables cooperate.

Individuals who lack teeth and have poor oral hygiene may be susceptible to developing oral cancer. The possibility that using mouthwashes with a high alcohol content raises the risk of SCC in the tongue and oral cavity has not been proven. It has been proposed that mate tea, a popular beverage in South America, increases the risk of oral cancer.

Epidemiologic study suggests that consuming vitamin A, β-carotene, and α-tocopherol may reduce the risk of cancers of the oral cavity. Tongue and oral cavity cancer is a typical complication of various syndromes caused by inherited defects (mutations) in certain genes. Genetic defects in several genes involved in DNA repair may cause Fanconi anemia. People with this illness often have hematologic problems early in life, which may lead to leukemia or aplastic anemia. Additionally, they run the risk of developing tongue cancer, namely oral cancer. Symptoms of dyskeratosis congenita, a genetic illness, include aplastic anemia, skin rashes, and uneven nail development in the hands and feet. Moreover, it increases the risk of cancer of the mouth.

Mechanisms and causes of cancer

The development of tongue and oral cavity SCC is a multi-step process that involves intracellular signal transmission, epigenetic mechanisms, and changes to specific genes. Tobacco smoke contains substances that may be carcinogenic. Additionally, it has been shown that an extract from tobacco smoke activates the EGFR in vitro. Furthermore, it has been shown that EGFR activation enhances the manufacture of prostaglandins, namely PGE2, which may have a positive feedback effect by improving the transmission of the EGFR signal. A consequence of EGFR activation is increased cyclin-D1 activity, and head and neck cancer often has overexpressed cyclin-D1.

One important epigenetic process in the development of cancer is the suppression of gene promoter regions by hypermethylation, which has been shown to affect the tumor suppressors p16, DAP-kinase, and E-cadherin. Moreover, the retinoic acid receptor-beta (RAR-beta) gene is silenced by methylation of its promoter.

Early-stage genetic alterations in cancer development include chromosome 3p and 9p deletions or mutations. Additional telomerase activation occurs early in the course of cancer development. Later on in the process, mutations or deletions often impact chromosomes 13q, 18q, and 17p, which contains the p53 tumor suppressor gene. Patients whose tumors include HPV mRNA had considerably lower frequencies of deletions in chromosomes 3p, 9p, and 17p, suggesting that their molecular process may be distinct. Research has shown that the viral proteins E6 and E7 deactivate retinoblastoma protein and p53, causing disruption of the cell cycle. This might be the process underlying carcinogenesis caused by HPV.

In addition to gene deletions or mutations, evidence points to a possible causative rather than a result of malignant transformation: numerical chromosomal imbalances, or aneuploidy. Aneuploidy may be caused by mutations in the genes controlling chromosomal segregation during mitosis and abnormalities in the centrosomes.

Predictions

It's essential to identify patients as soon as possible and refer them to a skilled physician who specializes in treating head and neck cancers since early discovery may lower mortality. The risk factors, such as a history of alcohol and cigarette use, that are mentioned in the etiology section of this page should be looked into. If an adult patient has symptoms from an asymptomatic cervical (neck) tumor or upper aerodigestive tract symptoms that have lasted for more than two weeks, they should undergo a comprehensive examination with a high index of suspicion for malignancy.

A physical examination is the most reliable approach for diagnosing lesions of the upper aero intestinal tract. The first examination often reveals the severity and chronicity of the illness. Since synchronous primary tumors occur in around 5% of instances in people with head and neck cancers, a complete evaluation of the whole upper aerodigestive tract is required at the time of diagnosis.

Tongue tumors are often accompanied with changes in the upper aerodigestive system, including speaking, breathing, swallowing, and hearing. During the interrogation, the physician must highlight the following symptoms: changes in the ability to form words, a non-healing ulcer on the tongue, and soreness in the tongue. Every patient should undergo a comprehensive physical examination, with special attention paid to the neurological exam, which should include cranial nerves V through XII in particular, and the head and neck exam, which includes palpation, inspection, otoscopic exam, indirect laryngoscopy, and nasopharyngolaryngoscopy when necessary. The most common symptom that persons with tongue tumors experience is a lump or soreness. Cancer of the mucosa of the tongue may manifest as a raised edge, indurated ulcer, or as an exophytic growth (Figure 1). Bleeding from the surface of the lesion indicates malignancy and raises the possibility of neoplastic activity. Approximately one-third of the patients who come to the clinic have a neck bump.

A tongue lesion biopsy is often performed in-office or as an outpatient operation, depending on the anatomic location and the patient's preference. A punch biopsy or biopsy forceps may be used to do the biopsy in an office setting (Figure 2). The biopsy should be performed near the perimeter of the lesion; areas with obvious necrosis or high keratinization should be avoided.

Fine needle aspiration (FNA) is a useful diagnostic procedure for differentiating benign from malignant lymph nodes in the neck. A thin gauge needle (#23 gauge) is repeatedly passed over the lesion while suction is applied. The suction must be released before removing the lesion's needle. This method has a 7% false negative rate. Cytology is a highly useful tool for distinguishing metastatic SCC from other malignant histologies. Conversely, in a clinical scenario when there is a high level of suspicion for malignancy, a negative result should not be interpreted as "absence of disease." A core needle biopsy of a neck tumor should not be performed unless the lump is confirmed to be a lymphoma. According to Martin Hayes, who voiced his concerns "not only to the needlessness but also to the possible harmfulness of excisional lymph node biopsy as the first or even as an early step in the diagnosis of cancer" in a communication to the medical profession as a whole, open biopsies should only be carried out when the diagnosis has not been made after extensive clinical evaluation and after at least two non-diagnostic FNAs. The surgeon should be prepared to immediately continue with a definitive surgical treatment, which may entail a complete neck dissection, if the open biopsy shows an SCC.

The most helpful diagnostic for assessing cancers of the tongue and oral cavity is probably computed tomography, or CT. Both the presence and extent of lymph node involvement, as well as the severity of the sickness, may be ascertained with its help. CT has high spatial resolution and is capable of differentiating between soft tissues such as fat, muscle, and bone. With a sensitivity of 100% and specificity of 85%, computed tomography (CT) performs better than magnetic resonance imaging (MRI) in detecting bone deterioration. MRI can precisely assess the extent, location, and size of the tumor's involvement in the soft tissues. Information on bone expansion is not very reliable if the medullary cavity is not completely included. MRI has a somewhat greater sensitivity than CT, while CT has a superior specificity. PET has been investigated in head and neck cancer patients, both initial and recurrent. A multicenter prospective examination of patients newly diagnosed with head and neck tumors revealed discrepancies between PET and CT in 43% of cases, and treatment plans were altered for 14% of patients. It is not recommended to use PET often for the diagnosis or evaluation of patients with early-stage oral malignancies.

A multicenter prospective examination of patients newly diagnosed with head and neck tumors revealed discrepancies between PET and CT in 43% of cases, and treatment plans were altered for 14% of patients. It is not recommended to use PET often for the diagnosis or evaluation of patients with early-stage oral malignancies.

The pathology and histologic categorization of malignancies of the tongue and oral cavity More than 90% of head and neck cancers, including oral cavity tumors, are caused by SCC. The World Health Organization divides squamous cancers of the head and neck into several histologic categories.

These polymorphisms may arise in any of the numerous head and neck locations, except for the Cuniculatum subtype, which only develops in the lining of the oral cavity. Up to 15% of all SCCs in these areas are SCC variations, which are often seen in the upper aerodigestive tract mucosa. The most common types are verrucous, basaloid, adenosquamous, exophytic or papillary, and spindle-cell (sarcomatoid). Each of these variants has a unique histomorphologic appearance, thus there are several differential diagnosis considerations to consider in addition to the corresponding clinically meaningful treatment alternatives. Each of these several SCC subtypes is treated similarly from stage to stage and has the same prognosis.

The idea of field cancerization (flaw in the field)

This concept is essential to comprehending how cancer of the oral cavity progresses. The term describes extensive damage caused by prolonged exposure to carcinogens to the head & neck, lung, and esophageal epithelium. The development of mucosal abnormalities, such as dysplasia and leukoplakia, repeatedly beyond the bounds of oral cavity cancer or secondary primary tumors in this area is known as clinical field cancerization. A patient's lifetime risk of getting another cancer is between 20 and 40 percent if they have mouth cancer.

TNM classification of cancers of the head and neck

The American Joint Committee on Cancer (AJCC) TNM staging technique guarantees uniformity in the staging of head and neck cancers by using the most accurate evaluation of the disease's extent prior to treatment. When possible, the primary tumor is evaluated by palpation and examination. Indirect mirror inspection and direct endoscopy are also utilized when necessary.

The prognosis and the stage of sickness upon diagnosis are closely related. Over 80% of people who have a stage I disease go on to live. For those whose disease is locally advanced at the time of diagnosis (i.e., stage III and IV), the survival rate is less than 40%. If metastases develop in lymph nodes, a patient with a moderate original tumor has a 50% decreased probability of surviving. Most individuals have head and neck cancers that are found to be in stage III or IV at the time of diagnosis.

II. CONCLUSION

In conclusion, the literature review and current management strategies for oral tongue cancer underscore the significance of early detection and comprehensive treatment approaches. The evolving understanding of the disease's molecular and genetic aspects has paved the way for targeted therapies and personalized treatment plans. Multidisciplinary teams involving oncologists, surgeons, radiologists, and speech therapists play a pivotal role in improving patient outcomes and quality of life. Additionally, the importance of patient education and awareness cannot be overstated, as early intervention remains the most effective strategy in combating this aggressive form of cancer. While significant progress has been made in the management of oral tongue cancer, ongoing research and advancements in medical technology continue to hold promise for even more effective treatments and improved patient prognoses in the future.

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