



Letter to the editor

Tongue cancer: A discrete oral cavity subsite

Oral cavity cancers offer a piece of complementary information to the clinician beyond what is provided by the imaging tools due to its easy access, visibility and pathognomonic clinical presentation: a chronic non-healing ulcer. The tongue is a distinguished anatomic subsite of the oral cavity. It is a multifunctional organ aids in mastication, articulation, deglutition, self-cleaning, taste sensation and is innervated by quintuple cranial nerves. The tongue is composed of 4 pairs of extrinsic muscles, intrinsic muscles and has no anatomical barriers, except the midline raphe that divides the tongue into twin structures [1]. The tongue muscles lack an envelope of fascia or bone and are non-encapsulated to shield the tumour spread. In addition, the malignant cells easily traverse through the soft muscle fibres, nourished by intricate arteriovenous drainage and neurovascular bundles. Yuen et al. [2] in their study postulate that the increased incidence of nodal metastasis in tongue carcinoma may be due to the contraction of tongue muscles that help in the entry of cancer cells into the lymphatics. The dense lymphatic drainage of the tongue offers extensive connections across the midline placing a high risk for the bilateral nodal basins to be involved especially the tumours close to or involving the midline [3,4].

Lack of anatomic shield between the muscles in each half of the tongue irks the surgeon when an early tongue cancer presents with local recurrence despite having achieved negative margins on the resected specimen. The sharp bend of the tongue muscles from the base tongue to the floor of the mouth allows a faster progression of tumour cells across the muscle bundles [5]. Tumour cells radiate beyond the clinically palpable margins in the form of sun ray filaments [6]. The presence of microsatellites [7] or the impalpable tendrils necessitates the need for a longitudinal resection rather than a circumferential approach across the tumour margins. Clinically, the contiguous lymphatic tissue in the vicinity of the floor of the mouth, sublingual nodes between the tongue and neck would not be addressed if a discontinuous approach is adopted for the tongue and the neck which in turn can lead to locoregional failure (Metastasis in the sublingual nodes) [8,9]. En bloc resection in advanced tongue cancer has a risk of fistula formation and requires resection of the suprahyoid muscles. This can derail the hyoid movements (reduced hyoid elevation), impair the time required, speed, range of motion during swallowing and increase the risk of aspiration [10].

A search in the literature has drawn conflicting results on the outcome of continuous vs discontinuous approach in tongue cancers. A compartmental resection in advanced tongue cancers is recommended to achieve 3-dimensional tumour clearance considering the frail anatomical barriers, extralingual insertion of the extrinsic tongue muscles and lack of functional activity of the remaining muscles when preserved [11–15]. In radical resections, the tissue shrinkage is maximum in tumours of the buccal mucosa and tongue, post resection prior to the formalin fixation. This can be attributed to the intrinsic tissue properties [16] necessitating the need for substantial macroscopic margins for optimal tumour clearance.

The tongue is a mass of intertwining skeletal muscle, connective tissue with some mucous and serous glands and a compartment of adipose tissue, enclosed in the oral mucosa. The anterior 1/3rd of the tongue has lingual papillae, unlike the posterior 1/3rd that lacks papillae but has numerous lymphoid follicles a gateway for tumour emboli to dislodge into the lymphovascular compartment. The tip and dorsum of the tongue have a thick keratinised and specialized gustatory mucosa [17]: a resilient physical barrier protecting against surface abrasions and the invasion of pathogens. Among all carcinomas of the tongue, the rate of SCCs located on the dorsum of the tongue is 3% to 5% [18,19]. The non-keratinised epithelium seen in the postero-lateral surface of the tongue represents a more flexible permeable surface layer and lacks the endurance to resist the infiltration of carcinogens, virus and traumatic injury. Pooling of the carcinogens in the high risk sites (Ventrolateral tongue, floor of the mouth, soft palate complex also known as the gutter zones, reservoirs was postulated by Lederman as a predisposing factor to the development of carcinoma [20,21]. A posterolateral oral tongue cancer when abuts or spreads to the base of the tongue can skip to another site (Oropharynx) rather than to the contiguous subsite seen in other oral cavity cancers [22]. The implications of this skip can alter the treatment plan: need for a tracheostomy, the fields of radiation, surgical plan as oropharyngeal cancers classically drain from levels II to level IV.

Taste sensation has three main functions: pleasure, defence and sustenance. There has been a significant association between dysgeusia and the radiation dose delivered to the tongue [23]. A lack of taste can impair the patient compliance, nutritional status and the quality of life. Adjuvant radiation is considered to address the microscopic tumour disease to reduce the locoregional spread. A compartmental tongue surgery compensates the greater infiltrative thickness of tongue cancers by eliminating the anatomic functional units of the primary tumour and its potential muscular, vascular, neural, glandular and lymphatic pathways of spread. In the same vein, compartmental radiation encompassing the radiation field from the origin of the tongue muscles to its insertion in the hyoid bone can burn the potential pathways of tumour spread with a better outcome.

Molecular markers allow us to explore the nascent activities of cancer long before its clinical presentation. It may serve as an effective tool for diagnosis, to gauge the prognosis well as the appropriateness of treatment options available. Upregulation of several proteins as per the stage can be a useful tool to understand the molecular progression and to escalate or deescalate the treatment options [24]

Local recurrence despite negative margins widens our suspicion to the presence of a distinct genetic signature. The study by Zuzana et al. [25] explored 3 genes (CCDC66, ZRANB2 and VCPKMT) which displayed significantly higher mRNA levels in tongue tumours with positive SM compared to tumours with negative SM.

The exclusion of the extrinsic muscle involvement from the T4 stage in the AJCC 8th edition has down staged the thin tumours with close

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proximity to the extrinsic muscles [26] but in terms of prognosis, tongue cancers continue to behave aggressively due to its cellular biology and lack of anatomical barriers. Tongue cancers are a distinct anatomical subgroup with a high risk of occult metastasis in early stage, poor survival, its presence in cryptic locations of the oral cavity with rich lymphatic drainage and dense neural network serves as a pathway for tumour cells to gain access into the lymphovascular compartment and accelerate the loco-regional metastasis.

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SS predominantly conceived this review and led the development of the short communication. Both SS and AK wrote the first draft of the letter, VR, AK, PS critically revised and edited successive drafts of the manuscript. SS, RJ, AK, VR, PS read and approved the final version of the manuscript.

Declaration of Competing Interest

The authors confirmed that they have no competing interests.

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