Reporting Periodontal Clinical Data in Patients with Head and Neck Cancer: Expert Opinion

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Relato de Dados Clínicos Periodontais em Pacientes com Câncer de Cabeça e Pescoço: Opinião de Especialistas

Reporte de Datos Clínicos Periodontales en Pacientes con Cáncer de Cabeza y Cuello: Opinión de Expertos

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INTRODUCTION

Head and Neck Cancer (HNC) etiology encompasses well-established risk factors, including tobacco use, alcohol consumption, and infection by specific strains of human papillomavirus[1]. Over the past two decades, additional risk indicators for HNC have been identified, particularly those supporting the biological plausibility of the cancer-inflammation association[2]. The relationship between chronic inflammation and cancer has been recognized since the 19th century, with inflammation established as a hallmark of cancer, influencing tumor progression and metastasis[3]. Notably, periodontal diseases such as gingivitis and periodontitis, which are inflammatory disorders, have contributed to oncogenesis[2].

Gingivitis is recognized as a risk factor and an essential condition for the onset of periodontitis, with both diseases representing distinct stages of the same inflammatory process[2,4]. Gingivitis is restricted to the gingival tissues, while periodontitis involves the supporting apparatus of the teeth[4]. In the worldwide adult population, periodontitis affects approximately 50%, while its severe forms are estimated to be 11.2%[5].

Despite the potential role of periodontal inflammation and microorganisms in oncogenesis, only a limited number of studies have incorporated comprehensive clinical periodontal assessments when examining the association between periodontal disease and head and neck cancer (HNC)[6-11]. Therefore, this article discusses the importance of monitoring periodontal disease (PD) in patients with head and neck cancer, while also exploring potential associations between these conditions based on evidence from observational studies.

DEVELOPMENT

The primary etiological factor of periodontal disease is the accumulation of a dysbiotic biofilm. Microorganisms associated with periodontal disease, such as *Porphyromonas gingivalis, Treponema denticola,* and *Fusobacterium nucleatum,* have been associated with oropharyngeal cancer progression[12,13]. A recent pangenomic analysis revealed that *F. nucleatum* consists of two distinct clades, FnaC1 and FnaC2, equally prevalent in the oral cavity. Remarkably, FnaC2 exhibited a significant association with the colorectal cancer microenvironment and tumorigenesis, mainly attributed to its capacity for epithelial invasion[14].

In an oral environment with gingival inflammation, whether gingivitis or periodontitis, the number of periodontopathogenic microorganisms increases significantly[15]. Consequently, in individuals susceptible to cancer, the presence of these microorganisms in high numbers can increase not only the risk of oncogenesis but also the risk of cancer progression.

The limited number of clinical periodontal evaluations in studies involving HNC patients may be attributed to the challenges associated with managing individuals with physical impairments and restricted functional mouth opening, which are common clinical features among HNC patients[16]. These limitations hamper comprehensive clinical assessments[8]. However, the omission of clinical periodontal examinations in research adversely affects the accuracy of determining the association between PD and HNC. A more significant limitation is the failure to record pocket

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depths, which overlooks the detection of anaerobic sites – microenvironments that favor excessive proliferation of periodontal pathogens, such as *Fusobacterium nucleatum* clade C2[14].

The gold-standard periodontal examination takes approximately 40 minutes[17] and can be challenging given the HNC limitations[8,16]. The exam involves assessing all present teeth at six sites per tooth: mesiobuccal, buccal, distobuccal, distolingual, lingual and mesiolingual[4,18]. Using the periodontal probe, measurements of probing pocket depth (pathological spaces between the tooth and the gums that favor the growth of anaerobic species), probing attachment loss (indicating the extent of supporting tissue destruction), and bleeding on probing (a marker of gingival tissue inflammation) are taken[4,5].

Clinical research incorporating periodontal assessments in the context of head and neck cancer remains limited. Over the past decades, only a small number of studies have attempted to perform comprehensive periodontal examinations in this patient population (illustrative summary in Table 1). Furthermore, the relationship between periodontal status and specific head and neck cancer subsites, particularly those more strongly associated with periodontal disease, remains poorly characterized. This observation highlights the necessity to adopt clinical approaches in future studies evaluating the PD and HNC association.

Regardless of the anatomical subsite involved, patients with HNC must undergo a comprehensive clinical assessment to elucidate the contribution of periodontal status to tumor progression and tissue involvement, with a full-mouth periodontal examination being the preferred gold-standard approach.

When a gold-standard examination is not possible, a partial exam of all present teeth, excluding third molars, at three vestibular sites (mesiobuccal, buccal, and distobuccal), referred to as the Full-mouth MB-B-DB approach[19], may be a feasible alternative. This method allows probing with minimal or no mouth opening, requiring only lip retraction. The Full-mouth MB-B-DB approach can reduce examination time by half while accurately estimating the prevalence, severity, and extent of periodontal disease, achieving ≥ 80% accuracy for attachment loss and pocket depth ≥ 6mm[19,20].

Although it is not the ideal periodontal exam, a partial periodontal examination is a clinical evaluation of a representative number of teeth or sites in an individual. Partial examinations are frequently utilized in epidemiological studies to reduce the time required for analysis and costs. They can diagnose the disease but may underestimate its severity[19]. To obtain a satisfactory sensitivity (≥ 80%), the study should evaluate at least 49 sites for assessing attachment loss, and a minimum of 33 sites should be evaluated to assess pocket depth[19]. Up to now, the three existing studies that performed partial periodontal examination did not meet the criteria that reached 80% sensitivity[7,8,10].

CONCLUSION

Given the limited evidence available in the literature, further studies employing the gold-standard periodontal examination in patients with HNC are warranted. We propose that authors who can perform the gold-standard periodontal examination also report data using the Full-mouth MB-B-D partial examination. Presenting the data in two formats will enable comparison between the data obtained from the gold-standard approach and enrich the literature on periodontal examinations in HCN patients, allowing comparisons of results from different population groups. As research incorporating periodontal clinical examinations continues to grow, this methodology would provide more substantial support for periodontal diagnosis as a potential predictive risk factor for the development and progression of HNC.

CONTRIBUTIONS

All authors contributed substantially to the conception or design of the study and to the acquisition, analysis, or interpretation of data. The author Rodrigo Norberto de Oliveira contributed to the preparation of preliminary versions of the article, and the other authors carried out the critical revision of the intellectual content. All the authors approved the final version for publication.

DECLARATION OF CONFLICT OF INTEREST

There is no conflict of interest to declare.

STATEMENT OF DATA AVAILABILITY

All the contents associated with the article are included in the manuscript.

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Table 1. An Illustrative summary of Clinical studies that applied clinical periodontal approaches in head and neck cancer patients

Reference & tumor studied	Periodontal parameters assessed	Record protocol: sites (a) and minimum of teeth required (b)	Aim of the periodontal approach	PD & HNC association outcomes found	Conclusions
Komlós et al.[6] Oral cancer	Clinical attachment loss; periodontal pocket depth; oral hygiene by the silness-löe plaque index and bleeding on probing	*Full-mouth recording protocol* a) (FM)MB-B-DB-ML-L-DL b) Not reported	Periodontal disease diagnosis and staging	72.1% of the oral cancer patients had advanced stages of PD, while in the control group, the most prevalent forms were the moderate stages (51.6%)	The PD is a possible non-genetic risk factor for oral cancer, and this risk increases as the PD progresses to more severe stages
Gupta et al.[7] Upper aerodigestive tract cancer	Periodontal pocket depth, bone defects, and calculus presence	*Partial-mouth recording protocol* a) Sites were recorded by the Basic Periodontal Exam approach: it registered the most severe site from each sextant b) Not reported	Screening and scoring to differentiate periodontally healthy individuals from those with the disease in a short time	42.1% of cancer patients had severe forms of PD against 34.2% of the control group. The cases of severe PD had a significantly higher risk of cancer than the mild forms (OR=2.35)	Severe PD is an independent risk factor for upper aerodigestive tract cancer
Laprise et al.[8] Oral cancer	Gingival inflammation and recession	*Partial mouth recording* a) Not reported b) Not reported	To record the qualitative degrees of gingival inflammation from no signs, mild inflammation, and severe inflammation; and grades for gingival recession from no recession, local, and generalized	The severe forms of gingival inflammation and the generalized recession were associated with an increased risk for oral cancer, even with the confounding factors adjustment (OR>1)	The periodontal diseases are an independent risk factor for oral cancer
Moraes et al.[9] Oral and oropharyngeal cancer	Clinical attachment loss; periodontal pocket depth; oral hygiene and bleeding on probing	*Full-mouth recording protocol* a) (FM)MB-B-DB-ML-L-DL b) 6 teeth	Chronic and severe periodontal disease diagnosis	The prevalence of severe PD forms in the cancer patient group was 88.6% against 32.5% of the control group	Even after the confounding factors adjustment, the PD extension and severity were found as risk indicators for mouth and oropharynx cancer
De Rezende et al.[10] Oral and oropharyngeal cancer	Periodontal pocket depth	*Partial mouth recording: record of two sites in each tooth per sextant* a) Sites recorded by the CPITN approach b) Not reported	To assess the periodontal disease severity by the periodontal pocket depth, and to score the complexity of periodontal treatment required	The prevalence of severe PD forms in cancer patients was 76% compared to 10% in the control group	There is a correlation between the PD and the oral-oropharynx cancer
Tezal et al.[11] Oral cancer and pre-malignant lesions	Clinical attachment loss	*Partial mouth recording: recording of two sites per tooth in two quadrants of the mouth* a) (PMPE)B-MB b) 6 teeth	Multiple logistic regression analyses with the Clinical Attachment Loss (CAL) from a multistage probabilistic sample Aim: to assess the effects of CAL on the oral soft tissue lesions	When the clinical attachment loss was > 1.5 mm, there was a statistically significant increased risk for malignant tumors and pre-malignant lesions in smokers (OR=21.76)	There was a specific association between the PD and the risk for oral tumors and pre-malignant lesions

Captions: RSSM: Random Site Selection Method; FM: Full-mouth; MB: Mesiobuccal; B: Buccal; DB: Distobuccal; ML: Mesiolingual; L: Lingual; DL: Distolingual; BPE: Basic Periodontal Examination; CPITN: Community Periodontal Index for Treatment Needs; PMPE: Partial-mouth record protocol.

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