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Invasive squamous cell carcinoma of the tongue in a young adult: case report and clinical implications

Ana Cristina Malheiro Barbosa [1] 0009-0000-5795-4313
Hugo Filipe Alves Ribeiro Ferraz [1] 0009-0001-7412-7093
Maria Baptista de Gouveia Gomes Osório [1] 0009-0009-1775-3061
Maria Teresa Dias Sequeira [1,3,4] 0009-0009-1775-3061
Maria Inês de Sousa Barreto Guimarães do Couto [1,2,3,4,5] 0000-0003-3687-7798
Augusta Pureza Alves Silveira [1,2,3,4] 0000-0002-9349-3443

[1] Faculty of Health Sciences, University Fernando Pessoa, Porto, Portugal
[2] RISE-Health, Faculty of Health Sciences, Fernando Pessoa University, Porto, Portugal
[3] CEISUC, Centre for Health Studies and Research from University of Coimbra, Portugal
[4] CIBB- Centre for Inovation in Biomedicine and Biotechnology 3004-512 Coimbra, Portugal
[5] National Institute of Legal Medicine and Forensic Sciences, North, Porto, Portugal

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Corresponding Author:
Ana Cristina Malheiro Barbosa; Fernando Pessoa University - Faculty of Health Sciences, Porto, Portugal; 2023106150@ufp.edu.pt

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ABSTRACT

Introduction: The increasing incidence of oral squamous cell carcinoma (OSCC) in young adults challenges the traditional epidemiological profile of the disease, which is typically associated with older individuals and long-term exposure to tobacco and alcohol.
Objectives: To describe a clinical case of invasive squamous cell carcinoma of the tongue in a young adult and to discuss its clinical and epidemiological implications.
Methodology: A descriptive case report was conducted based on clinical, histopathological, and follow-up data from a patient diagnosed through an Oral Cancer Early Intervention Program.
Results: A 26-year-old male presented with an infiltrative ulcer on the lateral border of the tongue. Histopathological analysis confirmed a well-differentiated keratinizing invasive squamous cell carcinoma with perineural invasion. The patient underwent surgical excision and remains under oncologic surveillance with no evidence of recurrence.
Conclusion: This case reinforces that oral cancer may occur in young adults, particularly in the presence of significant risk factors such as tobacco exposure. Early diagnosis and timely biopsy are critical for improving prognosis, highlighting the importance of clinical vigilance regardless of patient age.

Contributions: Conceptualization: AB and AS; Data curation: HF and MO; Formal Analysis: AB, HF, MO and AS; Funding acquisition: TS, MG and AS; Investigation: AB, TS, MG and AS; Methodology: AB and AS; Project administration: AS; Resources: AS; Supervision: AS; Validation: AB, TS, MG and AS; Visualization: AB and AS; Writing – original draft: AB and AS; Writing – review & editing: AB, HF, MO and AS.

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INFORMAÇÃO DO ARTIGO

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Autor correspondente:
Ana Cristina Malheiro Barbosa;
Universidade Fernando Pessoa – Faculdade de Ciências da Saúde, Porto, Portugal;
2023106150@ufp.edu.pt

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RESUMO

Introdução: O aumento da incidência do carcinoma espinocelular oral em adultos jovens desafia o perfil epidemiológico tradicional da doença, que está tipicamente associado a indivíduos mais velhos e à exposição prolongada ao tabaco e ao álcool.
Objetivos: Descrever um caso clínico de carcinoma espinocelular invasivo da língua num adulto jovem e discutir as suas implicações clínicas e epidemiológicas.
Metodologia: Foi realizado um relato de caso descritivo com base em dados clínicos, histopatológicos e de seguimento de um doente diagnosticado no âmbito de um Programa de Intervenção Precoce no Cancro Oral.
Resultados: Um paciente do sexo masculino, com 26 anos, apresentou uma úlcera infiltrativa no bordo lateral da língua. A análise histopatológica confirmou um carcinoma espinocelular invasivo, queratinizante e bem diferenciado, com invasão perineural. O doente foi submetido a excisão cirúrgica e mantém-se sob vigilância oncológica, sem evidência de recidiva.
Conclusões: Este caso reforça que o cancro oral pode ocorrer em adultos jovens, particularmente na presença de fatores de risco significativos, como a exposição ao tabaco. O diagnóstico precoce e a realização atempada de biópsia são fundamentais para melhorar o prognóstico, salientando a importância de uma elevada suspeição clínica, independentemente da idade do doente.

Introduction

Oral cancer represents a major global public health concern, with oral squamous cell carcinoma (OSCC) accounting for approximately 90% of malignant neoplasms of the oral cavity.[1,2] Despite advances in diagnostic and therapeutic approaches, OSCC continues to be associated with high morbidity and mortality, largely due to late diagnosis and its aggressive biological behavior.[3,4]

The tongue is one of the most frequently affected intraoral sites, particularly the lateral border and ventral surface, which are more susceptible to carcinogenic exposure and mechanical irritation. Tumors arising in this region are often associated with a higher risk of local invasion and regional metastasis due to the rich vascular and lymphatic network.[5]

Traditionally, OSCC has been described as a disease affecting predominantly males in the sixth and seventh decades of life. Its development is strongly linked to well-established risk factors, particularly tobacco use and alcohol consumption,[5,6] which act synergistically to increase carcinogenic potential.[7] These agents contribute to cumulative genetic damage, including mutations in tumor suppressor genes and oncogenes, as well as epigenetic alterations that promote malignant transformation.

However, in recent decades, a growing number of cases have been reported in younger individuals, often under the age of 40, with some patients presenting without the classical risk factors. This epidemiological shift has raised significant concern and has led to increased interest in identifying alternative etiological mechanisms.[8,9]

Several hypotheses have been proposed to explain this phenomenon, including early exposure to carcinogens, genetic susceptibility, environmental factors, dietary influences, and viral infections. Among viral agents, human papillomavirus (HPV) has been extensively studied in head and neck cancers, particularly in oropharyngeal tumors. Nevertheless, its role in oral cavity squamous cell carcinoma remains controversial, with inconsistent evidence regarding its prevalence and clinical significance.[10,11]

Additionally, molecular studies have suggested that OSCC in younger patients may present distinct biological characteristics, including differences in gene expression, immune response, and tumour microenvironment.[4] However, the extent to which these differences translate into variations in clinical behaviour and prognosis remains unclear.

Given these uncertainties, case reports continue to play an important role in highlighting atypical presentations and contributing to a better understanding of disease patterns. In this context, the present study aims to describe a case of invasive squamous cell carcinoma of the tongue in a young adult and to discuss its clinical and epidemiological implications in light of current scientific evidence.

Methodology

This study consists of a descriptive clinical case report based on data obtained during a dental consultation conducted under an Oral Cancer Early Intervention Program.

Clinical evaluation included detailed intraoral examination and assessment of lesion characteristics, followed by histopathological confirmation through an incisional biopsy performed in a representative area of the lesion. The specimen was fixed in 10% neutral buffered formalin and processed according to standard histological procedures. Microscopic analysis included evaluation of tumour differentiation, depth of invasion, and the presence of perineural and vascular invasion.

All procedures were conducted in accordance with ethical standards. Written informed consent was obtained from the patient prior to clinical intervention, ensuring confidentiality and compliance with ethical requirements.

Case description (Results)

A 26-year-old male patient was referred for evaluation under an Oral Cancer Early Intervention Program, presenting with a lesion located on the lateral border of the tongue, with an evolution of approximately two months.

The patient did not report pain or functional impairment, which contributed to delayed clinical concern despite the persistence of the lesion. His medical history was unremarkable. However, he reported significant behavioural and environmental risk factors, including active smoking for approximately four years, with a consumption of around 20 cigarettes per day, and occupational exposure to irritating chemical agents.

Intraoral examination revealed a solitary lesion on the lateral border of the tongue, measuring approximately 2 cm in its greatest dimension. The lesion, depicted in Figure 1, presented as an infiltrative ulcer with an irregular surface and a fibrinous base. Adjacent leukoplakic areas were noted, along with persistent fissuring of the mucosa.

Figure 1. Patient's solitary lesion on lateral border of the tongue.

Palpation of the lesion revealed raised, indurated margins and a firm consistency, suggestive of deep tissue involvement. No overt signs of acute inflammation were observed. The lesion was clinically asymptomatic, and no functional limitation in speech or mastication was reported.

Based on the clinical features, namely persistence, induration, irregular borders, leukoplakic changes, and ulceration, a provisional diagnosis of a potentially malignant disorder or oral squamous cell carcinoma was considered.

An incisional biopsy was performed in a representative area of the lesion. The specimen was fixed in 10% formalin and processed using standard histopathological techniques.

Microscopic examination revealed an invasive squamous cell carcinoma of the conventional type, keratinizing and well differentiated. The tumour exhibited infiltration of the underlying striated muscle and showed evidence of intratumoral perineural invasion. A moderate lymphoplasmacytic inflammatory infiltrate was present in the peritumoral stroma. No vascular invasion was identified. The biopsy margins were involved, indicating incomplete excision at the time of sampling.

Following histopathological confirmation, the patient was referred to the Portuguese Institute of Oncology for further management. Surgical excision of the lesion was performed as part of the oncological treatment plan.

At the time of reporting, the patient remains under regular oncological surveillance, with no clinical or radiographic evidence of local recurrence or distant metastasis.

Discussion

Squamous cell carcinoma of the tongue is classically described as a malignancy affecting individuals over the fifth decade of life, with a well-established association with long-term exposure to tobacco and alcohol.[5,6] The occurrence of this disease in a 26-year-old patient, as observed in the present case, is therefore uncommon and clinically relevant.[8, 9]

Unlike many reported cases in young patients without identifiable risk factors, this patient presented with a clearly defined major carcinogenic exposure — active smoking initiated at an early age and maintained at high intensity (approximately 20 cigarettes per day). This pattern of exposure is particularly important, as it suggests that the cumulative duration of exposure may not be the sole determinant of carcinogenic risk. Instead, early initiation combined with high consumption may accelerate carcinogenesis by promoting rapid accumulation of genetic damage.[6,12]

Tobacco-related carcinogenesis is mediated through multiple mechanisms, including the formation of DNA adducts, oxidative stress, and chronic inflammatory processes, all of which contribute to genomic instability and malignant transformation.[6,13] In younger individuals, these processes may

occur more rapidly when exposure begins early and is maintained at high levels, potentially explaining the early onset of disease in this case.

In addition to tobacco use, the patient reported occupational exposure to chemical irritants, which may have acted as a cofactor in the development of the lesion. Chronic exposure to irritant agents can lead to repeated epithelial injury and regeneration, increasing cellular turnover and the likelihood of mutational events. The interaction between behavioural and environmental factors may therefore play a significant role in accelerating carcinogenesis in susceptible individuals.[6]

The occurrence of OSCC in young adults has been increasingly reported in the literature, raising questions about additional contributing factors. Among these, genetic susceptibility has been proposed as a potential determinant. Variations in genes involved in carcinogen metabolism, DNA repair mechanisms, and immune response may influence individual vulnerability to malignant transformation, even in the presence of relatively shorter exposure periods.[7]

The role of HPV in oral cavity squamous cell carcinoma remains controversial. While HPV is strongly associated with oropharyngeal cancers, its involvement in oral cavity tumours is less consistent.[11,12] Current evidence suggests that HPV-positive tumours are less prevalent in the oral cavity compared to the oropharynx, and its etiological significance in this specific anatomical site is still unclear. Therefore, although HPV cannot be entirely excluded, it is unlikely to be the primary driver in this case.

From a clinical perspective, this case highlights an important diagnostic challenge. There is a tendency to underestimate the likelihood of malignancy in young patients, which may lead to delays in diagnosis. In this case, despite the relatively short evolution time of two months, the lesion already exhibited features of invasive carcinoma, including perineural invasion, a known adverse prognostic factor associated with increased risk of recurrence and poorer outcomes.[14-17]

This reinforces the importance of early recognition of suspicious lesions. Clinical features such as persistent ulceration, induration, irregular borders, and lack of healing should always raise suspicion, regardless of patient age. The presence of leukoplakic areas and fissuring, as observed in this case, further supports the need for prompt investigation.

The concept that "oral cancer is a disease of older individuals" may contribute to diagnostic delay and should be reconsidered. Instead, clinical decision-making should be guided by lesion characteristics rather than patient demographics. Any lesion persisting beyond two weeks without clear aetiology should be biopsied.[18]

Finally, this case supports the notion that OSCC in young adults may not necessarily represent a distinct disease entity, but rather the result of early and intense exposure to known carcinogens, possibly enhanced by individual susceptibility and environmental cofactors.[8]

Beyond improving survival and prognosis, early diagnosis and appropriate treatment of oral squamous cell carcinoma are fundamental for preserving the patient's quality of life. Delayed diagnosis often results in more extensive surgical procedures and functional impairments involving speech, mastication, swallowing, and social interaction, with significant psychological impact. Early clinical recognition and intervention may therefore contribute not only to better oncological outcomes, but also to improved functional, aesthetic, and psychosocial well-being.

Conclusions

This case demonstrates that oral squamous cell carcinoma can occur in young adults, particularly in the presence of significant risk factors such as early and intense tobacco exposure.

It challenges the traditional epidemiological profile of the disease and highlights the importance of maintaining a high level of clinical suspicion in all patients presenting with persistent oral lesions.[8,18]

Early diagnosis and timely intervention remain essential for improving clinical outcomes.

The data supporting the results can be found or stating that it will be provided on request.

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