Editorial

Fluorescence visualization as an auxiliary method to detect oral potentially malignant disorders and oral cancer

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Oral squamous cell carcinoma (OSCC) is among the most common human cancers worldwide and is associated with poor chances of cure and 5-year survival, representing a public health problem (1). OSCC may be preceded by mucosal conditions named oral potentially malignant disorders (OPMD) (2) that may be defined as conditions with higher risk of undergoing malignant transformation compared to the normal oral mucosa. Classically, OSCC is associated with harmful habits as chronic tobacco smoking and alcohol drinking, while the association with other risk factors as human papillomavirus (HPV) infection remains controversial (3-6).

The poor prognosis of OSCC is closely linked to delays in the diagnosis and prevention pitfalls (7). Delays in the diagnosis of OSCC and OPMD may be attributed to factors inherent to health professionals and to the patients themselves. The lack of information regarding the occurrence of OSCC and OPMD, its signs and symptoms, and its risk factors, are the main reasons for the "patient delay" in the diagnosis of oral cancer (7). Furthermore, the fear of the diagnosis may be considered (7). Therefore, population screening programs to early detect OSCC and OPMD have been conducted worldwide, although strong evidence on its effectiveness remains scarce (7). Nonetheless, the lack of knowledge and capacity to recognize OSCC and OPMD from oral health professionals, especially in the primary level of attention, becomes a barrier, what highlights the need for continued education and for auxiliary methods to help these professionals to detect oral high-risk lesions.

The detection of alterations in neoplastic tissues by fluorescence spectroscopy began with Policard (8) in 1924. Since then, fluorescence has been promisingly used to detect, characterize, and delimitate solid tumors. Given the presence of endogenous fluorophores, the normal oral mucosa shows an apple-green autofluorescence under stimulation with ~400 nm by light-emitting diodes (LEDs) (9). Molecular, cellular and tissue alterations, as in epithelial dysplasia (ED), and OSCC results in a fluorescence loss (9). Therefore, under fluorescence visualization (FV), these lesions present as a well demarcated dark area.

Since the development of the first prototype of a hand-held device for the fluorescence visualization of the oral mucosa presented by Svistun (10), in 2004, this method has demonstrated variable diagnostic values to detect OPMD, ED, and OSCC, with sensitivity ranging from 30% to 100%, and specificity ranging from 12.5% to 100% (11). The variability in diagnostic values may be due to several factors, of which the examiners' experience in the diagnosis of oral diseases and the sample selection stands as the most critical (11). In most studies, the examiners are specialists in oral medicine, oral pathology, or oral surgery, what may

create a bias to compare the FV with the conventional oral examination (COE). Furthermore, in order to validate the method, the first studies used selected sample with known oral alterations, therefore, both the sensitivity and specificity rates are higher in these studies (11).

However, when applied in the clinical practice, the sensitivity and specificity of the FV to detect oral high-risk lesions tend to reduce (11). Therefore, the high false positive rates led researchers to conclude that this method is not reliable to diagnose these lesions (12). Nonetheless, perhaps the definition of the FV as an auxiliary method in the oral examination is no well-comprehended (13). The FV must not be considered as a diagnostic method, but as an aid to the COE by the clinician with none or few experience in the detection and diagnosis of oral diseases (11). Farah *et al.* (14), demonstrated the importance of FV in addition to the COE in a trial program to detect oral high-risk lesions. Simonato *et al.* (15) demonstrated that the inclusion of the FV in the oral examination of a population screening program improved the detection of OPMD when used by general practice dental surgeons. Previously, the same team had demonstrated that the FV improved the diagnostic values of a dental student to detect OPMD to the same values as a specialist in oral medicine (16).

The results of the insertion of the FV as an auxiliary method the oral examination to detect oral high-risk lesions in the clinical practice and population screening programs have demonstrated enthusiastic results, supporting its use, with ponderation and good sense.

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References

1. Bray F, Ferlay J, Soerjomataram I, et al. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin 2018;68:394-424.
2. Warnakulasuriya S, Kujan O, Aguirre-Urizar JM, et al. Oral potentially malignant disorders: A consensus report from an international seminar on nomenclature and classification, convened by the WHO Collaborating Centre for Oral Cancer. Oral Dis 2021;27:1862-80.
3. Simonato LE, Tomo S, Garcia JF, et al. HPV detection in floor of mouth squamous cell carcinoma by PCR amplification. J Bras Patol Med Lab 2016;52:43-9.
4. Santos IDS, Ferreira LL, Tomo S, et al. Absence of human papillomavirus in cancer of the oral cavity and oropharynx in a Brazilian population. Eur J Cancer Prev 2021;30:350.
5. More P, Kheur S, Patekar D, et al. Assessing the nature of the association of human papillomavirus in oral cancer with and without known risk factors. Transl Cancer Res 2020;9:3119-25.
6. Tomo S, Biss SP, Crivelini MM, et al. High p16INK4a immunoexpression is not HPV dependent in oral leukoplakia. Arch Oral Biol 2020;115:104738.
7. Warnakulasuriya S, Kerr AR. Oral Cancer Screening: Past, Present, and Future. J Dent Res 2021;100:1313-20.
8. Policard, A. Etude sur les aspects offerts par des tumeurs experimentales examinees a la lumiere de Wood. C R Soc Biol 1924;91:1423-5.
9. Wang C, Qi X, Zhou X, et al. Diagnostic value of objective VELscope fluorescence methods in distinguishing oral cancer from oral potentially malignant disorders (OPMDs). Transl Cancer Res 2022;11:1603-15.
10. Svistun E, Alizadeh-Naderi R, El-Naggar A, et al. Vision enhancement system for detection of oral cavity neoplasia based on autofluorescence. Head Neck 2004;26:205-15.

11. Tomo S, Miyahara GI, Simonato LE. History and future perspectives for the use of fluorescence visualization to detect oral squamous cell carcinoma and oral potentially malignant disorders. Photodiagnosis Photodyn Ther 2019;28:308-17.
12. Amirchaghmaghi M, Mohtasham N, Delavarian Z, et al. The diagnostic value of the native fluorescence visualization device for early detection of premalignant/malignant lesions of the oral cavity. Photodiagnosis Photodyn Ther 2018;21:19-27.
13. Tomo S, Simonato LE. The applicability of fluorescence guided detection to epithelial dysplasia and oral cancer. Photodiagnosis Photodyn Ther 2018;21:181.
14. Farah CS, Dost F, Do L. Usefulness of optical fluorescence imaging in identification and triaging of oral potentially malignant disorders: A study of VELscope in the LESIONS programme. J Oral Pathol Med 2019;48:581-7.
15. Simonato LE, Tomo S, Scarparo Navarro R, et al. Fluorescence visualization improves the detection of oral, potentially malignant, disorders in population screening. Photodiagnosis Photodyn Ther 2019;27:74-8.
16. Simonato LE, Tomo S, Miyahara GI, et al. Fluorescence visualization efficacy for detecting oral lesions more prone to be dysplastic and potentially malignant disorders: a pilot study. Photodiagnosis Photodyn Ther 2017;17:1-4.

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