

OralID “Light of Lives” - Clinical Case Reports

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DOI: <http://dx.doi.org/10.21276/ijcmsr.2019.4.4.38>

How to cite this article: Vijaykumar Bokkasam, Nikitha Reddy Veluru, Sai Jyotsna Siddavaram, Yamini Reddy Puchalapalli. OralID “Light of Lives” - Clinical Case Reports. International Journal of Contemporary Medicine Surgery and Radiology. 2019;4(4):D160-D162.

A B S T R A C T

Introduction: Oral potentially malignant disorders (OMPDs) include leukoplakia, erythroplakia, oral submucous fibrosis, tobacco pouch keratosis. Most of Oral Potentially Malignant Disorders are asymptomatic in early stages which are not observed by the patients, only dental practitioners reported on routine oral examination. These OMPDs lesions are very enigmatic to differentiate from other conditions only by conventional white light examination. Various investigations are utilized for early detection which has certain limitations. The current non-invasive light-based diagnostic tool which focuses on tissue autofluorescence evaluates early mucosal changes and helps to rule out suspicious precursor lesions.

Case report: This paper aims to report the cases of OMPDs by using a light-based device called OralID to differentiate between normal and dysplastic tissues.

Conclusion: As we know the early detection of oral cancer can increase the higher chance of survival rate compared to advanced stages. This makes timely diagnosis and treatment play a critical role in the lives of patients. Tissue fluorescence technology aids as the gold standard for early detection of abnormal tissue changes when combined with traditional examination of oral mucosa and also helps to differentiate between normal and abnormal tissue.

Keywords: OMPDs, Autofluorescence, Oral cancer, OralID

INTRODUCTION

Oral cancer is one of the most common cancers which ranks sixth to eighth around global epidemiology. In India, oral cancer accounts for 40% of all cancers which is a significant health problem.¹ Oral squamous cell carcinomas often preceded by potentially malignant disorders (OPMDs). In 1877 Sir James Paget a famous surgeon first reported malignant transformation of an oral lesion into tongue carcinoma. World Health Organization (WHO) defined the term "Potentially Malignant Disorders" as the risk of malignancy being present in a lesion or condition either during the time of initial diagnosis or at a future date. Early detection and correct diagnosis of OPMDs may help to prevent malignant transformation of oral lesions and can improve the survival rate.²

Most of the oral cancers are habit related especially tobacco usage considered as the main risk factor in developing countries, particularly in India. For screening of oral cancer various chair-side diagnostic methods like conventional screening, vital staining, invasive scalpel procedures which is the gold standard aid for the detection of oral cancer. Due to certain limitations, each of the diagnostic techniques like visual examination lesions may not be detected properly. On vital staining, the degree of neoplastic changes and margins are not determined precisely. For a better selection

of dysplastic areas and to avoid false-positive results light-based autofluorescence technique is more preferable in the clinical examination as a guiding adjuvant tool. Despite other diagnostic aids biopsy plays an important role in the confirmation of oral cancer detection which is a gold standard technique. Delayed diagnosis at the early stages leads to an increase in mortality rate.

To understand the dysplastic nature of OPMDs, we need advanced optical light-based reliable diagnostic aid along with clinical white light examination. Tissue autofluorescence technology was used on different sites for many years, but it is recently adapted in the oral cavity region. The device OralID is a proven modified technology of VELscope (Visually Enhanced Lesion Scope) which is an innovation works on the principle of natural tissue fluorophores. This device uses a blue light of the wavelength (435–460nm) which excites the structural, biochemical, morphologic and environmental changes of diseased tissue affecting the natural fluorophores and also their absorption and reflecting properties. On the visualization of the oral cavity, the healthy mucosa appears in apple green colour whereas abnormal mucosa appears black or dark maroon areas against the surrounding tissue confirming the loss of fluorescence (LOF).³ OralID is used as an adjuvant standard visualization tool.

CASE REPORT

Case report 1

A female patient aged 45 years presented at the department of oral medicine and radiology with the chief complaint of a rough surface in her left buccal vestibule region for 6 months. Habit history revealed betel quid chewing for the past 20 years placing the quid in the left buccal vestibule for 2 minutes. On intraoral examination, a greyish-white plaque was present on the left buccal mucosa extending anteroposteriorly from commissure of the lip to retromolar region with diffuse borders involving vestibule, mucosa and gingival region. The lesion was stained and surrounded by keratin layer, at depth of vestibule pouch-like rough corrugations were present on palpation and provisionally diagnosed as Tobacco pouch keratosis. On OralID examination lesion showed loss of fluorescence at the centre of the vestibule compared to the border which appeared bright white due to the presence of keratin layer and rest of epithelium appeared as pale green colour as shown in fig-1. The region with a high degree of loss of fluorescence subjected to scalpel biopsy. The histopathological report revealed hyperkeratinized stratified squamous epithelium exhibiting features like drop rete ridges, basilar hyperplasia, hyperchromatic nuclei in the basal and parabasal layer overall features suggestive of Mild Epithelial Dysplasia.

Case report 2

A 38-year-old male patient visited the department of oral medicine and radiology for a regular dental check-up with a history of paan chewing for the past 5 years. On intraoral conventional examination under white light, no lesion was

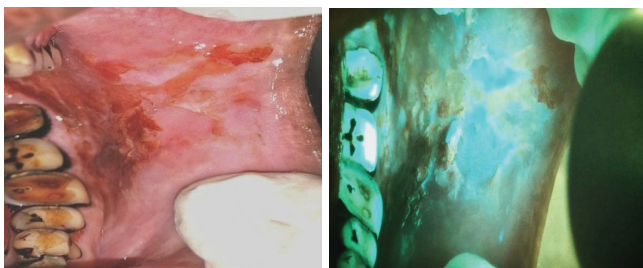


Figure-1: a) Clinical presentation of lesion; b) ORALID showing Loss of fluorescence vestibular region



Figure-2: a) Under white light examination presence of no lesion; b) ORALID spotted Dark area in vestibular region of 35

revealed. Due to patient long term paan usage predicted risk along with conventional oral examination used OralID, accidentally a suspicious lesion identified at the depth of the vestibule on left buccal sulcus which showed loss of fluorescence at the centre of sulcus compared to apple green colour surrounding tissue. The patient advised quitting the habit and re-evaluated after two weeks. After primary dental visit advised all routine haematological investigations and biopsy for the region which showed a high degree of loss of fluorescence as shown in fig-2. Surprisingly the histopathological report revealed hyperkeratinized stratified squamous epithelium exhibiting features like broad rete ridges, basilar hyperplasia, hyperchromatic nucleus, and prominent nucleoli overall features suggestive of Moderate Epithelial Dysplasia.

DISCUSSION

Oral cancer is an alarming major health problem among the head and neck regions globally. Due to delayed diagnosis, the overall 5-year survival rate has remained unchanged.⁴ To improve the outcome and to eliminate the development of oral cancer, precursor lesions have to be identified in the early stages. The precursor lesions are referred to as “pre-cancer,” “precancerous/premalignant lesions,” which are usually in the form of white or red patch.⁵ The lesions like leukoplakia defined as “predominantly white plaques of questionable risk, having excluded (other) known diseases or disorders that carry no increased risk for cancer”.⁶ The risk of malignant transformation of leukoplakia to SCC in various studies established approximately 5% to 17%⁷ which is 6 times more common among smokers than in nonsmokers. Smokeless tobacco keratosis is characterized by a white plaque in the buccal or labial vestibule where the tobacco is held. Smokeless tobacco keratosis takes about 5 years to develop. After tobacco cessation, most of the lesions are reversible within 2-6 weeks duration. Even though the transformation rate is relatively low epithelial dysplasia is a risk contributing factor for Malignancy. It is better to prevent earlier than later. Various oral cancer diagnostic techniques have been established so far eg: vital staining procedure, biopsy, DNA ploidy which have certain limitations. The new advanced light-based techniques including chemiluminescence and autofluorescence which work on abnormal metabolic and structural changes of neoplastic tissue. These neoplastic and preneoplastic tissues, when exposed to specific wavelength excitation of light absorption and reflection occurs. OralID is a simple hand-held, battery-operated device that is used to directly visualize the oral mucosa that works on tissue autofluorescence technology. It is a simple, non-invasive, efficient and little expensive screening device manufactured by Forward Science Technologies, Stafford. The examination takes less than 2-3mins. The device consists of a specially designed optical filter to see through and make a difference in identifying abnormal tissue changes. This device emits a specific wavelength of blue light which excites the natural fluorophores of the tissue.⁸ The structural and metabolic changes in the tissue cause excitation of natural fluorophores such as flavin adenine dinucleotide (FAD), collagen which plays a pivotal role in the diagnosis of dysplasia. FAD and

collagen are correlated with cell metabolic activity. As the disease progresses FAD and collagen decrease resulting in reduce fluorescence. The healthy tissues appear differently than the abnormal tissues. As the dysplastic progression increases the Fluorescence intensity decreases which is crucial in biopsy site selection. According to the BCCA⁹, this system provides 98% sensitivity and 100% specificity in discriminating between normal tissue and severe dysplasia, in situ carcinoma or invasive carcinoma. However, there are very limited studies established on the effectiveness of tissue autofluorescence for oral cancer detection.

Similar studies were conducted by Sawan and Mashiah¹⁰ using VELscope on 748 patients who were examined for premalignant and malignant lesions. Initially, patients underwent clinical examination along with tissue fluorescence examination before the excisional biopsy was done. The biopsy results were compared to the VELscope evaluation. They reported 74.1% sensitivity and specificity of 96.3%, and emphasized that VELscope is an efficient diagnostic aid in the detection of premalignant and malignant lesions and also differentiates the border for surgical biopsy and excision. Present Study supported by Farah *et al*¹¹ obtained 100% sensitivity and 96% specificity for 44 cases which matched results both histopathologically and by the device clinically. A study was done by Matsomoto *et al.* on 74 cases in which 37 of them were malignant lesions and remaining were benign lesions. They supported the diagnostic validity of the device as a good adjuvant tool in the detection of abnormal cellular activity of tissue mainly in the patients who are prone to risk factors.

A Cross-sectional study was conducted by Lane *et al*¹² in 2006 on 44 patients with inclusion criteria of Oral leukoplakia. The patients were evaluated directly under tissue fluorescence aid which achieved 98% sensitivity and 100% specificity discriminating normal mucosa from severe dysplasia/carcinoma in situ (CIS) or invasive carcinoma. They explained that the Device could be used as an adjunct to conventional oral screening to increase the accuracy of diagnosis.

CONCLUSION

A wide range of abnormalities is not easily identified by the unassisted eye under white light. Oral cancer abnormal cell growth begins beneath the surface by the time we can able to detect it clinically will be almost in advanced stages.

Early detection of epithelial dysplasia in OMPDs reduces the risk of both mortality and morbidity rate of oral cancer. Tissue fluorescence aids as the best diagnostic adjuvant tool in identification, detection, and selection of occult abnormal lesions which unnecessarily eliminate false results. However, the biopsy serves as a 'gold standard' for confirmation. The main advantage of this device is it allows us to capture and analyze lesions under digital fluorescence. The only drawback of this device is questionable in differentiating benign and inflammatory conditions.

REFERENCES

1. Efficacy of Light-based detection systems Med Oral Patol Oral Cir Bucal. 6 Jul 1;21 (4):e447-55

2. Oral Potentially Malignant Disorders: An Overview of More than 20 Entities JODDD 2014;8(1):23-29.
3. Comisi JC. Oral human papillomavirus lesion identified using VELscope instrumentation: a Case report. Gen Dent. 2008;56(6):548-50.
4. Mascitti *et al.* Diagnostic Devices in Oral Oncology. Front Physiol. 2018; 9(3): 1510.
5. Sachin C Sarode, Gargi S Sarode, Jagdish V Tupkari. Oral potentially malignant disorders. J Oral Maxillofac Pathol. 2014; 18(Suppl 1): S77-S80.
6. Saman Warnakulasuriya. Clinical features and presentation of oral potentially malignant disorders. Oral Surg Oral Med Oral Pathol Oral Radiol. 2018;125(6):582-590.
7. Rhodus NL, Kerr AR, Patel K. Oral cancer: leukoplakia, premalignancy, and squamous cell carcinoma. Oral Cancer Leukoplakia, Premalignancy, and Squamous Cell Carcinoma. Dent Clin North Am. 2014;58(2):315-40.
8. Patton LL, Epstein JB, Kerr AR. Adjunctive techniques for oral cancer and lesion diagnosis A systematic review of the literature. J Am Dent Assoc. 2008;139(7):896-905.
9. Trullenque-Eriksson A, Muñoz-Corcuera M, Campo-Trapero J, Cano-Sánchez J, Bascones-Martínez A. Analysis of new diagnostic methods in suspicious lesions of the oral mucosa. Med Oral Patol Oral Cir Bucal. 2009;14:E210-6.
10. Sawan D and Mashlah A. Evaluation of premalignant and malignant lesions by fluorescent light (VELscope). J Int Soc Prev Community Dent. 2011; 5(3): 248-254.
11. Ardore M, Tempia Valenta G, Pentenero M, Gandolfo S. Using the VELscope test in the evaluation of suspicious lesions of the oral mucosa oncologically. Dent Cadmos 2012;80(2):53842, 5456.
12. Lane PM, Gilhuly T, Whitehead P, Zeng H, Poh, CF, Ng S, *et al.* Simple device for the direct visualization of oral-cavity tissue fluorescence. J Biomed Opt. 2006;11(2):024006.

Source of Support: Nil; **Conflict of Interest:** None

Submitted: 16-10-2019; **Accepted:** 19-11-2019; **Published online:** 25-12-2019