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"Unveiling the Potential: A Comparative Analysis of VELscope and ViziLite in Oral Premalignant Lesions"

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ABSTRACT: Detecting oral cancers at an early stage not only enhances patients' quality of life but also alleviates the financial and emotional burdens on the healthcare system in the country. New techniques have emerged to enhance clinical examinations and refine the diagnosis of premalignant and early malignant lesions. Among these advancements, a tissue reflectance-based examination known as ViziLite has been tailored for oral cavity use and is currently available in the market. Additionally, the direct visual fluorescent examination, Velscope, is being proposed as an adjunct to conventional oral examinations. The article provides valuable insights into the utility of Velscope and ViziLite as adjunctive tools for oral cancer screening, making it a valuable resource for dental professionals, researchers, and individuals interested in this field. This information can enhance the existing knowledge base and assist healthcare providers in making informed decisions about integrating these devices into their clinical practice. By improving the detection and early intervention of potentially malignant mucosal lesions, these tools have the potential to significantly impact patient outcomes and reduce the burden on the healthcare system.

Key Words: Oral Premalignant Lesions , VELscope, Vizilite.

I. INTRODUCTION

The most prevalent head and neck malignancy in India has been attributed to oral premalignant lesions. It is stated that, the 5-year survival rate for patients diagnosed with this condition has remained persistently low, typically ranging from approximately 50% to 60%. Furthermore, this survival rate tends to decline further when patients receive their diagnosis during the later stages of the disease9[1,2]. Due to its significant impact on mortality and morbidity rates, early diagnosis is critically essential. Therefore, screening individuals who are at risk of developing malignant lesions and their precursors holds the potential for early detection and subsequent treatment, ultimately enhancing survival rates[3]. Without a definitive approach in place, the screening for oral cancer continues to rely predominantly on traditional oral examination and, when suspicious lesions are present, scalpel biopsy is performed[4]. Recognizing that visible alterations in the oral mucosa often precede the onset of nearly all oral squamous cell carcinomas (OSCCs), several supplementary techniques have been introduced to aid in the identification of early mucosal changes indicative of cancer, which may not be readily apparent through visual inspection alone[5,6,7]. Velscope which is a non invasive screening device has been recently introduced for oral premalignant and malignant lesions .It has the property of autofluorescence to help in the diagnosis of dysplastic changes in oral Premalignant lesion [7Vizilite is a non-invasive diagnostic tool devised for the early detection of oral cancer and is based on the principle of chemiluminescence[11-16]. The aim of this review has examined the role of the screening tools in oral premalignant lesion and to evaluate the efficacy between VELscope and ViziLite in oral premalignant lesions[7,8,9]

Comparative Analysis of VELscope and ViziLite

The VELscope system operates based on the principle of autofluorescence, wherein blue light at a wavelength of 436 nm interacts with tissues in the oral cavity[3,4,5] Healthy oral tissues contain natural fluorophores that emit green fluorescence when exposed to this blue light. Unhealthy tissues, on the other hand, reflect green light and appear dark in color, allowing for the detection of abnormalities in the oral cavity. The principle behind ViziLite involves the reflective properties of tissues, specifically focusing on chemiluminescence. In this system, an oral rinse

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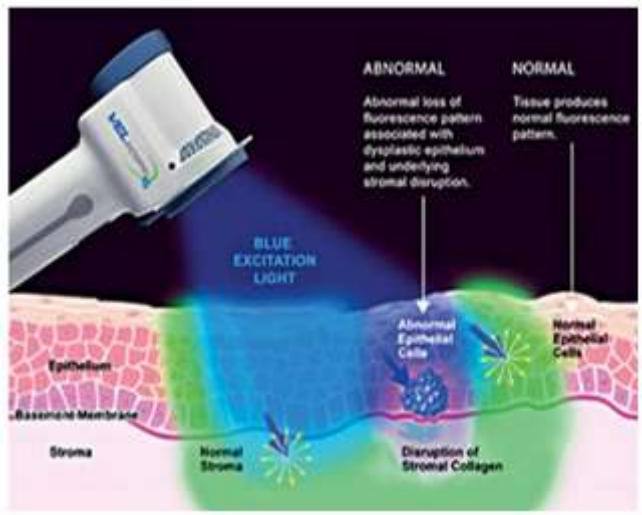
with a 1% acetic acid solution for 1 minute is used to remove the glycoprotein barrier. The ViziLite capsule or chemiluminescent light stick consists of an outer flexible plastic capsule containing acetyl salicylic acid and an inner fragile glass vial containing hydrogen peroxide[16]. Activation of the capsule occurs through flexing, causing the inner glass vial to rupture and release the hydrogen peroxide. The VELscope system relies on the chemical reaction that produces blue-white light with a wavelength ranging from 490 to 510 nm, lasting approximately 10 minutes. Normal cells absorb this light, appearing blue, while abnormal cells with a higher nuclear/cytoplasmic ratio reflect the light, appearing more "aceto-white" with brighter, sharpermargins[16,17].The VELscope demonstrates a specificity of 61.39% and sensitivity of 83.3%. In contrast, ViziLite operates with a specificity of 27.8% and sensitivity of 77.3%. Both the VELscope and ViziLite systems offer portability, painlessness, and non-invasiveness, making them accessible for use by a wide range of operators after minimal training. However, a common challenge faced by both systems is the difficulty in differentiating oral premalignant lesions from other pathologies, such as aphthous ulcers[4].



The VELscope system offers advantages such as patient comfort due to the absence of chemicals, lack of odor, taste, and sensation during the examination, along with the benefit of repeatability. However, it has the drawback of being expensive and may generate heat during prolonged examinations[1,2,9,10]On the other hand, ViziLite is advantageous due to its low cost and ability to provide real-time results. Nevertheless, its disadvantages include the interference of acetic acid-induced salivary flow with reflectance and the requirement for a dark environment during the examination[16,17].

II. CONCLUSION

While molecular and genetic analyses are not currently routine procedures for oral lesions when biopsies are regularly performed, the primary

role of autofluorescence, confocal reflectance imaging, and fluorescence imaging is to enhance the visibility of oral lesions and provide valuable assistance to physicians. Regarding diagnostic accuracy, VELscope yields the highest overall percentage of diagnostic coincidences at 83.3%, while ViziLite exhibits the lowest rate at 76.6%[(4).].

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