VELSCOPE A promising adjuvant in Identification of Suspicious Lesions???

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Introduction:

Oral cancer is one of the commonest malignancies worldwide. This pathology has a high morbidity and mortality, mainly due to the delayed diagnosis of the lesion. The cause of delayed diagnosis of this lesion can be attributed to the myriad of alterations which can affect the oral mucosa.[1]

Oral cancer, though is a dreaded condition, it is assumed that if a premalignant lesion is detected and treated, the lesion may not progress to cancer. Oral health professionals can play a important role in early detection of malignant and premalignant conditions and hence can make a considerable contribution to decrease the incidence of oral cancer by identifying high risk patients and educating them in healthy habits.[1]

The traditional approach to detect epithelial changes is mainly visual examination along with palpation and use of instruments which may aid in better visualization. But this traditional approach is subjective and hence not entirely reliable. Due to this numerous ancillary methods have been introduced and used overtime to aid in accurate diagnosis of oral premalignant or malignant lesions. Some of these techniques are toluidine blue staining, ViziLite (chemiluminisence), brush biopsy etc.[2] One of the newer addition to this myriad of techniques has been the VELscope (visually enhanced lesion scope)(Figure 1). While VELscope system can help clinicians to discover several types of abnormal tissues in the oral cavity, it is perhaps best known for its ability to assist in discovery of oral cancer and precancer.

Principle and Use

This device which has been widely claimed to visually enhance a clinician's ability to detect oral cancer is based on the principle that normal cells will glow when exposed to fluorescent light whereas abnormal cells will absorb light and appear dark when exposed to the safe blue light emitted by VELscope hand piece.[3](Figure 2,3,4)

Koise and Truelove have affirmed in their article that VELscope may help to detect cases that would otherwise go unnoticed, although it cannot ensure that clinical decision on the potential for malignant transformation is correct.[4]

According to Poh et al VELscope system is related to Slaughter's concept of field cancerisation, which states that genetically altered cells extend widely throughout the epithelium in oral cancer patients.[5] This necessitates the excision of cancerous oral tissue with apparently normal adjacent mucosa. Despite of this primary carcinomas have a high recurrence rate, though microscopically the margins may be free of dysplastic changes. These recurrences may be related to genetic and epigenetic alterations which can be detected by microsatellite analysis.[6] Since this analysis is a time consuming procedure, Poh et al in their study used VELscope to detect field cancerisation and determine surgical margins. Microsatellite analyses of margins in this study showed them to be areas of dysplasia. In most of the cases (19 out of 20) areas with loss of fluorescence was larger than the clinically apparent lesion. A significant correlation was also found between a high degree of dysplasia and loss of fluorescence, in this study.

Constraints

This device has been well acclaimed by few studies for detection of premalignant and malignant oral lesions. But a careful analysis, as cited by Balevi, shows that these studies have certain limitations which should be kept in mind.[3] Studies done using VELscope have included patients seen in referral clinics that are specialized in the diagnosis and management of oral pathology. This connotes that the population studied is not representative of the patient mix in a general dental practice, due to which, there is a risk of test-referral bias. Additionally the studies demonstrate the potential benefit of the VELscope during follow-up of already diagnosed (high-risk) patients to check for new lesions. Moreover studies may be giving an artificially high true-positive rate (sensitivity) and true-negative rate (specificity) because of "spectrum bias." This bias occurs when there is a significant difference between the study population and the general population that the device is intended for. All studies were limited to the detection of premalignant or cancerous lesions, not other oral lesions more commonly seen in general practice. In other words, there is no evidence that this device can distinguish between oral cancer and aphthous ulcers, lichen planus and pemphigoid to name a few. Also, intra- and inter-operator agreement in the interpretation of test results has not been verified.

The VELscope's inability to distinguish between oral cancer and other abnormal tissue and the lack of a kappa value to assess its intra- and inter-operator reliability raise the potential for many false positives and, therefore, overdiagnosis of oral cancer. This would cause unnecessary stress and fear among patients, as well as increase morbidity through unnecessary surgical biopsy

procedures. It would also increase costs for the patient and contribute to the financial burden that is already on the health care system with no evidence of a net benefit to the patient or society. Finally, there is no long-term evidence that this device actually saves lives.

Conclusion

Oral carcinoma is usually asymptomatic in its early stages and does not show the classical clinical characteristics associated with advanced oral cancer (ulcer, induration, bleeding and cervical endopathies). Therefore it can go undiagnosed even by a specialist. Also as cancer reaches a stage where excision is done with apparently normal margins clinically, which may even histologically appear free of cancer cells, it is quite often followed by recurrences. To overcome this VELscope may be a useful in intra-operative identification of high-risk field. But to confirm its usefulness, it is essential to carry out studies, with large samples and taking in account the factors and variables like inflammation which can influence the optical properties of oral mucosa. In addition though this system identifies the margins of cancerous lesions, biopsy is mandatory for confirmation of the same and hence remains the "gold standard" for final diagnosis. Thus even though this instrument may be useful in specialized centers, its routine use does not appear justifiable due to the risk of false positive results, high cost and lack of adequate scientific evidence.

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Figure 1: VELscope[7]

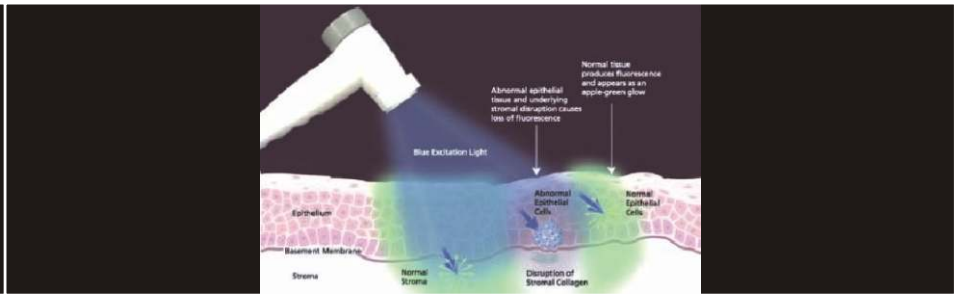

Figure 2: Diagrammatic representation of normal and abnormal cells under VELscope illuminatiuon[7]

Figure 3: Normal mucosa under VELscope illuminatiuon[7]

Figure 4: Abnormal mucosa under VELscope illuminatiuon[7]