Original Research Paper

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Non invasive screening for oral precancers using chemiluminescence

General Surgery

KEYWORDS: oral premalignant lesions, chemiluminesence, biopsy, screening.

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ABSTRACT

Oropharyngeal cancers are the 8th most common cancer worldwide. In India oral cancer is the most common cancer with an age standardized incidence of 12.6 per 100,000 populations. [1]

Our Aim is to study the reliability and effectiveness of chemiluminesence as a non invasive screening tool for oral pre cancers and to compare the results with gold standard of biopsy.

We have studied 100 patients with in the age group of 21 – 70 years with oral precancers in a cross sectional, intervention study, where after clinical examination patients were screened by chemiluminesence using Vizilite light stick[tm] and were then subjected to biopsy. The data was then subjected to statistical analysis. Permission of institutional ethics committee of GMC Gondia was taken. Study duration was from August 2016 to January 2017.

AIM: Our AIM is to study the effectiveness of non invasive screening method (chemiluminesence) for oral precancers and to compare its sensitivity and specificity in screening oral precancer lesions with the gold standard of biopsy.

Materials & Methods: We have studied 100 patients within the age group of 21 – 70 years with oral precancers (premalignant lesions) in a cross sectional, interventional study, where after clinical examination patients were screened by chemiluminescence and incision biopsy was taken to compare the results.

Vizilite plus[TM] was used as a source of chemiluminesence. The data was then statistically analysed.

Results : In our study chemiluminesence has sensitivity, specificity, positive predictive value, negative predictive value of 58%, 71%, 76% and 50.94%.

With 28 true negative, 34 true positive, 25 false negative and 13 false positive results. In our study chemiluminesence has high false negative cases with low sensitivity and low negative predictive value.

Conclusion: In our study chemiluminesence has high false negative cases with low sensitivity and low negative predictive value we totally agree that further studies are required to evaluate the full potential of chemiluminesence as a diagnostic adjunct in demarcating oral premalignant lesions.

Introduction

Oropharyngeal cancers are the 8th most common cancer worldwide. In India oral cancer is the most common cancer with an age standardized incidence of 12.6 per 100,000 populations. [1]

It accounts for 50 -70 % of total cancer mortality.[2]

Though easily accessible for examination, oral cavity cancers are usually first diagnosed when they become symptomatic & approximately two thirds of the patients present with advanced disease, regional metastasis as a consequence of which they have poor prognosis.[3]

This form of cancer is pre-eminently curable if it is diagnosed early. This helps in improving patients life by decreasing the morbidity and mortality associated with this disease. As has been stated by S P Khandekar, PS Bagdey, R R Tiwari, in 2006 in their study that "detecting oral cancer in early stages, when these are amendable to single modality therapies, offers the best chance of long term survival".[2]

The most commonly encountered & accepted precancerous lesions in the oral cavity are leukoplakia and erythroplakia. [4] With 5-25% Leukoplakia being premalignant lesions & 80% of erythroplakia harbouring malignancy. [5,6] The step towards prevention is early detection of malignancy.

Materials & Methods

A total number of one hundred patients spanning in an age group of 21 to 70 years were included in the study. A hospital based cross-sectional & interventional study was carried out after taking approval from the institutional ethical committee. Out of one hundred patients 70 were male & 30 were females. Each patient in the study was enrolled after a proper informed & written consent with inclusion criteria being predisposed patients presenting with pre malignant lesions in the oral cavity diagnosed clinically by the authors. Those excluded were established cases of malignancy, patients with dentures & patients with pigmented lesions. We have used Vizilite light stick[tm] for chemiluminesence light source.

After doing a thorough clinical examination & notifying the lesions, Patients were given 1% acetic acid rinse (vizilite[tm] rinse) 30ml solution for 1 minute followed by an examination by chemiluminescent illumination (vizilite[tm] light stick) and results are notified (Standard protocol as published by Zila pharmaceuticals, makers of Vizilite[tm] & provided with the product was followed). Biopsy was taken from the identified lesions and biopsy results were notified. The data was then subjected to statistical analysis.

RESULTS

A total of 100 individuals were screened 70 males and 30 females. The age group in our study spanned from 21 to 70 years, with highest incidence in the age group of 41-50 years age group. Tobacco chewing (in any form) was the most common addiction either alone or concomitant with other addictions with 65% patients addicted to it. Buccal mucosa was the commonest site of presentation of these lesions with 62% patients presenting with the lesions over this site.

Diagram (1)

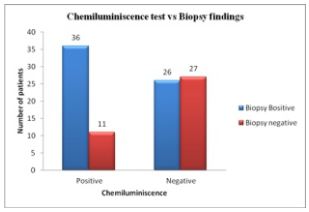

Diagram (1): Distribution of patients with respect to chemiluminesence test findings and histopthology (Biopsy) findings.

Table (1)

Chemiluminesence	*Biopsy*		*Total*
	Positive	*Negative*	
Positive	34	13	47
Negative	25	28	53
Total	59	41	100

Sensitivity	Specificity	Positive Predictive Value	Negative Predictive Value
58.06%	71.05%	76.60%	50.94%

Table (1) Sensitivity & specificity of chemiluminesence

The overall sensitivity and specificity of chemiluminesence in detecting oral precancers (dysplasia, carcinoma in situ & malignancy) was 58.06% & 71.05% with 28 true negative, 34 true positive, 25 false negative, and 13false positive results and Kappa Coefficient of 0.271.

Discussion:

It is a well known fact that scalpel biopsy and subsequent histological examination is the cornerstone for diagnosing premalignant & malignant oral lesions, but an oral biopsy is invasive and involves both psychological implications for the patients as well as technical difficulties for the health practioners. Like in cervical cancers where non invasive screening methods predominate the scene nothing much has been done for oral cancer screening using non invasive methods. Though we know the stigmata associated with oral cancers.

It has been stated that low intensity multichromatic light is differently absorbed and reflected from the tissues of varying densities. [9] The vizilite^{tm} uses the same principle as it imparts multichromatic low intensity light with spectral wavelengths in between 430-580 nm which produces a visible blue light.[8] Gynaecologists have long been aware of the ability of acetic acid to enhance regions of thickened surface keratin of uterine cervix. In the oral cavity, likewise, it makes the keratin whiter & more visible.

The vizilite^{tm} light stick takes advantage of this property of acetic acid and adds blue light to even further enhance keratin detection as the lesions appear "aceto white" in a blue background of normal epithelium.[7,8] (Fig 1a,b) .This light is obtained by fracturing the two capsule system of vizilite^{tm} light stick and mixing the contents. (Fig 1 c)

Fig 1, a. Without chemiluminescence

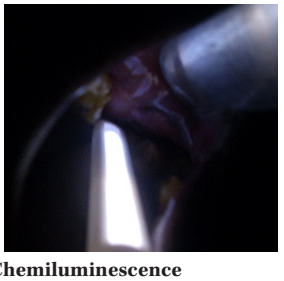

Fig 1,b. Positive Chemiluminescence

Figs 1, c. Illuminated light stick.

Conclusion:

From our study we have concluded that chemiluminesence is not superior or as accurate as biopsy. Biopsy though invasive, is still the gold standard to diagnose and confirm premalignant and malignant lesions of oral cavity.

In our study chemiluminesence has high false negative cases with low sensitivity and low negative predictive value.

The results in our study co-relate with the results by Ravi Mehrotra; Mamta Singh; Shaji Thomas [10] in context to low sensitivity and low positive predictive value, though study carried by Navneet Sharma , Mubeen [8] who in their case study have reported chemiluminesence sensitivity, specificity, positive predictive value and negative predictive value as 69.6%,81.5%,76.2% and 75.9%.

Lauren L. Patton; Joel B. Epstein; A. Ross Kerr [11], Lingen MW et al [12] in their independent review of various adjuncts in oral cancer screening have mentioned that the main problematic issues associated with these studies are their mixed results which necessitates further studies to establish the role of these adjuncts in oral pre cancer screening and we advocate the same.

Abbreviation

TM/tm- Trademark of Zila Pharmaceuticals Inc, Pheonix, USA.

Conflict of interest: NONE

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