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**Review Article** 

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## **Conventional and Superior Diagnostic Aids in Oral Cancer Screening**

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## ABSTRACT

Oral cancers are one of the most communal cancers globally today. Oral cancer accounts for a expressively superior section of the entire cancer cases. They are typically unobserved by the general people when connected to systemic cancers such as the lung cancer, colon cancer etc. Survival rates of oral cancers are comparatively low in contrast to other major cancers, though incidence rates are as low as 3%. Though, they also might be exceptionally fatal if left untreated even at a very early stage of the lesion. Dental health care workers have a duty to perceive benign and it grants the whole dental team with significant duties, challenges and a real prospect to save life. Delay in diagnosis, metastases, and the existence of secondary tumors are the main reasons for the poor prognosis of oral cancers. The purpose of this paper is to offer a detailed review about the numerous advanced diagnostic aids in the diagnosis of oral cancer.

Keywords: Oral cancer; LBC; Cytopathology; Brush biopsy; Vital tissue

## **INTRODUCTION**

Oral cancer (OC) refers to all violent neoplasms that influence the outside lip, oral cavity, and oropharynx; though, the major variety is oral squamous cell carcinoma (OSCC) and can concern all tissues of epithelial source (Figure 1). Internationally, oral cancer has one of the highest humanity rates among all distortions. It is familiar as the sixth most common cancer, and 270,000 new cases are predictable each year. There is significant disparity in geographical occurrence across the world, signifying geographical changes in risk factors, most of which have been recognized in other epidemiological studies. In South Asia and the Indian Subcontinent oral cancer accounts for nearly one third of all malignancies, in difference to the Western world, where it is moderately unusual and accounts for only 2-5% of all malignancies. India, Sri Lanka, and Pakistan have the maximum levels of the disease, and it is the most communal cancer for men in these nations and accounts for up to 30% of all new cases of cancer matched, to just 3% in the United Kingdom (UK) and 6% in France.



Figure 1: Oral cancer representative image

The prevalence of oral cancers is high in countries of South Asia and the Indian Subcontinent, where separate traditional practices, such as betel nut chewing, and variable designs of tobacco and alcohol use are significant risk factors that dispose people to cancer of the oral cavity. The trouble is not basically that the figure of fresh oral cancer cases is static or rising, as people carry on to put them at risk more smoking and extreme drinking. An equal or greater challenge is that oral cancers are not being found early adequate for successful handling. Oral cancer screening is subsequent the same course, with case law previously inaugurating that a dentist's duty of care comprises an Obligation to inspect the whole mouth. A distinct complaint could allege breakdown to recognise the chances of a growth having famous swollen gums and loose teeth, for instance, with a lack of suggestion of enough health and public history-taking and interruption in construction an expert referral.

## **RISK FACTORS FOR ORAL CANCER**

Oral cancer is a multifactorial disease and the pathogenesis is likewise multifaceted. Oral Cavity carcinomas are mainly instigated by chemical carcinogens, though evidence associating infectious factors (e.g. human papilloma viruses) and physical stimuli (e.g. recurrent trauma or chronic inflammation) in some carcinomas continues to grow. The most protuberant modifiable risk factors are lifestyle factors, comprising tobacco and tobacco products, alcohol, betel quid chewing, and poor diet, while the non-modifiable risk aspects are growing age (>40 years) and sex (male > female).

It has not been likely to prove convincingly a causative society among exact aetiological aspects and OSCC, signifying that the causes are multi factorial [1]. A causative aspect role over a complete time and malignant adjustment must turn out so slowly that there is a generous lag period facing it is clinically evident. The suggested risk factors for OSCC are:

- Carcinogens tobacco, alcohol, areca nut.
- Sunlight (lip lesions only).
- Infections syphilis, candida, viruses (e.g. HPV 16).
- Mucosal disease epithelial dysplasia, LP, OSF
- Genetic disorders dyskeratosis congenita, Fanconi's anaemia.

The effects of tobacco on the oral mucosa rest on the way it is inspired. In the UK cigarette smoking predominates and is supposed to be the major aetiological aspect for OSCC in synergistic mixture with alcohol. While, in South Asian countries tobacco chewing as well as smoking is a common habit and is often also connected with areca nut extract usage. Mixtures of a quid of areca nut, lime, tobacco and spices wrapped in betel leaf as paan are detained in the sulcus and this position is often someplace OSCC Improved in these entities. Areca nut releases the potent carcinogen are colin which acts in calculation to the crowd of carcinogens in tobacco. Areca nut mine custom is also the main aetiological feature in the development of the possibly malignant perplexity Oral Submucous Fibrosis.

## Age

There is no uncertainty that growing age is a main risk aspect for increasing oral cancer. In Europe, 98% of all head and neck cancer patients were more than 40 years old. Equally, in Australia it is erratic to discover oral cancer under the age of 40 years [2].

Key messages for oral cancer prevention:

- Don't smoke
- Keep within suggested guidelines for alcohol consumption
- Cut out use of betel-quid and evade tobacco use in the quid
- Don't sleep with the betel-quid in the mouth overnight
- If you use a quid, rinse your mouth thoroughly later
- Discourage children and young adults from chewing betel quid/areca/gutkha/tobacco
- Eat plenty of fresh fruits and green-yellow vegetables

## Screening Strategies

The WHO describes selection as the presumptive detection of unrecognised disease or flaws by means of tests, examinations, or other processes that can be practical quickly. The whole benefit should also balance any damage that results from selection. In adding, when communal resources are used to fund screening, there must be a group of people consensus that the welfares of screening protect the expense [3].

## DIAGNOSTIC AIDS IN SCREENING OF ORAL CANCER

Diagnostic aids can assist the doctor to decide whether the suspicious lesion needs biopsy or elimination for cancer detection. Occasionally nasty variations occur without any experimental signal of malignancy. In this point even a experienced eye might overlook malignant changes. Diagnostic aids can disclose these occult variations. In other word, diagnostic aids can be used as selection or as adjunctive tools. The result whether to screen for oral cancer or not depends on numerous factors. Below shown the criteria for realization of a screening plan and when screening is chosen for oral cancer in a specific people, a proper test should be occupied. Below the characteristics of a good screening test has been demonstrated. The disease must be a significant health problem an accepted treatment must be available for patients with familiar disease. Amenities for diagnosis and treatment must exist and there must be an identifiable latent or early symptomatic stage. A suitable test must be existing the test should be satisfactory to the population the natural history of the condition should be sufficiently understood There should be an agreed policy on whom to treat as patients. The screening program must be cost-effective the screening process should be a continuing procedure and not a 'once and for all' project [4-6].

## The Essential Elements of a Patient History for Oral Diagnosis

- 1. Chief complaint
- 2. History of the present illness (HPI)
- past medical history 3.
- 4. Social history
- 5. Family history
- 6. Review of systems
- 7. Dental history

# **Cytopathologic Studies**

## **Oral exfoliative cytology:**

Cytopathology is the minuscule study of cell examples collected from mucosal surfaces attained by exfoliative cytology (via smears, scraping or lavage) or by fine needle aspiration. Cytology has been functional to diagnose human diseases, ever since Papanicolaou and Traut validated it for diagnosis of cervical cancer (Papanicolaou GN 1941). Since then cytology of the oral cavity began to be used as a cytopathologic diagnostic method. In this method a collecting devise (swab, spatula and brush) is placed and alternated against the mucosal surface and the cells are composed. The next step is to make a smear by spreading the cells onto a glass slide. After fixation and papanicolaou mark the slide is inspected by pathologist. Interpretation of the results must be achieved by an expert pathologist acquainted with cytopathology. Occasionally cells are composed by a cytobrush. Analytical values of exfoliative cytology have a wide range due to kind of sampling instrument.

## **Brush biopsy:**



#### Figure 2: Brush biopsy

Oral CD-x brush is a kind of particular oral brush, which can infiltrate the thickness of the mucosa and collect illustrative example of the lesion. Basal and parabasal cells- which are the precursor of malignant changes- are composed by this specially designed brush. "Brush biopsy" employs oral CD-x brush, which is then examined by computer [7,8]. Some revisions have used oral CD-x brush, but have examined the result by visual histopathology inspection and not by computer (Figure 2).

## Liquid based cytology (LBC):

Since 1990, liquid-based cytology (LBC) has been intended to increase slide quality and quantity of conservative cytology. LBC is developments in cytology method that can compensate numerous drawbacks of conventional exfoliate cytology. In its place of a exclusive smear, a suspension of cells is attained and numerous slides could be prepared. In LBC the sample aerial with the model is held in a tube comprising stabilizer fluid, which fixes the cells straight and can be a useful resource of cells for upcoming researches. The fluid is placed on a centrifugal force and the cells make a thin high cellular confined zone on the glass slide, which can be evaluated easily by the pathologist. Numerous artifacts of conventional cytology do not happen in LBC method. By employing this method unsatisfactory slides and false negative results have been abridged and the diagnostic value of cytology has developed.

## Vital Tissue Staining

#### Vital iodine stain:

Vital iodine stain (3% lugol solution) has been used to rule the finest site for biopsy in endoscopy of alimentary expanse and cervix. This system workings on required of iodine to glycogen granules in the cytoplasm, ensuing in a black brown tissue color. In a lesson of 54 patients with oral cancer or OPL, this dye was used to fix on surgical limits. The consequences showed a suggestively low (<2%) reappearance rate.



Figure 3: Tissue staining

## **Toluidine blue staining:**

Tolonium chloride – 'toluidine blue' – has been used in subordinate care for numerous years to help classify dysplastic or malignant mucous membrane. Studies between high risk patients have recommended that more asymptomatic lesions are found using tolonium chloride than with a clinical examination alone. Studies of normal populations are tougher to conduct for the reason that of the low number of lesions to be found and additional research is required into the usefulness of tolonium chloride in a main care context (Figure 3). But the method is becoming accepted as a screening adjunct in primary care, with recent authorization from the FDI World Dental Federation [9].

## Light-based Detection Systems

## Chemluminescence (reflective tissue fluorescence):

In this technique the mouth is cleaned with 1% acetic acis clean, which helps to eradicate debris and increase the visibility of epithelial cell nuclei an effect of mild cellular dehydration. The blue white illumination will be simulated by unusual tissue, making occult lesion diverse from normal mucosa. The normal mucosa seems blue while abnormal mucosal lesions reflect the light and appear more aceto-white with brighter, sharper and more separate margins.

## **Tissue fluorescence imaging:**

In this method an intense blue excitation light (400-460 nm) is illuminated to oral mucosa and the abnormal tissue releases fluorescence due to altered formation and metabolism of epithelium and subepithelial stroma. Normal mucosa releases pale green auto fluorescence while irregular tissue seems darker in assessment to surrounding healthy tissue. Microlux, orascoptic and veloscope are instances of this method (Figure 4).



Figure 4: Tissue fluorescence imaging

#### Saliva:

Saliva has a cleansing effect on the teeth. Usually, 700– 800 ml of saliva is concealed per day. Caries activity upsurges as the viscosity of the saliva rises. Eating fibrous food and chewing energetically upsurges salivation, which helps in digestion as well as increases cleansing of the teeth? The capacity as well as work, pH, viscosity and buffering ability of the saliva plays a role in dental caries.

#### **CONTRIBUTION OF BIAS**

Whilst diagnosis in the asymptomatic phase from opportunistic oral cancer screening is worth accomplishing, it should be renowned that the success of any screening interference could be exaggerated by length-time and lead-time bias [10]. Length-time bias happens when the likelihood of noticing aggressive (rapid-growing) oral cancers by showing is low due to the fact that the period until symptoms arise is short. In contrast, less aggressive (slow-growing) cancers have longer periods until symptoms arise and are easier to detect by screening. This phenomenon might lead a researcher to think that an early diagnosis progresses prognosis, when in fact the screening method simply detects tumours that are biologically less aggressive [11]. Lead-time bias happens when survival following an oral cancer diagnosis appears better when cases are recognized early; when in fact the patient did not live any extended than he or she would have if the cancer had been identified in the symptomatic period.

#### CONCLUSION

Unluckily, no technique or knowledge to date has delivered definitive proof to recommend that it progresses the compassion or specificity of oral cancer program beyond clinical oral inspection. Unlike the mainstream of additional cancers, OSCC can be noticed early when action is simple and effective. There are numerous diagnostic aids for early discovery of oral cancer. Yet the gold ordinary of oral cancer diagnosis is surgical biopsy, which can be achieved by a trained dentist/physician.

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