Early Detection of Oral Cancer – Guidelines for Dental Practitioners
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Abstract:
Oral cancer is a common disease of global concern. It is known to be a devastating disease of tremendous consequence to the individual, to family, and to society. Early detection is the key in fight against oral cancer and has the potential to significantly reduce oral cancer deaths and morbidity. Screening for oral cancer by visual examination is simple, inexpensive and causes little discomfort. Adjunctive screening tools may be of added value and could be considered in conjunction with the annual oral cancer screening examination or at the time of identification of any suspicious lesion. The integration of an oral cancer screening examination into daily practice requires little additional time or expense in an already busy practice. The challenge to the dental profession is to ensure that all adult patients have a brief but regular oral cancer screening examination. A standardized step-by-step approach to oral cancer screening and to the evaluation of any mucosal lesion suspected to be premalignant or malignant is highly recommended.

Key Words: Adjunctive tools, oral cancer, oral precancer, screening

Introduction
Oral cancer is the eighth most frequent cancer in the world among men and the 14th among women, accounting for nearly 3% of all cancer cases worldwide.1 Over 80% of oral cancers are associated with tobacco use.2 Other known risk factors of oral cancers include alcohol and betel quid consumption. While historically the majority of patients have been found to be over the age of 40 at the time of detection, it does occur in those under this age. From a gender perspective, although the disease is more frequent in men than in women (1.8:1), the (higher) sex ratio is narrowing slowly. This is most likely due to lifestyle changes, primarily an increase in the smoking habit among women over the latter part of the last century, although firm data on this link are lacking.

Despite numerous advances in treatment, the 5-year survival has remained approximately 50%.3 Oral cancer is particularly dangerous because in its early stages it is usually asymptomatic and may not be noticed by the patient. Deaths associated with oral cancer are particularly high because this cancer is all too frequently discovered late in its development.4 Often, it is discovered only after cancer has spread to regional lymph nodes or has some associated symptoms. Prognosis at this stage of detection is significantly worse than when it is caught early. As well as increased probability of metastasis, at these later stages, the primary tumor also has had time to invade more deeply into local structures.

Poor prognosis is also attributed to lack of knowledge toward oral cancer associated with both health care professionals and patients.5,6 Data from the studies carried out on medical and dental students, dentists, dental hygienists, physicians, and nurse practitioners demonstrate a strong association between their lack of knowledge and ability to perform standardized preventive and diagnostic procedures.7,8

One approach to this problem would be to improve the ability of oral health care professionals to detect oral potentially malignant disorders (OPMD) at their earliest or most incipient stage. Such a goal could be achieved by increasing public awareness about the importance of regular oral screening or case finding examinations to identify small, otherwise asymptomatic cancers and precancers (secondary prevention). Another strategy would be the development and use of diagnostic aids that could help the general dentist or dental specialist more readily identify or assess persistent oral lesions of uncertain biologic significance.9 This paper is intended to provide guidance about the appropriate use of oral cancer screening techniques and to help dentists make informed decisions about screening for oral cancer in practice, which will eventually be used to facilitate clinical decision-making.

Patient History
The first step in the screening of oral cancer is to attain a detailed and comprehensive patient history that includes: A detailed medical history with listing of current medications...
and medication allergies; a detailed dental history with past
dental visits and treatments performed; a detailed history of
oral habits and lifestyle with specific reference to frequency,
quantity and duration of tobacco, betel quid, and alcohol
consumption; any oral/dental associated signs and/or
symptoms.

**Systematic Visual Oral Examination**
For a systematic visual oral examination, a health practitioner
visually examines both extraoral and intraoral region with
the incandescent light source, gauze, mouth mirror, and
magnification.

**Extraoral examination**
The extraoral examination includes: Inspection of the head
and neck region for any asymmetry, tenderness, or swelling;
palpation of the lymph nodes (submental, submandibular,
preauricular, supraclavicular, cervical, and occipital);
inspection and palpation of the lips and perioral tissues for
any abnormalities.

**Intraoral examination**
The intraoral examination consists of systematic inspection
and palpation of all oral soft tissues, with particular attention
to the high-risk sites (lateral and ventral surfaces of tongue,
floor of the mouth and soft palate) for the presence of OPMD
and/or oral cancer.

**Lesion assessment**
This includes a detailed evaluation of each oral lesion with
particular attention to specific characteristics that is duration,
size, color, site, texture, and any associated symptoms. The
lesions which need particular attention are white, red, mixed
white and red patches, and/or any ulcerated lesions with a
history of more than 2 weeks.

**Documentation**
At the time of initial assessment and at each follow-up
appointment, it is recommended that in addition to writing all
the clinical notes, an image of the clinically visible oral lesion be
obtained as well. This not only serves the medico-legal purpose
but also helps the health practitioner to compare the progress
of the lesion over a period of time and to modify or continue
the treatment plan accordingly.

**Adjunctive Tools for Screening**
A number of chair-side adjunctive tools have been developed
to help practitioners with oral cancer screening with the aim
of diagnosing high-risk lesions. Although these tools are not
diagnostic alone, they do have the aptitude to identify OPMD,
enhance visualization, and assist in biopsy site selection.^{10-12}
These tools are complementary to and not a replacement to
a comprehensive history and conventional oral examination
and, therefore, should be used with caution in the background
of proper training and experience.

**Light-based screening adjuncts**
Autofluorescence, one of the potential tools, works on the
principle that certain biofluorophores present within the tissue
become fluorescent on excitation with a suitable wavelength
(400-460 nm) light source. In contrast, diseased tissues lose
fluorescence due to disruption in the distribution of these
biofluorophores, and appear darker in color. The technology
utilizes a hand-held device, VELscope® that emits a cone of
blue-light, that when directed into the oral cavity, causes
normal healthy mucosa to emit an apple-green fluorescence
while the altered mucosa appears dark brown to black. There is
evidence in the published literature that VELscope is useful in
confirming the presence of oral leukoplakia and erythroplakia
and other oral mucosal disorders.^{10,13}

Chemiluminescence, another optical-based test has recently
been adapted for use in the oral cavity with the development
of a hand-held device, namely ViziLite system®. The system
is said to detect the mucosal tissues undergoing abnormal
metabolic or structural changes that by their nature have
different absorbance and reflectance profiles when exposed
to various forms of light sources – as a result enhancing the
identification of oral mucosal abnormalities. The device can be
used as a general oral mucosal examination system and may, in
particular, improve the visualization of leukoplakias.^{11}

**Vital tissue staining**
Toluidine blue (TBlue) has been used for more than four
decades as an adjunctive test for the detection of OPMD
and/or oral cancers. TBlue is a cationic metachromatic
dye that selectively binds in vivo to acidic tissue components
(sulfate, carboxylate, and phosphate radicals) of DNA and RNA,
tissues undergoing rapid cell division (such as inflammatory,
regenerative, and neoplastic tissues) and also may be retained in
intracellular spaces of the dysplastic epithelium.^{14-16} The binding
results in the staining of abnormal tissue with a blue coloration
that contrasts with adjacent normal mucosa. Its use in vivo is
based on the fact that dysplastic cells contain quantitatively
more nucleic acids than normal tissues.^{17} Previously, the system
was available in the form of an oral rinse; however, recently it
has been marketed in the form of swab along with ViziLite as
ViziLite Plus® – an oral lesion identification and marking system
which has found to be more convenient for use by the clinicians
and user-friendly for our patients.^{12}

**Diagnostic Biopsy**
The current gold standard for the assessment of OPMD and
to establish a definitive diagnosis of oral cancer is to perform a
tissue biopsy followed by histopathological analysis. Any white,
red, mixed white and red patch, and/or ulcer that have not
resolved for more than 2 weeks following removal of identified
local irritants such as trauma, infection or inflammation
necessitate a biopsy. If the biopsy confirms the presence of
dysplasia, an oral risk assessment is recommended to determine
appropriate management. This includes advice and support on risk-habit cessation and may range from long-term monitoring to medical and/or surgical therapy.

**Level of Evidence**

Because of the cost implications and the potential for over-diagnosis (false positive result), strict criteria are needed to evaluate screening programs and to determine their appropriateness before they are implemented. In the UK, for example, the National Screening Committee has listed 22 criteria (Table 1) that should be met before a screening program is introduced. Figure 1 illustrates the recommended pathway for the referral of OPMD and oral cancer.

The standard of scientific evidence required to prove that screening is beneficial to the patient is extremely demanding. There are a number of characteristics that should be considered in the development of an ideal screening test (Table 2). The ideal is to have evidence from a prospective randomized control trial to show that subjects which are offered screening have a reduced mortality rate, as compared to those who were not offered screening. A study to show this needs to be extremely large and requires a long follow-

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**Table 1: Criteria for the implementation of a screening program.**

- The disease must be a significant health problem
- An accepted treatment must be available for patients
- Facilities for diagnosis and treatment must be available
- There must be a recognizable latent or early symptomatic stage
- An appropriate test must be available
- The test should be acceptable to the population
- The natural history of the condition should be sufficiently understood
- There should be an agreed policy on treatment priority
- The screening program should be cost-effective
- The screening process should be a continuing process and not a ‘once and for all’ project

**Table 2: Characteristics of a good screening test.**

- Be simple, safe, and acceptable to general population
- Detect disease in the early stages
- Specifically detect those lesions which are likely to progress
- Detect lesions which are treatable or where an intervention will prevent progression
- Have a high positive predictive value and low false negatives (high sensitivity)

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**Figure 1: Recommended referral pathway for oral potentially malignant disorders and oral cancer.**
up. Screening for breast cancer by mammography and for colorectal cancer by fecal occult blood testing are the only cancer screening procedures for the general population supported by this ideal best evidence.

Oral cancer is a less frequent problem compared to breast or colorectal cancer in developed countries, and as a result, no large-scale prospective studies have been done. Furthermore, it will take many years to produce mortality results if a study to assess the use of the newer technologies in oral cancer screening is started now.

Evidence of benefit may also be obtained by the demonstration that screening result in early cancer detection with better clinical results, or from observational studies comparing screened and unscreened subjects. The most long-established cancer screening program, for cervical cancer by Pap smears, is not supported by randomized trials but is supported by consistent evidence from these weaker types of study design.

For oral cancer screening, there is, in fact, one such randomized trial evidence, which was carried out in India where more than 95,000 people were offered oral visual inspection by community health workers, with a similar number of people not offered screening, and up to 12 years monitoring of mortality results.20 Even with only 63% of people found with lesions coming back for the follow-up assessment, deaths from oral cancer were reduced by 21% in the group offered screening compared to the control group. In addition, in users of tobacco or alcohol the reduction was even further (34%) and statistically significant. No such extensive trials of oral cancer screening in developed countries have been performed.

The clinical recommendations presented here for dental practitioners address opportunistic screening, that is, screening in the context of a clinical assessment linked to routine care. The recommendation that oral cancer screening should be offered in the context of routine dental care is justified by the simplicity of the procedure and the minimal risks involved, compared to the potential benefits.

Summary
To summarize, there is no definitive scientific evidence of the ultimate benefit of oral cancer screening, as there are not many randomized control trials performed. However, the results of the Indian trial and other sources of evidence are encouraging. The visual oral examination is simple and risk-free, and can identify OPMD and early-stage oral cancer. The addition of methods such as autofluorescence, chemiluminescence, TBlue and a number of other developing procedures, adds to that potential. Dental practitioners are encouraged to take part in further research and evaluation studies where they have the opportunity.

References