

Exploring the comprehensive review of diagnostic methods of oral cancer: A global scenario

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World Journal of Biology Pharmacy and Health Sciences, 2023, 15(01), 043–048

Publication history: Received on 21 May 2023; revised on 01 July 2023; accepted on 04 July 2023

Article DOI: <https://doi.org/10.30574/wjbphs.2023.15.1.0292>

Abstract

Oral cancer is one of the common cancers in the worldwide, with a delayed clinical detection and prognosis. There is no specific biomarkers for this kind of disease and also no expensive therapeutic alternative methods. It is two to three times more prevalent in men than women in most ethnic groups. It is a preventable disease, where smoking and alcohol-considered major risk factors. India has one of the highest incidences of oral cancer and delayed stage recovery is common. Surgery remains the treatment of choice and adjuvant treatment is recommended in patients with high-risk. Functional outcomes and treatment-related morbidity needs to be considered, and reconstruction with free tissue transfer provides the best outcomes. Particularly while speech, swallowing, mastication efficiency, and dental rehabilitation. Future generations has to fight these dreadful diseases until scientists and clinicians are provided the opportunities to expand efforts to prevent, detect (early), and eradicate oral and other head and neck cancers.

Keywords: Oral Cancer; Dental rehabilitation; Dreadful diseases; Types of cancer

1. Introduction



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Figure 1 Oral cancer

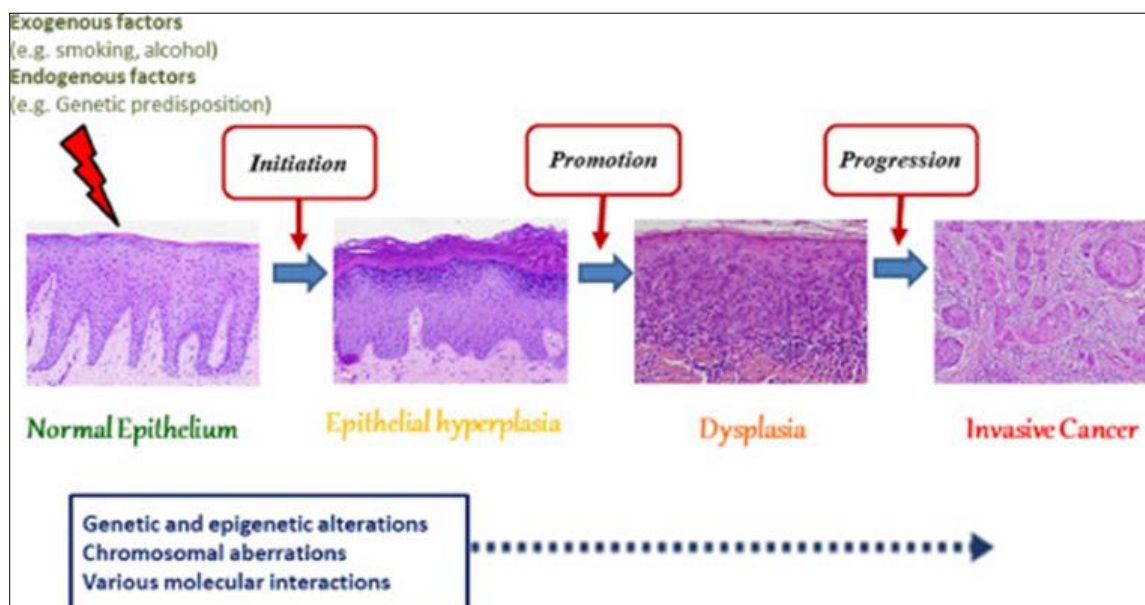
Oral cancer is that start in cells in the mouth or throat. It is that most common form of cancer in India 1,30,000 people succumb to oral cancer in India annually. The reason for this more prevalence of oral cancer in India is primarily tobacco consumption in the form of gutka, quid, snuff or misri. In the North East India, the use of areca nut is an important risk factor for oral cancer. Mouth cancer can occur on the tongue, buccal mucosa, soft palate, floor of the mouth, hard palate and pharyngeal walls and tonsils[1].

2. Etiology

Tobacco is the most significant risk factor for oral cancer. In comparison to people who never smoked. In India the use of smokeless tobacco is rampant in the form of betel quid (pan) that contains areca nut & lime with dried tobacco leaves this form of tobacco has been shown to be highly carcinogenic. Traditionally the pan is placed in the gingival-buccal sulcus & often retained for prolonged durations, which is responsible for the high prevalence of gingivo- buccal cancer. Recently there has been increasing popularity of dried tobacco & areca nut mixtures especially among the youth owing to their aggressive marketing in India. Alcohol alone confers a 1.7- fold risk to men drinking 1-2 drinks per day as compared to non-drinkers. The consumption of 25,50 & 100g per day of pure alcohol was associated with a pooled relative risk of 1.75, 2.85 & 6.01 of oral & pharyngeal cancer respectively. Tobacco & alcohol share a synergistic relationship[2].

3. Molecular pathogenesis

The incidence of oral cancer is significantly higher in Indian population compared with that in the USA & Canada. The gingival-buccal complex forms the most common sub site for oral cavity cancer in India in contrast to the tongue & floor of the mouth, which are common in the west. India smokeless tobacco exposure is common as compared to the smoked version in the west. Population characteristics of oral cancer also differ between India & the west with higher preponderance among Indians. Higher Prevalence of smokeless tobacco is associated with higher rates of several primary tumor compared with the west[3].

**Figure 2** Progression of Oral cancer**4. Oral cancer staging**

Staging is a way of classify cancer by how much disease is in the body & where it has spread when it is in the body & where it has spread when it is diagnosed.

Disease stage is determined by the size of the primary tumour the cancer has spread to the lymph nodes[4].

Table 1 Oral Cancer staging

TX-	Primary tumour cannot be assessed
Tis	Carcinoma in situ
T1	Tumor(0-2cm) in greatest dimension
T2	Tumour (2-4cm) in greatest dimension
T3	Tumour >4cm in greatest dimension
T4a	Tumour invades adjacent structures (eg.cortical bone).

5. Potentially malignant oral disorder

A pre-malignant lesion is a misnomer. The current nomenclature of potentially malignant disorder is based on the WHO. This disorder predominantly comprise Leukoplakia, erythroplakia & Lichenoid Lesion[5].

5.1. Leukoplakia:

Although leukoplakia is more common in males than in females the latter has a higher risk of developing oral cancer. Leukoplakia, “a white, irreversible, non-scrapable lesion of the oral mucosal membrane that cannot be characterized clinically or histopathologically or any other lesion/disease and has high risk of cancer occurrence than its normal counterpart and is usually associated with consumption of tobacco, betelnut and alcohol but otherwise can be of idiopathic in nature”[6].

5.2. Erythroplakia

Is classified into three types-Homogenous granular and speckled. Erythroplakia most frequently occurs in males aged 50-70. The point prevalence rate of erythroplakia in the oral cavity has been estimated to be 1 per 2500 adults. Common sites of involvement are floors of the mouth, tongue, retromolar pad and soft palate[7].

6. Screening methods for oral cancer

During health checkups, a healthcare professional various methods to look for any abnormalities in the oral cavity that might indicate cancer[8, 10].

Screening for oral cancer may involve the,

- **Medical history:** It is important to review a person’s health habits, previous illnesses, and treatments. A person who smokes or drinks alcohol may have a developing oral cancer.
- **Physical examinations:** Dentists, hygienists, or doctors will examine the mouth and throat. They may look for abnormal symptoms, such as lumps or patches.
- **Laboratory tests:** If the healthcare professional spots an abnormality, they may send samples of blood, tissue, or other substances to a laboratory for analysis.
- **Imaging tests:** These include procedures that take images of the inside of the body, such as MRI-SCAN, PET-SCAN, CT-SCAN and dental X-rays.

The specific methods that a healthcare professional may perform to screen for oral cancer include:

6.1. Toluidine blue dye test

A dentist or doctor may perform this test at a regular checkup for those with a high risk of developing oral cancer, such as people who smoke regularly. They are a special type of dye called toluidine blue to coat the inside of the mouth. Any abnormal areas that the dye touches will turn a darker blue. This allows the healthcare professional to detect any abnormal tissue that is difficult to see with the naked eye.

6.2. Fluorescent light test

Another test that a dentist or doctor may perform to diagnose oral cancer early is a fluorescent light test. They will shine a special light into the mouth, and if the light hits abnormal tissue, it will reflect differently than normal tissue. This allows the healthcare professional to detect any tissue that interferes with cancer. A newer device called a VELscope also uses fluorescent light. This device allows healthcare professionals to detect any changes in cellular structure that may indicate cancer. VELscope was a simple, noninvasive, cost effective technique.

6.3. Exfoliative cytology

Exfoliative cytology is the study of cells that a doctor has brushed or “exfoliated” from a person’s body. If a healthcare professional detects any abnormal areas in the oral cavity, they may wish Trusted Source to take some cells for further examination. They will use a brush-like tool to scrape off some of the cells, which they will send to a laboratory for testing. Pathologists in the lab can then analyze the sample for any cancerous or precancerous cells.

The test is simple trusted source and causes very little pain, so it is a good way to detect oral cancer early. However, this method does not show all cancers, and it may sometimes be difficult to tell whether cells are cancerous. In such cases, a doctor may order a biopsy.

7. Self-screening

It states that some doctors and dentists advise people to check their oral cavity regularly for abnormalities. A person should examine their mouth, tongue, gums, teeth, and throat in the mirror at least once a month. This is specifically important for people who smoke, or consume alcohol regularly, as these behaviors are among the risk factors. If a person notices any changes in their oral cavity, such as the development of sores, lumps, or white patches, they should make a note of it. If these symptoms persist for more than 2 weeks, they should contact a doctor or dentist[9].

8. Diagnosis

The following tests may be used to diagnose oral or oropharyngeal cancer:[10]

- **Physical examination.** Dentists and doctors often find out oral cavity cancers during routine checkups. If a person shows signs of oropharyngeal cancer, the doctor will take a complete medical history, asking about the patient’s symptoms and risk factors. The doctor will check the patient for any lumps on the neck, lips, gums, and cheeks. Because people with oropharyngeal cancer have a greater risk of other cancers elsewhere in the head and neck region, the doctor will examine the areas behind the nose, the larynx, and the lymph nodes.
- **Endoscopy.** An Endoscopy makes the doctor to see inside the mouth and throat. Typically, a thin, flexible tube with an attached light and viewing lens, called an endoscope, is inserted through the nose to examine the head and neck areas. Sometimes, a rigid endoscope, which is a hollow tube with a light and viewing lens, is placed into the back of the mouth to see the back of the throat for more detailed examination.
- There are various endoscopic examinations depending on the area of the body that is examined, such as laryngoscopy to reveal the larynx, pharyngoscopy to reveal the pharynx, or nasopharyngoscopy to reveal the nasopharynx. To make the patient more comfortable, these examinations are performed using an anesthetic spray to produce loss of pain in that particular area. If an area looks suspicious, the doctor will take a biopsy.
- **Biopsy.** A Biopsy is one of the diagnostic method in which the removal of a small amount of tissue for a microscopic examination will be done. Other tests can prove that cancer is confirmed, but only a biopsy can make a definite diagnosis. The type of biopsy performed will depends on the area of the cancer. During a biopsy, cells are removed using a thin needle inserted directly into the suspicious area. A pathologist then analyse the cells for evaluating cells, tissues, and organs to diagnose disease.
- **Oral brush biopsy.** During dental checkup, dentists will use a simpler method to detect oral cancer in which they uses a small brush to compile cell samples of a suspicious area. The sample is then conveyed to a laboratory for analysis. If cancer is confirmed using this method, a traditional biopsy will be proceeded to confirm the results.
- **HPV testing.** HPV is an higher risk of oropharyngeal cancer. ASCO recommends that HPV testing is done for all patients those who are all newly diagnosed with oropharyngeal squamous cell carcinoma. This is a type of oropharyngeal cancer that starts in flat, scale-like cells called squamous cells. Testing is not usually recommended for oropharyngeal cancer that starts in other types of cells or for other types of head and neck cancer.
- **X-ray.** An x-ray is used to view the structures present inside the body, using a small amount of radiation.

- **Barium swallow/modified barium swallow.** There are 2 barium swallow tests that are generally used to check the oropharynx. The first is a traditional barium swallow. During an x-ray examination, the patient is asked to swallow liquid barium. This leads the doctor check for any changes in the structure of the buccal cavity as well as throat and see whether the liquid passes easily to the stomach. A modified barium swallow, or videofluoroscopy, may be used to evaluate difficulties in swallowing the food particles.
- **Computed tomography (CT) scan.** A CT-scan used to reveals the inner structures using x-rays taken from different angles. A computer combines these pictures into a detailed 3-D structures that shows any abnormalities or tumors. A CT scan can be used to measure the tumor's size, help the doctor decide whether the tumor can be surgically removed, and show whether the cancer has spread to lymph nodes in the neck or lower jaw. Sometimes, a special dye called a contrast medium is given before the scan to provide detailed image. This dye can be injected into a patient's vein or given as a pill or liquid to swallow.
- **Magnetic resonance imaging (MRI).** An MRI uses magnetic fields, not x-rays, to reveals detailed body structures, especially soft tissue, such as the tonsils and the floor of the tongue. It used to measure the tumour's size. A special dye called a contrast medium is given before the scan to create a clearer picture. This dye can be injected into a patient's vein or given as a pill or liquid to swallow.
- **Ultrasound.** An Ultrasound uses sound waves to shows a picture of the internal organs. This test can shows the spread of cancer to the lymph nodes in the neck, also call the "cervical lymph nodes."
- **Positron emission tomography (PET) or PET-CT scan.** A PET scan is usually combined with a CT scan, called a PET-CT-SCAN. A PET scan is a way to create pictures of organs and tissues inside the body. A small amount of a radioactive sugar substance is injected into the patient's body. This sugar substance is taken up by cells that use the most energy. Because cancer tends to use energy actively, it absorbs more of the radioactive substance. However, the amount of radiation in the substance is too low to be harmful. A scanner then detects this substance to produce images of the inside of the body.

9. Conclusion

Functional outcomes and treatment-related morbidity needs to be considered, and reconstruction with free tissue transfer provides the best outcomes. Particularly addressing speech, swallowing, masticatory efficiency, and dental rehabilitation. Future generations will continue to fight these dreadful diseases until scientists and clinicians are provided the opportunities to expand efforts to prevent, detect (early), and eradicate oral and other head and neck cancers.

Compliance with ethical standards

Acknowledgments

We would like to express our sincere gratitude to all those who have given valuable guidance and support throughout the research process. Those supports helps in shaping our research and helping us to overcome challenges.

Disclosure of conflict of interest

The authors declare no conflict of interest in preparing this article.

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