Oral Changes Due to Tobacco Consumption: A Diagnostic Perspective

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Abstract

Tobacco use is a major public health challenge and has established risk factor for various oral changes. The adverse effects on oral and general health of tobacco smoking are well documented and on average, cigarette smokers die ten years younger than non-smokers.(1) The excessive use of tobacco products has been associated with various lesions in the oral cavity. A routine intraoral examination by a dental health professional can reveal most of these lesions at an early stage, and early intervention may prevent serious sequelae. The literature search for the present review was conducted utilizing various search engines and electronic databases such as PubMed and MEDLINE with the search words “smokers”, “tobacco”, “oral cavity”, “lesions” . In this article we have made an attempt to review the key to diagnosis of various changes in the oral cavity associated with tobacco.

Keywords: tobacco, smokers, smokeless, oral cavity, precancer

1. Introduction

Tobacco is one of the legal consumer products that can harm everyone exposed to it. Although tobacco is the single most preventable cause of death in the world today, its use is common throughout the world due to low prices and inconsistent public policies against its use.(2) Tobacco is chewed and smoked in various forms especially in India. Tobacco is used in the following forms:

Smoke - Preparation of bidis, Cigar / cheroot / chutta, Reverse Chutta Smoking, Chilums, Hookah, Hookli smoker

Smokeless - Pan (betel quid) with tobacco, Mawa, Mainpuri tobacco, Khaini

Application over the teeth and the gingiva - Gudhaku, Bajjar, Creamy, Snuff.(3)

In most areas, betel quid consists of tobacco, areca nut, slaked lime, catechu, and several condiments, wrapped in a betel leaf. In recent years, small, attractive, and inexpensive sachets of betel quid substitutes containing a flavored and sweetened dry mixture of areca nut, catechu, and slaked lime with tobacco (gutkha) or without tobacco (pan masala), often claiming to be safer products, have become widely available and are increasingly used by young people, particularly in India.(28)

For easy understanding, the changes in the oral cavity due to tobacco usage and its diagnosis can be dealt as following:

1. Teeth: Tooth Discolouration, Deposits ,Tooth Abrasion

2. Gingiva : Periodontitis, Acute Necrotising Ulcerative Gingivitis (Anug)

3. Palate: Palatal Keratosis, Ulcerations, Nicotinic Stomatitis, Excrecence, Hyperpigmentation

2. Discussion

India is the second largest consumer of tobacco in the world, second only to China. The prevalence of tobacco use among adults (15 years and above) is 35%. The prevalence of overall tobacco use among males is 48 percent and that among females is 20 percent. Nearly two in five (38%) adults in rural areas and one in four (25%) adults in urban areas use tobacco in some form.(24) The excessive use of tobacco products has been associated with various lesions in the oral cavity. Any product which contains tobacco is not safe for human health. There are more than twenty-five compounds in smokeless tobacco which have cancer causing activity but the Use of smokeless tobacco has been linked with higher risk of oral cancer. Smokeless tobacco contains tobacco-specific nitrosamines (TSNAS), polonium, formaldehyde, cadmium, lead, and benzo[a]pyrene, which are carcinogenic agents.(27) The active ingredient for addiction is nicotine, a naturally occurring drug found in all the different forms of tobacco. Nicotine sustains tobacco addiction by acting on nicotinic cholinergic receptors in the brain to trigger the release of dopamine and other neurotransmitters(34). The patients with systemic diseases like diabetes and hypertension have the higher risk of developing these oral changes on tobacco consumption. The different ways in which tobacco is used lead to considerable variation in appearance, site and frequency of the lesions associated with the tobacco habit. The clinical appearance and diagnosis of these tobacco associated conditions of the oral cavity are reviewed here.

**Tooth Discoloration And Deposits**: Tobacco from cigarettes, cigars, pipes, and chewing tobacco causes tenacious dark brown and black stains that cover the cervical one third to midway on the tooth.(7) Staining is caused by the tar and nicotine in the cigarettes.(14) There is also a strong and independent impact of tobacco smoking on subgingival calculus deposition leading to the gum disease called periodontitis.(13)

**Periodontitis**: Smokers have been associated with deeper pockets and greater attachment loss, more pronounced radiographic evidence of furcation involvement, and increased alveolar bone loss.(9) Smoking exerts a strong, chronic, and dose-dependent suppressive effect on gingival bleeding on probing. Bleeding on probing is less evident in smokers than nonsmokers, indicating its effect on gingival blood vessels. The mechanism by which smoking suppresses gingival bleeding is not understood exactly.(8)

**Anug**: Smoking has long been considered an etiologic factor in acute necrotizing ulcerative gingivitis (ANUG). Tar in the smoke has a direct irritating effect on gingiva giving rise to gingivitis and nicotine causes contraction of capillaries, thus interfering with the nutrition of the gingiva which consequently becomes less resistant to infection.(15) It has an acute clinical presentation with the distinctive characteristics of rapid onset of interdental gingival necrosis, gingival pain, bleeding, and halitosis.(16)

**Tooth Abrasion**: Pipe smoking and the use of smokeless tobacco are commonly associated with tooth abrasion.(4,5) Abrasion from pipe smoking occurs on the occlusal surfaces in association with placement of the pipe stem, whereas abrasion from smokeless tobacco usually occurs on the vestibular surface opposite the wad of smokeless tobacco, but may involve the occlusal surfaces if the tobacco is chewed. Abrasion may result in dentin hypersensitivity, pulp exposure or apertognathia (open bite). Apertognathia develops in pipe smokers and usually occurs unilaterally on the smoker’s favourite side. (6)

Palatal changes is specific to populations who smoke with the lighted end of the cigars or cigarettes inside the mouth, producing changes in the palatal mucosa. The largest number of reverse smokers are found in certain areas of India, but this habit is also practiced in some Latin American countries, in Sardinia and in the Philippines. The palatal changes consist of several components such as elevated white patches, red areas, ulcerations and hyper- or non-pigmented areas. These components occur independently, but more often, they coexist. Palatal cancers arise in this region with pre-existing palatal changes; hence they are considered as precancerous.(26) But there is no acceptable explanation why the soft palate escapes getting
either stomatitis nicotina lesion or carcinoma in reverse smokers.(22)

**Palatal Ulcerations:** Ulcerated areas are characterized by crater-like ulcerations with deposits of fibrin often surrounded by keratinization. Ulcerations form only 2% of the palatal components. They represent a "burn" type reaction of the palatal mucosa from the intense heat of the lighted end of chutta.(3)

**Smokers Palate or Nicotina Stomatitis:** Refers to well-defined diffuse or focal greyish black pigmentation of the palatal mucosa due to increased melanin production by melanocyte. This pigmentation is limited to the hard palate and has regular margins. It is produced due to increased melanin deposition as a protective reaction to heat and its antioxidant properties against toxic products produced during combustion of tobacco within the oral cavity.(11,12)

**Clinical Grading of Smokers Palate:**

**Mild (Grade I):** Consisting of red, dot-like opening on blanched area.

**Moderate (Grade II):** Characterized by well-defined elevation with central umbilication.

**Severe (Grade III):** Marked by papules of 5 mm or more with umbilication of 2-3 mm.(36)

**Smokers Melanosis:** It is a benign limited melanin pigmentation occurring in the attached gingiva of tobacco smokers.(18) Through the stimulation by polycyclic amines, smoking causes the activation of melanocytes to produce melanin. These manifestations of pigmentation are considered normal and generally no treatment is recommended except for aesthetic purposes. Tobacco cessation has been reported to be sufficient in eliminating pigmentation.(17)

**Excrescence:** Excrescences are 1–3 mm elevated area, often with central red dots marking the orifices of the palatal mucosal glands. There may be many of these painless popular lesions in the glandular part of the hard palatal mucosa and are not present in the soft palate or in the anterior half or third of the hard palate and will not extend up to the alveolar margin.(19) Mehta et al. in 1977 stated that excrescences were transient in nature and tend to regress with the discontinuation of the habit.

**PALATAL KERATOSIS:** It is the Diffuse whitening of the palatal mucosa which may be mild, moderate or severe in intensity. It may occur independently or coexist with other components.(25)

**Inflammation of Minor Salivary Glands:** Ulcerative sialadenitis of the minor salivary gland has not been mentioned in the literature so far. There is only one case reported wherein the inflammation of the minor salivary gland openings due to smoking and some kind of traumatic irritation could result in ulceration in the lower lip .(23)

**Leukoplakia:** Schepman et al. found that smokers have 6 times higher risk of developing leukoplakia than non-smokers, despite lesions of non-smokers having a greater probability to evolve into cancer(21). Leukoplakia is being recognized by two forms: Homogeneous and the non-homogeneous type. Homogeneous leukoplakia has predominantly white lesion of uniform flat, thin appearance, smooth, wrinkled or corrugated surface throughout the lesion, whereas non-homogeneous leukoplakia has been a mixture of white-and-red lesion that may be either irregularly flat, nodular, or verrucous.(20)

**Oral Submucous Fibrosis (OSMF):** OSMF is a chronic, insidious disease that affects the submucosa of the oral cavity resulting in progressive limitation of mouth opening which is a hallmark feature of this disease. The disease is solely caused by areca nut and the literature erroneously refers to smokeless tobacco as the causative agent. However, as gutka products contain both smokeless tobacco and areca nut, the disease is common among gutka chewers. The buccal mucosa, the tongue and the lips show loss of elasticity, the palatal mucosa shows fibrosis.(35)

**Tobacco Pouch Keratosis:** It is characterized by one or more of the following characteristics: Change in color, wrinkled appearance, thickening of the mucosa, scrapable or non-scrapable epithelial surface, and a presence of ulceration(10)

**Quid Induced Keratosis:** The buccal mucosa characteristically shows either bilaterally or unilaterally, ill-defined, whitish-gray discoloration that can be rubbed off at the site of quid placement(10)
Oral Cancer: Smoking and use of chewed forms of tobacco are the most common causes of oral cancer. The timely diagnosis of oral cancer relies on a detailed clinical history and a comprehensive clinical examination for detection of any abnormal tissue. Early disease is usually symptomatic and incidentally detected whereas advanced stage is frequently painful. In more advanced disease, ulceration may be a common finding which may be accompanied by pain (30). Pain is pronounced in tumors of the tongue due to its mobility and inherently sensitive nature. Advanced tumors that infiltrate the soft tissue and bone of the periodontium result in tooth mobility whereas large tumors involving the posterior oral cavity cause breathing and/or speech impediments. Additional clinical features include bleeding, parasthesia, trismus and referred pain which may be mistaken for earache.(29)

Delayed Healing of Socket Post Extraction: The association between cigarette smoking and delayed healing is well recognized in clinical practice. Slower healing has been observed clinically in smokers with wounds resulting from trauma or surgical procedures. The documented effects of the toxic constituents of cigarette smoke—particularly nicotine, carbon monoxide, and hydrogen cyanide—suggest potential mechanisms by which smoking may undermine expeditious wound repair. Nicotine is a vasoconstrictor that reduces nutritional blood flow to the skin, resulting in tissue ischemia and impaired healing of injured tissue. Smokers should be advised to stop smoking prior to any surgery (31)

Implant Failures: Failure rate of implants is more in smokers compared to nonsmokers and is directly proportional to tobacco use. In smokers, implant failure is more in maxilla as compared to mandible and significant numbers of implants fail after second-stage surgery and also marginal bone loss and incidence of peri-implantitis is more after implant placement. Implants placed in grafted maxillary sinuses of smokers fail two times more compared to that in nonsmokers. To increase implant survival in smokers, it is advised to stop the habit 1 week prior to and up to 2 months after implant placement.(32)

Halitosis: The bad breath in smokers is due to the chemical composition of tobacco. Not only do the lungs retain a measure of this tobacco smoke even after a cigarette has been extinguished, but the chemicals that also remain in the mouth affects on bacteria in the mouth. These sulphur-producing bacteria feed on proteins, and produce chemicals known as “volatile sulphur compounds causing halitosis. The nicotine in tobacco reduces saliva flow and some smokers can get dry mouth symptoms.(33)

3. Conclusion
Although the oral cavity is accessible through visual examination, still oral mucosal lesions are diagnosed behindhand, so early diagnosis and treatment are crucial for the efficacious management of patients with oral premalignant lesions and conditions. Health professionals especially oral physicians and general dentists should also take part in advancing the agenda of tobacco control in the community. Dentists have an important role in tobacco control as they can directly see the harmful effects of tobacco in the mouth.

References


