

Case Report

The Electronic Cigarette Induced Oral Cavity Carcinoma

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Abstract

The electronic cigarette (e-cigarette), a battery-operated device, was developed to help smokers stop their tobacco addiction. It is handheld electronic device which vaporizes a flavored liquid. The use of e-cigarette has been widely use in Vietnam after it has been invented in 2003 by Chinese pharmacist Hon Lik. We describe 2 cases of E-cigarette induced oral cavity carcinoma in HoChiMinh City. Family physician, psychiatrist, dentist, and otolaryngologist should be aware of this potential complication, and highly recommend for oral check up exam in patients smoking E-cigarette for more than 10 years. Limiting market of e-cigarette still under on-going process regulated for FDA (US Food Drug Administration). If you have any patient who experienced an unexpected health or safety issue with a specific tobacco product, you can report an adverse experience to FDA.

INTRODUCTION

Hookah pens, vaporizers, vape pens, electronic cigarettes (e-cigarettes) are some of many type of Electronic Nicotine Delivery Systems (ENDS). In addition to liquid containing Nicotine, Propylene Glycol, Glycerin, Propylene Glycol, Flavorings and Water have been added. The liquid is heated into an aerosol that the user inhales. Many ENDS are commercial manufactured to look like conventional cigarettes or cigars [1]. Some resemble office pens. However, it is misleading as scientists have found differing amounts of heavy metals in the vapor, including Nickel, Tin, Silver, Aluminum, Mercury and Chromium. E-cigarette containing “only water vapor” is false statement because evidence indicates e-cigarette vapor contains harmful deathly chemicals such as nicotine, carbonyls, metals and organic volatile compounds [2,3]. Here are we listed two cases reports of chronic use of e-cigarette induced oral cavity carcinoma. Both used e-cigarette since 2003. Both did not have any poor nutrition conditions or any chronic infections caused by fungi, bacteria or viruses. No known family history of oral cavity carcinoma on both patients. No known history of having HPV (Human Papilloma Virus), Hematopoietic stem cell transplantation. Both patients did not consume any amounts of alcohol. Both patients did not chew or eat betel, paan, and Areca leaf. These leaves are mostly consumed in Asia and elsewhere in the world by some Asian emigrants. In all two cases we described, all patients were under stable conditions, no comatose. They all have abnormal oral physical exam including significant weight loss, dry mouth,

difficulty swallowing. Because of the wide use of e-cigarette, clinician should be aware of this potential complication [4,5].

CASE REPORTS**Case 1**

A 66 year old man is brought to the otolaryngologist physician due to recent significant weight loss. His physical exam is unremarkable except difficulty of swallowing, and dry mouth. His immunizations included HPV, Varicella vaccination, HBV, are up to date. The patient's past medical history is unremarkable. His social history included smoking 20 e-cigarettes a day since 2003. He has had no travel or radiation exposures. In the office, he complained of his mouth is pain with difficulty of speech and swallowing. Oral physical exam showed there is an indurated area, paresthesia of the tongue. There are several exophytic masses turned out to be a carcinoma, while the surrounding hyperkeratotic area showed histological features of lichen planus. Chemistry blood tests have been ordered include: LFTs, CBC, Hb, Hct, Urea and electrolyte measurements, Calcium level (this is a poor prognostic indicator primarily found in person with advanced disease), Serum ferritin, alpha-antitrypsin, and alpha-antiglycoprotein levels. Person with high oral stage cancer usually have increased levels of serum ferritin, alpha-antitrypsin, and alpha-antiglycoprotein. Additionally, prealbumin levels are decreased slightly in person at any stage. Tissue biopsy has been taken for microscopic examination. Final biopsy reported from dictated and written report included: A small piece of

tissue is cut from an abnormal paresthesia, keratotic region at the anterior aspect of the tongue. This incisional biopsy has been taken at otolaryngologist's office, general anesthesia or localized anesthesia is not needed. The tissue removed and cut into thin section, placed on slides and stained with dyes before it processed for "frozen section" and histopathology revealed a moderately collagenous connective tissue stroma infiltrated with nests and islands of tumor epithelia cells. The tumor cells exhibited a basaloid appearance with hyperchromatic nuclei and scanty cytoplasm and were arranged in a lobular configuration. Occasional squamous differentiation was also noted, large number of mitotic figure with nuclear atypia were seen. A diagnosis of basaloid cell carcinoma was given. Oncologist has been notified to follow up case.

Case 2

A 59 years old male presented to an otolaryngology physician office, examination revealed a non healing ulceration of the lower lip. When questioned about the area, the patient claimed that ulcer had been present for at least 9 months, or longer. No pain or discomfort was noted by the patient. When questioned about excessive sun exposure, patient said that he spends many hours outdoors and always use sun block. The patient denied a history of alcohol use. No history of trauma to the area was noted. Patient admitted that he smoked 30 e-cigarettes per day since 2004. The patient had a previous history of regular and routine dental care. At the time of doctor appointment, the patient was not taking any kind of medication. Health history is unremarkable. Physical examination of the head and neck region revealed no abnormal findings. The patient's vitals sign were all found to be within normal limits. No palpable lymph nodes were detected. No other abnormal extra oral findings were noted. Oral examination revealed an ulcerative lesion of vermilion of the lower lip, measuring one cm in diameter. When palpated, the periphery of the lesion felt indurated. A CMP (comprehensive metabolic panel) was ordered by the staff physician in charge, result of normal, hepatic panel is normal as well. Chemistry blood tests have been ordered include: LFTs, CBC, Hb, Hcrt, Urea and electrolyte measurements, Calcium level, Serum ferritin, alpha-antitrypsin, and alpha-antiglycoprotein levels. After suspect of basaloid cell squamous carcinoma at the lip area, and the tongue biopsy has been taken by otolaryngologist for histological analysis. A small piece of tissue is cut from left lateral aspect of the tongue with necrotic slough. This incisional biopsy has been taken at otolaryngologist's office, general anesthesia or localized anesthesia is not needed. The tissue removed and cut into thin section, place on slides and stained with dyes before it processed from "frozen section" and "permanent section". Incisional biopsy was performed and histopathological examination revealed a dysplastic stratified squamous epithelium infiltrating into underlying moderately collagenous connective tissue. The infiltrating tumor cells had a basaloid appearance. There is nuclear atypia, pleomorphism with large number of mitotic figures were noted. A diagnosis of Basaloid Cell Squamous Carcinoma has been given. Staging is the process of determining if and how far a cancer has spread. Both treatment and prognosis are dependent upon the stage of a cancer. Staging information is obtained from the physical exam endoscopy, and imaging studies (CT scan, MRI). Oncologist has been notified to follow up the case [4-8].

SUMMARY

Clinical Findings

It may occur on the floor of the mouth, cheek lining, gingival (gums), lips or palate (roof of the mouth). Most oral cancers look very similar under microscope and called "squamous cell carcinoma" [6]. Early stage symptoms can include persistent red or white patches, a non-healing ulcer, progressive swelling or enlargement, unusual surface changes, sudden tooth mobility without apparent cause, unusual oral bleeding or epistaxis and prolonged hoarseness. At late state, symptoms can include an indurated area, paresthesia/dysesthesia of the tongue or lips, airway obstruction, chronic serous otitis media, dysphagia, cervical lymphadenopathy, persistent pain. Oral cavity cancer may manifest as a red lesion (erythroplakia), a granular ulcer with fissuring or raised exophytic margins, and a nonhealing extraction socket, a lesion fixed to deeper tissues or to overlying skin or mucosa [7,8].

Laboratory findings

Tissue biopsy, microscopic examination will confirm the diagnosis of oral cancer or precancer. A FOXM1-based molecular cancer diagnostic test (qMIDS) for quantifying squamous cell tumor aggressiveness [8]. Three species of bacterial, *C. Gingivalis*, *P. melaninogenica*, and *S. mitis*, are also found with oral squamous cell carcinoma (OSCC). They can be used as a diagnostic tool to predict more than 80% of oral cancer.

Treatment

If the tumor is small enough, surgical excision is usually recommended. If the tumor is inoperable, radiation +/- chemotherapy is often used in conjunction with surgery as the definitive radical treatment. Surgeries for oral cancers include: maxillectomy, mandibulectomy, glossectomy, radical neck dissection, and feeding tube to sustain nutrition. Treatment of oral cancer will usually be by a multidisciplinary team, with treatment professionals from the radiation, surgery, chemotherapy, nutrition, dental professional, rehabilitation and patient care would be followed up. The goals of pharmacotherapy for oral cavity cancer are to reduce morbidity associated with secondary infection and to prevent complications.

Pathophysiology

Tobacco is a potent risk factor for oral cancer. There is an interaction occurs between redox-active metals in saliva and the low reactive free radicals in cigarette smoke. The results may be that saliva loses its antioxidant capacity and instead becomes a potent pro-oxidant milieu [9,10]. Intraoral carcinoma primarily affects the posterior lateral part of the tongue. Area of spread usually is localized, especially through muscle and bone. Metastasis initially is to anterior cervical lymph nodes and to liver and skeleton at later stage.

DISCUSSION

Commercially available nicotine liquids for e-cigarettes can contain up to 100 mg/mL of nicotine. Just 1mg of nicotine can cause symptoms in toddler, and 6 to 13 mg/kg can be lethal. Investigators found that most of the products contained in

e-cigarettes, in addition to nicotine and within limited authorized for food pharmaceutical products, diethylene glycol, ethylene glycol, ethanol, formaldehyde and acrolein. Differing amounts of heavy metals also are in the vapor, including nickel, tin, silver, aluminum, mercury and chromium. The effects of chronic exposure to these chemicals are in the long list. In addition, none of the products tested were totally exempt of potentially toxic compounds. E-cigarettes contain other harmful chemicals as we mentioned above evidence, and most still delivery nicotine. There is also still not enough evidence that e-cigarettes are less risky than regular traditional cigarettes. Because e-cigarettes users often smoke the water piper for longer durations of time than regular cigarettes (40 to 45 min or longer versus 5 to 10 min on regular cigarettes), there is a concern that exposure to nicotine and other carcinogens is greater. In fact, in one hour smoking session, it is estimated that the smoker inhales 100 to 200 times the volume of smoke compare with a single regular cigarette. There is only limited and unknown safety information on the e-cigarettes. It is too soon to recommend patient use e-cigarettes for quit smoking purpose. The risk is much higher than the benefit of using e-cigarettes. Patients who want to quit smoking should be advised to use approved nicotine replacement products.

CONCLUSION

The use of regular cigarette tobacco often causes oral cavity cancer. However, e-cigarettes also cause oral cavity cancer since it still contains nicotine. Physicians and clinician should be aware of possible potential complication of using e-cigarettes. Abnormal oral physical exam included oral ulcer bleeding, significant weight loss, difficulty swallowing, both with chronic history of e-cigarettes smoking [4].

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