

Understanding the mechanism of commonly occurring COVID-19-associated oral lesions

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Abstract

Covid-19 pandemic is a novel disease with gradual emergence of its signs and symptoms. Oral healthcare providers had a setback in their dental practices due to the high rate of infectivity and the risk of contracting the disease through the patients carrying the virus. Once the dental practice resumed to its normalcy the dental surgeons came across a variety of oral manifestations in patients with a history of Covid and post recovery. An attempt is made to recognise the Covid-19 oral manifestations with plausible explanation of the mechanism of development of such oral signs.

Keywords: Covid-19, mechanism, oral manifestations

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INTRODUCTION

The global spread of coronavirus disease 2019 (COVID-19) pandemic which started from Wuhan city of China is a novel viral disease with gradual emergence of signs and symptoms as reported worldwide. COVID-19 is caused by infection with a new coronavirus (called SARS-CoV-2) and the mortality associated with this disease is approximately 3.7% which is higher in comparison with influenza which is only 1%.^[1] The common signs and symptoms of this disease include fever, dry cough, difficulty in breathing, sore throat, myalgia, headache and fatigue. Loss of smell and taste has been reported as one of the earliest manifestations of this infection.^[2] Recently, several oral lesions associated with COVID-19 have also been reported. Dental professionals have to render their services keeping in mind the COVID status of the patient. However, patients may not disclose

their status voluntarily either out of ignorance or fear. An awareness regarding the possible oral manifestations of this highly infective disease can prepare oral healthcare professionals to take extra precautions while treating such patients.

POSSIBLE ORAL MANIFESTATIONS ASSOCIATED WITH OF CORONAVIRUS DISEASE 2019 INFECTION

Erythematous lesions, ulcers and blisters

The direct involvement of the SARS Cov-2 virus in the etiopathogenesis of oral mucosal lesions is not established. However, the incidental finding of oral ulcers in COVID-19 infected patients is widely reported. These oral ulcers or erosions in COVID patients have been described by Sakaida *et al.* as possible drug

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reactions developing during the latency period.^[3] Drug hypersensitivity and urticaria have also been reported by some patients.^[3] In addition, drug eruptions may occur as a result of COVID-19-induced cytokine storm with dysregulation of T-helper 17 cells which are a subset of pro-inflammatory T helper cells defined by their production of interleukin17. It has also been suggested that the anxiety and stress related to the disease may also give rise to aphthous ulcer-like lesions in the oral cavity.^[4] Thus, the finding of unexplained oral mucosal lesions can warrant the collection of an oral viral sample for reverse transcription-polymerase chain reaction (RT-PCR) to diagnose asymptomatic SARS Cov-2 patients [Figure 1].

Exacerbation of autoimmune disorders

The role of the SARS Cov-2 virus in autoimmune pathologies has been reported by several researchers including exacerbation of autoimmune disorders.^[4,5] The development or relapse of autoimmune oral disorders should be monitored by dental practitioners throughout the progress of the disease. Disorders such as lichen planus, erythema multiforme and lupus erythematosus have been seen to exacerbate in some patients affected by COVID-19 infection.^[5] Such occurrence could be related to the anxiety associated with the disease or the influence of the virus on the immune system or may be due to the drugs administered to such patients.

Loss of taste and smell

Onset of loss of taste (ageusia) and loss of smell (anosmia) have been reported quite early in the course of COVID-19, more so in mild-to-moderate severity of the disease (95%–98% of patients).^[6] A sudden loss of taste or smell in the absence of any other inflammatory upper respiratory tract infection should alert the attending dental practitioner of potential COVID-19 disease in the patient which can facilitate early isolation of the patient. The mechanisms involved may include viral disruption of the cranial nerves 1, VII, IX and X and inflammatory exudate affecting the supporting cells of neural transmission.^[7] Angiotensin-converting enzyme 2 (ACE-2), an important receptor for COVID-19, is abundant on cells found in the nose and mouth. Thus, there is a possibility that the virus could directly invade the nerve cells associated with the senses of smell and taste.

Limited data are available on the mechanisms involved in the pathogenesis of taste disorders in COVID-19.^[8] Single-cell RNA-sequencing studies have demonstrated that epithelial cells of the tongue express abundant ACE-2 receptors. It could be hypothesized that, similar to what was suggested for olfactory disorders, the pathogenesis of



Figure 1: Patient suffering from coronavirus disease 2019 with ulceration in the lateral border of tongue and coated dorsum of tongue



Figure 2: Patient suffering from coronavirus disease 2019 with ulceration in the lateral border of tongue and coated dorsum of tongue

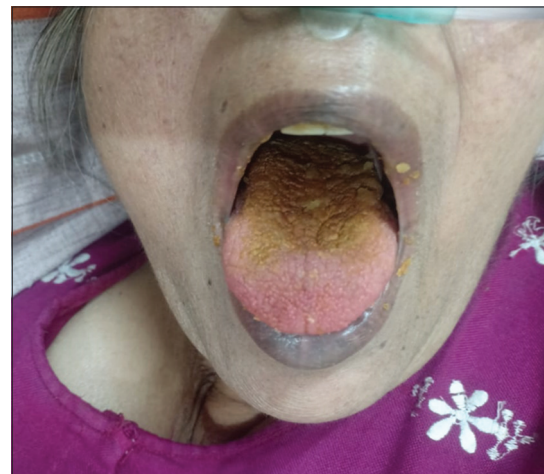


Figure 3: Coronavirus disease 2019 patient with coated and discolored tongue due to candida and drug-induced discoloration

taste disorders in COVID-19 may involve indirect damage of taste receptors through infection of epithelial cells and

subsequent local inflammation. Better knowledge of the pathogenesis will help in the therapeutic management of prolonged smell and taste impairment as a postSARS Cov2 complication.

Salivary gland disease

Salivary glands can be involved in patients with CoV infection.^[9] It is reported that ACE-2 expression in minor salivary glands is higher than that of lungs making the salivary glands a potential target for the COVID-19 virus.^[10,11]

Xerostomia

Viral invasion of salivary glands can cause dry mouth in COVID patients. The psychological status of the patients along with poor oral hygiene and adverse drug effects may be the other contributory factors in xerostomia.^[12]

Oral candidiasis

The most common complaints of patients having COVID-associated candidiasis is burning sensation and dysphagia. White membranous patches are seen spread over the dorsum of the tongue or lateral border of the tongue or palate or even the buccal mucosa.^[13] Concomitant occurrence of xerostomia can cause dysphagia in such patients. Most often pseudomembranous candidiasis is manifested or erythematous atrophic candidiasis is seen which leads to a painful mouth in such patients. Candida colonisation is reported to be significantly associated with cognitive impairment, multiple comorbidities, poor oral hygiene and in patients on long-term antibiotics and steroids. This opportunistic fungal infection is commonly seen in COVID-19 patients causing discomfort and inability to eat or swallow. The damage exerted by SARS CoV-2 among patients with Acute respiratory distress syndrome, may allow commensal *Candida* species to invade the internal organs of the affected patients [Figures 2 and 3].^[14]

Gingival inflammation

Gingival inflammation along with bleeding gums is noted in the majority of COVID-19 patients which may manifest as one of the early signs of the disease. This could be attributed to a lack of maintenance of oral hygiene during the disease state leading to biofilm production and bacterial colonization causing gingivitis and bleeding gums. High expression of ACE2 receptors in oral mucosal tissues could also be the contributory factor for inflammation of gingival tissues.^[15]

CONCLUSION

The common oral manifestations in patients suffering from COVID-19 are various forms of ulcerations, inflammation of oral mucosal tissues, loss of taste and smell and

Candidial colonization. The oral signs and symptoms may arise even before the disease sets in or a positive RT-PCR report is obtained. Oral healthcare professionals must identify such manifestations and aid in the early diagnosis of the COVID status of such patients. Further studies can be undertaken to elicit the viral load of the patients and a correlation with the type and severity of the oral lesions.

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Conflicts of interest

There are no conflicts of interest.

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