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A REVIEW ON COVID-19 AFFECTING ORAL HEALTH: IN THE COURSE AND AFTER RECOVERY

Dental Science

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ABSTRACT

The current COVID-19 pandemic has affected a vast majority of people throughout the world. It has impacted the oral health of many people due to several reasons. This article reviews various increasing oral health problems that have been reported frequently throughout the course of the disease, effect of bad oral hygiene on severity of COVID-19 and the basic measures to be taken for prevention of such problems. On one hand the use of corticosteroids and antiviral therapy to treat COVID-19 has led to increased fungal infections such as candidiasis and mucormycosis of oral cavity while on the other hand the stress of isolation has caused escalation of bruxism and temporomandibular disorders. Taste disorders due to COVID-19 are also very common. It has also been suggested that a good oral hygiene is advantageous in preventing the development of complications of COVID-19. Many post-COVID oral health problems such as dry mouth are frequently observed.

KEYWORDS

COVID-19 pandemic, oral health, fungal infections, bruxism, temporomandibular disorders, taste disorders, prevention, oral hygiene, post-COVID problems.

INTRODUCTION

Coronavirus disease (COVID-19) is an infectious disease caused by a newly discovered coronavirus. Most people infected with the COVID-19 virus will experience mild to moderate respiratory illness and recover without requiring special treatment. Older people and those with underlying medical problems like cardiovascular disease, diabetes, chronic respiratory disease, and cancer are more likely to develop serious illness. [1] Apart from this a number of oral health problems have been observed to develop during the entire course of the disease. This article overviews some of the important oral health problems which are commonly observed when a person is infected with COVID-19 and the preventive measures to be taken to avoid them.

EFFECTS OF COVID PHARMACOTHERAPY ON ORAL HEALTH

The most common treatments used for COVID-19 includes antiviral drugs, interferon therapy and corticosteroids which show varying side effects on the oral health. Widely used antiviral drugs have oral health implications such as the development of erythema multiforme, mouth ulcers, and xerostomia. The oral side effects of antiviral drugs may include dry mouth, and this dryness based on reduced saliva can lead to oral candidiasis, dental caries, alterations in the taste sensation (dysgeusia), or loss of taste sense (ageusia).While parotid lipomatosis, taste disturbances, and perioral paraesthesia are oral health-related adverse effects of protease inhibitor therapy, interferon therapy can lead to decreased salivary flow rate and ultimately to dental problems. [2] Fungal infections of the oral cavity occur as a result of corticosteroid therapy used in severe COVID-19 infection and include oral candidiasis and post-COVID oral mucormycosis.

COVID-19 PANDEMIC STRESS, BRUXISM AND TEMPOROMANDIBULAR DISORDERS

Bruxism is a movement disorder characterized by grinding and clenching of teeth. Tooth grinding is an activity particularly important to the dentist because of breakage of dental restorations, tooth damage, induction of temporal headache and temporomandibular disorders. [3] The pandemic of COVID-19 and the need for social isolation generates psychological impact that raises the pattern of anxiety and can directly affect patients with bruxism and temporomandibular disorders (TMD).Psychological factors associated with the pandemic can lead to an increased risk of developing, worsening and perpetuating bruxism, especially waking bruxism and TMD, so dentists should be aware of the occurrence of signs and symptoms to manage the multifactorial aspects of this condition. At that time, individual self-management strategies are advised for the patient, which consist of self-massage techniques, body education, exercise practices, sleep hygiene, meditation and making available the use of tools and online devices that facilitate this activity. [4] It should also be emphasized that TMDs are closely associated with orofacial pain. Increased psychosocial distress during the pandemic can exacerbate the TMD symptoms, including those associated with orofacial pain, which in turn may further negatively affect the patients' psychoemotional status. [5]

TASTE DISORDERS IN COVID-19 AND CHANGES IN TONGUE

The loss of taste sensation in patients infected with COVID-19 is very common. Olfactory and/or taste disorders (OTD) due to COVID-19 is usually temporary and the pathophysiology of OTD includes several mechanisms. First, OTD could result from an obstruction of the olfactory clefts, thereby preventing the activation of sensory neurons in the olfactory epithelium by the odorants. An alternative mechanism proposed was that the inflammatory cytokine environment in the nasal cavity could potentially affect the olfactory neuronal function, as in chronic rhinosinusitis Lastly, it was proposed that OTD could result not from a conductive problem but rather from a sensorineural etiology, where there is a direct invasion of the olfactory neurons by SARS-CoV-2. Damage to the olfactory bulb with the development of microbleeding and oedema, as seen on magnetic resonance imaging, have been reported in COVID-19 patients with OTD. [6]

COVID TONGUE

COVID Tongue refers to a recently recognized but relatively rare, peculiar oral symptom seen in coronavirus patients. It is characterized by inflammation, ulcers in the tongue of the afflicted person, besides discolouration entailing normal pink zones and infected white or yellow patches, as well as a furry appearance on the surface. Moreover, in certain cases, COVID Tongue presents in the form of painful rashes, prominent dents along the sides of the tongue and loss of structures known as papillae. These are tiny projections that present a rough surface on the tongue and are responsible for the sense of taste.[7]

COVID-19 AND BAD ORAL HYGIENE

Oral hygiene should be improved during a COVID-19 infection in order to reduce the bacterial load in the mouth and the risk of a bacterial superinfection. The development and severity of complications following a COVID-19 infection depend on numerous host and viral factors that will affect a patient's immune response. Whilst 80% of patients with COVID-19 infections have mild symptoms, 20% progress to have a severe form of infection associated with higher levels of inflammatory markers (Interleukin 2, 6, 10) and bacteria. They also exhibit a remarkably higher neutrophil count and lower lymphocyte count than in mild patients. A high neutrophil count is abnormal for a viral infection, but common for a bacterial infection, suggesting that in severe cases of COVID-19, bacterial superinfection is common. [8] Older adults and people of any age who have serious medical conditions such as chronic lung disease, diabetes, heart conditions or chronic kidney disease are at high risk for developing severe illness due to SARS-CoV-2 infection. At the same time, poor oral health increases the risk of developing the same medical

conditions. Therefore, improving oral health in people of any age, by reducing their risk of developing non-oral systemic diseases, may reduce the morbidity of COVID-19. [9]

ORAL HEALTH PROBLEMS IN COVID RECOVERED PATIENTS

The most common post-COVID dental issues reported include bleeding gums, dry mouth and loss of taste. As per dentists, 30-40% of recovered patients turn up for consultation, with bleeding gums and ulcerations in mouth. Gums usually bleed due to elevated levels of cytokines and interleukins initiated by COVID virus. Gum disease can increase levels of circulating cytokine. COVID-19 severity has been linked to an immune dysregulation leading to a cytokine storm - unregulated and excessive immune response or reaction. The most common reason for dry mouth is breathing through the mouth by an individual, due to mask use.

POSTCOVID ORAL MUCORMYCOSIS

Mucormycosis is an uncommon but serious infection that complicates the course of severe COVID-19. Subjects with diabetes mellitus and multiple risk factors may be at a higher risk for developing mucormycosis. Concurrent glucocorticoid therapy probably heightens the risk of mucormycosis. [10] This fungal infection usually originates from the paranasal sinuses. The fungus invades the blood vessels and subsequently spreads through them. Once fungal hyphae enter into the blood stream they can disseminate to other organs such as cerebrum or lungs which can be fatal for the patient. Mucor hyphae form thrombi within the blood vessels that reduce vascularity to the tissues and cause necrosis. Peripheral vascular disease (due to microangiopathy & atherosclerosis) in diabetic patients also causes local tissue ischemia and increased susceptibility to infections. Therefore thrombosis of the internal maxillary artery or descending palatine artery caused by mucormycotic infection as well as chronic diabetes results in necrosis of the maxilla. A definitive diagnosis of mucormycosis can be made by tissue biopsy that identifies the characteristic hyphae, by positive culture or both. [11] Many case reports show the occurrence of maxillary osteomyelitis due to mucormycosis and often such patients refer to the dentists. In such cases a proper case history of the patients allows the correct diagnosis of mucormycosis. AMB (Amphoterecin B) is considered the drug of choice for primary treatment of mucormycosis. Isavuconazole is a new broad-spectrum triazole and is the biologically active agent of the prodrug isavuconazonium sulfate. It is approved in the United States for the treatment of mucormycosis, and in Europe for the treatment of mucormycosis when amphoterecin B is not feasible. [12]

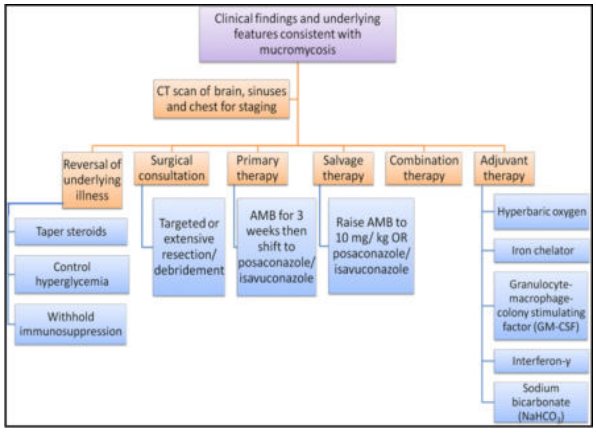

Figure 1: Management of Mucormycosis
Source: link.springer.com

PREVENTIVE MEASURES

Oral self care practices have been proved to be an effective preventive measure at individual level for maintaining good oral health as part of general health. [13] Advise your patients to drink more water. According to the American Dental Association, water keeps the mouth clean and also fights dry mouth. [14] Patients should be told to increase their antioxidant consumption daily with multiple servings of green leafy vegetables and bright colored fruits and vegetables to provide necessary nutrients and minerals to oral tissues. According to the World Health Organization good nutrition is crucial for health, particularly in times when the immune system might need to fight back. Limited access to fresh foods may compromise opportunities to continue eating a healthy and varied diet. It can also potentially lead to an increased consumption of highly processed foods, which tend to be high in fats, sugars and salt. [15] Patients should be advised to select a convenient time to devote at least two minutes to thorough brushing and another minute for cleaning in between their teeth daily. Tooth brushing is beneficial for oral health preservation among adults, since it produces pressure, stretching and mechanical vibratory stimulation of the tongue, periodontal ligament (through pressure on the teeth), gums and palate. Therefore, it has been assumed that tooth brushing modulates the salivary flow rate and thus favors maintaining oral equilibrium among older people. [16] Chlorhexidine-containing mouthwashes also have special applications, for example, in the prevention of ventilator-associated pneumonia — one of the most common and life-threatening complications in patients on long-term intubation. [17] Products that contain xylitol such as spry mints, gum and spray, or xylimelts can be very beneficial in stimulating saliva and hydrating tissues. So can antioxidant products, toothpaste, and mouth rinse, as well as products that contain arginine and calcium carbonate such as Basic Bites. Oral probiotics can help repopulate the oral cavity with beneficial bacteria during sleep when salivary flow is reduced. Furthermore, xylitol nasal sprays can help maintain clear nasal passages and potentially could be preventive against virus that have been shown to reside at higher viral counts in nasal passages. Patients should not delay in seeking preventive dental care. Increased protective layering of infection control strategies due to the pandemic make dental offices a safe place to receive preventive and therapeutic treatments. [18] Appropriate environmental control measures, in addition to careful metabolic control of the underlying condition, and judicious use of immunosuppressive agents are important factors in preventing mucormycosis. High-efficiency particulate filters (HEPA) used in hospital rooms for patients with profound immunosuppression have been shown to reduce the risks of mucormycosis. [19]

CONCLUSIONS

As new variants of the corona virus arise due to mutations, changes occur in the severity, symptoms and treatment of the disease. High doses of steroids can treat the life threatening respiratory crisis but the side effects of such high doses gives rise to other life threatening diseases such as mucormycosis. In addition, the overall stress of the pandemic has caused an increase in the number of patients with temporomandibular disorders. Other oral problems such as bleeding gums, ulcers and candidiasis cannot be ignored. Lastly, it can be concluded that a good oral hygiene may be helpful in reducing the complications of COVID-19.

REFERENCES:

[1] World Health Organization. (n.d.). *Coronavirus*. https://www.who.int/health-topics/coronavirus

[2] Radhika Chhibber, Madhura Tandale, Zeeshan Sheikh, Haider Al-Waeli. (2020). *The Oral Health Implications of COVID-19 Pharmacotherapy*. Oral health group. https://www.oralhealthgroup.com/features/the-oral-health-implications-of-covid-19-pharmacotherapy/

[3] Shetty, S., Pitti, V., Satish Babu, C. L., Surendra Kumar, G. P., & Deepthi, B. C. (2010). Bruxism: a literature review. *Journal of Indian Prosthodontic Society,* 10(3), 141–148. https://doi.org/10.1007/s13191-011-0041-5

[4] Oliveira SSI et al. (2020). Temporomandibular disorders: Guidelines and Self-Care for Patients During COVID-19 Pandemic. *Braz. dent. sci*, 23(2): SUPP. 2 – Dentistry and Sars-CoV-2.

[5] Emodi-Perlman A, Eli I, Smardz J, Uziel N, Wieckiewicz G, Gilon E, Grychowska N, Wieckiewicz M. (2020). Temporomandibular Disorders and Bruxism Outbreak as a Possible Factor of Orofacial Pain Worsening during the COVID-19 Pandemic—Concomitant Research in Two Countries. *Journal of Clinical Medicine*. 9(10), 3250.

[6] Tham, A.C., Thein, TL., Lee, C.S.et al. (2020). Olfactory taste disorder as a presenting symptom of COVID-19: a large single-center Singapore study. *Eur Arch Otorhinolaryngol.* 278(5). https://doi.org/10.1007/s00405-020-06455-0

[7] Divya Bharat. (2021). COVID Tongue: *All You Need To Know About This New Coronavirus Symptom.* netmeds. https://www.netmeds.com/health-library/post/covid-tongue-all-you-need-to-know-about-this-new-coronavirus-symptom

[8] Sampson V. (2020). Oral hygiene risk factor. *British dental journal*, *228*(8), 569. https://doi.org/10.1038/s41415-020-1545-3

[9] Nathalie Botros, Parvati Iyer, David M. Ojcius (2020). Is there an association between oral health and severity of COVID-19 complications? *Biomedical Journal,* 43(4), 325-327. https://doi.org/10.1016/j.bj.2020.05.016

[10] Garg, D., Muthu, V., Sehgal, I. S., Ramachandran, R., Kaur, H., Bhalla, A., Puri, G. D., Chakrabarti, A., & Agarwal, R. (2021). Coronavirus Disease (Covid-19) Associated Mucormycosis (CAM): Case Report and Systematic Review of Literature. *Mycopathologia*, 186(2), 289–298.

[11] Auluck A. (2007). Maxillary necrosis by mucormycosis. a case report and literature review. *Medicina oral, patologia oral y cirugia bucal,* 12(5), E360–E364.

[12] Sipsas, N. V., Gamaletsou, M. N., Anastasopoulou, A., & Kontoyiannis, D. P. (2018). Therapy of Mucormycosis. *Journal of Fungi*, *4*(3), 90. https://doi.org/10.3390/jof4030090

[13] Gopinath V. (2010). Oral hygiene practices and habits among dental professionals in Chennai. *Indian journal of dental research : official publication of Indian Society for Dental Research, 21*(2), 195–200. https://doi.org/10.4103/0970-9290.66636

[14] American Dental Association. (n.d.). *4 Reasons Water Is the Best Beverage for Your Teeth.* Mouthhealthy. https://www.mouthhealthy.org/en/nutrition/food-tips/water-best-beverage

[15] World Health Organisation Europe. (n.d.). *Food and Nutrition tips during self-quarantine*. WHO/Europe. https://www.euro.who.int/en/health-topics/health-emergencies/coronavirus-covid-19/publications-and-technical-guidance/food-and-nutrition-tips-during-self-quarantine
[16] Affoo, R. H., Trottier, K., Garrick, R., Mascarenhas, T., Jang, Y., & Martin, R. E. (2018). The Effects of Tooth Brushing on Whole Salivary Flow Rate in Older Adults. *BioMed research international, 2018*, 3904139. https://doi.org/10.1155/2018/3904139
[17] Nairn Wilson, Rakhee Patel, Jennifer Gallagher & Iain Chapple. (2014). How to Select the right mouthwash *The Pharmaceutical Journal*, 292(7795).
[18] Karen Davis. (2021). COVID-19 Impacts Oral Health—*Even If You Don't Acquire the Viral Infection*. Dentistry Today. https://www.dentistrytoday.com/news/todays-dental-news/item/7778-covid-19-impacts-oral-health-even-if-you-don-t-acquire-the-viral-infection
[19] Samantha Jacobs, Corina E Gonzalez, Thomas J. Walsh. (n.d.). *Mucormycosis and Entomophthoramycosis*. antimicrobe http://www.antimicrobe.org/f13.asp