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Post COVID-19 Dental practice and insight into oral manifestations of a post-covid patient

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ABSTRACT

The outbreak of COVID-19 has significantly affected the practice of dentistry. Dental treatment can generate large amounts of aerosols and droplets mixed with the patient's saliva or blood which poses a risk to dental professionals as SARS-CoV-2 has been detected in saliva of infected individuals. Many dentists have therefore discontinued the provision of elective dental treatment, in accordance with guidelines released by national-level government healthcare authorities. Cases that require urgent or emergency dental care continue to be seen. As the covid 19 lockdown is lifted, huge clusters of patients will be reporting to the dental clinics for their necessary treatments. Firstly, post covid patients must be differentiated from those who remained uninfected, with proper protocols followed within the setup. It is thus very important to carefully examine a post-covid patient for any signs of fungal infections, as mucormycosis, isconsidered to be an important outcome of SARS-CoV-2 infection. Because COVID-19 is still under investigation, all possible associations with the disease should be reported. Treatment of a post-covid patient should include only emergency treatments with non-emergency treatments to be postponed for 3 months.

Keywords: Covid-19, Mucormycosis, Sars-Cov, Aerosol

INTRODUCTION

Background: On the 31st of December 2019, reports of pneumonia of an unknown origin were detected in Wuhan, China, in large clusters. Provisionally named as 2019 novel coronavirus (2019-nCoV), there was evidence of exponential human-to-human transmission in the early outbreak stage. Consequently, on 30 January 2020, the WHO declared the outbreak a Public Health Emergency of International Concern (PHEIC). International Committee on Taxonomy of Viruses found that SARS-CoV-2 clusters phytogenetically with the species as severe acute respiratory syndrome-related coronavirus (SARS-CoVs) and genus Betacoronavirus, and formally designated it as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). On 11 February 2020, the WHO announced coronavirus disease 2019 (COVID-19) to be the disease caused by SARS-CoV-2. Subsequently, many countries continued to experience clusters of cases and community transmissions which led the WHO to declare the COVID-19 outbreak a pandemic on the12th of March 2020.[1]

The outbreak of COVID-19 has significantly affected the practice of dentistry. Dental treatment can generate large amounts of aerosols and droplets mixed with the patient's saliva or blood which poses a risk to dental professionals as SARS-CoV-2 has been detected in saliva of infected individuals. Many dentists have therefore discontinued the provision of elective dental treatment, in accordance with guidelines released by national-level government healthcare authorities. Cases that require urgent or emergency dental care continue to be seen.[1]

Potential Causes of Spread Within The Dental Setup: Additional precautions along with biosafety measures are essential to contain spread of infection within the dental setup. Working with a high-speed handpiece, has significant potential towards generation of aerosols, which remain suspended in the air for a longer period before settling on environmental surfaces or entering the respiratory tract. Aerosol of approximately 0.5 μmm in diameter have the potential to penetrate and lodge in the smaller passages of the lungs and are considered to possess the greatest potential for transmitting SARS-CoV-2. [2]While all routine dental care must be suspended in countries experiencing COVID-19 disease during the period of pandemic, the need for organised urgent care delivered by teams provided with appropriate personal protective equipment takes priority.[3]Cautiously using aerosol generating procedures is essential to prevent spread of infection. Use of personal protective equipment (PPE) such as masks, glasses, shields, visors, chemical and physical protection barriers, constant disinfection of dental equipment with 70% alcohol, special attention to aerosol

producing procedures, exercising hand hygiene are all important to prevent infectionsdue to SARS Cov-2 within a dental setup.[1,2,3]The sudden spread of SARS-CoV-2 has determined the need to modify both preventive and therapeutic protocols in dental practice.[4]To minimize the formation of drops and aerosols, it is recommended to perform minimally invasive procedures, to use the surgical vacuum cleaner, 4-hand work, and rubber dam isolation of the operator field. Before dental procedures it is recommended that the patient rinses with antimicrobial oral solutions. Resorbable sutures after surgical procedures are recommended. Aerosol generating procedures should be scheduled at the end of the program.[5]

Impact of Covid-19 on dental practice: In order to maintain the maximum level of SARS-CoV-2 safety measures, it had led to a marked increase in costs and reduction in the maximum number of treatments, which could be offered to patients on the timescale usually within a year.[6]Due to the severity in rate of infection spread, the patients were reluctant to have dental treatments unless until any emergency. Oral hygiene and preventive practices have always been extremely important, but now, in the current scenario, they are more critical than ever. Higher levels of oral hygiene could decrease the need for a person to attend a dental clinic for urgent matters; and at the same time, could significantly help the person to remove the virus from the body in the early contamination phase in day-to-day life, and also to reduce the bacterial load in the mouth.[5,7]The COVID-19 pandemic has led to the closure of dental offices around the world. There are many protocols that need to be considered and integrated into a comprehensive and concise pattern (table 1). Smart appointment systems and generally avoiding crowding in dental clinics are essential. Adequate time should be given between appointments so that appropriate decontamination procedures can be carried out.[7]

COVID-19 transmission risk and protective protocols in dentistry[7]			
Prior to dental treatment	Before entering a dental office	- Delay non-urgent dental and cosmetic services.	ADA, CDC, ADHA, NHS
		-Prevent crowding in appointment setting	ADA
		-Dental procedures in patients with a history of COVID-19 should be postponed for at least 1 month.	WHO
		-High-risk patients like diabetic and immunocompromised patients are treated at the early hours of a dental office opening.	NHS
		-Use telephone triage, teleconferencing, or Teledentistry options as alternatives to in-office care, if possible.	CDC, NHS, ADA
		- Ask staff to stay home if they are sick.	CDC, ADA
		-Actively screen and record the temperature of each staff. Send staff home if they develop symptoms while at work.	CDC, NHS
	At dental office	-Actively screen the patient at the time of check-in. Patients with fever should refer to specific medical centers. If the patient is afebrile (temperature < 100.4 °F) and otherwise without symptoms consistent with COVID-19, then emergency dental care may be provided.	CDC
		-No accompanying individuals should be allowed.	CDC, ADA
		-Offer hand wash or hydroalcoholic solutions (with 60–75% alcohol) for hand disinfection upon entrance to the dental office.	NHS, ADA
		-Provide a large room with adequate ventilation in the waiting area.	NHS
		-Appropriate zoning and separation measures should be undertaken. Waiting rooms and reception areas should allow for 2-m separation, ideally marked on chairs and flooring.	NHS
		-Remove magazines, reading materials, toys, and other objects that may be touched by others and which are not easily disinfected.	ADA
		- Place signage in the dental office for instructing patients on standard recommendations for respiratory hygiene/cough etiquette and social distancing.	ADA
		- Require the use of facemasks or cloth face coverings by everyone entering the dental office	CDC
		- Dental professionals should implement PPE (isolated wearing like N-95 masks, Health or FFP2-standard masks, gloves, face shields, goggles, gown, surgical cap, shoe cover)	CDC, NHS, ADA
		-Preparation of materials and instruments in advance and cover surfaces with disposable protections	NHS
		-Materials stored in a refrigerator should be sterilized before and after each treatment	WHO

		-Patients should be treated in an isolated and well-ventilated room with negative pressure relative to the surrounding area	CDC
During dental treatment		-Hand hygiene should be performed before and after all patient contact, contact with potentially infectious material, and before putting on and after removing PPE.	CDC
		-Preoperative antimicrobial mouth rinse like peroxide could reduce the number of microbes in the oral cavity. Since SARS-CoV-2 may be vulnerable to oxidation, use 1.5% hydrogen peroxide or 0.2% povidone as a preprocedural mouth rinse.	ADA
		-Rubber dams and high-volume saliva ejectors can help minimize aerosol or spatter in dental procedures.	CDC, NHS, ADA
		-use extraoral dental radiographs, such as panoramic radiographs or cone-beam C.T., as appropriate alternatives of intraoral radiography	ADA
		-If aerosol-generating procedures are inevitable for emergency care, use 4-handed dentistry.	CDC, ADA
		-Avoid the use of aerosol-generating procedures, handpieces/ultrasonic instruments, 3-in-1 syringes, and the air-water syringe whenever possible.	CDC, ADA
		-Dental professionals should use resorbable sutures to eliminate the need for a follow-up appointment.	ADA
		-Treatment should be completed in one visit wherever possible.	NHS
		-Environmental cleaning and disinfection procedures should be followed promptly after the completion of clinical care.	CDC
After dental treatment		-Clean PPE with soap and water, or if visibly soiled, clean and disinfect reusable facial protective equipment.	ADA
		-Manage laundry and medical waste in accordance with routine procedures	

ADA= American Dental Association, CDC= Centre for Disease Control and Prevention, NHS= National Health Service, WHO= World Health Organization, ADHA= American Dental Hygienists' Association

Oral Manifestations In Post Covid-19 Patients: Several studies have reported high prevalence of gustatory dysfunction, xerostomia, sialadenitis, and inflammatory reactions in the salivary glands and tongue in post covid-19 patients. Literature has also reported various opportunistic fungal infections, ulcerations, and HSV-1. Reports have also shown secondary infections such as gingivitis and periodontitis, painful herpetic recurrent stomatitis on the palate accompanied by sore throat, blisters on internal labial mucosa with desquamative gingivitis, necrotic interdental papillae with unprovoked gingival bleeding, ulcers on tongue, erythematous lesions and erosions on lips and buccal mucosa may also exist.[8]Recently, fungal infections typically Mucormycosis has been reported in post-COVID-19 patients, which has been attributed to occur as a consequence of steroid therapy and particularly, in uncontrolled diabetics.[8,9] It was first reported in humans by Paultaufin in 1885, and is also known as zygomycosis or phycomycosis.[10]Mucormycosis primarily affects immunocompromised patients, bone marrow–transplanted, hematological malignancies, or poorly controlled diabetic individuals.[11,12]Mucorales have been cultured from the oral cavity, nasal passage and pharynx of healthy individuals without any clinical signs of infection. Invariably this disease manifests, when the organisms affect an immunocompromised individual. Angioinvasion of mucorales and its spores into the blood vessels lead to the formation of thrombus, which causes progressive necrosis of associated hard and soft tissues. The most common form of this disease in maxillofacial region is rhinocerebral mucormycosis, with widespread involvement of oral cavity, maxilla, palate, nose, paranasal sinuses, orbits and central nervous system. Early symptoms of this disease include facial cellulitis, periorbital edema and nasal inflammation, followed by widespread tissue necrosis.[10]

Approach Of A Dental Professional Towards A Post-Covid-19 Patient: It is recommended to perform an extensive intraoral examination in recovered COVID19 patients to find anyoral manifestation. Dentists should have a high degree of clinical suspicion and keep COVID-19-associated Mucor mycosis (CAMCR) in the differential of a severely ill patients with COVID-19 and diabetes mellitus, especially if rhino-orbital or rhino-cerebral presentations are noted.[8]Clinical presentation of mucormycosis usually provides an invasive picture of perforation into bony areas. Cases have been documented with oroantral communication or perforation extending to facial tissues. A thorough clinical examination of the oral cavity in invasive lesions is recommended to achieve a clinical diagnosis, since not all the cases with mucormycosis will show the classical diagnostic interpretation in imaging studies like radiographs, computerized tomography (CT), magnetic resonance (MR), culture studies, or serological tests. Thus, a good clinical evaluation and histopathological examination remains the gold standard in diagnosis.[11]Failure of prompt medical and surgical intervention may lead to cerebral spread, cavernous sinus thrombosis, septicemia and multiple organ failure lending to high morbidity and mortality.[10]

Diagnosis of Mucormycosis: Certain signs clearly evident by a dentist, and the dental professional must keenly look for those signs in a post covid patient. Extra orally patient may present with nasal stuffiness, black nasal discharge,

erythema nasal mucosa, facial erythema, black discoloration of the skin, orbital pain ptosis, diplopia, orbital edema etc, whereas intra orally the patient may present with mobile maxillary teeth, halitosis, dental pain, palatal ulceration, and infected gums.[9, 10, 12,13]

Management of Mucormycosis: Glucocorticoids and remdesivir, the only drugs proven to be beneficial in the treatment of COVID-19, of which glucocorticoids are widely available, and have been shown to reduce mortality in hypoxemic patients with COVID-19. However, glucocorticoids can increase the risk of secondary infections.[13] Mucormycosis has gained widespread attention due to its high mortality rate, which is almost 50% in post covid patients.[14]Early diagnosis is the best way to manage oral mucormycosis, along with reversal of the underlying predisposing risk factors and systemic disorders, surgical debridement, and prompt administration of active antifungal agents.[13]Management is a team approach, which includes microbiologist, histopathologist, intensivist, Neurologist, ENT specialist, Ophthalmologist, Dentist, surgeons (maxillofacial and plastic), radiologist etc. immediate hospitalization and prompt diagnosis is necessary to prevent the progress of infection. Control of hyperglycemia, early treatment with liposomal amphotericin B, and surgery are essential for the successful management of mucormycosis.[14]

CONCLUSION

With covid-19, there has been tremendous changes all over the globe. Dentists being the ones directly working in the mouth of the patient,are at much higher risk of transmission. It has now become a universal protocol to maintain the maximum level of SARS-CoV-2 safety measures, to prevent spread of infection from patient to dentist, dentist to patient, patient to patient and with the staff. Also, dentists are the first ones to be approached when a patient encounters an oral problem, so it is even more important to carefully examine a post-covid patient for any signs of fungal infection, as mucormycosis, is considered to be an important outcome of SARS-CoV-2 infection. Because COVID-19 is still under investigation, all possible associations with the disease should be reported. Treatment of a post-covid patient should include only emergency treatments with non-emergency treatments to be postponed for 3 months.

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