

COVID-ified Dentistry: Clinical Dentistry in COVID Era

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ABSTRACT

“COVID-19”- Corona (CO) Virus (VI) Disease (D) named as COVID and 19 stand for the year 2019. World Health Organization has declared it as pandemic and as of now more than 180 countries have been affected and it is spreading like a wild fire all over the world. No one could predict the future and a lot of speculations about the prospects of dentistry when the pandemic goes untamed. This article is a modest attempt to understand the Covid 19 crash, confront in dental scenario when no dental school could have envisaged such a situation of a prolonged interlude. Due to the uniqueness of dental settings, the peril of cross infection may be high. In India all dental care other than emergency is suspended at the moment. But as WHO put forward, learning to live with Covid 19 may be vital. So in no longer time we need to introduce social, behavioral changes with effective infection control protocols to normalize our life to the best doable extend and to abide by the guidelines issued by Indian Ministry of Health, Indian Council for Medical Research and Indian Dental Association.

Key Words: Corona virus; COVID-19, Oral manifestations; SARS-CoV-2, Quarantine

INTRODUCTION

In mid-1960s Corona viruses were identified and were recognized to infect humans and a variety of animals. In 2003 SARS-CoV (Severe Acute Respiratory Syndrome) identified in southern China, and MERS-CoV (Middle East Respiratory Syndrome) was identified in Saudi Arabia in 2012¹. Corona viruses cause a variety of diseases in animals, birds to potentially

lethal human respiratory infections². In December 2019, a series of inexplicable pneumonia cases have been accounted in Wuhan, China & researchers have isolated a new virus from the patient³. The infectious agent of this viral pneumonia was finally identified as a novel coronavirus (2019-nCoV), a family of corona viruses that infects human⁴. The phylogenetic analysis based on the viral genome, discovered 2019-nCoV also belongs to the β -CoV alike to SARS-CoV & MERS-CoV.

On January 8, 2020 formally proclaimed, a novel corona virus as the causative pathogen of the infection. In a meeting on January 30, 2020, WHO declared the outbreak as a Public Health Emergency when it extended to 18 countries with four countries reporting human-to-human transmission⁵. On the same day (Jan 30 2020) first case of India reported in Kerala who was a medical student from Wuhan University. According to previously adopted guidelines, WHO named this pathogen as “COVID-19” on 11 February 2020.

Viral Etiopathogenesis & Epidemiological Characteristics

CoVs are positive-stranded RNA viruses with a crown-like appearance under an electron microscope (*coronam* - Latin term for crown) due to the presence of spike glycoproteins on the envelope⁶⁻⁷. Coronaviruses (CoVs) are the largest group of viruses belonging to the *Nidovirales*, which includes *Coronaviridae*, *Arteriviridae* and *Roniviridae* families. The

Coronaviridae comprise one of two subfamilies in the *Coronaviridae* family, with the other being the *Torovirinae*. Coronaviruses (CoVs), enveloped positive-sense RNA viruses, are typified by club-like spikes that project from their surface, an unusually large RNA genome, and a sole replication strategy⁸

Zhao et al⁹ suggested that the receptor for SARS-CoV-2 as angiotensin-converting enzyme 2 (ACE2). ACE2 is expressed on type I and II alveolar epithelial cells of human lung. Men have a higher ACE2 level in their alveolar cells than women. The binding of SARS-CoV-2 on ACE2 can lead to the damage of alveolar cells which may trigger a sequence of systemic reactions and even to death

Huang et al⁴ suggested that the patients reported had fevers(98%), of which 78% had a temperature higher than 38°C. 76% of The patients also had coughs(76%), dyspnea (55%), fatigue and muscle pain (44%).

Patients also developed expectoration (28%), headaches (8%), hemoptysis (5%) & diarrhea (3%). Myocarditis (12%) and a significantly increased level of hypersensitive troponin I⁹. Irregularities in chest computed tomography (CT) images were observed in all of the patients. Grinding glass-like and consolidation areas were found in infected patients (98%)¹¹

Most common symptoms of Covid 19 associated with with a fever (37 - 38°C), tiredness and dry coughs accompanied by chest discomfort^{10,11}. After the onset of the illness, difficulty in breathing and chest discomfort may get aggravated. Older people and people with other medical conditions like asthma, diabetes, heart disease are more vulnerable, may be fatal¹². Recent data suggest fever, may or may not be an early symptom.

Oral Manifestations^{12,13,14}

Few data from France suggestive of certain oral manifestations like irregular oral ulcers as an inaugural symptom of Covid 19

which has to be proven in larger samples in Cohort Case Studies. Suggestive oral manifestations include irregular ulcer on the dorsal surface of tongue with a history of painful inflammation of tongue papillae followed by erythematous macule and after 10 days ulcer healed without scar formation (Anne-Gaelle Chaux –Bodard et al).

Cases have been observed at day 3 after occurrence of the oral lesions an erythematous plane lesion appeared on toe which was painful initially and later asymptomatic. Covid 19 is related with a variable inflammatory reaction that may result in vascular inflammation thus oral and dermatological symptoms can represent the lesion.

Latest reports on Covid had drawn attention to dental risk which suggests that salivary gland in the epidemic process of asymptomatic infections, and can be a latent reservoir of infection (J.Xu et al).

Mode of Transmission

The first cases of the CoVID-19 disease were linked to direct exposure to the Huanan Seafood Wholesale Market of Wuhan. Animal-to-human transmission was assumed to be the main mechanism but later consequent cases were not associated with such exposure mechanism. Hence, it was accomplished human-to-human transmission, and symptomatic people were considered the most frequent source of COVID-19 spread¹⁵. Distressingly, there are suggestions that individuals who remain asymptomatic could transmit the virus and are asymptomatic carriers. Patient can be symptomatic, asymptomatic¹⁸ or pre symptomatic as suggested by recent scientific data. Isolation or quarantine is the only mode of this epidemic prevention now.¹⁶

Like many other respiratory pathogens (flu and rhinovirus), the transmission is alleged to occur through respiratory droplets from coughing and sneezing¹⁴. In addition, there may be risk of fecal-oral transmission¹⁷⁻¹⁸, as researchers have identified SARS-CoV-2 in the stool of patients from China and the United States.

However, whether SARS-CoV-2 can be spread through vertical transmission (from mothers to their newborns) is yet to be confirmed. If CoV-2 droplets present on the surface of any objects located near to an infected individual, it can lead to surface contamination which may be contacted by a healthy individual later. Thus, disinfection of inanimate objects and hand washing are crucial to avert the spread of infection. This recommendation is further reinforced by taking into consideration the fact that a person touches their face on an average of 23 times / hour and the awful data suggests

that more than 44% of these occurrence engross the mucous membranes of the mouth and/or nose. Furthermore, SARS-CoV-2 can bind to human angiotensin-converting enzyme 2 receptors and salivary glands¹⁶ are highly concentrated with these receptors. Thus the potential transmission of COVID-19 via aerosol, fomites, or oral routes may contribute to nosocomial spread in the dental office setting. Aerosol transmission is also likely in case of long-drawn-out exposure to elevated aerosol concentrations in closed spaces¹⁶.

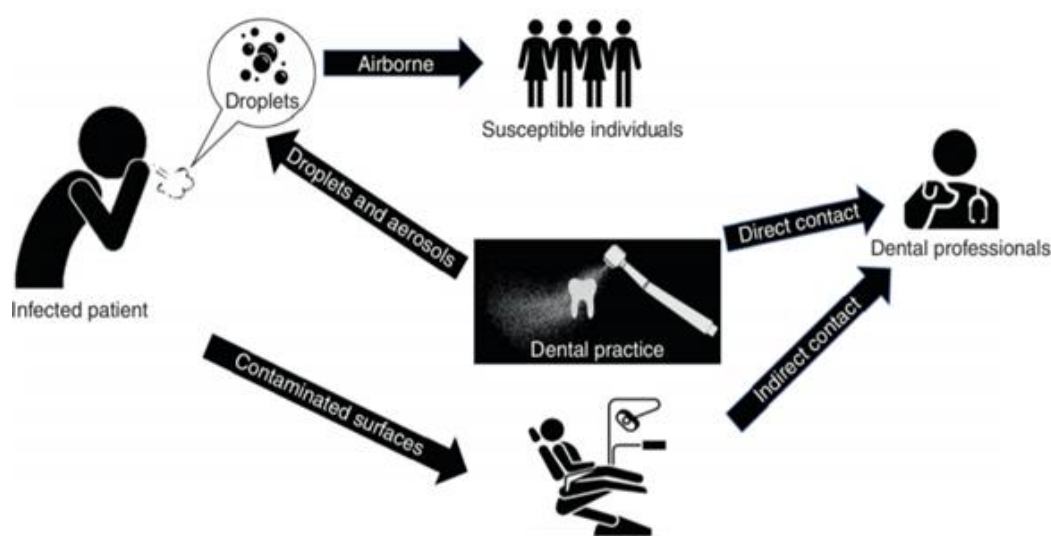


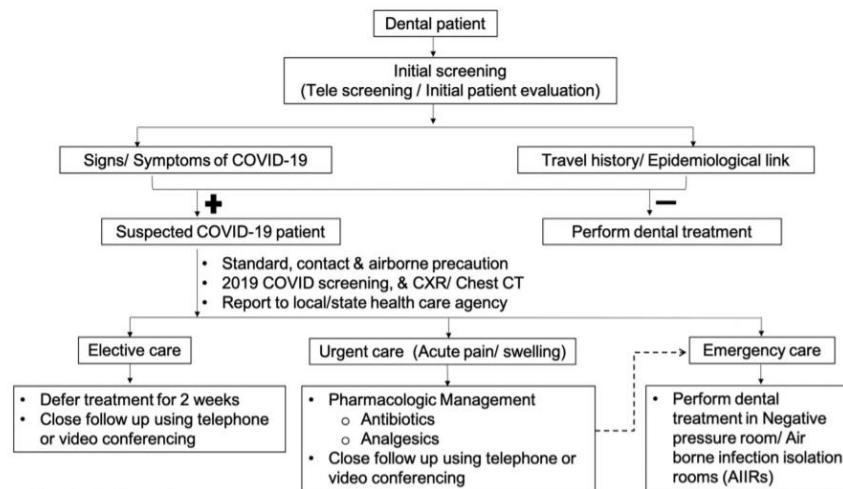
Fig 1: Illustration of routes of transmission of COVID-19 in dental setting (Peng et al ¹⁶)

Diagnosis and Treatment

The diagnosis of COVID-19 is now based on the epidemiologic information^{17,18} (e.g., a history of travel to or residence in affected region 14 d prior to symptom onset), clinical symptoms, CT imaging findings, and laboratory tests (e.g., reverse transcriptase polymerase chain reaction [RT-PCR] tests on respiratory tract specimens) according to strategy issued by Ministry of Health. More over it is to be mentioned that a single negative RT-PCR test result from suspected patients does not exclude infection^{19,20}. Clinically, we should be alert of patients with an epidemiologic history, COVID-19-related symptoms, and/or positive CT imaging results¹⁸.

Currently any specific anti-nCoV treatment is available, so the management of COVID-19 has been largely supportive (WHO 2020a). Currently, the approach to COVID-19 is to control the source of infection; use infection prevention and control measures to lower the risk of transmission; and provide early diagnosis, isolation, and supportive care for affected patients (Wang et al. 2020)⁴. A series of clinical trials are being carried out to investigate interventions that are potentially more effective (e.g., lopinavir, remdesivir). Still different school of thoughts regarding the use of hydroxychloroquine (malarial drug) due its potential side effects¹⁰.

PATIENT SCREENING, EVALUATION & TREATMENT



Flow Chart: A summary of patient selection, screening and dental treatment in Covid 19 Scenario. (Ather et al. JOE Volume 46, Number 5, May 2020²¹)

Based on the available research papers on SARS-CoV-2 and Covid 19, few measures are discussed for dental patient management in this pandemic period.

Telephonic screening/ Initial screening via telephone.

The Indian Ministry of Health has been recently put forward telephonic screening to spot out the patients suspected or possible COVID19 infection during the time of scheduling appointments. Telephonic screening should include the 3 pertinent questions like any exposure to a person with known or suspected COVID-19 facade, any recent travel history to an area with high incidence of COVID-19 or presence of any Covid 19 symptoms like febrile respiratory illness (fever or cough).

Patient Evaluation

In dental office, patients may have a assessment form for medical history, COVID-19 screening questionnaire and true emergency questionnaire. The patient's body temperature to be measured using a noncontact forehead thermometer or infrared thermal sensors. Dental care to be postponed in patients with fever (100.4F 5 38C) and/or respiratory disease symptoms, and report to nearest health care centre. The suspected individuals may be benched in a well-ventilated waiting area at least 6 ft from unaffected patients seeking dental

treatment. Patients should be requested to wear a surgical mask and follow proper respiratory hygiene. Dentists may ensure to instruct the patients to rule out Covid 19, self quarantine measures to be advised and report to the concerned public health care worker. Proper sanitation and disinfection protocols to be followed as per the guidelines issued.

Drug Administration:

For suspected/confirmed COVID19 infections, requiring decisive oral care (like tooth pain and/or swelling) pharmacologic management can be advocated. Antibiotics and/or analgesics may be chosen for symptomatic relief. Dental professionals may either postpone the treatment, refer to concerned specialist or deliver dental care with all appropriate measures in place to prevent the spread of infection¹⁸. In instances like dentoalveolar trauma, space infections (emergency dental intervention) dentist should follow the disease prevention protocols.

In case of providing dental treatment in the existing scenario with unpredictable future, dentists should be aware of the general recommendations (A nut shell of guidelines issued by IDA, ADA, Ministry of Health India etc.)

- i. Dentists must be in track with airborne precautionary measures like

- use of personal protective equipment, hand hygiene practice etc.
- ii. An indoor portable air cleaning system with high efficacy particulate air (HEPA), filter and UV light as suggested by the Ministry of Health, India.
 - iii. Pre procedural mouth rinse^{18,19}: SARS-CoV and MERS-CoV were greatly liable to povidone mouth rinse. Hence a pre procedural mouth rinse with 0.2% povidone-iodine might reduce the load of corona viruses in saliva as the lipid envelope does not usually vary even after genetic mutation of virus. 0.5-1% hydrogen peroxide mouth rinse, as it has non-specific virucidal activity against corona viruses is also an alternative. Researches progressing on mouth wash components like ethanol, chlorhexidine, povidone-iodine on the viral membrane disruption of Covid -19²⁰. Few studies suggestive of its potential in destroying viral envelope, replication²¹ etc.
 - iv. Use of disposable devices to be adopted in preventing cross contamination.
 - v. Radiography: Extra oral imaging to be practiced to avoid gag or cough reflex. Double barriered sensors to prevent perforation and cross contamination if intraoral imaging is mandated²².
 - vi. Rubber dam isolation^{24,22}- The amount of saliva- and blood-contaminated aerosol production may drastically reduced. Extra high-volume suction to be used along with regular suction when a rubber dam is placed²³.
 - vii. Minimize the use of ultrasonic armamentarium, high-speed handpieces, and 3-way syringes to trim down the risk of contaminated aerosols production^{24,25}. Manual devices can be considered, if rubber dam isolation is not indicative or even when suspecting a Covid 19 infection²⁴.
 - viii. Anti-retraction handpiece - Few studies have shown that the use of anti-retraction high-speed handpiece may significantly reduce the backflow into the tubes of the hand piece and dental unit^{24,21}. Anti-retraction hand piece with especially designed anti-retractive valves or anti-reflux designs as a added preventive measures²⁶.
 - ix. Disinfection of the clinical settings- Effective disinfection measures to be advocated in accord with the protocol issued by the concerned authorities²⁴.
 - x. Management of medical waste²⁵ - The medical waste to be disposed in accordance with guidelines. The medical and domestic waste generated by the treatment of patients with suspected or infected, must be regarded as an infectious medical waste. It should handled by the protocol issued by ICMR or concerned regulatory authority.
 - xi. Endodontic practices with diluted sodium hypochlorite irrigant solution or other suitable irrigants, without compromising on treatment outcome²³.
 - xii. Negative-pressure treatment rooms/ airborne infection isolation rooms (AIIRs) can be considered. Therefore, knowledge of health care centers with provision for AIIRs to be advocated²⁷.

DISCUSSION

The ubiquitous spread of Covid 19 amplifies the leeway of treating this subset of the patient population by dental professionals. The latest update (May 19, 2020) by the Ministry of Health in India recommends dentists nationwide to defer elective dental care other than emergency care. Even the dental consultations are recommended only in safe zones. Even after

the circumstances starts normalizing every patient to be considered as virus hauler, and all dental practices need to appraise their disease control policies, fabrication controls, and supplies. Oral care providers must keep themselves drift with the surfacing disease and provide adequate training to their workforce to uphold levels of screening and preventive measures.

CONCLUSION

Medical professionals have a huge responsibility to protect the communal health by sky-scraping standards of disease management and disease control. The clinical dental practice may not be soon promising as prior to the Covid era as this new pathogenic threat is predicted to persevere in our populace as more or less virulent infection for a prolonged period. Thus, it is important to make certain clinical modifications, to balance our lives and livelihood. The economic stress and struggle of dentists when the clinical set up undergoes a sea change also has to be addressed with paramount importance which is beyond the scope of this literature. After all to exterminate the panic of cross infection, for the well-being and to gain confidence in our patients, certain clinical modifications may be indispensable in the current Covidified Clinical Dentistry.

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