Review Article

# Covid 19- An Orthodontists' perspective

Dr Amruta Mantri (Chandak)[1], Dr Suchita Tarvade (Daokar)[2]

[1]PG Resident, [2]Professor and Guide,
Department of Orthodontics and Dentofacial Orthopaedics,
C.S.M.S.S Dental College and Hospital, Aurangabad, Maharashtra, India

*Corresponding author: Dr. Amruta Mantri (Chandak), Email: dramruta89123@gmail.com*

## ABSTRACT

COVID 19 has created havoc in the entire world in past few months. Starting from Wuhan, China the disease has spread to the entire world in couple of months. The highly contagious and notorious nature of the disease has made WHO declare it as a pandemic and sixth public health emergency of international concern. The nature and course of disease is constantly being upgraded by the researchers all over the world. Amongst all the health professionals, Dental fraternity is at utmost risk due to the mode of spread of infection via respiratory droplets. The fact has lead to increased anxiety amongst the fraternity and orthodontists are not an exception to it. In this article, an effort has been taken to summarise and review the cause and effects of SARS CoV 2, the precautions to be taken by the orthodontists and patients during the pandemic and smooth re opening of the practice post lockdown so as to minimise the anxiety and serve the patients in a safer way.

## INTRODUCTION

Corona virus (SARS CoV) has caused two major pandemics in two decades namely SARS (Severe Acute Respiratory Disease) and MERS (Middle East Respiratory Syndrome).[1,2] In the last week of December 2019, Wuhan, Hubei province, China experienced a severe pneumonia outbreak which claimed 80 deaths, infecting 2,671 people in China and 33 people in 10 different countries by last week of January 2020.[3] At the early stages of outbreak, Full-length genome sequences were obtained from five patients. It was found that the sequences share 79.6% sequence identity to SARS-CoV. Due to its high spread potential the WHO declared the COVID-19 outbreak as the sixth public health emergency of international concern.[4] On 30 January 2020; the Director-General of the World Health Organization (WHO) declared COVID-19 outbreak to be a Public Health Emergency of Global Concern. WHO has issued a set of Temporary Recommendations for the same.

### Etiopathogenesis

**About the virus SARS CoV-2:**

This new virus was initially referred to as novel corona virus 2019. The International Committee on Taxonomy of Viruses renamed it as SARS-CoV-2.[5]

This RNA virus belongs to coronaviridae family and is sister virus to SARS CoV. The SARS CoV 2 uses membrane bound ACE-2 (Angiotensin Converting Enzyme-2) to penetrate into host cells.

**Mode of transmission of virus:**

Bats are the reservoirs harbouring SARS-CoV-2. Previous studies reported an animal to human transmission, a link between a single local fish and wild animal market was reported. Most of the cases indicated a possible human to human transmission, commonest source being through droplets or direct contact with the infected individuals.[6] Droplet transmission occurs when a person is in intimate contact within 1 metre of range with someone who has symptoms (e.g., coughing or sneezing) and is therefore at risk of having his/her oral and nasal mucosa or conjunctiva (eyes) exposed to potentially infective respiratory droplets. Moreover, as mentioned earlier, the SARS CoV-2 uses membrane bound ACE-2 (Angiotensin Converting Enzyme-2) to

penetrate into host cells.[7] This enzyme is found into mucosal cells of dorsum of tongue and salivary glands. Thus it is clear that saliva harbours corona virus at high titres.[8]

**Signs and symptoms of patients with COVID 19:**
Individuals confirmed with the disease COVID 19 presented with symptoms like fever, coughing, sneezing, generalised fatigue, lower respiratory tract infection and severe pneumonia. The disease onset can be categorised into mild, moderate and severe. These symptoms may vary from one person to another from being asymptomatic to Acute Respiratory Shock Syndrome (ARDS), sepsis, shock, multiple organ failure followed by death.[9] The target organ affected by SARS CoV 2 is lungs. Recent studies have shown that there is pulmonary thrombosis which impairs blood supply and gas exchange leading to respiratory failure.

**Incubation period of SARS CoV 2:**
In a study, incubation period was explored for 58 case-patients. It was found that the mean incubation period was 6.1 days (range 1-16 days) amongst 33 cases who had a close contact with the infected symptomatic person. The mean incubation period for 25 cases was 6 days (range 1-15 days) who had travelled to Wuhan and stayed for less than a day over a period of three weeks.[6]

**Treatment considerations in COVID-19 patients:**
NICE (National Institute for Health and Care Excellence) recommended the use of paracetamol only for the initial symptoms of fever and headache in infected patients. Later, these guidelines were revised. As per the latest revised guidelines in treatment considerations, it has been stated that the patient with symptoms of fever and headache can be treated with minimum effective dose of ibuprofen or paracetamol for shortest duration. As this is a rapidly changing situation, the protocols are frequently being evaluated with best of evidence available.[10] It is advised that the patient should not take the medication without physician's consent or should report if already taken, as there may be chance of masking the disease when patient is looked for the dental treatment, since the infrared thermometer may fail to show the raised body temperature masked due to anti pyretic effect of the drug.

Government of India Ministry of Health & Family Welfare Directorate General of Health Services (EMR Division) has published Revised Guidelines on Clinical Management of COVID –19 in all phases of the disease. As per the latest news, ICMR is coming up with revised protocol for treatment with COVID 19 infected patients.

**Dentistry and COVID 19:**
The dental fraternity is the known source of aerosol production during maximum of its procedures, which is exclusive to dentistry. Salivary pool being one of the main reservoirs of the virus,[8] it is very essential for the dentists and health care professionals to take utmost care when performing oral procedures. The importance of infection control will prevent the spread of virus on a larger scale.

**Orthodontists and COVID 19**
All dental professionals are at risk of acquiring the infection and orthodontists are not an exception to it. There are many routes by which orthodontists can acquire infection. They are:

- Through coughing and sneezing by infected patient
- By touching a previously contaminated surface or instrument.
- Treating those patients who have been in contact with the infected person or carrier.
- Being in contact with multiple such people who accompany the patient in the institutes or clinics.[11]

Keeping all the potential sources of infection in mind, certain measures should be adopted by the orthodontists to combat the spread of COVID 19.

They are:
**A. Setting the priority and performing patient triage:**
When receiving patients, it is strongly recommended to investigate current health status of patients beforehand. Patients should be enquired about:

- Any recent symptoms
- Current travel history
- Visit to any place with epidemic outbreak

If any patient is suspected of having any of the above symptoms or history he/she should be reported to sanitary authorities and home/hospital quarantine should be performed depending on severity, without any delay.

All the dental treatments should be postponed to 14 days after exposure to the infected individual.[12]

**B. Registering the body temperature and measuring the oxygen saturation:**

Body temperature of the patient should be recorded possibly with contactless thermometer. Same measures should be applied to the person accompanying the patient (Figure 1).

Figure 1: Contactless Infrared Thermometer

Fall in oxygen saturation level (SPO2) below normal is one of the important diagnostic markers for COVID-19. Pulse oximeter (Figure 2) is a diagnostic tool in determining oxygen saturation level before starting any patient.

Figure 2: Pulse Oximeter

**C. Use of mouth rinses prior to dental treatment:**

Mouth rinses containing 1% hydrogen peroxide or 0.2% Povidone iodine can be employed to reduce salivary microbial load.

**D. Hand hygiene:**

It is very important measure to be performed thoroughly when coming in contact with patients, any non disinfected surface or equipments. With unwashed hands, avoid touching eyes, nose and mouth. A 5hand washing protocol has been put forward to reinforce compliance of health professionals which includes hand washing twice before treatment and thrice after treatment.[13]

**E. Use of personal protective equipments by practitioners:**

PPE includes protective outwear, protective face shield, eye glasses, masks and gloves; It is of utmost importance to protect eye, oral mucosa an nasal mucosa since the spread of SARS CoV-2 occurs through spread of droplets[13]

Table 1 enlists recommended PPE.

| |
|---|
| FPP3 /PAPR or N95 (FFP2) mask plus face shield (or mask/with attached shield over N95) |
| Gloves |
| Nonporous gown |
| Disposable cap |
| Scrubs worn during the procedure should be changed immediately afterwards |

**a. Face masks:** there are various masks available in the market. According to the situation, the population and the purpose of mask use, WHO has published guidelines regarding the use of appropriate mask for respective population. [15]

For a person performing AGP (Aerosol Generating Procedure) on a suspected or confirmed case, Respirator (N95 or N99 or FFP2 or FFP3) mask is recommended.

Certain guidelines have been published regarding the use of mask in proper way. They are:

I. Clean hands thoroughly before wearing the mask.
II. Cover the mouth, nose and adapt the mask over the bridge of nose.
III. Ensure minimum gap between nose and mask.
IV. Avoid touching mask while wearing it.
V. While removal, don't touch the front portion of the mask and remove it from the back.
VI. Don't re-use masks meant for one time use.
VII. If the mask is soiled or damp, discard it and dispose immediately upon removal.

A thorough guideline has been provided by CDC guidelines regarding the usage of disposable respirator (Figure 3)

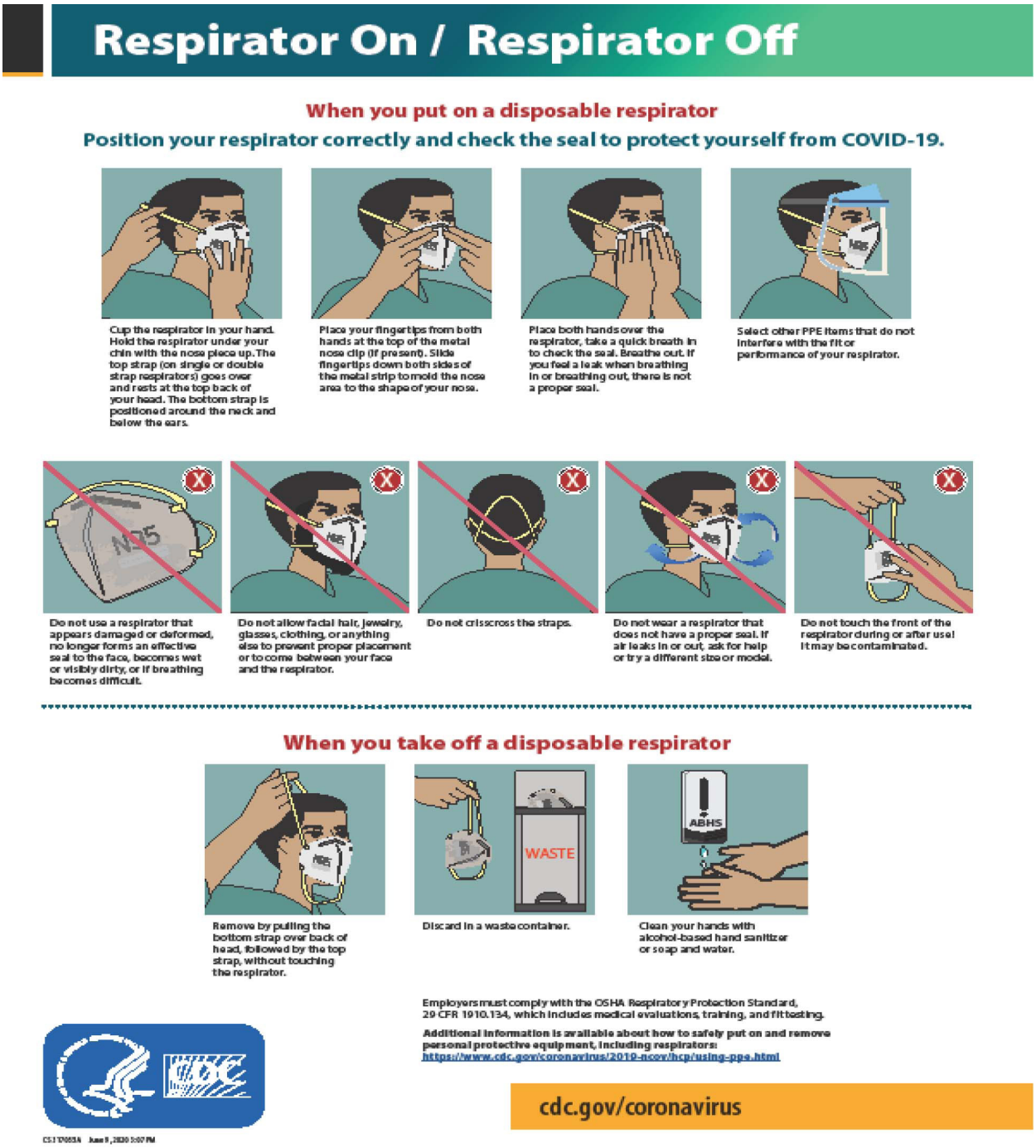


Figure 3

**F. Limitations to aerosols producing procedures:**
SARS CoV-2 spreads though droplets. Aerosol generating procedures add to the risk of spread of this virus. In dentistry, is recommended to use anti retraction dental hand piece as a preventive measure.

The air rotor hand piece must be run for at least 20-30 seconds in spittoon or any container after completion of each patient.

The room where any aerosol generating procedure is carried out should be well ventilated with fresh air for 15 minutes before new patient is admitted on dental chair. In case of lack of natural air ventilation in closed set ups, High Efficiency Particulate Air (HEPA) filtration should be used for the recycled air.

After completion of ventilation, a viricidal disinfectant like 0.05% sodium hypoclorite (NaClO) is recommended for cleaning the areas of dental care.[16]

**G. Cleaning of Potentially Contaminated Surfaces:** Careful disinfection of surfaces should be carried out with particular attention to door handles, chairs, and

desks.[13] The ADA recommends that all surfaces of the clinic, especially those frequently touched, should be wiped with Environmental Protection Agency (EPA)-registered surface disinfectants.

**H. Sterilisation of plastic instruments:**

The UV (Ultra Violet) chamber is found effective in sterilising the plastic instruments like cheek retractors, agate spatulas, aligners, elastomeric chains, and elastomeric modules. It employs two Philips UV lamps radiating at 253.7nm; the wavelength which is reported to be ideal for sterilization. [17]

**I. Sterilisation of dental instruments:**

ADA recommends that instruments along with dental hand pieces should be properly autoclaved using a standard protocol after every use considering manufacturer's product guidelines for use.[17]

**Are we ready to combat COVID 19 ?**

**Fear and anxiety amongst orthodontists and patients**

Fear and anxiety are the most prevalent behaviour seen in every human being and dentists and orthodontists are nowhere exception to it. The possible attributing factor to this scenario is the electronic media and constant bombardment of repetitive things leading to fear factor. An online survey was conducted for dentists across 30 countries regarding fear and anxiety in dentists and readiness for practice modifications. It was found that the fear prevailed in among 87% of participants who were afraid of getting infected with COVID-19 from either a patient or a co-worker. It was also seen that the dentists were fearful to treat a coughing patient, carrying infection from dental practice to home and talking to a patient in close vicinity. Many were afraid of getting quarantined if they get infected and their fear hiked after learning about mortalities due to COVID-19. About 66% dentists wanted to close their dental practice until number of COVID-19 cases decline in India.[18]

The fear factor was observed in patients as well. There was an impact of COVID 19 pandemic on anxiety on patients with respect to their orthodontic problems and appointment. An online questionnaire was conducted regarding the anxiety about the COVID 19 situation and acceptance to attend the appointment. The questionnaire was answered by 354 patients, most of them were found to respect the quarantine. Considerate amount of patients were afraid or anxious (46.3%). It was noticed that the level of anxiety was lower in some patients who were ready to attend orthodontic appointment. Few patients opted to see the orthodontist only in emergency. Anxiety level was more in females than males. Overall, the delay in orthodontic treatment was the greatest concern of patients undergoing treatment.[19]

**Orthodontic emergencies: every problem has a solution!**

Orthodontic emergencies can bother the patient, his relatives or the orthodontist as well. Calling up a patient to the clinic for solving his/her problem can unnecessarily risk many people especially when the emergency can be managed at home. It is the duty of Orthodontist to play a role in managing the emergency by guiding the patient to take appropriate measures at home. If at all the patient is unsuccessful in doing so, he may be seen by the orthodontist with due precautions and maximum conservative approach.

Following guidelines are given in tabular form (table 2 and table 3) for emergency management by the patient. They are to be followed by the orthodontist too if the patient visits the dental clinic so as to minimise the risk of spread of the disease.

| Type of appliance | Emergency | Management |
|---|---|---|
| Functional removable appliance | Breakage of appliance | Discontinue the use and inform orthodontist |
| Aligners | Loss of appliance or breakage | Get back to previous appliance and inform orthodontist |
| Retainers If broken or lost | Breakage or loss | ask to the dentist to evaluate buying hot customable preforms on e-commerce sites[17] |

Table 2: Emergency management of removable orthodontic appliance[20]:

| **Type of component** | Emergency | Management |
|---|---|---|
| Arch wire | Poking of distal end of wire | Asking the patient to cut the distal end with disinfected nailcutter |
| Arch wire | Shifting of archwire on to one side | Asking patient to shift the wire to normal position using eyebrow tweezer. |
| Ligature wire | Pricking of ligature tie cut end | Ask the patient to compress the end with eraser present at the back of pencil or apply wax on the tie end. |
| Bracket | Debonded bracket attached to wire with ligature | Should be left on place if present in close approximation with tooth. |
| Bracket | Debonded bracket dislodged from archwire as well | Patient is asked to remove the bracket carefully using eyebrow tweezers |
| Band | Periodontal abscess caused due to slippage of band into gingival tissue | Removal of band under professional guidance. If visiting orthodontist is not possible then prescribing antibiotics and analgesics for symptomatic relief. |
| Pre-activated appliances, such as Pendulum, Forsus, Distal Jet appliance, and transpalatal bar | Pain, swelling, accidental dislodgement of appliance | Asking the patient to visit the clinic for removal of the appliance. |

Table 3: Emergency management of fixed orthodontic appliance component[20]:

## CONCLUSION

Emergence of COVID 19 pandemic has become a clinical threat to the health care sector, the patients and general population. Its effect is noticed it the field of dentistry as well and orthodontics is nowhere an exception to the fact. The overall fraternity is exposed to higher risk of this virus due to its mode of spread through spatter, saliva and aerosols. This has eventually led to fear prevalence amongst the doctors of the field. COVID-19 has hugely affected the overall orthodontic treatment protocols and follow-up schedules of patients. The quarantine advised by the government was obeyed by the patients and has led to the delay in orthodontic appointment schedule. The only way to combat this situation in orthodontics in this emergency crisis is following the strict sterilisation protocol, minimising personal contact and reducing the amount of aerosol production.

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