



Review Article

Orthodontic interventions during covid-19 pandemic

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ABSTRACT

Objectives: To provide a comprehensive summary of the implications of severe acute respiratory syndrome coronavirus 2(SARS) infection and coronavirus disease 2019 (COVID-19) on orthodontic treatment, contingency management, and provision of emergency orthodontic treatment, using currently available data and literature.

Materials and Methods: Orthodontically relevant sources of information were searched using electronic databases including PubMed and Google Scholar and current reports from major health bodies such as Centers of Disease Control and Prevention, World Health Organization, Dental council of India and major national orthodontic associations.

Results: Due to the rapidly evolving nature of COVID-19 and limitations in quality of evidence, a narrative synthesis was undertaken. Relevant to orthodontics, human-to human transmission of SARS-CoV-2 occurs predominantly through the respiratory tract via droplets, secretions and or direct contact, where the virus enters the mucous membrane of the mouth, nose, and eyes.

Conclusions: During the spread of the COVID-19 pandemic, elective orthodontic treatment should be suspended. Emergency orthodontic treatment can be provided by following a contingency plan founded on effective communication and triage. Treatment advice should be delivered remotely first when possible, and where necessary, in-person treatment can be performed in a well-prepared operatory following the necessary measures.

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1. The pandemic covid-19

The present outbreak of the 2019 coronavirus strain (COVID-19) concerns the public health emergency at global level. International centres for disease control and prevention are monitoring this infectious disease outbreak; symptoms of COVID-19 infection include fever, cough, and severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS)., with severe cases leading to pneumonia, kidney failure, and even death. The severe respiratory illness caused by the COVID-19 was first detected in Wuhan, Hubei, China, and infections have spread worldwide.¹

In March 2020, the World Health Organization (WHO) declared the COVID-19 outbreak a pandemic.² The virus is thought to be natural and has an animal origin,³ through spill over infection.⁴ The actual origin is unknown, but the first known cases of infection happened in China. By December 2019, the spread of infection was almost entirely driven by human-to-human transmission.⁵⁻⁷ As per the WHO, this virus was responsible for many deaths globally. The male-to-female ratio of the affected patients was 2:1, with a median age of 49 years. The incubation period for human-to-human transmission ranges from 2-15 days.⁸ Considering that COVID-19 was recently identified in saliva of infected patients the COVID-19 outbreak is a reminder that dental/oral and other health professionals must always be diligent in protecting against the spread of infectious disease.

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As the popular saying goes "Change is the only constant" adapting to the new COVID era is the only option left for the profession we are in, but with only half knowledge of how to handle it will lead to distress and some major consequences hard to bear with. Highlighting the Orthodontic procedures in the dental clinic that should be carried out amidst this tough times, this article makes us aware of the fact that the treatment we offer to our patients requires multiple visits rather than being a one sitting treatment thus knowing how to handle the procedures and the emergencies in the current scenario is our main concern.

2. Risk of transmission in a dental office

Saliva can have a pivotal role in the human-to-human transmission, and salivary diagnostics may provide a convenient and cost-effective point-of-care platform for COVID-19 infection. The COVID-19 measures around 120 nm (0.12 μm) and aerosol particle sizes range from 3-100 nm. The use of a FFP3 respirator offers a filtration rate of 99% of all particles measuring up to 0.6 μm .⁹

Currently, the COVID-19 transmission routes are still to be determined, but human-to-human transmission is definitely the most evident one. However several potential scenarios of COVID-19 transmission have been depicted here in Figure 1.

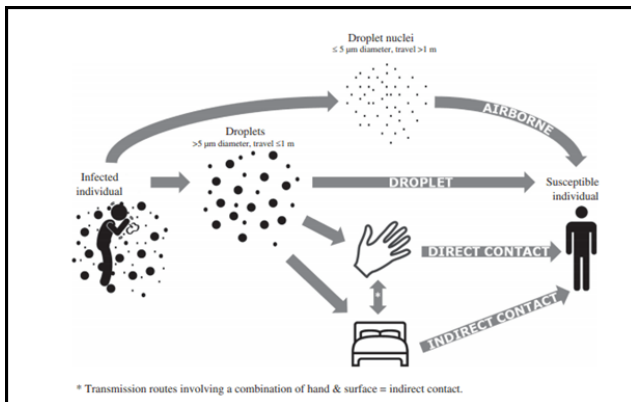


Fig. 1: Potential scenarios of COVID-19 transmission

3. Challenges to overcome

These are extraordinary times and extremely testing times for so many. Starting from the patient taking an appointment to his/her going back with the treatment done involves various modes of transmission of the virus. Keeping in mind the serious consequences each step must be carried out with utmost care.¹⁰

The patient taking an appointment is the first and major step where the dentist must be informed priorly. The patient may inform the dentist through a phone call or through various app in social media like Whatsapp, Zoom, facebook

messenger or others with a video call option which only helps the dentist with triage. The contact number of the clinic may be taken from Google or some other modes serving the same purpose. The steps to be followed during telescreening are elaborated in a flowchart Figure 2.

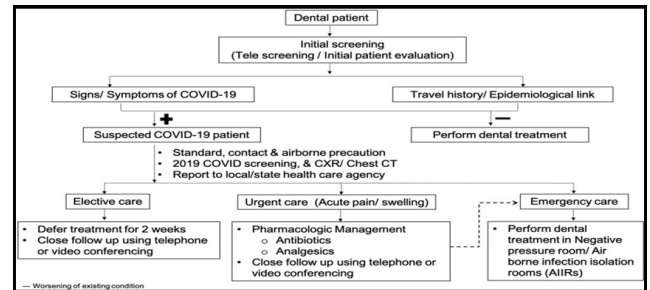


Fig. 2: Flowchart of telescreening

3.1. Major risk factors to be considered

1. Recent travel from or residence in an area with ongoing community spread of COVID-19 as determined by WHO
2. Close contact (within 6 feet, or 2 meters) with someone who has COVID-19 or being coughed or sneezed on by an infected person

Only after the telescreening if the patient is not suspected of the COVID-19 he/she is given an appointment on a specific date and time. The treatment is carried out as per the need of the hour, the ongoing patients in an orthodontist's clinic can be categorised according to Table 1.

1. The patient is asked to follow few rules before heading out for their appointment :-
 - i. To brush their teeth prior to the appointment
 - ii. To tie up their hair if possible
 - iii. Not to wear heels (as they have to wear shoe covers)
 - iv. To wear loose clothes, not to panic and be comfortable
2. As the patient arrives outside the clinic the dentist is informed through a video call and fumigation of the patient is done after which he/she are given proper shoe covers and then asked to roll up their sleeves and sanitise their hands.
3. The front desk of the clinic should be properly shielded to protect the patient as well as the personnel. Training of the orthodontic team on disease symptoms, routes of transmission, infection control measures and keeping up with regulation updates is beneficial during SARS-CoV-2 infection crisis. Also the staff level should be minimal during this time and must be provided with proper PPE (Personal Protective Equipment) i.e. N95 respirators, disposable gowns, face shields etc.

Table 1: Orthodontic scenarios

Orthodontic Emergency Scenarios And How To Handle Them			
Removable Appliances	Functional	If it is broken or does not fit, send photos to the orthodontist and suspend the use	
	Aligners	Remain on the current go on with treatment following clinician's indications if broken or lost get back to the previous and ask the clinician	
	Retainers	If broken or lost, ask to the dentist to evaluate buying hot customizable preforms on e-commerce sites	
Fixed	Non-removable appliances (eg. straightwire appliance)	Loose bracket	Send a photo to the dentist, eventually remove it with tweezers
		Poking distal wire	Send a photo to the dentist, use wax, eventually push it back with eraser of a pencil
		Periodontal abscess around molar band	Send a photo to the dentist, symptomatic therapy with paracetamol, eventually prescription of antibiotic
	Non-removable appliances activated by the patient (eg. headgears)	Must be suspended for future emergencies	
	Pre-activated non-removable appliance	Take a picture every 20-40 days, if the patient feels pain or swelling, see as an emergency in the dental office and eventually remove the appliance.	

4. The patient then enters the treatment chamber where the dentist is there wearing proper PPE(personal protective equipment) . As per the DCI guidelines the patient is asked to rinse with 1% Sodium hypochlorite 15ml for 30 seconds and not any other mouthwash, also the spittoon is blocked and the patient is asked to use the common washing area as to avoid contamination of the pipelines of the dental chair.
5. As the treatment commences proper disposal is followed for the personal protective equipment, also the patient is asked to have a shower and get his clothes washed once he reaches home after the procedure.
6. Fumigation of the dental setup is done and sterilization of instruments is done. Proper time gap is kept between the appointment of two patients to carry out the disinfecting procedures of the clinic efficiently and the same procedure is followed for the next patient.

3.2. *Modifying the different orthodontic procedures in a dental office*

If the patient is tested negative for the symptoms with no travel history and also willing for the treatment then the procedures must be carried out definitely after certain modifications.

1. Instead of using airtors for removing the composite off the tooth we must use composite removing pliers to chip off the left over composite.
2. Avoiding bonding new cases will be the priority

3. Wire change and proceeding with the space closure must be done
4. No disimpactions or exposure of tooth must be carried out
5. No impressions must be taken
6. Most orthodontic appliances can be left as it is for some months without detriment to the patient if the patient continues with the usual after care instructions
7. Aerosol generating procedures (AGP) should only be undertaken to provide urgent care where no other option is available as it presents a higher risk of transmission.
8. Any patient requesting urgent care should first be triaged by telephone or online video-link by an orthodontist to assess the clinical urgency, offer any interim self-care advice and make an appointment for face-to-face assessment if absolutely necessary. Broadcast communication is the key after all.
9. In general, it is recommended during the outbreak to postpone any routine appointments and restrict patients visits to emergency treatment only

3.3. *Orthodontic supplies and instruments*

The following are recommendations to reduce risk of cross-contamination and help protect vulnerable patients as well as the orthodontic staff:

1. Orthodontic pliers can be sterilized with steam autoclave sterilization, ultrasound bath and thermal

disinfection or disinfected with chemical substances 2% glutaraldehyde or 0.25% PAA. Instrument cassettes can be effectively used, with pliers preferably sterilized in an open position.^{11,12}

2. Autoclave is preferred over cold sterilization, without negatively affecting surface characterization of arch wires.^{13,14}
3. Orthodontic markers can be autoclaved or disinfected using glutaraldehyde solution.^{15,16}
4. Cleaning photographic retractors with washer-disinfector was reported as the most effective method of decontamination.¹⁷

3.4. Digital aid with arogya SETU APP

Aarogya Setu is an open-source Indian CoVID-19 Contact tracing, Syndromic mapping and Self-assessment digital service, primarily a mobile application, developed by the National Informatics Centre under the Ministry of Electronics and Information Technology. It keeps the user informed in case she/he has crossed paths with someone who has tested positive. The tracking is done through a Bluetooth & location-generated social graph, which can show your interaction with anyone who has tested positive.

It has a tool for self-testing. The user is asked to answer a number of questions. In case some of the answers suggest Covid symptoms, the information will be sent to a government server. The data will then help the government take timely steps and initiate the isolation procedure, if necessary. The app alerts are accompanied by instructions on how to self-isolate and what to do in case you develop symptoms.

3.5. Virtual Assistance

WhatsApp Messenger (Facebook Inc., Mountain View, California) is an instant messaging application developed in 2009 and quickly spread among users of all ages, for personal relationships, as entertainment, as an aid to the study, and as a virtual place of contact with their group. The international scientific literature on the use of this application in the health sector, identified by the major database, on-line, reports only a small number of publications.

Although its impact in the clinical setting has been poorly investigated, WhatsApp is among the most widely used communication tools, which may also be valuable in favouring the communication and relationship between patients and physicians. Healthcare providers should be trained to use modern web-based communication systems with accurate assessment of indications and contraindications.^{18,19}

Furthermore the American Association of Orthodontists (AAO) recommendations to postpone elective dentistry and offers its own guidance pertaining specifically to orthodontics. Non-elective procedures such as those

considered to be orthodontic emergencies address:

1. Significant oral pain, though the AAO cautions that many such cases could be managed by wax or by sectioning an arch wire with cuticle cutters or nail clippers
2. Infection
3. Limited function
4. Physically traumatic events that yield any of these results

4. Conclusion

In conclusion, a good method to manage emergencies, reassure, and follow patients remotely, while they are in their home is teletriage. The orthodontist should not let the patient use anything that could generate an urgency in the office such as appliances that can be activated by the patient. At the moment, it is essential to manage in the office with the necessary PPE only the real cases of urgencies that cannot be resolved remotely by the patient, following the guidelines dictated by the WHO and local authorities.

Emergency orthodontic treatment can be provided by following a contingency plan founded on effective communication and triage. Treatment advice should be delivered remotely first whenever possible and, where necessary, in-person treatment can be formed in a well-prepared operator following the necessary precautions and IPAC protocol. Guidelines and practice advisories issued by federal, state/provincial, and local health and regulatory authorities should be followed.²⁰

Further studies are needed to investigate the potential diagnostic of COVID-19 in saliva and its impact on transmission of this virus, which is crucial to improve effective strategies for prevention, especially for dentists and healthcare professionals that perform aerosol-generating procedures. We need to support each other in our professional family, reduce patient contact, restrict the generation of aerosols and use the best PPE. We also need to look out for our own mental health and wellbeing of each other because "Together we stand and divided we fall".

5. Source of Funding

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6. Conflict of Interest

None.

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