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Management of Dental and Orthodontic Practice in the COVID-19 Scenario

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A B S T R A C T

The coronavirus disease-2019 (COVID-19) pandemic due to the severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) has casted a deep impact on every aspect of the human life all over the world. The healthcare professionals dealing with the patients have been at the greatest risk of exposure. Dental practitioners fall among the highest risk practitioners because of their field of operation being around the oropharyngeal region of patients, as well as due to the risk of generation of aerosols during various dental procedures. There is a continuous urgent need of modifying the dental practice in accordance with the guidelines issued by the health authorities time to time. Meticulously planned approaches, and adequate precautions and modifications need to be introduced into dental practice. The field of orthodontics also demands a high level of practice modification in order to ensure proper infection control for patients, practitioners, and dental staff.

Keywords: COVID-19; Infection Control, Dental; Pandemics; Disease Outbreaks; Aerosols; Orthodontics

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INTRODUCTION

The novel coronavirus known as the severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) is considered as the 7th member of the Coronaviridae family that has infected humans [1]. It is believed to spread from person to person through droplet transmission (within 6 feet) by coughing, sneezing, and even by conversation and deep exhalation [2]. It has been proven that the virus remains suspended for hours in the aerosols, and for days on some surfaces such as plastics, glassware, and metal surfaces [3]. Oral health providers possess a great risk of contracting the SARS-CoV-2 because of their close communication with the orofacial region of patients, use of rotary and surgical instruments such as air rotors, air-water syringes, ultrasonic scalers, and piezoelectric handpieces, and continuous exposure to body fluids such as saliva and blood, food debris, calculus, aerosols, and contaminated restorative and impression materials [4]. The oral health practitioners and their staff need to have adequate knowledge and awareness regarding the various aspects of prevention and control of infection in dental office in view of the coronavirus disease-2019 (COVID-19) outbreak. By resuming routine dental practice, the demand for modification of orthodontic treatment is also changing. The advancements in computer and imaging technology can solve this problem by the combination of computer-assisted virtual treatment planning and bracket placement, robotic wire bending, indirect

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bonding procedures, use of digital scanners, and efficient sterilization protocols to create a safe dental/orthodontic practice.

Prior to appointment scheduling:

A pre-appointment virtual consultation should be encouraged to control the footfall to dental offices, and to avoid unnecessary travelling by patients. Certain virtual consultation options such as Zoom, We-Chat, and Skype can be utilized for this purpose to take a proper history from the patients, which should include any history of contact with a COVID-19 positive patient in the recent past, and any history of recent illness with cough, cold, fever, and loss of taste and smell sensation. For patients with a positive history of COVID-19 infection, the duration of infection, and updated reverse-transcription-polymerase chain reaction test status may be required. Also, rapid antigen test may be requested for such cases [5]. Most importantly, patients with co-morbidities should be preferably managed by remote consultations as much as possible. The patients should be asked to be accompanied by the least possible number of persons.

Appointments:

Make the virtual appointment as the first choice wherever possible, especially in case of follow-ups not requiring any procedural involvement such as in case of patients on elastics which need to be changed by the patient. Any modification in the force and duration of the wearing of elastics can be recommended on the basis of the progress and status of the occlusion evident from the virtual examination and photographs requested [6]. The parents can be guided telephonically or through video calling in case of patients who need to be guided for the activation of the jackscrew for palatal expansion provided no necessary intervention is required, such as in case of breakage, mucosal irritation, overexpansion of maxilla, excessive buccal inclination of the maxillary posteriors, and no clinical and radiographic evidence of expansion after 2-3 weeks in rapid maxillary expansion and 6 weeks in slow maxillary expansion [7].

Preparation before entering the operatory:

The patient is asked to report at the appointed time only to allow proper sterilization of the operatory and the instruments to be used.

The patient is asked to wait in the waiting lounge or his/her personal vehicle until the proper sanitation of the area is ensured after discharging the previous patient [8]. The disinfection of door knobs, taps, and washbasins or toilets used by the patient or any accompanying person should be ensured. The waiting area and the operatory should display reminders such as posters and signboards to raise awareness about hand hygiene, coughing, and sneezing etiquettes as well as proper disposal of the contaminated objects like tissues, containers, used elastics, dressings, packs, etc.

As the patient enters the office, the receptionist guides him/her for evaluation of vital signs such as body temperature (most preferably with a contactless thermometer). Any history of recent contacts, or travel history of the patient should be recorded.

Preparation of the operatory:

The dental chair and the operatory are sanitized with appropriate sanitizing solutions (mostly sodium hypochlorite or ethyl alcohol). Any disposable glasses, tissues, suction tips, or disposable sleeves for curing lights used for the previous patient should be discarded carefully as per the biomedical waste management protocols [9,10]. The patient should be ensured that all possible measures for the sanitation have been taken care of; this will enhance the trust and awareness among the patients.

Requirements of the operatory setup:

High vacuum suction should be used along with valve mechanism to prevent any source of infection from the vacuum. Air rotors can be replaced with the conventional or electronic micromotors to reduce aerosol generation [1,11]. The equipment to be used frequently should be preferably the disposable ones. Extra sets of the utility pliers need to be kept in stock to allow proper sterilization of the used instruments; this would undoubtedly add to the financial burden as well as burden to carry the extra instruments for consultations. Most of the chair functions should be foot-controlled to avoid contamination with hands. Any switches and the items touched by hands should be covered by clear plastic sleeves which should be discarded after discharging each patient [12,13]. Proper use of personal protective equipment is

inevitable; it includes the surgical mask, eye protection (goggles or a face shield that covers front and sides of the face), a protective gown, head-cover, shoe-cover, and gloves. Use of a N95 respirator or an equivalent high-level protection respirator such as powered air-purifying respirators, elastomeric respirators, disposable filtering face piece respirators, etc. is recommended by the Occupational Safety and Health Administration and Center for Disease Control guidelines for health workers [14,15]. Meticulous hand hygiene is the most effective way of preventing cross infections. The dental healthcare professional should ensure the proper cleaning of hands before examining the patient, and prior to commencement of any dental procedure. Avoid touching surroundings and equipment that are not disinfected [14]. Mouth rinsing with 0.5-1% hydrogen peroxide or with 0.2-0.5% povidone-iodine prior to starting the procedure reduces the viral load. For diagnostic imaging, extraoral techniques should be preferred, such as panoramic radiography, and cone-beam computed tomography as they can reduce the exposure to oral mucosa and saliva secretions as well as the gag reflex and coughing. Maintenance of the digital records has become a need of the hour; intraoral scanners and hence digital models reduce the risks of infection related to the handling and transportation of the impressions and models. In case of impression taking, pre-rinsing with hydrogen peroxide (0.5-1%), or povidone-iodine (0.2-0.5%) should be performed. The impression trays and mixing bowl and spatula should be sanitized before and after each use with a suitable solution [15]. A waterproof disposable or autoclavable apron/towel should be placed over the patient, and any splattering of saliva or any vomitus due to gag reflex or tissue irritation should be collected in suitable disposable containers. The impressions should be thoroughly washed under running water and dipped in a suitable sanitizing solution for the specific time to avoid distortion. A 1000 mg/L chlorine-containing solution is best for the alginate and silicone-based impression materials [1]. The sanitized impressions and models should be transported to the labs in airtight sealed bags. While doing the dental procedures, the most preferred position of the clinician is at 10-11 o'clock for avoidance of the splatter while the 8 o'clock position should be avoided.

Modifications in the Orthodontic Practice:

Modifications in Bonding:

Since the conventional acid-etch technique involves the use of air-water syringe to rinse off the etchant, it increases the chances of droplet infection and virus transmission by many folds. Techniques that could decrease the chances of droplet spread would be beneficial. Self-etch primers are a good alternative as they obviate the need for separate etching and rinsing although the bond strength may be compromised [16]. Resin modified glass ionomer cement is a good option as a bonding agent, since it requires no etching, rinsing and drying, and thus, reduces the risk of infection spread. Cotton rolls (wet and dry), used for cleaning of the enamel surface, eliminate the use of air-water syringe. Indirect bonding requires shorter time and less exposure to the patient; however, removal of flashes should be done meticulously to avoid any aerosol-generating procedure [16]. Laser etching can reduce the invasiveness of the process as well as the aerosol generation. Dry-field techniques such as Nolla's retractors, and Quest™ dry-field systems can significantly decrease the droplet spread. Anti-sialagogues have also been recommended in patients with excessive salivation. Use of a quick curing system such as a 4th generation LED reduces the exposure time; however, use of disposable sleeves for the curing lights and frequent wiping with 70% alcohol are highly recommended after each use, and the lights with autoclavable tips should be preferred [8].

Wire changing:

The wires should be sanitized with 70% alcohol after being removed from the patient's mouth for giving any 3rd order bend, torque correction, curve of Spee, etc. The use of double gloves is preferred to check any lacerations and contamination [17]. The used wires and ligature ties and modules should be treated with a suitable disinfectant (70% alcohol, or 1000 gm/L chlorine-containing solution), and disposed in a sealed container/polyethylene bags as recommended. Any reusable material

should be properly sanitized and stored in a specific sealed packet/container.

Modification of treatment mechanics:

Frictionless and continuous-arch mechanics should be preferred over the frictional mechanics in view of the more differential momentum and the need for more frequent monitoring of the appliance in the loop and segmental mechanics as well as in the cantilever mechanics. However, the fail-safe loop-mechanics can be carried out in some specific cases where the space closure is minimal and the chances of unwanted side effects are markedly lower. The use of springs and cantilevers for the space closure, torque correction, or intrusion/extrusion should be limited to avoid overcorrection and unwanted side effects [16]. In case of frictional mechanics, the use of tie-backs should be preferred over the close coil springs and elastic chains, as the rate of force decay is more in the tie-back mechanics. In addition, the trampoline effect [18] property of tie-backs is an advantage in case the patient is not able to show up for the follow-up on time due to the COVID-19 pandemic situation.

The successful use of temporary anchorage devices is subject to constant monitoring and meticulous oral hygiene maintenance, which is a matter of concern during the current pandemic situations and the need to minimize the patient flow at the clinics and hospitals. In addition to this, frequent monitoring of mini-implants and oral hygiene of patients requires more frequent visits and additional contact procedures which is a much appreciable modification if replaced by more feasible methods in the current scenario [19]. Clear aligner therapy is the most suitable method of orthodontic treatment in the current pandemic situation. It requires minimal exposure of the clinician and staff to the patient. The patient needs to wear the assigned set of aligners as prescribed, and needs to visit the orthodontist less frequently. The follow-up can be maintained through digital modes (intraoral selfies/tele-consultation), and any undesired effects observed in the patient can be avoided further by asking the patient to go for the previous set of aligners until further appointment is made [20].

For the purpose of accelerated orthodontics, various methods of rapid acceleratory phenomenon have been explained by various authors, such as micro-osteoperforation, plasma rich fibrinogen therapy, Propel, and low level laser therapy. Amongst them, the least invasive is the use of VPro5, as it is a patient-operated device to be used by the patient at home for at least 5 min a day. Its use reduces the frequency of patient visits and decreases the chair-side time which is a prime requisite in view of the current protocols for the COVID-19, thus preventing the patient from undue exposure [9].

In case of deep bite, NiTi reverse curve of Spee wires for flattening of the curve of Spee in the lower arch are used in routine practice. But this is not advisable in view of the current scenario. If the patient fails to report for the scheduled visit in view of any lockdown situation as a result of another peak in the number of cases, there are maximum chances of overcorrection such as excessive flaring and canting of occlusal plane due to high forces (300 g) generated [20].

The patients on functional appliance therapy need to be monitored frequently to assess the progress and do the necessary adjustments like occlusal trimming of the twin block, or activation of any fixed functional appliances. However, removable functional appliances are preferred over the fixed functional appliances in view of the current pandemic situations as the fixed bite correctors such as Forsus and Herbst appliance, are more prone to breakage, and need more frequent adjustments [21] and if left unobserved for long durations, they can lead to certain detrimental side effects such as deviation of the midline, occlusal canting, flaring of the lower incisors, opening of extraction spaces, bite changes, etc.

CONCLUSION

There is a need for inclusion of intense modifications in the general dentistry and orthodontic practice to reduce the potential transmission and contamination with SARS-CoV-2 and also for the maintenance of a sustained practice amid the COVID-19 pandemic. Protective measures are diverse and should not be limited to pre-evaluation of the patients and the necessary triage protocol, maintenance of hand and oral hygiene (oral-

rinse), use of personal protective equipment, reduction of aerosol generating procedures, adequate disposal and sterilization of the equipment and materials used, and frequent disinfection of the dental office and other utilities and appliances used such as archwires, brackets, elastic chains, springs, etc. The use of disposable items, self-limiting mechanics, digital dentistry, and modified ergonomics should be encouraged for higher patient-doctor safety.

CONFLICT OF INTEREST STATEMENT

None declared.

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