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Review Article

New paradigm shift in the times of pandemic: Effects and influence of covid-19 on prosthodontic practice

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ABSTRACT

The coronavirus disease 2019 (COVID-19) pandemic has put the world in a panic situation. It has been evident that the geriatric population is more susceptible to get this infection, mainly due to advanced age and comorbidities and thus reduced immunity. In this ongoing crisis, individuals could-not visit a dental clinic, hence unattended dental needs and emergencies. The prosthodontic management in geriatric patients is essential for their well-being, as the partial or complete edentulism are very prevalent among them. However, a prosthodontist remains at high risk for exposure to the novel coronavirus through the aerosol-generation, possibly through the contaminated surfaces and the indirect contact with dental laboratories and the technicians through the impressions, dental stone casts, and the prosthetic appliances. It demands the implementation of the preventive measures, including performing emergency treatments only, rescheduling patients with suspected COVID, disinfecting surfaces and prosthodontic materials with biocidal substances, and using protective equipment such as the N95 masks, gowns, and face-shields.

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1. Introduction

In the past also, several epidemics (such as H1N1, H5N1, Avian influenza, Ebola, SARS, Zika, and Nipah) have troubled many countries of the including India. They were successfully addressed with appropriate research.¹ A novel human coronavirus initially referred to as the Wuhan coronavirus (CoV), currently designated as severe acute respiratory syndrome (SARS)-CoV-2, is responsible for the latest pandemic that is affecting human health and economy across the globe.² On 30 January 2020, the WHO declared the Chinese outbreak of COVID-19 as a Public Health Emergency of International Concern because of its unbridled spread, thus posing a high risk to countries with vulnerable health systems. COVID-19 has affected dentistry and the dental practice globally.³ It was found that a high number of dentists, i.e., 284 (70%) were affected by the

financial burden and were not receiving a salary during this lockdown.⁴ Patients receive dental treatments only from 10% of the dentists. Only 28 (7%) dentists opined to do the regular dental procedures, but 240 (59%) dentists believed that they should perform only emergency dental treatments for COVID-19 infected cases.

Prosthodontics, a dental speciality dealing with the services to the geriatric patients in the form of Complete Denture, Removable Denture, Implant supported Prosthesis and Crown and Bridge for replacing the missing teeth in any adult age group patients. In tough times in all dimensions a constant wrangle is going on regarding recommencing the dental services in emergency and somewhat elective circumstances. A prosthodontists practice is going to be more tough and challenging due to the certain factors like high concentrated copious saliva in trays & dentures, exposure to the blood during pre-prosthetic surgeries and implant-placement and the aerosols exposure during the

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tooth preparation for crown and bridge. Large number of patients visiting prosthodontist belongs to geriatric age group who are prone to get this infection easily. As almost every prosthodontic treatment demands multiple visits by the patients, it throws a unique challenge to ensure bilateral safety at every visit, whereas the other routine dental procedures can be finished in one sitting. Unlike other specialities of dentistry, a very climacteric aspect in prosthodontics is the lab service, in any form of prosthodontic treatment, be it complete denture to partial denture, crown to bridge laboratory support is must.

2. Standard Dental Office Protocols

1. Initial tele-screening of dental patients to identify any COVID-19 suspect.
2. Assuming every patient as a potential asymptomatic COVID-19 carrier.
3. Considering recently recovered patients as potential virus carriers for at least thirty days after the recovery confirmation by a laboratory test.
4. Meticulous screening of even the asymptomatic patients is important. Patients should be requested to fill out detailed questionnaire regarding COVID-19 symptoms.
5. Maintenance of proper record, the address and the contact details are of paramount importance.
6. Since the incubation period of SARS-CoV-2 may extend two weeks, a positive response for any of the above queries mandate deferring the appointment for minimum of two weeks. Additionally, the patients should be encouraged to self-quarantine at home and remain in contact with their primary care physician for any tele-consultation.⁵⁻⁷
Patients who seem fit for the appointment scheduling should be advised to wear surgical face mask and preferably come alone or with a single attendant at the time of their visit to clinic
7. Dental office as well as the waiting area should be well ventilated at all times along with spaced out seating of patients.
8. Patients should be instructed to reach on time for their appointments.
9. Remove magazines, reading materials, toys and unnecessary objects, if any.
10. Schedule appointments in such a manner so that there is minimize possible contact amongst the patients in the waiting room.
11. A contactless thermal screen and pulse oximeter device should be used even if the patient answers no to the COVID symptoms related questions.⁵
12. Use of pulse oximeter can be emphasized in general dental office screening procedures during this pandemic. An oxygen saturation of below ninety percent is a good marker for some form of respiratory

distress or hypoxemia in the body. Using a pulse oximeter can actually help in screening of the patients, who might be asymptomatic but are actually having the disease.

13. Patients should be directed to sanitize their hands and perform hand washing as soon as he/she enters the clinic.
14. The prosthodontist in his clinic should make sure that the entire staff is well versed with the universal precautions in this pandemic

2.1. Methods of disinfecting impressions

1. Alginate – 0.5 % Sodium Hypochlorite or iodophors or 2% Glutaraldehyde.
2. Zinc-oxide eugenol impression paste – 2% Glutaraldehyde or Chlorine compounds.
3. Elastomeric impression materials – 2% Glutaraldehyde or Cidex.

2.2. Methods of disinfecting trays & cast

1. Prefer disposable trays.
2. Metal trays to be autoclaved.
3. Plastic trays / Bite rim 2% Glutaraldehyde solution for 10 minutes.
4. Dental casts & die to be immersed in Sodium Hypochlorite for 10 minutes.

2.3. Prosthodontic urgencies

There are many situations, where the availability of the prosthodontic treatment becomes an urgency, so that the patient can carry on with his/her usual activities without impairment in oral function or appearance.

Some of those situations are:

1. Dental injury due to denture fracture
2. Restoration of broken dentures
3. The need for temporary or immediate dentures
4. Final crown/bridge repair or cementation, in case the temporary restoration is lost or broken.
5. Any problem with implants or implant prosthesis
6. Ulcers due to sharp edge of teeth or prosthesis.

For complete denture

1. Creating a snap impression followed by disinfection with glutaraldehyde.
2. Moderation of final impression technique such as single step border moulding.
3. Virtual face bow records and jaw relation records can be made outstripping the conventional technique to lessen the chair side time followed by teeth arrangement and try-in.⁸

2.4. *For interim or cast partial denture*

1. Digital impression records can be created to decrease the contact and chair-time of the patient.
2. Virtual face-bow and bite records registrations can be made and prostheses can be made.
3. Prosthesis manufactured with CAD/CAM are precise and require lesser chair side adjustments.
4. Verification of try-in followed by fabrication of denture with digital work flow for precise prostheses for fixed prosthodontic treatment.
5. Covid pandemic has changed the paradigm for conventional prosthetic treatment for fixed prosthodontics as these procedures involve the aerosol generation and splatter production that makes the dentist more prone to infection and the dental chairs are hot bed of infection.
6. Use of laser for tooth preparation to perform splatter and aerosol free procedure to decrease the risk of cross-contamination.
7. Employment of high suction to reduce the splatter and aerosol generation.
8. Employment of cordless gingival retraction to further decrease the chair side time.
9. Recording the digital impression followed by prosthesis fabricated by CAD/CAM.
10. This digital work flow reduces the chair side adjustments, thus reducing the time of appointment, hence delivering the prosthesis with continuous service to the patients, safe-guarding the operator.⁸

2.5. *For implant prosthodontics*

1. Guided implant-placement with stents to reduce the splatter during the surgical procedure.
2. Immediate loading under proper diagnosis of the existing clinical situation to lessen the number of appointments.
3. When the immediate loading is contraindicated post-uncovering the osseointegrated implants, a digital impression can be worked upon and the prosthesis can be fabricated with CAD/CAM for the delivery.^{8,9}

2.6. *For maxillofacial prosthesis*

1. During pandemic only the rehabilitation function is to be considered as a dental emergency which with certain changes in the protocol of prosthesis fabrication can help the operator rehabilitate the patient, hence restoring the function.
2. Recording the impression with conventional or digital technology to decrease chair side time.
3. Transfer of bite records on articulators for easy lab communication.
4. Fabrication of prosthesis followed by insertion of prosthesis thus restoring the aesthetics function and

providing the comfort to patient.^{8,9}

2.7. *Proposed guidelines for laboratory personnel*

1. Minimal staff at the workplace.
2. Practicing the social-distancing.
3. Checking the temperature routinely as well as recording the pulse-oximeter readings.
4. Hand sanitizers are to be placed at vantage sites.
5. All lab equipment should be handled with the gloves on.
6. Thorough handwashing with soap and water, after every case and avoid touching the face while in laboratory.
7. All laboratory personnel without any exception should observe the proper infection control protocols including wearing Personal Protective Equipment (PPE) like protective garment, mask and eye-wear that is worn in the lab needs to be left in the lab itself and not taken out of the lab and should be discarded through proper channel.
8. Notice that the flints or fragments are sucked out using a high vacuum, while using the trimmers and buff.¹⁰

2.8. *Proposed guidelines for the disinfection of the laboratory equipments, surfaces & prosthesis*

1. Dental impressions, casts, prosthesis or appliances should be completely disinfected prior to handling at the clinic as well as the operatory, on acceptance of the work at the laboratory and prior to delivery of the same.
2. Prior to the insertion, the dental prostheses should be stored in diluted mouthwash and not in disinfectant.
3. Laboratory surfaces should be disinfected using the disinfectant sprays or surface wipes.
4. Sanitization of the dental laboratory on a regular basis.
5. Heat sterilization should be used for the burs, polishing points, rag wheels, or laboratory knives, used on contaminated or potentially contaminated appliances, prostheses, or other material.
6. Separate polishing attachments should be kept for all cases coming to the lab.
7. The lathe machine should be cleaned and disinfected on daily basis.
8. Pumice must be discarded after single use.
9. Articulators can be disinfected by spraying with a disinfectant followed by rinsing them. Non-sterilizable equipment like face bow components must be cleaned using the soap.
10. Laundry service must be organized for regular cleaning after every single patient.

2.9. Hand hygiene and personal protective equipment (PPE)

Although the basic hand hygiene has been stressed upon since ages for minimising the risk of transfer of infection & its importance becomes impossible to negate at the time of this pandemic. The hand hygiene is of paramount importance for both the practitioner and associated staffs. The Prosthodontist should make sure that he/she as well as the associated staffs have got adequate and appropriate PPE during their interaction with the patients, in case a condition arises needing consultation at the clinic. During the aerosol generating procedures the dentist and the assistant should have three layers of PPE beginning with a minimum N95 mask or higher, a surgical gown, a sterile surgical mask, goggles, a face shield and surgical impervious overall with a head cap and shoe covers. The ideal protocol demands the donning and doffing of the entire PPE kit after every visiting patient. The current scenario warrants the rational use of PPE as advocated both by WHO and MOHFW India.¹² The reception staff should also be equipped with a head cap and N95 mask as basic equipment while having the formalities done by the patient.

2.10. Waste management and disposal

Disposal of soiled waste the protecting equipment and all the dental waste is deemed necessary to ensure the safety of the professional as well as the patients. For removing the PPE after procedure – the following order should be followed:

1. Gloves (outer)
2. Goggles/Loupes and Face shield
3. Gown
4. Head and Foot covers
5. N95 Facemasks
6. Gloves (inner)

The hands should be sanitized after each of the above steps is completed in the doffing room and finally a bath must be taken.

All disposable wastes / sharps (e.g. orthodontic wire, disposable blades, burs, etc.) should be disposed of in the appropriate containers. The reusable tools and materials must be cleansed, sterilized, and carefully preserved in compliance with the protocol for the Disinfection and Sterilization of Dental Instrument.¹¹ The medical and domestic wastes generated by treating any suspected or confirmed COVID-19 case are the infectious medical waste. Double-layer yellow clinical waste bags with a “gooseneck” knot must be used to collect them. The outer surface of the waste bags should be labelled and disposed in compliance with the requirements of medical waste disposal.¹¹

3. Conclusion

Dentists, dental assistants, dental staffs along-with the patients are potentially at very high risk of getting COVID-19 infection during the prosthetic dental treatments. The prosthetic dental treatment procedures carry low to very high risk for getting COVID-19 infection. Hence, the prosthodontic/prosthetic dental treatment procedures must be done with standard of care and infection control following high standard guidelines and day to day changing recommendations for COVID-19.

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5. Conflict of Interest

The authors declare no potential conflicts of interest concerning the authorship and publication of this article.

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