

New Approaches in the Treatment of Oral Pathology during Covid-19 Pandemics

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Abstract. COVID-19 pandemic required the introduction of new treatment protocols and the reorganization of circuits in dental offices to protect patients from Covid 19 infection. This new approach involves the restructuring of clinical workflow and new treatment procedures. Guidelines were supplied by regulatory authorities with instructions and recommendations focusing on limiting the contact with patients in dental emergencies and implementing strict safety measures. During pandemic it was noticed an increase in the pathology of the oral cavity that requires treatment through oral surgery procedures and a greater openness of practitioners to the introduction of new techniques and technologies. In this context, there is an increasing trend in the use of teledentistry, digital techniques for planning minimal invasive surgical procedures in the pro-prothetic and pro-implant stage, optical impression in implant-prosthetic therapy, and laser technologies that allow minimally invasive approach to oral surgery procedures in soft tissues and bone. The new therapeutic approaches have numerous benefits in terms of efficiency, ergonomics and patients' comfort as well as in the prevention of the spread of Covid-9 infection.

Keywords: *COVID-19, pandemic, minimal invasive, surgery, digital*

Introduction

During Covid-19 pandemics dental professionals faced unexpected and unforeseen challenges regarding the introduction of new treatment protocols and the reorganization of circuits in dental offices for patients' protection (1).

This new approach involves the restructuring of clinical workflow and new treatment procedures. Guidelines supplied by regulatory authorities with instructions and recommendations focuses on limiting the contact with patients in dental emergencies and implementing strict safety measures. The limitation of patients' access to dental care during conducted to an increase of the pathology of

the oral cavity that requires treatment through oral surgery procedures and a greater openness of practitioners to the introduction of new techniques and technologies. One Chinese research group reported that proportion of dental and oral infection raised from 51.0% of pre-COVID-19 to 71.9% during COVID-19, while dental trauma decreased from 14.2% to 10.5%. Also, the non-urgency cases decreased to three-tenths of pre-COVID-19 (2).

Despite the normalization of dental activities, the dental practitioners worldwide must adapt to the implications of the “new normal” dentistry. Dentists are aware of high risk of infection from patients and potentially spreading it to their families and other patients. 90% of dentists know CDC or WHO guidelines for cross-infection controls, 89% routinely follow universal precautions of infection control for each patient, 76% use high-volume suction in practice for every patient, but only 14% of dentists use rubber dam isolation for each patient, and 24% ask each patient to use antibacterial mouthwash before dental treatment (3).

In the next period the dental practitioners must consider the following changes (4):

- patients' needs of routine dental care will grow;
- the rate of the new dental pathologies will increase;
- the delay of the dental procedures will conduct to the increase of complications;
- patients' behavior will change due to psychological and financial changes;
- new measures and reorganization of circuits in dental practices;
- new management of workflow and patients' schedules.

The post-pandemic changes will reflect in the increase of the costs of the dental materials, instruments and consumables, higher preparation time, reduced number of patients daily, reduced patients' demands for complex oral treatments, as well as the reduction of the patients' real working time.

Numerous representative of dental professionals worldwide highlight the fact that the dentists are aware about the complete change of habits and routine activities that will have high impact on timing of the procedures, work ergonomics, workflow, and financial supply (4).

In compensation, it was noticed an increasing trend regarding minimal invasive dental procedures both in restorative dentistry, prosthetics (pro-prosthetic, pro-implant stages), and oral surgery. New digital technologies are implemented at a larger scale in dentistry: teledentistry, digital expert systems, 3D navigation systems, optical impression, laser technologies. These new technologies will allow a more minimally invasive approach especially in oral surgical procedures on soft and bone tissues.

First challenge for dentists is the selection of proper methods of sterilization because conventional cleaning and disinfection procedures may have limited effectiveness due to several factors. It is requested alternative sterilization methods, that do not depend on the operator, because they are based on devices that perform the entire procedure on their own, with minimal human intervention. The dentists must consider combining proper disinfectants and no-touch decontamination technologies to improve sterilization procedures in post-pandemic period (5).

Teledentistry is used to facilitate diagnostic and dental treatment as well as guidance, and education by replacing the direct face-to-face contact with patients with information transmission via technology (teleconsultation, tediagnosis, telemonitoring) (6). Teledentistry represents a novel solution that will be largely incorporated into routine dental practice in post-pandemic period (7).

The concept of Dentistry 4.0 introduces various advanced technologies based on Internet of Dental Things (IoDT) to connect various dentistry tools and devices. The implementation of this concept will be helpful in the reduction of Covid-19 infection risk by monitoring various dental and periodontal parameters and by enabling data transmission from dental practice to lab for CAD-CAM manufacturing of prosthetic restorations (8). IoDT will enable the dentistry equipment to collect and exchange data by using networking connectivity.

Expert digital systems based on artificial intelligence is playing an important role in the response of dentistry to Covid-19 outbreak. This technology can be used to reduce the clinical time and to increase the accuracy of decision-making processes, especially in alveolar bone rehabilitation, implant surgical (associated to CAD-CAM manufacturing of the surgical guide), as well as in the designing of the future prosthetic restoration (9).

3D Navigation assist dental professionals by providing images of operative sites to help the future positioning of the dental implants and to reduce the risk of failure, the time of execution and the costs, with better accuracy and lower working time, comparing to classic procedures (10). The use of these systems allow real-time visualization of the depth and angle of the burr and fully automatic recording of the patient data and of the implant surgical procedures (11).

Optical impression is another technology that can reduce the risk of Covid-19 infection both for dentist and patient. The benefits are as follows: low discomfort for patient, time-efficient and easy-to-use clinical procedures for the dentist, elimination of the plaster models, better communication with the dental technician and with patients (12). Limits are represented by difficulty in the detection of the deep margin lines in prepared teeth and/or in case of bleeding, learning curve, purchasing and managing costs. Current technology IOS has sufficient accuracy to be used in the manufacturing of prosthetic restorations

(inlays/onlays, copings and frameworks, single crowns and fixed partial dentures) in conventional prosthetics and implant-prosthetic treatments. Also, optical impression can be integrated in implant guided surgery and in orthodontics for fabricating aligners and custom-made devices(12). Digital impressions have small angle deviations ($0.07-0.3^\circ$) with digital impressions and implant impression accuracy is influenced by factors as follows: implant angulation, distance between the implants, depth of implant placement, operator experience (13).

Laser technology is especially useful in the reduction of the risk of Covid-19 infection in the periodontal surgery, pro-prosthetic surgical procedures, pro-implant stage and oral surgery interventions. The advantages of laser surgery are as follows: minimally invasive procedures, enhanced control of saliva spread, hemostasis, field visibility, accuracy, higher infection control, lack of bacteremia, absence of the mechanical tissue trauma (14). Also, in the post-operative stage, laser-assisted procedures are associated to lower postoperative pain and edema, reduced scarring and tissue shrinkage, microsurgical capabilities, asepsis due to non-contact tissue ablation (15).

Conclusion

Dental professionals have implemented or extended the use of various technologies have during Covid-19 pandemic: teledentistry, internet of things, AI based exert systems, 3D navigation systems, optical impression, CAD-CAM manufacturing, surgical lasers. The new therapeutic minimal invasive approaches have numerous benefits in terms of reduction of Covid-19 risk of infection for dental professionals and patients as well as in the higher efficiency, ergonomics and patients' comfort.

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