Volume 3 / Issue 2 / December 2023

Review Articile

COVID-19 and Oral and Maxillofacial Imaging and COVID-19 Oral and Maxillofacial Radiology

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Kamburoğlu, Kıvanç. "COVID-19 and Oral and Maxillofacial Imaging and COVID-19 Oral and Maxillofacial Radiology". *Acta Stomatologica Cappadocia.* 3;2 (December 2023): 114-121
DOI: https://doi.org/10.54995/ASC.3.2.5

Received: 03.07.2023; Accepted: 08.09.2023

COVID-19 and Oral and Maxillofacial Imaging and COVID-19 Oral and Maxillofacial Radiology

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Abstract

Oral and Maxillofacial Radiology (OMFR) Clinics, private or at Dental Schools, represent a potential environment for transmission and cross-infection of coronavirus disease 2019 (COVID-19). During OMFR procedures, such as intra- or extraoral imaging examinations, cone-beam computed tomography, and ultrasonography, the dental staff is in direct contact with patients, increasing the risk of disease transmission. Thus, new biosafety protocols had to be adopted. Due to the high transmissibility of SARS-CoV-2 highly restrictive measures were imposed, and social distance was the main one. In this scenario, teleradiology was encouraged to reduce contamination and protect radiologists, and dental schools had to take strict precautions in their traditional educational system. Considering recent literature regarding OMFR and COVID-19, this review provides substantial data about the new precautions of biosafety, teleradiology, and the impact on OMFR teaching.

Keywords: COVID-19, Dental Digital Radiography, Dental Education, Infection Control, Teleradiology

Introduction

Beginning in late 2019, researchers have focused on severe acute respiratory syndrome coronavirus[1,2] (SARS-CoV-2) and its impact on human health. Despite the latest developments, such as the approval of vaccines,1 there has been a sharp increase in positive tests and deaths. According to the data collected on July 30th, 2021, coronavirus disease 2019 (COVID-19) infected 196.847.238 individuals and caused 4.203.020 deaths.[2]

SARS-CoV-2 is thought to spread primarily through respiratory droplets which are expelled when an infected person coughs, sneezes, talks and close person-to-person contact.[3] Saliva can host several microorganisms, including viruses as SARS-CoV-2.[4] The exposure of dentists and patients to saliva, either by direct contact with the oropharyngeal region or indirectly through the generated aerosols, along with the high transmissibility of the virus, may all increase the chance of transmission and cross-infection of COVID-19 in dentistry and Oral and Maxillofacial Radiology (OMFR) Clinics.[3-6]

OMFR is a prominent specialty since imaging examinations are crucial for a correct diagnosis in most cases for dental applications. Despite the high number of papers published last year, the literature is still lacking in terms of evidence regarding possible abnormalities associated with the stomatognathic system in patients diagnosed with COVID-19 through imaging examinations. Up to now, literature regarding OMFR and COVID-19 has focused on new measures for biosafety, teleradiology, and their impact on OMFR teaching. Therefore, these subjects will be the main interest of the present review.

Biosafety in OMFR during the COVID-19 Pandemic

Basic information and updated recommendations in biosafety is vital for the safety of dental patients and dental staff in the struggle against the pandemic.[5,6] Important health organizations, such as the Center for Disease Control and Prevention (CDC), published guidelines regarding dental procedures. On December 04th, 2020, the CDC made the last update in the Guidance for Dental Settings.[7] This guideline has become a reference for the Health Committees Council in many countries.

The Occupational Safety and Health Administration (OSHA) categorized oral healthcare providers under the “very high exposure risk” category for SARS-CoV-2.[8]

Evidence shows that the transmission of SARS-CoV-2 may occur not only from symptomatic individuals but also from asymptomatic ones.[4,7] Therefore, biosafety precautions should be adopted considering every patient potentially contaminated with the virus.[5-7]

Although aerosol contaminations are mainly created by dental equipment, such as; dental handpieces, ultrasonic devices, and air/water syringes, some imaging examination techniques, especially 2D intraoral radiography, can also produce aerosols because of cough and gag reflexes.[6,9-11] Based on this, the first report regarding the challenges to Dentistry in the pandemic era recommended that extraoral radiography, such as; panoramic radiography, and cone-beam computed tomography (CBCT), were appropriate alternatives to intraoral radiography.[12] However, Dave et al[11] stated that intraoral radiographic examinations could be performed when necessary. Authors of a recent guideline, presented an interesting decision tree regarding several conditions and the most appropriate imaging examination, considering the recovery phase of the pandemic.[6] Intraoral, extraoral, and CBCT were considered in their flowchart, even for patients being investigated for COVID-19.[6]

In addition to CDC Guidance for Dental Settings[7], MacDonald et al[6] Sushanth et al[9] and Carmelo et al[13] published guidelines that were strongly recommended to be followed by OMFR Clinics. Such articles addressed all important aspects of biosafety, including environmental protection, staff protection, personal protective equipment (PPE), and the different types of imaging examinations (e.g. intra- and extraoral, CBCT, and Ultrasonography) in detail. Thus, to guarantee the correct performance of biosafety protocols by the OMFR personnel staff during the COVID-19 pandemic, we encourage the application of the general steps previously described in the literature.[6,9,13]

Teleradiology

Despite the crucial improvements in the field of OMFR owing to digital technology, many dental clinics still perform dental radiography using analog films and printed images.[14,15] To avoid unnecessary contact with the patients and cross-contamination of SARS-CoV-2 dentists need to optimize their workflow.[16]

In the traditional workflow, analog films or printed images pass through several hands until they reach the clinician, and the possibility of cross-contamination increases.[10] On the other hand, in the digital workflow, the images and their reports, are

available on online platforms, clouds, or e-mail, enabling the clinician to access the digital files from any electronic device.[17] Therefore, by the complete digitalization of the diagnostic systems in dental clinical settings, the risk of dissemination and contamination will decrease.[14,16]

In the context of the pandemic, it is also important to highlight that it is worthless to adopt digital radiographic systems and continue printing the images.

As seen In Figure 1, the only way to effectively reduce the number of contacts and cross-contamination is to perform all steps, such as the imaging reports, delivery, and clinician evaluation online.

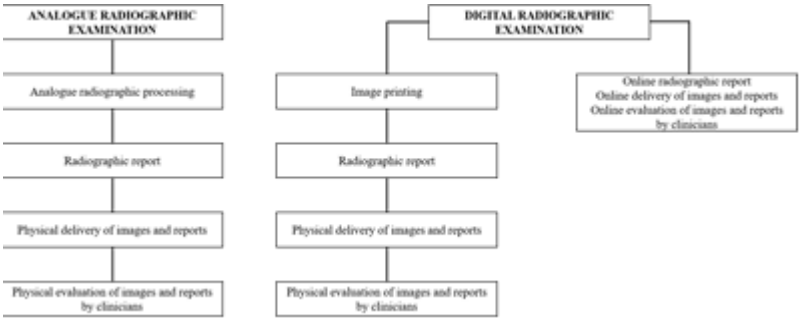

Figure 1. Flowchart showing the steps since of image acquisition until its evaluation by the clinicians, for both analog and digital images.

According to Rosado et al[15] oral radiologists should be encouraged to use Teleradiology to assist clinicians without exposing themselves to contamination risk, as the images can be exported from the original acquisition software without diagnostic loss. Exported high-resolution JPEG, TIFF, and DICOM files can be accessed easily by oral radiologists and clinicians from their computers or mobile devices.[9] Moreover, oral radiologists can use applications such as “Team Viewer” or “Any Desk” to control the clinic workstation from home.[9,15]

OMFR Teaching

The educational sector was one of the first to suffer from the effects of the pandemic soon after the announcement of social distancing. In many countries, remote education substituted presential classes and digital learning platforms have become imperative.[18,19] The professors and students need to know how to use the digital tools to make the remote classes more dynamic, interactive, and appropriate.[18]

As previously reported, e-learning may be as effective as traditional classroom methods in students' knowledge gain and performance on clinical procedures in Oral Radiology.[20] Also, it is important to emphasize that e-learning prevents unnecessary gatherings and associated risk of infection.[14] There is a wide range of digital tools and resources that can be used to improve learning and diagnosis tasks in OMFR.[19] However, studies testing their effectiveness in OMFR education are still sparse. Therefore, we would like to encourage researchers to conduct studies regarding the effectiveness of various digital remote education tools.

The radiographic techniques classes become a challenge once the students need to practice. Dental schools that have already reestablished the clinical activities, or are planning to start, should strictly follow the biosafety precautions during the OMFR clinics. Considering the differences between private OMFR clinics and OMFR departments of Dental Schools although challenging, Dental Schools should adopt protocols that, at the same time, speed up the service, increase biosafety and ensure learning.[14]

Based on the importance of balancing social distancing to reduce the COVID-19 spread and ensure the quality of learning[14], a hybrid format seems to be an efficient and achievable alternative and can be considered as proposed by Mupparapu et al.[21]

Conclusions

OMFR professionals must be aware of new biosafety protocols and their updates. It is imperative to adopt them in daily routine to reduce the risk of COVID-19 contamination. Teleradiology is no longer a trend, but a reality and radiologists are encouraged to practice it. Dental Schools must ensure OMFR learning by reducing the risks of contamination. Despite the effectiveness of the e-learning methods, the radiographic techniques classes remain a challenge, and a hybrid format seems to be an efficient and achievable alternative.

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