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Original Research Article

Using Chemical Compounds in Teeth Using X-ray Images in Patients with Covid-19

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ABSTRACT

One of the most complicated tasks is the use of chemical compounds in the automatic segmentation of teeth using X-ray images in patients with Covid-19. Due to increasing attention to this technique by researchers and turning it into a vital role in many practical fields such as medical applications, it is used. Today, in modern dentistry, techniques based on the use of computers, such as planning and planning before surgery, are being developed day by day. In order to achieve and implement the mentioned processes, the automatic segmentation of teeth is one of the important and primary steps. In order to achieve and implement the mentioned processes, the automatic segmentation of dental images is one of the important and primary steps. Segmentation of teeth is also used in the field of identification, orthodontic planning and facial cosmetic surgery. The problem of the size of image data and the effort to remove noise and image disturbances such as the parameters resulting from inappropriate light sources, the disproportion of the combination of colors and many other factors in the received images are very important issues in working with images and processing them. Isolation of dental structures is very important both anatomically and pathologically

Keywords: Chemical Compounds, Teeth, X-ray, Covid-19

Introduction

The science of image processing is one of the most used and useful sciences in engineering techniques. Extensive studies and researches have been done in this field for a long time and many advances have been made. The speed of development of these developments has been such that now and after a short period of time, the effect of image processing can be clearly seen in many sciences and industries. While some of these applications are so dependent on image processing that they cannot be used without it [1-3]. In today's world, the science of image processing in a comprehensive and specialized way is gaining a more fundamental and important role day by day, and it is also at the beginning in our country [4].

The problem of the size of image data and the effort to remove noise and image disturbances such as the parameters resulting from inappropriate light sources, the disproportion of the combination of colors and many other factors in the received images are very important issues in working with images and processing them. Isolation of dental structures is very important both anatomically and pathologically [5-7]. Finding the size, volume and sometimes the location of the structures is also very important in terms of diagnosing the disease. Most of the efforts have been made on two-dimensional images of jaw and dental surfaces and curves (Figure 1). Tooth segmentation is the separation of different parts of a tooth from each other in dental radiology images.

A group of researchers examined almost 65,000 people infected with the corona virus in order to evaluate the effects of the Covid-19 virus on the oral health of the affected people [8-10]. According to the results of this research, one of the effects of the corona virus on the body is the reduction of oral moisture. Almost 43% of the patients accepted this effect.



Figure 1. Teeth Using X-ray

In general, dry mouth is one of the causes of oral and dental diseases, especially bad breath. Corona virus also increases the risk of tooth decay by reducing the moisture in the mouth [11-13]. For this reason, people should brush their teeth twice a day with toothpaste containing fluoride, make sure to use dental floss and reduce the number of sugary drinks and foods they consume in order to reduce the effect of this virus on their oral and dental health [14]. Another effect of the corona virus on the mouth and teeth is to cause ulcers in the gums and tongue. Of course, in this case, researchers do not comment with certainty because they believe that other factors are also effective in causing these wounds [15]. Also, about 40% of those infected with the Covid-19 virus lose their sense of taste, and of course, this effect is usually temporary and after a while, people's sense of taste returns to normal (Figure 2). Some people regain their sense of taste only a few days after complete recovery, but there are also people who after a few months of recovery are still without sense of taste, or with a weak sense of taste [16-18].

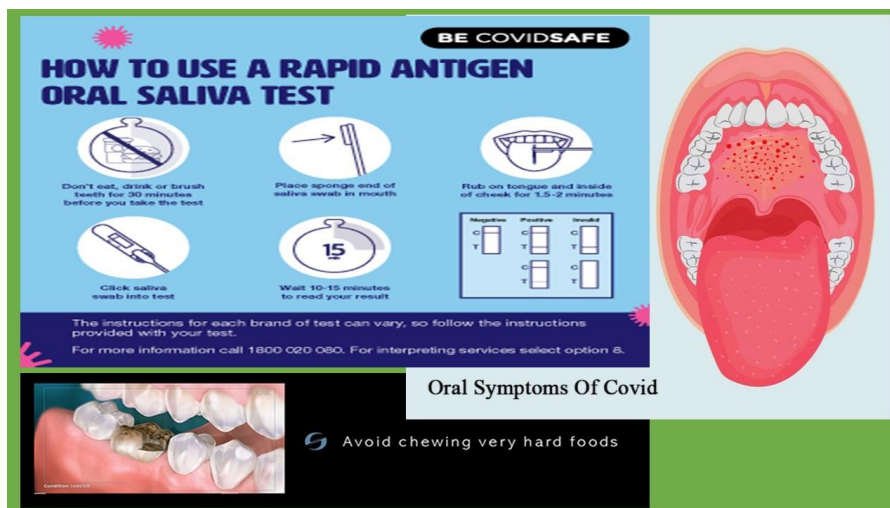


Figure 2. Coronavirus (COVID-19) – Social – How to use a rapid antigen oral saliva test

Some dentists, due to the lack of information regarding the relationship between Covid-19 and oral and dental diseases, are not sure whether Covid-19 alone can cause symptoms and complications in the mouth and teeth. Some other experts say that due to that more than 47% of adults who are 30 years old or older have periodontal diseases such as; Gum infection, inflammation of the gums and bone around the tooth [19].

We should expect that the existing dental and oral problems will become more acute in case of Covid-19. With the spread of the Covid-19 virus, almost all aspects of human life changed. Dentistry is one of the things that have been affected by this pandemic [20]. Although Covid-19 has affected different groups in the society, those who suffer from oral and dental diseases are more susceptible to it than other people. Dental services increase the possibility of transmission of the Covid-19 virus, and the dental office can be a suitable place for the spread and transmission of this virus. Therefore, the more oral and dental hygiene people have, the less they will suffer from oral and dental diseases, the less they will need to see a dentist and the less they will be exposed to Covid-19. Regular use of toothbrushes, dental floss and mouthwash can help reduce the risk of oral and dental diseases [21].

Failure to observe oral and dental hygiene increases the possibility of contracting Covid-19 because some types of viruses such as the Covid-19 virus have the ability to be absorbed into the body through the mouth and nose. in such a way that; The Covid-19 virus sticks to the mucous membrane of the mouth and nose cells and then attacks healthy cells and reproduces. This causes the patient to experience problems such as sore throat [22].

Radiographic images

A conventional radiograph is a two-dimensional image of a three-dimensional object. In such an image, the total volume of the tissue between the X-ray source and the film or digital receiver is depicted as a two-dimensional image. The advent of digital imaging has revolutionized radiology. This development is the result of technological change in image acquisition processes and creation of computer communication systems for image retrieval and transmission [23]. Since the quality of digital images is much better than analog and it is possible to archive and transfer images from the radiology center to other medical centers around the world even simultaneously (Figure 3), and it is also possible to use computers in diagnostic matters using this method. Today, digital imaging seems more affordable and efficient than its analog counterpart [24]. OPG image is an x-ray image of the jaw and all teeth.



Figure 3. Panoramic dental x-ray of a mouth left and right side

This type of image provides the doctor with an overview of the position of the teeth and jawbones. The total number of teeth, the condition of the roots, the condition of the bones of the two jaws, the presence of cysts or any other lesion in the jaw, hidden teeth, extra teeth, the location and shape of the jaw fracture, the presence of large caries, the condition of the temporomandibular joint are the information obtained from this sample of images [25]. Dental images are important images that are used in the diagnosis of oral and dental diseases. Due to the digitization of these images, little effort has been made to segment these images and use their information in medical science. As it is known, most efforts are aimed at separating teeth from other teeth and other parts of the image. It should be kept in mind that the image of the extracted tooth contains useful information that can help the doctor in diagnosing dental problems. By segmenting a tooth, information about tooth decay, tooth enamel and pulp can be obtained. This information can be very useful in the automatic diagnosis of dental diseases.

What is dental radiology and how is it done?

One of the fast and accurate methods of diagnosing tooth abscess, tooth decay, jaw and tooth defects and other types of abnormalities and injuries is the use of X-ray devices and cameras [26]. There are different types of X-ray devices in the field of dentistry, and in general X-rays are divided into two main categories: intra-oral and extra-oral. In intraoral radiography, the X-ray strip is inside the mouth, and in extra oral radiography, the X-ray strip is outside the mouth. Intraoral radiographs are the most common type and display a high level of detail.

Applications

- Diagnosis of caries;
- Viewing the root of the tooth;
- Checking the health of the bone around the tooth;
- Observing the condition of growing teeth.

Different types of intraoral radiographs show different directions of the teeth, which include:

1- Bitewing radiograph showing the right side of the tooth

This radiograph shows the crown of the back teeth. Dentists take one or two bitewing x-rays on each side of the face. Each radiograph shows molars (back teeth) and bicuspid (teeth in front of the molars) on the top and bottom, and actually details of the top and bottom teeth on one side of the tooth. This x-ray is called bitewing because when taking the x-ray, the person bites down on a wing-like device that holds the x-ray strip in place during the x-ray process. These radiographs help dentists detect decay between back teeth and changes in bone thickness due to gum disease. Also, bite wing radiography can help to determine the appropriate amount of crown (cap covering the tooth) or other restorations, for example bridges. It can also show any wear or decay in the tooth filling [27].

2- Periapical radiograph showing the left side of the tooth

This dental radiograph shows only one or two teeth at a time. A periapical radiograph is similar to a bitewing radiograph, except that this radiograph shows the full height of each tooth from the crown to the root and the base that connects to the jaw [28]. Depending on the oral health conditions and dental problems you have had in the past, the dentist may prescribe a complete radiographic examination or FMX. This process includes showing each tooth from the crown to the root and the root part of the tooth. This radiograph shows abnormal changes in the roots and surrounding bone.

3- Occlusal radiograph showing the occlusal surface of the teeth

This radiograph is larger than other conventional radiographs and shows the growth and position of children's teeth. Each radiograph shows almost the entire arch of the upper or lower jaw.

4- Standard CT scan (CT)

This type of radiography should usually be done in a radiology center or hospital. The person is placed in a lying position and the device records the flat layers of the image with several rotations around the patient's head [29]. The radiation exposure in this method is much higher than in CT cone radiography. A standard CT scan may be used to check the size and placement of the implants. This method helps the surgeon to avoid possible complications before and after surgery.

5- Tomography radiography

Tomography shows a specific layer or section of the mouth and blurs the rest of the layers. This radiograph is for examining parts that are difficult to see or are closed by other parts.

6- Sialography

Another method that uses X-rays is called sialography. In this method, a type of dye is used that is injected into the salivary glands so that they can be seen on the radiograph (salivary glands are soft tissues that cannot be seen by X-rays) [30]. A dentist can use this method to check for problems with the salivary glands, such as blockages, or Sjogren's syndrome (a disorder with symptoms including dry mouth and eyes; this disorder can play an important role in tooth decay).

7- Digital radiography

Digital radiographs are one of the newest X-ray methods. In this method, instead of taking the tape in a dark room, the standard X-ray tape is replaced with a flat electronic screen or sensor. Two-dimensional images are immediately entered into the computer without waiting, so that they can be saved on the screen or printed [31]. The image taken of the tooth can be magnified several times the actual size, which helps the dentist to examine the smallest changes that may not be seen even during the in-person examination, and even send them to another doctor if necessary. Digital radiographs taken at different times can be compared in a way that highlights the differences between the images. For this reason, the smallest changes that are not visible to the naked eye will be observed. If this method is used correctly, the amount of radiation compared to the usual methods will be almost half.

8 - MRI - Magnetic Resonance Imaging

This method is a method in which three-dimensional images are taken of the oral cavity, which includes the jaw and teeth. This method is the best way to examine soft tissues [32]. Although radiation exposure is low in methods such as digital radiography, no one should be exposed to more radiation than necessary. Lead protective aprons and thyroid rings should be used, especially for pregnant women, children, or women of childbearing age. X-rays up to 4 units per visit are safe for pregnant women, although many patients and doctors choose to delay X-rays until the end of pregnancy. There should not be any concern for emergency X-rays of pregnant women. Precautions such as the use of double-layered lead aprons lower the radiation levels to a completely safe level (Figure 4). Women who are breastfeeding or trying to conceive do not need to postpone the radiography.

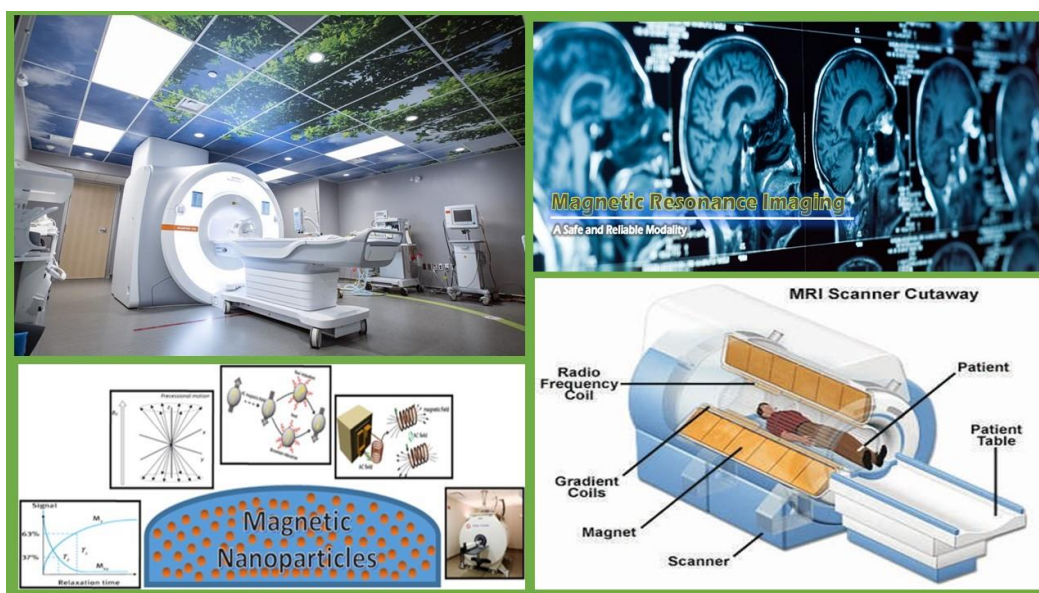


Figure 4. MRI - Magnetic Resonance Imaging

Extra oral radiography

As the name suggests, photography is done from the outside of the mouth. In extra oral radiography, the tape is placed on the outside of the mouth. In this type of dental radiology, in addition to photographing the teeth, it provides the doctor with very good information about the jaw and skulls. Of course, the use of extra oral radiography is mostly for photographing the jaw and skull and is not useful in diagnosing diseases of the inner parts of the mouth [33]. Among the

applications of extra oral radiography, one can check the growth and development of teeth, as well as dental and oral diseases, check teeth under pressure, check the relationship between teeth and jaw, check the bones of the whole face, and also diagnose possible diseases of the facial bones.

Of course, this point is also important for dentists that in this type of dental radiology, much less detail is depicted and it is not suitable for diagnosing the problems of each tooth separately. There are different types of extra oral radiography, such as panoramic radiography, cephalometric radiography, cone radiography, standard CT scan, tomographic radiography, sialography, digital radiography, and MRI [34]. In the OPG radiograph, the entire area of the teeth is depicted, including the lower and upper jaw areas. Cephalometric radiography is taken from one side of the head and can identify problems between teeth and jaw. In cone radiography, a device moves around the head and can take pictures of bone tissues, nerves, and bones. A standard CT scan is used to check the location and size of the implant, and the device takes images from around the head of the patient who is placed while lying down. Tomographic radiography is a type of extra oral radiography that can show blind areas covered by other oral tissues in a linear form [35]. In order for the doctor to understand the problems of the salivary glands in the mouth, he uses the sialography method. In this method of extra oral radiography, first a special dye is injected into the mouth, and then the machine takes pictures through X-rays. The dental radiography method also works digitally in such a way that it displays the image directly and without delay at the same moment.

Dental laminate

Dental laminate is a thin layer made by a thin ceramic layer similar to tooth enamel and based on the needs of men and women. Dental veneers, which are often called porcelain veneers or porcelain laminates, are thin, tooth-colored shells that cover the front layer of the tooth to give it a better appearance [36]. These layers are attached to the front surface of the teeth and correct the distance between them, the color, shape and height of the teeth. Laminates are used to improve the color, shape, height and distance between the teeth so that you can achieve what you expect (Figure 5). Porcelain laminate is made of different and thin ceramic layers that meet the needs of the person seeking treatment. Contrary to popular belief, there is no need to shave teeth to install laminate, if such work is needed, it will be done by a dentist without damaging the tooth enamel.



Figure 5. Dental laminate

In addition to the beautiful appearance, laminate will correct the problems related to the height of the teeth or their long distance. Ceramic veneers will not damage tooth enamel, and in fact, the purpose of veneer design is to preserve the health of teeth and improve their beauty. This means that the use of veneers that are connected to each other does not cause any damage to the teeth. Second, porcelain veneers cover the front surface of the tooth. If you visit an experienced dentist who specializes in the field of beauty, your teeth will not be damaged [37]. Your dentist will ask you to take photos of your teeth, mouth, and jaw to make sure laminate is the right choice for you. In cases where the doctor concludes that laminate is not a suitable option for you, he will suggest other methods such as composite veneer, tooth bonding, orthodontics, tooth enamel whitening or tooth enamel angulation.

What problems are ceramic veneers used to solve?

- Correcting problems related to tooth discoloration caused by root canal treatment, stains from tetracycline or various drugs, or other reasons, or the use of high amounts of resin to fill teeth that have changed the color of teeth.
- Repair of fracture, lip filling or tooth damage;
- Imbalance and mismatch of teeth or their inappropriate appearance;

- Correcting a long distance between teeth.

For the same reason that tooth enamel should not be put under pressure, porcelain veneers should not be put under pressure. For example, you should avoid nail biting, ice chewing, or using tools on your laminate [38].

How are dental veneers installed on teeth?

The installation of dental veneers is done by the dentist in three stages, the first stage is for the corresponding consultant, and in the second session, dental veneers are made and will be installed in the third stage.

One or more teeth can be treated simultaneously with the following steps:

Diagnosis and treatment planning

Diagnosis and planning for treatment is the first and active step in the process of correcting teeth problems. Explain your goals and expectations for the treatment to your dentist and say exactly what you want to do. At this stage, the dentist will examine your tooth enamel in order to make special dental veneers for you and will talk to you about the steps involved in doing this work and some of the restrictions related to it. In the next step, he will ask you to take a picture of your mouth and teeth so that he can evaluate your mold, mouth, teeth and enamel.

Tooth preparation

In order to prepare the tooth for veneer installation, the dentist changes the shape of the tooth bed to prepare the veneer installation area with its thickness. Before grinding your teeth, the dentist will talk to you about the need for anesthesia to avoid pain, then he will design a model of your tooth enamel [39]. It usually takes about 2 to 4 weeks for the veneer to be prepared in the dental laboratory and provided to the dentist for installation. Temporary veneers can be used until your main veneers are ready.

Bonding

Since dental veneers are permanently attached to your tooth enamel, the dentist will temporarily place it on your tooth enamel to ensure its fit and color. The dentist can match the color of the veneer to the color of the cement to be used. After these steps and the installation of the veneer on

the tooth, the tooth enamel will be cleaned and polished, and the wear phase will be done, which will roughen the tooth enamel so that strong bonding is possible. A special type of cement is used to install the veneer, and in the final step, the veneer will be attached to the tooth enamel [40]. After the veneer is well placed on the tooth, the dentist uses a special light that can be applied to the veneer to activate the chemical compounds in the cement and the cement hardens quickly. The last step involves removing excess cement, final evaluation of the teeth, and making final adjustments to the veneer. The dentist may ask you to visit him for a checkup next week to examine your gums and evaluate how they react to the veneer and recheck how the veneer is placed on the tooth [41].

How long does dental laminate last?

The small spots that can be seen on the veneer are usually removed by brushing and eating, and if these spots do not disappear, the dentist can help you in this field. Older ceramic veneers usually last between 10 and 15 years, and ready-made veneers last about 5 to 7 years [42].

Do ceramic veneers need special care?

Dental veneers do not require special care, but paying attention to the following points can be very beneficial:

- As with natural teeth, avoid chewing very hard foods such as ice, raw carrots, chocolate or hard sweets, because if the veneer is under too much pressure, it will break [43].
- Visit your dentist every six months for examinations and check-ups because usually in this situation he can easily diagnose and treat the problems that arise in the veneer. The later you go to the dentist, the more difficult your treatment conditions will be and you will incur more costs. The dentist will talk to you about the right time for an annual checkup.
- Take care of your teeth and follow all the tips that your doctor has told you to prevent tooth decay in the future and the erosion of protective tissue [44].

Paying attention to the following tips will help you maintain the health of your veneers and teeth:

1. Brush your teeth with fluoride toothpaste and floss after eating and before going to bed.
2. Wash your mouth with mouthwash for at least 30 seconds every day. The best time to use mouthwash is before bed.

3. If you grind your teeth and press your teeth together, you can use a dental guard while sleeping.
- Too much pressure or impact can cause Presley veneers to break, just as stressing natural teeth causes them to break. Be very careful when performing sports activities or situations where there is a possibility of head and jaw injury.
 - Do not use one tooth to bite hard foods. If your veneer breaks, you should see a dentist to repair it [45].
 - After a few years, stains may form on some types of veneers and their edges. If there is a problem, you should inform your dentist so that he can fix this problem.
 - The veneer may cause the gum line to recede and the tooth color can be seen under the veneer. This usually happens over a period of several years, and in this case, it is necessary to replace the veneer [45-47].

Is veneer or dental crown better?

The important difference between veneer and dental crown depends on the amount of tooth grinding, the amount of remaining tooth tissue and the type of tooth covering. Dental crowns and veneers can improve the shape of teeth in some way. The dental crown covers the entire tooth.

Does it hurt to install dental veneers?

Most people ask their dentist if veneers are painful or not. Usually, during the installation of the veneer, the dentist uses anesthetic so that the patient does not have any problems, and after the work is finished and the anesthetic wears off, they should not experience any pain. In cases where several veneers are used, for example, a person needs 4 veneers, the patient may experience little or no pain after the anesthetic wears off [17].

Can people with tooth decay use veneers?

Contrary to the fact that veneers can cover problems related to mild structural deformity, they cannot cover bigger problems and you should see a dentist because dental veneers cannot help to improve and correct tooth decay or gum disorder. In order to be able to have a beautiful smile and apply for treatment with this beautiful method, the health of your teeth is absolutely necessary.

Why is the price of veneer high?

Laminate is the most effective covering for teeth, which has most of the characteristics of real teeth, and for that reason, its price is a bit high [48].

Is root canal treatment necessary for veneer installation?

Sometimes a tooth does not heal after treatment and root canal treatment is necessary. About 5 to 10% of teeth will need root canal treatment in the first ten years after the installation of veneers or dental crowns [49].

Type of tooth filling material**Amalgam**

This material is a combination of mercury, silver and tin. Amalgam is the oldest material for tooth filling. As you know, mercury is a toxic substance, and for this reason, it is not allowed to use it for treatment little by little.

Amalgam is usually used for back teeth due to its silver color. In addition, amalgam has more resistance than composite, and because the back teeth need a lot of resistance to chew, it is recommended to use this material to fill them [50]. For filling using amalgam, there is no need to put glue under it, so oral saliva and moisture do not cause problems for amalgam. Of course, this issue is more related to the back teeth, which are closer to saliva. The lifespan of amalgam is about 12 years.

Ceramic (porcelain)

In this type of filling, the material is not attached to the tooth, but is made in a dental laboratory that completely covers the decayed part. Filling with ceramic will give you a tooth with a completely natural appearance, so that the filled tooth is unrecognizable. One of the disadvantages of using ceramic is shaving a large part of healthy teeth and paying more than amalgam and composite [31].

Composite

In order to have teeth similar to your other teeth with a natural appearance, it is better to use composite to fill your teeth. When composite is used, there is no need to shave the healthy part of

the tooth for bonding. Another advantage of it is that, like metal, its color does not change, nor does it rot. Of course, composite is not used to treat large caries. Also, the use of this material has a high cost and is less resistant than amalgam [12].

Glass ionomer

This material easily adheres to the tooth tissue and has the same color as natural teeth. The way Eymen's Glass works is that it slowly and gradually releases fluoride to prevent decay around and under the filling.

Gold

As you know, the process of filling teeth with gold involves a heavy cost and is made in a laboratory just like ceramics. Those who want to have a very durable and strong tooth use gold for filling because gold prevents the entry of any bacteria, food, saliva into the cavity caused by decay. Also, filling with gold does not corrode or change color. Its disadvantages include its golden color and high cost [23].

Discuss

The 2019 corona virus disease epidemic (Covid-19), which originated in the city of Wuhan, China, has gradually become a major and important public health challenge that has involved not only China but also other countries in the world. The World Health Organization announced that the outbreak of the Corona virus has created an urgent public health concern at the international level. As of February 26, 2020, Covid-19 is known in 34 countries, with a total of 239,80 laboratory-confirmed cases and 2,700 deaths (the number of infected people has now reached one million in the world at the beginning of April) [14]. Due to the characteristics of the dental environment, the risk of transmission of infection can be high among patients and dentists. Strict and effective infection control protocols are urgently needed for dental offices and hospitals in areas affected by Covid-19. This article, based on China's experience as well as related guidelines and research, provides essential knowledge about Covid-19 and hospital-acquired infection in dental facilities and provides recommended management protocols for dentists and students in affected areas.

People at high risk of infection

Current observations suggest that people of all ages are generally susceptible to this new infectious disease. However, those in close contact with symptomatic and asymptomatic patients with Covid-19, including medical staff and other hospitalized patients, are at higher risk for CoV-SARS-2 infection [5]. Early in the epidemic, in an analysis of 138 hospitalized patients with Covid-19 in Wuhan, 57 (41%) were thought to have been infected in the hospital, including 40 (29%) medical staff and 17 (12 %) who were hospitalized for other reasons. From February 14, 2020, a total of 1,716 medical personnel in China were infected with CoV-SARS-2, which included 3.8% of infected patients in the country, and 6 people died from this group.

Summary of clinical manifestations

Most patients experienced fever and dry cough, while some also had shortness of breath, fatigue, and other atypical symptoms such as muscle pain, confusion, headache, sore throat, diarrhea, and vomiting. In general, older people and those with underlying problems (ego, diabetes, hypertension, and cardiovascular disease) had a poorer prognosis [6].

Infection control in dentistry

The risk of nosocomial infection in the dental work environment, patients who cough and sneeze or receive dental treatments, including procedures that use high-speed or ultrasonic hand pieces, spread the patient's oral secretions, saliva or blood into the air and the surrounding environment. After use, dental hand tools have the possibility of being contaminated with various pathogenic microorganisms or even being exposed to a contaminated environment in the clinic. Also, infections can be caused by piercing the skin with sharp instruments or direct contact between mucous membranes and infected hands. Due to the unique characteristics of dental procedures, despite the large number of droplets and suspended particles. When airborne, standard routine protective measures during clinical dental procedures are not effective enough to prevent the spread of Covid-19. Especially when patients are in the latent period, unaware that they have an infection or choose to hide their infection [11].

Effective infection control protocols

Observance of hand hygiene is the most important measure to reduce the risk of transferring microorganisms to patients. Depending on the type of surface, temperature or humidity of the environment, CoV-SARS-2 can exist on surfaces for several hours or up to several day. This reinforces the need for good hand hygiene and the importance of thorough disinfection of all surfaces in the dental clinic. The use of personal protective equipment including masks, gloves, gowns and goggles or face shields is recommended to protect the skin and mucous membranes (potentially) from contaminated blood and secretions [7]. Because the main route of CoV-SARS-2 transmission is respiratory droplets, N-95 masks approved by the National Institute for Occupational Safety and Health or 2FFP standard masks designated by the European Union are recommended for routine dental work.

Necessary recommendations for dental clinics

Dentists must take strict personal protection measures and avoid or minimize operations that can produce droplets or aerosols. The use of low or high-volume saliva repellants can reduce the production of droplets and airborne particles [8]. Screen your staff in advance and patients should also be asked about their health status and contact or travel history. Patients and companions should be provided with medical masks and their temperatures taken upon arrival. Patients with fever should be registered and referred to certain hospitals. If the patient has visited epidemic areas in the past 14 days, quarantine for at least 14 days is recommended. In areas where Covid-19 has spread, non-emergency dental procedures should be postponed [5].

Oral examination

Antimicrobial mouth rinse before treatment procedures can reduce the number of microbes in the oral cavity. Procedures likely to induce cough should be avoided (if possible) or performed with caution. Aerosol production steps, such as the use of air and water vapor, should also be minimized as much as possible. Although intraoral x-ray examination is the most common radiographic method in dental imaging [6]. However, it can stimulate salivation and cough (Vandenberg et al. 2010); Therefore, extra oral radiography such as panoramic radiography and CT are suitable options during the outbreak of Covid-19.

Treatment of emergency cases

Dental emergencies may occur and escalate in a short period of time and therefore require immediate action. The use of a large amount of rubber foam and saliva can help minimize aerosols or prevent them from spreading during the treatment procedure. In addition, face shields and goggles are essential when using a hand piece with high speed or low speed with water spray.

If a decayed tooth is diagnosed with symptoms of irreversible pulpitis, pulp exposure is performed after local anesthesia, caries removal by chemical-mechanical method using rubber and high-volume saliva remover; And finally, denervation can be done to reduce pain. The filling material can be replaced later slowly without the need for anesthetic according to the manufacturer's instructions and recommendations. It should be noted that we met a patient who had spontaneous pain due to a cracked tooth without tooth decay and using a high-speed hand piece. After the treatment steps, cleaning, disinfection and disinfection of the environment was done. On the other hand, in case of suspected cases of Covid-19, patients can be treated in an isolated room with proper ventilation or in rooms under negative pressure. The treatment plan for dental fractures, displacement of teeth, and complete loss of teeth from dental sockets depends on age, severity of dental tissue damage, root development, and duration of tooth loss [7]. If the tooth needs to be extracted, an absorbable suture is preferred. For patients with facial soft tissue damage, debridement and sutures should be used. It is recommended to wash the wound area gently and use a saliva repellent to prevent the spread of saliva. Threatening cases of oral and maxillofacial injuries and combined injuries should be immediately performed chest CT for hospitalization and, if present, to diagnose and rule out suspected infections. When dentists work on your teeth, such as pediatric dentistry, dental laminates, dental implants, dental orthodontics, etc., or for example during tooth grinding with a turbine or when scaling and polishing teeth with polishing brushes, aerosols-drops Airborne from saliva or blood – created.

Under normal circumstances, dentists are required to assume that all patients are infected with infectious diseases and to take precautionary measures in the field of infection control for all patients in order to reduce the risk of transmission of infectious respiratory and blood diseases. These precautionary measures make both patients and dentists stay safe [4]. But despite the corona virus epidemic, the risk of virus-carrying aerosols has increased during dental procedures, which either directly infects the office staff or causes disease transmission by sitting on a surface that is touched by the staff or subsequent patients. Even in seemingly healthy patients, there is a

possibility of transmission because not all people infected with the virus have symptoms of corona disease. Therefore, infection control and the implementation of special disinfection measures become especially important during the period when the corona virus is spreading.

Conclusion

The use of teeth whitening powders and its complications have raised many questions for many people who care about the health and beauty of their teeth. Of course, in addition to whitening powders, there are other products for teeth whitening, the raw materials and the way many of these product's work are not known. The use of teeth whitening powders and its complications have raised many questions for many people who care about the health and beauty of their teeth. Of course, in addition to whitening powders, there are other products for teeth whitening, the raw materials and the way many of these product's work are not known. Tooth whitening powder is available in pharmacies. Usually, these powders are made of a substance called silica. Most brands of teeth whitening powder work in such a way that the silica contained in them has an abrasive effect and destroys a layer of tooth enamel. This layer is the protective layer of the tooth that has changed color and turned yellow or dark. With the wear of this delicate layer, the tooth may be white for a while, but it will change color and turn yellow again. It may even cause decay because the tooth does not have a protective layer. Dentists believe that tooth whitening powder makes the tooth sensitive and painful over time due to its abrasive properties, and as a result, such a tooth needs nerve extraction. Teeth whitening strips and gels, like teeth whitening powder, make teeth more beautiful, but the performance of these products is different from powders. We said that the teeth whitening powder has a material called silica, while the teeth whitening strip is a strip of very thin plastic whose surface is covered with a chemical called peroxide. Peroxide is a tooth whitening agent. It can be said that like fabric bleach, this substance removes stains on the teeth. Dentists recommend using a whitening strip twice a day for two weeks. Be sure to buy toothpaste from reputable brands so that there are no harmful chemicals in them. Consider a point about the whitening strip, this product, like the teeth whitening powder, destroys the tooth enamel after a while and may be the cause of tooth decay in the future.

Teeth whitening gels also contain peroxide, but like toothpaste, they should be applied to the teeth with a toothbrush. Whitening gels have less side effects than teeth whitening powder, but these products will cause the loss of tooth enamel over time. Accordingly, American experts have

declared that one of these strange symptoms is "tooth loss". Earlier this month, a 43-year-old woman in New York witnessed her teeth falling out after being infected with the corona virus. David Okano, a professor at the University of Utah stated: We have seen a very rare and strange symptom in a corona patient. This corona patient was infected with this virus last month and has shown symptoms such as brain fog, neurological problems and muscle pain. Scientists' research shows that since there were no signs of any other disease that caused this woman's teeth to fall out, the evidence showed that not only the corona virus caused this woman's teeth to fall out, but also caused her gums to become vulnerable and the teeth to become black and worn. Researchers say that people who are only infected with corona have a high risk of losing their teeth. However, people with gum and tooth diseases may experience much worse conditions and severe oral problems if they are infected with Covid-19. According to the American Center for Disease Control and Prevention in 2012, 47% of people over 30 years of age had underlying diseases including inflammation of the gums or bone that covers the teeth. Therefore, the risk of oral and dental problems in these people after contracting Covid-19 is high. Other studies have also determined the relationship between the deadly risk of contracting the corona virus and gum disease. Gum disease is directly related to heart disease and chronic lung disease. These two diseases themselves can directly increase the risk of death of patients from Covid-19. Researchers in the state of California and Brazil have announced: gum disease causes the level of the immune protein called "interleukin 6" in the blood to be high. It has been observed that those who have a high level of this protein in their blood will show very severe symptoms if they are infected with the corona virus and must be put on artificial respiration in order to survive. Also, the death rate of these people is higher than that of patients. There are more people with Covid-19. This research also showed that although various diseases can increase the blood level of interleukin 6 in people, but in the case of treatment of gum disease in people, the level of this protein in the blood decreases significantly. Researchers say that people whose level of interleukin 6 is more than 80 pictograms per milliliter are much more likely than others to die from the corona virus or require artificial respiration if the disease worsens. Shervin Melayam, one of the dental surgeons of Los Angeles, USA, says about this: We believe that many of those who have a high level of interleukin 6 in their blood suffered from gum disease before contracting Covid-19, and this affects the severity of the disease.

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