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REVIEW

Oral diseases associated with COVID-19

Enfermedades bucales asociadas al COVID-19

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ABSTRACT

The oral cavity houses saliva, which is a reservoir for SARS-CoV-2. Knowledge of oral pathologies that may arise during COVID-19 is significant, as it can prevent severe health problems from developing in other parts of the human body. Therefore, the author set out to describe oral diseases associated with COVID-19. The documentary analysis method was used, and a total of 30 bibliographies were reviewed. Patients who tested positive for COVID-19 presented with impaired salivary gland function, taste and smell sensations, oral mucosal integrity, herpetic lesions, and candidiasis. If surveillance and control of oral pathologies associated with the presence of COVID-19 are activated, high transmission of the virus and the spread of infections to other anatomical regions of the human body would be prevented, often avoiding serious complications in patients.

Keywords: SARS-CoV-2; COVID-19; Oral Health.

RESUMEN

La cavidad bucal alberga la saliva, que constituye un reservorio del SARS-CoV-2, resultando significativo el conocimiento de las patologías bucales que se pueden presentar durante la presencia de COVID-19, evitando que no se generen problemas de salud severos en otras regiones del organismo humano, por lo que la autora se trazó como propósito describir las enfermedades bucales asociadas al COVID-19. Se utilizó el método de análisis documental y se revisaron un total de 30 bibliografías. Los pacientes positivos al COVID-19 presentan afectaciones en el funcionamiento de las glándulas salivales, las sensaciones del gusto, olfato, la integridad de la mucosa bucal, lesiones herpéticas y la candidiasis. Si se activa la vigilancia y control de las patologías bucales asociadas a la presencia de COVID-19, se evitaría la transmisión elevada del virus y la propagación de infecciones hacia otras regiones anatómicas del organismo humano impidiendo en muchas ocasiones la gravedad del paciente.

Palabras clave: SARS-CoV-2; COVID-19; Enfermedades Bucales.

INTRODUCTION

On 8 January 2020, a new strain of coronavirus (SARS-CoV-2) was announced globally as the pathogenic cause of COVID-19 by the Chinese Centre for Disease Control and Prevention.(1) The epidemic of this disease began in Wuhan, Hubei Province, of the People's Republic of China, in December 2019 as an outbreak of pneumonia of unknown cause. This was reported to the World Health Organization (WHO) as 27 cases of Acute Respiratory Syndrome (ARS) of unknown etiology, with the Huanan seafood wholesale market, which primarily

sells live animals, being considered as a possible link.[2]

According to genetic and epidemiological findings in the early literature, COVID-19 started as animal-to-human transmission by ingesting the Chinese bat (Rhinolophus sinicus) and then human-to-human transmission.[3] Currently, transmission has been shown to occur via saliva droplets from an infected person with the mucosa (nasal, oral, and ocular) of another subject and by contact with feces.[4]

The main symptoms are fever, dry cough, chest pain, respiratory distress, and malaise.[5] If the patient has the first two symptoms and has been in contact with a confirmed COVID-19 person, a confirmatory molecular test is performed by taking a pharyngeal and nasopharyngeal swab sample and analyzed by reverse transcriptase polymerase chain reaction (RT-PCR) to confirm or rule out the presence of the virus.[6] These symptoms are non-specific, and their presentation, according to the WHO, may even be symptomless (asymptomatic). In severe cases, it is characterized by pneumonia, acute respiratory distress syndrome, sepsis, and septic shock, leading to death in about 3,75 % of those infected, according to WHO. Although symptomatic patients have been considered the main transmission vectors, recent observations suggest that asymptomatic patients and incubating patients are also sources of SARS-CoV-2 transmission.

In the face of such a global health crisis, health professionals are working every day in their line of action on prevention, timely diagnosis, and treatment of the virus, which, although generally noticeable by symptoms within the field of medicine, also qualifies symptoms for the field of stomatology, where it is still not given the importance it requires; the oral cavity being the primary host and transmitting agent of the disease, from contaminated saliva microdroplets, but also from alterations and diseases that originate in this area associated explicitly with COVID-19. Hence, the imminent need determined by the author to investigate the oral manifestations that occur in patients with the new coronavirus (SARS-CoV-2), describing each of the pathologies, and in this way, both the patient himself and the stomatologist in his clinical analysis during a consultation can effectively determine the possible presence of the virus, even if it is then necessary to corroborate it with an RT-PCR test.

Overall objective

To describe the oral diseases associated with COVID-19.

DEVELOPMENT

The patient's immune system mainly determines the impact of COVID-19 on oral health, the pharmacotherapy received, and the pathogenesis of the virus. It has been suggested that the oral cavity is a perfect habitat for SARS-CoV-2 invasion due to the special affinity of the virus for cells with receptors for angiotensin-converting enzyme (ACE2) such as those in the respiratory tract, oral mucosa, tongue, and salivary glands.[8]

SARS-CoV-2 is a virus that can affect salivary gland function, taste sensation, smell, and oral mucosal integrity.[9] Studies indicate that this new coronavirus can alter the balance of the oral microbiota, which, combined with a depressed immune system, would allow colonization by opportunistic infections.[10] Currently, there are doubts as to whether the origin of these oral manifestations is the result of direct viral infection, whether they are the product of the patient's systemic involvement, or whether they occur as adverse reactions to the treatments received to treat COVID-19.[11,12]

COVID-19 and oral health

Multiple scientific articles have investigated the oral cavity as the main route of SARS-CoV-2 infection, the implications of the high risk of infection in stomatological practice, and the possible use of saliva for diagnosis. However, few studies have linked COVID-19 to salivary gland disorders, taste and smell disorders, intraoral lesions, and oral hygiene, information that may be useful for preventing, diagnosing, and treating the disease.[13,14]

Salivary gland disorders

Saliva plays a vital role in maintaining the integrity of the tissues of the oral cavity by lubricating them, buffering pH changes, and possessing antibacterial, antiviral, and antifungal action. The salivary secretion volume, under normal conditions, depends on factors such as temperature, circadian rhythm, type of taste, and chemosensory, masticatory, or tactile stimulation.[15] Sometimes, mainly associated with the patient's systemic condition and the consumption of certain drugs, hyposalivation develops. This is associated with ulcerative lesions of the intraoral mucosa, dysgeusia, dysphagia, and increased susceptibility to infection.[16]

Hyposalivation and xerostomia have been reported in those infected with SARS-CoV-2. Studies indicate that patients with hyposalivation are at increased risk of developing a severe respiratory infection, as reduced salivary secretion may alter the barrier function of the airway mucosa, favoring viral adhesion and colonization. In turn, hyposalivation is related to a decrease in salivary proteins such as mucins, lysozyme, cathelicidin, lactoferrin, peroxidase, salivary agglutinin, alpha-defensins, beta-defensins, and cystatins, which could potentially impede virus replication, especially of SARS-CoV-2.

Therefore, hyposalivation may be considered a risk factor for developing respiratory infections such as COVID-19. It can also be related when the pathology is already present to poor oral hygiene and an increase in these patients of all stomatological pathologies associated with this risk factor, such as dental caries.

Taste and smell disorders

The olfactory system detects volatile chemicals via olfactory sensory neurons in the nasal cavity and food odors via the nasopharynx (retronasal olfaction). The taste system responds to a special sensitivity in the mouth that elicits sweet, salty, bitter, and sour sensations. Chemostasis detects other chemicals in herbs or spices that evoke burning, cooling, or tingling. Often, these modalities combine and transfer a unique taste experience during a meal, so it is common for a loss of retronasal olfaction and alteration in the somatosensory system, which transmits chemostasis, to be reported as a loss of taste.[17] Chemosensory alterations in these systems can result in quantitative (anosmia, hyposmia; ageusia, hypogeusia) and qualitative (dysgeusia, parosmia) changes in taste and smell, respectively.[18]

Recently, COVID-19 has been reported to be associated with alterations of smell (AO) and/or taste (AG). The association of viral infections with OA and GA is common, as viruses can cause inflammation of the nasal mucosa and rhinorrhoea. However, the case of COVID-19 is unique, as it is not associated with these features.

While it is known that SARS-CoV-2, through its affinity for ECA2 receptors, can infect tongue keratinocytes, the mechanism by which it affects the senses is not entirely clear, and while an AO may lead to GA, they may not occur together as they have distinct peripheral and central neural mechanisms.[15] It is thought that the virus may have the ability to infect taste receptor cells, cranial nerves that carry taste and chemo-aesthetic information or may even infect surrounding blood vessels and cells of the central nervous system.[19]

Studies indicate that the prevalence of AO and GA for patients with COVID-19 varies between 58-86 % and 54-88 %, respectively.[20] Of these manifestations, the most frequent would be the qualitative ones, mainly anosmia and ageusia. It has been pointed out that AO and GA are followed in prevalence by fever, dry cough, and fatigue[21], and other authors even indicate that they are the most prevalent manifestations of COVID-19, especially in patients with a mild to moderate severity of infection and who are female.[9] Therefore, they are considered excellent predictors of infection, and if they are present, the patient should be isolated until the laboratory test results are available.

Intraoral findings

The oral cavity may manifest manifestations of underlying diseases of bacterial or viral origin. These include oral ulcers, gingivorrhoea, glossitis, halitosis, and orofacial pain. The most prevalent oral lesions of viral etiology are ulcers and blistering lesions of tissues.

Several case reports have confirmed the presence of oral manifestations in patients with COVID-19. These are thought to be mainly due to the patient's immune status, poor oral hygiene, and infection with other viral or bacterial infections.[22]

The most commonly reported intraoral findings in patients with COVID-19 are candidiasis and herpetic lesions. It has been suggested that recurrent oral ulcers may be an inaugural symptom of COVID-19. However, as these findings are still recent in the literature, it is unclear whether they are due to the coronavirus infection or secondary manifestations of the patient's systemic condition.[23]

Candidiasis

So far, the prevalence of fungal infections in patients with COVID-19 has not received much attention. However, it is known that they may experience lymphocytopenia, require hospitalization in an intensive care unit, need broad-spectrum antibiotics, corticosteroids and have underlying diseases, which together would severely compromise the immune system and are considered risk factors for co-infection with oropharyngeal candidiasis (OC).[23]

In more than 80 % of cases of OC, the responsible species is Candida albicans. Although it is part of our endogenous flora, infection develops when the host's local defenses are weakened, and taste alterations, glossodynia, and dysphagia may occur. In case of untreated or ineffective OC, the infection may spread regionally from the oropharynx to the esophagus or systemically through the bloodstream or upper gastrointestinal tract, which could lead to candidemia with significant morbidity or even mortality. Therefore, timely detection of CO and accurate identification of the aetiological agents in patients suffering from COVID-19 are essential for effective therapy.[23]

Studies on CO in patients with COVID-19 are scarce. An investigation of more than 1000 patients infected with SARS-CoV-2 revealed that 5 % of them developed OC, on average 8 days after diagnosis of COVID-19, with Candida albicans accounting for 71 % of cases and patients older than 49 years accounting for 80 % of those affected.[24] Considering the clinical course, progression, and severity of COVID-19, most patients with severe disease would have at least one of the above risk factors for the development of OC, with older adults being

particularly vulnerable.

Herpetic lesions

So far, 3 cases of oral manifestations probably associated with SARS-CoV-2 infection have been reported, one of which belonged to a suspected case, the second to a probable case, and the third to a confirmed case of COVID-19 infection. All three patients presented with oral ulcers or blisters, corresponding to elementary lesions commonly seen in other viral processes such as foot and mouth disease, herpetic gingivostomatitis, and oral cytomegalovirus infection.[25]

The first two cases were in keratinized tissue, as usually observed in oral herpes simplex lesions.[26] In the third case, although the oral manifestation had a herpetiform appearance, it was located in both keratinized and non-keratinized tissue, being more compatible with erythema multiforme (EM).[27]

In May 2020, macular lesions and oral petechiae on the palate were reported in four hospitalized patients with COVID-19 infection as part of a pattern of MS-like skin lesions, with herpes simplex virus and Mycoplasma pneumonia being the main causative agents associated with MS.[28] Subsequently, in June 2020, the clinical and microscopic features of the case of a SARS-CoV-2 positive patient were reported who, in addition to the main symptoms of fever, cough, and respiratory distress, presented painful oral ulcers and multiple erythematous macules on the hard palate, tongue and lips, as part of the infectious picture that also included small vesicular skin lesions, similar to petechiae, of unknown etiology.[29]

Clinical and microscopic aspects of the lesions showed areas of hemorrhage and small vessels, suggesting that SARS-CoV-2 may cause oral lesions, being a primary reaction. This report is the only one to date that includes histopathological study of oral lesions and mentions a possible etiopathogenic mechanism.[29]

Oral hygiene control

The link between good oral care and reduced risk of acute respiratory viral respiratory infections has been established in several studies. It has been found that inadequate oral hygiene may increase bacterial exchange between the lungs and mouth, increasing the risk of lung infections and bacterial complications following viral infection. A connection has also been established between the presence of periodontal disease and post-viral complications, as cytokines such as IL-1a, IL-1b, and TNF-a present in periodontal sacs can infiltrate saliva through gingival crevicular fluid and be aspirated, increasing the risk of inflammation or infection at the pulmonary level.[29,30]

An association has been found between oral care and the incidence of pneumonia in patients on mechanical ventilators, especially in those over 60 years of age with morbidities.[26] Research indicates that pneumonia and acute respiratory distress syndrome (ARDS) are among the main complications in patients with COVID-19, with a diagnosis of ARDS being made when oxygen levels drop and assisted ventilation is required.[30]

This is supported by the official Italian report, which indicates that 96,5 % of complications from COVID-19 infection were ARDS, suggesting that patients are more likely to die from complications of postviral infection than from COVID-19.[27] While further studies are needed to establish the importance of oral hygiene in the prognosis of the COVID-19 patient, it is recommended that oral hygiene be maintained or even improved during SARS-CoV-2 infection to reduce bacterial load and the potential risk of superinfection.[30]

No bibliography on this research topic was found in the Isle of Youth Special Municipality or Cuba, making this research a challenge and a necessity in the field of health as an alternative for the timely diagnosis of the pathology in the population and thus avoid the transmission of this pathology, which is so complicated in the current epidemiological context, taking as a premise that the best way to maintain adequate health is to comply with general and oral hygiene measures correctly to maintain a healthy life since the objective of the stomatologist is not only to ensure a beautiful smile but to promote health and prevent illnesses.

CONCLUSIONS

COVID-19-positive patients have impaired salivary gland function, taste sensations, smell, and oral mucosal integrity. Still, they are also associated with viral diseases originating from the patient's immune status, poor oral hygiene, and other bacterial infections. The most commonly reported intraoral findings are herpetic lesions and candidiasis, which usually present with taste alterations, glossodynia, and dysphagia. If not effectively treated, they can spread regionally, and the patient will require hospitalization in an intensive care unit, aggravating the patient's condition.

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