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Dental Diagnostics of Damages to Organs and Systems During Coronavirus Infection

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Annotation. It has been proven that coronavirus infection (COVID-19) can influence the development of diseases of soft tissues and oral mucosa of varying severity, cause the formation of pathology of some hard structures of the oral cavity, a long-term pathological process that complicates the patient's dental status. However, early diagnosis, with the identification of frequently occurring symptoms in the form of pulpitis, periodontitis, periodontitis, stomatitis and oral candidiasis, makes it possible to prevent the formation of clinically burdened forms, timely treatment, as well as the prevention of complications - suppuration of soft tissues, loose teeth up to tooth loss. COVID-19.

Key words: coronavirus pathology, COVID-19, oral pathology, early diagnosis, index assessment of the condition of the oral cavity.

Relevance. Modern healthcare throughout the world has directed its existing efforts towards studying, combating and preventing infection with the SARS-CoV-2 virus, and as practice has shown, this problem covers all branches of medicine, and damage to organs and systems is diffuse and multi-organ. According to WHO, coronavirus has the ability to spread through secretions from the mouth, including splashes of saliva, and as stated - "Cells of the salivary glands, tongue and tonsils carry the most RNA associated with proteins that are necessary for the SARS-CoV-2 virus to infect cells and everything organism" [1, 5, 14]. At the same time, isolated damage to the oral mucosa cannot be ruled out, which, together with saliva, are objects of high risk for invasion of the SARS-CoV-2 virus, and dentists become a high-risk group for developing morbidity [2, 12, 16]. Covitology experts confirm that the oral cavity can play a fatal role in transporting the SARS-CoV-2 virus deep into the body through saliva containing the virus from infected cells of the oral cavity [4, 15, 19]. Damage to the oral cavity, loss of taste and smell, neurological signs in the form of headaches, prosopalgia, deep asthenia, anxiety, phobic and depressive disorders, cognitive deficits are common clinical symptoms in the clinic of coronavirus infection [7, 10, 11, 17].

The list of coronavirus symptoms is annually and confidently updated at the time of each outbreak; infection of the oral cavity, neurological symptoms, damage to the tissue of the salivary glands, and severe forms of complications are no exception. To date, there have been

many scientific studies that have proven a wide range of nonspecific lesions of the oral mucosa and subsequent neurological complications, degeneration of the oral mucosa, of various etiologies, however, the formation, diagnosis, prevention, treatment of such diseases against the background of the SARS virus have not been sufficiently studied -CoV-2.

Moreover, despite significant advances in the field of covitology, pathogenetic aspects, routes of invasion, the principle of biological attack, issues of diagnosing lesions of the oral cavity, the pathogenesis of possible neurological complications, prognosis of neurodental manifestations, dental care and preventive measures to prevent the aggression of the SARS-CoV-2 virus in the mouth area still remain open. Studying similar and other issues related to local immunity of the oral cavity, setting up and assisting in proper management, oral hygiene, and choosing medications for the treatment of post-Covid dental and neurological complications will contribute to the timely detection, prediction, prevention of complications and diffuse spread of SARS-CoV-2 by organs and tissues. However, to date, there are only a few studies evaluating the possibility of using long-term monitoring of the concentrations of modern biomarkers in comparison with NUP to assess the effectiveness in the treatment of patients with HF (O'Meara E, Prescot MF et al, 2018; Van Vark LC, Lesman Leegte I et al, 2018). al, 2017; Gaggin HK, Szymonifk J et al, 2014) [9, 22, 23]. There are no specific characteristics of symptoms that occur in the oral cavity, due to the virus continuing to evolve. In addition, due to the weakening of the body's protective functions, dental problems themselves can serve as a risk factor for infection, and a dental examination for COVID-19 would be correct to include in the list of necessary studies.

The purpose of the study was to develop methods for early diagnosis of damage to organs and systems by coronavirus infection in dental practice to prevent the spread and prevent complicated forms of the disease.

Research methods and materials. The scientific work was carried out based on our own observation of patients suffering from COVID-19 (SARS-CoV-2) for the period from 2019 to 2022. A total of 217 patients who sought help in outpatient and inpatient settings were subjected to a dental examination. Clinical, laboratory and instrumental studies were carried out taking into account the existing coronavirus infection, a positive PCR result for COVID-19. Clinical studies were carried out on the basis of the Bukhara Regional Infectious Diseases Hospital and the private clinic of PREMIUM-DENT GROUP LLC in compliance with all sanitary safety measures, after the permission of the chief physicians and directors of clinics and outpatient services.

For the objectivity and reliability of the results obtained, the examined 174 (80.2%) patients were marked as main group 1, suffering from oral pathology after suffering from COVID-19; Group 2 included 43 (19.8%) patients who did not have an established diagnosis of COVID-19 at the time of examination, but suffered from oral pathology, who were considered as a comparative group.

The age of the patients in the main group ranged from 17 to 71 years, with an average of 46.02±2.1 years. There were 101 (58.0%) women with an average age of 46.4±2.3 years, 73 (42.0%) men with an average age of 45.5±2.7 years. The age category of all patients was divided according to the WHO classification (2021), according to which in the main, 1st group, young (18-44 years old) were found in 80 (46.0%) cases, middle-aged (45-59 years old) and elderly (60

-74 years old) in 47 (27.0%) cases, suffering from oral pathology after suffering from COVID-19.

In the main, 2nd group, there were patients with concomitant pathology, and mainly hypertension was observed - 8 (4.6%) patients, and diabetes mellitus (DM) - 5 (2.9%) patients, while while in the comparison group there was practically no concomitant pathology.

In Table 1, all patients were distributed by age and sex, according to which, in group 1 there were 1.9 times more young men and 1.8 times more women of the same age than in group 2, which had a significant difference ($P<0.05$).

There were 3.1 times more middle-aged women in group 2, while there were 3.6 times more men of the same age compared to group 1 ($P<0.001$). There were also significantly more elderly patients in group 1 ($P<0.001$), whereas in group 2 there were only women. Moreover, in the main group there was no significant difference between the number of women and men of the same age (Table 1).

The analysis revealed that at a young age after suffering from COVID-19, oral pathology was observed almost 2 times more, compared with middle and elderly age ($P<0.01$), which was also observed in the comparison group. In our opinion, this trend does not have any specific connections with the coronavirus infection; most likely, older patients refuse to go to the dentist during a pandemic in order to avoid repeated reinfections, even if there is damage to the oral mucosa, resorting to ancient methods of treatment (which is subject to careful analysis and statistical study).

Table 1

Fig 2. Distribution of patients by age (WHO, 2021) and gender

1-group (main) **n=174**								
Patients - gender	Age, years						Total	
	Young (18-44)		Average (45-59)		Elderly (60-74)			
	abs	%	abs	%	abs	%	abs	%
Men	35	20,1	18	10,3	18	10,3	71	40,8
Women	45	25,9	29	16,7	29	16,7	103	59,2
Total	80	46,0	47	27,0	47	27,0	174	100
2-group (comparative) **n=43**								
Пациенты/пол	Age, years						Total	

	Young (18-44)		Average (45-59)		Elderly (60-74)			
	abs	%	abs	%	abs	%	abs	%
Men	0	0,0	16	37,2	0	0,0	16	37,2
Women	4	9,3	20	46,5	3	7,0	27	62,8
Total	4	9,3	36	83,7	3	7,0	43	100

However, it should also be noted that the number of women with lesions of the oral cavity in both groups was significantly higher (1.5 and 1.7 times, respectively, in groups 1 and 2), which, apparently, was associated with more fragile local immunity in the weaker sex.

It was noted that among the main group 1 there were patients suffering from somatic pathology - 32 (18.3%) hypertension, 20 (11.5%) diabetes mellitus, 7 (4.02%) ischemic heart disease, 8 (4. 6%) obesity, 41 (23.6%) other somatic diseases (gastritis, pneumonia, kidney disease), i.e. 108 (62.1%), more than half of the patients had concomitant pathology of internal organs (Table 3.1).

Table 2

Comparative analysis of patients based on the presence of somatic pathology

Group of patients	Hypertonic disease		Diabetes mellitus		Obesity		Other somatic diseases		Coronary heart disease	
	abs	%	abs	%	abs	%	abs	%	abs	%
1-group (n=174)	32	18,3	20	11,5	8	4,6	41	23,6	7	4,02
2-group	11	25,6	23	53,5	4	9,3	1	25,6	0	0,0
(n=43)	P<0,05		P<0,001		P<0,01		P=0,01		P<0,05	

As can be seen from table 2, in relation to group 1, the control group 2 had a significantly larger number of patients suffering from somatic pathology (39/90.7%), in other words, the observed patients with oral pathology had a background for their development. At the same time, in patients of the main group, the background for the formation of the pathology under study was COVID-19, somatic pathology was not the initial cause of their development, and in group 2, somatic pathology, without the presence of a viral lesion, served as a similar background. This observation proves a decrease in local and systemic immunity in both cases, which leads to the possible development of pathology of the oral mucosa (Table 2).

Meanwhile, in group 1, the most common symptoms were cracks, erosions, ulcers, and rashes in the oral mucosa, which contributed to early diagnosis and prevention of further

development of aggravating symptoms of COVID-19 in the oral cavity, which led to cost-effectiveness, as in material and time terms (Table 4).

Table 4

Symptoms of damage to the mucous membrane and some structures of the oral cavity

Symptoms	1-group (n=174)		2-group (n=43)		Note
	abs	%	abs	%	
Oral hyperemia	98	56,3	32	74,4	P<0,05
Bad odor/halitosis	132	79,9	34	79,1	P=0,00001
Coated tongue	110	63,2	36	83,7	P<0,01
Cracked tongue	78	44,8	16	37,2	P<0,05
Rashes on the oral mucosa	77	44,3	8	18,6	P<0,001
Cracks and redness in the corners of the lips	72	43,4	9	20,9	P<0,01
Ulcers on the oral mucosa	28	16,1	3	7,0	P<0,0001
Erosion on the oral mucosa	49	28,2	6	14,0	P<0,01
Aphthae on the oral mucosa	33	19,0	2	4,7	P<0,001
Plaques on the oral mucosa	42	24,1	3	7,0	P<0,001
Pain in teeth when biting	38	21,8	3	7,0	P<0,0001
Increased enamel sensitivity	34	19,5	2	4,7	P<0,001

Following from the analysis, patients suffering from or having had COVID-19, even in the absence of concomitant pathology, have serious problems with systemic and local immunity, and therefore deep lesions of the oral mucosa and some of its other structures that require special care may develop, treatment and prevention of further complications. Thus, the fact of antibiotic therapy remains controversial for the development of oral pathology against the background of COVID-19, which requires further, more detailed tests, with laboratory diagnosis of some pro- and anti-inflammatory markers in the hemogram.

Upon palpation, the lymph nodes had a softer consistency and were mobile; there was no local hyperemia on the skin. The salivary gland was sore, mobile, without elasticity in consistency. As you can see, lymphadenopathy of the submandibular lymph nodes and sialadenitis, i.e. inflammation of the salivary glands turned out to be the predominant clinical symptoms of oral lesions associated with COVID-19.

In 62 (35.6%) patients of group 1 with severe inflammatory-erosive lesions of the gums, pathological mobility of teeth was revealed, which was observed significantly less in group 2 (9/20.9%) (P<0.01).

Thus, coronavirus infection (COVID-19) can influence the development of diseases of soft tissues and oral mucosa of varying severity, cause the formation of pathology of some hard structures of the oral cavity, a long-term pathological process that complicates the patient's dental status.

Conclusions:

1. Following from the analysis, patients suffering from or having had COVID-19, even in the absence of concomitant pathology, have serious problems with systemic and local immunity, as a result of which deep lesions of the oral mucosa develop, which require special care, treatment and prevention of further complications.

2. Coronavirus infection (COVID-19) can influence the development of diseases of soft tissues and oral mucosa of varying severity, cause the formation of pathology of some hard structures of the oral cavity, a long-term pathological process that complicates the patient's dental status.

3. Early diagnosis, with the identification of common symptoms in the form of pulpitis, periodontitis, periodontitis, stomatitis and oral candidiasis, makes it possible to prevent the formation of clinically burdened forms, timely treatment, and the prevention of complications.

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