

Evaluation of the State of the Oral Mucosa and Tactics of Its Treatment in Patients with Coronavirus Infection Complicated by Arterial Hypertension

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Abstract At the present stage of the development of medicine, the features of dental morbidity in the population are the high prevalence and intensity of damage to the dentition, the simultaneous development of several types of dental pathology of carious and non-carious origin, as well as inflammatory diseases of the periodontium and oral mucosa. The pathogenesis of SARS-CoV-2 lesions has not been studied. It is believed that the virus enters the cell by attaching to angiotensin-converting enzyme-2 (ACE2) receptors. Diseases of the oral cavity in most cases are the first clinical signs of systemic disorders.

Keywords COVID-19, Blood pressure, Overproduction of pro-inflammatory cytokines, Interleukin-6

1. Introduction

To study the clinical and laboratory parameters of the oral fluid and blood in patients who underwent COVID-19 against the background of arterial hypertension, and also, based on the study of the state of the oral mucosa, to develop tactics for managing these groups of patients. Once infected, the virus spreads through the mucus through the respiratory tract, causing a significant release of cytokines and an immune response in the body. There is a decrease in the number of lymphocytes in the blood, in particular T-lymphocytes [9,10]. Currently, it is known that the infectious process, including COVID-19, can cause the development of decompensation of chronic cardiovascular diseases (heart failure - HF, coronary artery disease, increased risk of thrombotic complications). Acute myocardial injury has also been described against the background of COVID-19. Dysregulation of the renin-angiotensin-aldosterone system (RAAS), respiratory failure, hypoxia, oxidative stress, mitochondrial dysfunction, and inflammation are discussed as the main mechanisms.

2. Research Objectives

- to study the features of clinical and laboratory manifestations of the main dental diseases in patients who have undergone COVID-19 complicated by arterial hypertension;

- to assess the state of the protective system of the oral cavity and the functional state of the endothelium in patients with arterial hypertension;
- to study the state of the endothelium in patients who underwent coronavirus against the background of chronic inflammation of the oral mucosa with combined arterial hypertension;

3. Relevance of the Topic

Arterial hypertension remains one of the determining risk factors for the development of severe cardiovascular pathology in people of working age.

The significant prevalence of arterial hypertension and the frequency of its complications determine the relevance of research on the active detection, treatment and prevention of the disease at the population level.

Along with an increase in the frequency of detection of cardiovascular diseases, their incidence and mortality from them in young working-age people has increased significantly, thereby increasing the importance of early diagnosis of arterial hypertension, which makes it possible to have an effective effect before irreversible organic changes occur in target organs [6,10,15].

Diseases of the oral mucosa and pathological processes in periodontal tissues in arterial hypertension are explained by the pathogenetic commonality of these processes.

One of the most important factors in the pathogenesis of hypertension is a violation in the microcirculatory bed, which is the basis of inflammatory-destructive diseases of periodontal tissues and oral mucosa [5,6,9].

The change in the microcirculatory bed progresses with the development of the disease and closely correlates not only with the severity of arterial hypertension, but also with the degree of circulatory disorders in the periodontium.

It has been established that the periodontal microvasculature, an active zone in the hemodynamics of the whole organism, undergoes changes with constant or frequently occurring stresses in the vascular system [4,8,9].

Great importance in the occurrence and development of hypertension, generalized periodontitis and periodontal disease is given to increased activation of the sympathetic division of the autonomic nervous system, which leads to dysfunction of the centers that regulate vascular tone and blood pressure, microcirculatory disorders, increased vascular permeability, including including in periodontal tissues [8,11,16,17].

It should also be taken into account that in patients with chronic generalized periodontitis and periodontal disease, combined with arterial hypertension, hypoxia contributes to an increase in the excitability of the sympathetic-adrenal system, swelling of the endothelium of arterial vessels, deterioration of redox processes in periodontal tissues, lower adaptive capabilities of the microvasculature and connective tissue.

Given the prevalence of coronary heart disease, a comprehensive assessment of the dental status of such patients is necessary, the identification of odontogenic foci of inflammation, inflammatory periodontal diseases and their sanitation, the development of recommendations for individual oral hygiene, taking into account the possible occurrence of dry mucous membranes. The traditional inclusion of pastes and rinses based on chlorhexidine in the complex treatment can cause such undesirable

consequences as dysbiotic changes, staining of the tongue and teeth, taste disturbance. That is why studies aimed at identifying the characteristics of the dental status of patients with coronary artery disease, evaluating the effectiveness of personal oral hygiene products of constant use, which have anti-inflammatory, antiseptic and moisturizing effects, but do not cause dysbiotic changes in the oral cavity, are relevant.

4. Material and Research Methods

The results of clinical and functional studies of the state of the oral mucosa in patients with coronavirus infection complicated by hypertension (stages I and II) and in persons without arterial pressure served to solve the tasks. The examination of the oral mucosa was carried out on the basis of the infectious diseases hospital of the city of Bukhara.

The total number of examined persons of the main and control groups was 210 patients.

Patients with coronavirus infection complicated by hypertension underwent a clinical examination, which included subjective, objective and additional research methods. During the examination, all patients underwent repeated measurements of blood pressure and in the anamnesis, they took into account how long the disease of hypertension began, the presence of dizziness and tinnitus, whether the head hurts (the nature and duration of the headache), goosebumps, fatigue, physical weakness, as well as concomitant and past diseases, heredity of hypertension, bad habits, occupational hazards, psycho-emotional stress and taking antihypertensive drugs.

Table 1. Distribution of patients with coronavirus complicated by hypertension by age and stage

Age of patients (in years)	Stages of hypertension				Number of patients		Control Group	
	1		2					
	surveyed	%	surveyed	%	surveyed	%	surveyed	%
34-38	12	27,2	24	20,7	36	22,5	20	40,0
39-49	18	40,9	47	40,5	65	40,6	12	24,0
50-58	8	18,2	34	29,3	42	26,2	12	24,0
61 and over	6	13,7	11	9.5	17	10,7	6	12,0
Total	44	100,0	116	100,0	160	100,0	50	100,0

Table 2. Evaluation of IGR-V in patients with coronavirus infection, complicated and uncomplicated hypertension in various age groups

Age of patients (in years)						
	Main group (patients with coronavirus infection complicated by HD)				Control Group	
		1		2		patients with coronavirus infection, uncomplicated HD
34-38	12	1,86±	24	1,94±	20	1,7±
39-49	18	1,92±	47	2,1±	10	1,8±
50-58	8	1,7±	34	1,7±	10	1,5±
61 and over	6	1,7±	11	1,7±	10	1,5±
Total	44		116		50	

The study of the dental status in patients with coronavirus complicated by hypertension, respectively, of both stages, indicates a high level of their dental morbidity, mainly lesions of the oral mucosa. Both stages in hypertension in patients with coronavirus, the main group are characterized mainly by proliferative (hypertrophy of the foliate and fungiform and papillae), atrophic (atrophy of the filiform papillae) and vascular (hyperemia, edema, cyanosis, vascular-vesical syndrome, cyanosis of the lips) lesions. In patients of the control group, atrophic and proliferative lesions were detected insignificantly.

Currently, one of the important problems of dentistry is the disclosure of mechanisms for regulating the dynamic constancy of the internal environment of the oral cavity in patients with arterial hypertension. As you know, the barrier function of saliva is a general biological adaptive reaction and acts as the first echelon of protection of the oral mucosa in conditions of a disturbed circulatory system. Therefore, in this situation, saliva should be considered as a biological fluid that reflects the processes of homeostasis. However, its role and changes occurring in it in persons with a combined form of the disease have not been practically studied. Moreover, the study of its homeostatic function will make it possible to identify unknown links in the pathogenesis of OM diseases in people with arterial hypertension and suggest new approaches to its treatment in people with CCI.

The result of the damaging effect of homocysteine is the development of endothelial dysfunction, which is accompanied by a change in the production of a number of regulatory substances produced by the endothelium, in particular, a decrease in the synthesis of nitric oxide and prostacyclin and an increase in the formation of thromboxanes. It is known that homocysteine reduces the anticoagulant activity of the endothelium of the vascular wall, due to the degradation of thrombomodulin, a decrease in the expression of antithrombin III-heparin complexes on the surface of endothelial cells, and significantly reduces the activity of the protein C system. fibrinolysis. It is important to note that homocysteine increases the expression of the plasminogen activator inhibitor-1 (PAI-1) gene, which suppresses fibrinolysis. Thus, the results of the study are consistent with the data of domestic and foreign authors and confirm the diagnostic and pathogenetic significance of the concentration of homocysteine in the blood in the pathology of oral mucosa associated with hypertension.

Before treatment, in patients of four age indicators, CP was high in patients (n=11) with coronavirus infection, complicated by stage II hypertension in the age group of 61 years and over, which amounted to 18.32. Accordingly, the index was the same in age indicators of 50-58 years in patients with GB I and GB II stages. The lowest KPU indicator in all age groups was low in patients with coronavirus without complications of HD. The PMA index was high in patients (n=11) with coronavirus infection complicated by stage II hypertension in the age group of 61

years and over and amounted to 62.07%. This indicator was low in patients of the control group, which amounted to 42.08. Indicators (IGR-U) in the age group of 39-49 years was high in patients (n=47) with coronavirus infection complicated by stage II hypertension, and was equal to 2.1 points. The indicator in the group of patients (n=18) with coronavirus infection complicated by stage I hypertension was 1.9 points. A low indicator in relation to the two groups was in patients of the control group (n=10), which amounted to 1.8 points. The factor that has a significant impact on the value of clinical indices in the age range is the presence of tartar.

Based on the above studies, in addition to the treatment of coronavirus infection, in patients with coronavirus infection complicated by stage I, II GB and not complicated by GB, we proposed a simultaneous therapeutic and prophylactic measure to reduce the level of oral hygiene, the RMA index, KPU, as well as diseases of the oral mucosa.

5. Conclusions

It has been established that in patients with OM pathology combined with hypertension, there is a decrease in thromboresistance of the vascular wall, which is manifested by inhibition of the anticoagulant and fibrinolytic activity of the endothelium, which is apparently associated with a change in thromboresistance of the vascular endothelium. A decrease in the anticoagulant activity of the vascular endothelium in patients of the main group is manifested by inhibition of the release of antithrombin III by the endothelium of the vascular wall. Inhibition of the fibrinolytic activity of the vascular endothelium may be associated with a decrease in the release of tissue plasminogen activator t-PA and an increase in the level of homocysteine.

In chronic inflammatory diseases of the oral mucosa with a combination of its hypertension, especially in those who had coronavirus, a slight increase in the concentration of pro-inflammatory cytokines IL-1b, IL-6 was noted in the blood and oral fluid. At the same time, the concentration of lactoferrin and cortisol in the oral fluid has a multidirectional character in patients who have undergone coronavirus.

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