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CLINICAL AND FUNCTIONAL STATUS OF THE CARDIOVASCULAR SYSTEM IN DIABETIC PATIENTS WITH COVID-19

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ABSTRACT

In December 2019, the first cases of a new coronavirus infection, later declared a pandemic, were reported. COVID-19 has been found to be much more severe in patients with diabetes mellitus. Diabetes mellitus and hypertension are known to be much more common together. That is why the potentially dangerous combination of a new infectious disease and diabetes mellitus has become an important problem in cardiology.

December 31, 2019, the first report of cases of pneumonia of unknown etiology in Wuhan, PRC, appeared. On January 9, 2020. The China Center for Disease Control and Prevention reported the discovery of the agent causing these pneumonias. It was a new coronavirus of severe acute respiratory syndrome type 2 (SARS-CoV-2). The disease this virus causes was named COVID-19 on March 11, 2020. The World Health Organization announced the beginning of the COVID-19 pandemic.

Published data from the countries most affected by the virus - China, the United States, and Italy - show that the risks of getting this infection in people with diabetes are generally very similar to those in the general population, where the number of COVID-19 cases among people with diabetes was 5-10%. Second, is the disease more severe in people with diabetes? Definitely yes. In diabetes, the disease is often accompanied by severe complications: develop critical oxygen deprivation, acute respiratory distress syndrome and high risks of death. According to various countries of the world, the lethality rate of type 2 DM patients is 2.5-4.5 times higher than in the general population.

It should be noted that the mere presence of chronic disease makes a patient more susceptible to the new coronavirus. Chronic cardiovascular disease, chronic obstructive pulmonary disease, chronic kidney disease, and, of course, DM increase people's vulnerability to SARS-CoV-2. But there are several additional aggravating circumstances with DM.

The first is chronic hyperglycemia. We know that in this viral infection, the critical point is the "cytokine storm. Cytokines are Morse code, a signaling system that helps the components of the immune system interact with each other. It has been found that glucose is the energy source that fuels the release of cytokines in response to viral infection; the more

glucose, the more intense the release of cytokines. This means that the worse a patient with diabetes is compensated for, the more severe the infection will be. The second is hyperactivity of the renin-angiotensin system (RAS) and its component angiotensin-converting enzyme type 2 (ACE-2). It is known that RAS activity is extremely high in DM. It is also known that ACE-2 is a receptor for SARSCoV-2. This receptor is expressed on the surface of the cells of many organs and systems, primarily the alveolar cells of lung tissue, in the colon, myocardium, pancreas, and kidneys. Under conditions of hyperglycemia, the expression of ACE-2 is increased manifold. In addition, against the background of hyperglycemia, ACE-2 receptor glycosylation, i.e. its biochemical binding to glucose, is activated, which dramatically increases the affinity of these receptors to the SARS CoV-2 coronavirus. Thus, in DM, both the expression of the viral receptor (ACE-2) and its binding to the SARS CoV-2 coronavirus are increased in tissues, which affects the susceptibility of DM patients to attack by the pathogen. The third is obesity. The presence of obesity increases by 1.5-2 times the probability of a severe course of viral infection in DM patients, their need to be transferred to artificial lung ventilation regardless of age and the presence of arterial hypertension.

However, months of observation since the beginning of the coronavirus epidemic have dispelled our fears and, moreover, have added confidence that the use of RAS blockers, on the contrary, has a protective effect and speeds up the recovery of our patients with diabetes. A scientific article by our center's team on the results of an analysis of the Federal Register of DM in the journal "Problems of Endocrinology" on the risks of fatal outcomes from COVID-19 in type 2 DM is now being prepared for publication. The results of the analysis showed that the use of RAS blockers reduced the risk of death by 64% in patients steadily taking this group of drugs. Similar results were obtained in other countries of the world. Therefore, the leading international and Russian medical associations have voiced strong recommendations to continue therapy with RAS-blocking drugs in patients infected with SARS-CoV-2. Patients with type 2 DM with an uncomplicated course of the disease (temperature below 38.5°C, absence of dyspnea, sufficient blood oxygen saturation - SpO2>93%) and HDL93%) can conditionally continue therapy with dipeptidyl peptidase-4 inhibitors, sulfonylurea drugs with low risk of hypoglycemia (gliclazide MB). When the above drugs are withdrawn, insulin is added to therapy in doses that allow to maintain the target glycemic values.

At any stage of disease severity and GPA>13- 15 mmol/l, the start of insulin therapy is recommended. Schemes of transfer of type 2 DM patients to insulin therapy are detailed in the 9th (supplemented) issue of Algorithms of specialized medical care for patients with diabetes mellitus, 2019. In the mild and asymptomatic course of COVID-19 requirements for glycemic control remain the same as in the preinfective period. The maximum daily glycemic values should not exceed 8 mmol/L, with daily glycemic monitoring by CGM systems time between 4 and 8 mmol/L should be at least 70% for young people and at least 50% for the elderly and debilitated. The following symptoms suggest a mild course of the infection: body temperature below 38.5°C, adequate blood oxygen saturation and no criteria for moderate or severe course. With a moderate to severe course, the guidelines for diabetic patients in the period of acute illness serve as a guide. In order to prevent the development of both ketoacidosis and hypoglycemic states, it is important to maintain glycemic levels of 6-7 mmol/L before meals and up to 10 mmol/L during the day. The transition from mild to moderate infectious disease

can be diagnosed by the following symptoms: fever above 38.5°C, respiratory rate over 22 per minute, shortness of breath when exercising , blood oxygen saturation by pulse oximeter SpO2.

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