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SOME PATHOPHYSIOLOGICAL FEATURES OF THE COURSE OF COVID -19 IN ELDERLY PERSONS AND OLD AGE.

(Literature review)

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Abstract: Pandemic caused coronavirus infection special group risk elderly and senile patients, especially those with cardiovascular diseases most often meet in populations. Spreading coronavirus infections represent a special danger regarding decompensation available chronic diseases, specific defeat cardiovascular systems, especially in case heavy course of coronavirus infection and a high risk of adverse outcomes at sick with cardiovascular diseases. Combination coronavirus infections with cardiovascular diseases create additional difficulties in diagnostics, definition priority tactics, change orders routing patients with urgent states, and choice therapy. The situation gets complicated deficit information, significant volume daily, often contradictory publications on data questions, and extremely high importance in solving a number of issues for clinical practices. This article discusses literature data that discuss aspects of the course of coronavirus infection, its main symptoms, as well as treatment features and possible complications, options for the outcome of the disease, and preventive measures in the elderly and senile.

Keywords: COVID -19, old age, old age, cardiovascular diseases, coronary heart disease, atherosclerosis, heart rhythm disturbances.

A dangerous infectious disease, the new coronavirus infection — CoronaVirus Disease (COVID-19) — continues to cause high morbidity and mortality. It is known that COVID-19 is mostly mild to moderate, but most people who have had
disease, note the slow rate of recovery [13, 14]. A year after the start of the pandemic, it was found that the virus is dangerous with long-term consequences for the body with the formation of a "post-covid" syndrome. Thus, numerous studies confirm long-term damage to some organs and systems of the body, including the lungs, brain, kidneys, and the cardiovascular system with the development of severe heart damage [1-13]. An important aspect of interest to the medical community is the question of how coronavirus manifests itself in elderly and senile people [17, 26].

Coronavirus in the elderly is an infectious disease of viral etiology that affects the respiratory organs [2, 7, 13, 16, 31]. The causative agent is very contagious, and not only old people can get sick. However, people over the age of 65 are the most vulnerable and are at risk with a high proportion of severe disease. Unfortunately, today the virus that causes the disease is being studied in detail, and new details about the course of the disease are being discovered every day [1, 14, 15, 16, 26]. The knowledge gained will help to successfully combat the spread of an infectious agent and reduce the number of deaths and the development of severe consequences for those who have recovered. It is important to understand why the coronavirus affects the elderly and more often causes serious complications [3, 4, 14, 18, 21, 26].

COVID-19 is a disease with a fairly high mortality rate. To a greater extent, coronavirus is dangerous for older people, because. It is in this category of the population that severe symptoms are observed with the development of serious complications associated with a risk to life. High mortality from coronavirus in the elderly is explained not only by age-related weakening of the body, but also by the unpreparedness of modern medicine for a large flow of patients in need of mechanical ventilation [2, 7, 8, 10, 15, 23, 26]. At the same time, the elderly often die from coronavirus, who did not seek medical help in the early stages of the disease, when it was necessary to support the body and stimulate the immune response in order to prevent complications [3, 4, 7-16].

Currently, the elderly are massively sick with coronavirus, due to the high contagiousness of the pathogen. As for the severe course of the disease with an unfavorable prognosis and the appearance of complications against the background of the pathological process, which is caused by age-related changes in the body and the presence of numerous chronic diseases, for example, arterial hypertension, diabetes, heart disease, oncology, tuberculosis, etc. In addition, with with age, all metabolic processes slow down, and the immune system may not be able to cope with the load, which is manifested by an unfavorable prognosis for morbidity and mortality from coronavirus [2, 7, 13, 16, 30, 31].

It is known that the SARS-CoV-2 virus infects the respiratory organs and rarely provokes pathology of the nasal mucosa, throat and bronchi, the lungs are more often affected. Men are the most affected by the coronavirus in older age. This is due to a long addiction to smoking, the presence of occupational diseases associated with lung pollution. In a general sense, COVID-19 refers to the group of SARS, which now and then occur during the cold season. As you can see, they are similar in symptoms. There are no specific signs of coronavirus in the elderly [14, 26, 28]. Because of this, it is quite difficult to make a diagnosis without blood sampling and tests [6, 8,10]. The fact that sometimes in the early days the disease is mild or completely asymptomatic does not guarantee a quick recovery. The causative agent is quite insidious, while an important aspect of high virulence is a high mutation rate, which potentiates the formation of new strains. Even in such cases, the mortality rate of the elderly from coronavirus is quite high [10, 11, 15, 23, 27, 30].

A distinctive feature of the symptoms of coronavirus in the elderly is the atypical manifestations. COVID-19 has a rather long incubation period compared to other seasonal acute respiratory viral infections. It usually lasts from 2 days to 2 weeks. Most often, the first symptoms of coronavirus in older people appear from the 3rd to the 5th day. Very rarely there is an asymptomatic course. To adequately assess the condition of the infected, it is very important to understand how the coronavirus proceeds in the elderly. From the moment the virus enters the body, it moves along the mucous membranes of the nose and throat to the bronchi, and then to the lungs. In the upper respiratory tract, infection can cause irritation - a slight runny nose and sore throat [13, 15, 16, 19, 23, 24, 29].

Being an "intracellular parasite", the virus, getting into the lungs with the help of spiny processes, is fixed on the cell and starts a cascade of reprogramming the production of viral RNA and proteins. Then, with the help of carrier lipids, self-

assembly occurs - replication of exact copies of the pathogen [13, 16, 26, 27, 30]. The patient at this stage is most aggressively contagious, excreting into the environment with saliva and mucus. From this moment, serious signs of the disease begin to appear. The causative agent releases waste products into the blood and provokes intoxication. Elderly people most often have an acute onset of coronavirus, and often no more than 1-2 days pass from the onset of the first symptoms to viral pneumonia [1, 14-16, 26]. The acute onset is characterized by a rapid deterioration of the condition, with severe, resistant fever with nocturnal chills, with a dry, choking cough [23–26].

The most typical for elderly patients is the variability of clinical manifestations, which is characterized from asymptomatic manifestations with a mild degree of damage to severe acute respiratory distress syndrome with a severe degree of damage with a high risk of death, the recovery process usually drags on for several weeks [1, 21, 26, 28].

The pathophysiological features of COVID-19 are that the SARS-CoV-2 virus enters target cells by interacting with angiotensin-converting enzyme 2 (ACE 2, ACE 2). The biological role of this membrane enzyme is the conversion of angiotensin I to angiotensin 1-9 and angiotensin II to angiotensin 1-7. In this case, not only the inactivation of angiotensin II occurs, but the formation of the angiotensin 1-7 peptide, which in itself has a lot of biological effects (vasodilation, increased diuresis, reduced oxidative stress, proliferation and fibrosis). ACE 2 is present in the tissues of the lungs, heart, kidneys, and brain [13, 15, 16, 19-22, 29]. This protein is fundamentally different from ACE, which converts angiotensin I to angiotensin II and is the target of a whole class of drugs - ACE inhibitors, widely used in the treatment of patients with arterial hypertension, heart failure, myocardial infarction, diabetes mellitus, so it is important to know that ACE 2 is not inhibited by drugs from the class of ACE inhibitors [20, 21, 27].

The literature describes data showing that the use of ACE inhibitors, angiotensin 2 receptor antagonists and mineralocorticoid receptor blockers can increase the expression of ACE2. Another important aspect is the high incidence in the elderly, arterial hypertension and diabetes mellitus turned out to be the most common comorbidities in individuals in whom COVID-19 - associated infection is more severe [6, 8, 9, 10, 15]. As you know, ACE inhibitors and ARA2 are very often prescribed to this particular group of patients. Summarizing this information, the idea arose of a possible adverse effect of ACE inhibitors and ARA2 [23, 25]. We emphasize once again that there is no evidence that taking ACE inhibitors or ARA2 increases the risk of infection with COVID-19, or its severe course, there is no. Moreover, there is evidence that ACE inhibitors improve the prognosis in patients with respiratory distress syndrome (data were obtained in patients suffering from influenza). The high frequency of hypertension and diabetes in patients with severe coronavirus infection may simply be due to the fact that the frequency of these diseases increases with age, and elderly and debilitated patients are significantly more likely to die from any infections [29]. Of course, epidemiological studies are needed to assess the relationship between arterial hypertension, taking ACE inhibitors, ARA2 and the course of coronavirus infection [16, 21, 23, 27, 29].

A factor of viral aggression is also acute myocardial/cardiac damage in COVID-19 . Cardiovascular disease can be diagnosed in 40% of patients who die from COVID-19 infection. Possible mechanisms include the following pathophysiological processes: a) involvement of ACE2 signaling pathways in the cascade of myocardial damage (decrease in ACE2 expression, dysregulation of the renin-angiotensin system); b) a pathological systemic inflammatory response, which is manifested by a "cytokine storm" caused by an imbalance in the response of type 1 and type 2 T-helper cells, which leads to multiple organ failure with damage primarily to the cardiovascular system; c) acute respiratory dysfunction with hypoxia of organs and tissues (oxidative stress, intracellular acidosis and damage to mitochondria), leading to damage to cardiomyocytes; d) an imbalance between increased metabolic needs and a decrease in myocardial reserve due to the death of cardiomyocytes; e) the risk of rupture of an existing atherosclerotic plaque due to virus-induced inflammation in the plaque area with the development of coronary blood flow disorders; f) the risk of thrombotic complications (eg, stent thrombosis) due to the procoagulant and prothrombogenic effects of systemic inflammation; g) microvascular damage due to hypoperfusion, increased vascular permeability, angiospasm, direct damaging effect of the virus on the endothelium of the coronary arteries [3, 4, 6, 10, 15, 23, 29].

Thus, a multi-linked lesion leads to the formation of both new cases of myocardial damage, including the development of fulminant myocarditis, and the destabilization of an existing chronic cardiovascular disease, leading to an aggravation of the latter [6, 8, 11, 15].

It is important to clearly understand the cause of the difficult situation. It is not clear whether the risk of cardiovascular complications persists in the long term. A 12-year follow-up of patients with a history of SARS-CoV infection demonstrated changes in lipid metabolism compared with patients without a history of this infection. Given that SARS-CoV-2 has a structure similar to SARS-CoV, this new virus may also cause metabolic disorders, which needs to be evaluated in the management of patients with COVID-19 [10, 16, 19, 23, 27, 30].

 Mortality is often determined by the involvement of other organs (eg lungs). An interdisciplinary approach is needed in the management of severe cases and long-term follow-up of recovered patients. Antiviral therapy-associated cardiotoxic damage to the heart in the treatment of COVID-19 has been discussed [30, 31].

Our further studies are devoted to the study of the features of the use of antiviral drugs and aspects of possible complications when using them, the need for regular monitoring of the risk of cardiotoxicity.

Thus: an important feature of the SARS-CoV-2 lesion of elderly patients is at least a twofold mechanism for the development of COVID-19 disease. First, one of the features is undoubtedly a highly probable virus-damaging effect with the development of de novo of acute viral infection with varying degrees of severity of the course and, accordingly, different outcomes from recovery to death. Therefore, it is important to carefully monitor patients who first contacted a doctor with complaints of palpitations and chest tightness, with an assessment of concomitant respiratory symptoms (fever and cough) and epidemiological history, etc. Secondly,

another feature is a virus-provoking exacerbation of a chronic disease, background of which, with a high probability due to the immunoconflict situation. In this case, both the aggravation of the course of the underlying disease and the distorted course of the inflammatory process caused by SARS-CoV-2 occur with a high probability of attaching a secondary bacterial flora and, undoubtedly, a very high risk of cardiovascular disability and mortality.

Also, as a conclusion, it should be noted that, given the importance of SARS-CoV-2 expression under the action of angiotensin-converting enzyme, drugs of classes of angiotensin-converting enzyme inhibitors, angiotensin 2 receptor antagonists are vital drugs that prolong life and protect against disabling complications. Unjustified withdrawal of drugs can lead to very serious consequences, on a scale potentially exceeding the risks associated with coronavirus infection.

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