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Guest Editorial

Consequences of Coronavirus Infection: Clinical Manifestations, Diagnosis and Treatment Tactics

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The zooanthropogenic virus SARS-CoV-2 was first identified in December 2019 as the causative agent of the dangerous infectious disease COVID-19. As we move away from the official dates of the pandemic in all countries of the world, new clinical data are accumulating on the numerous sufferings of patients who have suffered the acute stage of the infection. It is generally accepted that 20% of people may have residual long-term symptoms lasting up to 12 weeks, and 2.3% longer lasting, up to indefinitely [1]. Doctors began to actively use the terms "long COVID, post-acute sequelae of COVID-19 (or PASC), chronic COVID syndrome (or CCS), long-haul COVID" as consequences of coronavirus infection (COVID-19). Post-Covid syndrome is included in the International Classification of Diseases (ICD-10) under the heading code U09.9 "Condition after COVID-19, unspecified," which also includes the post-Covid condition. All stages of viral infection are divided into:

- Acute COVID-19 (symptoms lasting up to four weeks);
- Ongoing symptomatic COVID-19 (symptoms lasting 4 to 12 weeks);
- Post-Covid syndrome (symptoms and signs of the disease for more than 12 weeks, not explained by an alternative diagnosis, capable of changing over time, disappearing and reappearing, affecting many body systems). In addition to the above definitions, the clinical term "long COVID" has also been introduced, which includes a period of symptoms of four weeks or more. Some researchers consider post-Covid syndrome to be complications of cured COVID-19, and long-Covid to be a chronic persistence of the virus in the body.

Despite professional conclusions, people who had recovered from SARS-Cov-19 or its new strains began to actively engage in medical public activity, starting from the official date of the end of the pandemic (spring 2020), on social networks. Patients from many countries began to share experiences or useful tips for self-healing. Such activity was caused by ineffective treatment measures in patients who had long-term symptoms of damage to many organs and systems of the body, which they themselves associated with the consequences of a viral infection.

At present, there is no need to describe the clinical picture of the acute phase of the disease, since not all patients can detect it even when collecting anamnesis. It should only be noted that as we move away from the start of the pandemic, the emotional impressions of patients of different genders and ages are not the same. Some patients do not even remember the serious signs of the disease; they answer that "he had a fever, was only mildly ill, and was at home." By asking about long-term symptoms, you can identify the following signs of illness that occur in waves or last a long time [2]:

- Transient or constant weakness, a feeling of incomplete inspiration, shortness of breath with little physical exertion, irregular breathing, even episodes of sleep apnea, heaviness in the chest;
- Neurological dorsopathies and spondylopathies, transient stabbing joint pain in the arms and legs, more often constant pain in the interphalangeal joints, muscle pain;
- Headaches, prolonged loss of smell, distortion of the smell or taste of familiar types of food;
- Hair loss in the form of local alopecia, tooth loss, progression of dental caries;
- Vascular rashes on the skin, unexpected and unexplained bruises and petechiae on the skin of the arms and legs, capillary networks;
- Sudden and unexplained jumps in blood pressure and pulse, periods of arrhythmia, tachycardia (including orthostatic tachycardia), episodes of dizziness;
- Memory impairment, a feeling of fog or heaviness in the head, less commonly, episodes of disorientation in space, feelings of anxiety and even panic attacks;
- Gastrointestinal disorder in the form of diarrhea that occurs in waves and does not depend on the type of food or medication;
- Prolonged abnormal temperature from hypothermia to low-grade fever, or temperature fluctuations;
- in rare cases, Guillain-Barré syndrome;
- Other numerous and inexplicable symptoms to patients, which doctors define as nonspecific.

There is no clear and unambiguous clinical picture of post-Covid syndrome, since the set of symptoms varies widely among different patients. Some people who have recovered have long-term symptoms similar to those they experienced during infection, while others develop new symptoms. This variability is explained by individual premorbid background, damage to various organs, previous treatment and medical interventions. In 80% of cases, post-Covid syndrome is accompanied by attacks of severe weakness. Many patients literally cannot get out of bed and are unable to perform their usual daily physical activity. More than half of people suffering from post-Covid have had their normal rhythms of life disrupted: insomnia develops at night, daytime sleepiness bothers them, that is, there is a change in the rhythm of sleep and wakefulness. Unsteadiness of gait, diffuse myalgia, tremors of the limbs, difficulties with concentration and memory may also be observed. Neurological complications include spondylitis, myelitis, polyneuropathy and even ischemic strokes. About 45% of patients report increased sweating, periodic low-grade fever or hypothermia, and bouts of chills. Many patients are concerned about respiratory disorders: a feeling of chest congestion, bronchospasm, cough, lack of air. Dysregulation of blood pressure is accompanied by hypertensive crises (30%), less often - episodes of hypotension and orthostatic hypotension (15%), tachycardia. About 30% of patients report hair loss and a burning sensation in certain areas of the skin. About 20% complain of the appearance of nodules and pain along the veins, hemorrhagic rashes on the skin. In a quarter of those who have recovered from the disease, diarrhea persists or periodically recurs [3]. Women often experience irregularities in their menstrual cycles. In 75% of patients, the symptoms of post-Covid syndrome are wavy in nature, in a quarter they are constant. All these various ailments cause a significant decrease in the quality of daily life for at least six months. In the long term, the risk of thrombosis, thromboembolism, and sudden cardiac death is increased. The long-term consequences of coronavirus disease pose a threat to public health.

Pathogenetically, post-Covid syndrome can be associated with several processes: a) residual inflammation (convalescent phase); b) long-term persistence of SARS-CoV-2 in hidden foci (latent infection, like herpes or HIV).

According to current observations, patients in the following groups are most susceptible to developing post-Covid syndrome:

- Adult men and women over 50 years of age;
- Persons who have suffered a severe form of covid infection and prolonged ventilation;
- People with comorbid chronic diseases: arterial hypertension, heart failure, pulmonary pathology, obesity, Diabetes mellitus, autoimmune diseases of any kind. In most cases, it is not possible to identify a correlation between the severity of the acute clinical course of COVID-19 and the frequency and/or severity of post-Covid symptoms;
- People who have undergone complex treatment in intensive care units and intensive care units are especially affected. They may develop PIT - Post Intensive Care Syndrome or PICS - Post Intensive Care Syndrome. This refers to the totality of neurological and socio-psychological consequences of staying in an intensive care unit for more than 72 hours, reducing the quality of the patient's daily life and requiring rehabilitation.

All of the above symptoms and signs of the disease are closely related to complex pathogenesis. In the acute stage, the so-called cytokine storm is considered the main pathogenetic link. In most cases, its intensity exceeds the usual inflammatory reactions in similar diseases such as influenza or respiratory viral infection. But gradually SARS-Cov-2 exhibits pronounced neurotropic activity. During infection, its particles or waste products enter the nervous system through the olfactory receptors of the superior turbinate. Next, multi-organ effects occur: damage to brain structures, including the limbic system, hypothalamus, and cerebellum. The affected area includes the respiratory center and parts of the brain that regulate the release of hormones and cardiovascular reactions. A particularly wide variety of symptoms results from damage to the intracerebral nuclei and vagus nerve tracts. Circadian disturbances in the release of regulatory hormones determine the wave-like nature of the symptoms that arise. The main role in the dynamics of all signs of the disease is played by the imbalance of two systems - parasympathetic and sympathetic. Moreover, there is a predominance of damage to the sympathetic department of the autonomic nervous system. This leads to disturbances in the frequency of heart impulses, orthostatic tachycardia, sleep disturbances, episodes of panic attacks, and anxiety disorders. By acting on receptors that are involved in regulating blood pressure, the virus causes a bradykinin storm. The vessels dilate and become more permeable, plasma accumulates in the tissues, causing swelling and acting on nociceptors, which causes widespread pain. Viruses or their waste products infect the vascular endothelium, which leads to spontaneous hypercoagulation [4]. As a new name for severe pulmonary coronavirus disease COVID-19, the current proposal is to use the term MicroCLOTS (microvascular COVID-19 lung vessels obstructive thromboinflammatory syndrome). Microthrombosis of the intrinsic vessels of the walls of arterioles disrupts the functioning of richly vascularized organs, such as the heart muscle, endocrine glands (thyroid gland, adrenal glands, pituitary gland, gonads and kidneys). Hence, inflammation of the structures of the heart muscle (endocarditis, myocarditis) and ischemic focal lesions in the brain are frequent. The effect of the virus on blood vessels is not limited to endotheliitis (inflammation of the endothelium) and vasculitis. Numerous affected areas may include monocytes isolated from the peripheral blood of patients and macrophages. Moreover, the SARS-Cov-19 virus can replicate in certain types of lymphocytes, such as CD4+. All these data indicate that there is a material prerequisite for the long-term persistence of the virus in the human body. It is possible that processes similar to antiphospholipid syndrome contribute to the pathogenesis of disease complications. This is due to the fact that the virus, multiplying in many tissues and organs, uses phospholipids of the host body to build its shell. This mimicry helps viral particles enter immune cells using the "ADE" (antibody-dependent enhancement of infection) principle.

Diagnosis of post-Covid syndrome is largely subjective and is based mainly on the varied complaints of patients. Therefore, the clinical picture of all identified deviations according to the clear rules of propaedeutic medicine is considered important. Depending on the prevailing symptoms, patients may come to the attention of doctors of various specialties: general practitioner, internist, pulmonologist, cardiologist, neurologist and even psychiatrist. Most often, the inflammatory process is detected in lung tissue (parenchyma, interstitium,

bronchioles). To confirm that you have had COVID-19 (if it has not been previously verified in a laboratory), you should obtain the results of an analysis for antibodies to SARS-CoV-2. In order to assess residual inflammatory changes, a complete blood count, erythrocyte sedimentation rate, C-reactive protein level, and plasma procalcitonin concentration are examined. To identify coagulation disorders, indicators of D-dimer and fibrinogen are important. It is also important to determine the level of soluble fibrin-monomer complexes, a marker of specific thrombinemia. For long-term complaints from patients with the heart and blood vessels, it is necessary to analyze the electrocardiogram, blood pressure monitoring, and echocardiography. If symptoms of respiratory dysfunction predominate, it is advisable to determine spirometry parameters and, if indicated, examine the lung structures using computed tomography.

Official protocols for the treatment of post-Covid syndrome have not yet been published, so treatment in most cases is symptomatic. In Russia, detailed guidelines have been published on all aspects of the clinical picture, diagnosis and treatment of Long COVID infection [5]. Algorithms for diagnosis and treatment are presented for training doctors and practical use in clinical work [6]. Post-COVID syndrome should be considered a multisystem disorder, as a result of which therapy is individualized from the perspective of an interdisciplinary approach. Anti-inflammatory drugs (non-steroidal drugs, paracetamol or prednisolone) are considered mandatory. Against the background of their action, it is recommended to use direct-acting antiviral drugs favipiravir and riamilovir. In patients with confirmed persistence of the virus, enisamium iodide, azokimer bromide, imidazolylethaniamide pentanedic acid or hydroxyethylammonium methylphenoxyacetate have been proposed as an antiviral and immunomodulatory drug. At all stages of treatment, it is necessary to monitor blood coagulation systems and, if necessary, prescribe anticoagulants. You should avoid triggers that can provoke exacerbations of post-Covid symptoms: significant physical activity, overwork, stressful situations, insolation. Also, all those who have been ill should refrain from any routine immunization for six months.

Since SARS-CoV-2 has a direct damaging effect, supporting inflammation and disrupting the anticoagulant properties of the endothelium, it is advisable to use reactive oxygen species in the form of infusion ozone therapy. To illustrate methods of effective therapy, we can cite our own therapeutic experience [7]. We observed 18 patients (12 men and 6 women). Some patients received anti-inflammatory drugs at the beginning of therapy (pure paracetamol or in official combinations, trekrezan at a dose of 0.5 per day or isoprinosine 0.5). Also, in four cases, prednisolone was prescribed at a dose of 20-30 mg per day for 7-8 days. But ultimately they were treated with ozone infusion therapy. To obtain gaseous ozone, an oxygen generator and a domestic Russian device from Nizhny Novgorod “Medozons Beauty” were used. The main course of treatment consisted of 5-6-7 sessions of low-flow (with a concentration of 0.8-1.2 μg/l of ozone gas) drip intravenous infusions (in 200 ml of saline solution) of an ozone-oxygen mixture, carried out after 1 - 2 days. At the same time, mucolytics (acetylcysteine or fluimucil) were prescribed daily. The use of infusion ozone therapy was most effective compared to other treatment approaches. These sessions were easily tolerated by patients with the appearance of a feeling of complete (“I am healthy”) restoration of health and elimination of all manifestations of the inflammatory process. When comparing the effectiveness of therapy for treating patients with post-Covid inflammation, it should be noted:

1. The use of non-steroidal anti-inflammatory drugs (amelotex, movalis, meloxicam or nise) had a clinical anti-inflammatory effect, but was often accompanied by negative manifestations from the gastrointestinal tract.
2. Treatment with short courses of prednisolone led to a pronounced therapeutic effect, allowed to restore satisfactory well-being of the patients, but required additional correction of the manifestations of bronchial inflammation.
3. The use of a course of infusion ozone therapy ensures rapid and complete rehabilitation of patients with the elimination of complaints and excellent clinical effect.

The full story of the emergence and development of the SARS-COV-19 pandemic is still far from over. It is quite possible that future years will bring even more significant observations on the mutations of this man-made virus and advances in world medicine to combat its active introduction into the human population.

Bibliography

1. Sudre CH., *et al*. "Attributes and predictors of Long-COVID: analysis of COVID cases and their symptoms collected by the Covid Symptoms Study App". medRxiv (2020).

2. Subramanian A., *et al*. "Symptoms and risk factors for long COVID in non-hospitalized adults". *Nature Medicine* 28.8 (2022): 1706-1714.

3. Liang W., *et al*. "Diarrhoea may be underestimated: a missing link in 2019 novel coronavirus". *Gut* 69.6 (2020): 1141-1143.

4. Thachill J., *et al*. "ISTH interim guidance on recognition and management of coagulopathing in COVID-19". *Journal of Thrombosis and Haemostasis* 18.5 (2020): 1023-1026.

5. Methodological recommendations. "Features of the course of Long-COVID infection. Therapeutic and rehabilitation measures". *Therapy* 1 (2022): 1-147.

6. Algorithms for diagnosis and treatment. "Management of patients with long-COVID and post-Covid complications (including antiviral/immunomodulatory therapy". *Therapy* 9.4S (2023): 34-50.

7. Katyukhin VN. "Experience in the Treatment of Postcovid Inflammation in Adults". *EC Clinical and Medical Case Reports* 6.2 (2023): 29-30.

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