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CLINICAL ASPECTS OF A NEW CORONAVIRUS INFECTION (COVID-19)

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Resume. The appearance of COVID-19 has set tasks for healthcare professionals related to the rapid diagnosis and provision of medical care to patients. Currently, information about the epidemiology, clinical features, prevention and treatment of this disease is limited. It is known that the most common clinical manifestation of a new variant of coronavirus infection is bilateral pneumonia, in 3-4% of patients the development of acute respiratory distress syndrome (ARDS) was registered.

Keywords: SARS-CoV, Coronaviridae family, angiotensin converting enzyme type II (ACE2), pulse oximetry.

КЛИНИЧЕСКИЕ АСПЕКТЫ НОВОЙ КОРОНАВИРУСНОЙ ИНФЕКЦИИ (COVID-19)

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Резюме. Появление COVID-19 поставило перед специалистами здравоохранения задачи, связанные с быстрой диагностикой и оказанием медицинской помощи больным. В настоящее время сведения об эпидемиологии, клинических особенностях, профилактике и лечении этого заболевания ограничены. Известно, что наиболее распространенным клиническим проявлением нового варианта коронавирусной инфекции является двусторонняя пневмония, у 3 - 4% пациентов зарегистрировано развитие острого респираторного дистресс-синдрома (ОРДС).

Ключевые слова: SARS-CoV, семейства Coronaviridae, ангиотензинпревращающий фермент II типа (ACE 2), пульсоксиметрия.

Coronaviruses (Coronaviridae) are a large family of RNA-containing viruses capable of infecting humans and some animals. In humans, coronaviruses can cause a number of diseases - from mild forms of acute respiratory infection to severe acute respiratory syndrome (SARS). Currently, it is known about the circulation among the population of four coronaviruses (HCoV-229E, -OC43, -NL63 and -HKU1), which are present year-round in the structure of ARVI, and, as a rule, cause damage to the upper respiratory tract of mild and moderate severity.

According to the results of serological and phylogenetic analysis, coronaviruses are divided into four genera: Alphacoronavirus, Betacoronavirus, Gammacoronavirus

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and Deltacoronavirus. The natural hosts of most of the currently known coronaviruses are mammals.

Until 2002, coronaviruses were considered as agents causing mild upper respiratory tract diseases (with extremely rare deaths). At the end of 2002, coronavirus (SARS-CoV) appeared, the causative agent of SARS, which caused SARS in humans. This virus belongs to the genus Betacoronavirus. The natural reservoir of SARS-CoV is bats, intermediate hosts are camels and Himalayan civets. In total, during the epidemic period, more than 8000 cases were registered in 37 countries around the world, of which 774 were fatal. Since 2004 No new cases of SARS caused by SARSCoV have been reported.

In 2012, the world faced a new coronavirus MERS (MERS-CoV), the causative agent of the Middle East respiratory syndrome, also belonging to the genus Betacoronavirus. The main natural reservoir of MERS-CoV coronaviruses are single-humped camels (dromedaries). From 2012 to January 31, 2020, 2,519 cases of coronavirus infection caused by the MERS-CoV virus were registered, of which 866 were fatal. All cases of the disease are geographically associated with the Arabian Peninsula (82% of cases are registered in Saudi Arabia). At the moment, MERS-CoV continues to circulate and cause new cases of the disease.

The new coronavirus SARS-CoV-2 is a single-stranded RNA-containing virus, belongs to the Coronaviridae family, belongs to the Beta-CoV B lineage. The virus is assigned to group II pathogenicity, as are some other representatives of this family (SARS-CoV virus, MERS-CoV).

The SARS-CoV-2 coronavirus is presumably a recombinant virus between a bat coronavirus and an unknown coronavirus. The genetic sequence of SARSCoV-2 is similar to the sequence of SARS-CoV by at least 79%.

The entrance gate of the pathogen is the epithelium of the upper respiratory tract and epithelial cells of the stomach and intestines. The initial stage of infection is the penetration of SARS-CoV-2 into target cells having type II angiotensin converting enzyme (ACE2) receptors. ACE2 receptors are present on the cells of the respiratory tract, kidneys, esophagus, bladder, ileum, heart, and central nervous system. However, the main and quickly achievable target is alveolar cells of type II (AT2) of the lungs, which determines the development of pneumonia. The role of CD147 in the invasion of SARS-CoV-2 cells is also discussed.

It has been established that the dissemination of SARS-CoV-2 from the systemic bloodstream or through the Lamina cribrosa (Lamina cribrosa) can lead to brain damage. A change in the sense of smell (hyposmia) in a patient at an early stage of the disease may indicate both a central nervous system lesion and swelling of the nasopharyngeal mucosa.

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Many aspects of the pathogenesis of coronavirus infection need further comprehensive study.

EPIDEMIOLOGICAL CHARACTERISTICS

The main source of infection is a sick person, including those who are in the incubation period of the disease.

Transmission of infection is carried out by airborne droplets, airborne dust and contact routes. The leading route of transmission of SARS-CoV-2 is airborne, which is realized when coughing, sneezing and talking at a close (less than 2 meters) distance. The contact route of transmission is carried out during handshakes and other types of direct contact with an infected person, as well as through food products, surfaces and objects contaminated with the virus. It is known that at room temperature, SARS-CoV-2 is able to maintain viability at various environmental objects for 3 days.

According to available scientific data, a fecal-oral mechanism of transmission of the virus is possible. SARS-CoV-2 RNA was detected in the study of fecal samples of patients. The nucleocapsid protein COVID-19 was found in the cytoplasm of epithelial cells of the salivary glands, stomach, duodenum and rectum, urinary tract. The role of COVID-19 as an infection associated with the provision of medical care has been established.

CLINICAL FEATURES OF CORONAVIRUS INFECTION

The incubation period is from 2 to 14 days, on average 5-7 days.

COVID-19 is characterized by the presence of clinical symptoms of acute respiratory viral infection:

- increase in body temperature (> 90%);
- cough (dry or with a small amount of sputum) in 80% of cases;
- shortness of breath (55%);
- fatigue (44%);
- feeling of congestion in the chest (> 20%).

There may also be sore throat, runny nose, decreased sense of smell and taste, signs of conjunctivitis.

The most severe shortness of breath develops by the 6th - 8th day from the moment of infection. It was also found that among the first symptoms may be myalgia (11%), confusion (9%), headaches (8%), hemoptysis (5%), diarrhea (3%), nausea, vomiting, palpitations. These symptoms at the onset of infection can also be observed in the absence of an increase in body temperature.

Clinical variants and manifestations of COVID-19:

- Acute respiratory viral infection (affecting only the upper respiratory tract);
- Pneumonia without respiratory failure;
- Pneumonia with ONE;

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- ARDS;
- Sepsis;
- Septic (infectious-toxic) shock;
- Thrombosis;
- Thromboembolism.

Hypoxemia (SpO2 reduction of less than 88%) develops in more than 30% of patients.

In 80% of patients, the disease occurs in a mild form of ARVI. The average age of patients in the PRC is 51 years, the most severe forms developed in elderly patients (60 years or more), such concomitant diseases as diabetes mellitus (in 20%), arterial hypertension (in 15%), and other cardiovascular diseases (15%) are often noted among sick patients.

Twenty percent of confirmed cases of the disease registered in the PRC were classified by the PRC health authorities as severe (15% of severe patients, 5% in critical condition). In severe cases, rapidly progressive lower respiratory tract disease, pneumonia, ODN, ARDS, sepsis and septic shock were often observed. In Wuhan, almost all patients with a severe course of the disease have progressive ODN: pneumonia is diagnosed in 100% of patients, and ARDS - in more than 90% of patients.

DIAGNOSIS OF CORONAVIRUS INFECTION

In the presence of factors indicating a case suspected of a coronavirus infection caused by SARS-CoV-2, patients, regardless of the type of medical care, undergo a complex clinical examination to determine the severity of the condition, including anamnesis collection, physical examination, examination of diagnostic material using nucleic acid amplification methods, pulse oximetry.

Based on the results of the conducted complex of clinical examination, the issue of the type of medical care and the amount of additional examination is being resolved. The diagnosis is established on the basis of a clinical examination, epidemiological history and laboratory results.

1. Detailed assessment of all complaints, medical history, epidemiological history.

When collecting an epidemiological history, the presence of foreign trips is established 14 days before the first symptoms, as well as the presence of close contacts over the past 14 days with persons suspected of being infected with SARS-CoV-2, or persons whose diagnosis has been confirmed in the laboratory.

2. Physical examination with the establishment of the severity of the patient's condition, necessarily including:

- assessment of the visible mucous membranes of the upper respiratory tract,
- auscultation and percussion of the lungs,
- palpation of lymph nodes,

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- examination of the abdominal organs with the determination of the size of the liver and spleen,
- thermometry,
- assessment of the level of consciousness,
- measurement of heart rate, blood pressure, frequency of respiratory movements.
- pulse oximetry with SpO2 measurement to detect respiratory failure and assess the severity of hypoxemia.

3. Laboratory diagnostics etiological:

- detection of SARS-CoV-2 RNA using nucleic acid amplification methods (information is provided in Section 4.2). Instructions for conducting etiological laboratory diagnostics of coronavirus infection are provided in Appendix 3.

4. General laboratory diagnostics:

General (clinical) blood test with determination of the level of erythrocytes, hematocrit, leukocytes, platelets, leukocyte formula.

Biochemical blood analysis (urea, creatinine, electrolytes, liver enzymes, bilirubin, glucose, albumin, lactate, lactate dehydrogenase troponin, ferritin). Biochemical blood analysis does not provide any specific information, but detectable abnormalities may indicate the presence of organ dysfunction, decompensation of concomitant diseases and the development of complications, have a certain prognostic value, influence the choice of drugs and / or their dosage regimen.

The study of the level of CRP in the blood serum. The level of CRP correlates with the severity of the course, the prevalence of inflammatory infiltration and the prognosis for pneumonia.

5. General instrumental diagnostics:

Pulse oximetry with SpO2 measurement to detect respiratory failure and assess the severity of hypoxemia. Pulse oximetry is a simple and reliable screening method that allows identifying patients with hypoxemia who need respiratory support and evaluating its effectiveness.

Patients with signs of acute respiratory failure (ODN) (SP2 less than 90%) are recommended to study arterial blood gases with the determination of PaO2, PaCO2, pH, bicarbonates, lactate.

Patients with signs of ODN are recommended to perform a coagulogram with the determination of prothrombin time, fibrinogen, D-dimer and activated partial thromboplastin time (APTT).

Radiation diagnostic methods are used to detect COVID-19 pneumonia, its complications, differential diagnosis with other lung diseases, as well as to determine the severity and dynamics of changes, and to evaluate the effectiveness of therapy.

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Radiation methods are also necessary to identify and assess the nature of pathological changes in other anatomical areas and as a means of control for invasive (interventional) medical interventions.

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