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A CASE OF EFFECTIVE TREATMENT OF A PATIENT WITH COVID-19 COMPLICATED BY BILATERAL PNEUMONIA WITH DAMAGE TO MORE THAN 60% OF THE LUNG TISSUE AGAINST A BACKGROUND OF SEVERE CARDIOVASCULAR PATHOLOGY

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ABSTRACT

Introduction. COVID-19 is a disease caused by a new coronavirus called SARS-CoV-2. WHO first became aware of this new WHO virus on 31 December 2019, when a cluster of viral pneumonia cases were reported in Wuhan, People's Republic of China.

About 15% of patients develop a serious form of the disease, which requires oxygen therapy, and 5% - an extremely severe form that requires treatment in an intensive care unit.

Fatal complications can occur, including respiratory failure, acute respiratory distress syndrome (ARDS), sepsis and septic shock, thromboembolism, and / or multiple organ failure, including heart, liver, or kidney damage. People aged 60 and over are at risk for severe disease, as well as people with underlying health conditions such as high blood pressure, heart and lung disease, diabetes, obesity, or cancer.

However, the risk of contracting COVID-19 and severe illness or death affects everyone and is present in all age groups.

Methods. The patient, a man of 60 years old, in his youth suffered from rheumatism with rheumatoid myocarditis, which developed later, suffers from arrhythmia with atrial fibrillation, and 8 months ago he underwent cardioversion-defibrillation with direct current and catheter ablation. Hospitalized with Covid-19, which was complicated by bilateral pneumonia affecting more than 60% of lung tissue, as confirmed by computed tomography, saturation average 92.

With tachyarrhythmia's arising from additional conduction pathways or ectopic foci of automatism, the lesion can be purposefully destroyed (removed) for the effectiveness of treatment. Prior to the application of energy, the ablation zones should be noted during the electrophysiological examination.

Ablation efficiency is> 90% for reciprocal supraventricular tachycardia's (atrioventricular [AV] - nodal or involving additional conduction pathways), focal atrial tachycardia's, atrial flutter, focal idiopathic ventricular tachycardia's (VT from the outlet tract of the right ventricular septum or along the legs of the bundle of His).

Since atrial fibrillation (AF) is most often caused and / or maintained by arrhythmogenic zones in the pulmonary veins, this source can be electrically isolated by circumferential ablation of the pulmonary veins or in the left atrium.

Transcatheter ablation is safe; the risk of death is higher with complex procedures. Mortality is <1/2000 with non-complex ablation procedures, but can be as high as 1/500 with pulmonary vein isolation during ablation for patients with atrial fibrillation or ventricular tachycardia.

Complications include heart valve damage, pulmonary venous stenosis or occlusion (in the treatment of AF), stroke or other embolic complications, cardiac perforation, tamponade (1%), and unintentional ablation of the AV junction. The patient's operation was complicated by heart perforation.

Results. Treatment of complications of Covid-19 for 7 days in the Department of Anesthesiology and Intensive Care with complex oxygen therapy, antibiotic therapy, cardiac drugs and hormones led to effective results and patient recovery.

Keywords: *Covid-19, Complication, Treatment.*

1. INTRODUCTION

COVID-19 is a disease caused by a new coronavirus called SARS-CoV-2. WHO first became aware of this new WHO virus on 31 December 2019, when a cluster of viral pneumonia cases were reported in Wuhan, People's Republic of China.

About 15% of patients develop a serious form of the disease, which requires oxygen therapy, and 5% - an extremely severe form that requires treatment in an intensive care unit.

Fatal complications can occur, including respiratory failure, acute respiratory distress syndrome (ARDS), sepsis and septic shock, thromboembolism, and / or multiple organ failure, including heart, liver, or kidney damage. People aged 60 and over are at risk for severe disease, as well as people with underlying health conditions such as high blood pressure, heart and lung disease, diabetes, obesity, or cancer.

However, the risk of contracting COVID-19 and severe illness or death affects everyone and is present in all age groups.

In the pathogenesis of COVID-19, without a doubt, defeat plays a crucial role microcirculatory bed, the genesis of which requires further study, but the most direct viral damage seems likely. COVID-19 is characterized by a pronounced plethora of capillaries of interalveolar septa, as well as branches of pulmonary arteries and veins, with erythrocyte sludge, fresh fibrinous and organizing blood clots; intrabronchial, intrabronchiolar and intraalveolar hemorrhages, which are a substrate for hemoptysis, as well as perivascular hemorrhage. Expressed alveolar-hemorrhagic syndrome is typical for most cases, up to formation, in fact, hemorrhagic heart attacks (although true hemorrhagic heart attacks are not uncommon). It is important to distinguish blood clots in the lungs from thromboemboly, since

Pulmonary embolism (PE) is also common in COVID-19. Pulmonary thrombosis arteries sometimes progresses to the right heart, thrombosis of arteries of various organs with development of their heart attacks (myocardium, brain, intestines, kidneys, spleen). This distinguishes changes in the lungs with COVID-19 from those previously observed with influenza A / H1N1. Despite severe hemorrhagic syndrome, significant deposits of hemosiderin are not observed.

The described lung lesions are the cause of death without attaching a bacterial or mycotic superinfection.

2. METHODS

The patient, a man of 60 years old, in his youth suffered from rheumatism with rheumatoid myocarditis, which developed later, suffers from arrhythmia with atrial fibrillation, and 8 months ago he underwent cardioversion-defibrillation with direct current and catheter ablation. Hospitalized with Covid-19, which was complicated by bilateral pneumonia affecting more than 60% of lung tissue, as confirmed by computed tomography, saturation average 92.

With tachyarrhythmia's arising from additional conduction pathways or ectopic foci of automatism, the lesion can be purposefully destroyed (removed) for the effectiveness of treatment. Prior to the application of energy, the ablation zones should be noted during the electrophysiological examination. [1].

Ablation efficiency is> 90% for reciprocal supraventricular tachycardia's (atrioventricular [AV] - nodal or involving additional conduction pathways), focal atrial tachycardia's, atrial flutter, focal idiopathic ventricular tachycardia's (VT from the outlet tract of the right ventricular septum or along the legs of the bundle of His).

Since atrial fibrillation (AF) is most often caused and / or maintained by arrhythmogenic zones in the pulmonary veins, this source can be electrically isolated by circumferential ablation of the pulmonary veins or in the left atrium.

Transcatheter ablation is safe; the risk of death is higher with complex procedures. Mortality is <1/2000 with non-complex ablation procedures, but can be as high as 1/500 with pulmonary vein isolation during ablation for patients with atrial fibrillation or ventricular tachycardia.

Complications include heart valve damage, pulmonary venous stenosis or occlusion (in the treatment of AF), stroke or other embolic complications, cardiac perforation, tamponade (1%), and unintentional ablation of the AV junction. The patient's operation was complicated by heart perforation.

Extremely severe course:

- Acute respiratory failure with the need for respiratory support (invasive ventilation)

- Septic shock

- Multiple organ failure

- Changes in the lungs on CT (X-ray), typical of a viral lesion critical degree (the volume of the lesion is significant or subtotal; CT scan 4) or a picture of ARDS. [2].

On average, 50% of those infected are asymptomatic. In 80% of patients with the presence of clinical symptoms, the disease proceeds in a mild form of ARVI. Twenty percent of confirmed cases

reported were classified by health authorities as severe (15% of critically ill, 5% in critical condition). The average age of patients was 51 years, the most severe forms developed in elderly patients (60 years or more), among sick patients comorbidities such as diabetes mellitus (in 20%), arterial hypertension (15%), other cardiovascular diseases (15%).

Algorithm for examining a patient with suspected COVID-19.

If there are factors indicating a suspected case of coronavirus infection caused by SARS-CoV-2, to patients regardless of the type of medical help, a complex clinical examination is carried out to determine the severity conditions, including taking anamnesis, physical examination, diagnostic material using nucleic acid amplification methods, pulse oximetry.

Based on the results of the complex of clinical examination, the issue of the type of medical care and the amount of additional examination. Diagnosis established on the basis of clinical examination, data from the epidemiological history and the results of laboratory tests. [3].

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

When collecting an epidemiological history, the presence of foreign trips for 14 days before the first symptoms, as well as the presence of close contacts in the last 14 days with persons suspected of being infected with SARS-CoV-2, or persons diagnosed with COVID-19

laboratory confirmed.

2. Physical examination to determine the severity of the patient's condition, necessarily including:

- Assessment of the visible mucous membranes of the upper respiratory tract, - auscultation and lung percussion,

- Palpation of lymph nodes,

- 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, respiratory rate movements.

- Pulseoximetry with measurement SpO2 to detect respiratory distress and assessing the severity of hypoxemia.

Laboratory diagnostics etiological:

- Detection of SARS-CoV-2 RNA using nucleic acid amplification methods.

- Identification of class M and class G immunoglobulins to SARS-CoV-2.

General laboratory diagnostics (additional):

The volume, timing and frequency of laboratory tests depend on the severity diseases. An easy course of the disease with observation of the patient on an outpatient basis is not requires additional laboratory tests. In case of hospitalization for moderate, severe and extremely severe course, the following must be performed research:

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

Biochemical blood test (urea, creatinine, electrolytes, glucose, alanine aminotransferase, aspartate aminotransferase, bilirubin, albumin, lactate, lactate dehydrogenase, troponin, ferritin, procalcitonin, brain sodium uretic peptide - NT-proBNP / BNP). A biochemical blood test does not provide any specific information, but detected abnormalities may indicate the presence of organ dysfunction, decompensation of concomitant diseases and the development of complications, have a certain predictive value, influence the choice of drugs and / or their regimen dosing. [4].

C-reactive protein (CRP) is the main laboratory marker of process activity in the lungs. Its increase correlates with the volume of lung tissue damage and is the basis to start anti-inflammatory therapy.

Procalcitonin for coronavirus infection with respiratory tract damage lungs is within reference values. Increased procalcitonin indicates the addition of a bacterial infection and correlates with the severity of the course, the prevalence of inflammatory infiltration and the prognosis for bacterial complications.

Coagulogram in volume: activated partial thromboplastin time (APTT), prothrombin time (prothrombin ratio and% prothrombin according to Quick), fibrinogen, D-dimer (by quantitative method).

Intensive care for acute respiratory failure is one of the most common complications of COVID-19. In patients with severe and extremely severe course (10-15%), after the 5th day of illness, fever persists, symptoms of respiratory failure appear, infiltrative changes in the lungs (viral pneumonia), ARDS progress. Even with a mild course of COVID-19, most patients with CT of the lungs show infiltrative changes. So, SARS-CoV-2 was detected in nasopharyngeal swabs in 59% of patients, and infiltrative changes on CT of the lungs - in 88% of patients with probable COVID-19.

Features of viral pneumonia and ARDS in COVID-19 ARDS in COVID-19 is diagnosed on average on the 8th day from the onset of the disease, upon admission to the ICU, the frequency of ARDS is about 60%, the PaO2 / FiO2 index is 136 (103-234) mm Hg. Art. In ARDS due to COVID-19, two variants of lung lesions are described: - Low-revolving lungs (viral pneumonia, often an earlier stage):

normal or slightly reduced compliance, on CT only frosted glass areas located subpleurally and along the interlobar fissures, low lung recruitment. A step-by-step approach is shown:

1 step – at SpO2 <92% start a regular O2 therapy (through a face mask or nasal cannulas, preferably a mask with a disposable bag) flow up to 15 l / min up to SpO2 96-98%; at patients with concomitant diseases - COPD, chronic heart failure - instead of step 1, you should go directly to step 2.

2 step - if step 1 is ineffective - pron-position for at least 12-16 hours per day with high-flow oxygenation (HPO, it is recommended to wear a protective mask on the patient!) flow of 30-60 l / min or non-invasive ventilation (NIV: Pressure Support, S, S / T, BIPAP) in mode CPAP 7-10 cm of water column (see clinical guidelines PAR "Use of non-invasive ventilation lungs ");

Step 3 - while maintaining hypoxemia (SpO2 <92%) , signs of increased work breathing (participation of auxiliary muscles, frequent deep breathing), patient fatigue, impaired consciousness, unstable dynamics, the appearance of pressure "dips" of 2 cm or more water column below the CPAP level against the background of step 2, tracheal intubation and invasive ventilation in combined with pron-position. It is important that an isolated increase in RR up to 30-35 / min at the absence of the above signs is not an indication for tracheal intubation. When failure of step 2 in COVID-19 patients delayed intubation is not recommended trachea and initiation of mechanical ventilation, as delaying tracheal intubation worsens the prognosis! It is important to remember that respiratory failure can progress extremely quickly. [5].

The use of NIV is recommended only under the following conditions: preservation of consciousness, stable hemodynamics, and the ability to collaborate with staff, no claustrophobia (when using helmets) and maintaining the mechanism of coughing up sputum.

Non-invasive respiratory support is not recommended for:

- Lack of spontaneous breathing (apnea);

- Unstable hemodynamics (hypotension, ischemia or myocardial infarction, life-threatening arrhythmia, uncontrolled arterial hypertension);

- Failure to provide airway protection (impaired coughing and swallowing) and high risk of aspiration;

- Excessive bronchial secretion;

- Signs of impaired consciousness (agitation or depression of consciousness), inability patient to cooperation;

- Injury or burns to the face, anatomical defects that prevent the installation of the mask;

- Patient's inability to remove the mask from the face in case of vomiting;

- Active bleeding from the gastrointestinal tract;

- Obstruction of the upper respiratory tract;

- Discomfort from the mask.

Therapy with helium-oxygen gas mixtures the efficiency of the heated oxygen-helium mixture is currently being studied heliox (70% helium / 30% oxygen) in complex intensive care of patients at primary stages of hypoxemia in COVID-19 to improve aeration of areas of the lungs with impaired bronchial patency.

Therapy with helium-oxygen gas mixtures is carried out using special devices that ensure effective and safe inhalation of thermal helium-oxygen mixture, allowing you to change the percentage of helium and oxygen, and also temperatures at any time during one procedure. The device allows create a homogeneous helium-oxygen mixture, change and monitor many times the percentage of helium and oxygen, the temperature of the inhaled gas mixture during one procedure in order to determine the most effective regimen for each patient, ensure during the procedure that the actual composition of helium, oxygen and temperature to the set parameters, monitor the required parameters during the procedure (tidal volume, respiratory rate, saturation, form a uniform laminar flow gas mixture, deliver the necessary pharmaceuticals through a nebulizer built into the respiratory circuit.

It should be noted that this therapy limits the impossibility of creating FiO2 above 30%, since helium therapy is effective only at concentrations exceeding 70%.

3. RESULTS

Treatment of complications of Covid-19 for 7 days in the Department of Anesthesiology and Intensive Care with complex oxygen therapy, antibiotic therapy, cardiac drugs and hormones led to effective results and patient recovery.

4. CONCLUSION

Monitoring the examination and methods of treatment of this patient allows us to recommend complex therapy, including in a Department of Anesthesiology and Intensive Care, for use in patients with COVID-19 complicated by bilateral pneumonia with damage to more than 60% of the lung tissue against a background of severe cardiovascular pathology.

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