CHOICE OF RESPIRATORY THERAPY IN SEVERE PATIENTS WITH NEW CORONAVIRUS INFECTION COVID-19

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Abstract: *the respiratory problems of pneumonia and acute respiratory distress syndrome (ARDS) caused by COVID-19 coronavirus infection have not yet been fully resolved. World medicine has extensive experience in the use of nasal tube oxygen therapy, high-flow oxygen therapy (HFOT), non-invasive pulmonary ventilation (NIPV) and invasive pulmonary ventilation (IPV) in patients. However, the problem of choosing non-invasive pulmonary ventilation or invasive pulmonary ventilation in patients has not been fully resolved. This is because the effectiveness of non-invasive pulmonary ventilation is higher than that of invasive pulmonary ventilation, which prevents the solution of this problem. Below we attempt to shed more light on the selection of an effective method of respiratory therapy based on simple respiratory indications. To study the choice of respiratory therapy in severe patients with new coronavirus infection COVID-19.*

Keywords: *oxygen therapy, high flow oxygen therapy, non-invasive pulmonary ventilation, invasive pulmonary ventilation, tracheostomy.*

The study of the mechanisms for the development of hypoxemia in COVID-19 continues, one of the main of which is vascular thrombosis associated with damage to the endothelium, which leads to a decrease in blood circulation, the development of alveolar atelectasis. If the disease is stable, the target saturation values (SaO2) should be above 90%. In the course of the disease with severe respiratory distress, the target saturation value should be higher than 94%. In this case, oxygen therapy through nasal tubes or masks is usually not effective enough, it is preferable to ventilate with positive pressure using high-flow oxygen therapy or a non-invasive Ventura mask [1]. According to available data, up to 20% of patients with severe coronavirus 2 (SARS-Cov-2) acute respiratory syndrome require hospitalization [2 - 10]. Patients with COVID-19 receive supportive oxygen therapy (i.e., at a flow rate of up to 6 l / min) through nasal tubes or a Ventura mask. Data on the aerosolization of microorganisms during low-flow oxygen therapy are not currently available, but this can be assumed to be minimal. Oxygen therapy with high flow (i.e. up to 10-20 l / min) can be performed through a simple face mask, a Ventura mask, or a non-return mask. However, as the flow increases, the risk of the spread of viruses also increases, and therefore there is a risk of contamination of buildings and personnel [11 - 13]. Considering the toxicity of oxygen at a concentration of more than 60%, a 40-60% oxygenated air mixture is used for long-term oxygen therapy [1]. In another study, a comparative analysis of gas content disturbances in patients with acute respiratory failure (ARF) receiving NIPV in CPAP and DUAL-LEVEL regimens showed that patients had a decrease in blood gas levels and SaO2 in the initial cases. The CPAP and DUAL-LEVEL regimens showed improved blood oxygenation in patients after treatment with conventional therapy in combination with NIPV, but when comparing the two regimens, the DUAL-LEVEL regimen was found to be more effective than the CPAP regimen [14]. If non-invasive ventilation is ineffective, timely tracheal intubation and invasive (artificial) ventilation of the lungs are required [1]. It should be noted that the lack of adequate sanitation during the transmission of SAV through the intubation tube is likely to lead to the development of secondary foci of infection due to severe changes in the microflora of the oral cavity, nasal cavity, pathogenic microflora [15].

Oxygen therapy is a treatment that provides oxygen to the body using a variety of methods under conditions of hypoxia. Oxygen therapy - should be used at saturation below 94%. In the group of patients with coronavirus infection COVID-19 and complicated by pneumonia, in 70-80% of patients with less than 94% of saturation, a significant decrease in saturation was observed in the first 3-5 days. This indicator is maintained despite adequate anticoagulant therapy. The obvious reason for this can be explained by the fact that the alveoli have not yet been completely damaged, but the damage has begun, and as a result the body has lost its ability to compensate. If there was no damage to the alveoli, the saturation rate would have remained unchanged or improved from the day anticoagulant therapy was started.

Oxygen therapy is started using a nasal tube, in which the amount of oxygen should be 2-5 l / min (FiO2 -25-40%). If saturation does not improve, oxygen therapy with a face mask should be started, with an oxygen content of 6-10 l / min (FiO2 -40-60%). If the saturation does not improve in this case, oxygen therapy is started using an additional reservoir on the face mask, with an oxygen content of 10-15 l / min (FiO2 -60-95%). If the degree of saturation does not exceed 88-90% against the background of pure wet oxygen 6-10 l / min (10-15 l / min against the background of oxygen therapy with an additional balloon to the face mask), the patient should be treated with HFOT (oxygen content 20-60 l . / min) or go to NIPV. Our studies show that the improvement in respiratory rate after early onset of HFOT or NIPV is 8 ± 2 days from the date of reduction in satiety. This is due to the fact that the recovery of type 2 alveocytes producing sulfactant coincides with these days, and therefore the blood respiration rate is normalized by reducing the likelihood of adhesion of the alveolar wall to each other.

We concluded that an increase in oxygen concentration above 15 L / min and no increase in oxygen saturation from 82–84% within 1–2 days, despite NIPV, was an indication for early patient intubation. Because in this case, prolongation of NIO'V for 1-2 days can lead to a sharp deterioration in respiratory parameters, disruption of the body's reserve mechanisms, impaired consciousness, hypoxic brain tumors, fatigue of the respiratory muscles, acute ischemia of organs.Endotracheal intubation performed after such cases is often ineffective, leading to avoidance of artificial endotracheal intubation, leading to increased mortality.

Intubation problem: The reason we call this a problem is that patients may experience deep hypoxia during intubation, which often results in ventricular fibrillation during intubation and consequent asystole. It is impossible to eliminate fibrillation at this time. Prevention of such cases is to take patients without delay to tracheal intubation, that is, while maintaining the patient's ability to tolerate short hypoxia. Before the intubation procedure, it is important for the patient to increase the volume of oxygen therapy (oxygen volume), to saturate the body with oxygen, and only then to start induction. All equipment required for intubation must be prepared in advance and checked for suitability. Induction should use adequate drug analgesics (Subfentanil, Fentanil, Promedol), psychotropics (Propofol, Ketamine, Midozalam), muscle relaxants (Ditilin) that have the fastest and most effective effect. This is a fast-acting induction - Crash induction, which usually does not require excessive hyperventilation, and therefore the aerosolization of the virus is almost low. Induction is preceded by the administration of narcotic analgesics in dissolved state, after 30-60 seconds psychotropic drugs are administered, followed by depolarizing muscle relaxants, and immediately after 10 seconds tracheal intubation is performed. Tracheal intubation should take a maximum of 30 seconds and, if possible, tracheal intubation should be performed in 20 seconds. Only then is the patient's likelihood of hypoxia reduced. Intubation with hyperventilation can lead to a number of shortcomings (e.g., improper and inadequate ventilation, increased risk of viral aerosolization, regurgitation of gastric product as a result of air passing into the stomach, and inhalation of these products into the respiratory tract).

There are specific advantages to treating patients with early endotracheal intubation, including:

1. Keeping patients in constant sedation and muscle relaxation. Reduction of sedation and myorelaxation should be performed when the patient's respiratory rate is normalized, ie 94% and above, while the oxygen demand is reduced to 10 l / min. Against the background of adequate sedation, organs and tissues emerge from a state of hypoxia and begin to restore their functional activity. Once ischemia and hypoxia are eliminated, lung tissue also begins to recover rapidly, resulting in the production of surfactant.

2. Providing continuous positive end-expiratory pressure. Patient intubated patients are permanently connected to the IPV, there are no interruptions or changes in positive end expiratory pressure (REER) compared to the patient connected to the NIPV.Positive end-expiratory pressure (PEEP) is 5-10 mm Hg. storage is harmless to lung tissue, according to our research and observations, storage of PEEP at 7-8 mmHg. art is the ideal indicator. Maintaining a positive end-expiratory pressure helps to normalize gas exchange in the alveoli and stimulates the production of a sulfactive substance. Studies have shown that patients who maintain positive end-expiratory pressure at all times have a much higher likelihood of prematurely rejecting respiratory therapy than patients with delayed positive end-expiratory pressure.

3. Maintain respiratory volume within the lower limit of the norm. Maintaining low respiratory volume is one of the criteria for preventing volumetric and barotraumas in lung tissue. Maintaining a respiratory volume of 4–6 ml / kg should be an ideal choice. Respiratory performance can be improved by maintaining respiratory volume at 10–12 ml / kg, but increases the likelihood of injuries resulting from mechanical ventilation of lung tissue. By keeping the tidal volume at lower norms, the respiration rates may not rise to the norm, but it is sufficient to bring the respiration rates closer to the norm (e.g., an increase in saturation to 86-90%). These indicators are then normalized or the organism adapts to these indicators and it has almost no effect on the vital activity of the organism.

4. Adequate enteral nutrition. This includes inserting a nasogastric tube and tube feeding 5-6 times a day, giving up to 4-5 liters of fluid to patients receiving HFOT, NIPV, and IPV.At the same time, after the installation of a nasogastric tube, patients will have no difficulty in taking the drug, that is, the drugs will be taken on time. The caloric content of the food given to the patient should not be less than 2500-3000. The amount of vitamins, micronutrients, protein, fat and carbohydrates in the food provided should be properly distributed. At present, special enteral nutritional compounds (e.g., Nutrikomp, Nutrizon, Berlamin Modular, Unipit, etc.) with high nutrient content but low volume have been produced. With the help of these special mixtures, it is possible to feed a small amount but with quality.

5. Patient care. Caring for patients with respiratory IPV is 2 times easier than caring for patients with NIPV, which is due to the care of the patient, limited ability of the patient to resist treatment, saving time spent on separation from the NIPV apparatus. It takes a lot of cocktail from the nurse. Constant changes in the

patient's condition to prevent bed sores in the patient include situations related to ensuring the patient's hygienic cleanliness (oral cavity, nasal cavity, skin cleanliness, etc.).

Tracheostomy: It is advisable to perform an early tracheostomy in patients with coronavirus, complicated by respiratory failure, who are clearly stored in the IPV for more than three days. This should be ensured by experienced physicians. By installing a tracheostomy, the volume of the dead cavity, the likelihood of developing a secondary infection in the oral cavity, and the cough reflex are reduced. Patients are given the opportunity to eat orally after discharge from sedation. Some authors recommend delaying tracheostomy until at least 10 days of mechanical ventilation and considering it only when patients show signs of clinical improvement.

Conclusion. In patients with coronavirus infection COVID-19 and complicated by pneumonia, oxygen therapy is used to meet oxygen demand through nasal tube, face mask (Venture mask), high-flow oxygen therapy, non-invasive lung ventilation and invasive lung artificial ventilation. The choice of one of these methods depends on the patient's demand for oxygen, the severity of the patient's condition, the composition of gases in the blood, the results of instrumental examination, the psychoemotional state of the patient. It is important not to delay the transition from one method of oxygen therapy to another, which is an important factor in the recovery of the patient. All methods of oxygen therapy are ineffective without adequate anticoagulant, antiaggregant, antibacterial, antioxidant, and other standard treatments.

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