Covid-19, Acute Respiratory Distress Syndrome (ARDS) and Refractory Pulmonary Failure: Inhalation of an Aerosol that Dissolves Thick Pus as an Alternative to Extracorporeal Membrane Oxygenation (ECMO) and Traditional Oral Hygiene Medications

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Statement of the Problem: The COVID-19 sometimes can induce acute respiratory distress syndrome (ARDS) and refractory pulmonary failure. To save the patient's life, today recommended to urgently using extracorporeal membrane oxygenation (ECMO). However, ECMO technology is not available to everyone in need and is very dangerous for the patients. Therefore, mortality from the new coronavirus disease remains high even in those countries where ECMO is most widely used. However there is still no alternative to ECMO. In particular, there are no medications for individual use for the purpose to remove pus and mucus from the respiratory system and restore pulmonary oxygenation.

The purpose of this study is to offer a worthy alternative to ECMO for airway blockage with pus and mucus in patients and also if they have pus and mucus in the mouth.

Methodology & Theoretical Orientation: A thorough study of scientific and patent literature on the possibilities of emergency dissolution of thick pus, mucus and blood clots was conducted. The possibility of physical-chemical dissolution of thick and viscous biological masses was analyzed in order to focus on the local interaction between drugs and pus in combination with mucus inside the bronchi, the oral cavity and develop a new drug. Findings: It has been shown that the cause of biological death in patients with acute respiratory distress syndrome (ARDS) and refractory pulmonary failure is hypoxic damage to brain cells. It was found that the cause of hypoxia in such patients is the accumulation of pus and mucus in the lumen of the bronchi and bronchioles due to the lack of drugs that dissolve the pus in the respiratory system.

It is shown that a few years ago in Russia, a new group of medicines was discovered for the treatment of "purulent diseases". These medications are called "Pus solvents". Medicines of this group are alkaline solutions of hydrogen peroxide and are intended for topical use. It was found that the most effective and safe pus solvents are solutions of 2-4% sodium hydrocarbonate and 0.5-3% hydrogen peroxide at a temperature of +42 °C.

It is shown, that these products not only dissolve pus and blood stains, but also very quickly and effectively dissolve plaque and whiten teeth, dentures, braces and ceramic dishes. At the same time, they effectively eliminate bad breath in caries, purulent gingivitis, periodontitis, stomatitis, laryngitis, tonsillitis and bronchitis, and are also safe and edible. It is also established that these drugs quickly and effectively discolor spots and blood traces, so they can be used as cosmetic products in dermatology and dentistry for the purpose of discoloring the skin in the area of bruises. Based on this, there is every reason to believe that very soon these drugs can take their rightful place among personal hygiene products in purulent surgery, pulmonology, dentistry, dermatology and cosmetology.

Modernizing this group of drugs has allowed the invention of a new aerosol that urgently dissolves pus, mucus and blood clots, which facilitates expectoration and provides pulmonary oxygenation. New aerosol for inhalation includes 1.2% Sodium hydrocarbonate, 0.3-0.5% Hydrogen peroxide, 0.5% Lidocaine hydrochloride and this aerosol using at a local temperature of + 41 - + 55 °C ("Aerosol for inhalation in obstructive bronchitis", RU Application N 2020100533. 09.01.2020).

The mechanism of action all solvents of thick pus are when locally interacting with pus, they cause alkaline saponification of protein-lipid complexes in it. In this pus due to the catalase enzyme "includes" the release of oxygen gas from hydrogen peroxide, which provides solutions with a biochemical softening of thick pus, rapid introduction into the purulent mass and physical destruction of its monolithic structure due to intra-tissue cold boiling due to the rapid release of gas bubbles. It is shown that the cardinal difference between the formulation of drugs that dilute thick pus, thick mucus and blood spots from the formulation of medicines of all other pharmacological groups, is as follows. More recently, it was discovered that all new pus solvents are a warm (at a temperature above +37 - +55 °C) solution of sodium hydrocarbonate (preferably a saturated solution), which contains hydrogen peroxide in a concentration of up to 3%. It was found that the local physical and chemical action of such solutions can be enhanced by additional introduction to the solution of carbon dioxide, oxygen gas, or an inert gas such as helium or argon into them under excessive pressure of 0.2-4 ATM.

The discovery of this group of drugs suggests that such drugs may be effective for restoring airway patency and eliminating hypoxia in pneumonia caused by COVID-19. The fact is that with the help of pus-dissolving agents that thick pus and thick mucus with blood can be quickly dissolved and removed from the lumen of the airway bronchi to the outside. In this case the expulsion of purulent masses from the respiratory tract with the help of solvents of pus is an analogy to sanitizing purulent fistulas, cavities and wounds. It is hoped that pus solvents can quickly dissolve the thick pus and thick mucus in the respiratory tract and facilitate the removal of pus and mucus outside. This will free up the airways, which will again become free for breathing gases, which will facilitate breathing, increase the delivery of oxygen to the alveoli of the lungs, and increase the lung oxygenation.

Conclusion & Significance: The developed aerosol can be used for emergency dissolution and loosening of thick masses of pus and mucus for expectorating them outwards in order to facilitate breathing, increase the lumen of the bronchi and eliminate hypoxia in resuscitation patients with pneumonia caused by COVID-19 as a good alternative to ECMO. Regardless of this, the developed aerosol can become a worthy means of oral hygiene. To do this, the aerosol should be used by dispersed spraying of liquids using ultrasonic, compression and jet inhalers and nebulizers.