Pneumonia With Coronavirus And Its Specific Characteristics

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ABSTRACT

Novel coronavirus pneumonia is a type of viral inflammation of the lungs. Viral pneumonias are already known to us, but we were not used to working with them in such large numbers as now. The conditions of the SOVID-19 pandemic made the statistics of this type of pneumonia very high. In the early years of the pandemic, about 20-25 percent of patients with COVID-19 developed pneumonia, and this rate increased even more after the "delta" strain became the dominant version. The purpose of our research is to develop measures to prevent the spread of pneumonia and complications of this disease in the context of the COVID-19 pandemic. We have set ourselves the task of providing an understanding of the nature of the infection with the coronavirus and developing tactics for the treatment of this infection.

Keywords: Coronavirus infection, viral pneumonia, treatment tactics

Currently, bronchial asthma, chronic obstructive pulmonary disease and pneumonia are the main respiratory diseases among the population. For example, according to world statistics, bronchial asthma occurs in an average of 5% of the population, and among children, this indicator is even more common, making up 10%. Chronic obstructive pulmonary disease is becoming a major cause of morbidity and mortality worldwide. This in turn creates economic and social problems. Among infectious diseases, pneumonia is the first cause of death and the sixth cause of death among other diseases[1, 3].

In our country, among the population, respiratory diseases take the first place in terms of morbidity and make up 30-31.5% of the main diseases. Respiratory diseases are the fifth leading cause of death (4.1-4.2 percent), second among children (16.6 percent). Among respiratory diseases, there are several other diseases that cause serious problems. These include interstitial lung diseases, cystic fibrosis, respiratory failure, pulmonary tuberculosis and upper respiratory tract diseases. According to the data of the State Statistics Committee, in 2020 the death rate from respiratory diseases is 16.6 percent, and it ranks third, cardiovascular diseases (59.3 percent) and tumor diseases (7.1 percent) take the third place. In 2020, 35 percent of child deaths were caused by respiratory diseases, and 44.8 percent were caused by perinatal pathology. In recent years, mortality from respiratory diseases is 6.1-8.1% and ranks fifth. Among children, this indicator decreased to 16-16.6 percent. The dynamics of these indicators were affected by the corona virus infection pandemic[2,4,5]

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about 20-25 percent of patients with COVID-19 developed pneumonia, and this rate increased even more after the "delta" strain became the dominant version. To make matters worse, the death rate skyrocketed during those years. Even those who received treatment and fully recovered still had complications. The most common of these is pulmonary fibrosis. Patients with coronavirus pneumonia developed scarring of the lungs after appropriate treatments, leading to decreased respiratory efficiency over time. This complicates the treatment. The changes that cause coronavirus pneumonia are also present in, for example, influenza, but in COVID-19 they develop more and differently. The purpose of our research is to develop measures to prevent the spread of pneumonia and complications of this disease in the context of the COVID-19 pandemic[1,4]

We have set ourselves the task of providing an understanding of the coronavirus infection (Coronavirosis) infection and working out the tactics of using treatment measures in the conditions of this infection. Coronaviruses are a large family of viruses that can cause severe acute respiratory syndrome in humans, ranging from simple inflammation to severe.

Coronavirus infection (CVI) is an acute respiratory disease, which is characterized by inflammation of the upper respiratory tract and general symptoms of mild intoxication. Acute respiratory diseases with coronavirus etiology occur in 5-10% of cases[1,3]

Etiology. The disease is caused by RNA-containing coronaviruses with a size of 80-220 nm. There are 4 different antigens of coronaviruses. The outer shell of the virus is covered with villi. Through these villi, the virus attaches to the cell (hence the name of this family of viruses is Coronoviridae.). Viruses multiply in the cytoplasm of the epithelium of the upper respiratory tract. This virus produces many vibrios after 4-6 hours after entering the cell. Coronaviruses are resistant to the external environment. They bind the complement contained in the patient's blood and hyperimmune serum in their outer shell.

Before continuing our thoughts and talking about the differences, it is necessary to remember that our lungs are made of matter. Before continuing our thoughts and talking about the differences, it is necessary to remember that our lungs are made of matter. It consists of a system of air-conducting tubes, ending with breathing bags - alveoli. These alveoli are united into a single structure with the help of an arch - an interstitium. It is composed of connective tissue. Blood and lymph vessels pass through the interstitium [4,5]

In many cases, we have to work with infectious or bacterial pneumonia. Its development is caused by bacteria that cause inflammation inside the alveoli. Air from the affected parts inside the respiratory sacs is exchanged for inflammatory fluid. Carcass - interstitium is almost not damaged, the walls of the vessels remain dense. One of the symptoms of this type of pneumonia is fever and cough with sputum. The appearance of cough is explained by the fact that the inflammatory liquid is inside the alveoli and it goes out through the bronchi. To relieve cough, mucolytics (drugs that dilute sputum without increasing its volume and facilitate the release of sputum from the lungs) are prescribed. A rise in temperature is associated with bacterial inflammation. In this way, our body destroys disease-causing bacteria. With the destruction of the "enemy", the situation will improve, the person will recover. In this way, our body destroys disease-causing bacteria. With the destruction of the "enemy", the situation will improve, the person will recover.

Since bacteria are the cause of infectious pneumonia, antibiotics are the primary drugs in its treatment. If necessary, drugs are administered by drip in an inpatient setting rather than at home. If necessary, drugs are administered by drip in an inpatient setting rather than at home.

In viral pneumonia (new coronavirus pneumonia is a type of it), the walls of blood vessels are damaged. Their density decreases. The liquid part of the blood comes out of the veins and causes their swelling. Bacteria are added later, but this does not always happe[1].

In pneumonia with coronavirus, an inadequately strong reaction of the immune

system to the effect of the virus is the cause of high temperature and inflammation. The cough will be dry, because the liquid settles in the interstitium, where there is no exit to the bronchus. In this case, sputum-thinning drugs are rarely effective, they can be effective only when a bacterial infection is added or when accompanying chronic bronchitis is aggravated. In viral pneumonia, an antibiotic is a second-line drug. If necessary, it is prescribed not at the first stage of treatment, but later.

Intravenous fluid can cause swelling in the lung tissue. Imagine a broken hose through which water is being pumped under increasing pressure. Around him, puddles begin to rise sharply. A similar process occurs in the lungs. The virus enters the body through airborne droplets. During contact, we inhale it, and it stays in the upper respiratory tract for a while, and in some cases it descends later. What is this situation due to -

First of all, to the state of the human immune system. The amount of secretory immunoglobulin A (IgA) on the surface of the nasal mucosa, the background and accompanying conditions of the body, the specific characteristics of metabolism. The strain of the infected virus also plays a role, that is, its dose, how aggressive it is. Pneumonia with coronavirus develops without symptoms. The typical course of a COVID infection has several characteristic stages. The clinic of the disease appears 2-4 days after the virus infection. The disease begins acutely, with an increase in body temperature, general signs of intoxication that have not developed clearly. Also, when breathing in children, pain in the chest, cough, dry whistling sounds are heard. Coronavirus infection can be complicated by acute pneumonia. Focal or interstitial infiltrates are detected in the chest X-ray. In severe cases, the functioning of the respiratory organs deteriorates, and in the second week, the disease develops respiratory distress syndrome, in adults, it is caused by the dysfunction of various organs. In severe cases, the functioning of the respiratory organs worsens, and in the second week, the disease may develop respiratory distress syndrome, and in adults, it can be observed with the dysfunction of various organs. Sometimes the neck lymph nodes are enlarged. The course of coronavirus infection in the form of acute gastroenteritis has also been determined. This disease lasts 1-3 days and the patient recovers completely.

Diagnostic main symptoms of coronavirus infections:

- group disease, mainly among members of the same family or children;
- seasonality – winter and spring seasons;
-latent period- 2-4 days;
- acute onset of the disease;
-leading symptom complex-intensive rhinitis, sometimes symptoms of laryngotracheitis may develop;
- non-permanent fever, less expressed general signs of poisoning;
- the course of the disease is acute, the duration is 1-3 days.

It is very important to carry out daily monitoring of the patient's condition, that is, to record the temperature, pulse, respiratory rate, as much as possible blood oxygen saturation (saturation).

Sometimes the frequency of breathing is not paid attention to, which is a very important symptom.

It should be counted in such a way that the patient does not notice it. Abdominal or chest movements are recorded. Up-down (inhale-exhale) is one breathing cycle. The number of these cycles in one minute is counted. In a normal state, the frequency of breathing depends on gender and age, it can be in the range of 12-20 per minute. It is necessary to evaluate the frequency of breathing in dynamics, by days, and to see the ratio of breathing to the pulse. The frequency of heart contractions should be four times more than breathing.

Additional symptoms are also noted: lethargy, shortness of breath, excessive sweating. It is better to evaluate them on a scale from 0 to 5, where 0 is the absence of symptoms, 5 is their obvious manifestation. It is necessary to pay attention to violation of sense of smell, taste, diarrhea.

Most often, the new type of coronovirus (NCoV) is moderately severe. But in dangerous groups,

this disease is severe and complications may occur. Risk groups with severe disease include: pregnant women, especially in the third decade, postpartum women, children and the elderly (under two years and over 65 years old), overweight patients and chronic diseases overweight patients and patients with chronic diseases (lung diseases, bronchial asthma, chronic bronchitis, cardiovascular diseases, diabetes, etc.).

The symptoms of the new type of coronavirus infection are similar to flu and many other acute respiratory infections, and the disease usually begins with an increase in body temperature, malaise, inflammation of the mucous membrane of the upper respiratory tract, and a cough.

In this disease, self-diagnosis and self-treatment are dangerous and can lead to serious complications.

In laboratory analysis, lymphopenia - at the expense of CD4+, CD8+ and NK-cells - occurs in 50%. When the disease progresses, thrombocytopenia is observed. An increase in the activity of aminotransferase, creatine kinase and lactate dehydrogenase is detected in blood serum. The diagnosis is determined by reverse transcription, PCR test in the respiratory tract and plasma at the beginning of the disease, and later in urine and feces, and gives quick results. Antibodies are detected by IFA or immunofluorescence method within 28 days from the onset of the disease.

World practice shows that even when the disease is asymptomatic, there are some changes in the lungs. There is no way to prevent their spread, so it is always treated on a case-by-case basis. There is no way to prevent their spread, so it is always treated on a case-by-case basis.

Active treatment is not necessary if there is no increase in temperature, respiratory failure, or a decrease in blood oxygen saturation. Studies show that the early appointment of antibiotics and hormones can worsen the course of the disease.

Computed tomography as a diagnostic method of pneumonia with coronavirus

Computed tomography (CT) is a good method for detecting any changes in the lungs, including pneumonia in cases of coronavirus infection. Changes can be missed when taking an X-ray at the initial stage, especially if it is not a modern digital device, but old models. But in cases where inflammatory changes require treatment, radiography shows them.

It is often asked how CT (computed tomography) differs from MSCT (multispiral computed tomography). Both methods allow you to obtain a layered image of the human body, the only difference is that the examination in CT is carried out using one detector, while in MSCT, it is carried out using several detectors. Due to the presence of several detectors, the step of the tomograph, that is, the distance between the tissue sections under examination, is reduced. If before, 5 mm was considered good quality between the examined areas, now these parameters are much smaller. Thanks to this, we get high-resolution images and the research time is significantly reduced.

Three advantages of MSKT-research can be distinguished. It allows to identify even the first forms of pneumonia, to assess the extent of damage, which is one of the criteria for the severity of the disease.

Personally, we find that the presence of specific changes in the lower back of the lungs helps to visually demonstrate to patients why lying on their stomachs is important.

MSCT performed on a sufficiently high-quality machine shows structural changes in the lungs. There are certain symptoms that are characteristic of coronavirus pneumonia. However, it is impossible to say with 100% certainty that it is him.

As with any research method, MSKT is filled with information about the clinical conditions of the patient, the specifics of the duration and course of the disease, and, of course, with the data of the epidemic situation. All of these pneumonias are now considered likely to be caused by the coronavirus.

MSKT alone cannot be the reason for prescribing a treatment scheme without additional information.

Ideally, MSKT should be done according to a doctor's appointment. If there are symptoms of respiratory failure, if the temperature is higher

than 38.5, and especially if the patient is in the risk group, then it can be done.

Many countries have waived all patients with MSCT. The main role is given to the clinic, laboratory data. Most of the patients admitted to the hospital will undergo plain X-rays. If necessary, UTT is performed. Special protocols have been developed and are being implemented for this purpose. As for how often research should be conducted, in medicine, when conducting all therapeutic and diagnostic activities, two concepts are always evaluated: benefit and possible harm. Accordingly, a decision is made to carry out a certain intervention or to abandon it. If MSKT is carried out according to vital instructions, then the interval is not important - it can be carried out several times a day.

Sometimes inflammation can disappear during this period, but in most cases it takes three to four months.

An important point: the size of the damage is not the main thing. About 50% of asymptomatic patients have changes in MSKT. In most cases, it is not necessary to treat them with drugs, but everyone needs breathing exercises to prevent fibrosis.

Do CT images differ between patients with coronavirus pneumonia and those with usual pneumonia?

To answer this question, it is necessary to consider the structure of lung parts and the mechanism of development of lung damage in the case of coronavirus pneumonia.

The human respiratory system consists of respiratory tracts - tubes through which air passes (trachea, bronchi, bronchioles). The diameter of these tubes gradually narrows and becomes very small - about five microns in size. At the end of these small bronchioles are respiratory bubbles - alveoli. They are connected to each other by a stroma, a special framework - interstitium. It is quite soft, and blood and lymph vessels pass through it.

In typical bacterial pneumonia, the main damage occurs in the small bronchi and alveoli. They are filled with inflammatory fluid in response to infection. A less serious process takes place in the interstitium.

In viral pneumonia, especially in COVID-19, the main pathological changes occur in this framework (interstitium), which surrounds each part. The walls of the vessels passing through it become thinner, they cannot hold the liquid part of the blood well. It begins to flow out of the veins. The interstitial tissue swells, but a part of the air remains in the alveoli, so a kind of "blur" appears on the X-ray.

A healthy lung with enough air in the alveoli is transparent. Inflammation in some part of the alveoli of the lungs, when air is exchanged with inflammatory fluid, is seen as a more clearly visible darkening.

When the air is partially stored in the alveoli, the swelling of the interstitium is called "stained glass" or "vitreous body".

I emphasize once again: such changes occur not only in pneumonia with coronavirus, but also in other cases.

About drug treatment, drug drips and nebulizers

At first, the coronavirus infection is treated like a common cold. It is necessary to drink plenty of fluids, take vitamins and, if necessary, antipyretic drugs. Depending on the symptoms that appear, new drugs can be added. Since the bacterial infection here is secondary, antibiotics are added only after feverish chills (if the temperature is higher than 38.5 and persists for more than five days) or when the microflora is confirmed in the laboratory. Antibiotics are often given prophylactically, so antibiotics approved for the management of pneumonia outside the hospital in an outpatient setting are mostly given as tablets[4].

Strong, broad-spectrum antibiotics should be used only in intensive care, based on vital signs. Indiscriminate administration of such antibiotics may lead to increased mortality in ventilated patients. After a year, people begin to die from sepsis, peritonitis. The degree of non-union of implants and artificial joints increases; severe bacterial infections develop after the implantation of stents, artificial heart valves.

Hormonal therapy should be used only when respiratory failure occurs. From the first day of the disease, it is used in cases when there are

imperceptible changes in the blood. Its early appointment relieves breathing by removing interstitial edema. It is also used with blood thinners from the 1st day. They are used to continue treatment in outpatient settings. It is absolutely impossible to use immunostimulating drugs. It is not at all necessary to activate the uncontrolled activity of the immune system in a disease that is not well studied.

It is not recommended to use existing anti-viral agents and drugs that have not been proven effective. It will not be useful, it can cause additional negative effects on the liver and kidneys, allergies and other side effects.

Before prescribing drugs, it is necessary to check the state of the body's inflammatory system, the functioning of various organs, and some other indicators.

Can a nebulizer be used for symptoms of COVID-19?

We must clearly understand what we want to achieve when we use any treatment method, how this or that tool will have an effect.

A nebulizer is a device that delivers drugs directly to the bronchi. Using a number of methods, the drug liquid is turned into an aerosol - tiny droplets of up to five microns in size. The diameter of the smallest respiratory tubes is the same. When a person inhales, the aerosol containing the drug is directed to the bronchi and lungs. When exhaling, aerosol particles fall into the surrounding air. If a person has the virus, it will be concentrated in large quantities in this aerosol cloud. It should be taken into account that such small particles settle very slowly. They remain suspended in the air for several hours. It is very dangerous for others - the risk of infection increases several times. It is better that the patient himself does not receive new doses of the virus. At the onset of the disease, the virus is in the upper respiratory tract. So, if we start inhaling, there is a risk of opening a wide path to the lungs for infection.

If nebulizer therapy is prescribed according to objective indications, then special safety measures should be taken. For example, I recommend spending it on a balcony with the windows open and the door to the room closed. It is better to replace inhalation through a nebulizer with ready-dosed aerosol powder preparations as much as possible. To make the procedure more convenient and more effective, the finished aerosol can be inhaled through a spacer.

— Is it possible to use antiseptic preparations for inhalation? There is an opinion that they can dry out the mucous membrane, cause fibrosis?

— Antiseptic drugs are mainly used to wash body cavities during pleural puncture. Theoretically, they can destroy bacteria, viruses, fungi in the respiratory tract when inhaled. Whether it should be done or not is another matter. Once upon a time, antibacterial hand sanitizers were very popular. Their popularity quickly disappeared, because it became clear that it is not necessary to destroy the natural bacterial layer on the skin and mucous membranes.

The second point is that there are no studies on how these drugs affect the epithelia of the respiratory tract. Therefore, I cannot answer yes or no to the question of the possible development of fibrosis. There is a possibility of developing acute allergic reactions to these agents. Allergy to chlorhexidine has been reported several times, and the number of such cases is increasing.

There is also a serious risk of developing resistance to these drugs. For example, there are many strains of different microorganisms that live inside the hospital, they live very well in the popular antiseptic solution - furatsilin. If we also get bacteria that are not sensitive to decamethoxine and chlorhexidine, then it will be more difficult for surgeons to save patients with purulent diseases.

According to current guidelines, it is recommended to use oxygenators for oxygen when the pulse oximeter reading falls below 94. This device is available in some family polyclinics, medical centers, and patients.

An oxygen concentrator may improve the patient's condition when desaturation is reduced. According to the latest data, the device should provide at least five liters of air per minute and work for at least 24 hours. A nasal cannula and a mask for the patient must

be included in the kit, because part of the oxygen is lost when breathing through the cannula.

Pulseoximeters are also in high demand. Every patient should buy them for themselves. He should check the saturation level with a pulse oximeter 5-6 times a day.

As in the case of oxygen concentrators, pulse oximeters are not needed in normal life. They can be passed from one person to another, and they are also very easy to disinfect, just by treating them with alcohol-based products.

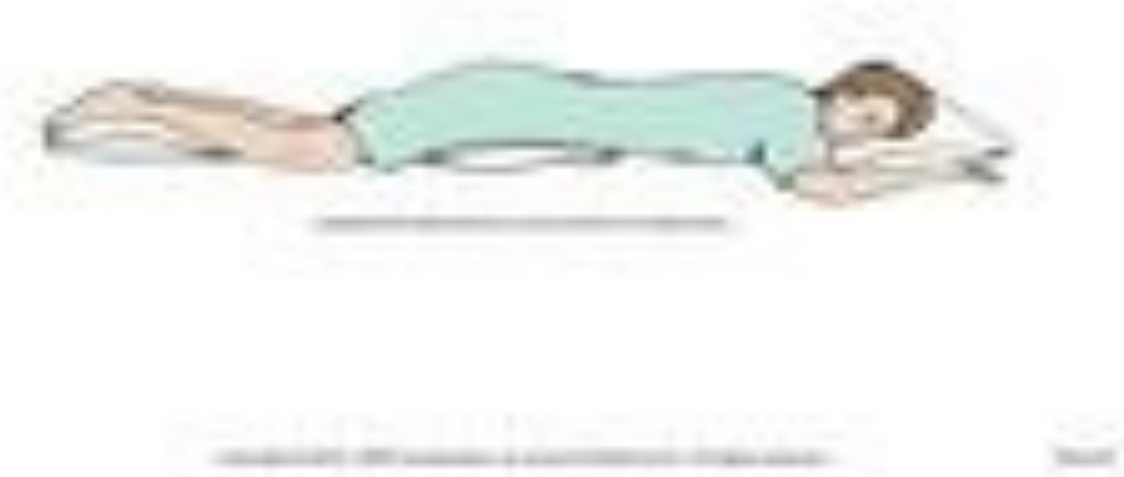
Let's talk about "how to breathe with what?" from the question "how to do it right?" let's move on to the question.

Prone positions

The purpose of the prone position is to increase the volume of the lungs that can be breathed in thanks to the lower and back lobes of the upper body. Usually, when lying on the back, such lobes are less involved in breathing and act as a reserve for cases involving lung damage. If we say the correct position of pronunciation, it can be compared with the butterfly effect - the wings are separated from each other, allowing to reach without increasing the pressure in the respiratory system of the lungs. Prone position is the position of lying on the stomach. In covid pneumonia, changes first occur in the lower back sections of the lungs. When we lie on our backs, they are in a state of hypoventilation, that is, they work weakly[2,4].

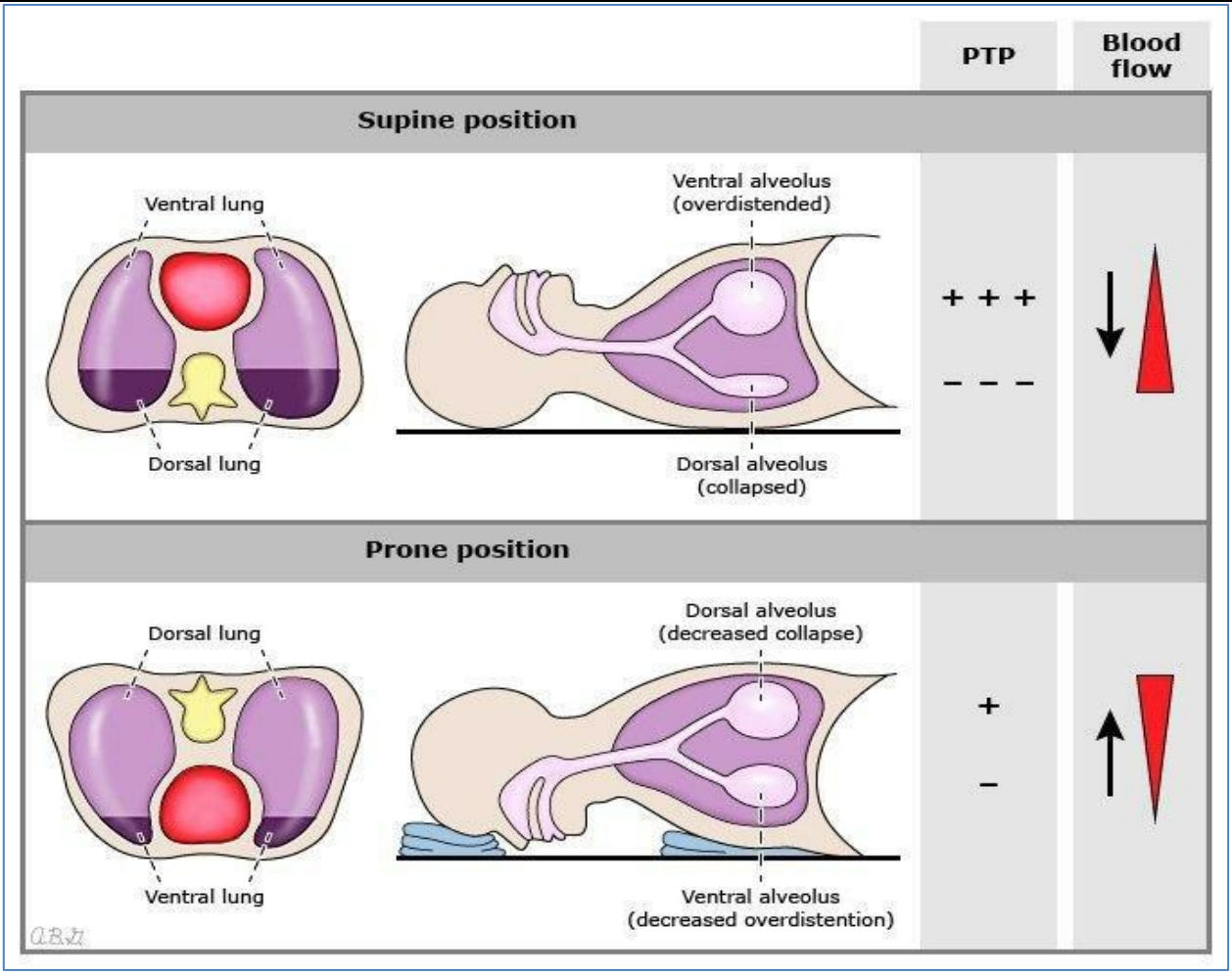
Accordingly, the tumor fluid in them is absorbed slowly and poorly. Fibrin is deposited, some production processes of connective tissue are activated, therefore the size of damage increases, fibrosis increases.

Figure: Prone Position



Source: https://www.uptodate.com

Also, when lying on the back, the chest muscles work, the excursion of the chest (range of movements) is not so great. The amount of breath that can be taken is also limited.

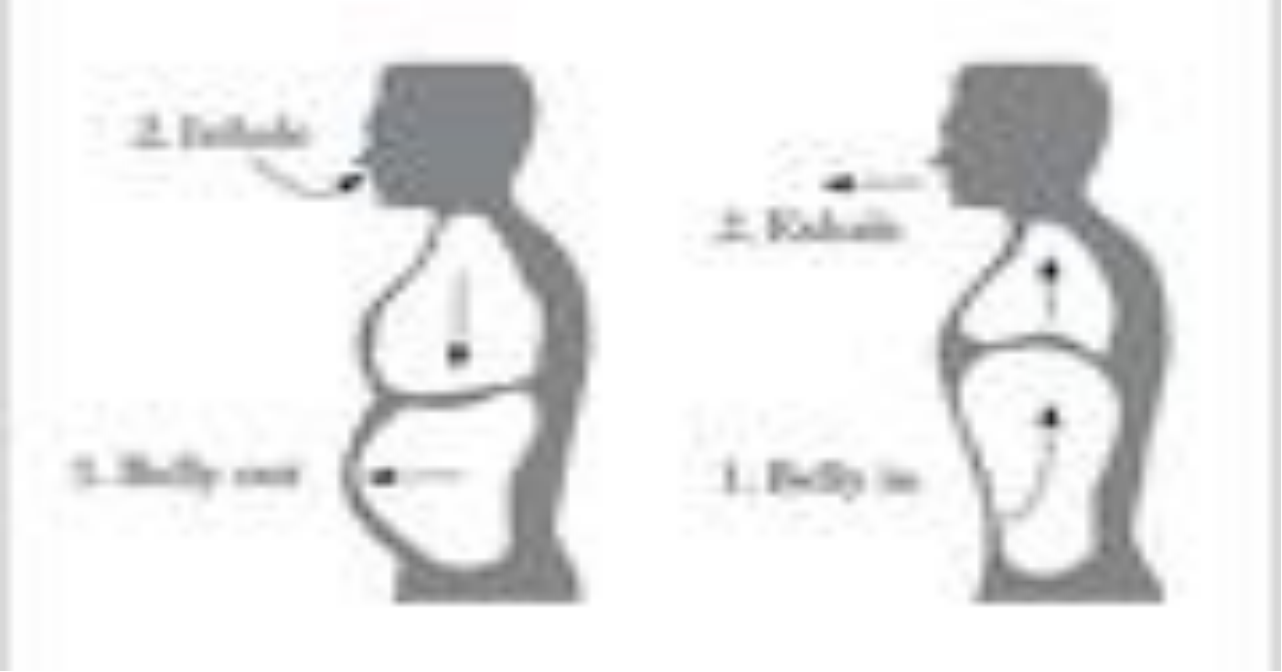


When a person lies on his stomach, the strong muscles of the back begin to work. More oxygen enters the lungs in one breath. Swelling fluid is absorbed better, changes pass faster.

It is recommended to lie in a prone position during the entire illness. It is mandatory at night, and during the day, depending on the degree of damage, the more it is, the more it is necessary to lie on the stomach. Even after recovery, it is better to lie on your stomach for several months.

- What is paradoxical breath?

It is also called diaphragmatic breathing. Put your hands on your belly and try to watch it move when you breathe. During inhalation, the abdomen seems to be pulled in, and when exhaling, it relaxes.



In paradoxical breathing, the opposite is true: the abdomen expands during inhalation, and contracts during exhalation. A more obvious variant of such a breath is a yoga exercise, in yoga it is called "vacuum"[2,4]/

It can be done several times a day. The main thing is that both inhalation and exhalation should be even. At first, the exercise is done with some effort, and then it is done at a normal pace.

Paradoxical breathing is considered a habit. Changes in the lungs can be completely absorbed, but in most cases they remain for a long time. Therefore, lying on the stomach and breathing gymnastics should become a way of life for at least 3-6 months. The recovery of the lung structure can only be assessed after such a period of time.

I think that more and more medicinal (first of all, taking vitamins and microelements) and physiotherapeutic rehabilitation complexes, curative physical education methods will be developed.

Conclusions:

1. As a result of scientific research, the widespread spread of pneumonia and the manifestation of its complications in the context of the COVID-19 pandemic were identified.

2. Several recommendations aimed at preventing complications of coronavirus infection have been developed.

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