ACUTE RESPIRATORY FAILURE

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Abstract: Acute respiratory distress syndrome occurs when fluid builds up in the tiny, elastic air sacs (alveoli) in your lungs. The fluid keeps your lungs from filling with enough air, which means less oxygen reaches your bloodstream.

Keywords: respiratory failure, breathing, grunting, widening.

This deprives your organs of the oxygen they need to function. You can have symptoms of low oxygen and high carbon dioxide at the same time. Some people who have respiratory failure become extremely sleepy or lose consciousness if their brain does not get enough oxygen or if carbon dioxide levels are very high. Symptoms of respiratory failure in newborns include rapid breathing, grunting, widening of the nostrils with each breath, a bluish tone to the skin and lips, and a pulling inward of the muscles between the ribs while breathing. Respiratory failure may cause damage to the lungs and other organs including the brain and kidneys, so it is important to get treated quickly. Respiratory failure is a syndrome in which the respiratory system fails in one or both of its gas exchange functions: oxygenation and carbon dioxide elimination. In practice, it may be classified as either hypoxemic or hypercapnic.

Hypoxemic respiratory failure (type I) is characterized by an arterial oxygen tension (PaO2) lower than 60 mm Hg with a normal or low arterial carbon dioxide tension (PaCO2). This is the most common form of respiratory failure, and it can be associated with virtually all acute diseases of the lung, which generally involve fluid filling or collapse of alveolar units Acute respiratory failure happens quickly and without much warning. It is often caused by a disease or injury that affects your breathing, such as pneumonia, opioid overdose, stroke, or a lung or spinal cord injury. Respiratory failure can also develop slowly. When it does, it is called chronic respiratory failure. A low oxygen level in the blood (hypoxemia) will result in the following: Shortness of breath. Air hunger (feeling like you can't breathe in enough air) A bluish color on the skin, lips, and fingernails (if the level of oxygen is very low). The etiological factors of acute respiratory failure are very diverse, therefore, doctors working in the departments of resuscitation, pulmonology, traumatology, cardiology, toxicology, infectious diseases, etc. may encounter this condition in their practice. Depending on the leading pathogenetic mechanisms and immediate causes, they distinguish primary acute respiratory failure of centrogenic, neuromuscular, thoraco-diaphragmatic and broncho-pulmonary origin. The basis of ARF of central genesis is the inhibition of the activity of the respiratory center, which, in turn, can be caused by poisoning (an overdose of drugs, tranquilizers, barbiturates, morphine, and other drugs), TBI, electrical injury, cerebral edema, stroke, compression of the corresponding area of the brain brain tumor. Any condition or injury that affects breathing can cause respiratory failure. The condition or injury may affect your airways or lungs. Or it may affect the muscles, nerves, and bones that help you breathe. When you can't breathe well, your lungs can’t easily move oxygen into your blood or remove carbon dioxide. This causes a low oxygen or high carbon dioxide level in your blood. Occasionally a patient with a sub-clinical intra-pulmonary shunt may become hypoxemic due to venous admixture. In this situation inadequate oxygen delivery to the periphery results in increased peripheral oxygen extraction and thus the return of blood with a very low mixed venous oxygen saturation. The

relatively small shunt in the lungs is normally not clinically obvious, but is great enough so that if extremely desaturated blood returns to the lungs it will not be adequately re-oxygenated. Thus patient hemodynamics and the possibility of a low-flow state should be kept in mind as a possible cause of hypoxemia.

However, the two most common causes of hypoxemic respiratory failure in the ICU are V/Q mismatch and shunt. These can be distinguished from each other by their response to oxygen. V/Q mismatch responds very readily to oxygen whereas shunt is very oxygen insensitive. A classic cause of V/Q mismatch is a COPD exacerbation. In shunt, alveolar capillary perfusion is much greater than alveolar oxygenation due to collapse and derecruitment of alveoli. This means that venous blood does not come in contact with oxygen as it is "shunted" by the collapsed or fluid - filled alveoli. Therapy for shunt is directed at re-opening or recruiting collapsed alveoli, preventing derecruitment, diminishing lung water, and improving pulmonary hypoxic vasoconstriction.

Some causes of shunt include ;

- cardiogenic pulmonary edema
- noncardiogenic pulmonary edema (ards)
- pneumonia
- lung hemorrhage
- atelectasis

Therapies for acute hypoxemic respiratory failure include;

- oxygen
- peep
- diuresis
- prone position
- permissive hypercapnia
- inverse ratio ventilation or pressure control ventilation
- nitric oxide
- ecmo / eccor / partial liquid ventilation

Violation of neuromuscular conduction leads to paralysis of the respiratory muscles and can cause acute respiratory failure in botulism, tetanus, poliomyelitis, overdose of muscle relaxants, myasthenia gravis. Thoraco-diaphragmatic and parietal ARF are associated with limited mobility of the chest, lungs, pleura, and diaphragm. Acute respiratory distress may be accompanied by pneumothorax, hemothorax, exudative pleurisy, chest trauma, fractured ribs, and posture disorders.

The most extensive pathogenetic group is broncho-pulmonary acute respiratory failure. ARF of the obstructive type develops as a result of impaired airway patency at various levels. The cause of obstruction can be foreign bodies of the trachea and bronchi, laryngospasm, status asthmaticus, bronchitis with mucus hypersecretion, strangulation asphyxia, etc. extensive lung resections, etc.). The diffuse form of acute respiratory failure is due to a significant thickening of the alveolo-capillary membranes and, as a result, the difficulty of oxygen diffusion. This mechanism of respiratory failure is more typical for chronic lung diseases (pneumoconiosis,

pneumosclerosis, diffuse fibrosing alveolitis, etc.), but it can also develop acutely, for example, with respiratory distress syndrome or toxic lesions. Respiratory failure is a serious condition that makes it difficult to breathe on your own. Respiratory failure develops when the lungs can't get enough oxygen into the blood. We breathe oxygen from the air into our lungs, and we breathe out carbon dioxide, which is a waste gas made in the body's cells. Breathing is essential to life itself. Oxygen must pass from our lungs into our blood for our tissues and organs to work properly.Buildup of carbon dioxide can damage tissues and organs and prevent or slow oxygen delivery to the body.Acute respiratory failure happens quickly and without much warning. It is often caused by a disease or injury that affects your breathing, such as pneumonia, opioid overdose, stroke, or a lung or spinal cord injury.Respiratory failure can also develop slowly. When it does, it is called chronic respiratory failure. Symptoms include shortness of breath or feeling like you can't get enough air, extreme tiredness, an inability to exercise as you did before, and sleepiness.

Secondary acute respiratory failure occurs due to lesions that do not directly affect the central and peripheral organs of the respiratory apparatus. So, acute respiratory disorders develop with massive bleeding, anemia, hypovolemic shock, arterial hypotension, pulmonary embolism, heart failure and other conditions. Labored breathing and signs of oxygen deprivation, including response to supplemental oxygen, are among the clinical signs and symptoms of chronic respiratory failure.The severity of acute or chronic respiratory failure is determined by checking the oxygen and carbon dioxide levels in your blood.

This is done in several ways:

Pulse oximetry is a small sensor attached to a finger or ear and measures the oxygen level in your blood.Arterial blood gas test is done through a blood sample taken from an artery where laboratory results determine both the oxygen and carbon dioxide levels in your blood.A chest X-ray may help find the underlying cause of respiratory failure; an electrocardiogram (EKG), which detects and records the heart's electrical activity, may reveal any effects of respiratory failure on your heart.

While the first goal of treating respiratory failure is to get oxygen to your lungs and other organs and remove carbon dioxide from your body, it is vital to identify and treat the underlying cause.Treatment for respiratory failure depends on whether the condition is acute (short-term) or chronic (ongoing) in its severity. Treatment also depends on the underlying cause.Acute respiratory failure can be a medical emergency, often treated in an intensive care unit at a hospital with intubation and mechanical ventilation. A tracheostomy, a surgically made hole that goes through the front of your neck and into your windpipe, may be necessary.Chronic respiratory failure often can be treated at home but if chronic respiratory failure is severe, treatment in a long-term care center may be needed. Extra oxygen is given in various ways:Through a nasal cannula (two small plastic tubes, or prongs, that are placed in both nostrils).Through a mask that fits over your nose and mouth.By noninvasive positive pressure ventilation (NPPV), which uses mild air pressure to keep your airways open while you sleep; you wear a mask or other device that fits over your nose or your nose and mouth connected to a machine that blows air into the tube.CPAP (continuous positive airway pressure) is one type of NPPV. The causes of respiratory failure are damage to the respiratory organs at their various levels.Very often, respiratory failure develops due to malfunctioning of the central nervous system and the respiratory center in particular. It is

provoked by an overdose of narcotic substances, damage to the respiratory center, head injuries, and cerebrovascular accidents. The pathologies of the function of the neuromuscular system, which develop due to neurological disorders, infectious diseases that affect the nervous system and distort the transmission of impulses to the muscles that regulate respiratory function, have the same consequences for the body. Pneumonia, acute respiratory distress syndrome (ARDS), drowning, and other lung diseases can cause this fluid buildup. It can also be caused by heart failure, which is when your heart can't pump enough blood to the rest of your body. Severe head injury or trauma can also cause sudden fluid buildup in the lungs. Acute respiratory failure occursTrusted Source when your lungs cannot release enough oxygen into your blood, which prevents your organs from properly functioning. It also occurs if your lungs cannot remove carbon dioxide from your blood.Respiratory failure happens when the capillaries, or tiny blood vessels surrounding your air sacs, cannot properly exchange carbon dioxide and/or oxygen.There are two types of respiratory failure: acute and chronic.

Acute respiratory failure happens suddenly. It occurs due to a disease or injury that interferes with the ability of the lungs to deliver oxygen or remove carbon dioxide. In most cases, acute respiratory failure can be fatalTrusted Source if not treated quickly.Chronic respiratory failure has multiple causes. It can occur when the airways narrow or become damaged over time. It can also occur with conditions that cause the respiratory muscles to weaken over time.

Some causes of chronic respiratory failure include:

- damaged and/or narrow airways, which can occur in conditions like:
- chronic obstructive pulmonary disease (copd)
- bronchiectasis
- asthma
- cystic fibrosis
- lung fibrosis, which can occur in conditions like:
- pneumonia
- interstitial lung disease
- respiratory muscle weakness, which can occur with amyotrophic lateral sclerosis (als)

A low oxygen level in the blood (hypoxemia) will result in the following: Shortness of breath. Air hunger (feeling like you can't breathe in enough air) A bluish color on the skin, lips, and fingernails (if the level of oxygen is very low). Breathing in lung irritants can lead to lung damage over the long term and put you at risk of serious lung diseases. You may breathe in these irritants from the air where you live or work. Lung irritants include air pollution, chemical fumes, asbestos, aniline (artificially produced) dyes and paints, dust, and secondhand smoke (smoke in the air from other people smoking). If you have a condition that puts you at risk of respiratory failure, talk to your healthcare provider. They can ask questions and do a physical exam to look for issues that may put you at risk of getting respiratory failure in the future. You can also talk with them about how to manage your condition to prevent respiratory failure. They can also screen you if you have a planned surgery.There are things you can do to keep your lungs healthy, including not smoking, quitting or limiting alcohol, and not misusing opioids or taking recreational drugs.

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