



Pulmonary Edema

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1. Introduction

Pulmonary edema is a disease that consists in the collection of fluid in the lungs. This makes breathing difficult and therefore puts the patient's life at risk. In most cases, pulmonary edema originates from a cardiac problem, but it can also be caused by trauma, pneumonia (lung infections) and even drugs. Fluid accumulation is called pulmonary edema. It usually occurs due to heart problems and in this case it is called cardiogenic pulmonary edema. It mainly occurs when the left ventricle of the heart weakens. However, pulmonary edema may not be associated with the heart (noncardiogenic edema).

2. The Purpose of the Study

- To identify the causes and risk factors in pulmonary edema,
- To clearly point out the fundamental role of the nurse in the care of the patient with pulmonary edema,
- Determination of nursing diagnoses related to this disease,
- Treatment and education about this disease.

3. Material and Methods

It has been studied based on the data of the registers of Kruja Hospital. For this, the patient registers for the years studied have been used. This study is retrospective. The purpose of studying these statistics is to accurately assess the problems of pulmonary edema. The number of patients taken in the study is 71.

4. Conclusion

The symptoms depend on the cause and the speed with which edema is formed, which are generally: Difficulty in breathing, which worsens when the patient lies down, feeling of asphyxia, dyspnea, or wheezing during breathing, cough accompanied by possible blood stains, tachycardia, the skin may become very cold and clammy and the lips are bruised and the feet tend to swell,

Key words: edema, heart, lungs, fluids

5. Pulmonary Edema

Pulmonary edema is a condition caused by excessive accumulation of water from the pulmonary capillaries in the interstitium and alveolar spaces.

It is often secondary to other medical problems, such as heart failure (heart failure) or kidney disease.

In the initial stage, only the connective tissue of the lungs is involved, while the alveoli of the lungs remain free.

At a later stage, the alveoli are also flooded by excess plasma.

The main symptom of pulmonary edema is difficulty breathing. In the lungs, doctors listen with a stethoscope for characteristic sounds called crackles.

Acute pulmonary edema is a medical emergency that requires immediate management.

There are two types of pulmonary edema based on origin:

Pulmonary edema of CARDIAC origin: In most cases as a result of left heart failure, accompanied by increased pressure in the pulmonary circulation as seen in:

Cardiac infarction

- myocardial
- Hypertensive crisis
- Cardiac rhythm disorders
- Decompensated valve defects.

Pulmonary edema of non-CARDIAC origin:

- Renal insufficiency
- Pneumonia
- Tracheal trauma
- Physical overload
- Anaphylactic shock
- Toxic causes.

6. Signs and Symptoms of Pulmonary Edema

Pulmonary edema can develop gradually and instantly, the identification of symptoms is quite different, it depends on the development of the pathological process in the disease. In the case when pulmonary edema develops slowly, shortness of breath occurs spontaneously and signs of fatigue also appear, this happens even when the patient is resting. Rapid breathing, dizziness, anxiety, difficulty breathing, low oxygen content in the blood, leading to hypoxia, these symptoms should not be ignored and indicate an advanced stage of the disease.

Among the main symptoms affecting the patient are:

- Shortness of breath, difficulty breathing, this usually happens when the patient is asleep, wakes up short of air
- Cough containing blood and sputum,
- Excessive sweating, restlessness,
- Whistling can be heard in the patient's lungs,
- Another symptom of the patient is a pale face,
- Chest pain if pulmonary edema is caused by heart disease.
- In cases of gradual development of pulmonary edema:
- Edema in the ankle (talocrural region),
- Orthopnea and Dyspnea.

7. Pathogenesis

To better understand how this pathology develops, a division of its progression into four stages will help us:

1. Interstitial pulmonary edema: pulmonary capillary edema
2. Alveolar pulmonary edema: exudation and transudation of serous fluids in alveoli and bronchioles
3. Formation of foam by extension of the existing amount of liquids
4. Asphyxia

8. Clinical Presentation

8.1 Interstitial pulmonary edema

- Tachypnea
- Shortness of breath
- Presence of wheezing
- Great difficulty in breathing (dyspnea) which worsens during activity or when the individual lies down.
- Cough (cardiac asthma)

8.2 Alveolar pulmonary edema

- More pronounced dyspnea: subjective unit of suffocation or breathlessness when the individual pretends to be.
- Cyanosis or pallor of the skin
- Anxiety
- The presence of pulmonary crepitations, which can be heard even without a stethoscope.
- Fast, irregular heartbeats (palpitations)
- Cold and clammy skin from profuse sweating.

9. Care in Pulmonary Edema

1. Help the patient relax and receive the necessary humidified oxygen via mask or catheter.
2. Place the patient in the Foëler position in order to increase the ability of the lungs to absorb oxygen.
3. Administer O₂.
4. Carefully record the time when the Morphine solution is given and its amount given i/v. Carefully observe and assess the patient's condition through vital signs and relief or non-relief of symptoms
5. Observe and assess for possible complications from the Medicine such as electrolyte deficit
6. Monitor vital signs every 15 minutes or more often if needed
7. Ask the patient to follow the given medical regimen in order to avoid future episodes of Pulmonary Edema.
8. Explain the entire procedure to the patient and his family
9. Emphasize the necessity of early reporting of signs of fluid overload (the main sign is Dyspnea and cyanosis)
10. Make a description of all the medications given to the patient
11. Discuss ways to estimate and observe physical energy.

In order to provide the most adequate treatment for the patient, we provide the equipment we need, such as: oxygen therapy, ECG, vital signs monitoring, physical examination: auscultation and percussion, aspirator, blood oxygen level, taking of blood for analysis, after placing the urinary catheter, we check the patient's diuresis, we describe the date of the therapy, which nurse will apply the therapy, the time of the therapy and the prescription of the therapy.

10. Nursing Intervention

The goals of intervention for a patient with pulmonary edema are to reduce circulatory volume, improve respiration, and improve the patient's condition.

These goals are achieved through the combination of oxygen therapy, drug therapy and nursing support.

Oxygenation: O₂ is administered at the concentration prescribed by the physician to relieve hypoxia and dyspnea.

Oxygen is monitored by measuring it in the blood.

Drug therapy: morphine is administered i/v in a small dose to reduce anxiety and dyspnea and to decrease peripheral resistance so that blood can be distributed from the pulmonary circulation to the periphery. Morphine may not be administered if pulmonary edema is caused by a cerebral accident, or if chronic pulmonary disease or cardiogenic shock is present.

Diuretics: IV furosemide is administered to have a rapid diuretic effect. In addition, furosemide causes vasodilatation and an increase in peripheral venous blood, with a reduction in venous return occurring before diuretic treatment.

Since a large amount of urine accumulates after the administration of diuretics, the placement of a urinary catheter is recommended.

Digitalis, to improve the contractile force of the heart, in order to increase the work of the left ventricle, the patient can be administered digitalis preparations with fast action.

Increased heart contractions will increase heart work, increase diuresis and reduce diastolic pressure.

Digitalis should be given with great caution to patients with acute myocardial infarction, because these patients are sensitive to digitalis and may develop arrhythmias.

Assess the serum potassium level at intervals because diuresis can cause hypokalemia.

Aminophylline, when the patient has difficulty breathing aminophylline can be administered to relax bronchospasm.

11. Nursing Practice

1. Implementation refers to the phase of action in which nursing care is provided, treatment procedures are explained to the patient, psychological, spiritual and physical support is offered.
2. We control and maintain the airways,
3. After connecting to the monitor, we often look at the patient's vital signs for any possible changes.
4. Mental preparation of the patient before any nursing intervention
5. Administering medications in parenteral and enteral ways to relieve pain and other symptoms at the right time with the right dose and as needed
6. We control and supervise the infusion solutions and place the urinary catheter
7. Place the patient in a comfortable body position, the lighting of the room should be appropriate to more easily notice the changes in the patient, air the room
8. We maintain personal hygiene, remove obstacles and provide comfort to the patient

12. Diagnosis

It is realized through the symptoms that are:

Inspiratory and expiratory dyspnea that can be relieved by sitting still.

Anxiety, cough with scanty sputum, frothy and tinged with a dark red hue.

Cyanosis, dramatic condition for the patient.

On auscultation, crepitant rales are heard in both pulmonary fields that increase over time and may include all lungs as well as bronchial rales.

Sometimes there may be dry rales that are a sign of accompanying bronchospasms.

The skin is cold and moist; signs of shock can also be observed.

- Radiology, symmetrical hilar opacities with signs of pulmonary congestion are observed.
- Laboratory examinations, the Astrupogram shows decreased PaO₂, initially decreased PaCO₂, but over time Hypercapnia is observed in half of the patients.
- ECG, Echocardiography

13. Treatment

It is divided into immediate intensive care and continuous intensive care.

Preload reduction is performed in several ways: by means of Furosemide, which reduces intravascular volume by increasing diuresis, but also by means of the little venodilation it provides, also Nitroglycerin and Morphine i/v are excellent venodilators.

Invasive phlebotomy (removing some blood) and non-invasive phlebotomy with the use of a rotating catheter can reduce the burden.

Decreasing afterload will give increased ejection fraction but without increasing cardiac output because the resultant decrease in left ventricular filling pressures may decrease increased pulmonary microvascular pressures.

This is achieved with the use of Nitroprusside and less with Nitroglycerine; also the Intra-Aortic Balloon can give the same effect.

14. Preventing

Prevention of pulmonary edema is important to first treat diseases and conditions that can lead to pulmonary edema. Immediate and adequate treatment of heart diseases such as angina, cardiac arrhythmia can prevent the development of pulmonary edema. Patients suffering from chronic heart failure should reduce the intake of salt in the dish, it is recommended not to consume food after six o'clock in the evening. If the disease often appears in people with heart disease, the doctor should be visited regularly, to examine the problem without neglecting the advice and recommendations of doctors. Physical activity should be limited to the level at which a person will not have shortness of breath during physical exertion. It should be noted that one of the toxic gases that can cause pulmonary edema is cigarette smoke. Therefore, we must stop smoking, it helps to avoid not only pulmonary edema, but also a number of other dangerous diseases. Otherwise, for the prevention of pulmonary edema, we should periodically visit a doctor to detect the disease in time, and to follow a healthy lifestyle, strengthening our body.

15. Complications of Pulmonary Edema

Most complications in pulmonary edema can arise from complications related to the underlying cause of the disease. More specifically, pulmonary edema can cause severe impairment of blood oxygenation from the lungs. Poor oxygenation (hypoxia) can potentially lead to reduced oxygen delivery to various body organs, such as the brain.

Other complications are:

Decompensation of the right ventricle, edema of the legs, ascites, pleural effusion, congestion and swelling of the liver.

16. Complications, Prognosis

In cases of ARDS, an increased Morbidity and Mortality is observed during intensive therapy. These complications are presented below:

- Pulmonary: Pulmonary Embolism, Pulmonary Baro trauma, Pulmonary Fibrosis, Toxicity from O₂.
- Gastrointestinal: Gastrointestinal Hemorrhage, Gastric Distention, Ileus, Pneumoperitoneum.
- Renal: Renal Insufficiency, Fluid Retention.
- Cardio-Vascular: from Invasive Catheters, Dysrhythmia, Hypotension, Low Cardiac Output.
- Infection: Sepsis, Nosocomial Pneumonia.
- Hematological: Anemia, Thrombocytopenia,
- Other: Hepatic, Endocrine, Neurological, Psychiatric, Malnutrition.
- Complications attributed to Intubation and Extubation: Prolonged attempts at intubation, intubation of one of the main bronchi, premature extubation, extubation by the patient himself, from tube malfunction such as: Necronasal, paranasal sinus infection, Tracheal stenosis, Tracheomalacia, Polyps, Fistulas .
- Complications attributed to the work of the ventilator: Malfunctioning of the ventilator machine
- Complications occurring during PEEP therapy:
 - Alveolar Hypo-Ventilation,
 - Massive gastric distension
 - Hypotension

Important is the possibility that the patient has to escape from this deadly pathology, because patients who escape this condition can return to a condition like before, with a respiratory failure approximately 6 months after extubation.

17. Statistics from Kruje Hospital about Pulmonary Edema

According to a study done in Kruje hospital about Pulmonary Edema for a period of three years. According to 2019-2021, 71 patients with Pulmonary Edema were diagnosed. The reports of these statistics are as follows:

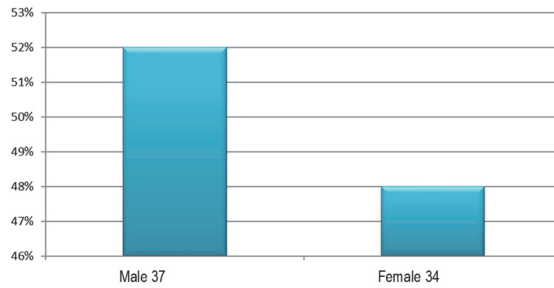


Figure 1: The ratio of men and women

Referring to this graph, on the ratio of men and women affected by Pulmonary Edema in the city of Kruje, men are more at risk of Pulmonary Edema.

The most affected age group is:

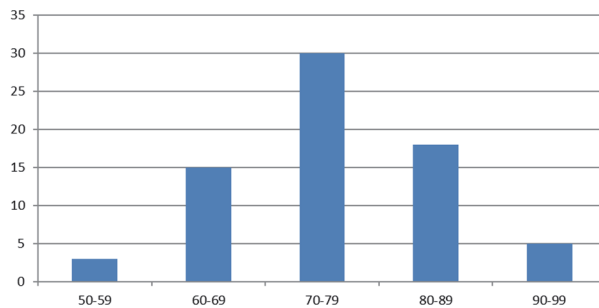


Figure 2: The number of patients according to age groups

Looking at the chart above, the riskiest age group is 70-79 years old, after this age group, the age group 80-89 years old and so on, and the least affected age group is 50-59 years old with 3 patients diagnosed with Pulmonary Edema.

In terms of residence, we have this distribution:

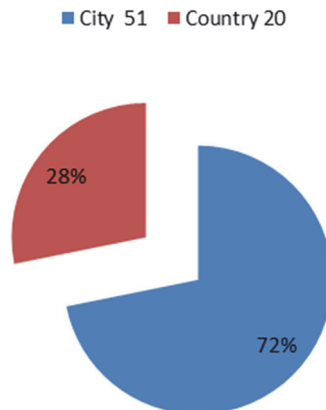


Figure 3: Residence

So 28% of the patients diagnosed with Pulmonary Edema were from the surrounding villages city, and 72% of them were from the city.

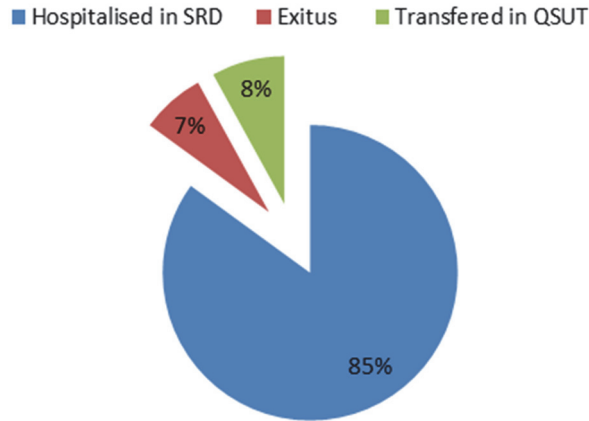


Figure 4:

Referring to the chart above 8% of patients were transported to a specialized center, i.e. in QSUT, 7% of them did exitus and 85% were hospitalized in SRD cardiology for further follow-up.

18. Conclusion

The symptoms depend on the cause and the speed with which edema is formed, which are generally: Difficulty in breathing, which worsens when the patient lies down, feeling of asphyxia, dyspnea, or wheezing during breathing, cough accompanied by possible blood stains, tachycardia, the skin may become very cold and clammy and the lips are bruised and the feet tend to swell,

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