



Spontaneous Pneumothorax

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ABSTRACT

Background: Pneumothorax is a medical emergency which is defined as an abnormal condition where there is air in the pleural cavity which physiologically contains only a small amount of fluid. Pneumothorax can arise spontaneously or as a result of trauma. **Method:** The method used in this study is a literature review. The literature study conducted by the author is by searching various written sources, whether in the form of books, archives, magazines, articles and journals, or documents that are relevant to the problem being studied. **Discussion:** Pneumothorax is classified as primary spontaneous if it occurs in the absence of basic lung disease or thoracic trauma. Pneumothorax is classified as secondary spontaneous if it is caused by basic lung disease. The etiology of primary spontaneous pneumothorax is pleural bleb and bulla. A bleb (air pocket) or bulla is a small air-filled pocket that forms between the lung and pleural tissues. The risk factors associated with pneumothorax are smoking and body thinness. **Conclusion:** The initial management of spontaneous pneumothorax includes emergency management. Furthermore, management can be divided into conservative and invasive management.

Keywords: *Chest Tube, Needle Aspiration, Pneumothorax, Spontan Pneumothorax*

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ABSTRAK

Latar Belakang: Pneumotoraks adalah kegawatdaruratan medis yang didefinisikan sebagai suatu keadaan abnormal dimana terdapat udara di dalam rongga pleura yang secara fisiologis hanya berisi sedikit cairan. Pneumotoraks dapat timbul secara spontan atau akibat trauma. **Metode:** Metode yang digunakan pada studi ini adalah tinjauan pustaka. Sumber kepustakaan disusun dari buku, artikel, majalah, jurnal yang relevan dengan permasalahan yang terdapat pada studi ini. **Diskusi:** Pneumotoraks diklasifikasikan sebagai spontan primer jika terjadi tanpa adanya penyakit paru dasar atau trauma toraks. Pneumotoraks diklasifikasikan sebagai spontan sekunder jika disebabkan oleh penyakit paru dasar. Etiologi pneumotoraks spontan primer adalah pleural bleb dan bulla. Bleb (kantong udara) atau bulla adalah kantong kecil berisi udara yang terbentuk di antara paru-paru dan jaringan pleura. Faktor risiko yang berhubungan dengan pneumotoraks adalah merokok dan tubuh kurus. **Kesimpulan:** Penatalaksanaan awal pneumotoraks spontan meliputi tatalaksana darurat. Selanjutnya, manajemen dapat dibagi menjadi manajemen konservatif dan invasif.

Kata Kunci: *Aspirasi Jarum, Chest tube, Pneumothorax, Pneumothorax Spontan*

INTRODUCTION

One of the vital organs of humans is the lungs. Many lung diseases which is one of the main causes of a person's death, one of them is a pneumothorax. Pneumothorax is a condition when air collects in the pleural cavity, which is the space between the lungs and the chest

wall. This air can enter as a result of an injury to the chest wall or a tear in the lung tissue. As a result, the lungs become collapsed (collapse) and cannot expand. Pneumothorax is characterized by dyspnea, decreased consciousness and chest pain originating from the lungs and chest wall and can interfere with normal breathing due to gas bubbles in the pleural

space or gas retention in the pleural cavity that occurs after bullae rupture.^[1]

Basically, anyone can experience pneumothorax. However, the main risk factors for pneumothorax are male, aged 20 to 40 years, have a smoking habit, suffer from lung disease, especially Chronic obstructive pulmonary disease (COPD), have a family history of pneumothorax and had had a pneumothorax before.^[2,3]

There are several types of pneumothorax which are grouped by causes: spontaneous pneumothorax, pneumothorax traumatic, (stab wound, bullet) or blunt (impact in a vehicle accident motor), pneumothorax can also be a complication of medical procedures certain (eg thoracentesis) and pressure pneumothorax.^[2]

One type of pneumothorax that often occurs and is life-threatening is spontaneous pneumothorax. Spontaneous pneumothorax is further classified into primary and secondary pneumothorax. Primary pneumothorax develops following rupture of the bullae in healthy people without underlying lung disease. Secondary pneumothorax is caused by rupture of damaged lung tissue, and occurs mainly in patients diagnosed with pulmonary emphysema.^[3,4]

METHOD

The method used in this study is a literature review. The literature study conducted by the author is by searching various written sources, whether in the form of books, archives, magazines, articles and journals, or documents that are relevant to the problem being studied. So that the information obtained from this literature study is used as a reference to strengthen existing arguments. In this study, eleven reference sources were used,

consisting of various journals related to spontaneous pneumothorax. The analysis technique used is descriptive analysis, namely content analysis which is intended to describe in detail a message or a certain text. The design of this analysis is not intended to test a particular hypothesis or test the relationship between variables.

DISCUSSION

Pathogenesis

The thoracic cavity has two important structures and is used to perform the process of ventilation and oxygenation, namely first the bones, the bones that make up respiratory structures such as the bones of the clavicle, sternum, scapula. Then the second are the respiratory muscles which are very important in the process of inspiration and expiration. If one of the two structures is damaged, it will affect ventilation and oxygenation processes.^[5]

The intrapleural pressure is negative, in the process of normal respiration, air will not be able to enter into the pleural cavity. The sum of the total partial pressure of air in the capillaries blood vessels averaged 706 mmHg. The movement of air from the capillaries of the blood vessels to the pleural cavity, requires pleural pressure lower than -54 mmHg which is very difficult to occur in normal circumstances. So that causes the entry of air into the pleural cavity is the result of trauma to the chest wall and tearing of the parietal or visceral pleura, or due to congenital abnormalities bullae in the subpleura that will rupture if there is increased pleural pressure.^[6]

Risk Factors

The risk factors for spontaneous pneumothorax are very diverse, they usually occur in tall, thin men aged 10-30

years, active smokers. The risk increases with the length of time and number of cigarettes smoked, even without emphysema. Lung disease, Having an underlying lung disease especially COPD makes a collapsed lung more likely. Tall and thin posture, pleural pressure in the upper pulmonary lobe of a tall individual is thought to be getting negative and the alveolar pressure also increases. As a result, the risk of developing a bulla and pneumothorax increases.^[7]

Primary Spontaneous Pneumothorax

Primary spontaneous pneumothorax (PSP) is an unknown type of pneumothorax for sure the cause, a lot of research and theory has been put forward to try explain what exactly is the underlying cause of this type of pneumothorax.^[8]

There is the theory states that it is caused by congenital factors, namely the presence of bullae on visceral subpleura, which one day will rupture due to high intra-pleural pressure, thus causing a pneumothorax.^[8,9]

These subpleural bullae are said to be most commonly present at the apex of the lung as well in the tracheobronchial branching. Other opinions say that this PSP can caused by smoking habits. Allegedly smoking can cause imbalance of proteases, these antioxidants cause degradation and weakness elastic fiber from the lungs, as well as many other possible causes prove the cause of PSP.^[9]

Secondary Spontaneous Pneumothorax

Secondary Spontaneous Pneumothorax (SSP) is a pneumothorax caused by an underlying lung disease. Many lung diseases are associated with secondary pneumothorax. Chronic obstructive pulmonary disease is the most common secondary cause of pneumothorax, Pulmonary tuberculosis is

often found in pneumothorax patients. It is suspected that liquefaction of the caseosa pleural infiltrates results in pleural necrosis and rupture, an infection caused by bacteria pneumocystis carinii, the presence of immunocompromise caused by HIV infection, as well as many other causes, mentioned by sufferers of this type of pneumothorax aged between 60-65 years.^[1-3]

Cancer is also the underlying disease that causes CNS. based on several studies of several types of cancer such as sarcomas, hematological malignancies, lung cancer, solid non lung cancer. head and neck cancer, breast cancer, thyroid cancer, and kidney cancer.^[10]

Clinical Manifestations of Spontaneous Pneumothorax

Increased air pressure in the pleura will prevent the lungs from expanding when inhaling. As a result, symptoms can appear in the form chest pain, shortness of breath, cold sweat, cyanosis, palpitations, weakness, cough.^[7]

The initial complaint that often appears in patients with spontaneous pneumothorax is chest pain. Nearly Ninety-five percent of affected patients complain acutely and sudden chest pain with tightness breath. Severity dyspnea like symptoms are proportional to their size pneumothorax. Spontaneous pneumothorax usually occurs at rest, and only a few cases occur during exercise.^[1,2]

The most recent case of secondary spontaneous pneumothorax was found in a patient with Coronavirus-19 (COVID-19). In this case pneumothorax was accompanied by pneumomediastinum and subcutaneous emphysema.^[11]

Management of Spontaneous Pneumothorax

Early identification of spontaneous pneumothorax symptoms is needed to give

basic life support in pneumothorax patients. Due to proper initial handling in patients with pneumothorax is very important to prevent death. It said in a study the initial treatment in 85% of pneumothorax sufferers can be treated using basic life support maneuvers without the need surgery.^[4]

Observation

If the case is classified as mild, meaning that only a small portion of the lung has collapsed and without serious respiratory problems, the doctor will only monitor the condition of your lungs. During this monitoring period, the pulmonologist will ask the patient to undergo X-rays periodically, until the lung shape recovers.^[12] Giving oxygen through an oxygen mask will be carried out if the patient has difficulty breathing or the oxygen level in his body decreases. This treatment takes about a few weeks.^[8]

Needle Aspiration or Chest Tube Insertion, meanwhile, if the lung collapse condition is more extensive, treatment is needed to focus on removing the accumulated air. A needle is inserted to help insert a tube into the chest cavity through the between the ribs, so that the pressure is reduced and the lungs return to normal shape. A part from using a needle, a flexible chest tube can also be inserted into an air-filled chamber that can expel air continuously, from the chest cavity until your lungs expand and recover.^[3,12]

Oxygen Therapy, oxygen administration is recommended according to the BTS Guideline. use of high-flow oxygen (10L / min) in patients with symptoms of spontaneous pneumothorax. However, care must be taken to avoid hypercarbia patients with COPD underlying disease.^[12]

Complication and Prognosis

Complications that can occur with spontaneous pneumothorax include tension pneumothorax, hemopneumothorax, bronchopleural fistula, pneumomediastinum, and chronic pneumothorax (failure of the lung to expand).^[13]

Pneumothorax has various prognosis depending on the type. Spontaneous pneumothorax has relatively low morbidity and mortality whereas secondary and traumatic pneumothorax has higher morbidity and mortality.^[14]

CONCLUSION

Spontaneous pneumothorax is a condition in which the pleural cavity fills with air without any underlying disease. In general, spontaneous pneumothorax is divided into two, namely primary and secondary. Early identification of spontaneous pneumothorax symptoms is needed to give basic life support in pneumothorax patients. Due to proper initial handling in patients with pneumothorax is very important to prevent death. It said in a study the initial treatment in 85% of pneumothorax sufferers can be treated using basic life support maneuvers without the need surgery

RECOMMENDATIONS

This literature review research in the future can be developed into a meta-analysis study related to spontaneous pneumothorax. The goal is to increase knowledge and expertise in treating spontaneous pneumothorax

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