

Excessive Use of Nipah Leaf Membrane Cigarettes Increases the Severity of Spontaneous Pneumothorax: A Case study from Jambi, Indonesia

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Abstrak—Nipah (*Nypa fruticans*) merupakan jenis sawit yang banyak digunakan oleh masyarakat. Masyarakat Jambi menggunakan daun Nipah sebagai membran nipah untuk selaput rokok. Namun, kami menemukan laporan kasus penggunaan rokok yang berimplikasi pada tingkat keparahan penyakit pneumotoraks spontan. Seorang pria berusia 57 tahun datang ke ruang gawat darurat menderita sesak napas, ketidaknyamanan dada sisi kanan, batuk dahak hijau kekuningan, sakit perut, mual, kelemahan, nafsu makan menurun, dan ketidakmampuan untuk tidur. Selama dua tahun, pria ini mengonsumsi sepuluh batang membran Nipah yang dibuatnya secara mandiri setiap hari, sehingga mengakibatkan penyakit paru-paru. Paru-paru ditemukan asimetris dengan fremitus batang paru-paru kanan yang melemah; perkusi mengungkapkan resonansi hiper di paru-paru kanan dan resonansi di paru-paru kiri; Auskultasi mengungkapkan adanya penurunan suara pernapasan vesikular di paru-paru kanan, dan suara pernapasan lainnya berderak di kedua paru-paru. Asidosis pernapasan kompensasi parsial berat pasien menunjukkan tingkat pH, pO₂, pCO₂, HCO₃, total CO₂, dan BE. Sinus takikardia, normoaxis dan hipertrofi atrium yang cocok ditemukan. Daerah luscen terlihat, dan garis putih pleura di hemithorax kanan menunjukkan pneumotoraks paru-paru kanan. Kasus ini relatif jarang terjadi, dan kelebihan mengkonsumsi rokok selaput daun Nipah sebagai pengganti rokok meningkatkan keparahan penyakit pneumotoraks spontan penyebab PPOK.

Kata Kunci: PPOK; Pneumotoraks; Selaput Daun Nipah; Rokok Daun

Abstract—Nipah (*Nypa fruticans*) is a type of palm that is widely used by the community. The local people of Jambi use Nipah leaves as a tobacco membrane for cigarettes. However, we found reports of cigarette use cases having implications for the severity of spontaneous pneumothorax disease. A 57-year-old man came to the emergency room suffering from shortness of breath, right-side chest discomfort, yellowish-green sputum cough, abdominal pain, nausea, weakness, decreased appetite, and inability to sleep. For two years, this man consumed ten Nipah membrane cigarettes he made independently daily, resulting in lung disease. The lungs were found to be asymmetrical with the weakened fremitus of the right lung stem; percussion revealed hyper resonance in the right lung and resonance in the left lung; auscultation revealed the presence of a decrease in vesicular breathing sounds in the right lung, and other breathing sounds crackling in both lungs. The patient's severe partially compensatory respiratory acidosis indicated levels of pH, pO₂, pCO₂, HCO₃, total CO₂, and BE. Sinus tachycardia, normoaxis and suitable atrial hypertrophy were found. The luscen region is visible, and the white line of the pleura on the right hemithorax shows the pneumothorax of the right lung. This case is relatively rare, and excess Nipah leaf membrane cigarettes increase the severity of spontaneous pneumothorax disease that causes COPD.

Keywords: COPD; Pneumothorax; Nipah leaf membrane; Cigarettes Leaf

1. INTRODUCTION

Pneumothorax is a life-threatening condition that requires medical attention immediately after diagnosis (Milisavljevic, Spasic, & Milosevic, 2015). Pneumothorax accumulates air outside the lungs but inside the pleural cavity, the area between the chest wall and the lungs. Pneumothorax is etiologically categorized into spontaneous and traumatic pneumothorax (Barnes & Celli, 2019; Desai, Karkhanis, Joshi, & Hospital, 2020; Huan, Sidhu, & Thomas, 2021). Traumatic pneumothorax appears due to damage to the dull chest wall or a translucent injury (Porcel & Lee, 2021). 7.4-18 per 100,000 males and 1.2-6.4 per 100,000 females get pneumothorax annually (Hallifax, 2022; Nava & Walker, 2022). Men are more likely than women to develop spontaneous pneumothorax due to smoking habits (de Smet et al., 2020; Onorato et al., 2022). The habit of smoking with high intensity can increase the severity of pneumothorax, which has implications for the high risk of COPD (Barnes & Celli, 2019).

Pneumothorax disease continues to be a severe health problem with a high recurrence rate. Pneumothorax appears spontaneously between the ages of 20–40 years. Secondary spontaneous pneumothorax (SSP) often occurs due to underlying lung disease. Pneumothorax is most commonly seen in patients with chronic obstructive pulmonary disease (70% of cases) (Cortes-Telles, Ortíz-Farías, Perez-Hernandez, & Rodriguez-Morejon, 2021; Tezcan, Özsoy, Gürler, & Karakükü, 2021). However, other lung diseases such as tuberculosis, necrotizing pneumonia, carini pneumocystis, lung cancer, sarcoidosis, endometriosis, cystic fibrosis, severe acute asthma, and idiopathic lungs can also increase the risk. Recent studies revealed that of 505 patients with secondary spontaneous pneumothorax, the most common cause was COPD, with 348 patients (Huan et al., 2021).

Anamnesis generally applied to pneumothorax is the presence of sudden shortness of breath, affected chest discomfort, heaviness, breathing with additional muscles, coughing, increased pulse rate, and cyanosis (Desai et al., 2020; Hallifax, 2022; Smith, 2013; Zarogoulidis et al., 2014). The diagnosis is confirmed based on anamnesis, physical examination, and supportive investigation (Kawai et al., 2021; Tokur, Ergin, & Demiröz, 2015). In this study, we reported the case findings of an active smoker who used excess Nipah leaf membrane cigarettes, thereby increasing the severity of spontaneous pneumothorax disease that causes COPD. Nipah Leaf Cigarettes are classified as a type of traditional

cigarette produced by users independently with more than two years of use and a minimum of 18 cigarettes per day. Patients and their families have agreed that all or part of the information can be used while keeping their privacy.

2. RESEARCH METHODOLOGY

This case study was reported from Royal Prima Jambi Hospital and further identified related complaints, signs, and symptoms, as well as diagnosis and enforcement. Identification focused on using Nipah membrane leaf cigarettes (*Nypa fruticans*) concerning spontaneous pneumothorax disease causing Chronic Obstructive Pulmonary Disease (COPD). Results are presented in the form of figure and narration. Patient consent was obtained for all data reported.

3. RESULTS AND DISCUSSION

3.1 Case Description

A 57-year-old man presented to the Emergency Unit of the Royal Prima Jambi Hospital following a referral from Sungai Gelam Hospital. His primary complaint was shortness of breath—sudden shortness of breath that worsens with short breaths with the mouth open and tachypnea. Additionally, the patient had right chest discomfort, coughing, abdominal pain, nausea, weakness, decreased appetite, and difficulty sleeping. According to the anamnesis, the patient complains of shortness of breath for ten days and worsens for 6 hours before treatment. Previously, patients had experienced severe coughing for the past two months with yellowish-green sputum and worsening shortness of breath while lying down. The patient said he could not sleep for ten days due to shortness of breath. The presence of right chest pain and feeling depressed, pain in the area of the right hemithorax, and worsening when breathing, coughing, and other movements. The stomach and solar plexus discomfort are accompanied by night sweats, fever, yellow or sandy urine, or blood in the urine that appears. The patient had a two-year history of pulmonary disease and active smoking, with an average of 18 cigarettes per day. Cigarettes are made independently from Nipah leaves as tobacco wrappers, and patients have been smoking for 37 years. Clinical photos of patients (Figure 1a).

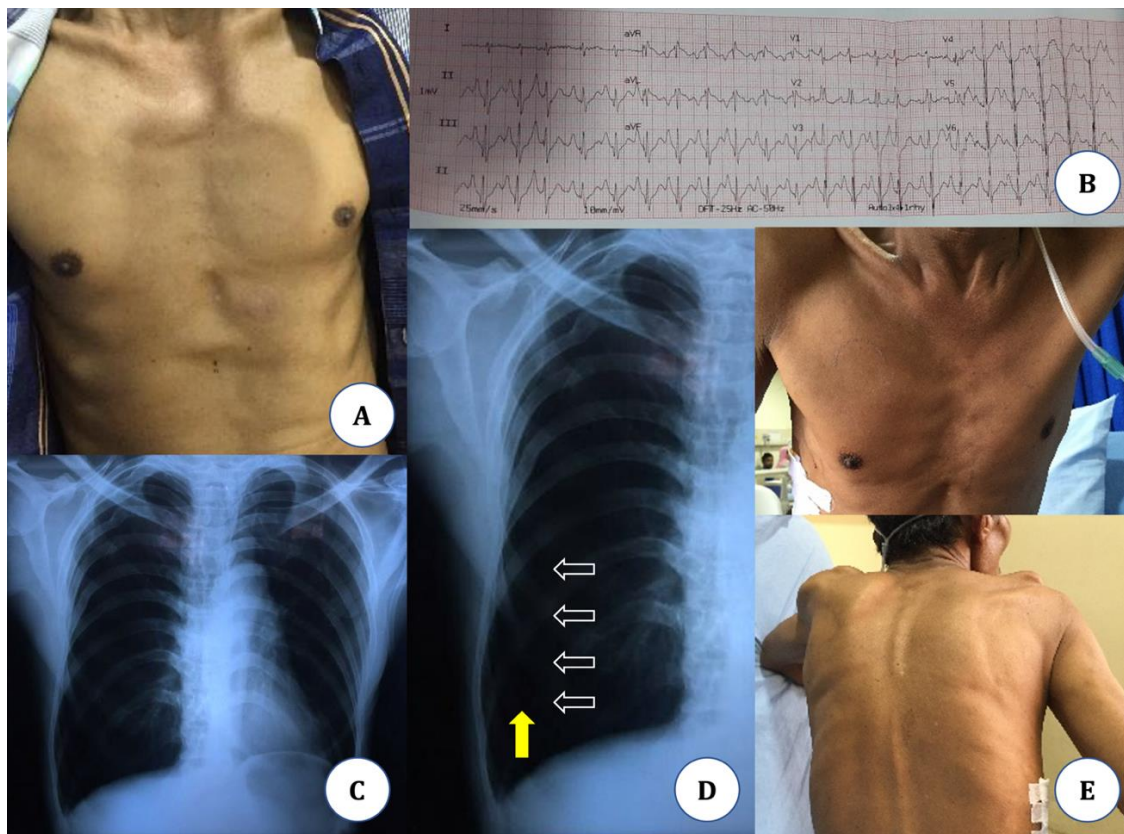


Figure 1. The examination results of spontaneous pneumothorax patients who used excess Nipah leaf membrane cigarettes. (a) Clinical photos of patients; (b) existence of sinus tachycardia, normoaxis, and right atrial enlargement; (c) PA chest radiograph demonstrating a right-sided pneumothorax; (d) Lucsen area (yellow arrow), pleural white line (black arrow), right pneumothorax impression; and (e) patient with water-sealed drainage (WSD) installation.

The result of the patient's physical examination appeared agitated, the lips were dry, and the blood vessels of the neck were dilated. On thoracic examination, the asymmetry of movements of the left chest wall, thorax, abdominal breathing, expanded right and left intercostal spaces, breathing with additional muscles, suprasternal and intercostal

retraction, and intercostal retraction. Inspection of the lungs: asymmetrical when static and dynamic, palpation: pain in the right chest, weakened right lung stem fremitus, percussion: hyper resonance in the right lung, resonance in the left lung, auscultation: decrease in the sound of vesicular breathing in the right lung, and other breathing sounds crackling in both lungs. Laboratory examination revealed hemoglobin (14.5 g/dl), hematocrit (43.5%), erythrocytes ($5.15 \times 10^6/\text{mm}^3$), platelets (343.000/uL), leukocytes ($10.100/\text{mm}^3$). Liver function albumin (2.96 g/dl), kidney function urea (25 mg/dL), creatinine (0.8 mg/dL) and blood sugar (221 mg/dL). Electrolytes: sodium (129 mmol/L), potassium (3.45 mmol/L), chloride (84.55 mmol/L), calcium (9.23 mmol/L). Blood gas analysis: pH (7.210), pO_2 (154 mmHg), pCO_2 (109.5 mmol/L), HCO_3^- 33.9 mmol/L, total CO_2 (46.2 mmol/L), BE (12 mmol/L) and O_2 saturation (99%). Blood gas analysis: pH was decreased, and pO_2 , pCO_2 , HCO_3^- , total CO_2 , and BE were increased, which indicated that the patient had severe partially compensated respiratory acidosis. The patient's ECG revealed sinus tachycardia, 136 beats per minute heart rate, normoxic, and right atrial enlargement (Figure 1b). A chest radiograph taken with the PA system revealed a right-sided pneumothorax (Figure 1c). A lucency region was visible on the patient's chest radiograph, and a collapsed or pleural white line on the right hemithorax suggested a right lung pneumothorax (Figure 1d). Following the primary survey and diagnosis of pneumothorax, the patient was immediately treated for decompression, and the water-sealed drainage system was installed (Figure 1e). At 12 days following WSD installation, the patient reported decreased shortness of breath, increased use of auxiliary muscles for breathing, and was discharged.

3.2 Excessive use of Nipah leaf cigarettes is associated with spontaneous pneumothorax

Pneumothorax is the presence of air seepage on the walls of the chest and lungs. There are two types of pneumothorax, namely pneumothorax due to an increase in air pressure and spontaneous pneumothorax. Secondary spontaneous pneumothorax (PSS) appears due to diseases of the parenchyma of the lungs or obstruction of the respiratory system (Chan, Yu, Kwok, Yeung, & Yu, 2021). Under normal circumstances, the pleural cavity maintains negative pressure on the lungs to prevent them from collapsing while the chest wall expands. The pleural chamber is not filled with air and has a negative pressure of -11 to -12 cm of water on inspiration and -4 to -8 cm of water at the time of expiration. Pneumothorax is most often caused by rupture of visceral blebs or subpleural bulls, often associated with underlying lung disease, most often chronic obstructive pulmonary disease (Tezcan et al., 2021; Tschopp et al., 2015). By type of fistula, the classification of pneumothorax is closed pneumothorax, open pneumothorax, and ventile pneumothorax. Pneumothorax is classified as partial or total pneumothorax based on the extent of the damage. Simple pneumothorax occurs because the pleura is closed and has no connection with the outside. It is a partial pneumothorax because it compresses a small part of the lungs, or <50% of the lung volume (Barnes & Celli, 2019; Yamakawa et al., 2022).

In the cases we find in the field, the main complaint of patients is tightness, which becomes the main symptom of secondary spontaneous pneumothorax (PSS). The tightness occurs due to free air pressure in the pleural cavity, which has implications for tissue damage and inhibition of lung tissue growth (Cortes-Telles et al., 2021; Kawai et al., 2021). The presence of chest discomfort results from friction between the lungs and the chest wall during movement. Concomitant symptoms include hypotension, tachycardia, cyanosis, hypoxemia with or without hypercapnia, and acute respiratory distress (Wang et al., 2022). Clinical findings on physical examination indicate the occurrence of a pneumothorax characterized by reduced or absent breathing sounds, ipsilateral chest expansion, and hyper-resonance. Laboratory results confirmed that the patient had severe partial compensatory respiratory acidosis. Respiratory acidosis occurs due to a decrease in respiration (hypoventilation). This condition leads to an increase in carbon dioxide and a decrease in the pH of the blood. Acid-base disorders appear due to alveolar ventilation and are characterized by hypercapnia ($\text{pCO}_2 > 45 \text{ mmHg}$). High blood acid levels occur due to carbon dioxide, which indicates decreased lung function. Elevated levels of carbon dioxide in the blood affect the central nervous system, making the patient breathe faster and deeper (Huan et al., 2021; Zarogoulidis et al., 2014).

Based on the ECG interpretation, the enlargement of the right atrium, or RAE, is the size of the right atrium due to excessive pressure or volume in the right atrium. This condition generally occurs in patients with chronic COPD. Chest radiography shows the effect of pneumothorax in the right lung based on the Lucsen region and the appearance of a collapsed line or pleural white line on the right hemithorax. Imaging modalities confirm the diagnosis of pneumothorax (erect chest PA radiography, lateral position radiography, expiratory film, supine and lateral radiography, ultrasound, image archiving and communication systems (PCAS), and CT scans with result information on the size of pneumothorax and are used for complex cases (Barnes & Celli, 2019; Desai et al., 2020; Sriram et al., 2022).

As soon as the diagnosis of pneumothorax is established, the patient is decompressed to remove air from the pleural cavity and prevent the possibility of recurrent pneumothorax. Water Sealed Drainage (WSD) as a thoracostomy tube is a therapeutic modality for pneumothorax. The installation of WSD aims to make the end of the tube independent of the air surface and allow air and outside flow into the pleural cavity (Bozkurt et al., 2013; Pradhan et al., 2016; Ravindra M Mehta, Sameer Bansal, & Hariprasad Kalpakkam, 2018). After the installation of the WSD, suction can be carried out periodically or continuously if the lungs cannot expand properly. The pressure usually used ranges from 12 to 20 cm of water. Complications with WSD insertion include empyema, lung lacerations, diaphragmatic perforation, subcutaneous tube insertion, bleeding due to intercostal artery rupture, and pulmonary edema due to a sudden expansion of the lungs (Chan et al., 2021; Cortes-Telles et al., 2021). In this case, we found that smoking a lot of Nipah leaf membrane cigarettes can increase the risk of secondary spontaneous pneumothorax, which causes COPD, especially if smoke a lot (de Smet et al., 2020; Onorato et al., 2022). The content of Nipah leaves burned with tobacco in the form of cigarettes is suspected of having toxic properties that have implications for increasing the severity of secondary spontaneous pneumothorax and

increasing the prevalence of unreported COPD cases in the community (Khattak et al., 2021; Nugroho et al., 2021; Picanço, Limberger, & Apel, 2022). The hope is that more research on the toxicity of Nipah leaves (*Nypa Fruticans*) as a cigarette membrane ingredient needs to be done to reduce similar cases.

4. CONCLUSION

Nipah (*Nypa Fruticans*) is part of the natural resources in Jambi and is widely used by the community. In the cases encountered, using Nipah leaves as cigarette membranes have a negative impact, especially in increasing the severity of secondary spontaneous pneumothorax disease. This is with the discovery of the case, a 57-year-old man with complaints of shortness of breath, right-sided chest discomfort, yellowish-green sputum cough, abdominal pain, nausea, weakness, decreased appetite, and inability to sleep. The man consumed an average of 18 cigarettes per day for 37 years, resulting in an increase in spontaneous pneumothorax disease that causes COPD. The results of the treatment provided can reduce the complaints felt. However, recurrent relapses are very likely to occur if the intensity of smoking is high amount. Thus, the community is expected to eliminate the habit of smoking with Nipah leaf membranes that have toxic properties when used for a long time.

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DECLARATIONS

Ethics approval

Not applicable for case report.

Patient's consent

The authors certify that all necessary patient permission papers have been acquired. The patient (s) has consented in the form for his/her/their photos and other clinical data to be published in the publication. Patients acknowledge that their names and initials will not be published and that reasonable steps will be taken to maintain their privacy.

Conflict of interest

Authors declare no conflict of interest.

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