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Lung Absess With Complication of Bronchopleural Fistula in A Patient With Type 2 Diabetes mellitus at Klungkung Regional Hospital

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Abstract: Lung abscess is a clinical condition characterized by the accumulation of purulent material in the necrotic lung parenchyma. One of the complications is a bronchopleural fistula, which is an abnormal channel that connects the bronchus to the pleural cavity. KS, a 65 years old male, presented with complaints of intermittent shortness of breath for 3 months, which had worsened the day before hospital admission. The patient also reported fever and cough with foul-smelling phlegm for 1 week. Physical examination revealed tachypnea and decreased breath sounds in the right intercostal spaces 3-6. Laboratory examination showed anemia, leukocytosis, and hyperglycemia. A plain chest radiograph revealed a loculated right pleural effusion, with suspected empyema, and a chest CT scan with contrast showed pneumonia with suppurative fluidopneumothorax and fistulation into the bronchus. Examination of the patient's pleural fluid revealed increased ADA test results and isolation of *Candida spp* on culture. Additional tests showed that MTB was not detected, and the IGRA was negative. Patient management included antibiotics, transfusions, and insulin administration. A bronchopleural fistula is a complication of a lung abscess that occurs when a channel forms from the abscess to the bronchus, creating a sinus between the main branch of the bronchus, lobe, or bronchial segment and the pleural space. Management includes controlling infection, treating respiratory dysfunction, and controlling air leaks. A 65-year-old male patient with a history of type 2 diabetes mellitus complained of coughing and shortness of breath for 3 months, which had worsened over the past week. Examination revealed a lung abscess with a bronchopleural fistula. Therapy included antibiotics to eradicate the infection and thoracentesis to treat respiratory dysfunction.

Keywords: Lung abscess, bronchopleural fistula, diabetes mellitus

INTRODUCTION

A lung abscess is a clinical condition characterized by the lung parenchyma containing purulent material, such as debris and infectious fluid, resulting in the formation of a cavity filled with pus, often with an air-fluid level appearance. Along with lung gangrene and necrotizing pneumonia, lung abscess is included in the group of severe lung infections (1).

Epidemiologically, lung abscess is a significant cause of morbidity and mortality, with an incidence of approximately 4-5 per 10,000 hospitalized patients per year. Lung abscess is more common in people aged 60-80 years and occurs more often in men. The high death rate, which previously reached 30-40% before the discovery of antibiotics, is now around 15-20%. Mortality due to abscesses is still categorized as high and varies, ranging from 5-75% in patients with certain conditions, such as nosocomial infections caused by *Staphylococcus aureus*, *Klebsiella pneumoniae*, and *Pseudomonas aeruginosa*. Other risk factors that influence mortality rates include large abscess sizes, neoplasms, and immunocompromised conditions (1,2,3).

Lung abscesses, based on their causes, are divided into primary and secondary. For primary abscesses, the most common cause is pneumonia that does not receive adequate treatment. One of the complications of a lung abscess is a bronchopleural fistula, which is an abnormal channel that connects the bronchus to the pleural cavity or other structures in the body. This complication can occur due to non-optimal treatment of a lung abscess. Treatment for lung abscesses can be divided into conservative management with optimal antibiotics and surgical intervention (4,5).

METHOD

A 65-year-old male with the initials IKS, came to the emergency room at Klungkung Regional Hospital on May 29, 2024, with the main complaint of shortness of breath and a cough with foul-smelling phlegm for the past 7 days. The patient stated that this complaint had been recurring since February 2024. Additionally, the patient had a history of coughing up blood spots and weight loss. The patient also had a history of type 2 diabetes mellitus.

On physical examination, the patient was found to be alert and oriented (E4V5M6), with stable general condition and good nutrition (BMI 22.03 kg/m²). Vital signs examination revealed tachypnea. Lung examination revealed decreased breath sounds in the right intercostal spaces 3-6. Table 1 presents the laboratory examinations results.

Table 1. Laboratory examination results

Parameter	Result		Unit	Normal Range
	25/5	29/5		
Hematology				
Leukocyte	14.96	9.5	10^3/uL	3.5 – 10
Haemoglobin	10.2	7.3	g/dL	10.8 – 16.5
Neutrophils	93.9	87	%	39.3 – 73.7
Lymphocyte	4	9.3	%	18.0 – 48.3
Monocyte	2	30	%	4.4 – 12.7

Eosinophils	0	0.2	%	0.6 – 7.30
Basophils	0.1	0.2	%	0 – 1.70
Eritrocyte	3.99	2.9	10^6/uL	3.5 – 5.5
Hematocrit	32.5	22.7	%	35- 55
MCV	81.6	79.0	fL	81.1 – 96
MCH	24.2	25.6	Pg	27 – 31.2
MCHC	31,4	32.4	%	31.5 – 35
Thrombocyte	530	514	10^3/uL	145 – 450
Liver Function Test				
AST	48.4	24	U/L	8 – 37
ALT	33	27	U/L	13 – 42
Kidney Function Test				
Ureum	47.5	29	mg/dL	10 – 50
Kreatinin	0.77	0.3	mg/dL	0.6 – 1.2
Electrolyte				
Sodium	-	137	mmol/L	135 – 145
Potassium	-	3.9	mmol/L	3.5 – 4.5
Chloride	-	100	mmol/L	95 – 105
Blood Sugar				
Random blood glucose	294	109	mg/dL	80 – 200

A plain chest radiograph showed an infiltrate with a loculated right pleural effusion suspicious for empyema. Subsequently, thoracentesis was performed, revealing 800 ml of pus and free air. The patient was advised to undergo chest tube insertion with a water-seal drainage (WSD), but the patient declined.

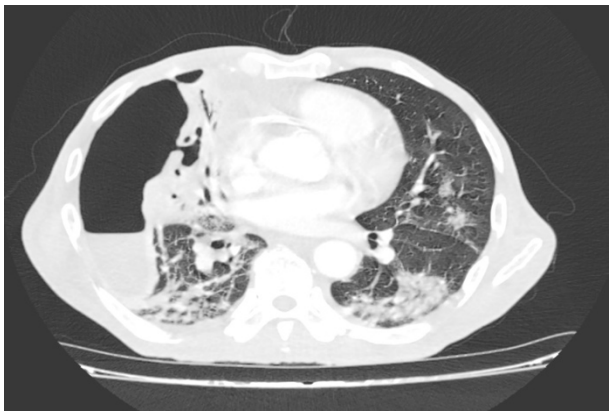

Figure 1. Plain chest x-ray examination of patients at the polyclinic (left) and during hospitalization (right).

A contrast-enhanced CT scan of the thorax then performed for evaluation, revealing a specific impression of a suspected pneumonia process with a loculated suppurative fluidopneumothorax in the middle lobe and visible fistulation into the right middle bronchus

measuring of 6 mm. Surgery was recommended to the patient, but the patient continued to refuse.

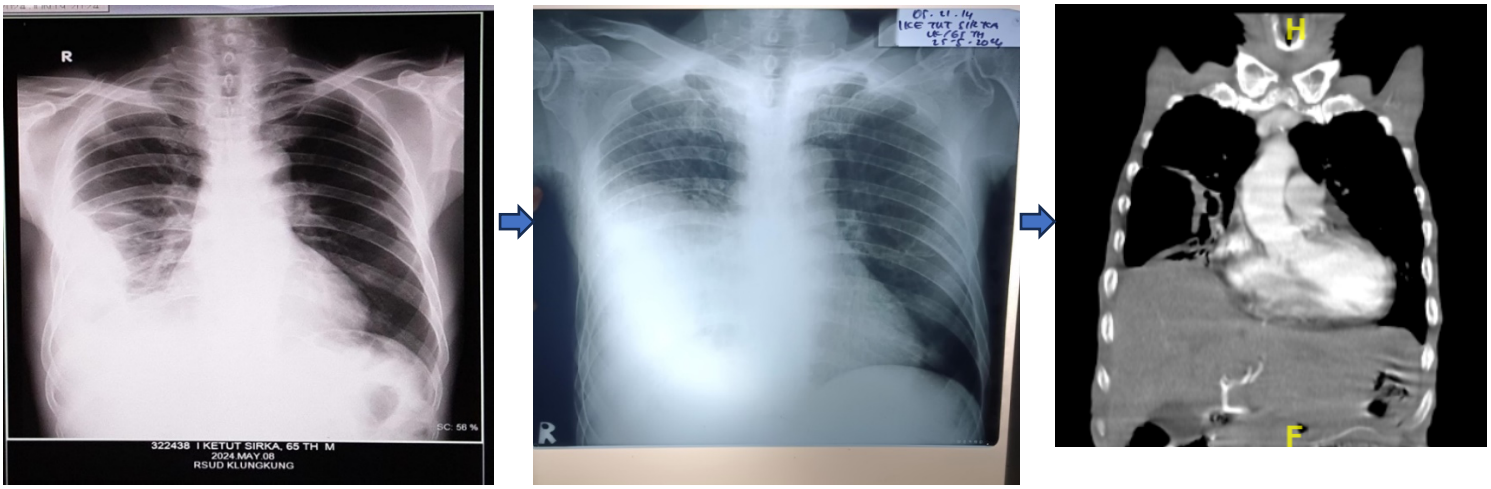

Figure 2. CT scan results of the thorax showing a bronchopleural fistula (arrow)

Other complementary examinations, the pleural fluid test (ADA test) showed > 400 U/L, and the pleural fluid culture revealed *Candida spp*., which sensitive to Fluconazole. Additional tests showed that MTB test was not detected, and the IGRA test was negative.

The patient was treated by Internal Medicine and Pulmonology and Respiratory Medicine departments with a diagnosis of right lung abscess with bronchopleural fistula, type 2 DM, and anemia. Treatment included administering empiric antibiotics, which were then replaced with antifungals according to culture results for 14 days, along with insulin, blood transfusions, and other symptomatic therapies. Due to the patient's refusal to undergo chest tube insertion or surgery, conservative therapy was continued until the patient's condition improved. Subsequently, the patient was discharged with instructions for regular medication, and advised to follow up with the geriatrics and pulmonary clinic for further monitoring.

RESULT AND DISCUSSION

Lung abscess is a microbial infection in the lungs that results in necrosis of the lung parenchyma. Based on duration, lung abscesses are classified as acute (less than four weeks) or chronic (more than four weeks). Based on cause, lung abscesses are categorized as secondary if there are underlying lesions in the lungs, and primary if there are no pre-existing lung lesions (6).

A 65-year-old male patient presented with complaints of cough with a foul-smelling sputum, accompanied by shortness of breath for 3 months, worsening over the past 7 days before hospital admission. The patient also has a history of coughing up blood and weight loss, along with a history of diabetes mellitus. The clinical manifestations of an abscess depend on the size and duration of the infection. Patients generally experience fever, cough with mucosal or purulent sputum, night sweats, and chills. The cough worsens when the patient sleeps on the side opposite the location of the fistula, and a typical sign of this condition is significant fluid production in the water-seal drainage (WSD) within a few days

of treatment. Patients often also complain of pleuritic chest pain, caused by the spread of infection through a bronchopleural fistula (2,7).

Based on the onset of symptoms, the patient was diagnosed with chronic lung abscess due to the symptoms persisting for 3 months. There are several accompanying factors that contribute to lung abscesses, including advanced age, dental infections, alcohol use, illicit drug use, diabetes mellitus, malnutrition, steroid therapy, GERD, and sepsis. The predisposing factors in this patient are advanced age and comorbidities, particularly diabetes mellitus, which can exacerbate and increase the likelihood of a lung abscess (2,7).

On vital sign examination, fever and tachypnea may be present. Lung examination may reveal increased tactile fremitus, crackles, and bronchovesicular sounds on auscultation. Patients with chronic abscesses may also exhibit clubbing of the fingers. Specifically, this patient was found to be tachypneic with decreased breath sounds in the right intercostal spaces 3-6 upon auscultation (1).

Based on the clinical history, physical examination, and laboratory tests, the patient was diagnosed with type 2 diabetes mellitus and a lung abscess accompanied by a bronchopleural fistula. The patient has had diabetes mellitus for the past 5 years, which has been controlled with oral anti-diabetic drugs (OAD). During hospitalization, the patient's OAD regimen was switched to insulin, with a basal insulin dose of 14 IU once daily and a prandial insulin dose of 4 IU three times daily. One of the reasons for transitioning from OAD to insulin therapy is the presence of systemic infection, which induces stress and increases counter-regulatory hormones, leading to elevated blood sugar levels in the patient. Therefore, the patient's therapy was changed from oral medications to insulin (15).

This patient's history of diabetes mellitus can be a risk factor that compromises the body's immune system, leading to infections such as lung parenchymal infection, known as pneumonia. A complete blood count revealed leukocytosis, indicating systemic infection. Subsequently, a chest x-ray showed impressions of right pleural effusion and pneumonia. Initially, during the thoracic x-ray examination at the clinic, the patient was in stable condition, with images showing pneumonia and effusion in the right lung. However, the clinical condition deteriorated, prompting a repeat chest x-ray that revealed signs suggestive of an abscess, indicating a lesion in the lung. This condition, resulting from lung lesions, is classified as a primary lung abscess, a complication that can arise if pneumonia is inadequately treated (14).

After thoracentesis was performed, the pleural fluid culture revealed *Candida spp.* and gram-positive coccus bacteria as the sources of infection. Lung abscess due to Candida infection is rare but can occur in immunocompromised patients, such as those with a history of diabetes mellitus, which categorizes them as immunocompromised and at risk for Candida-induced lung abscesses. Changes in cell-mediated immunity and decreased natural killer cell activity increase the susceptibility of these patients to secondary fungal infections (8).

The patient presented with a lung abscess along with a bronchopleural fistula. Treatment for lung abscesses typically involves three therapeutic strategies: infection control, management of respiratory dysfunction, and controlling air leaks. Antibiotic therapy is the primary treatment of choice, but approximately 10% of patients may require drainage and surgical intervention if antibiotic therapy proves ineffective (9,10,11). The presence of a bronchopleural fistula is an acute indication for surgery in cases of lung abscess. Other acute indications for surgery include hemoptysis, sepsis, prolonged fever, and a ruptured abscess leading to pyopneumothorax or empyema. Chronic indications for surgery in lung abscess

cases include treatment failure after 6 weeks, suspicion of malignancy, cavities larger than 6 cm, and persistent leukocytosis despite adequate antibiotic therapy (2). Lobectomy is considered for centrally located large lung abscesses, while video-assisted thoracoscopy (VATS) is suitable for peripherally located abscesses without pleural adhesions or fibrothorax. Surgical outcomes depend on the patient's overall health and immune status. Elderly patients, individuals with malnutrition, and those with alcoholism tend to have poorer prognoses. The mortality rate after surgery ranges from 11% to 28%. (2).

CONCLUSION

It has been reported that a 65-year-old male patient presented with complaints of a cough accompanied by shortness of breath, which had persisted for 3 months and worsened over the past 7 days. The patient also has a history of diabetes mellitus with routine treatment. Based on the history, physical examination, and supporting examinations, the patient was diagnosed with a lung abscess with a bronchopleural fistula, accompanied by diabetes mellitus. The patient was treated with antibiotics to eradicate the infection and thoracentesis to address respiratory dysfunction.

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