Bronchiectasis in Geriatric Patients: Adaptation of Diagnosis and Management in the Context of Advanced Age

Khansa Tsabitah Aulia[1*] , Prasetyaning Estu Pratiwi[1]

[1]Faculty of Medicine, Universitas Pembangunan Nasional Veteran Jawa Timur

Corresponding Author

Khansa Tsabitah Aulia

Faculty of Medicine, National Development University "Veteran" East Java

Rungkut Madya Number 191, Rungkut Kidul, Rungkut, Surabaya, East Java 60293

Tel/Fax: +628981958343

Email: 23091010027@student.upnjatim.ac.id

ABSTRACT

Introduction: Bronchiectasis is an abnormal and permanent dilation of the bronchi caused by chronic inflammatory processes or recurrent infections. This condition can aggravate the patient's respiratory status, especially if it is accompanied by complications.

Case Description: A 70-year-old man came in with complaints of chronic cough with phlegm and increasingly severe shortness of breath. No history of tuberculosis or other systemic diseases was found. Thoracic photos and CT scans show a picture of bronchiectasis with honeycombing leading to pulmonary fibrosis. Laboratory tests showed leukocytosis, increased urea and creatinine, and impaired liver function. The patient received injectable moxifloxacin antibiotic therapy followed by oral ciprofloxacin, as well as other supportive therapies. Clinical improvement begins to be seen after a few days of treatment.

Discussion: Bronchiectasis in the elderly is often a challenge due to symptoms that overlap with other lung diseases as well as the presence of comorbidities. The absence of a definitive cause in these patients led to the diagnosis of idiopathic bronchiectasis. The honeycombing findings on imaging indicate the possibility of pulmonary fibrosis aggravating the condition. Prompt and appropriate management is essential to prevent disease progression.

Conclusions: Idiopathic bronchiectasis with complications of pulmonary fibrosis is a rare and challenging case in diagnosis and management. A thorough radiological and laboratory examination is helpful in establishing the diagnosis and determining the optimal therapy.

Keyword: Bronchiectasis, Diagnosis, Geriatric, Management.

Introduction

Bronchiectasis is a chronic airway disease characterized by permanent dilation of the proximal bronchi (>2 mm in diameter), due to damage to the muscles and elastic tissues of the bronchial wall. This condition can be congenital due to impaired bronchial development since birth, but it is more often acquired due to a secondary airway infection that causes structural damage. The main symptoms include chronic cough, persistent phlegm production, and recurrent exacerbations. Radiologically, it was found that there was a thickening of the bronchial wall, a loss of normal narrowing (tapering), and a widening of the airway to the periphery of the lungs. [1,2]

Bronchiectasis is a heterogeneous disease, meaning it has many causes, different types of germs, varying severity, and response to treatment that is not always the same. The main goal of the treatment of bronchiectasis is to prevent exacerbations, alleviate symptoms, improve quality of life, One of the important parts in the course of the disease is exacerbation, that is, episodes of periodic worsening of symptoms, which are generally triggered by bacterial, viral or fungal infections. This exacerbation has a major impact because it is associated with a decrease in quality of life, an increased risk of hospitalization and death, and a progressive decline in lung function.[3]

Bronchiectasis is more common in women. The age range of sufferers is mainly in middle age and increases in old age. In Indonesia, there are no reports of exact numbers of this disease, but it is quite often found in clinics or hospitals. Elderly men with bronchiectasis have a higher risk of death compared to women and the general population, mainly due to the presence of related comorbidities such as COPD, asthma, pneumonia, and cardiovascular diseases commonly found in old age. Older age factors are independently associated with an increased risk of death, and studies show that mortality is higher in the elderly with bronchiectasis, in line with findings in other chronic lung diseases. Therefore, special attention is needed for the management and supervision of the elderly with bronchiectasis to reduce the risk of mortality.[1,4]

Case Presentation

A 70-year-old male patient came to the Emergency Unit (ER) with the main complaint in the form of shortness of breath and a persistent cough that appeared after his return from Umrah. When the initial examination was carried out, the patient's oxygen saturation was below 95%, so oxygen therapy through the cannula was immediately given.

The patient then undergoes a thoracic radiology examination and laboratory analysis to assess the clinical condition thoroughly. Laboratory results showed a decrease in hemoglobin (Hb) levels to 11.4 g/dL, a drastic increase in blood precipitation rate (LED) to 118 mm/h, segmental neutrophils increased to 86%, accompanied by lymphocytopenia (8% lymphocytes) and a decrease in erythrocyte count to 3.7 million/µL. Liver function showed a significant increase in SGOT up to 105 U/L and SGPT to 64 U/L. Renal function showed creatinine 1.64 mg/dL, eGFR decreased to 44 mL/min/1.73 m^2, and BUN increased to 44.1 mg/dL. Serum potassium levels also decreased drastically to 2.5 mmol/L, indicating the presence of severe hypokalemia.

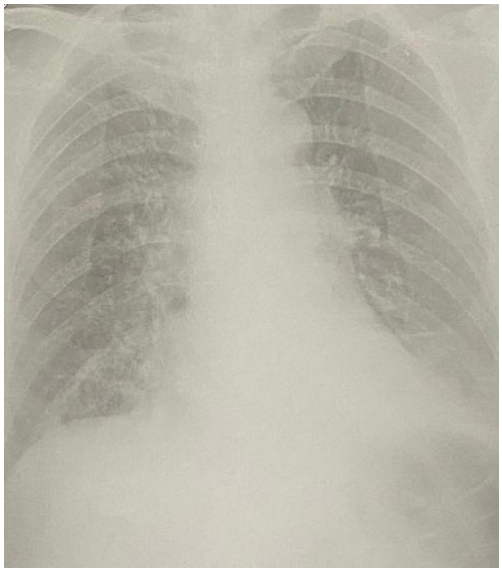

Figure 1. Thoracic radiological examination.

Patients have been recommended to undergo inpatient treatment considering their advanced age, the presence of symptoms of shortness of breath, as well as the results of examinations that indicate the possibility of severe lung infection with complications. However, the patient refused to be hospitalized. Therefore, patients are given outpatient therapy in the form of fluoroquinolone antibiotics, namely Moxifloxacin 400 mg, and other symptomatic drugs according to existing complaints.

Then, the patient performs a follow-up check to a pulmonologist and is advised to perform a repeat thoracic radiology examination. The thoracic photograph showed a honeycombing picture of the right and basal parahiler regions of the right and left lungs, leading to the possibility of pulmonary fibrosis or advanced interstitial lung disease.

As a follow-up to therapy, the patient was given the antibiotic Ciprofloxacin HCl 500 mg with a dose twice a day for 10 days, accompanied by the administration of other symptomatic medications according to the complaints that were still felt. Patients are advised to undergo a Rapid Molecular Test (TCM) on sputum to detect the presence of Mycobacterium tuberculosis. However, this examination is constrained because the patient has not expelled sputum significantly, making it difficult to obtain a sample.

Based on the anamnesis, the patient had a productive cough that lasted more than a month with mucoid phlegm, sometimes mixed with purulent. The cough is quite annoying so that the patient has to sit down when going to sleep. In addition, patients reported a weight loss of 4 kg in less than a month. The patient stated that the environment in which he lived was poorly ventilated, exercised regularly twice a week, and had no previous history of chronic diseases. Family history recorded that the patient's wife died from gastric disease. The patient is a retiree, with the habit of not smoking or consuming alcohol.

Discussion

Bronchiectasis in the geriatric population shows clinical manifestations that are generally similar to those experienced by adult patients in younger age groups. The most dominant symptom is cough, which is reported to occur in about 98% of elderly patients with bronchiectasis. In addition, approximately 73% of them have a cough that is chronic or lasts every day. [5] *Patients previously experienced a severe cough, especially during the exacerbation phase of the disease. However, after undergoing therapy, cough complaints gradually improved. Currently, patients still experience daily coughing, but their intensity and frequency have decreased significantly and no longer interfere with daily activities or the patient's overall quality of life.*

The volume of sputum produced in geriatric-aged bronchiectasis patients is generally less compared to younger adult patients. Most geriatric patients, about 69%, are known to produce sputum in amounts of less than 10 mL per day. In contrast, in the younger adult group, the volume of sputum production tends to be higher, ranging from 10 to 150 mL per day. [5] *In the exacerbation*

phase, the patient had produced a considerable amount of sputum, which was consistent with an active inflammatory process in the airways. However, after getting adequate therapy, the symptoms of exacerbation show significant improvement. In less than five days after treatment begins, the volume of sputum produced decreases drastically. At this time, the patient is no longer even able to expel sputum, which indicates a good therapeutic response as well as reduced bronchopulmonary inflammatory activity.

In geriatric populations, the etiology of bronchiectasis is most idiopathic, with a prevalence of about 29%. The next most common causes are bronchiectasis after pulmonary tuberculosis (post-pulmonary tuberculosis) at 21%, and chronic obstructive pulmonary disease (COPD) which is close to 19%. In comparison, in the younger adult group, idiopathic causes also dominate with a higher proportion, at about 44%, followed by asthma at 21%. These data suggest that idiopathic etiology remains the leading cause of bronchiectasis in the elderly population, although the contribution of diseases such as tuberculosis and COPD is also quite significant in this group.[5] *In patients, although no definite history of tuberculosis was found and confirmation was not obtained through Molecular Rapid Test (TCM) examination due to difficulties in obtaining sputum, the possibility of recurrent lung infections or previously unidentified chronic inflammatory processes remains a consideration. The radiological picture in the form of honeycombing also strengthens the suspicion of long-term structural lung damage. Taking into account the absence of a history of asthma, smoking, or other systemic diseases, it is most likely that in these patients, bronchiectasis is idiopathic, as it is most commonly found in the elderly population.*

The use of antibiotics in the elderly requires special attention because physiological changes due to aging can affect the pharmacokinetics of the drug, as well as the high risk of polypharmaceuticals and drug interactions. Macrolide antibiotics, such as azithromycin, have been used to reduce the frequency of exacerbations with fairly promising results. In addition to having anti-inflammatory effects, macrolides are considered relatively safe to use in the long term, as long as monitoring is carried out strictly. However, high levels of resistance remain a concern, as Streptococcus pneumoniae resistance to azithromycin is reported to be 88%, so its use should be adjusted to periodic evaluation of the patient's clinical condition.[6]

Meanwhile, moxifloxacin, an antibiotic of the fluoroquinolone group, offers another advantage that is relevant for the elderly. The drug has good penetration of lung tissue, can be administered orally once a day, and requires only a short duration of therapy (5 days), thus

improving patient adherence. Studies show that the effectiveness of moxifloxacin reaches 90.9% in the age group of 56–80 years and even 100% in the age group of 35–55 years, higher than ceftriaxone. However, its use still needs to be monitored, especially because of the potential for QT interval prolongation in the elderly with cardiovascular comorbidities. [7] *In these patients, the administration of moxifloxacin 400 mg as antibiotic therapy was selected taking into account advanced age and complex lung conditions. Although there has been no confirmation of specific bacterial infections due to difficulty obtaining phlegm for Molecular Rapid Tests (TCMs), the use of moxifloxacin with broad spectrum and good penetration of lung tissue is essential to address the possibility of severe lung infections or exacerbations of undiagnosed chronic lung disease.*

Ciprofloxacin in inhaled form (ciprofloxacin DPI) has been used effectively for bronchiectasis patients with chronic Pseudomonas aeruginosa infection. This drug has been shown to be able to extend the exacerbation-free time and decrease its frequency. However, in some elderly people, there is an increase in MIC values for ciprofloxacin, which indicates potential long-term microbial resistance. This demonstrates the importance of patient selection and close monitoring during use, as well as periodic evaluation of its effectiveness and side effects. *After further evaluation, the patient was given a follow-up of antibiotics with Ciprofloxacin HCl 500 mg twice daily for 10 days, which is effective against common pathogens in bronchiectasis, particularly Pseudomonas aeruginosa. The selection of ciprofloxacin also takes into account the drug's ability to prolong exacerbation-free time and reduce the frequency of recurrence, although the risk of resistance and side effects in the elderly should always be closely monitored.* [6]

Conclusion

Bronchiectasis is a chronic airway disease characterized by permanent dilation of the bronchi due to structural damage, which is often acquired as a result of repeated airway infections. In the elderly population, bronchiectasis shows typical manifestations with chronic cough, varied sputum production, as well as an increased risk of exacerbation and mortality due to accompanying comorbidities. The case of a 70-year-old male patient shows how bronchiectasis can develop progressively with typical symptoms and systemic complications, including impaired kidney, liver, and electrolyte function. Management with broad-spectrum antibiotics such as oral moxifloxacin and ciprofloxacin showed a good response to symptoms, although confirmation of the etiology of infection has not been obtained due to diagnostic limitations. Radiological imaging of

honeycombing indicated the possibility of advanced pulmonary fibrosis, and in the absence of a history of other systemic diseases, bronchiectasis in these patients was likely idiopathic. Treatment in the elderly requires strict monitoring and an individualized approach to prevent disease progression and improve patients' quality of life.

References

1. Yumna MII, Mayasari HN. A MAN WITH BRONCHIECTASIS AND A HISTORY OF TUBERCULOSIS. Continuing Medical Education. 2022 Sep; 755–63.
2. Barbosa M, Chalmers JD. Bronchiectasis. Vol. 52, Medical Press. 2023.
3. Aksamit TR, Lapinel NC, Choate R, Feliciano J, Winthrop KL, Schmid A, et al. Association between bronchiectasis exacerbations and longitudinal changes in FEV1 in patients from the US bronchiectasis and NTM research registry. Respir Med [Internet]. 2024;228:107660. Available from: https://www.sciencedirect.com/science/article/pii/S0954611124001343
4. Choi H, Yang B, Kim YJ, Sin S, Jo YS, Kim Y, et al. Increased mortality in patients with non cystic fibrosis, bronchiectasis with respiratory comorbidities. Sci Rep. 2021 Dec 1; 11(1).
5. Zhou Y yan, Wang Y hong, He S qi, Wang W ying, Wang X yue, Li D shuai, et al. Gender differences in clinical characteristics of patients with non-cystic fibrosis bronchiectasis in different age groups in northern China. Clinical Respiratory Journal. 2023 Apr 1; 17(4):311–9.
6. Inchingolo R, Pierandrei C, Montemurro G, Smargiassi A, Lohmeyer FM, Rizzi A. Antimicrobial resistance in common respiratory pathogens of chronic bronchiectasis patients: A literature review. Vol. 10, Antibiotics. MDPI AG; 2021.
7. Anum ilyas, Hafeez-ud-din, Hina Saghir, Zunera Jahanzeb, Fibhaa Syed, Yagana Iqbal. Comparison of Efficacy of Moxifloxacin and Ceftriaxone in Acute Exacerbation of Chronic Obstructive Pulmonary Disease. Annals of PIMS-Shaheed Zulfiqar Ali Bhutto Medical University. 2023 May 31; 19(2):157–61.