

**BRONCHIECTASIS IN TREATMENT FAILURE OF PULMONARY TUBERCULOSIS PATIENTS WHO NEEDS LONG TERM OXYGEN THERAPY / LTOT****Eka Wahyuningtias**

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ABSTRACT Tuberculosis is caused by the bacillus *Mycobacterium tuberculosis*, a member of the mycobacterium family. A 35-year old male came to the emergency room with progressive dyspnea and cough. The patient has a history of hospitalization with the same symptom and is receiving advanced anti tuberculosis drugs (2FDC 1x3 tab) in the 3th month. At that time, patient was diagnosed with pulmonary tuberculosis treatment failure. Based on the clinical, the chest X-Ray, and BTA, patient was declared to have failed anti-tuberculosis drugs, anti-tuberculosis drugs was repeated with 4FDC 1x3 tab. Patient treated with acetylmide 1x250 mg was given during 6 months. The chest CT shows several bullae with a giant bulla, Old inactive duplex pulmonary TB with fibrosis, bronchiectasis and some cystic. According to the guidelines from WHO definitions of treatment outcomes about treatment failed is a TB patient whose sputum smear or culture is positive at month five or later during treatment. Maintenance therapy with azithromycin in Cystic Fibrosis, is associated with reduced pulmonary exacerbations and improved pulmonary function. Some chronic respiratory diseases can cause hypoxemia and, in such cases, long-term home oxygen therapy (LTOT) is indicated as a treatment option primarily to improve patient quality of life and life expectancy.

KEYWORDS : Tuberculosis, Bronchiectasis, Azithromycin, LTOT.**INTRODUCTION**

Tuberculosis (TB) remains a major global health burden. Tuberculosis has been known to man for many centuries and is caused by the bacillus *Mycobacterium tuberculosis*, a member of the mycobacterium family. In contrast to the microbiologic cure, up to half of TB survivors suffer from lung function decline and lower quality of life after TB treatment. Pulmonary impairment includes airflow obstruction as well as a restrictive ventilatory defect, which can be explained by TB-associated lung pathologies such as pulmonary cavitation, bronchiectasis, and fibrosis (Kim, T., Lee, H., et al. 2021).

METHOD

This study is a descriptive case report of a patient with bronchiectasis secondary to treatment failure of pulmonary tuberculosis requiring Long-Term Oxygen Therapy (LTOT). The patient was treated at RSPPN Soedirman Kemhan, Indonesia, from April 2025 to May 2025.

Clinical data were obtained retrospectively from the patient's medical records, medical history, physical examination findings, laboratory investigations, microbiological tests, radiological imaging, arterial blood gas analysis, oxygen saturation measurements, treatment history for pulmonary tuberculosis, and subsequent management of bronchiectasis.

The diagnosis of bronchiectasis was established based on clinical manifestations and high-resolution computed tomography (HRCT) findings demonstrating irreversible bronchial dilatation consistent with post-tuberculosis structural lung disease. The indication for Long-Term Oxygen Therapy (LTOT) was determined according to international recommendations for chronic hypoxemic respiratory failure, including persistent hypoxemia confirmed by arterial blood gas analysis and/or pulse oximetry.

Patient management included oxygen therapy, pharmacological treatment, and regular follow-up to evaluate clinical status and oxygen requirements. Written informed consent was obtained from the patient for publication of this case report and accompanying clinical information. Patient confidentiality was maintained by removing all personal identifiers. This case report was prepared according to the case report Guidelines.

Case Illustration

A 35-year old male came to the emergency room with progressive dyspnea and cough which had gotten worse 4 days prior. The patient reported dyspnea on effort, orthopnea. The patient has a history of hospitalization with the same symptom and is receiving advanced anti tuberculosis drugs (2FDC 1x3 tab) in the 3th month. The patient body weight in the emergency room was 50 kg with a height of 165 cm, IMT 18.37. During physical examination in the Emergency Room, patient awareness composmentis, blood pressure 110/80 mmHg, had a

temperature of 37,0 C, a heart rate 148 bpm, a respiratory rate of 30 rpm, and an SpO2 level of 86%, responded well to NRM oxygen, SpO2 increased to 97%. On auscultation, bilateral coarse crackles was heard. The blood test results were:

Table 1. Laboratories of Patient

Test	Result	Pred
Haematology		
Haemoglobin	12.9	14.0-18.0
Haematocrit	38 %	40-54 %
Leucocyte	19.8 103	4.5-11.5
Thrombocyte	560 103	132-356
MCV	86 fL	80-94 fL
MCH	29 pg	26-32 pg
MCHC	34 g/dL	32-36
Basophil	0.7 %	0-2 %
Eosinophil	0.6 %	1.0-3.0 %
Lymphocyte	13.3 %	18.0-42.0
Monocyte	7.3 %	2.0-11.0
Neutrophil	78.0 %	50.0-70.0

On chest X-Ray: Old duplex pulmonary TB, cloudy opacity in the left lower lung field, minimal bilateral pleural effusion, suggestive of right lung bulla, suspected right lung bronchiectasis, normal heart.

**Figure 1. Chest X-Ray of the Patient**

The patient was assessed with TB Paru on therapy in the 3th month and Syndrome Obstructive Post Tuberculosis. The patient was treated with levofloxacin 1x750 mg, inj. Ceftriaxone 1x2 gr, inj. omeprazole 2x4 mg, theobron 2x1 amp, nebul combivent 3x/hr, RH 450/300, Vit B6 1x25 mg, Vit D3 1x5000 iu. After 7 days of treatment, the patient shows improvement, coughing has decreased, and dyspnea has also decreased. Hemodynamics are stable and the patient has education to continue using oxygen at home. The patient can be outpatient care.

On the next months the patient came again to the emergency room (26/04/2025) with progressive dyspneu which had gotten worse since 1 day prior. The patient reported dyspneu on effort, orthopnea, productive cough and 10 kg of weight loss over a period of 6 months. The patient body weight in the emergency room was 50 kg with a height of 165 cm, IMT 18.37. The patient reported no fever, no vomiting, eating and drinking normal. In the last 4 months, the patient was hospitalized 5 times with the same symptom as the history of Pulmonary TB and is currently undergoing OAT treatment in the 6th month. During physical examination in the Emergency Room, patient awareness composmentis, blood pressure 118/74 mmhg, had a temperature of 36.3 C, a heart rate 121 bpm, a respiratory rate of 28 rpm, and an SpO2 level of 78% room air responded well to NRM oxygen, SpO2 increased to 98% and pulse to 104x/mnt. On auscultation, bilateral coarse crackles was heard. The blood test results were:

Table 2. Laboratories of Patient

Test	Result	Pred
Haematology		
Haemoglobin	13.8	14.0-18.0
Haematocrit	43	40-54
Leucocyte	11.2 103	4.5-11.5
Thrombocyte	283 103	132-356
MCV	89 fL	80-94 fL
MCH	29 pg	26-32 pg
MCHC	32 g/dL	32-36
Basophil	0.5 %	0-2 %
Eosinophil	5.0 %	1.0-3.0 %
Lymphocyte	17.3 %	18.0-42.0
Monocyte	6.2 %	2.0-11.0
Neutrophil	71.0 %	50.0-70.0
Blood Chemistry		
Glucose	108 mg/dL	<140 mg/dL
AFB Examinations		
Substances	Sputum	
Result of the AFB on day 1	Scanty (5)	
Result of the AFB on day 2	Scanty (5)	
Sputum Gram Examinations		
Substances	Sputum	
Batang gram (-)	Not detected	
Coccus gram (+)	Detected	
Leucocyte	>25 / LP	
Epitel	3-5 / LP	
Arterial Blood Gas (ABG)		
A	79.5	
BEb	3.8	-2.0-3.0
PO2/FIO2	1073	
pH	7.34	7.37-7.45
PCO2	56.7	35-45
PO2	224	83-108
HCO3	30.6	22-28
TCO2	32	23-27
SO2	100 %	95-98

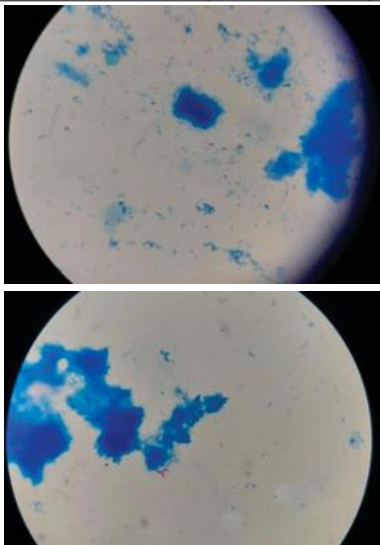


Figure 2. AFB Examinations of the Patient

The results of the ABG indicate that the patient is experiencing acidemia, with respiratory acidosis partially compensated by metabolic alkalosis. In the AFB examination, the result was Scanty (5) where 5 Acid Fast Bacilli were found in 100 fields of view. On chest X-Ray, show duplex old lung TB, fibrocalsification dominant, suspect active, relative opacity of multiple nodular in the lower right lung (suspect pleural thickening), minimal bilateral pleural effusion, suggestive giant bula in the upper right lung, suspect right lung bronchiectasis, a normal heart.



Figure 3. Chest X-Ray of the Patient

The patient was assessed with Bronchiectasis, Treatment Failure of Pulmonary Tuberculosis, Long Term Oxygen Therapy. The patient was treated with Inj. Meropenem 3x1 gr, inj. Resfar 1x2 gr, inj Omeprazole 2x40 mg, inj Hydrocortison 2x1 amp, Azitromicin 1x250 mg tablet, codein 3x20 mg, theobron 2x1 tablet, nebul combivent 4x/hr, treatment failure tuberculosis 4FDC 1x3 tab, Vit B6 1x25 mg, Vit D3 3x1000 iu. Based on the clinical, the results of the chest X-Ray, and BTA, this patient was declared to have failed anti-tuberculosis drugs, anti-tuberculosis drugs was repeated with 4FDC 1x3 tab. Patient treated with acytromicin 1x250 mg was given during 6 months. On the 9th day of treatment, the patient said the tightness and cough had decreased and can be outpatient care at 5/05/2025. Patient planned ct thorax at the time of control.



Figure 4. CT Thorax of the Patient

During the outpatient check-up, the patient was scheduled for a CT thorax with the results, Multiple bullae with giant bullae in the superior lobe of the right lung, reaching a diameter of +/- 8 cm, A representation of a tree in but sign the characteristic of pulmonary tuberculosis with fibrosis, there are distinctive signet ring sign and bunch of grapes sign in bronchiectasis. During the check-up, the patient showed significant clinical improvement.

DISCUSSION

In a research article was done in Hunan Province, China states that risk factors associated with an unsuccessful TB treatment outcome shows results of univariable and multivariable logistic regression models and factors associated with an unsuccessful treatment outcome. In the univariable analysis, demographic factors such as male sex, increasing age, occupation (i.e. agriculture housekeeping, childcare, retired and un-employed) and year of enrolment; and clinical factors such as severe illness, non-systematic management and supervision process were significantly associated with unsuccessful TB treatment outcomes (Gilmour, B., Xu, Z., et al. 2022).

In this patient, symptoms of prolonged cough, shortness of breath, and weight loss were previously observed. A thorax photo and TCM were performed, yielding a positive result for drug-sensitive TB. Then, TB treatment was started with 4FDC 1x3 tablets based on body weight for 6 months. According to the patient's statement, during the treatment until the 6th month with 2FDC 1x3 tablets, the patient did not adhering to medication, resulting in ongoing symptoms of shortness of breath and persistent cough up to now.

The 2021 treatment outcome definitions will address several programmatic implementation challenges. The most important change of the definitions is that the new definitions of "treatment failed", "cured" and "treatment completed" apply to both DS-TB and DR-TB, to treatment regimens of different lengths and those without a clear distinction between intensive and continuation phases "Treatment failed" is now defined as a permanent regimen change due to no response to treatment (bacteriologically or clinically), an adverse drug reaction or amplification of drug resistance. No time limit applies to "no treatment response", which allows treatment failure to be defined during any stage of treatment. In addition, the assessment of "no treatment response" does not rely only on bacteriological (Linh, NN., et al. 2021). According to the guidelines from WHO definitions of treatment outcomes about treatment failed is a TB patient whose sputum smear or culture is positive at month five or later during treatment (Abdu M, Balchut A, et al. 2020).

The patient, after several hospitalizations, underwent a smear test for AFB in the sixth month with a result of scanty AFB (5). At that time, the patient was diagnosed with pulmonary tuberculosis treatment failure. The patient was given TB medication from the beginning again with 4FDC 1x3 tablets based on body weight.

Bronchiectasis is a chronic disorder characterized by irreversible dilation of the bronchi accompanied by inflammatory processes in the respiratory system, particularly in the bronchial walls and the surrounding lung parenchyma. Bronchiectasis can occur without prior disease but often is a complication of previous lung infections such as bacterial TB infection or due to underlying systemic diseases. The primary clinical manifestations of bronchiectasis are recurrent, chronic, or refractory respiratory tract infections that lead to chronic airway obstruction and progressively impaired breathing, resulting in a loss of lung function. Patients with bronchiectasis also experience signs and symptoms such as chronic cough, hemoptysis (coughing up blood), sputum production, shortness of breath, wheezing, localized rhonchi, muscle spasm of accessory respiratory muscles, chest pain, and weight loss (Pratama, AD. 2021).

During TB treatment, the patient was hospitalized several times with recurring shortness of breath, productive cough, with auscultation examination in the emergency department showing bilateral rhonchi, and SpO₂ desaturation that improved with the administration of NRM Oxygen. Upon chest X-ray examination, old lung TB duplex was found, with dominant fibrocalsification, suspected active disease, relative opacity of multiple nodules in the lower right lung (suspected pleural thickening), minimal bilateral pleural effusion, suggestive giant bulla in the upper right lung, suspected right lung bronchiectasis.

Maintenance therapy with azithromycin in Cystic Fibrosis (CF), is associated with reduced pulmonary exacerbations and improved pulmonary function. Azithromycin maintenance therapy is included in the guidelines for CF patients aged ≥ 6 years of age and is currently widely used. The beneficial effect of azithromycin in patients with CF is thought to emerge from a combination of its antibacterial activity as well as its anti-inflammatory and immune-modulatory properties (Nijland, A.M., et al. 2021). This prospective, open-label and randomised controlled trial be conducted in the First People's Hospital of Jiashan, China. Eligible patients with high-resolution CT defined

NCFB will be randomly divided into three groups, which will receive either 250 mg daily azithromycin, or 500 mg three-times-weekly azithromycin or no treatment for 6 months. They will be followed up for another 6 months without treatment.

At last, azithromycin was found to be more efficient than roxithromycin and erythromycin in preventing exacerbation of NCFB in systematic review. Regarding regimen, those two dosing regimens of azithromycin had been tested in BAT and EMBRACE study, respectively, and both reduced exacerbations significantly (Mao, Y., Chen, L., et al. 2021). Other Guidelines for Infection Treatment in Adults with Cystic Fibrosis using recommended therapy azithromycin 500 mg three times weekly orally (250 mg three times weekly if <40 kg) (Shaw, A., Hill, K. 2023).

Based on the patient's symptoms, examinations, and supporting tests, the patient is concluded to have pulmonary tuberculosis that failed therapy and is suffering from bronchiectasis, and was given additional therapy with azithromycin 1x250 mg for 6 months.

Some chronic respiratory diseases can cause hypoxemia and, in such cases, long-term home oxygen therapy (LTOT) is indicated as a treatment option primarily to improve patient quality of life and life expectancy. LTOT is indicated for patients with persistent severe hypoxemia who are clinically stable and have been on optimal drug therapy for at least one month. Those who are clinically unstable, for example, after a recent exacerbation, should receive temporary oxygen supplementation until clinical reassessment 1-3 months after decompensation, since approximately 50% will not require LTOT at follow-up. It is recommended that all patients assess the need to increase the oxygen flow rate during exercise and sleep.

Patients during outpatient treatment are advised to use oxygen with a nasal cannula at 3 lpm at home as Long Term Oxygen Therapy to improve quality of life and exercise performance, as well as to reduce morbidity and mortality rates.

CONCLUSION

As medical officers, we have a duty to remind patients to comply with their medication, and the role of PMO (The supervisor swallows the medicine) is important to supervise TB Patients. As doctors, we must educate patients about the risks of non-compliance with their medication.

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