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(CASE REPORT)

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Case Report: Radiographic findings of pulmonary tuberculosis in a young adult female patient at a type D Hospital

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Abstract

Background: Tuberculosis (TB) is a chronic infectious disease caused by Mycobacterium tuberculosis and remains one of the leading causes of morbidity and mortality in Indonesia. Early diagnosis of pulmonary TB is often delayed because the initial symptoms resemble those of common respiratory tract infections. Chest radiography plays a crucial role in facilitating early identification and confirmation of TB diagnosis, particularly in healthcare facilities with limited resources such as type D hospitals.

Objective: To report a case of a young adult female patient with chronic respiratory symptoms confirmed as active pulmonary tuberculosis through radiography and sputum examination.

Methods: This descriptive case report was compiled based on data from medical history, physical examination, chest radiography, and sputum smear microscopy results.

Results: A 21-year-old female patient presented with complaints of bloody cough, shortness of breath, weight loss, and fever for two months. Chest X-ray results showed infiltrates and fibrosis in the right lung, indicating a specific tuberculosis process. Sputum examination showed a positive BTA result. The patient was then referred to a type B hospital due to limited facilities and the unavailability of a pulmonologist at the type D hospital.

Conclusion: Chest radiography plays an important role as an initial diagnostic tool for detecting pulmonary TB. Early detection and timely referral to more comprehensive facilities are key to the successful control of tuberculosis in the community.

Keywords: Chest radiography; Early diagnosis; Hemoptysis; Referral system; Pulmonary tuberculosis

1. Introduction

Tuberculosis (TB) is a chronic infectious disease caused by Mycobacterium tuberculosis that primarily affects the lungs. This disease remains one of the global public health problems with high morbidity and mortality rates. According to the 2023 WHO report, Indonesia ranks third in the world in terms of TB cases after India and China. This situation is exacerbated by the low rate of early detection and treatment adherence in the community, especially in areas with limited access to referral health facilities[1,2].

The clinical manifestations of pulmonary TB are often nonspecific, such as coughing for more than two weeks, mild fever that does not subside, weight loss and night sweats. These symptoms are often misinterpreted as common respiratory tract infections, resulting in many patients presenting in advanced stages with complications such as hemoptysis or

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decreased lung function. Therefore, healthcare workers at primary care facilities must be able to recognize the symptoms of TB early and perform initial diagnostic steps before referring patients for definitive treatment[3].

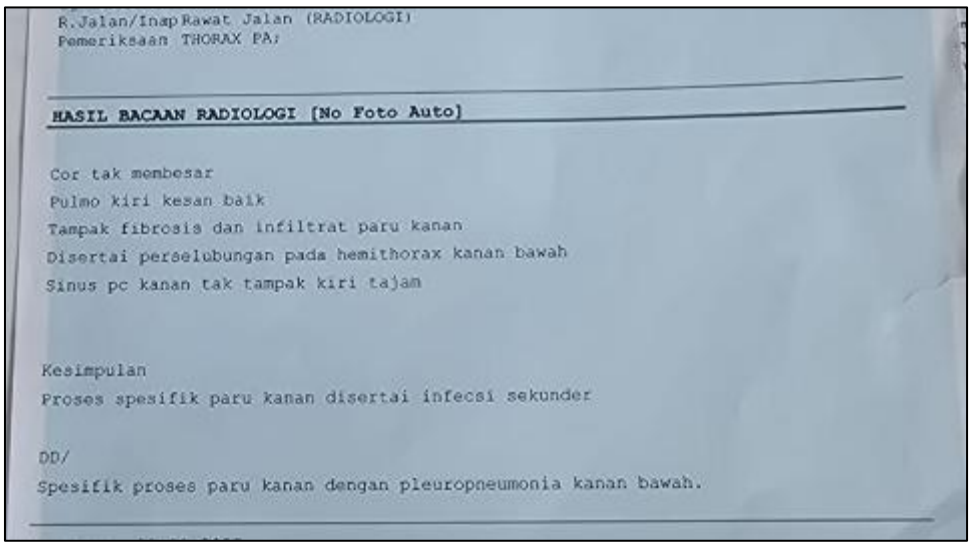
Chest radiography or chest X-ray is one of the supporting examinations that plays an important role in establishing a diagnosis of pulmonary tuberculosis. This examination can show characteristic images such as infiltrates, cavities, fibrosis and pleural thickening, which often form the basis for initial suspicion of Mycobacterium tuberculosis infection. Although radiography results cannot replace bacteriological examination as a definitive diagnosis, chest X-rays remain an essential tool in screening, evaluating disease progression, and determining treatment response. The use of radiography in primary health care facilities, such as type D hospitals, is very helpful in speeding up the identification of patients with suspected active TB so that they can receive further treatment immediately[4,5].

This case report aims to highlight the importance of early detection of pulmonary TB through clinical and radiological approaches, as well as to describe the medical decision-making process in a type D hospital with limited human resources and diagnostic facilities. With this case report, it is hoped that clinicians will become more aware of the vital role of radiographic examination and the tiered referral system in supporting national TB control efforts.

2. Case Report

A 21-year-old female patient came to the Emergency Room complaining of shortness of breath, nausea and bloody cough for the past two months. The patient also experienced weight loss and intermittent fever. She had previously sought treatment from a general practitioner but did not improve. Physical examination revealed BP 105/85 mmHg, pulse 90 beats per minute, temperature 36°C and respiratory rate 20–30 breaths per minute. The patient was administered Ringer's Lactate infusion, diphenhydramine injection, codeine, and tranexamic acid. Supporting tests included a PA chest X-ray and sputum examination.

The chest X-ray shows: the right lung appears to have fibrosis and infiltrates accompanied by effusion in the lower right hemithorax. Conclusion: specific process in the right lung accompanied by secondary infection (DD: lower right pleuropneumonia). Sputum examination results are positive for TB.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Proses spesifik paru kanan disertai infecsi sekunder

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Figure 1 Radiology reading results for the patient

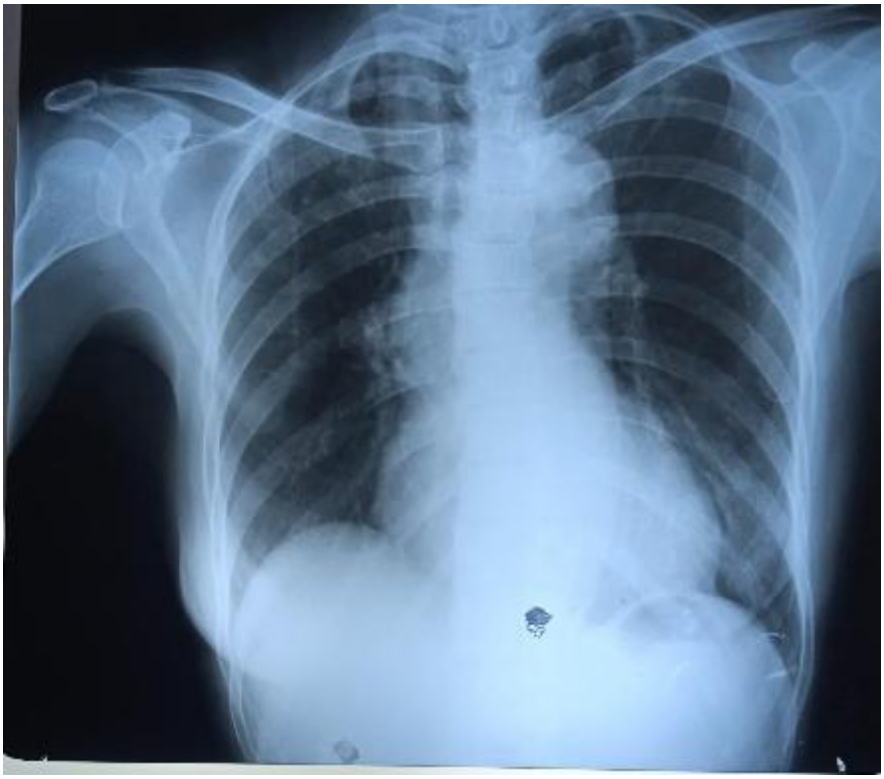

Figure 2 PA chest X-ray showing infiltrates and fibrosis in the right lung.

3. Result and Discussion

Tuberculosis (TB) is a chronic infectious disease caused by Mycobacterium tuberculosis, which primarily affects the lungs but can also affect other organs such as the lymph nodes, bones, kidneys, or central nervous system. TB is transmitted through airborne droplets when an active TB patient coughs, sneezes, or talks. Once in the respiratory tract, TB bacteria can remain dormant or develop into an active infection depending on the individual's immunity. Risk factors include poor nutritional status, overcrowding, comorbidities such as HIV/AIDS and diabetes mellitus, and low socioeconomic status[6,7].

Clinically, pulmonary TB symptoms have characteristics that can aid in early diagnosis. The main symptoms include a cough lasting more than two weeks, which may be accompanied by phlegm or blood (hemoptysis), unexplained weight loss, mild fever that does not go away, night sweats, weakness, and sometimes shortness of breath in the advanced stages. Hemoptysis in TB is caused by damage to lung tissue and blood vessels due to chronic inflammation. In this case, the patient presented with complaints of bloody cough, fever, and weight loss over a period of two months, which were highly consistent with the typical symptoms of active pulmonary TB. These symptoms indicate a chronic infection and extensive tissue damage, which was confirmed by positive radiography and sputum examination results[8].

Chest radiography plays an important role in supporting the diagnosis of pulmonary TB. Typical TB findings on radiography include infiltrates in the upper lobe, cavities with thick walls, fibrosis, mediastinal shift to the side of the lesion, and residual calcification in old TB. In this patient, the PA chest radiograph showed fibrosis and infiltrates in the right lung, accompanied by right lower hemithorax opacity, indicating a specific process with possible secondary infection. These findings often describe the advanced stage of TB with destruction of lung tissue. In addition, there was no evidence of cardiac enlargement, thus ruling out the possibility of cardiogenic disease[9,10].

In addition to the most commonly used posteroanterior (PA) chest X-ray, there are several other types of radiographic examinations that can be used to detect TB, depending on the facilities and clinical needs. First, lateral chest X-rays are often used as a supplement to view lesions in the posterior or hilar areas that are not clearly visible on PA projections. Second, computed tomography (CT) scans of the chest provide better anatomical detail, are able to detect small lesions and multiple cavities, and can assess pleural and mediastinal involvement more accurately. Third, high-resolution CT (HRCT) can reveal miliary nodules, bronchiectasis, or the tree-in-bud pattern characteristic of active TB. Fourth, digital radiography and portable radiography are useful for mass screening or patients with limited mobility. In some places,

thoracic ultrasound (USG thorax) can also help identify pleural effusion due to TB, although its sensitivity is lower than that of CT[11,12].

Radiographic results cannot be used alone to confirm a diagnosis of TB, but must be confirmed through laboratory tests, such as sputum acid-fast bacilli (AFB) testing, rapid molecular testing (TCM/GenXpert), or mycobacterial culture. In this case, the sputum test results showed positive signs of TB, which reinforced the radiographic findings. This confirms that the combination of radiological and laboratory tests is crucial for confirming the diagnosis and determining the appropriate treatment strategy[13].

The management of pulmonary TB refers to the National Guidelines for Tuberculosis Control[1]. The main therapy is the administration of first-line anti-tuberculosis drugs (OAT) with a category 1 regimen consisting of Isoniazid (H), Rifampicin (R), Pyrazinamide (Z), and Ethambutol (E). The treatment is divided into two phases: an intensive phase lasting two months (HRZE) and a continuation phase lasting four months (HR). The main objectives of the therapy are to kill the TB bacilli, prevent recurrence, and break the chain of transmission. Patient compliance in taking medication is a key factor in the success of the therapy. Supervision by health workers (Directly Observed Treatment, Short-course or DOTS) is mandatory to ensure compliance and prevent drug resistance[14].

In addition to pharmacological therapy, TB patients need to be educated about healthy lifestyles, including improving nutritional intake, getting adequate rest, and wearing masks to prevent transmission to others. In this case, the patient was referred to a type B hospital because the initial facility (type D hospital) did not have a pulmonologist. This is in accordance with the principle of a tiered referral system, in which primary care facilities perform early detection and stabilization, then refer patients to the next level for comprehensive management. At the referral hospital, the patient will undergo further evaluation, determination of the OAT regimen, and monitoring of drug side effects[15].

Thus, this case emphasizes the importance of synergy between clinical anamnesis, radiographic examination, laboratory examination, and referral systems in the diagnosis and management of pulmonary TB. In health facilities with limited resources, such as type D hospitals, the ability to recognize the typical radiographic features of TB and take initial action is crucial to speeding up treatment and preventing further transmission in the community.

4. Conclusion

This case demonstrates that the diagnosis of pulmonary tuberculosis requires a combination of careful clinical assessment, radiographic examination, and laboratory confirmation. Characteristic symptoms such as chronic cough, hemoptysis, weight loss, and prolonged fever should immediately raise suspicion of TB, especially in areas with high prevalence. Chest X-ray examinations play a crucial role in detecting pulmonary abnormalities consistent with TB, even before laboratory results are available.

Suggestion

Type D healthcare facilities must be able to perform early detection and provide initial management, then refer patients to more comprehensive hospitals for comprehensive OAT therapy in accordance with national standards. Early detection, appropriate treatment, and prompt referral are key to breaking the chain of transmission and reducing the burden of TB in the community.

Compliance with ethical standards

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Disclosure of conflict of interest

The author reports no conflicts of interest in this work.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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