

C-Arm Fluoroscopy Guided Bronchoscopic Biopsy For Diagnose Aspergilloma With Massive Hemoptysis After Pulmonary Tuberculosis: A Case Report

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Abstract

Background: Aspergilloma usually develops in the pulmonary cavity that already exists, including tuberculosis. The most frequent symptom is hemoptysis. Diagnosis 'proven fungal infection' requires a tissue sample obtained from a disease location is subjected to histological examination or culture. A specimen taken by using bronchoscopy alone is quite challenging because of its location. In this case, C-arm fluoroscopy guided bronchoscopic biopsy may be a solution to get specimens for proven diagnosis.

Methods: A 53 years old male presented to the emergency department following a massive haemoptysis with previous histories of tuberculosis. Chest radiography revealed opacity and hilar restriction in the left upper lobe. Chest CT scan without contrast infusion revealed suspected aspergilloma. The patient underwent c arm fluoroscopy guided bronchoscopy for biopsy sample. Biopsy sample referred to *Aspergillus niger*

Results: *Aspergillus, sp* leads to parenchymal damage and causing several symptoms mostly hemoptysis. Aspergilloma usually develops in the pulmonary cavity that already exists, including tuberculosis. The diagnostic effectiveness of bronchoscopy guided by C-arm fluoroscopy for peripheral lung lesions consistently improved.

Conclusion Aspergilloma usually develops in the pulmonary cavity that already exists, including tuberculosis. The patient comes to the emergency department with massive hemoptysis and meets all the criteria for diagnosis of "proven" fungal infection. The diagnosis is made by analyzing biopsy samples which is taken by C-arm fluoroscopy guided bronchoscopy.

Keywords: aspergilloma, post-treatment tuberculosis, massive hemoptysis, c-arm fluoroscopy guided bronchoscopy.

INTRODUCTION

Aspergilloma usually develops in the pulmonary cavity that already exists, including tuberculosis.¹ Aspergilloma develops when aspergillus, sp colonizes and grows inside pre-existing single or multiple lung cavities and forms a ball-like structure called fungus ball. Fungus ball is composed of hyphae of *Aspergillus*, fibrin, mucus, inflammatory cells, blood, and epithelial cell components. More than 90% Aspergilloma is caused by *Aspergillus fumigatus* which is widely found in people with tuberculosis. Other species that can cause aspergilloma include *Aspergillus niger*, *Aspergillus terreus*, *Aspergillus flavus*, and *Aspergillus nidulans*.^{2,3}

Aspergilloma can be asymptomatic for several years. The most frequent symptom is hemoptysis that may be simple recurrent hemoptoic sputum or life-threatening hemoptysis. Other symptoms are chest pain, bronchorrhea, dyspnea, poor general condition, and fever.^{4,5}

The most complete guideline for the diagnosis and treatment of chronic pulmonary aspergillosis, including aspergilloma, was released by the European Society for Clinical Microbiology and Infectious Diseases in partnership with the European Respiratory Society. Consistent radiographic findings, together with serological and microbiological evidence of *Aspergillus* species in a person with symptoms lasting more than three months, are required for a diagnosis.⁶ Furthermore, the diagnostic criteria can be divided into 3 levels namely "proven," "probable," and "possible" (Figure 1). Proven fungal infection needs a tissue sample taken from a disease location to be histologically analyzed or cultured to identify a fungus. Probable fungal infection required a host factor, clinical features, and mycological proof. Possible fungal is defined as cases having the necessary host characteristics and clinical data supporting a fungus infection but without any mycological support.⁷ Histological analysis of a specimen taken from a site of Aspergilloma by

using bronchoscopy only is a bit difficult because of its location. Diagnosis is important for the treatment that will be received.^{8,9}

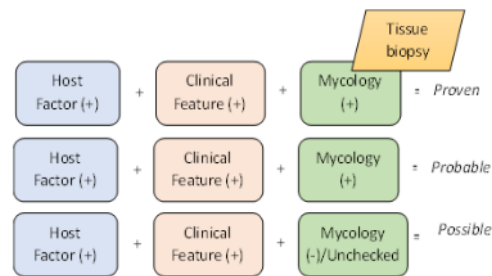


Figure 1. Diagnostic criteria for lung mycosis.⁹

Treatment for Aspergilloma can be surgical or non-surgical. The most effective method of treating symptomatic aspergilloma, especially for massive hemoptysis, entails surgical removal of infected lung lobes. Non-surgical treatment is an option for patients who have a variety of surgical contraindications, such as inadequate respiratory reserve, numerous or bilateral aspergillomas, or personal preference. For those patients, systemic administration of an antifungal drug, intracavitary instillation of an antifungal drug, or endobronchial instillation of an antifungal drug may be recommended.¹⁰⁻¹²

CASE

A 53 years old male presented to the emergency department on March 9, 2023 following a haemoptysis of about 400 ml of fresh blood. For more than 10 years, the patient had recurring episodes of blood-tinged sputum, along with fever and occasionally chest pain. He had previous histories of tuberculosis two times and successfully completed standard treatment in 2007 and 2015.

The patient was conscious, oriented, and hemodynamically stable when examined. Pallor was present. Low vesicular breathing was discovered during a respiratory system assessment in the left hemithorax region. Examinations of the nervous system, heart, and abdomen were all normal. Initial blood tests revealed severe anaemia with haemoglobin 6,0 g/dL. Xpert MTB-RIF Assay G4 did not detected *Mycobacterium tuberculosis*. Chest radiography shown in figure 2.



Figure 2. Chest radiography revealed opacity and hilar restriction in the left upper lobe

A chest CT scan (Figure 3) without contrast infusion revealed lobulated with regular edge space occupying lesions in the posterior segment of upper lobe. Irregular hiperdens appearance is shown around the space occupying lesions. Inside the space occupying lesions showed solid hiperdens irregular lobulated lesions with a strict line and air around it, suspected aspergilloma.



Figure 3. Suspicious aspergilloma shown in chest ct scan

The patient underwent a bronchoscopy after getting 4 kolf of blood due to severe anemia. Under general anesthesia, the tube was put through LMA into the bronchus and bronchioles. It found stenosis at left B1+2/Apicoposterior (figure 4). No active bleeding found. Sample to be examined was taken by bronchial washing, brushing, and forceps biopsy (figure 5). The sample is checked for histology, sitology, and KOH smear. The results can be seen in figure 6.

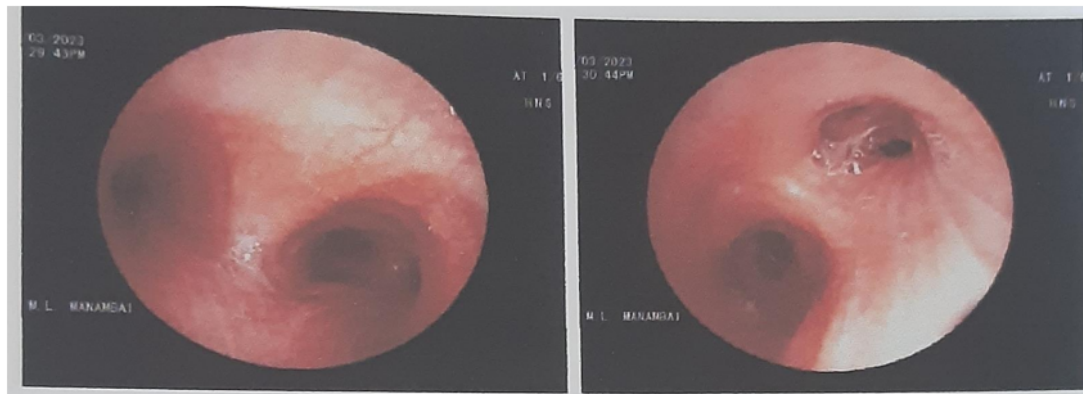


Figure 4. Stenosis at left B1+2 (Apicoposterior)

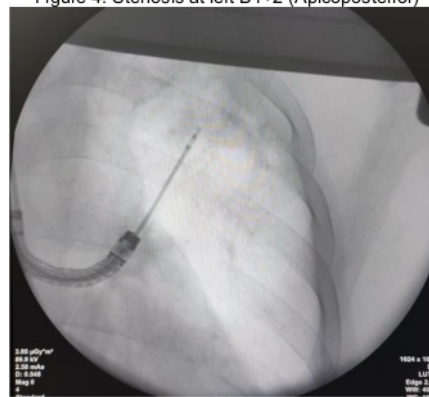


Figure 5. Biopsy sample was taken by C-arm fluoroscopy guided bronchoscopy at left B2 segmen.

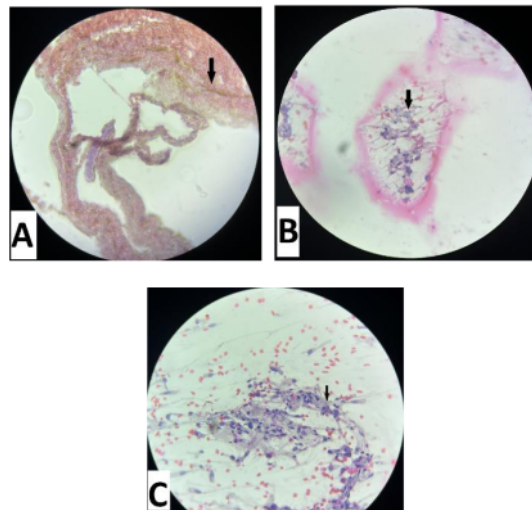


Figure 6. Under 400 x magnification of microscopic examination. A. Hyphae with brownish dark pigment shown in histologic sample (pointed by arrow) referred to *Aspergillus niger*'s hyphae.
B and C Spore and hyphae surrounding respiratory epithelium in cytology sample of bronchoscopy (pointed by arrow).

The patient is treated with itraconazole 100 mg twice daily. The patient went home on March, 11 2023 with no more symptoms like hemoptysis, fever, and chest pain.

DISCUSSION

Aspergilloma usually develops in the pulmonary cavity that already exists, including tuberculosis. After breathing in its spores from the environment, *Aspergillus* species can colonize and thrive in the cavity. By creating an intricate assemblage of *Aspergillus* hyphae, tissue fragments, inflammatory cells, and mucin known as a fungus ball (aspergilloma), it causes parenchymal injury. The cause of Aspergilloma in this case is *Aspergillus niger*. The most common *Aspergillus*, *sp.* that causes Aspergilloma in post-tuberculosis disease, according to a comprehensive review and meta-analysis of cross-sectional studies in Asia and Africa, is *Aspergillus fumigatus*.^{13,14} *Aspergillus niger* is uncommon cause of Aspergilloma especially Invasive Pulmonary Aspergillosis even though some authors report it.^{15,16}

Massive hemoptysis makes the patient come to the emergency department. He coughs around 400 ml of fresh blood. Aspergilloma can remain asymptomatic but once the patient has hemoptysis, it can be life threatening.¹⁷ Rarely, a rapidly growing cavity might encroach on the intercostal arteries and pleural surface, leading to a huge, usually fatal hemoptysis that is very challenging to control. The bleeding usually originates from a bronchial vessel and can be caused by endotoxin release from the organism, mechanical irritation of exposed vessels within the cavity, and direct penetration of the wall lining's capillaries.⁶ Younger age, blood-tinged sputum, and cavitary lesion with thick walls are some risk factors for severe hemoptysis in aspergilloma patients.¹⁸ The patient has had a blood tinged sputum for more than 10 years, a risk factor that can develop to severe hemoptysis.

As seen in figure 1, diagnostic criteria depend on three parameters i.e host factor, clinical feature, and mycology examination. Host factors including risk factors (long term therapy of antibiotic, ongoing chemotherapy, long term therapy of corticosteroid), underlying chronic disease (diabetes mellitus, cancer, pulmonary chronic disease). Clinical features including clinical symptoms, radiology examination, and general laboratory results. Mycology examination including culture or identification of fungus, serology, or molecular basic examination. For diagnosis 'proven fungal infection' requires detected fungus by histological analysis or culture of a specimen of tissue taken from a site of disease. In this case, the patient meets all the criteria for diagnosis of "proven" fungal infection. Cytology sample of the patient is taken by washing and brushing technique while the biopsy sample of the patient is taken by using c-arm fluoroscopy as guided bronchoscopy (figure 4). Without c-arm fluoroscopy, it will be difficult because a bronchoscope alone can't reach peripheral lung parenchyma. A study revealed the diagnostic effectiveness of bronchoscopy guided by C-arm fluoroscopy for peripheral lung lesions consistently improved and findings that biopsy was more effective than the other sampling methods.⁸

According to several research, surgical aspergilloma treatment has positive results and should be the first line of treatment. In terms of long-term survival and a low likelihood of recurrence, the long-term outcomes of aspergilloma surgery are favorable.^{19–21} But some significant risk occurring after surgery should be considered. Those include post lobectomy empyema, excessive postoperative bleeding, prolonged air leak and residual pleural space.²² Non-surgical treatment is an option for patients who have

a variety of surgical contraindications, such as inadequate respiratory reserve, numerous or bilateral aspergillomas, or personal preference. Systemic administration of antifungal medication, intracavitary instillation of antifungal medication, or endobronchial instillation of antifungal medication can be preferred for those patients. Itraconazole, the most widely used antifungal agent, is the medication best adapted to treating a persistent illness like aspergilloma. But because of possible poor drug penetration, it acts slowly, especially for aspergilloma, and may not be helpful for patients with significant hemoptysis.^{10,12} A study revealed only 49 % of patients with aspergilloma show radiological response to itraconazole 200 mg daily for 3 months.²³ Another study discovered that a weight-based variable dose schedule of itraconazole is both an efficient and secure treatment option for aspergilloma, and that treatment should be continued for longer than six months, particularly in individuals with simple aspergilloma. Moreover, patients with simple PA who do not react to the medication should have access to surgical options.¹¹ The patient in this case is given itraconazole 100 mg twice daily as treatment.

LIMITATION

Further investigation needs to be done for knowing the effectivity of itraconazole as treatment for massive hemoptysis in Aspergilloma because this case does not explain about long term outcomes of patient after hospitalization

CONCLUSION

Aspergilloma usually develops in the existing pulmonary cavity due to tuberculosis. Patient comes to the emergency department with massive hemoptysis and meets all the criteria for diagnosis of “proven” fungal infection. The patient is given itraconazole 100 mg twice daily as treatment. The diagnosis is made by analyzing biopsy sample, taken by C-arm fluoroscopy guided bronchoscopy. C-arm fluoroscopy may be a good solution to get biopsy in peripheral site so the diagnosis can be established

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Alexander Koch, Daniel H. Schanne, Gunar Günther, Daniel M. Aebersold, Olgun Elicin.

"Stereotactic body radiotherapy for recurrent hemoptysis due to chronic pulmonary aspergillosis: a case report and systematic review of the literature", *Strahlentherapie und Onkologie*, 2022

Publication

Tae Hoon Kim, Hyun Jung Koo, Chae-Man Lim, Sang-Bum Hong, Jin Won Huh, Kyung Wook Jo, Tae Sun Shim, Woo Sung Kim, Younsuck Koh.

"Risk factors of severe hemoptysis in patients with fungus ball", *Journal of Thoracic Disease*, 2019

Publication

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