Case Report

Pulmonary mucormycosis diagnosed by convex probe endobronchial ultrasound-guided fine needle aspiration of cavity wall

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ABSTRACT

Pulmonary mucormycosis is an opportunistic fungal infection in immunocompromised individuals. It is difficult to diagnose as it requires tissue biopsy, and generally these patients are unfit to undergo invasive lung biopsies. We describe a novel technique in a case with uncontrolled diabetes mellitus with nonresolving pulmonary cavitary disease where convex probe endobronchial ultrasound (EBUS)-guided aspiration of lung cavity wall showed classical histopathological picture establishing the diagnosis of mucorale infection. EBUS being real-time, minimally invasive technique with minimal risk of complications, led to early diagnosis, and prompt treatment. This appears to be a novel diagnostic modality in pulmonary mucormycosis with minimal complications as compared with other biopsy methods with very high complication risk.

KEY WORDS: Endobronchial ultrasound-guided fine needle aspiration, mucormycosis, pulmonary cavity

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INTRODUCTION

Mucormycosis is a potentially fatal aggressive fungal infection involving mostly immunocompromised hosts.[1] Diagnosis of this uncommon disease requires a high index of suspicion for early treatment and better survival. Sputum or bronchoalveolar (BAL) fluid analysis is frequently nondiagnostic.[2] The diagnosis requires more invasive modalities such as computerized tomography (CT)-guided needle aspiration or core lung biopsy, which is risky in critically ill patients and can lead to serious complications. We report a case of isolated pulmonary mucormycosis diagnosed by convex probe endobronchial ultrasound (CP-EBUS)-guided fine needle aspiration (FNA) of cavity wall, thus highlighting a minimally invasive and safe modality for rapid diagnosis of mucormycosis to facilitate early antifungal therapy.

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CASE REPORT

A 72-year-old female uncontrolled diabetic (HbA1C - 10.7%), ex-smoker, presented with a history of cough and fever with exertional breathlessness for the past 2 months. On examination, the patient was conscious, oriented to time place and person. Examination of head, ears, eyes and upper airways were normal. Her pulse rate was 104/min, blood pressure 110/80 mmHg, respiratory rate 28/min, and afebrile with SpO_2 – 92% on room air. Examination of the respiratory system revealed bronchial breath sounds over right mammary and interscapular areas. Chest radiograph revealed the presence of large cavitary lesion in right mid zone of the lung. CT chest revealed large thick walled cavity on the right side in right upper lobe [Figure 1a and b]. Her complete blood count and biochemistry profile were within

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normal limits. Sputum examination did not reveal acid-fast bacilli or any evidence of fungal elements and pyogenic culture was sterile. Positron emission tomography CT revealed a fludeoxyglucose (FDG) avid thick walled cavitary lesion (measuring - 8 cm × 7.1 cm × 5.5 cm) with air fluid level in upper lobe of the right lung and mildly enlarged FDG avid mediastinal lymph nodes with no other abnormal FDG avidity in rest of the body. Fiber optic bronchoscopy with CP-EBUS-guided FNA of station 7 lymph node was done; EBUS probe was applied at right secondary carina,[Figure 1b] right upper lobe cavity wall was visualized, and FNA samples obtained under real-time guidance ruling out any vascular structure. Cytology of EBUS slides from cavity wall showed fungal elements and histopathology of cell block revealed broad-based aseptate, right-angled branching fungal hyphae consistent with mucormycosis [Figure1c]. Cytopathology from station 7 lymph node revealed reactive lymph node. All samples cultures were negative for pyogenic infection and tuberculosis. The patient was started on injectable liposomal amphotericin B and showed symptomatic improvement. Three weeks later EBUS sample culture showed fungal growth confirming the diagnosis as mucormycosis. Repeat CT scan after 4 weeks showed marked reduction in size of the cavity and surrounding consolidation [Figure 1d]. The patient was offered right upper lobe lobectomy as definite treatment, but she declined.

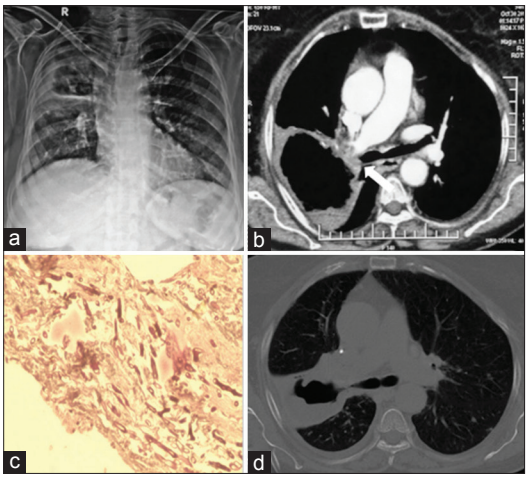

Figure 1: (a and b) X-ray chest and computerized tomography scan of the chest showing thick walled large cavity in the right upper lobe, (b) site of endobronchial ultrasound scope placement in right secondary carina for localization of cavity wall (arrow). (c) Histopathology of cavity wall showing fungal colonies with aseptate, broad-based right-angled branching fungal hypha consistent with mucormycosis. (d) Repeat computerized tomography chest after 4 weeks showing marked reduction in size of the cavity as compared to computerized tomography chest shown in Figure 1b

DISCUSSION

Pulmonary mucormycosis is an aggressive fungal infection, usually associated with vascular invasion and infarction, and can be fatal if not treated quickly. Early diagnosis is essential for successful treatment.[1] Given the patient's presentation, the diagnosis of malignancy, tuberculosis, and cavitating pneumonia was considered as primary differentials.

Diagnosis of pulmonary mucormycosis requires histopathological demonstration of characteristic features of fungus showing tissue invasion by aseptate, broad ribbon-shaped, right-angled branching hyphae.[3] Serological tests of galactomannan or 1,3 beta-D-glucan are negative and of no help in diagnosis of mucor. Blood and sputum cultures have poor diagnostic sensitivities. Bronchoscopic methods utilizing BAL lavage, endobronchial brushings or biopsy, and transbronchial lung biopsies are frequently done but have variable success rates.[2,3] Furthermore, massive bleeding after endobronchial mucosal or transbronchial lung biopsy using flexible bronchoscopy has been reported.[4] Moreover, the technique of sampling during bronchoscopy can trigger massive hemorrhage and hence, in patients with suspicion of Mucorales infection only BAL has been recommended.[4] Percutaneous transthoracic fine needle or "tru cut" lung biopsies obtained tissue for diagnosis through video-assisted thoracic surgery (VATS) lung biopsy is most accurate for diagnosis and considered gold standard, but most of these patients are critically sick to undergo any such invasive diagnostic procedures.[3]

The utility of EBUS is well established in diagnosing malignant as well as granulomatous benign mediastinal lesions by sampling mediastinal lymph node and masses. It has also been utilized in diagnosis of fungal infections by sampling lymph nodes.[5] To the best of our knowledge, the use of CP-EBUS in diagnosing cavitary lung lesions has never been described in literature. Chen *et al*.,[6] evaluating 815 patients with radial EBUS, did report two cases with mucormycosis in peripheral lung lesions. In our case, thick cavity was abutting the perihilar region and was in proximity to bronchial wall allowing us to use CP-EBUS-guided needle-guided aspiration of the fungal cavity wall. This case highlights the rapid, safe, and real-time diagnostic potential of CP-EBUS in tissue diagnosis of pulmonary mucormycosis. This unconventional use of CP-EBUS has significant potential in definitive diagnosis of pulmonary mycosis in countries where tuberculosis and cavitating bacterial pneumonia add to the confusion, besides it being safe in critically ill patients. In addition, considering widespread availability of CP-EBUS facilities in comparison with handful centers performing VATS, this modality may provide a potentially economical alternative for definite diagnosis of cavitary lung disease in resource-limited settings.

CONCLUSION

This case illustrates the utility of CB-EBUS as a minimally invasive tool for the diagnosis of cavitary lung disease in patients who are poor candidates for lung biopsy with minimal risk of complication. Further research is required to assess the efficacy and possible complication of this approach in a large cohort of patient versus other invasive diagnostic technique.

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Conflicts of interest
There are no conflicts of interest.

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