International Journal of Research in Medical Sciences
Waseem MDA et al. Int J Res Med Sci. 2017 Dec;5(12):5462-5465
www.msjonline.org
pISSN 2320-6071 | eISSN 2320-6012

DOI: http://dx.doi.org/10.18203/2320-6012.ijrms20175475

Case Report

Isolated pulmonary cavitary mucormycosis in uncontrolled diabetic, diagnosed by fiber-optic bronchoscopy and completely managed medically

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Received: 27 September 2017
Accepted: 01 November 2017

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ABSTRACT

Pulmonary mucormycosis is rare life-threatening infection affecting mostly immunocompromised individuals such as diabetes mellitus, hematological malignancies, chronic renal failure, post transplantation etc. Based on the anatomic site involved, mucormycosis can be one of several forms, such as rhinocerebral, pulmonary, cutaneous, gastrointestinal, disseminated, and uncommon presentations that include endocarditis, osteomyelitis, peritonitis, and renal infection. Pulmonary infection is the most common form of mucormycosis recognized in patients with hematological malignancy and remains the second most common presentation after rhinocerebral infection in diabetic patients. Its presentation in the lungs may mimic cavitary diseases like tuberculosis, mass lesions as in malignancies and non-resolving pneumonias. Here we report a case of isolated pulmonary mucormycosis in an uncontrolled diabetic male patient with a cavitary lesion. Diagnosis was made with a bronchoscopic biopsy and treatment was completely medical with liposomal amphotericin B.

Keywords: Amphotericin B, Bronchoscopy, Mucormycosis, Non-resolving pneumonia, Pulmonary

INTRODUCTION

Isolated pulmonary mucormycosis is a relatively rare and serious infection caused by fungi of class zygomycetes and occurs in immunocompromised individuals like diabetes mellitus, hematological malignancies, chronic renal failure, post-transplant patients etc.

Furbinger reported the first case of pulmonary mucormycosis in 1876.[1] Pulmonary infection is the most common form of mucormycosis recognized in patients with hematological malignancy and remains the second most common presentation after rhinocerebral infection in diabetic patients.[2] Pulmonary mucormycosis has a wide variety of clinical and radiological presentations. Radiographically, findings like lobar consolidation, isolated masses, nodular disease, and cavitation have been seen.[3] Here we report a case of isolated pulmonary mucormycosis presenting acutely with a cavitary pattern.

CASE REPORT

A 60-year-old male farmer came to Bhaskar hospital with complaints of high-grade fever and persistent cough with scanty mucoid sputum since, 15 days and shortness of breath (grade 3 mMRC) for the last 3 days. He never had similar complaints in the past. There is no history suggestive of asthma, bronchiectasis or other chronic lung diseases. He is a known hypertensive on losartan 25 mg daily and a diabetic since last 15 years for which he is

on oral hypoglycemic drugs. Vitals at presentation were: temperature 100^0 F, pulse rate 120 per minute, blood pressure 120/70 mmHg, respiratory rate of 24 per minute and oxygen saturation of 100% with 2 liters of oxygen. Laboratory reports were as follows: total leucocyte count of 21400 cells/mm^3, hemoglobin value of 11.5gram%, erythrocyte sedimentation rate of 118mm in first hour, serum creatinine of 1.5mg%, random blood sugar value was 330mg% at admission, glycated hemoglobin value of 10%, platelet count was 3.5lakh/mm^3 and liver function tests were within normal limits. Serology for human immunodeficiency virus and hepatitis B antigen was negative.

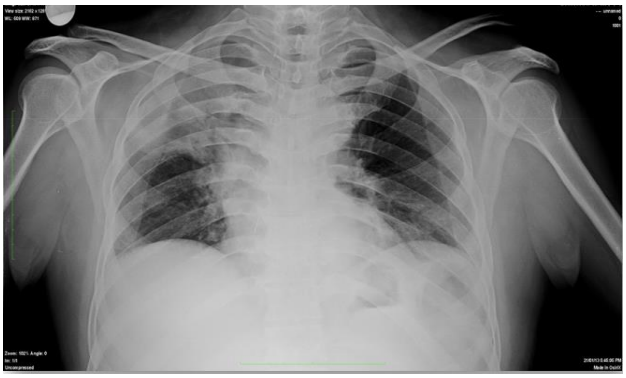

Figure 1: Chest x-ray showing right upper lobe consolidation.

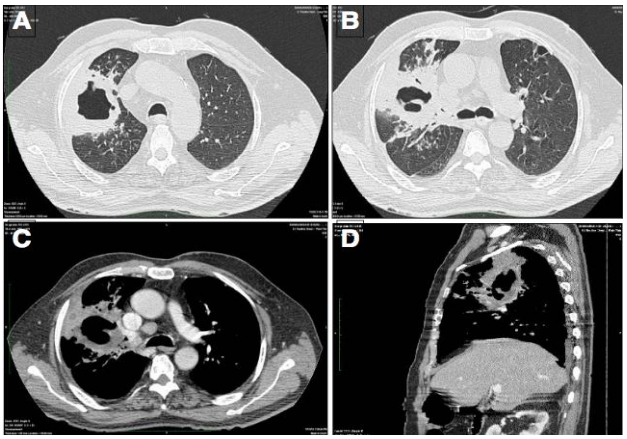

**Figure 2: CT scan chest showing a thick-walled cavity with air-fluid level in the right upper lobe.
A) consolidation around the cavity with ground glass opacities (halo sign) and intra cavitary mass
B) mediastinal windows axial and sagittal views showing cavity with surrounding consolidation and intra cavitary mass (C, D).**

Chest x-ray showed features of right upper lobe consolidation (Figure 1), sputum was negative for acid-fast bacilli on repeated smears and pyogenic culture showed no growth. CT scan was done to further evaluate the lesions, which showed right upper lobe consolidation surrounding a large cavity with an intra cavitary pedunculated extension. Alveolar hemorrhage around the consolidation termed as "Halo sign" was also seen (Figure 2).

Empirical antibiotics were started, and trial anti-tuberculosis treatment was also started, which failed to show any clinical improvement. Fiber-optic bronchoscopy was performed which showed a whitish necrotic mass protruding into the right upper lobe, which bleeds on touch with a background of hyperemic bronchial walls.

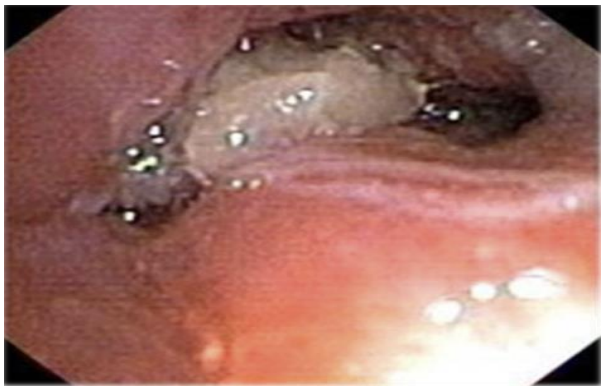

Figure 3: Bronchoscopic view of right upper lobe bronchus showing whitish material, with a background of shiny and hyperaemic bronchial walls.

(Figure 3) Bronchial washings, brushings and bronchial biopsy were taken from the site. Histopathological examination showed multiple fungal colonies, consisting of broad fungal hyphae with perpendicular branching and no septation, admixed with fibrinous material and collections of neutrophils.

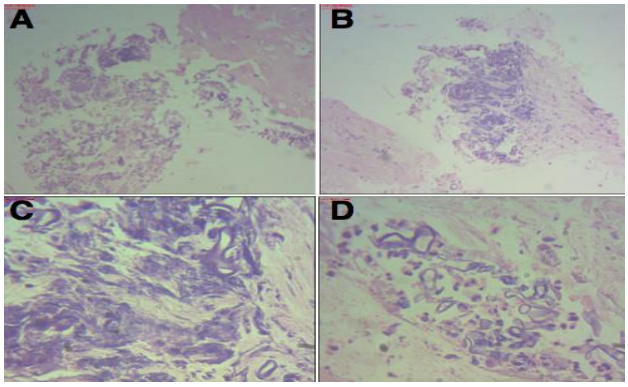

Figure 4: Section of biopsy tissue show bronchial mucosa, lined by columnar epithelium and few lobules of cartilaginous tissue. There are multiple fungal colonies, consisting of broad fungal hyphae with perpendicular branching and no septation. They are admixed with fibrinous material and collections of neutrophils. No definite stromal infiltration is seen (A and B). Histochemistry: PAS stain shows positive staining of the fungal elements. They are short, broad, filamentous and show thick cell walls, without septations (C and D).

Figure 4, PAS stain showed positive staining of the fungal elements. They are short, broad and filamentous and show thick cell walls, without septations, suggestive of mucormycosis. Fungal culture did not show any growth. Treatment was started with intravenous liposomal amphotericin B, followed by posaconazole after 4 weeks. Patient showed a marked clinical improvement within 1 week of treatment.

DISCUSSION

Mucormycosis, also called zygomycosis is an important opportunistic infection caused by a fungus that belongs to the class zygomycetes, which is the third most common invasive fungal infection after candidiasis and aspergillosis. Based on the anatomic site involved, mucormycosis can be one of several forms, such as rhinocerebral, pulmonary, cutaneous, gastrointestinal, disseminated, and uncommon presentations that include endocarditis, osteomyelitis, peritonitis, and renal infection. The underlying predisposing conditions can influence clinical presentation and outcome. The most commonly affected patients were those with poorly controlled diabetes, followed by patients with hematologic malignancies or undergoing HSCT. Pulmonary infection is the most common form of mucormycosis recognized in patients with hematological malignancy and remains the second most common presentation after rhinocerebral infection in diabetic patients.[2,4] Uncontrolled diabetes, particularly diabetic ketoacidosis, predisposes patients to the development of mucormycosis; however, cases have been described even in patients with well-controlled diabetes mellitus.[5]

The spores of the fungi become airborne and inoculate in the respiratory tract. These spores of mucorales show minimal pathogenicity in immunocompetent hosts because the macrophages can kill spores by phagocytosis and oxidative killing mechanisms. However, macrophages in a host with immune deficiency or diabetes can lose their ability to inhibit spore germination and prevent the hyphae and spores from invading the bronchus and lung.[6]

Hyperglycemia and acidosis in people with poorly controlled diabetes impair phagocyte function.[7] Moreover, growth of pathogenic Mucorales is enhanced by free iron; thus, iron overload and treatment with deferoxamine, which behaves, as a siderophore that increases iron availability to the fungus, are associated with mucormycosis. Likewise, systemic acidosis increases free iron by decreasing iron binding to transferrin.[8]

Mucormycosis is angioinvasive, resulting in thrombosis, infarction, and tissue necrosis, with risk for dissemination to other sites. Strong experimental evidence indicates that one mechanism that promotes angioinvasion by Rhizopus oryzae (the most common species in patients with mucormycosis) is glucose-and iron-induced expression of glucose-regulated protein 78 by vascular endothelial cells, which promotes binding of Rhizopus to endothelial cells in vitro and in vivo.[9]

The clinical manifestations of pulmonary mucormycosis infection cannot be easily distinguished from those of pulmonary bacterial infection. Patients may present with fever, cough, expectoration, hemoptysis, and pleuritic chest pain. The laboratory examination results are nonspecific, with most patients only showing an increase in their WBC count. The radiographic presentations of patients with pulmonary mucormycosis appear abnormal and include infiltrate, cavity, consolidation, air crescent sign, pleural effusions, fistula, pneumothorax and pulmonary collapse.[3,10] Both halo sign and the reversed halo sign may be seen, although the later one is more common in mucormycosis.[11]

Direct examination of sputum and BAL specimens may show the characteristic broad 10- to 20-µm, ribbon-like, irregularly branching hyphae.[12] Potassium hydroxide wet mounts enhanced with calcofluor (which stains chitin) may assist in detecting the fungus in fresh specimens; periodic acid-Schiff and/or Gomori's methenamine silver staining is used to visualize the fungi in tissue samples.[13]

Early treatment for mucormycosis is essential for optimal outcomes and includes pharmacologic, medical (reducing immunosuppression, correcting metabolic acidosis, and optimizing control of diabetes), and often surgical intervention. Surgery, when feasible, is useful for debulking infection and preventing spread to contiguous structures, and is associated with decreased mortality compared to medical treatment alone.[14,15] In current practice, amphotericin is the sole antifungal agent licensed by the US Food and Drug Administration for the primary therapy of mucormycosis. Antifungal treatment options consist of lipid formulations of amphotericin B, amphotericin B deoxycholate, or posaconazole. First line treatment is with an amphotericin derivative, preferably with liposomal amphotericin. Although some reports have described a combination of antifungal agents, trials are needed to determine the efficacy of this approach.[16]

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

REFERENCES

1. Furbinger P. Observations on lungenmycose beinmeschen. Arch Pathol Anat Physiol Klin Med. 1876;66:330-65.
2. Petrikkos G, Skiada A, Lortholary O, Roilides E, Walsh TJ, Kon- toyiannis DP. Epidemiology and clinical manifestations of mucor-mycosis. Clin Infect Dis. 2012;54(Suppl 1):S23-S34.
3. McAdams HP, Rosado de Christenson M, Strollo DC, Patz Jr EF. Pulmonary mucormycosis:

radiologic findings in 32 cases. AJR. Ame J Roentgenol. 1997;168(6):1541-8.
4. Roden MM, Zaoutis TE, Buchanan WL, Knudson TA, Sarkisova TA, Schaufele RL et al. Epidemiology and outcome of zygomycosis: a review of 929 reported cases. Clin Infect Dis. 2005;41(5):634-653.
5. Di Carlo P, Cabibi D, La Rocca AM, De Luca D, La Licata F, Sacco E. Post-bronchoscopy fatal endobronchial hemorrhage in a woman with bronchopulmonary mucormycosis: a case report. J Med Case Rep. 2010;4:398.
6. Chayakulkeeree M, Ghannoum MA, Perfect JR. Zygomycosis: The re-emerging fungal infection. Eur J Clin Microbiol Infect Dis. 2006;25:215-29.
7. Chinn RY, Diamond RD: Generation of chemotactic factors by Rhizopus oryzae in the presence and absence of serum: relationship to hyphal damage mediated by human neutrophils and effects of hyperglycemia and ketoacidosis. Infect Immun. 1982;38(3):1123-9.
8. Spellberg B, Edwards J Jr, Ibrahim A. Novel perspectives on mucormycosis: pathophysiology, presentation, and management. Clin Microbiol Rev. 2005;18(3):556-69.
9. Liu M, Spellberg B, Phan QT, Yue Fu, Yong Fu, Amy S. Lee et al. The endothelial cell receptor GRP78 is required for mucormycosis pathogenesis in diabetic mice. J Clin Invest. 2010;120(6):1914-192.
10. Lee FY, Mossad SB, Adal KA. Pulmonary mucormycosis: The last 30 years. Arch Intern Med. 1999;159:1301-9.
11. Georgiadou SP, Sipsas NV, Marom EM, Kontoyiannis DP. The diagnostic value of halo and reversed halo signs for invasive mold infections in compromised hosts. Clin Infect Dis. 2011;52(9):1144-55.
12. Kwon-Chung KJ, Bennett JE. Medical mycology. Revista do Instituto de Medicina Tropical de São Paulo. 1992;34(6):504.
13. Walsh TJ, Gamaletsou MN, McGinnis MR, Hayden RT, Kontoyyiannis DP et al. Early clinical and laboratory diagnosis of invasive pulmonary, extrapulmonary, and disseminated mucormycosis (zygomycosis). Clin Infect Dis. 2012;54(Suppl 1):S55-S60.
14. Tedder M, Spratt JA, Anstadt MP, Hegde SS, Tedder SD, Lowe JE: Pulmonary mucormycosis: results of medical and surgical therapy. Ann Thorac Surg. 1994;57(4):1044-50.
15. Petrikkos G, Skiada A, Sambatakou H, A. Toskas, G. Vaiopoulos, M. Gionnopoulou et al. Mucormycosis: ten-year experience at a tertiary-care center in Greece. Eur J Clin Microbiol Infect Dis. 2003;22(12):753-6.
16. Spellberg B, Ibrahim A, Roilides E, Lewis RE, Lortholary O, Petrikkos G, et al. Combination therapy for mucormycosis: why, what, and how?. Clini Infect Dis. 2012;54(suppl_1):S73-8.

Cite this article as: Waseem MDA, Zahera M, Gopalakrishnaiah V. Isolated pulmonary cavitary mucormycosis in uncontrolled diabetic, diagnosed by fiber-optic bronchoscopy and completely managed medically. Int J Res Med Sci 2017;5:5462-5.