

Rhino-pulmonary Mucormycosis in Post COVID-19 patient

Keywords: Mucormycosis; COVID-19; Diabetes

Abstract

Invasive fungal sinusitis is a rising concern among individuals with COVID 19, as the recent trend shows a three-fold increase in cases during the second wave of the pandemic. Mucormycosis caused by the fungi of the Mucorales group can manifest with florid clinical presentations depending on the various sites it can involve, the most common being Rhino-orbital-cerebral Mucormycosis. Current literature review reports few cases of pulmonary mucormycosis and even rare is the presentation with concurrent sinonasal involvement. Here we report a case of Rhino-pulmonary mucormycosis in a Post Covid Diabetic patient.

Case Report

62-year-old male, with a history of Diabetes, Hypertension & Coronary artery disease for 7 years, presented to our tertiary centre with chief complaints of right-sided chest pain for 3 days which was dull aching, moderate in severity increased on inspiration, non-radiating and not associated with palpitation or perspiration, with one episode of blood-tinged sputum and occasional cough. No c/o breathlessness. No headache or nasal complaints. He had COVID-19 disease two weeks prior for which he received Inj methylprednisolone 30mg for 10 days, Inj piptaz 4.5gm TID for 3 days, Tab fluconazole 200mg BD for 6 days & Tab Levofloxacin 250mg BD for 5 days, during the course of his hospital stay. He was not treated with antivirals or antibodies.

On examination, the patient was conscious. Vitals were stable. On auscultation, coarse crepitations were heard in the right infrascapular and interscapular areas. ENT examination was normal. Blood investigations revealed Blood Glucose 358mg/dl, Hemoglobin 12.5g/dl, White blood cell count 18,250/microlite, Neutrophil 88%, Lymphocyte 8% platelet count 2.6 Lac, Hemoglobin A1c was 9%. Urine Ketones was negative, C-Reactive protein 22.3mg/L & Viral markers were negative. Chest X-ray revealed right pleural thickening with surrounding homogenous opacity. Sputum acid-fast bacilli (AFB) and culture were negative. High-resolution CT of the chest revealed central ground-glass opacity surrounded by dense consolidation suggestive of reverse Halo sign in the right lower lobe [Figure 1]. Following which a CT of the Nose & Paranasal sinus was taken to rule out ENT foci of fungal infection i/v/o high suspicion for mucormycosis, it revealed a homogenous soft tissue density in the bilateral maxillary sinus and left ethmoid with no intraorbital or intracranial extension [Figure 2].

A diagnostic nasal endoscopy revealed blackish necrotic middle turbinate and crust along the left middle meatus, which was sent for KOH fungal mount that reported broad aseptate hyphae suggestive of Mucormycosis. Subsequently, Sputum fungal culture grew *Rhizopus* species [Figure 3].

A diagnosis of Pulmonary with concomitant sino-nasal mucormycosis was made. The patient was started on Injection



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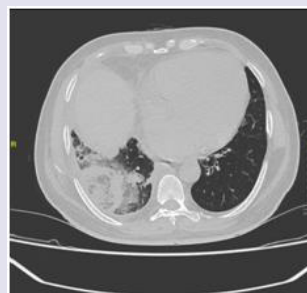


Figure 1: HRCT chest showing the 'Reverse Halo sign' (arrow) in the right lower lobe.



Figure 2: CECT Paranasal sinuses show homogenous soft tissue density noted involving bilateral maxillary sinus and the left ethmoid sinus.



Figure 3: Lactophenol cotton blue mount of *Rhizopus* species showing unbranched sporangioophores and nodal rhizoids.

Amphotericin therapy & was scheduled for Endoscopic surgical debridement. However, his general condition deteriorated, and he developed sudden refractory hypotension with respiratory failure and succumbed to it.

Discussion

Among the risk factors for mucormycosis, he had uncontrolled diabetic status and a history of corticosteroid therapy for COVID 19 illness. Literature review reports that the incidence of pulmonary mucormycosis relative to other clinical forms is 25 % [1]. It has a fatality rate of > 50% [2].

Pulmonary mucormycosis results from the inhalation of sporangiospores or by hematogenous or lymphatic spread and presents with nonspecific symptoms like cough, dyspnea, chest pain, and fever [2,4]. Mani et al reported a case of isolated pulmonary mucormycosis which initially mimicked malignancy, this patient had uncontrolled diabetic status but without ketoacidosis and prolonged corticosteroid therapy for intractable asthma concluding that isolated pulmonary mucormycosis is extremely rare and carries a poorer prognosis than rhino-orbital-cerebral disease [3].

The pathogenesis of fungal infection depends on the interaction of host factors (epithelial defence mechanism) & virulence of the organism. Hyperglycemic state and in particular ketoacidosis impairs the ability of neutrophils to destroy the Mucorales hyphae. Also, ketoacidosis increases the availability of free iron which is used as a growth factor by Mucorales. Pulmonary mucormycosis may induce pulmonary embolism because Mucorales species tend to invade the elastic intima of large and small vessels, causing thrombosis, bleeding, and infarction, which should be considered a differential in patients presenting with pulmonary embolism of unknown cause [5,6].

Imaging and nasal endoscopy revealed stage 2 ROCM (Rhino-orbital-cerebral Mucormycosis) with pulmonary involvement in our patient. The reverse halo sign which is a ground glass lesion with a peripheral rim of consolidation is a specific sign of pulmonary mucormycosis on a high-resolution CT scan which was also seen in our patient [7,8]. Immunocompromised state being a prerequisite for invasive fungal infection, the sequelae includes angioinvasion and direct tissue injury of the respiratory tract and extension to great vessels, invasion from the paranasal sinuses into the orbit and brain, and hematogenous dissemination [2].

Histopathology and Fungal mount microscopy along with culture for various clinical specimens are the major diagnostic modalities for mucormycosis. Sputum and BAL cytology are unpredictable and may be negative [2]. In our patient, the KOH mount of the middle turbinate tissue grew broad aseptate hyphae and sputum fungal culture revealed *Rhizopus* species. In the current COVID 19 pandemic era, there has been a three-fold increase in the cases of invasive fungal infection attributed to the wide use of steroid therapy and concurrent uncontrolled diabetic status.

The differential diagnosis of pulmonary mucormycosis involves bacterial, viral and other fungal pneumonia which becomes a diagnostic challenge [9,10]. Aspergillosis remains a very close differential and hence in a case of suspected fungal infection unresponsive to voriconazole strongly favours mucormycosis [4].

In cases where there is a high suspicion of a fungal aetiology in post-COVID patients who are diabetic and have received steroid therapy, nose and paranasal foci of infection should be investigated even though clinically they are asymptomatic as seen in our case which will expedite in confirming the diagnosis and early initiation of antifungal therapy and surgical debridement.

Treatment should be continued for a minimum of twelve weeks but especially until all the clinical and radiological symptoms are resolved and cultures have become negative. Strengthening immunity along with risk factors such as diabetes and protein-energy malnutrition should be treated and kept under control. Surgery should always be considered in the management of mucormycosis more so in the case of localised diseases it allows systemic treatment to reach the infected areas isolated by vascular thrombotic events, and reduces the fungal burden [4].

Few learning points through this case study:

- Pulmonary mucormycosis can be a devastating and life-threatening infection if not correctly diagnosed and treated.
- Concomitant Sinusitis and pulmonary involvement should be kept in mind during diagnostic dilemmas and hence promoting early specific management of mucormycosis.
- Invasive fungal sinusitis is a rising concern among individuals with COVID 19, as the recent trend shows a three-fold increase in cases during the second wave of the pandemic.

Conclusion

Mucormycosis is a life-threatening infection mostly occurring in the immunocompromised host. The risk is many including haematological malignancies, uncontrolled diabetes mellitus, immunocompromised states, and Steroid therapy. Early diagnosis and treatment which includes surgery and antifungal drugs can improve outcomes and survival. Definitive diagnosis requires pathologic demonstration of the organism in affected tissue. Concurrent Sinusitis and pulmonary involvement should be kept in mind during diagnostic dilemmas and hence promoting early specific management of mucormycosis.

References

1. Luo Z, Zhang L (2017) Diagnosis and treatment of pulmonary mucormycosis: A case report. *Exp Ther Med* 14: 3788-3791.
2. Mekki SO, Hassan AA, Falemban A, Alkotani N, Alsharif SM, et al. (2020) Pulmonary Mucormycosis: A Case Report of a Rare Infection with Potential Diagnostic Problems. *Case Rep Pathol* 2020: 1-4.
3. Mani RK, Mishra V, Sharma M, Kumar RA (2017) Isolated pulmonary mucormycosis. *BMJ Case Rep*: bcr2017219342.
4. Point S, Gabriel F, Bégueret H, Jougon J, Lanternier F, et al. (2018) Tumor shape pulmonary mucormycosis associated with sinonasal aspergillosis in a diabetic patient. *Med Mycol Case Rep* 19: 13-17.
5. He J, Sheng G, Yue H, Zhang F, Zhang HL. Isolated pulmonary mucormycosis in an immunocompetent patient: a case report and systematic review of the literature. *BMC Pulm Med* 21: 138.
6. Spellberg B, Edwards J, Ibrahim A (2005) Novel Perspectives on Mucormycosis: Pathophysiology, Presentation, and Management. *Clin Microbiol Rev* 18: 556-569.
7. Agrawal R, Yeldandi A, Savas H, Parekh ND, Lombardi PJ, et al. (2020)

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- Pulmonary Mucormycosis: Risk Factors, Radiologic Findings, and Pathologic Correlation. Radiographics 40: 656-666.
8. Legouge C, Caillot D, Chrétien M-L, Lafon I, Ferrant E, et al. (2014) The Reversed Halo Sign: Pathognomonic Pattern of Pulmonary Mucormycosis in Leukemic Patients With Neutropenia? Clin Infect Dis 58: 672-678.
 9. Serris A, Danion F, Lanternier F (2019) Disease Entities in Mucormycosis. J Fungi 5: 23.
 10. Chamilos G, Marom EM, Lewis RE, Lionakis MS, Kontoyiannis DP (2005) Predictors of Pulmonary Zygomycosis versus Invasive Pulmonary Aspergillosis in Patients with Cancer. Clin Infect Dis 41: 60-66.