Bilateral Fungus Ball: An Uncommon Complication Post Severe COVID-19 Infection

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Abstract
COVID-19 is one of the world’s worst hit pandemics. WHO first learned of this new virus on 31 December 2019, following a report of cluster of cases of ‘viral pneumonia’ in Wuhan, China. Covid 19 causes systemic infection but it worst hits the lungs and can cause ARDS (<5%). Bilateral lung fibrosis is a commonly observed sequela after severe Covid 19 infection. Covid 19 pneumonia also acts as a nidus for superadded bacterial and fungal infections. However we haven’t come across fibrocavitation and fungus ball as post Covid 19 sequelae. We here present a case report of a patient who was diagnosed as ARDS due to SARS CoV2, was treated as per standard Covid 19 protocols, required NIV and discharged on home oxygen. The HRCT on discharge showed bilateral fibrosis. The follow up HRCT after 45 days of discharge showed evidence of Bilateral cavities with Fungus ball.

Introduction
COVID-19 has led to a global pandemic. Severity of Covid 19 can be associated with fever, rising inflammatory markers and signs of systemic inflammation, in the absence of secondary infection. Superadded bacterial or fungal infections can occur due to immune suppression due to viral infection, use of corticosteroids and drugs like tocilizumab, as well as comorbid conditions like diabetes mellitus. Severe Covid 19 infection leads to bilateral lung fibrosis which is evident on HRCT. However, to our knowledge very few cases of fungus ball in a COVID-19 patient’s lungs have been reported. Here we present a case of severe Covid 19 infection who on follow up HRCT showed evidence of Bilateral cavities with fungus ball.

Case Presentation
A 55 Years old male, known case of diabetes Mellitus, hypertension and ischemic heart disease status post percutaneous transluminal coronary angioplasty (PTCA) presented to the emergency department with history of low grade fever, cough with expectoration, progressive increase in dyspnoea and generalized weakness since 1 week. On examination, the patient had a pulse rate of 130/min, was tachypnoeic with a respiratory rate of 36-40 breaths per minute, had a oxygen saturation of 95% on 10 Litres of Oxygen by a non rebreather mask and blood pressure of 130/80 mmHg. The patient was admitted as a COVID 19 suspect and appropriate investigations done. He was diagnosed as SARS CoV2 positive by RT-PCR test of nasopharyngeal swab. His X-ray chest on admission showed Bilateral peripheral patchy opacities consistent with Covid 19 pneumonia. Due to progressive worsening of respiratory distress, the patient was put on CPAP by Non invasive ventilation. Patient was started on Hydroxychloroquine, doxycycline, ivermectin which was the standard treatment protocol at that time. Subsequently the patient also received lopinavir and ritonavir.

Patient was also treated with high dose steroids (injection methylprednisolone 500 mg once a day) and intravenous antibiotics Piperacilline+Tazobactum and azithromycin in view of raised WBC counts. Patient required non invasive ventilation for 3 weeks after which he was shifted to oxygen by nasal prongs. HRCT chest was done 4 weeks after his admission (Figure 1) which showed diffuse areas of ground glass opacities and inter-intra lobular septal thickening in bilateral lung fields and patchy areas of consolidation in bilateral upper lobes. Due to persistent oxygen requirement, the patient was discharged on home oxygen therapy and oral steroids. A follow up HRCT Chest was done (Figures 2a, 2b) after one and a half month of previous CT scan which showed evidence of cavitory lesion in bilateral upper lobes with evidence of fungus ball within.

The patient’s sputum was sent for fungal stain and culture and was subsequently started on oral itraconazole.

Discussion
Coronaviruses are enveloped RNA viruses. Six coronavirus species are known to cause human disease. Four viruses — 229E, OC43, NL63, and HKU1 — typically cause common cold symptoms in immunocompetent individuals. The other two strains are severe acute respiratory syndrome coronavirus (SARS-CoV) and Middle East respiratory syndrome coronavirus (MERS-CoV). SARS-CoV was the causal agent of the severe acute respiratory syndrome outbreaks in 2002 and 2003 in Guangdong Province, China while MERS-CoV responsible for severe respiratory disease outbreaks in 2012 in the Middle East. Severe acute respiratory syndrome Coronavirus -2 (SARS CoV2) is responsible for the Covid 19 pandemic.

Secondary infections are a well known complication of viral...
pneumonia. Most of these are bacterial infections, but fungal infections have also been reported. During the H1N1 outbreak of 2009 in the United States, bacterial co-infection occurred in almost 30% of cases; 46% of which were with S. pneumoniae, 9% with S. aureus and 1% with H. influenzae. The most common pathogens implicated during the 2003 influenza pandemic were gram-negative bacilli and Candida species. Also during prior pandemics Aspergillus species have been implicated to cause superimposed infection.

Secondary infections have been documented after Covid 19 pneumonia as well. In a study done at IRCCS San Raffaele Hospital, Italy, Among 731 patients, a secondary infection was diagnosed in 68 patients (9.3%); 58/731 patients (7.9%) had at least one Blood stream infection and 22/731 patients (3.0%) at least one LRTI.8

Saprophytic colonization of a parenchymal lung cavity by fungal species is referred to as a fungus ball.9 A fungus ball consists of both dead and living mycelial elements, fibrin, mucus, amorphous debris, inflammatory cells, and degenerating blood and epithelial elements. The mycelial mass may lie free within the cavity or can be attached to the cavity wall by granulation tissue. Most fungal balls are caused by Aspergillus Fumigatus, rarely by Aspergillus niger.

A secondary fungus ball is caused by the colonization and proliferation of the fungus in a pre-existing pulmonary cavity. The cause of a pre-existing cavity is most commonly prior cavitary tuberculosis. However, it may complicate a wide spectrum of cavitating pulmonary diseases, such as sarcoidosis, histoplasmosis, blastomycosis, AIDS (especially in cases of atypical Pneumocystis jiroveci pneumonia), lung abscess, pulmonary or bronchial cysts, bronchiectasis, cyanotic heart disease, and pulmonary infarction.9

Primary fungus ball, which arises within the bronchial tree with the proliferation of Aspergillus leading to a pulmonary cavity, is far less common. The clinical conditions leading to the initiation of a cavitary process and formation of a fungus ball include Invasive pulmonary aspergillosis, chronic necrotizing pulmonary aspergillosis (CNPA), and Allergic bronchopulmonary aspergillosis.9

Diagnosis is based on fungal cultures of sputum or bronchoalveolar lavage (BAL) from these patients and chest imaging. Most cases of fungus balls are diagnosed incidentally on a chest x-ray or CT scan. Chest radiographs show a solid round mass within a cavity (3–5 cm diameter) partially surrounded by a radiolucent crescent. CT provides a timely diagnosis or can at least provide more logical differentials. Signs on CT scans constituting clinical evidence for invasive pulmonary disease by the 2008 criteria proposed by the EORTC/MSG include dense, well-circumscribed lesion(s) with or without a surrounding “halo” of ground-glass gray attenuation, air-crescent sign, and cavity formation.9 Movement of the fungus ball within the cavity may be appreciated when comparing upright and decubitus images.

Sputum culture for aspergillus may be positive for more than half of the patients with fungus ball, it is not a sensitive and specific diagnostic marker. Precipitating antibodies to Aspergillus antigens are present in the sera of more than 95% of patients with aspergilloma; however, some patients receiving corticosteroids may be seronegative.

We report this case of bilateral fungus ball in our patient post Covid 19 infection who did not have any past history of pulmonary tuberculosis, bronchiectasis, sarcoidosis or any preformed cavities to result in fungus ball formation. As depicted in the pictures, prior CT scan images did not show any evidence of a cavity which was later diagnosed at the follow up CT scan suggesting that the fungus ball was a complication after SARS CoV2 infection. As with any superadded infection, the mortality and morbidity increases due to a secondary infection.

Conclusion

Superadded fungus ball in a cavity can be a complication in patients recovering from SARS CoV2 infection and can lead to increase morbidity and mortality. By reporting this case, we would like to make our readers aware about such a complication in Covid-19 infection.

References