Severe Acute Respiratory Syndrome Coronavirus-2 and Pulmonary Tuberculosis Coinfection: Double Trouble

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Abstract

The ongoing pandemic of novel coronavirus Severe Acute Respiratory Syndrome Coronavirus - 2 (SARS-CoV-2) has received worldwide attention by becoming a major global health threat. We encountered one case of SARS-CoV-2 and pulmonary tuberculosis (TB) coinfection which has not been frequently reported. A 76 year old female presented with acute respiratory symptoms superimposed on chronic symptoms, suggestive to have pneumonia. Oropharyngeal throat swab sample for SARS-CoV-2 infection was positive as detected by real-time reverse-transcriptase–polymerase-chain-reaction (RT-PCR) assay. Sputum smear staining was positive for acid fast bacilli. Clinicians should suspect coinfection with pulmonary TB while treating Coronavirus disease 2019 (COVID-19) during ongoing pandemic as therapeutic strategies need to be determined accordingly to improve outcome and prevent transmission in community.

Introduction

The 2019 novel coronavirus (2019-nCoV) or recently renamed as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) by World Health Organization (WHO), has been rapidly spreading with emergence from Wuhan City of Hubei Province of China in December 2019 to the rest of the world involving 203 other countries. [1, 2] Disease associated with SARS-CoV-2 also termed as Coronavirus disease 2019 (COVID-19), has now become a major threat to global health. WHO has declared this disease as a pandemic on 11th March 2020. Since then (as on 4th April, 2020), 1,182,136 confirmed cases and 63,897 deaths have been reported worldwide. [2] The clinical features of COVID-19 are variable, ranging from asymptomatic state to pneumonia, acute respiratory distress syndrome and multi-organ dysfunction. Tuberculosis (TB) is already existing as unprecedented pandemic worldwide with estimated 10 million with mortality of 1.2 million in 2018. [3] Around one-fourth of world population estimated to have latent TB infection (LTBI). [3] Convergence of TB and COVID-19 pandemics will be more deadly with propensity to cause sustained community transmission across all countries. To our knowledge, the coinfection of SARS-CoV-2 and TB has been rarely reported. Here, we present one case of coinfection of SARS-CoV-2 and TB.

Case

A 76 years old female presented to our emergency on 8th March, 2020 with a 1.5 month history of low grade intermittent fever, non-productive cough and decreased appetite with an eventual weight loss of 4 kg. She had worsening of symptoms five days prior to presentation with high grade fever (up to 101ºF) followed by breathlessness 3 days prior to her presentation. There was no prior history of pulmonary TB, any recent hospital admission and no known contact with patients of active TB. Her background history revealed that she was hypertensive taking tablet amlodipine 10 mg once daily and also having medical renal disease (Baseline creatinine-1.5 mg/dl) on conservative management. On physical examination at the time of admission, the patient was febrile (102°C) and had an arterial blood pressure of 140/80 mmHg, a heart rate of 110 beats/min, respiratory rate of 32 breaths/min and oxygen saturation of 86% on room air. Chest auscultation revealed bilateral crepitation with bronchial breathing on left side. Findings of the remainder of the systemic examination were unremarkable. The arterial blood gas on room air showed a PaO2 of 52 mmHg, PaCO2 of 30 mmHg, HCO3 of 18 mmol, pH of 7.46 and wide alveolar-arterial gradient (36 mm Hg) suggestive of acute hypoxemic respiratory failure. Routine blood tests revealed the following: hemoglobin level of 11.5 g/dL, a leucocyte count of 7600 cells/mm^3, with 90% neutrophils, 7.0% lymphocytes, and 3.0% monocytes, platelet count of 220,000/mm^3, serum sodium level was 133 mmol/L, urea was 62.7 mg/dL and creatinine level was 2.32 mg/dL. The erythrocyte sedimentation rate was elevated (65 mm in the 1st hour). Other remarkable blood test findings included serum lactate dehydrogenase 550 U/L, High sensitive C-reactive protein- 55 mg/l, procalcitonin 0.5 ng/ml, NT-pro Brain Natriuretic Peptide level 600 pg/ml, ferritin level 426.2 ng/ml, Troponin-I negative, creatine phosphokinase (CPK) level 430 U/L and CPK-MB 30.7 U/L. Chest radiograph revealed left lower zone alveolar opacity likely lobar consolidation. Computed tomography (CT) thorax revealed left lower lobe dense consolidation having air bronchogram with bilateral ground glassing as shown in **Figure 1 (A & B).** Provisional diagnosis of community acquired pneumonia was established. A therapeutic trial of intravenous antibiotics (Ceftriaxone 1gm twice daily and Azithromycin 500 mg once daily) was initiated after collection of cultures along with oxygen inhalation and other supportive measures. Culture of blood as well as

urine at admission were sterile. A 2D echocardiogram revealed mild concentric left ventricular hypertrophy with preserved ejection fraction, grade 1 diastolic dysfunction and no vegetations. Serology was negative for HIV, hepatitis B and C, malaria, scrub typhus, mycoplasma, legionella, leptospira, and viruses like dengue, chikungunya, cytomegalovirus (CMV) and Epstein–Barr virus (EBV). Throat swab was negative for respiratory viruses including influenza. In view of the height of novel SARS CoV-2 pandemic worldwide, throat swab for SARS CoV-2 was also sent and found to be positive as detected by validated real-time reverse-transcriptase–polymerase-chain-reaction (RT-PCR) assay for both E-Sarbeco and RdRP genes. Ziehl Neelsen (ZN) staining of second sputum smear sample was also positive for grade 1+ acid fast bacilli (AFB). GeneXpert of sputum revealed rifampicin sensitive *Mycobacterium tuberculosis* complex (MTBC). Based on these reports, history of patient was again reviewed after enquiring all family members staying along with her. She was confirmed to have had direct contact with her grandson who travelled from France 12 days prior to the onset of acute symptoms and returned back after five days. Thereafter, her grandson also turned out to be SARS-CoV-2 positive. The patient was treated simultaneously with four anti-tubercular drugs regimen and hydroxychloroquine 400 mg twice daily in addition to antibiotics. Patient was shifted to COVID 19 designated hospital on 11th March 2020 with utmost precautions for further management according to national policy. However, we continued tracking the patient for further follow up. Liquid culture (MGIT BACTEC) also revealed growth of MTBC. Patient responded well to treatment and currently continuing treatment for pulmonary TB. Written informed consent was obtained from the patient for using clinical records in this study.

Discussion

We have reported this case with particular interest due to coinfection of SARS-CoV-2 and pulmonary TB which is rare. There are studies that have reported coinfection of SARS-CoV-2 with other respiratory pathogens particularly influenza virus. [4-7] Few studies have reported coinfection of TB with SARS-CoV and MERS-COV during outbreaks in 2003 and 2012 respectively. [8-11] Most of cases were having pulmonary TB initially followed by viral superinfection [8, 9, 11] while few contracted TB after recovery from viral infection. [10] A study from China recently reported that persons with active

or latent TB have increased susceptibility for SARS-CoV-2 infection associated with rapid progression and severe involvement. [12] TB infection was more common among patients with SARS-CoV-2 infection than in those with bacterial or other viral infections. Although this coinfection might be a mere coincidence but there could be a temporal relationship. It has been postulated that there is augmentation of dual infection as both cause a transient suppression of cellular immunity predisposing to new infection or exaggerated reactivation of latent infection. Induction of Type 1 interferons during viral infections inhibit immune responses mediated by interferon-gamma leading to flare up of TB infection. [13] Differentiation between TB and SARS-CoV-2 is quite difficult as both can manifest with similar respiratory symptoms like fever, cough, breathlessness and weakness but there is gradual or chronic progression of symptoms in TB as compared to acute or rapid progression in case of COVID 19. It is of prime concern as diagnosis of TB might be missed or delayed in view of ongoing pandemic of COVID-19 leading to poor outcome and enhanced transmission of infection in community. Both share common risk factors like advanced age, diabetes, malnutrition, HIV and other chronic illnesses. Therefore, clinicians should be cautious and evaluate every COVID-19 case for TB coinfection including latent form. The situation will be more difficult to tackle if there is associated drug resistance. Patients of COVID-19 either having active TB infection or previous history of TB with or without sequelae, will be more at risk of worse outcomes. However, larger studies are required to unveil this association for further validation. Therapeutic strategies like intense monitoring, timely decision for implementing appropriate ventilatory strategies, aggressive contact tracing, appropriate infection control and use of steroids or other immunosuppressive drugs, need to be prioritized with these subset of patients to avoid severity or complications.

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Declarations

Declaration of patient consent

The authors of this manuscript declare that this scientific work complies with reporting quality, formatting and reproducibility guidelines set forth by the CARE Network. The medical superintendent of Ayushman Hospital and Health Service, Dwarka, Delhi, India, in charge of ethical committee granted permission for this case report. The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given consent for images and other clinical information to be reported in the journal. The patient understands that their names and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed. We also certify that we have not plagiarized the contents in this submission and have done a Plagiarism Check.

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Conflicts of interest

There are no conflicts of interest.

Figures

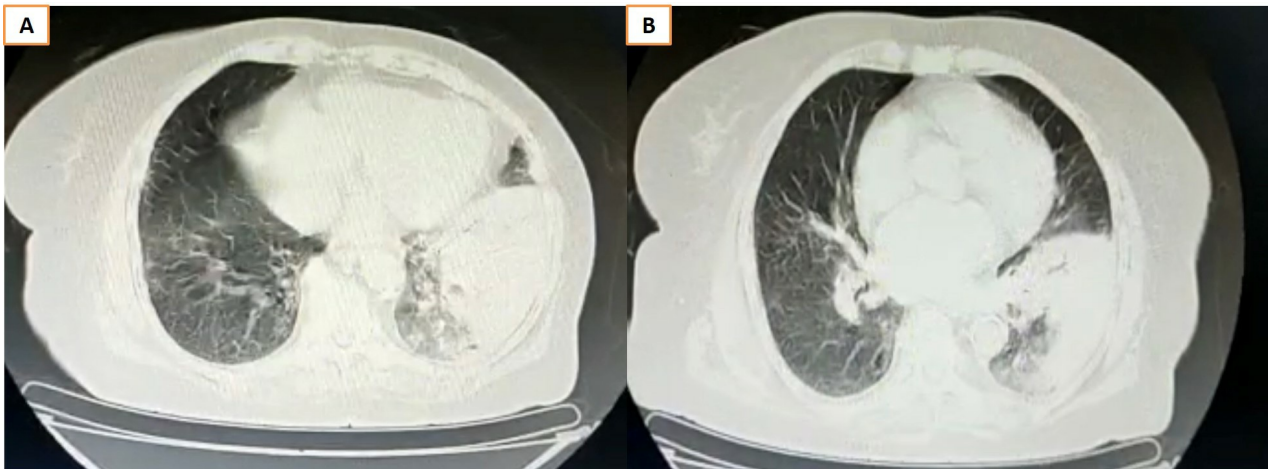

Figure 1

(A, B) Computed tomography thorax showing left lower lobe dense consolidation having air bronchogram with bilateral ground glassing

Supplementary Files

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