D J Med Sci 2021;7(1):30-33
doi: 10.5606/fng.btd.2021.25043

Case Report

Multiple cavity formation during COVID-19 pneumonia

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ABSTRACT

The typical manifestations of novel coronavirus-2019 (COVID-19) pneumonia on computed tomography include ground-glass opacities, air bronchogram sign, crazy-paving pattern, consolidation, multiple small patchy shadows, spider web sign, cord-like, nodular, pleural thickening, lymphadenopathy, and pleural effusion. Herein, we report a case of cavitary lesions and bilateral multilobar involvement in the late period of COVID-19 pneumonia.

Keywords: Cavitary lesion, computed tomography, COVID-19, ground-glass opacities.

Thoracic computed tomography (CT) plays an essential role in the diagnosis, treatment, and post-discharge follow-up of novel coronavirus-2019 (COVID-19) pneumonia.[1] Additionally, it can show typical COVID-19 pneumonia lesions in the lungs before the definitive diagnosis as evidenced by nucleic acid tests through real-time reverse transcriptase-polymerase chain reaction (RT-PCR).[1] The typical manifestations of COVID-19 pneumonia on a CT scan include ground-glass opacities, air bronchogram sign, crazy-paving pattern, consolidation, multiple small patchy shadows, spider web sign, cord-like, nodular, pleural thickening, lymphadenopathy, and pleural effusion predominantly distributed in the peripheral third of the lungs.[1] Although cavitary lung lesions are usually related to mycobacterial, parasitic, fungal, autoimmune, or neoplastic disease, lung cavitation following pulmonary embolism/infarction or inaccurate healing of the lesions has been described previously in COVID-19 patients.[2]

In this article, we report a case of cavitary lesions and bilateral multilobar involvement in the late period of COVID-19 pneumonia.

CASE REPORT

A 54-year-old man was admitted to the emergency room with fever (38.7°C) and dry cough for two days about seven months ago. Ground-glass opacities were observed in scattered localizations in the initial thoracic CT (Figure 1a-c). Laboratory tests showed a white blood cell (WBC) count of 6.71×10^9, a neutrophil count of 4.4×10^9 (73.4%), a lymphocyte count of 1.89×10^9 (20.2%), a C-reactive protein (CRP) value of 1.2 U/mL, a D-dimer value of 550.6 ng/mL, and an erythrocyte sedimentation rate (ESR) of 67 mm/h. The RT-PCR test confirmed COVID-19 pneumonia. The patient was hospitalized, isolated, and medical treatment including hydroxychloroquine (200 mg b.i.d. for five days), ceftriaxone (1 g b.i.d. for 7 days),

Received: December 08, 2020 ***Accepted:*** January 18, 2021 **Published online:** May 05, 2021

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Cite this article as:
Şimşek S, İşlek A, Atabay Y, Çetin FM. Multiple cavity formation during COVID-19 pneumonia. D J Med Sci 2021;7(1):30-33.

favipiravir (Day 1: 1,600 mg b.i.d. for the first day and 600 mg b.i.d. on Days 2-5), two consecutive transfusions of 200 mL of convalescent plasma, enoxaparin (40 to 60 mg/day during hospitalization), and dexamethasone (20 mg/day for the first three days and 4 mg/day thereafter) was initiated. The patient was transferred to the intensive care unit (ICU) on Day 6 of the treatment and underwent non-invasive mechanical ventilation support due to severe respiratory distress. Diffuse patchy parenchymal infiltrations in the lung parenchyma with diffuse ground-glass opacities and progression of pneumonia were detected on thoracic CT 12 days after his admission to the hospital (Figure 2a-c). The lymphocyte count decreased to 0.52×10^9 (5.8%), and the CRP value increased to 94.3 U/mL, while D-dimer value was 1,154.6 ng/mL. The patient was monitored in the ICU for 11 days and was transferred to the inpatient isolation ward due to the regression of respiratory distress. The RT-PCR test was negative on Day 16 after hospitalization and the patient was discharged on Day 22.

At one week of follow-up, the patient still complained of mild dyspnea. Multifocal patchy reticular ground-glass opacities and alveolar consolidation areas were observed in all lobes and segments of both lungs after 28 days of his

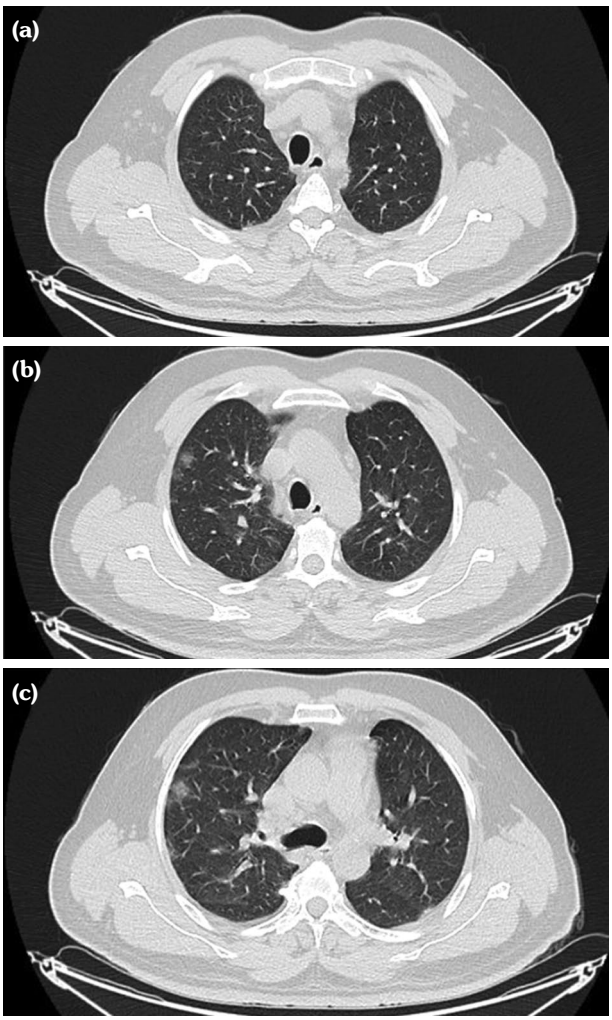

Figure 1. Initial CT images obtained on August 01, 2020. **(a)** A CT image showing upper lobes of lungs. **(b)** Ground-glass opacities in right upper lobe. **(c)** Peripherally located ground-glass opacities in right upper lobe.
CT: Computed tomography.

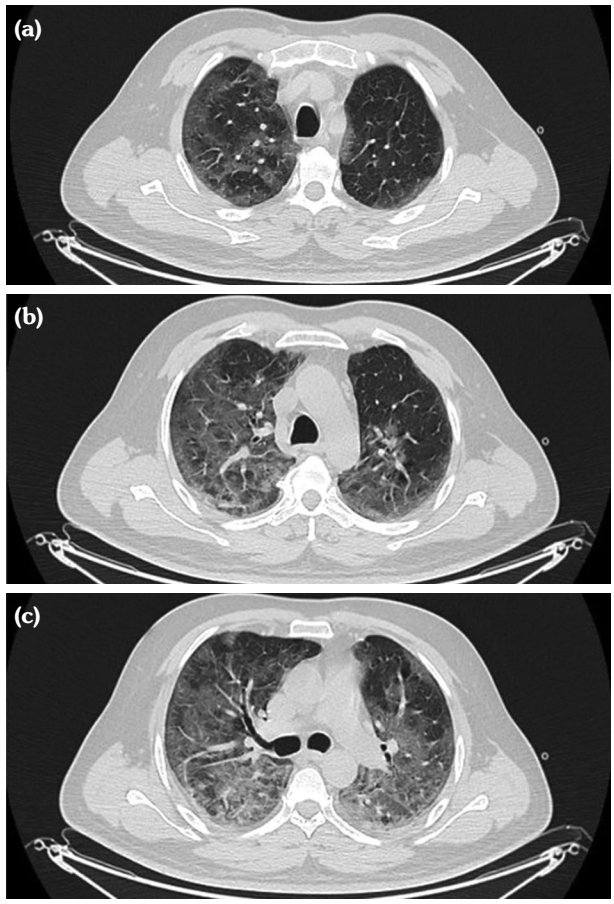

Figure 2. CT images obtained on August 12, 2020. **(a)** A CT image showing diffuse patchy parenchymal infiltrations in upper lobes of lungs. **(b)** Ground-glass opacities dominantly in right upper lobe. **(c)** Diffuse ground-glass opacities and parenchymal infiltrations.
CT: Computed tomography.

first admission (Figure 3a-c). A new 27×25-mm cavity with an 8-mm wall thickness and septation was detected in the upper lobe of the right lung. The second 15×14-mm and 6×7-mm cavities were also detected in the upper lobe of the left lung, and the third one was 11×10 mm in size in the upper lobe of the right lung adjacent to the pleura. The lymphocyte count was 1.52×10^9 (14.2%), the CRP value was 1.3 U/mL, and D-dimer value was 88.6 ng/mL. The Ziehl-Neelsen (ZN) staining, tuberculin skin test (9 mm), and sputum culture for tuberculosis were all negative. The RT-PCR test result of fungi and blood culture was also negative. A written consent was obtained from the patient.

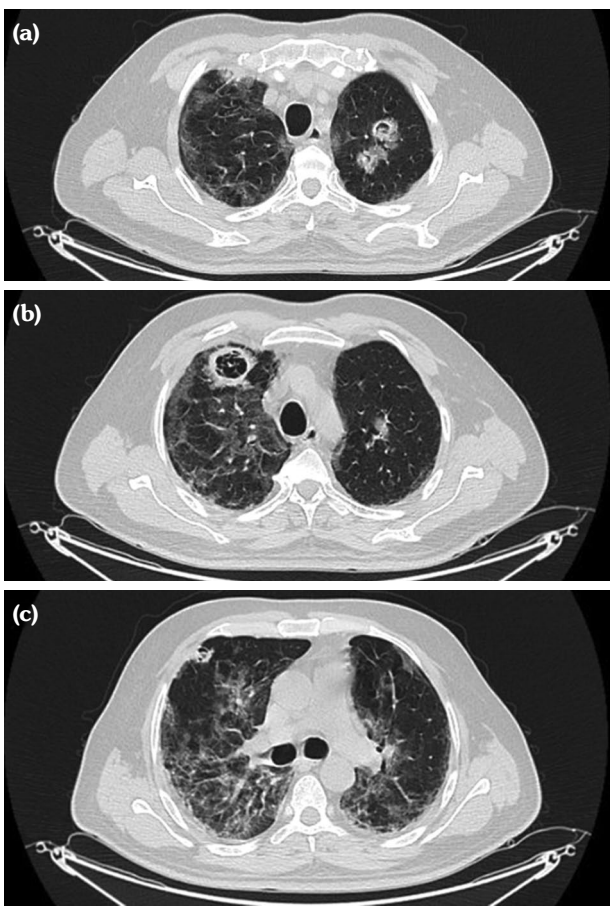

Figure 3. CT images obtained on August 28, 2020. **(a)** A CT image showing two cavitary lesions in upper lobe of left lungs. **(b)** A 27 x 25-mm cavitary lesion with an 8-mm wall thickness in right upper lobe. **(c)** Small cavitary lesion in upper lobe of right lung adjacent to pleura.
CT: Computed tomography.

DISCUSSION

Thoracic CT has an irreplaceable role in the screening and diagnosis of COVID-19, monitoring disease progression during follow-up for changes of lung lesions, such as shrinkage, expansion, or absorption, dissipation, or densification, and fibrosis formation.[3] Zoumot et al.[2] reported lung cavitation formation with a rate of 1.7% (n=689) with COVID-19 pneumonia. They reported that five of 12 patients had solitary cavities with size ranging between 30 to 100 mm in diameter, and all patients with more than one cavity had bilateral cavitation. Septation of the cavity was not described in this report. Similarly, in our case, bilateral cavity formation and multilobar involvement including septa formation were detected. Xu et al.[4] showed that, in a 27-year-old male patient, a small lung cavity was detected during the initial diagnosis, and the cavity significantly regressed after approximately nine days of treatment. In the present case, the lung cavity emerged as a late complication. Chen et al.[5] also observed small cavities in both lungs during the COVID-19 recovery period, due to the absorption phase of ground-glass opacities or consolidated nodules. Similarly, in this case, cavity formation occurred in the late period; however, cavities appeared independent from the consolidated nodules or ground-glass opacities or infiltrates.

In conclusion, this report and limited number of literature data indicate that cavitary lesion is an important manifestation of COVID-19 pneumonia and may occur in the early or late stage of the disease, although its pathological mechanism is still unclear.

Declaration of conflicting interests

The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

Funding

The authors received no financial support for the research and/or authorship of this article.

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