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Computed Tomography Imaging of an HIV-infected Patient with Coronavirus Disease 2019 (COVID-19)

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Running title:

Imaging of AIDS with COVID-19

Abstract

In December 2019, an outbreak of Coronavirus disease 2019 (COVID-19) occurred in Wuhan, China. Since then, this disease has infected more than

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900,000 individuals worldwide. Here we report a case of non-severe COVID-19 pneumonia who was living with HIV. Chest computed tomography (CT) showed different abnormalities from those of conventional COVID-19, and the faster absorption of pulmonary lesions also highlights the importance of antiretroviral therapy in this patient. This report provides reference for the diagnosis and treatment of HIV-infected patients with COVID-19.

Key words: Computed tomography, Coronavirus Disease 2019, SARS-CoV-2, HIV

To the Editor,

In December 2019, a cluster of pneumonia cases were reported in Wuhan, China, which were later determined to be caused by a novel betacoronavirus, the 2019 novel coronavirus (2019-nCoV) and later Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The disease was then officially named as Coronavirus disease 2019 (COVID-19).^{1,2} By April 2, 2020, there have been more than 900,000 individuals infected with this newly discovered coronavirus. On February 4, 2020, the *Diagnosis and Treatment Program of COVID-19 (Trial Fifth Edition)* recommended chest computed tomography (CT) as one of the main evidences for confirmed cases of COVID-19.³ Here, we report a patient of non-severe COVID-19 pneumonia living with HIV. Chest CT imaging of this patient showed quick absorption of pulmonary lesions and different CT characteristics from conventional COVID-19. This pattern is different from that of the people living with HIV (PLWH) with severe COVID-19 pneumonia described in the article entitled “**Co-infection of SARS-CoV-2 and HIV in a patient in Wuhan city, China.**”⁴

A 24-year-old HIV-infected man with a living history in Wuhan was admitted to our hospital with a one-day history of fever (37.8°C) and dry cough. Laboratory examinations revealed no abnormalities in leukocyte count, lymphocyte count, C-reactive protein (CRP), erythrocyte sedimentation rate (ESR) or flow cytometry (FCM). Unenhanced CT showed multiple high-density patchy shadows with unclear boundaries in the subpleural regions of the middle and lower lobes of the right lung, with involvement of adjacent interlobar pleura (Fig 1a, 1b). Finally, he was diagnosed with non-severe COVID-19 pneumonia based on two real-time reverse transcription polymerase chain reaction (RT-PCR) tests on oropharyngeal swabs. The patient was confirmed with HIV infection two years ago, and then received an antiretroviral therapy (ART) (Tenofovir 0.3 g, qd; Lamivudine 0.3 g, qd; Efaviren 0.6 g, qd) for 2 years. He reported to have no history of drug abuse or blood transfusion, and refused to disclose the sexual history. After COVID-19 diagnosis, he was given Lopinavir/Ritonavir (300/75 mg, bid) combined with interferon inhalation (5 µg, bid) for treatment. Meanwhile, the anti-HIV treatment (oral tenofovir, lamivudine and efavirenz) continued. During treatment, the symptoms improved. And follow-up chest CT suggested that the pulmonary lesions decreased on day 7 of hospitalization (Fig 1c, 1d) and were partially absorbed on day 12 (Fig 1e, 1f). After 15 days of treatment, the chest CT imaging showed that the pulmonary lesions substantially disappeared, leaving a small amount of residual fibrosis foci (Fig. 1g, 1h). After three RT-PCR tests on the pharyngeal swab specimens (interval >24 h) all producing negative results, the patient was discharged and transferred to Guizhou Provincial Staff Hospital for medical observation. Meanwhile, the nasopharyngeal swabs were sent to Guizhou Provincial Center for Disease Control and Laboratory Department of Guizhou Provincial People's Hospital for detection of SARS-CoV-2 RNA. The PCR tests on days 14 and 28 both showed negative results.

The COVID-19 disease has clinical main symptoms of fever, dry cough, and fatigue.⁵ Besides, patients with impaired immune functions are more likely to develop severe acute respiratory distress syndrome and even death.⁶ However, the HIV-infected case reported here presented moderate clinical symptoms, and laboratory examinations revealed no abnormalities. Furthermore, the symptoms improved after a short period of treatment, and had a good outcome.

The main findings of chest CT in this case were patchy shadows in the peripheral lung, involving the interlobar fissure, which are different from the common COVID-19 CT findings of ground glass opacity followed by consolidation and interlobular septal thickening.⁵ This difference suggests that the chest CT findings in this case may be atypical of COVID-19. Commonly, the pulmonary changes in patients with COVID-19 include development into the greatest severity at around 10 days following the initial symptoms and improvement at around day 14.⁷ By contrast, the pulmonary lesions of the patient described here improved around 7 days following the initial symptoms, and substantially disappeared around day 15. The quick absorption of lesions may be related to the ART before SARS-CoV-2 infection. As a component of ART, the tenofovir has been proven effective against SARS-CoV-2 by binding its RNA polymerase.⁸ In contrast, the severely ill patient reported by Feng Z et al. did not receive regular ART.⁴ Thus, the PLWH with COVID-19 pneumonia receiving ART may have moderate symptoms and faster improvement than the general population and different CT imaging features from the conventional. In addition, although preliminary clinical trials showed no clinical benefit of Lopinavir/Ritonavir for COVID-19,^{9,10} the possible positive effect of the interactions of Lopinavir/Ritonavir with other antiviral agents cannot be denied in this case. The efficacy of these medications on COVID-19 needs to be further confirmed in future studies.

In conclusion, the chest CT imaging findings of the case of non-severe COVID-19 pneumonia with HIV infection are mainly patchy shadows in the peripheral lung, involving the interlobar fissure, which are different from the common chest CT findings of COVID-19. The quick absorption of pulmonary lesions also highlights the importance of ART in this patient. This report provides reference for the diagnosis and treatment of HIV-infected patients with COVID-19.

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Conflicts of Interest

The authors have no conflicts of interest to declare.

Ethical statement

This manuscript, or any part of it, has not been published and will not be submitted elsewhere for publication.

This report was approved by Jiangjunshan Hospital Institutional Review Board, and the requirement for informed consent was waived.

References

1. World Health Organization. WHO Director-General's remarks at the media briefing on 2019-nCoV on 11 February 2020 2020 [cited 2020 April 2]. Available from: <https://www.who.int/dg/speeches/detail/who-director-general-s-remarks-at-the-media-briefing-on-2019-ncov-on-11-february-2020>.

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2. Zhu N, Zhang D, Wang W, Li X, Yang B, Song J, et al. A Novel Coronavirus from Patients with Pneumonia in China, 2019. *N Engl J Med.* 2020;382(8):727-33.
 3. National Health Commission of China, State Administration of Traditional Chinese Medicine. Notice on the issuance of a programme for the diagnosis and treatment of novel coronavirus (2019-nCoV) infected pneumonia (trial fifth edition) 2020 [cited 2020 April 2]. Available from: <http://bgs.satcm.gov.cn/zhengcewenjian/2020-02-06/12847.html>.
 4. Zhu F, Cao Y, Xu S, Zhou M. Co-infection of SARS-CoV-2 and HIV in a patient in Wuhan city, China [published online ahead of print, 2020 Mar 11]. *J Med Virol.* 2020;10.1002/jmv.25732. doi:10.1002/jmv.25732
 5. Wu J, Wu X, Zeng W, et al. Chest CT Findings in Patients with Corona Virus Disease 2019 and its Relationship with Clinical Features [published online ahead of print, 2020 Feb 21]. *Invest Radiol.* 2020;10.1097/RLI.0000000000000670. doi:10.1097/RLI.0000000000000670
 6. Guan WJ, Ni ZY, Hu Y, et al. Clinical Characteristics of Coronavirus Disease 2019 in China [published online ahead of print, 2020 Feb 28]. *N Engl J Med.* 2020;10.1056/NEJMoa2002032. doi:10.1056/NEJMoa2002032
 7. Pan F, Ye T, Sun P, et al. Time Course of Lung Changes On Chest CT During Recovery From 2019 Novel Coronavirus (COVID-19) Pneumonia [published online ahead of print, 2020 Feb 13]. *Radiology.* 2020;200370. doi:10.1148/radiol.2020200370
 8. Elfiky AA. Ribavirin, Remdesivir, Sofosbuvir, Galidesivir, and Tenofovir against SARS-CoV-2 RNA dependent RNA polymerase (RdRp): A molecular

docking study [published online ahead of print, 2020 Mar 25]. *Life Sci.* 2020;117592. doi:10.1016/j.lfs.2020.117592

9. Cao B, Wang Y, Wen D, et al. A Trial of Lopinavir-Ritonavir in Adults Hospitalized with Severe Covid-19 [published online ahead of print, 2020 Mar 18]. *N Engl J Med.* 2020;10.1056/NEJMoa2001282. doi:10.1056/NEJMoa2001282
10. Li Y, Xie Z, Lin W, Cai W, Wen C, Guan Y, et al. An exploratory randomized, controlled study on the efficacy and safety of lopinavir/ritonavir or arbidol treating adult patients hospitalized with mild/moderate COVID-19 (ELACOI). medRxiv. 2020:2020.03.19.20038984.

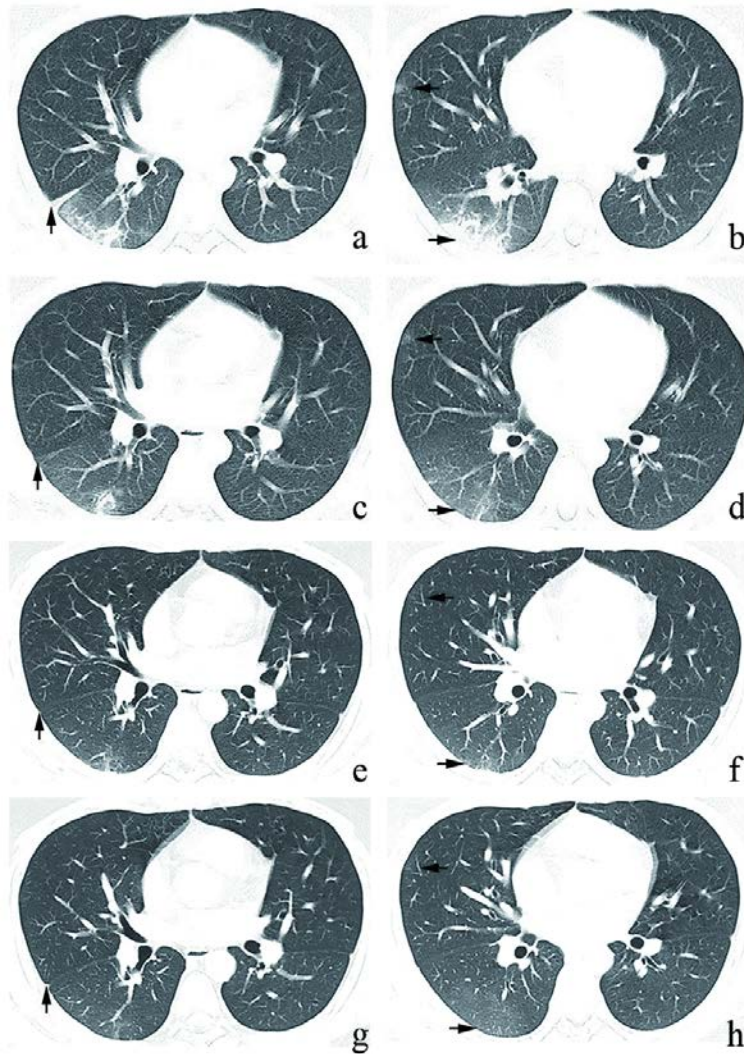


Figure 1. Chest CT images of the HIV-infected patient with COVID-19.

(a, b) Initial unenhanced chest computed tomography (CT) showed multiple high-density patchy shadows with blurry boundaries in subpleural regions of the middle and lower lobes of the right lung (horizontal arrow), with adjacent interlobar pleura involved (vertical arrow). (c, d) The second follow-up CT (on day 7 of hospitalization) revealed decreased pulmonary lesions. (e, f) The third follow-up CT (on day 12 of hospitalization) showed that the pulmonary lesions were partially absorbed. (g, h) The last CT (on day 15 of hospitalization) suggested substantial disappearance of the pulmonary lesions.