

Two case reports of COVID-19: A 6-year-old boy and his 66-year-old grandmother

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Case Report

Keywords: COVID-19, SAMS-CoV-2 RNA test, Imaging diagnosis, Case report

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Abstract

Background: Currently, COVID-19 is a global pandemic disease that has caused a large number of infections worldwide. Reports of COVID-19 cases are not uncommon, but there is no report that SAMS-CoV-2 RNA test results for grandma and grandchildren in family aggregation infections are completely different.

Case presentation: A 6-year-old boy's chest CT indicated lung infection, but SAMS-CoV-2 RNA test was negative. His grandmother's imaging showed lung inflammation absorption, and nucleic acid test was positive.

Conclusions: Children and the elderly people have different clinical manifestations during the course of SAMS-CoV-2 infection, it is challenging to identify whether they are infectious. Therefore, the diagnosis of COVID-19 requires a combination of multiple detection measures, including clinical features, imaging features, and SAMS-CoV-2 RNA test results.

Keywords: COVID-19; SAMS-CoV-2 RNA test; Imaging diagnosis; Case report

Background

As of April 8, 2020, 81802 cases of coronavirus disease (COVID-19, SAMS-CoV-2) have been diagnosed in China [1] and more than 1300,000 cases worldwide. These statistics suggest that COVID-19 is highly infectious and extremely harmful. However, the diagnostic criteria for COVID-19 are still controversial, and there is currently no consensus internationally. However, clinical case and experience sharing may contribute to the control of emerging infectious diseases [2]. Therefore, in this report, we describe two cases of COVID-19.

Case Presentation

Case 1

A 6-year-old boy who lives in Wuhan presented with symptoms of fever in late January 2020; the body temperature was up to 38.6°C, with chills, paroxysmal dry cough, fatigue, diarrhea, muscle soreness throughout the body, and other discomforts; no dyspnea, no hemoptysis, no palpitation, no nausea, no vomiting, and no abdominal pain. The boy had experienced poor mental health, appetite, and sleep since the onset of condition. A chest CT scan at the community hospital on February 14 revealed a posterior basal segment infection of the right lower lobe of the lung (Figure 1A). A nucleic acid test was negative. After admission to the Guanggu District of Hubei Province Maternal and Child Health Hospital on February 20, he was given oseltamivir, vitamin C, and Chinese medicine. His temperature dropped below 37°C. Two consecutive nucleic acid tests on February 27 and March 1 showed negative results. A routine blood test on February 28 showed decreased leukocyte count (4.7×10^9 cells/L), but other indicators were normal. Blood biochemical tests showed that aspartate aminotransferase was 35.9 U/L (children's

reference value is 0–40 U/L), and the rest of the indicators were normal. A review of chest CT on March 1 revealed no significant lesions (Figure 1B). On March 5, the patient's physical signs were normal. He was discharged from the hospital and was quarantined for 14 days.

Case 2

A 66-year-old female who has been living in Wuhan for a long time and in good health, without hypertension, diabetes, and other common diseases. She started having symptoms of fever in early January, with a body temperature of up to 38.7°C, chills, paroxysmal dryness, wheezing, fatigue, general muscle pain, and discomfort; no coughing of blood, no palpitation, no nausea and vomiting, no abdominal pain and diarrhea. Symptomatic treatment (medicine unknown) was given at the community hospital, and the temperature dropped to normal. On February 17, 2020, a chest CT scan of the patient showed an increased flaky ground glass-like density in both lungs, and bilateral lung infection was considered (Figure 1C). A nucleic acid test showed negative result. For further treatment, she was admitted to the Guanggu District of Hubei Province Maternal and Child Health Hospital. Since the onset of the disease, the patient has had poor mental health, appetite, and sleep, and normal bowel movements. After being admitted to the isolation ward, the patient was given control cough, phlegm cooling, and Chinese medicine treatments. Her temperature was maintained below 37°C and her respiratory rate was 20 breaths per minute. Consecutive nucleic acid tests on February 24, March 2, and March 7 showed positive results. Routine blood test on February 25 indicated that CRP, liver function, kidney function, and myocardial enzymes were all normal. A chest CT review on March 1 showed bilateral lung with increased multiple ground glass-like density, mainly under the pleura (Figure 1D). Compared with the imaging findings on March 1, chest CT on March 7 showed obvious absorption of inflammation in the bilateral lung (Figure 1E). On March 9 and March 12, two consecutive nucleic acid tests showed negative results. The patient was discharged on March 13 without any discomfort and was quarantined in the community for 14 days.

Discussion And Conclusions

COVID-19 is caused by a beta coronavirus with a diameter of 60–140 nm [3]. These viruses have enveloped virions that appear oval or round, and often polymorphous [4]. This virus is mainly transmitted via the respiratory tract and contact. Currently, COVID-19 patients are the main source of infection [5]. Fever and cough are the most common clinical symptoms in addition to other non-specific symptomatology including fatigue, headache, and muscle soreness. There are usually no special findings in standard laboratory tests. In Case 1, the 6-year-old boy only presented with a decrease in leukocyte count, while his 66-year-old grandmother (case 2) had a normal hematological indicator. Differentiation of COVID-19 from influenza or other pneumonias is challenging. At present, the diagnostic criteria are mainly based on real-time fluorescence RT-PCR analysis of respiratory or blood samples for the detection of the new coronavirus nucleic acid [6]. Although the RT-PCR is used to analyze respiratory specimens, the results are obtained within 4–6 h, and numerous false negatives for nucleic acid testing are generated during the tests. In this report, based on the image data of the 6-year-old boy who had a history of close

contact with COVID-19 patients, and has been diagnosed with COVID-19, his nucleic acid test has repeatedly been negative. It further illustrates the high incidence of false negatives in nucleic acid detection. This conclusion is also consistent with those reported in the previous literature. Yicheng Fang et al. found that the sensitivity of detecting the nucleic acid of the 2019 novel coronavirus was lower than that of the imaging diagnosis [7]. Ai et al. insist that chest CT has a high sensitivity for the diagnosis of COVID-19 [8]. Nucleic acid detection results are affected by the type of sample, the technique used to collect the samples, the detection reagent, and the detection ability, and it may also be associated with the disease course of the patient [9]. To guarantee the accuracy of nucleic acid detection, it is recommended to keep as much lower sputum secretion samples as possible and submit the samples as soon as possible after collection. It is crucial that to exclude suspected cases, there must be negative results at least two times for the nucleic acid test [10]. If necessary, multiple samples can be taken to confirm the diagnosis. Imaging examination plays an important role in the early clinical diagnosis of COVID-19. In our two reported cases, the chest CT scan indicated lung infection, while nucleic acid tests were still negative. In case 2, compared with the results of March 1, 2020, the chest CT showed inflammation in the 66-year-old grandmother on March 7, 2020, was significantly absorbed, while the nucleic acid test results were still positive on the same day. It means that she may still be in danger of transmitting the virus. Therefore, we believe that relying on nucleic acid diagnosis or imaging diagnosis alone has the risk of missed diagnosis, which is not conducive for the prevention and control of COVID-19.

In conclusion, we recommend that the diagnosis of COVID-19 which is highly infectious should be combined with the medical history, imaging examination, and multiple types of samples for nucleic acid test results to avoid missed diagnosis.

Abbreviations

COVID-19, coronavirus disease 2019; SARS-CoV-2, severe acute respiratory syndrome coronavirus 2.

Declarations

Ethics approval and consent to participate: This study was approved by the ethics committee of Guanggu District of Hubei Province Maternal and Child Health Hospital (Number FYGG(L)2020-004), and written informed consent was obtained from patients.

Consent for publication: Written informed consents were obtained from the patient's legal guardian(s) and the 66-year-old patient for publication of these case reports and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

Availability of data and materials: The case information used during the current report is available from the corresponding author on reasonable request.

Competing interests: The authors declare that they have no competing interests.

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Authors' contributions: HF collected and analyzed the clinical data. XL and HZ performed the data examination. WY was a major contributor in writing the manuscript. ZL reviewed and modified the article. All authors read and approved the final manuscript.

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Figures

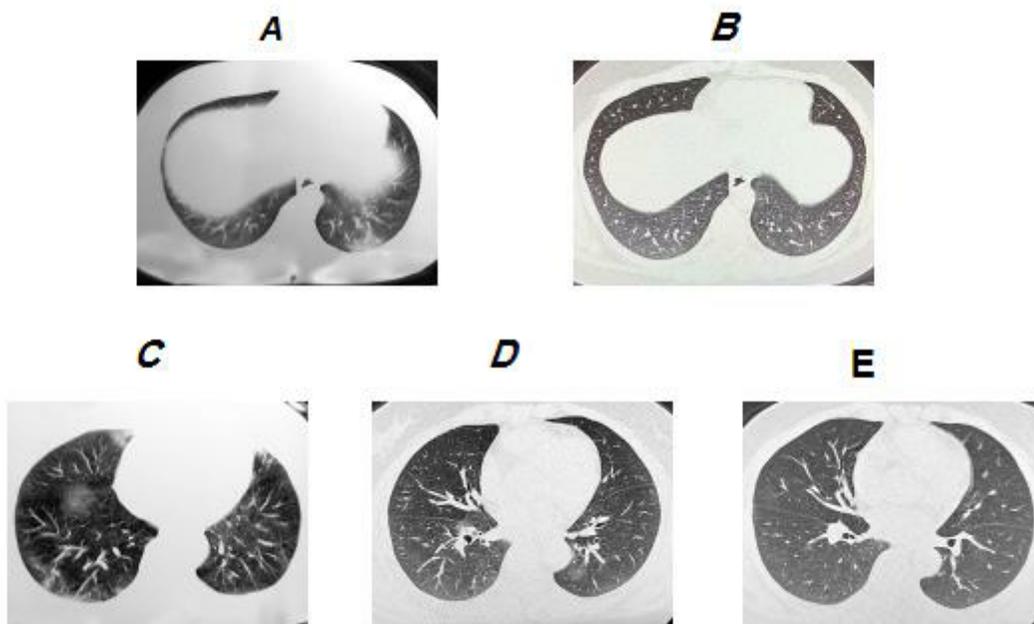


Figure 1

Chest CT of two patients with COVID-19 A. Chest CT scan of the 6-year-old boy at the community hospital on February 14 suggested that the left basal segment of the lower lobe was infected. B. Chest CT examination of the 6-year-old boy at Guanggu District of Hubei Maternal and Child Health Hospital on March 1, 2020, showed that no obvious lesions were seen. C. On February 17, 2020, the 66-year-old grandmother's first chest CT showed that the density of plaque-like ground glass was increased in both lungs. Diagnosis: bilateral lung infections. D. Chest CT of the 66-year-old grandmother on March 1, 2020: Bilateral lung with increased multiple ground glass-like density, mainly under the pleura. E. On March 7, 2020, a Chest CT of the 66-year-old grandmother, which showed no significant infection.