

Case Report

Positive Result for SARS-CoV-2 RNA Test after a Long Time for the Patient with COVID-19 even after Discharge from the Hospital

Maryam Fazeli¹, Saman Pazira², Behzad Pourhossein¹, Azadeh Rasooli³, Nastaran Ansari¹, Farid Azizi Jalilian^{1*}

¹Department of Medical Virology, Faculty of Medicine, Hamadan University of Medical Sciences, Hamadan, Iran

²Department of Microbiology and Microbial Biotechnology, Faculty of Life Sciences and Biotechnology, Shahid Beheshti University, Tehran, Iran

³Department of Biochemistry, Faculty of Sciences, Payame Noor University, Tehran, Iran

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Abstract

Background: Ruthin's coronavirus disease 2019 (COVID-19) diagnosis is based on the positive result of real-time polymerase chain reaction (PCR) from the nasal and oropharyngeal swab. However, chest CT scans can play an important role in diagnosing patients with COVID-19.

Cases Report: In this study, we reported a 44 years old female with a mild form of the COVID-19 who showed a positive result for the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) RNA for 44 days after symptom onset. The suspected case was detected using real-time PCR. After two weeks of hospitalization, the patient was discharged, but her molecular tests were performed twice after one month and 44 days, and they remained positive for SARS-CoV-2 RNA.

Conclusion: In theory, if the patient becomes re-infected or the virus reacts, these individuals may serve as a transmission source. So far, the only way to screen for possible reinfection has been by using PCR on separate specimens.

Keywords: COVID-19, Real-time polymerase chain reaction, Patient outcome assessment

***Corresponding Author:** Farid Azizi Jalilian, PhD; Department of Medical Virology, Faculty of Medicine, Hamadan University of Medical Sciences, Hamadan, Iran. Email: f.jalilian@umsha.ac.ir. Orchid Id: 0000-0003-3134-1441

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Introduction

Coronavirus virus disease 2019 (COVID-19) is a global concern caused by acute respiratory coronavirus syndrome 2 (SARS-CoV-2)¹. Coronaviruses are enveloped viruses with a large plus-strand RNA genome (□27–32 kb in size) that belongs to a genus of the *Coronaviridae* family². These families mainly infect animals, including mammals and birds, and also they generally cause mild respiratory infections in humans. Three human coronavirus infections have resulted in lethal

endemics, which include the severe acute respiratory syndrome (SARS) in 2003 from Southern China with a total of 8098 cases, Middle East respiratory syndrome (MERS) in 2012 from Saudi Arabia with a total of 2,494 cases globally and SARS-CoV-2 (the cause of COVID-19 disease) in 2019 from China with rapid spread around the world³⁻⁵. Understanding the mechanism of infectious virus shedding is crucial to guide infection prevention and control strategies⁶. Common symptoms of COVID-19 include fever and cough that usually resolve within four to eight days⁷. There are different assays to detect antibodies within 14

to 20 days of illness onset. However, the more sensitive method is the reverse transcriptase-polymerase chain reaction (RT-PCR) assay. Detection of viral RNA by this method is the gold standard for COVID-19 diagnosis⁸. However, the critical issue with this test is the risk of eliciting false-negative and false-positive results. The sensitivity and specificity of the Real-Time RT-PCR test is not 100%; therefore, the laboratory standard techniques are important to explain the exact accurate results⁹⁻¹².

Some studies indicate that SARS-CoV-2 RNA can be identified in infected individuals 1-3 days before the symptom onset^{13, 14}. The viral load reaches a peak in the first week of symptoms and gradually decreases over time¹⁴. Long-term shedding of viral RNA reported in patients with COVID-19, even after complete recovery, puts severe constraints on timely discharging recovered patients from the hospital and de-escalation of infection prevention and control practices¹⁵. In this regard, in the following study, we reported a patient with COVID-19 with prolonging positive result test of Real-Time PCR for SARS-CoV-2 RNA even after being discharged from the hospital.

Case Report

A 44 years-old-woman was referred to Corona ward in Hamedan's Atieh Hospital with complaints of fever, shivering, dry cough, dyspnea, and respiratory dystrophy in 2020, October 1.

Her vital signs were measured with noninvasive monitoring (BP: 110/70 mmHg, PR: 120 min, RR:26min, T:38, Spo2: 92% in room air), ABG at the same time (pH 7.3, pCO2:48.5, PO2:68.3, HCO3:26.2, BE:3.7, O2Sat:94.2%). Routine laboratory examinations were done according to Table 1.

The suspected case was tested using Real-Time PCR commercial kits (Pishtaz Teb Diagnostics - COVID-19 One-Step COVID-19 RT-PCR Kit, Iran) according to the following procedures: 50°C 30 minutes; 95°C 10 minutes; 94°C 15 seconds → 50°C 30 seconds → 72°C 30 seconds, five cycles; and 94°C 10 seconds → 58°C 30 seconds, 35 cycles. With a positive molecular result for diagnosis of COVID-19, the intensivist started treatment with oral Oseltamivir, Ceftriaxone, Azithromycin, and supplemental O2 therapy with a face mask.

After two weeks of hospitalization, the patient was discharged, but her Real-Time PCR results were performed twice after one month and 44 days, and they remained positive for SARS-CoV-2 RNA.

Discussion

The current diagnosis of SARS-CoV-2 is based on the detection of viral nucleic acids. In this study, a case was reported that showed a positive result after being discharged from a hospital in Hamadan, Iran.

The incubation period for COVID-19 is usually at intervals 14 days following exposure, with most cases occurring more or less four to five days once exposure. The duration and effectiveness of protection against COVID-19 are unknown; therefore, antibody tests (IgM and IgG) on blood are used to confirm past infection and presumed immunity to repeat infection. It was found that the immune response plays a vital role in the spectrum of disease caused by SARS-CoV-2. The immune system plays an important role in protecting against viruses and diseases by producing antibodies to limit pathogens^{16, 17}. In patients with COVID-19, overly active immune systems can activate pathogenic T cells and inflammatory monocytes/macrophages to develop an inflammatory cytokine storm, resulting in severe damage to the lungs^{18, 19}. By contrast, after being affected by the virus, immune responses produce specific antibodies to prevent viral disease by entirely blocking the virus from entering into host cells to prevent the infection. As a result, cytotoxic T cells play a crucial role in clearing and cleaning viral-infected cells²⁰. Continuous or repeated positive SARS-CoV-2 PCR tests have been reported in samples taken from patients, weeks or months after recovery from an initial infection²¹. Some studies have shown that reinfection may occur up to 142 days after an individual has been discharged from the hospital. It is also thought that a potential reason for SARS-CoV-2 reactivation is a reduced humoral immune response^{22, 23}.

A 26-year-old patient from Rio de Janeiro, Brazil, showed signs of COVID-19 reinfection in another research. Clinical signs began consistently with infection with COVID-19 longer than 40 days after the initial mild infection. During the first hospitalization, the viral load of the second infection was more significant than in the first. Finally, only after the second episode of infection was a detectable antibody

for SARS-CoV-2²⁴.

Prolonged detection of SARS-CoV-2 RNA and recurrence of PCR-positive tests are widely reported in patients even after full recovery from COVID-19; many of these patients do not seem to shed infectious viruses. Positive results that occurred might not be caused by virus recurrence or second virus infection. Researchers have suggested in one hypothesis that it is possible the virus genome is integrated into the human cell genome and has not been practically eliminated from the body²⁵. Because the studies have shown that the only subgenomic sequences are detected that derived principally from the 3' end of the viral genome integrated into the DNA of the host cell, the infectious virus cannot be produced from the integrated subgenomic SARS-CoV-2 sequences.

In theory, if the patient becomes re-infected or the virus reactivates, these individuals may serve as a transmission source. So far, the only way to screen for possible reinfection has been by using PCR on separate specimens. This molecular assay cannot tell whether or not viruses are alive. There have been no documented instances of infection among individuals who had contact with re-positive patients²⁶.

Conclusion

Based on this report, after 44 days, there were no significant differences in the Real-Time PCR results after drug treatment. This commentary raises a question: how should patients with COVID-19 be managed with a positive retest for SARS-CoV-2 RNA?

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