Can SARS-CoV-2 Viral RNA Continually Persist in an Asymptomatic COVID-19 Patient?

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Abstract
An asymptomatic 39-year-old male patient with well-controlled hypertension on a combination of antihypertensives including angiotensin receptor blocker was screened positive for SARS-CoV-2 by RT-PCR nasopharyngeal (NP) swab and was admitted to an isolation facility in Dubai on March 23, 2020. He had a history of exposure to a COVID-19 patient a few days prior to the screening test. His chest X-ray showed signs of pneumonitis. He was discharged from the isolation facility on day 28 with 2 consecutive negative SARS-CoV-2 RT-PCR NP swab results, 24 h apart. After 14 days of home quarantine, he tested positive again for SARS-CoV-2 on day 44 and was again isolated in our facility. He continued testing positive until day 51, after which he was discharged again following 2 consecutive negative tests 24 h apart.

Introduction
The emergence of SARS-CoV-2 in December 2019 in Wuhan, China, with the successive spread of the virus has resulted in a pandemic of COVID-19. As researchers and healthcare workers try to decode the virus and its characteristics, continuous developments are being made on the understanding of the exact infective period, incubation period, and duration of RT-PCR positivity in a patient with the virus. According to a recent study, 26–49\% of cases were tested positive again after discharge. From the date of onset of symptoms to testing positive after discharge by RT-PCR, it took an average of 45 days (range: 8–82 days), based on 226 cases \cite{1}. “Re-positive cases” referred to those cases which tested positive for SARS-CoV-2 after discharge but are currently referred to as “PCR re-detected after discharge from isolation” as per expert recommendations. Here, however, we report an asymptomatic patient who had persistence of SARS-CoV-2 viral RNA by nasopharyngeal (NP) swabs till day 51 after being tested negative twice on day 26 and day 28.
Case Report/Case Presentation

A 39-year-old male patient with no significant past medical history except for well-controlled hypertension on a combination of antihypertensives including angiotensin receptor blocker was screened positive for SARS-CoV-2. The test of diagnosis was the nucleic acid amplification test using the real-time RT-PCR assay for detecting SARS-CoV-2 RNA using a NP swab. He had a history of exposure to a COVID-19 patient a few days prior to the screening test. He was admitted to an isolation facility in Dubai on March 23, 2020 (day 1). He denied any history of fever, cough, myalgia, dyspnea, smell, and taste disorders upon admission, along with normal vitals, and was classified as an asymptomatic COVID-19 patient. A chest X-ray was done on day 3 (shown in Fig. 1) and showed features of pneumonitis as commonly seen in COVID-19 patients with no signs of pneumothorax or pleural effusion. However, the patient continued to be clinically asymptomatic. A repeat chest X-ray done on day 9 showed signs of improvement (shown in Fig. 2). The complete blood picture (shown in Table 1), which includes differential counts on day 2 and day 51, suggests a mild increase in neutrophil percentage along with a decrease in lymphocyte percentage on day 2 that normalized by day 51.

RT-PCR NP swabs for SARS-CoV-2 were done repeatedly for surveillance, the results of which are shown in Table 2. The patient tested positive on day 8, day 14, and day 21. He tested negative consecutively on day 26 and day 28, after which he was discharged and advised to follow home quarantine guidelines for 14 days as per state protocol. However, 16 days (day 44) after the last NP swab was taken, the patient retested positive for COVID-19 and was still asymptomatic. He reported no possibility of a breach during the period of home quarantine. He was readmitted to our isolation facility. The patient retested positive again after 7 days (day 51) and was finally discharged as per the COVID-19 discharge protocol on day 56, after 2 consecutive negative swabs on day 53 and day 55. He continued to be asymptomatic during the second hospitalization.

Discussion/Conclusion

According to current discharge criteria by the UAE National Emergency Crisis and Disasters Management Authority and COVID-19 Crisis and Control Center, asymptomatic and mild COVID-19 patients are usually kept in home isolation or admitted to an institutional isolation facility. They are isolated for 14 days and discharged after they display no symptoms and no fever without taking antipyretics for 3 days prior to the scheduled discharge date, and 2 consecutive negative NP RT-PCR tests are obtained 24 h apart in case of health care workers [2]. There have been reports of several patients that have retested positive after discharge [1, 3]. Among some plausible causes of recurrence of positivity is firstly the possibility of RT-PCR false negativity, which can be attributed to the sampling procedures of NP swabs, quality of sampling tube, sample storage temperature and time, transportation process of samples, and quality of detec-
tion reagents (kits) [4]. Second, prolonged viral shedding can be seen especially in immunocompromised patients [3]. Reports suggest that the cycle threshold (Ct) value of RT-PCR can be used as a surrogate marker of viral load. On detecting the Ct value of RT-PCR above 33–34 in CO-VID-19 patients, they can be deemed “not contagious” and hence discharged from isolation [5, 6]. In a study, viral cell culture testing of 108 PCR re-detected cases, all cases had tested negative; hence, viral RNA detection by PCR does not equate to infectiousness or a viable virus [1, 3]. In another study, antibody responses to SARS-CoV-2 start about 7 days from the onset of symptoms, and most patients develop detectable antibodies by day 14–28 [7, 8]. The use of spike protein of the SARS-CoV-2 in an ELISA by the Centers for Disease Control and Prevention could offer 99% specificity and 96% sensitivity [9].

Our report shows isolating patients just based on SARS-CoV-2 RT-PCR of NP swabs would lead to erroneously deciding that all patients are infective, leading to isolation either at home or hospital facility. This will increase the physical and emotional well-being and financial burden of the family. This also adds significantly to the patient burden and economic burden of the healthcare system of the country.

Hence, we suggest that rather than detecting SARS-CoV-2 by RT-PCR of NP swabs, this should be coupled with the Ct value of RT-PCR and antibody blood test particularly in patients who had prior COVID-19 infection. Large-scale serological screening with validated tests will identify individuals who may have protective immunity to infection and a better measure of disease activity. It is very highly unlikely that COVID-19 infection strikes the person twice in a short window. For better management of the patient, more studies should be done with a good sample size as this is a reflection based on a single patient.
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Statement of Ethics

All necessary patient consent has been obtained to publish his case.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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