A Case Report of Recurrent Covid-19 Infection of a Physician in Bangladesh: Re-infection or Persistence Infection?

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Abstract

The novel coronavirus disease (COVID-19) has created a large problem to the healthcare system all over the world. “Retest Positive” for SARS-CoV-2 from “recovered” patients (COVID-19) has been reported recently which raised several questions for the COVID-19 disease. In this case report, we had described a patient who became positive after 1 month from the initial infection with SARS-CoV-2. It is therefore possible that recurrences should be actually persistent infections in which PCR resulted falsely negative during initial infection when he left home isolation assuming himself disease free. The discharge criteria should be ensured for a recovered patient to prevent the relapse or persistence of COVID-19.

Keywords: COVID-19; discharge; recurrence; persistence; RT-PCR

Introduction

Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) causes Coronavirus disease 2019 (COVID-19), which emerged in China and spread throughout the world. Approximately, three million individuals are diagnosed with COVID-19, whereas 0.2 million are reported deaths¹. Already there are known 80 distinct genotypic variants of this virus as per another study which advances the concern for effective vaccine production and also might
contribute to the variations of presentations in different countries.\(^2\)

All patients with COVID-19 need to meet criteria of recovery before hospital discharge in Bangladesh: 1. Resolution of fever without the use of fever-reducing medications e.g. paracetamol for at least three days 2. Significant improvement in the respiratory symptoms (e.g., cough, shortness of breath) for consecutive three days 3. After discharge, continue home or facility isolation for the duration which extends from the day of symptom onset to 21th day for hospitalized patients 4. Two consecutively reverse transcription-polymerase chain reaction (RT-PCR) tests negative for SARS-CoV-2 RNA more than 24 hours. But the last criteria was excluded later from the updated version of guideline\(^3\). However, the recovered (discharged) COVID-19 patients with retest positive for SARS-CoV-2 RNA have recently been reported\(^4\).\(^5\)

A new report on 25 February 2020 indicated that 14% of discharged patients were tested positive for SARS-CoV-2 RNA in Guangdong province of China. On 2 February 2020, a woman patient with COVID-19 became positive for SARS-CoV-2 RNA again during her quarantine after hospital discharge because of two consecutively negative results on 2 and 30 January, respectively.

Another single center study reported that 8 out of 108 confirmed patients with COVID-19 from 10 February to 13 April 2020 became SARS-CoV-2 positive and were re-admitted in hospital.\(^6\) This “Retest Positive” for SARS-CoV-2 from the discharged COVID-19 has attracted extra attention and triggered numerous discussions\(^7\). The brief report describes that a physician of Bangladesh who became positive after 1 month from the initial infection with SARS-CoV-2.

**Case Presentation**

The patient is a physician of 40 years working in Upazilla Health Complex, Shibchar, Madaripur, Bangladesh from last 6 months. His parents were diagnosed as COVID 19 positive cases on 25th April, 2020. From 1st May, he felt low grade fever and mild cough. As his family history was positive, he tested RT PCR for SARS-CoV-2 and became positive on 3rd May, 2020. After that he was in isolation for 15 days at home as his symptoms were mild in nature. His highest body temperature was 39 °C, with cough and fatigue, without asthma and dyspnea. He monitored his vital signs regularly and his oxygen saturation was 98%. Routine blood tests, renal function, serum electrolyte, D dimer, serum ferritin, serum procalcitonin and liver function tests were normal (Table 1) except SGPT which was mildly increased (67 U/L). His chest x-ray was normal.

**Table 1: Investigation Shown During Initial And Later Infection**

<table>
<thead>
<tr>
<th>Investigations</th>
<th>Findings with Reference Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 May, 2020</td>
<td>27 June, 2020</td>
</tr>
<tr>
<td>HB%</td>
<td>15.3 gm/dL</td>
</tr>
<tr>
<td>ESR</td>
<td>48 mm in 1st hr</td>
</tr>
<tr>
<td>Total count</td>
<td>4100/cmm</td>
</tr>
<tr>
<td>Lymphocytes (differential)</td>
<td>35%</td>
</tr>
<tr>
<td>Platelet count</td>
<td>158,000/cmm</td>
</tr>
<tr>
<td>RBS</td>
<td>6.7 mmol/l</td>
</tr>
<tr>
<td>S. Creatinine</td>
<td>0.9 mg/dl</td>
</tr>
<tr>
<td>SGPT</td>
<td>67 U/L</td>
</tr>
<tr>
<td>CRP</td>
<td>3.1 mg/L</td>
</tr>
<tr>
<td>S ferritin</td>
<td>207.1 ng/ml</td>
</tr>
<tr>
<td>D-dimer</td>
<td>0.2 microg/ml</td>
</tr>
<tr>
<td>CXR</td>
<td>Normal</td>
</tr>
<tr>
<td>S. Electrolytes</td>
<td>Normal</td>
</tr>
</tbody>
</table>

RBS= Random blood sugar; CXR= Chest X-ray P/A View; CRP= C-Reactive Protein

When his clinical conditions improved, then he gave throat and nasal swab for follow up after 15 days. As report was negative, he joined to his hospital for providing services on 22nd May. After that, he attended a diagnosed COVID 19 case in indoor on 19th June. He attended the patient with proper personal protective equipment’s. After 3 days of the contact, he felt low grade fever and running noses. Then he sent his nasal swab for RT PCR to exclude SARS-CoV-2. He was declared as COVID 19 positive case on 23rd June again.

This time the testing authority performed RT PCR twice and it was positive again (Table 2). The physician was in institutional isolation this time although his fever was low graded. He was started ivermectin (0.15mg/kg) for 3 days along with paracetamol and antihistamine. His vital signs and all routine investigation were almost normal also this time (Table 1). On 8 and 10 July, 2020 he gave nasal and throat swab again which came negative on both samples.

Then he was discharged from hospital. Sequencing was not possible to perform. Informed consent was obtained from the physician for publication of this case report.
Table 2: Result of RT PCR for SARS-CoV-2 of the patient

<table>
<thead>
<tr>
<th>Sample Collection Date</th>
<th>RT PCR Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 May, 2020</td>
<td>Positive</td>
</tr>
<tr>
<td>18 MAY, 2020</td>
<td>Negative</td>
</tr>
<tr>
<td>23 June, 2020</td>
<td>Positive (done twice)</td>
</tr>
<tr>
<td>8 July, 2020</td>
<td>Negative</td>
</tr>
<tr>
<td>10 July, 2020</td>
<td>Negative</td>
</tr>
</tbody>
</table>

Discussion

Our report describes a physician who was reinfected by SARS-CoV-2 after 30 days from initial infection. His initial symptoms were low graded fever and mild cough. He became well without any complications. But after treating a COVID 19 positive case, he felt again low graded fever and running noses. This time also his symptoms were mild.

It is observed that those who retested positive for SARS-CoV-2 RNA after discharge were generally young and had mild COVID-19 disease in the hospital and they did not show any disease progression when readmitted. The spectrum of this disease ranges from mild to severe, even life-threatening consequences. Host immune response to pathogens may prevent severe illness or reinfection by the same pathogens. Many studies have shown that recovered patients with COVID-19 have antibodies to SARS-CoV-2, some patients have very low levels of neutralizing antibodies. These may be the cause for possible reinfection of SARS-CoV-2.

The currently recommended medical observation period for COVID-19 patients is 14 days. According to the WHO’s guidelines on clinical management, a patient can be discharged from hospital after two consecutive negative PCR results at least 24 hours apart in a clinically recovered patient. Recently Li et al reported in the Journal of Medical Virology that prolonged SARS-CoV-2 RNA shedding with a median duration of 53 days and a maximum of 83 days in 36 patients. In another study, a median viral shedding duration of 20 days was observed with a maximum of 37 days. Another studies have demonstrated that cultivatable virus may no longer be recovered from infected hosts 7 days after symptom onset, but more than 28 days viral RNA may be detected by PCR.

Technical issues in testing may trigger apparent “reinfection” cases, including sample type, sample processing, and test performance. In addition, negative results in samples with low viral loads around the lower limit of detection of the assay are a proposed mechanism for this phenomenon.

It is important to note that the reverse transcription PCR test used to detect SARS-CoV-2 can be very sensitive, and scant RNA fragments can be detected even though the individual is not infectious, shows no symptoms, and has recovered from COVID-19 recently. In the scenario of prolonged PCR positivity, it is important to note that the result of the SARS-CoV-2 RNA test depends on the quality of sample collection (operator dependent) and the viral load of the specimen.

So any of the above causes may happen with our recovered physician. His initial and later both infections were mild in nature. When he was declared negative, there is a certain possibility of RT PCR rendering false negative results, including sampling procedure, sample storage or transport and the sensitivity/specificity of the nucleic acid test kit. It is therefore possible that recurrences should be actually persistent infections in which PCR resulted falsely negative during initial infection when he left home isolation assuming himself disease free. Another cause may be prolonged viral shedding.

This brings up the issue of using more sensitive RNA detection methods before declaring a patient as disease free, and also samples should be taken from two different sites on two consecutive days if needed.

Conclusion

In case of this case report, it is unclear that the recurrence COVID-19 infection in this physician occurred due to re-infection or he was discharged without full recovery (his follow up sample report may be false-negative during initial infection). It is necessary to avoid false negative and false positive results by performing the coronavirus antibody tests. Considering the significance of this ongoing global public health emergency, it is necessary to carry out large studies to better understand the issue of potential SARS-CoV-2 persistence in COVID-19 patients.

References


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