

## CASE REPORT

# A Convalescent of COVID-19 with RT-PCR Test Continues Positive in Stool

Zhiwei Yang<sup>2, #</sup>, Mingxue Yu<sup>1, #</sup>, Ganwen Li<sup>3</sup>, Xiaoling Dai<sup>3</sup>, Guirong Liu<sup>4</sup>, Jinjun Xie<sup>5</sup>,  
Gang Li<sup>1</sup>, Yusheng Jie<sup>1</sup>

# These authors contributed equally to this work

<sup>1</sup> Department of Infectious Diseases, The Third Affiliated Hospital of Sun Yat-Sen University, Guangzhou, China

<sup>2</sup> Department of Gastroenterology, The Third Affiliated Hospital of Sun Yat-Sen University Yuedong Hospital, Meizhou, China

<sup>3</sup> Department of Infectious Diseases, The Third Affiliated Hospital of Sun Yat-Sen University Yuedong Hospital, Meizhou, China

<sup>4</sup> Department of Laboratory Medicine, The Third Affiliated Hospital of Sun Yat-Sen University Yuedong Hospital, Meizhou, China

<sup>5</sup> Department of Radiology, The Third Affiliated Hospital of Sun Yat-Sen University Yuedong Hospital, Meizhou, China

## SUMMARY

**Background:** Coronavirus disease (COVID-19) has affected more than 100 countries worldwide and the discharge criteria of patients with COVID-19 vary across different countries. In China, patients with two negative respiratory viral RNA tests taken at least one day apart can be discharged with no further quarantine required. Currently, PCR testing of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) in fecal sample is not routinely performed.

**Methods:** We present a patient with COVID-19, whose respiratory swabs became negative but fecal sample remained positive for SARS-CoV-2 RNA.

**Results:** Stool sample collected on 27th of February was still positive for SARS-CoV-2 RNA, 24 days after the first negative respiratory swab.

**Conclusions:** Based on the experience from the 2003 SARS epidemic, we recommend that fecal RNA testing of SARS-CoV-2 should be incorporated into the discharge criteria to minimize the risk of transmission from the gastrointestinal tract.

(Clin. Lab. 2020;66:xx-xx. DOI: 10.7754/Clin.Lab.2020.200623)

### Correspondence:

Dr. Gang Li

Department of Infectious Diseases

The Third Affiliated Hospital of

Sun Yat-Sen University

No. 600 Tianhe Road

Tianhe District, Guangzhou 510630

China

Phone: +86 20-85252372

Email: 18038583936@189.cn

Dr. Yusheng Jie

Department of Infectious Diseases

The Third Affiliated Hospital of

Sun Yat-Sen University

No. 600 Tianhe Road

Tianhe District, Guangzhou 510630

China

Phone: +86 20-85252372

Email: jieyusheng@163.com

### KEY WORDS

COVID-19, SARS-CoV-2, convalescent, RT-PCR, fecal, gastrointestinal tract

### LIST OF ABBREVIATIONS

ACE2 - angiotensin-converting enzyme 2

COVID-19 - coronavirus disease 2019

SARS - severe acute respiratory syndrome

SARS-CoV-2 - severe acute respiratory syndrome coronavirus 2

Manuscript accepted July 6, 2020

## INTRODUCTION

Since the outbreak of COVID-19 in Wuhan, China, the number of confirmed cases has exceeded 80,000 with nearly 3,000 deaths nationwide. It has evolved into a pandemic affecting more than 100 countries. The Ministry of Health in China has published its Seventh Edition of Diagnosis and Management Guideline for COVID-19. It outlines the following discharge criteria: defervescence for at least 3 days, significant improvement of respiratory symptoms and lesions on lung imaging, together with two negative respiratory PCR tests taken consecutively and more than 24 hours apart. There are a few reported cases that patients tested positive again after being discharged based on aforementioned criteria [1]. Yuedong Hospital, the third affiliated Hospital of Sun Yat-Sen University, is one of the designated hospitals to admit patients with COVID-19. A total of 7 confirmed cases were treated. Three of them had a positive fecal PCR test to SARS-CoV-2 RNA after the pharyngeal swab turned negative. One patient's fecal samples persistently tested positive, as reported below.

## CASE REPORT

A 25-year-old female flew from Wuhan to Meizhou (in Guangdong Province) with her brother on the 20th of January, 2020. Her brother tested positive for SARS-CoV-2 on the 25th of January. Therefore, she was isolated in a local hospital, asymptomatic, awaiting the pharyngeal swab result. The qRT-PCR result came back negative and she was discharged from hospital on the 28th of January. She self-isolated at home in Meizhou. On the 1st of February, the patient developed a sore throat, cough, dyspnea, fatigue, rigors but no documented fever. She was immediately referred to Yuedong Hospital. Pharyngeal swabs were obtained again and returned positive for SARS-CoV-2 (Figure 1). CT scans of the chest demonstrated a small patchy, slight high-density shadow in the posterior basal segment of the right lower lobe and the outer basal segment of the left lower lobe (Figure 2). The patient was started on Oseltamivir (75 mg twice daily, orally) and Lopinavir/Ritonavir (200/500 mg twice daily, orally). Additionally, traditional Chinese medicine was also used as part of the treatment regimen. On the 3rd of February, her respiratory symptoms significantly improved. However, she reported new onset of diarrhea up to 3 times per day. Both pharyngeal swab and stool sample were collected on that day. Subsequently the PCR results returned negative from the pharyngeal swab but positive from the stool sample. Montmorillonite powder (3 g three times, orally) and live combined bacillus subtilis and enterococcus faecium enteric-coated capsules (250 mg three times, orally) were used as symptomatic relief for the diarrhoea. The patient's fecal PCR tests were persistently positive for SARS-CoV-2 while her respiratory PCR tests remained negative. Serum total anti-

body for SARS-CoV-2 was also tested and the result became positive after the 10th of February.

Twelve days into the patient's admission, Arbidol (200 mg three times daily, orally) was started and Oseltamivir together with Lopinavir/Ritonavir were ceased. On the 14th of February, Chloroquine phosphate (500 mg twice daily, orally) was added according to the recommendation from the Department of Health of Guangdong Province. Furthermore, Thymalfasin subcutaneous injection (1.6 mg daily) was introduced. Stool sample collected on the 27th of February was still positive for SARS-CoV-2 RNA, 24 days after the first negative respiratory swab. Repeat chest CT imaging did not reveal significant changes of lung lesion (Figure 2C - F). Finally, the patient was discharged on the 5th of March 2020, with negative PCR tests from pharyngeal swab, nasopharyngeal swab, and stool.

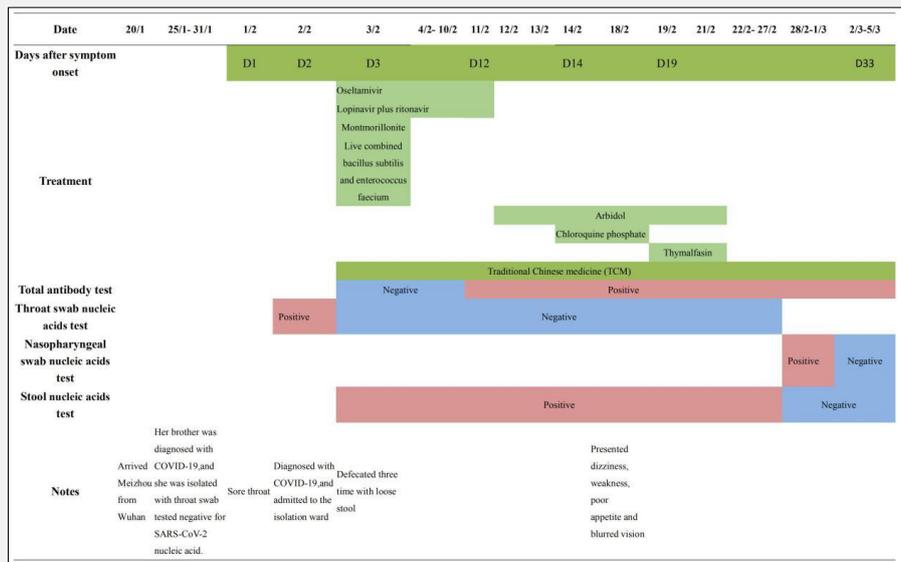
## DISCUSSION

Both SARS-CoV-2 and SARS-CoV belong to the species of Sarbecovirus with high genomics similarity [2,3] and express the same cell entry receptor, ACE2 (angiotensin-converting enzyme 2) [4,5]. Xiao et al. verified that the gastrointestinal system played an important role in viral transmission and stool samples collected from more than half of the patients were positive for SARS-CoV. Even after the pharyngeal swab turned negative, fecal PCR tests remained positive in more than 1/5 of the patients, for 1 - 12 days [6]. In our reported case, SARS-CoV-2 RNA was still detected in the fecal sample 24 days after the pharyngeal swab became negative. A study on SARS-CoV shedding reported that the median duration of virus excretion in sputum was 21 days and 27 days in stool. Notably, RNA was detected in stool sample from 4 out of 56 patients with SARS after 100 days of symptoms onset [7]. During the SARS epidemic of SARS Hong Kong, a patient with SARS and associated diarrhea visited his brother's unit and used the toilet. Due to the poor design of the sewage system, 321 people from the building developed SARS and 42 of them died from the illness [8]. SARS-CoV-2 is homologous to SARS, but more contagious [9]. Our case suggested that SARS-CoV-2 can be continuously excreted from the gastrointestinal tract for a long time. The potential risk of transmission of SARS-CoV-2 from the gastrointestinal tract should be considered [10]. In conclusion, we strongly recommend that fecal RNA testing of SARS-CoV-2 should be performed routinely and incorporated into the discharge criteria to minimize the risk of transmission from the gastrointestinal tract.

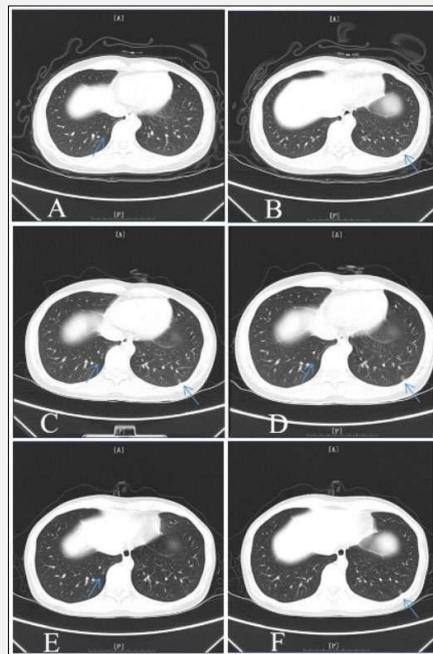
### Authors' Contributions:

Zhiwei Yang and Mingxue Yu designed the study, analyzed and interpreted the data, and wrote the manuscript. Ganwen Li, Xiaoling Dai, Guirong Liu, and Jinjun Xie provided samples and interpreted clinical da-

## RT-PCR Test of COVID-19 in Stool



**Figure 1. Timeline of RT-PCR test results and treatment according to days from initial onset of illness, from Feb 1 - Mar 5, 2020.**



**Figure 2. Comparison of CT images of the case of COVID-19.**

A, B. The images showed a small patchy, slight high-density shadow in the posterior basal segment of the right lower lobe and the outer basal segment of the left lower lobe (arrows), with fuzzy boundary on Feb 2 (d2). C, D. The images showed the change of pulmonary lesions was not obvious in the lower of lobe of both lungs, respectively, on Feb 7 (d7) and Feb 14 (d14). E, F. Ten days after treatment, the images showed the lesions of both lungs were considered as chronic inflammatory nodules on Feb 25 (d25).

ta. Gang Li and Yusheng Jie supervised the project, conceptualized and designed the study, analyzed and interpreted data, and wrote the paper.

**Declaration of Interest:**

On behalf of all authors, the corresponding authors state that there is no conflict of interest.

**Ethical Statement:**

Informed consent was obtained from the patient for publication of this case report and accompanying image.

**Funding:**

This work was supported by grant from the 5010 Project of Clinical Research in Sun Yat-sen.

**References:**

1. Lan L, Xu D, Ye GM, et al. Positive RT-PCR Test Results in Patients Recovered From COVID-19. *JAMA* 2020;323:1502-3 (PMID: 32105304).
2. Zhou P, Yang X, Wang X, et al. A pneumonia outbreak associated with a new coronavirus of probable bat origin. *Nature (London)* 2020;579:270-3 (PMID: 32015507).
3. Lu R, Zhao X, Li J, et al. Genomic characterization and epidemiology of 2019 novel coronavirus: implications for virus origins and receptor binding. *Lancet* 2020;395:565-74 (PMID: 32007145).
4. Xu X, Chen P, Wang J, et al. Evolution of the novel coronavirus from the ongoing Wuhan outbreak and modeling of its spike protein for risk of human transmission. *Sci China Life Sci* 2020;63:457-60 (PMID: 32009228).
5. Lei C, Qian K, Li T, et al. Neutralization of SARS-CoV-2 spike pseudotyped virus by recombinant ACE2-Ig. *Nat Commun* 2020 Apr 24;11(1):2070 (PMID: 32332765).
6. Xiao F, Tang M, Zheng X, Liu Y, Li X, Shan H. Evidence for Gastrointestinal Infection of SARS-CoV-2. *Gastroenterology* 2020;158:1831-3 (PMID: 32142773).
7. Liu W, Tang F, Fontanet A, et al. Long-term SARS coronavirus excretion from patient cohort, China. *Emerg Infect Dis* 2004;10:1841-3 (PMID: 15504274).
8. McKinney KR, Gong YY, Lewis TG. Environmental Transmission of SARS at Amoy Gardens. *J Environ Health* 2006;68:26-30 (PMID: 16696450).
9. Liu Y, Gayle AA, Wilder-Smith A, Rocklöv J. The reproductive number of COVID-19 is higher compared to SARS coronavirus. *J Travel Med* 2020;27:taaa021 (PMID: 32052846).
10. Yeo C, Kaushal S, Yeo D. Enteric involvement of coronaviruses: is faecal-oral transmission of SARS-CoV-2 possible? *Lancet Gastroenterol Hepatol* 2020;5:335-7 (PMID: 32087098).