

CASE REPORT

The isolation period should be longer: Lesson from a child infected with SARS-CoV-2 in Chongqing, China

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Abstract

In December 2019, COVID-19 caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) outbreak in Wuhan, the capital city of Hubei province, China. The disease rapidly spread to other areas in China due to a huge population movement during the New Year Festival. Here, a 7-year-old child with SARS-CoV-2 infection in Chongqing, outside of Wuhan, Hubei province, was reported. This case suggested that children infected with SARS-CoV-2 are more likely to present milder manifestations than adults. The continuous positive real-time reverse transcription-polymerase chain reaction assay for SARS-CoV-2 in the child's throat swab sample indicated the isolation period for suspected child cases should be longer than 14 days.

1 | CASE REPORT

A 7-year-old girl was admitted to a quarantine ward in a local country hospital of Chongqing, China, with complaint of nasal obstruction for 2 days without cough, fever, dyspnea, or diarrhea. Before checking into the quarantine ward, the throat swab sample of this child was tested positive for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) by real-time reverse-transcriptase polymerase chain reaction (rRT-PCR) assay in Chinese Center for Disease Control and Prevention (CDC). The child's axillary temperature was 36.6°C, with the respiratory rate (RR) of 19 breaths/min, heart rate (HR) of 101 beats/min, blood pressure of 106/65 mm Hg. The physical examination showed no apparent rhonchi or moist rales at admission to the hospital.

The girl's father worked in Shanxi province and took the car from Taiyuan, Shanxi province to Jingzhou, Hubei province on

January 21, 2020 and then took a bus to Xiangyang, Hubei at that night. On January 22, 2020, the father self-drove from Xiangyang, Hubei to Chongqing city with the girl, her grandparents, mother, and 2-year-old brother. In the early morning of January 23rd, the whole family finally arrived at the house of the girl's grandparents in the countryside of Chongqing and all family members lived there. The father did not have close contact with anybody except the family members on the way from Wuhan back to Chongqing and had been living alone in a single room since their return.

Five days after meeting his daughter, the girl's father presented fever, rhinorrhea, without cough on January 27th. The symptoms did not alleviate after taking Lianhuaqingwen granule (a Chinese herbal medicine) orally. On January 30th, he was tested positive for SARS-CoV-2 by throat swab culture and was diagnosed with Coronavirus Disease (COVID-19) on February 1st. Later, he developed the severe condition and was transformed to

Jilei Lin and Jun Duan contributed equally to this study.

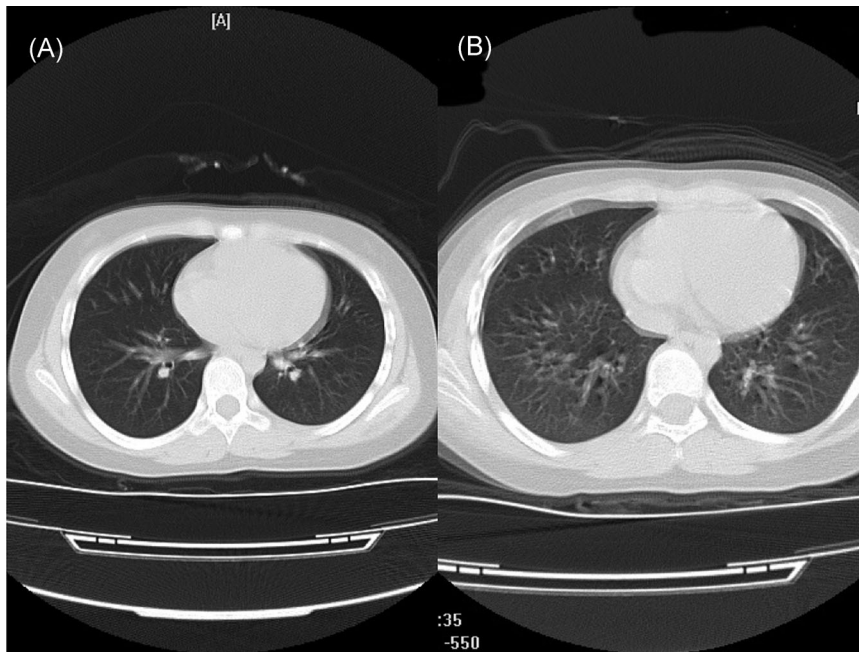


FIGURE 1 Computed tomography scans of the lung in a 7-year-old girl, (A) on February 4th, (B) on February 8th. No signs of pneumonia obtained

COVID-19-designated hospital. Although the girl and her father were both infected with SARS-CoV-2, the girl's grandparents, mother, and 2-year-old brother had no clinical manifestation and rRT-PCR tests for SARS-CoV-2 were all negative.

During the hospitalization, the girl had dry cough on February 8th but soon alleviated on February 9th. She had no fever, cough, diarrhea, or other discomfort with normal auscultation. The computed tomography scan showed no signs of pneumonia on February 4th and February 8th (Figure 1). Supportive treatment and interferon α -1b nebulization have been offered from the admission of the hospital till now. Oseltamivir was used from February 4th to February 9th. However, the throat swab sample of this child was still positive for SARS-CoV-2 on February 8th, 9th, and 10th. She was still in quarantine ward now. Detailed information is shown in Table 1.

2 | DISCUSSION

Coronaviruses are a group of pathogens that cause respiratory and intestinal diseases.¹ In recent 10 years, the coronavirus SARS-CoV and the Middle East respiratory syndrome coronavirus (MERS-CoV) have attracted great attention because of the high morbidity and fatality.²⁻⁴ A novel coronavirus named SARS-CoV-2 was identified by deep sequencing analysis of patients' nasopharynx aspirate in Wuhan, China in 2019.²

The clinical manifestations of patients with SARS-CoV-2 infection include fever, nonproductive cough, dyspnea, myalgia, fatigue, with laboratory tests indicating normal or decreased leukocyte counts and radiographic evidence of pneumonia.⁵ Children's manifestations may differentiate from adults in

respiratory infection, therefore we need to pay more attention to children with COVID-19.

Hypotheses were carried out with this case. First, we speculate that the girl's father may be infected by her, considering the fact that he only had a short stay in Hubei province and did not have close contact with anybody except the family members. More importantly, he became symptomatic and diagnosed with COVID-19 just 5 days (appeared to be the appropriate incubation time) after meeting his daughter. It has been usually ignored that the source of infection could be children, so active monitoring of children back from Hubei province by the local health department should be conducted. Second, the difference of the disease severity between the child and his father indicated that children infected with SARS-CoV-2 are likely to present milder manifestations. The inapparent infection with SARS-CoV-2 increases the difficulty of the prevention and control of the disease, so quarantine for children at home is necessary. Moreover, the RT-PCR assay for SARS-CoV-2 in the child's throat swab sample has been positive from January 22nd to February 12th, which indicated the child is shedding virus for no less than 20 days, thus the isolation period for suspected child cases should be longer than 14 days. Further, oral intake of oseltamivir may not reduce the replication of SARS-CoV-2.

In conclusion, this is a case that an adult was infected by a relatively asymptomatic child. It helps us to recognize that children infected with SARS-CoV-2 may be more likely to develop mild symptoms and could be potential sources of infection. The isolation period for suspected child cases should be longer than 14 days. Further research with large sample size is urgently needed to investigate the feature of children infected with SARS-CoV-2.

TABLE 1 The clinical characteristics of the case, during January 22 to February 12, 2020

	Back home from Hubei province		Admission	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	
	Home												
Date	Jan 22- Jan 23	Jan 23- Jan 31	Feb 1	Feb 3	Feb 4	Feb 5	Feb 6	Feb 7	Feb 8	Feb 9	Feb 10	Feb 11	Feb 12
Days of illness			1	2	3	4	5	6	7	8	9	10	11
Clinical manifestations													
Rhinostegnosis													
Cough													
Rhinorrhea													
Fatigue													
Nausea													
Vomiting													
Diarrhea													
Abdominal discomfort													
Signs													
Peak body temperature (°C)			36.7		36.9	36.8	36.5	36.8	36.7	36.9	36.7	36.7	36.6
SBP/DBP (mm Hg)			106/65				100/60						
HR (beats/min)			101				86		87		80		84
RR (breaths/min)			19				20		20		20		20
Rales			-										
Laboratory findings													
WBC (×10 ⁹ /L)			5.8									9.1	
RBC (×10 ¹² /L)			4.87									4.84	
Hb (g/L)			132									132	
PLT (×10 ⁹ /L)			299									338	
Neutrophil proportion (%)			45.4									85.1	
Lymphocytes proportion (%)			44.5									12.1	
ALT (U/L)			22									24	
AST (U/L)			27									28	
ALB (g/L)			48.9									50.6	
LDH (U/L)			226									247	
PCT (ng/mL)			0.04										
CRP (mg/L)			<0.499									<0.499	
Virus antigen detection in NPAs			Influenza A(+)										
SARS-CoV-2 PCR (throat swab sample)			+								+	+	+
SARS-CoV-2 PCR (anal pharyngeal swab)													-
Imaging findings													
CT			Normal						Normal				
Treatment													
Supportive therapy													
Interferon α-1b nebulization													
Oseltamivir													

Abbreviations: ALB, albumin; ALT, alanine aminotransferase; AST, aspartate aminotransferase; CRP, c reactive protein; CT, computed tomography; DBP, diastolic blood pressure; Hb, hemoglobin; HR, heart rate; LDH, lactate dehydrogenase; NPA, nasopharynx aspirate; PCR, polymerase chain reaction; PCT, procalcitonin; RBC, red blood cells; RR, respiratory rate; SARS-CoV-2, severe acute respiratory syndrome coronavirus 2; SBP, systolic blood pressure; WBC, white blood cells.

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CONFLICT OF INTERESTS

The authors declare that there are no conflict of interests.

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