


Clinical Notes

Croup as a manifestation of coronavirus disease 2019Akihiko Shimizu,  Mariko Shimizu and Shigeru Nomura

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Croup (laryngotracheitis) is a common pediatric syndrome characterized by barking cough, fever, and stridor.¹ Parainfluenza virus is the most frequent causative agent in children with croup.¹ Only a few reports have described croup as a manifestation of coronavirus disease (COVID-19) caused by SARS-CoV-2.^{2–5}

A 6-month-old girl was brought to the emergency department (ED) for barking cough, fever, and stridor. Her father had tested positive for SARS-CoV-2 4 days prior. One day prior, she developed fever and cough. On the morning of the ED visit, the cough acquired a barky presentation. She was born full term through vaginal delivery. No abnormalities were identified during pregnancy. No past medical history was noted.

On ED arrival, her body temperature, heart rate, respiratory rate, and oxygen saturation were 39.5 °C, 175 beats/min, 60 breaths/min, and 98%, respectively. Physical examination revealed biphasic stridor. Chest retraction and tachypnea were aggravated during breastfeeding. Her white blood cell count was 7,170/ μ L, with 53.5% neutrophils and 35.8% lymphocytes. Serum C-reactive protein level was 0.04 mg/dL. Venous blood gas analysis showed no abnormalities (pH 7.406, pCO₂ 39.4 mmHg, HCO₃⁻). She was diagnosed with croup, for which oral dexamethasone (0.15 mg/kg) was administered. A nasopharyngeal respiratory pathogen nicking enzyme amplification reaction (NEAR) test result (ID Now COVID-19, Abbott Diagnostics Scarborough, Inc., Scarborough, ME, USA) was positive for SARS-CoV-2. She was transferred to our hospital for further medical care. She was stable on ambient air. Neck radiography revealed subglottic narrowing or the “pencil sign” (Fig. 1). A nasopharyngeal respiratory pathogen multiplex polymerase chain reaction test result (BioFire FilmArray Respiratory Panel, BioFire Diagnostics, Inc., Salt Lake City, UT, USA) was negative for respiratory pathogens other than SARS-CoV-2. The barking cough worsened on the



Fig. 1 Neck radiograph demonstrating mild subglottic narrowing (yellow arrow) or the “pencil sign.”

second day of admission, for which she was administered a second dose of oral dexamethasone (0.15 mg/kg). Her respiratory symptoms improved, and her fever subsided rapidly. She was discharged after the 10th hospital day without any complications (The Ministry of Health, Labor and Welfare of Japan stipulates that patients with COVID-19 should be isolated in a hospital or lodging facility for recuperation for 10 days after the onset of symptoms or diagnosis of COVID-19).

Most pediatric patients with COVID-19 present asymptotically or with mild upper respiratory symptoms. Acute respiratory failure or multisystem inflammatory syndrome in children is a rare but severe COVID-19 presentation. In our

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case, the patient developed the typical signs of croup, and radiological imaging supported the diagnosis. We prescribed two doses of dexamethasone because the symptoms worsened 24 h after the first dose. To the best of our knowledge, this is the first case of SARS-CoV-2-induced croup in Japan. There are seven other case reports of SARS-CoV-2-induced croup, of which four were from the USA³ and one each from the Netherlands,⁴ Iran,⁵ and Hong Kong.⁶ Among the seven cases, three^{4,6} responded to one or two dexamethasone doses without nebulized racemic epinephrine (NRE); however, another two cases required several NRE and dexamethasone doses. One required further heliox therapy because the patient did not respond to NRE and dexamethasone therapy.³ The Iranian case was complicated by tracheitis due to *Staphylococcus aureus*; mechanical ventilation was required.⁵

We did not use NRE for symptomatic relief in this patient from the viewpoint of infection control. Although NRE therapy is a quick-acting therapy for croup, it can generate aerosols. Based on limited available data, aerosols generated from nebulizer administration may transmit SARS-CoV-2 to medical staff or caregivers. The Centers for Disease Control and Prevention recommend the following infection prevention measures if aerosol-generating procedures are performed: (i) procedures should take place in an airborne infection isolation room; (ii) healthcare personnel (HCP) in the room should wear an N95 or equivalent or high-level respirator, eye protection, gloves, and a gown; (iii) the number of HCP present during the procedure should be limited; and (iv) clean and disinfect procedure room surfaces promptly.⁷ Nebulizer inhalation therapy should be performed cautiously and avoided if possible.

In conclusion, there are still only a few reports of SARS-CoV-2-induced croup, although croup is not a rare manifestation in children. The symptoms of SARS-CoV-2-induced croup can be severe and indistinguishable from those with other respiratory viruses. Pediatricians should therefore consider croup as a COVID-19 manifestation and the SARS-CoV-2 test should be considered for patients with croup.

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Disclosure

The authors declare no conflict of interest.

Author contributions

A.S. conceptualized and drafted the manuscript. M.S. and S.N. reviewed and edited the manuscript. All authors read and approved the final manuscript.

Informed consent

Written informed consent was obtained from the patients' parents for the publication of this case report.

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