

# A Curious Case of Croup: Laryngotracheitis Caused by COVID-19

Claire E. Pitstick, DO, Katherine M. Rodriguez, MD, Ashley C. Smith, MD, Haley K. Herman, MD, James F. Hays, MD, Colleen B. Nash, MD, MPH

We describe a case of croup in a 14-month-old boy caused by severe acute respiratory syndrome coronavirus 2, the virus that causes coronavirus disease 2019. The patient presented with classic signs and symptoms consistent with croup. Workup was remarkable for a positive point-of-care test for severe acute respiratory syndrome coronavirus 2. This case represents recognition of a new clinical entity caused by coronavirus disease 2019.

abstract

Croup, or laryngotracheitis, is a common childhood syndrome involving subglottic inflammation commonly associated with fever, “barking” cough, and stridor.<sup>1</sup> This is a viral illness most often secondary to human parainfluenza viruses, but it is also associated with respiratory syncytial virus, rhinovirus, enterovirus, and others. As a result, croup is typically seen in the late fall and early winter seasons, and patients usually have associated viral symptoms, such as rhinorrhea and nasal congestion. The diagnosis of croup is clinical. On physical examination, patients have inspiratory stridor, which may occur at rest or only while crying. A thorough physical examination and sometimes imaging will help exclude diagnoses, such as epiglottitis or retropharyngeal abscess. The severity of croup relates to the child’s degree of respiratory status and work of breathing. Although not necessary to diagnose croup, a neck radiograph may reveal subglottic narrowing or “steeple sign.”<sup>2</sup> A chest radiograph can also help exclude an aspirated foreign body. Viral croup is a self-limited illness that typically resolves over several days.<sup>3</sup>

The novel coronavirus, severe acute respiratory syndrome coronavirus 2

(SARS-CoV-2) has been shown to be a multifaceted pathogen. Most pediatric patients with confirmed cases present asymptotically or with mild upper respiratory symptoms, but a small percentage can progress to acute respiratory distress syndrome or multiorgan system dysfunction.<sup>4</sup> There are no known documented cases of SARS-CoV-2 causing croup in the pediatric population. We report the case of a 14-month-old boy with classic symptomatology and radiographic confirmation of croup who was subsequently found to have coronavirus disease 2019 (COVID-19) infection.

## PATIENT PRESENTATION

In early May 2020, a term, unvaccinated 14-month-old boy who was recently diagnosed with influenza A in February presented to the emergency department with 2 days of fever, cough, and stridor. His maximum temperature was 38°C at home. Cough and stridor were intermittent, with increased work of breathing only when crying. He had normal appetite and urine output. Parents denied diarrhea, vomiting, or rash. He had been staying home with family, including his 3-year-old sister, who had a febrile illness

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1 week before. His father worked at a brick factory.

The patient presented to a community emergency department for difficulty breathing. He arrived with a fever of 39.3°C, which resolved with acetaminophen. He was initially tachycardic to 194 beats per minute, his blood pressure was 103/85 mm Hg, his respiratory rate was 40 breaths per minute, and he was saturating 100% on room air. Physical examination findings were significant for tachypnea, nasal flaring, and inspiratory stridor.

### DIAGNOSIS AND OUTCOME

Our patient was found to be positive for COVID-19 via point-of-care testing. A respiratory pathogen nucleic acid amplification panel (which was not used to test for COVID-19) was negative for other viral etiologies, including other types of coronavirus, influenza, parainfluenza, respiratory syncytial virus, rhinovirus, and enterovirus. There was no leukocytosis; the total white blood cell count was 8000 cells per  $\mu\text{L}$ , with 5200 neutrophils (57% segmented cells, 8% band cells) and 2400 lymphocytes per  $\mu\text{L}$  (30%). The C-reactive protein level was elevated at 34 mg/dL. Because of early concern for epiglottitis given the patient's unvaccinated status, neck and chest radiographs were obtained, which revealed subglottic narrowing. There was no radiographic evidence of epiglottitis or focal consolidation. After initial treatment in the community emergency department with racemic epinephrine and dexamethasone, he was transferred to our quaternary care center for overnight observation. He arrived stable on room air, with mild inspiratory stridor only when crying, and was tolerating oral hydration. He had an uneventful hospitalization and was discharged from the hospital the following day with supportive care and outpatient follow-up. There were

no known complications during his recovery. His COVID-19 antibodies were not tested; therefore, it is unknown whether he seroconverted.

### DISCUSSION

Our case indicates that SARS-CoV-2 can cause croup in pediatric patients. This presentation of disease is not unprecedented because other coronaviruses have previously been shown to cause croup.<sup>5</sup> Our patient displayed no signs of pneumonia or lower respiratory tract infection, as has been seen in the majority of symptomatic adult and pediatric cases of COVID-19. A case series of 171 pediatric patients with COVID-19 in Wuhan, China, revealed that 65% of patients presented with pneumonia and 19% presented with upper respiratory tract illness.<sup>4</sup> Most pediatric patients to date have had relatively mild courses of illness, with few developing respiratory failure requiring intubation and mechanical ventilation; only 3 of the patients in the Wuhan cohort required intubation and mechanical ventilation.<sup>4</sup>

However, SARS-CoV-2 causes a broad spectrum of diseases, ranging from asymptomatic infection to acute respiratory failure, as well as the emerging multisystem inflammatory syndrome in children causing Kawasaki-like disease with shock requiring ICU admission.<sup>6</sup> In a recently published case series of 64 pediatric patients in Chicago with confirmed COVID-19, the most common symptoms encountered were cough (75%) and fever (56%).<sup>7</sup> In this series, 10 patients required hospital admission. Of the 7 patients who required admission to the ICU, the majority had underlying comorbid conditions, including congenital heart disease, chronic lung disease, or genetic syndromes.<sup>7</sup> SARS-CoV-2 has thus been shown to cause a wide array of clinical presentations and severity of disease. Our case

represents a new presentation of COVID-19 in pediatric patients. We recommend that infants and children presenting with symptoms concerning for croup be tested for COVID-19 so that appropriate isolation precautions can be taken to limit disease transmission.

### ABBREVIATIONS

COVID-19: coronavirus disease 2019  
SARS-CoV-2: severe acute respiratory syndrome coronavirus 2

### REFERENCES

1. Engorn B, Flerlage J. *The Harriet Lane Handbook*, 20th ed. Philadelphia, PA: Saunders; 2015
2. Mills JL, Spackman TJ, Borns P, Mandell GA, Schwartz MW. The usefulness of lateral neck roentgenograms in laryngotracheobronchitis. *Am J Dis Child*. 1979;133(11):1140–1142
3. Thompson M, Vodicka TA, Blair PS, Buckley DI, Heneghan C, Hay AD; TARGET Programme Team. Duration of symptoms of respiratory tract infections in children: systematic review. *BMJ*. 2013;347:f7027
4. Lu X, Zhang L, Du H, et al.; Chinese Pediatric Novel Coronavirus Study Team. SARS-CoV-2 infection in children. *N Engl J Med*. 2020;382(17):1663–1665
5. van der Hoek L, Sure K, Ihorst G, et al. Croup is associated with the novel coronavirus NL63. *PLoS Med*. 2005;2(8):e240
6. Verdoni L, Mazza A, Gervasoni A, et al. An outbreak of severe Kawasaki-like disease at the Italian epicentre of the SARS-CoV-2 epidemic: an observational cohort study. *Lancet*. 2020;395(10239):1771–1778
7. Mannheim J, Gretsche S, Layden JE, Fricchione MJ. Characteristics of hospitalized pediatric coronavirus disease 2019 cases in Chicago, Illinois, March–April 2020. *J Pediatric Infect Dis Soc*. 2020;9(5):519–522

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