



# Croup: A Rare Manifestation of Coronavirus Disease 2019

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## Abstract

### Keywords

- ▶ croup
- ▶ laryngotracheobronchitis
- ▶ COVID-19
- ▶ SARS-CoV-2
- ▶ stridor

Croup is an acute inflammatory condition affecting upper airways and commonly seen in children with younger age group. Croup is most commonly due to acute viral infection and rarely because of bacterial and atypical agents. Here, we report a 3-month-old child who presented to us with classic signs and symptoms of croup and was also positive for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Child's mother also tested positive for SARS-CoV-2. SARS-CoV-2 infection presenting with stridor and croup is very rare and probably represents a new manifestation which should be considered in a young infant presenting with croup.

## Introduction

Croup, also known as acute laryngotracheobronchitis, is characterized by acute inflammation of larynx, trachea, and bronchus and clinically presents with barking cough, stridor, and respiratory distress. Croup is commonly due to viral pathogens infections and most often due to parainfluenza viruses, respiratory syncytial virus, influenza A and B, adenovirus, and measles and rarely bacterial.<sup>1,2</sup> Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection may be asymptomatic or may present with fever, coryza, cough, and/or shortness of breath. It can also have plethora of other manifestations such as nausea, vomiting, diarrhea, dehydration, abdominal pain, headache, pharyngitis, rash, myalgia, cyanosis, tachypnea, tachycardia, apnea, etc. But, to the best of our knowledge, croup as a manifestation of COVID-19 has been reported only twice before in children.<sup>3,4</sup> We report a 3-month-old child with classic symptomatology and radiographic sign suggestive of croup due to SARS-CoV-2 infection.

## Case Report

A 3-month-old developmentally normal female child was brought to emergency ward with a history of fever and cough

of 3 days, noisy, and hurried breathing for 1 day. At admission, baby was afebrile (temperature: 98.6°F), heart rate was 145/minute, respiratory rate was 50/minute with suprasternal and subcostal retractions, blood pressure was 94/60 mmHg, capillary refill time was <3 seconds, and SpO<sub>2</sub> was 98% in room air. Respiratory system examination revealed inspiratory stridor more on crying with increased work of breathing, bilateral equal air entry with normal vesicular breath sounds, and conducted sounds. Other systems examination was unremarkable.

Investigations: Hemoglobin was 9.9 g/dL, total leucocyte count was 17,540 cells/mm<sup>3</sup> with 73.5% neutrophils, 20.2% lymphocytes, platelet count was 6.17 lakh/mm<sup>3</sup>, and erythrocyte sedimentation rate was 45 mm at 1 hour. CRP was negative (3.37 mg/L). Liver and renal function tests were within normal limits. Neck and chest X-ray showed steeple sign with patchy opacities in right paracardiac region (→ Fig. 1). The nasopharyngeal swab reverse transcription polymerase chain reaction for SARS-CoV-2 infection was positive. However, we could not test for other respiratory pathogens. Inflammatory markers like serum ferritin, lactate dehydrogenase, procalcitonin and d-Dimer were normal. Baby's mother also tested positive for SARS-CoV-2 on the next day.

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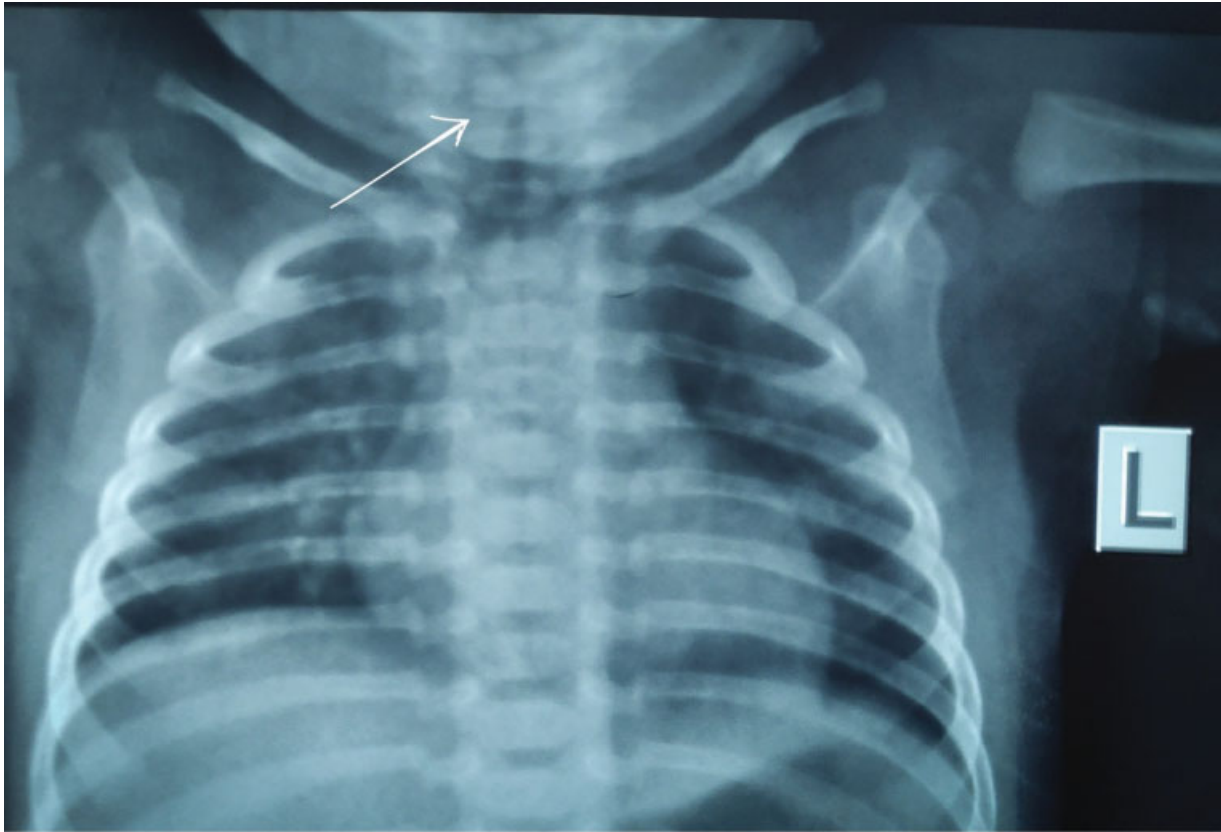
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**Fig. 1** Neck and chest X-ray showing steeple sign with patchy opacities in right paracardiac region.

Baby was treated with nebulized epinephrine (0.5 mL/kg; three doses over 48 hours), intravenous (IV) dexamethasone (0.15 mg/kg/day once a day for 2 days), salbutamol nebulization, and IV ceftriaxone. Fever was present only on the day of admission for 12 hours. Baby's stridor and cough completely resolved by 48 hours. Even though baby recovered by 48 hours, baby was admitted for 3 more days to observe for complications of COVID-19 infection. On 5th day of admission, there was no stridor, vitals were stable and baby was discharged.

## Discussion

Croup is a common upper respiratory tract infection of young children and is most commonly due to viral etiology.<sup>1</sup> Croup is often preceded by cough, coryza, and fever, followed by sudden onset of barking cough, hoarse voice, and inspiratory stridor.<sup>2</sup> The diagnosis of croup is mostly clinical and determining the etiology is rarely helpful.<sup>3,4</sup> Usually, viral croup is a self-limiting illness that typically resolves within 3 to 7 days in most cases.<sup>4</sup> Our baby presented with classical clinical features of croup and neck X-ray showed steeple sign.

The novel coronavirus SARS-CoV-2 has been shown to have protean manifestations. Though most pediatric cases present with no or mild upper respiratory symptoms, a small percentage of them can progress to severe forms such as acute respiratory distress syndrome or multiorgan system dysfunction.<sup>4-6</sup> Cough and fever are the two most commonly reported symptoms, while rhinorrhea, nausea, vomiting,

fatigue, diarrhea, dehydration, abdominal pain, headache, pharyngitis, rash, myalgia, cyanosis, tachypnoea, tachycardia, and apnea are other important presentations of SARS-CoV-2 infection.<sup>3</sup> Most of the pediatric cases require just close observation or symptomatic treatment and only a minority of them require intensive care treatment.<sup>5</sup>

SARS-CoV-2 infection presenting with croup is quite rare.<sup>3,4</sup> In children, only two published reports are available in the literature to the best of our knowledge.<sup>3,4</sup> Pitstick et al reported a 14-month-old child with croup due to SARS-CoV-2 infection with classical symptoms and was treated symptomatically and recovered.<sup>4</sup> Our child who was COVID-19 positive, also presented with classical features of croup with steeple sign; hence, we made a diagnosis of croup due to SARS-CoV-2 infection and treated symptomatically for which the child responded well. We used 0.15 mg/kg of dexamethasone instead of the recommended dose of 0.6 mg/kg in view of COVID-19 positivity, and the response was good. However, Venn et al used multiple doses of 0.6 mg/kg dexamethasone in all three cases.<sup>3</sup> In one child heliox (70% helium/30% oxygen), remdesivir and bilevel positive airway pressure was used. Authors opined that this therapeutic decision was infrequent in their hospital's practice and is reserved for atypical cases not responding as expected to initial treatment.<sup>3</sup> Current COVID-19 guidelines recommend dexamethasone to patients who are mechanically ventilated or are requiring oxygen as in adults.<sup>3</sup> Therefore, we used only 0.15 mg/kg with good response. However, Pitstick et al have not mentioned the dose they have used.<sup>4</sup>

In a study from Wuhan, out of 171 SARS-CoV-2 positive children, 19% presented with upper respiratory tract illness and 65% presented with pneumonia. Most of the cases had mild course and only three children required mechanical ventilation.<sup>5</sup> In another study involving 64 pediatric patients, most common symptoms were cough (75%) and fever (56%).<sup>6</sup> In both studies, croup as a manifestation was not reported. However, in a study involving 702 COVID-19 adult patients, 188 (26.8%) reported dysphonia during the clinical course of the disease and seven dysphonic patients reported aphonia. Probably dysphonia may be caused by vocal fold edema or inflammation.<sup>7</sup> Testing for COVID-19 helps in appropriate isolation precautions so that we can limit disease transmission. We had kept our infants mother in isolation to avoid spread of COVID infection. There are various social impacts of COVID-19 quarantine period. Maugeri et al observed a significant positive correlation between the variation of physical activity and mental well-being suggesting that the decrease in total physical activity had a profound negative impact on psychological health and well-being during COVID-19 pandemic in Italy.<sup>8</sup> A study from Canada also concluded that health-promoting measures directed toward increasing physical activity levels in inactive individuals may be essential to improving well-being during COVID-19. Even during public health restrictions, outdoor physical activity should be offered where feasible as it improves well-being of patients.<sup>9</sup>

## Conclusion

Croup like presentation in young infant may also be due to SARS-CoV-2 infection. Therefore, screening for COVID 19 is ideal in every child with croup syndrome so that appropriate isolation and standard precautions in managing these cases may be initiated.

### Note

Being a single case reported in the report, a formal ethics committee approval was not required as per institutional policy. However, a written consent from the parents was obtained for sharing the clinical information of the patient.

### Authors' Contributions

H.C.K.K. and K.J.K. dedicated in the conception and design of the work, preparation, and finalization of the draft. H.C.K.K., K.J.K., S.N., and M.V.G. supported in the acquisition, analysis, and interpretation of data for the work. H.C.K.K. and K.J.K. helped in drafting the work and revising it critically for important intellectual content. H.C.K.K., K.J.K., S.N., and M.V.G. carried out the final approval of the version to be published and agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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### Conflict of Interest

None declared.

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