International Journal of Contemporary Pediatrics
*Sarangi B et al. Int J Contemp Pediatr. 2021 Nov;8(11):1884-1886*
http://www.ijpediatrics.com
pISSN 2349-3283 | eISSN 2349-3291

DOI: https://dx.doi.org/10.18203/2349-3291.ijcp20214164

**Case Series**

# Croup as a manifestation of COVID-19 in infancy: a case series

**Bhakti Sarangi*, Guruprasad H. Shankar, Ajay Walimbe, K. C. Prithvichandra**

Department of Pediatrics, Bharati Vidyapeeth Medical College, Pune, Maharashtra, India

**Received:** 10 August 2021
**Revised:** 03 September 2021
**Accepted:** 11 October 2021

***Correspondence:**
Dr. Bhakti Sarangi,
E-mail: dr.bhaktisarangi@gmail.com



## ABSTRACT

The second wave of the COVID-19 pandemic in India brought with it an emerging clinical spectrum of the infection in children. Amongst these is the rarely reported presentation of croup, which otherwise remains a common clinical condition in infants caused by a variety of viruses and seen by pediatricians regularly. Airway manifestations of COVID-19 require reporting and unless their evaluation brings up any specific peculiarities, it is imperative to screen all such children presenting to the emergency department for SARS-CoV-2 infection. We hereby reported a series of three infants who were brought to us with typical features of croup including a mild fever, runny nose and indicators of subglottic inflammation including a hoarse voice, brassy cough and an inspiratory stridor. Each of them responded to conventional therapies for croup. However, the added conundrum of possible SARS-CoV-2 infection increases the relevance of rapid screening, assessment for complications and counselling in children presenting with croup.

**Keywords:** SARS-CoV-2, Croup, Acute laryngotracheitis, Stridor, Budesonide

## INTRODUCTION

In the first wave of the pandemic, SARS-CoV-2 infection was found to be a milder ailment in children with the common symptoms apart from fever being predominantly respiratory in nature in the form of cough, sore throat and coryza with the occasional child demonstrating fast breathing and hypoxia.[1] As the pandemic has evolved newer clinical presentations have come to the fore including with the rare occurrence of virus induced wheezing also being reported.[2] Similarly, the picture of upper airway obstruction as seen in croup manifesting with stridor amongst other classical features have only seldom been reported as a part of the SARS-CoV-2 clinical spectrum in children, with no such reports from India.[3,4] We hereby reported a series of three infants with SARS-C0V-2 infection who were brought to us in a span of one month (between 15 March and 15 April 2021) with the typical manifestations of acute laryngotracheitis with the presence of an audible stridor, all of whom responded to treatment with oxygen, nebulized epinephrine and steroids. Our objective was to alert fellow pediatricians to this particular manifestation of COVID-19 in infancy and discuss the practical considerations involved with the assessment, diagnosis and management of these children.

## CASE SERIES

In the peak of the second wave of the COVID-19 pandemic, we saw 3 infants brought to us with typical features of croup (Table 1). Of the 3 infants, two were male. All 3 had a prodrome of fever, runny nose and a brassy cough in addition to change in voice and an audible stridor. Two infants tested positive for SARS-CoV-2 by rapid antigen while one tested negative for antigen but positive by real time polymerase chain reaction (RT-PCR) of nasopharyngeal swab. Two infants had a moderate disease while one had a mild disease. The infants with moderate disease received epinephrine and

budesonide nebulizations in addition to intravenous dexamethasone while the one with mild disease received only a stat dose of dexamethasone. Two required hospital admission for treatment while the infant with mild disease was managed on outpatient basis. All infants responded well to abovementioned measures and remained well on telephonic as well as post quarantine follow up.

**Table 1: Clinical and laboratory characteristics.**

| Characteristics | Case 1 | Case 2 | Case 3 |
|---|---|---|---|
| **Age (in years)** | 1 | 1 | 2 |
| **Gender** | Female | Male | Male |
| **Presenting complaints** | Fever, brassy cough, coryza followed by change in voice and noisy breathing | Fever followed by change in voice and noisy breathing | Fever, coryza and brassy cough followed by change in voice |
| **Examination** | Irritable; HR-112 /min; RR-44 /min; temp-98$^0$ F; Spo2-93% on room air; R/S-stridor at rest; air entry mildly decreased. Prominent suprasternal and subcostal retraction present. | Alert, HR-140 /min RR-48 /min; temp-100$^0$ F; Spo2-96% on room air; R/S-stridor at rest. Air entry mildly decreased; subcostal and suprasternal retraction present. | Alert, HR-104 /min; RR-32 /min; temp-98$^0$ F; Spo2-98% on room air; R/S-stridor on agitation; air entry normal; no retractions. |
| **Westley croup severity score** | 5 (moderate disease) | 5 (moderate disease) | 1 (mild disease) |
| **Rapid antigen test** | Positive | Positive | Negative |
| **Nasopharyngeal swab for COVID-19 RT-PCR** | Not done | Not done | Positive |
| **Laboratory investigations** | Hb-9.8g/dl; TLC-9000 /cmm; neutrophils-75%; lymphocyte-23%; platelets-209000 /cmm | Not done | Not done |
| **NLR ratio** | 3.26 | Not done | Not done |
| **CRP** | 13.7 mg/l | Not done | Not done |
| **Chest radiograph** | Normal | Not done | Not done |
| **Co-morbidities** | Nil | Nil | Nil |
| **Treatment** | | | |
| **Aerosol therapy** | Nebulized epinephrine and budesonide | Nebulized epinephrine and budesonide | No aerosol therapy |
| **Steroids** | IV dexamethasone 0.15 mg/kg/dose 6 hourly | IV dexamethasone 0.15 mg/kg/dose 6 hourly | IV dexamethasone 0.6 mg/kg stat |
| **Antiviral drugs** | Nil | Nil | Nil |
| **Length of hospital stay (in days)** | 4 | 1 | Outpatient basis |

## DISCUSSION

Our case series adds another dimension to the wide array of respiratory symptoms seen with SARS-CoV-2 infection in children. Croup is a common clinical condition caused by a host of viruses including influenza, parainfluenza, respiratory syncytial virus (RSV), adenovirus and measles virus amongst others.[5] However, in the past, coronaviruses have also been known to cause croup in children, hence the occurrence of SARS-CoV-2 related acute laryngotracheitis remains a distinct theoretical possibility which was not entirely unprecedented.[6] In our series, all three children were brought with the typical manifestations of subglottic inflammation including a brassy or barky cough, a change in voice and an inspiratory stridor, all in addition to a pre-existing fever and a runny nose (Table 1). Two had a moderate disease while one had a mild disease. It was interesting to note that the cases occurred in peak summer as opposed to the historically known peak incidence of croup in late fall and early winter.[7] This highlighted the practicality of a higher index of suspicion and a lower threshold for SARS-CoV-2 testing in children who presented with similar symptoms to the emergency room (ER). Rapid access to available testing will help reduce the exposure of the treating physicians in the ER to a SARS-CoV-2 patient. A positive test result will also prompt a more focused diagnostic approach for complications and/or any features of severe inflammation as has been witnessed in SARS-CoV-2 infection. None of the children in our series had symptomatic family members or any recent exposure to another symptomatic

individual/child with COVID-19. This reiterated the threat of possible asymptomatic infections as well as the non-negligible risk of possible transmission from other children. Also, in the current epidemiological environment, identifying the association with SARS-CoV-2 infection became paramount particularly for counseling inpatient and outpatient families on quarantine and home isolation practices.

The management of croup irrespective of the causative agent remained targeted towards improving oxygenation, reducing the subglottic edema, controlling factors that contributed to work of breathing such as fever and anxiety/irritability and ensuring adequate hydration.[8] Dexamethasone (oral or intravenous) remained the cornerstone of treating children with croup and was helpful in reducing the airway inflammation thus reducing the symptoms as well as length of hospital stay.[8] In our series, the two children with moderate disease received multiple doses of dexamethasone while the third one received a single dose in the ER. Dexamethasone has also known been one of the mainstays of therapy in SARS-CoV-2 infection over the past year, stated to reduce mortality in those requiring oxygen as well as invasive mechanical ventilation.[9] Nebulized epinephrine was the other intervention used in the admitted patients, keeping in mind the aerosol generating nature of the process, the amplified risk of transmission of infection to bystanders as well as need for appropriate personal protective equipment.[2] Inhaled corticosteroid in the form of budesonide which has been used in treating croup cases refractory to conventional therapy was not used in all of our patients.[8] Recent trials have also suggested the role of inhaled budesonide in reducing the likelihood of worsening disease as well as the length of hospital stay in adults with SARS-CoV-2 infection making it a plausible therapeutic choice in children with croup associated with COVID-19.[10] We did not use any anti-viral drugs in our patients. The course of illness remained as anticipated in all three children. Though there have been recent reports of croup in COVID-19 being complicated with superadded bacterial infection causing tracheitis and pneumonia, all the children in our series remained well on telephonic follow up and were advised home quarantine for 14 days since onset of symptoms.[11] In our series, we were not able to test for other viruses in search of a possible co-infection which remained a limitation.

## CONCLUSION

Keeping pace with the rapid evolution and transmission of the SARS-CoV-2 virus, its clinical spectrum is also unfolding simultaneously. Croup (acute laryngotracheitis) adds to the fast-expanding list of the clinical manifestations of SARS-CoV-2 infection in children and may pose diagnostic as well as therapeutic dilemmas. However, from the current experience traditional therapies used in croup may also be used to good effect in croup with COVID-19.

*Funding: No funding sources*
*Conflict of interest: None declared*
*Ethical approval: Not required*

## REFERENCES

1. Meena J, Yadav J, Saini L, Yadav A, Kumar J. Clinical features and outcome of SARS-CoV-2 infection in children: a systematic review and meta-analysis. Indian Pediatr. 2020;57(9):820-6.
2. Sarangi B, Shankar GH, Reddy VS. Virus-induced wheezing with COVID-19. Indian Pediatr. 2020;57(12):1183-5.
3. Venn AMR, Schmidt JM, Mullan PC. A case series of pediatric croup with COVID-19. Am J Emerg Med. 2020;735(20):30829.
4. Pitstick CE, Rodriguez KM, Smith AC, Herman HK, Hays JF, Nash CB. A curious case of croup: laryngotracheitis caused by COVID-19. Pediatrics. 2021;147(1):2020012179.
5. Rodrigues KK, Roosevelt GE. Acute inflammatory upper airway obstruction (croup, epiglottitis, laryngitis, and bacterial tracheitis). In: Kliengman RM, Geme JWS, Blum NJ, Shah SS, Tasker RC, Wilson KM, eds. Nelson Text book of pediatrics. 21st ed. Philadelphia: Saunders Elsevier; 2019: 2202-6.
6. Hoek LV, Sure K, Ihorst G, Stang A, Pyrc K, Jebbink MF, et al. Croup is associated with the novel coronavirus NL63. PLoS Med. 2005;2(8):240.
7. Hanna J, Brauer PR, Morse E, Berson E, Mehra S. Epidemiological analysis of croup in the emergency department using two national datasets. Int J Pediatr Otorhinolaryngol. 2019;126:109641.
8. Ortiz-Alvarez O. Acute management of croup in the emergency department. Paediatr Child Health. 2017;22(3):166-9.
9. RECOVERY Collaborative Group, Horby P, Lim WS, Emberson JR, Mafham M, Bell JL, et al. Dexamethasone in hospitalized patients with COVID-19. N Engl J Med. 2021;384(8):693-704.
10. Ramakrishnan S, Nicolau DV, Langford B, Mahdi M, Jeffers H, Mwasuku C, et al. Inhaled budesonide in the treatment of early COVID-19 (STOIC): a phase 2, open-label, randomised controlled trial. Lancet Respir Med. 2021;9(7):763-72.
11. Aghdam MK, Mirzaee HS, Eftekhari K. Croup is one of the clinical manifestations of novel Coronavirus in children. Case Rep Pulmonol. 2021;2021:8877182.

**Cite this article as:** Sarangi B, Shankar GH, Walimbe A, Prithvichandra KC. Croup as a manifestation of COVID-19 in infancy: a case series. Int J Contemp Pediatr 2021;8:1884-6.