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CASE REPORT

SARS-CoV-2 infection in children aged less than two years - a case series

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Abstract

The current pandemic of the new coronavirus has brought new public health concerns, given the rapid spread around the world and the variety of clinical manifestations. In this context, the clinical picture of SARS-CoV-2 has been widely studied in different age groups. Especially in the pediatric population, it is known that the clinical picture tends to be oligosymptomatic or even asymptomatic, making diagnosis difficult. Added to this is the fact that the signs and symptoms of the flu syndrome are part of the most common complaints in the pediatric setting. Aiming to contribute to the understanding of the spectrum of clinical presentations of SARS-CoV-2 in children, the present study proposes to present a series of case reports in infants with the presence of a respiratory condition and positive RT-PCR for COVID-19, highlighting the predominant signs and symptoms, the radiological changes, the management and clinical outcome, correlating with the scientific evidence published

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INTRODUCTION

Coronavirus Disease 2019 (COVID-19) is a condition caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) first identified in Wuhan, China, in late 2019. The disease has since spread and been described as a global pandemic. Although it has disseminated globally, the epidemiological and clinical patterns tied to COVID-19 remain largely obscure, particularly in children.^{1,2} The first studies to include children in a series published in China described milder involvement compared to adults and a predominance of respiratory symptoms. Children with COVID-19 also suffer from many of the same symptoms seen in flu-like syndrome.¹⁻³

In order to better understand the spectrum of clinical manifestations tied to COVID-19 in children, this study described a series of cases of the disease involving infants with respiratory symptoms and positive tests for SARS-CoV-2 infection; particular attention was given to prevailing signs and symptoms, imaging alterations, patient management, and outcomes; comparisons against scientific evidence published to date are also offered.

This observational retrospective descriptive study looks into case reports of children aged less than two years (infants). The cases were selected from the medical charts of children seen at the pediatric emergency department of a hospital in the outskirts of the city of São Paulo in April and May 2020. The files of eight patients were selected and compared for prevalence of signs and symptoms, imaging alterations, patient management and outcomes. The data presented in this study is expected to strengthen the scientific evidence published to date about infants diagnosed with COVID-19.

CASE REPORTS

Patient clinical findings are described in Table 1. Age ranged from 12 days to 16 months; four were males and four were females (1:1 ratio). Two patients were in contact with individuals suspected for COVID-19 (25%). Four patients (50%) had fever lasting from two to five days. Fever spikes varied from 38.2°C to 39°C; half of the patients did not have their temperatures measured by their caretakers and had fever before admission. Six patients (75%) had coughs; three (37.5%) had coryza; three (37.5%) had wheezing; and six (75%) had diffuse crackling rales. Two patients (25%) did not present signs of respiratory distress. Half (50%) developed mild to moderate respiratory distress with subdiaphragmatic and intercostal retractions, but none required referral to an ICU. Retractions worsened in two (25%) patients and involved the sternal furcula; they progressed to respiratory failure and required invasive mechanical ventilation in an ICU. One patient (12.5%) had fever as the only symptoms (Patient 1). Imaging examination revealed diffuse interstitial infiltrates in five patients (62.5%). The other three (37.5%) did not present significant imaging alterations. One patient (12.5%) had diarrhea prior to admission (Patient 7). Five (62.5%) were healthy

prior to admission. Patients 1, 2, 5, and 8 had the following respective comorbidities: wheezing; neurological sequelae from encephalitis; subglottic stenosis; and cerebral palsy. Time of hospitalization ranged from seven to 32 days (mean: 10 days); Patient 8 was hospitalized throughout the duration of the study. None of the patients died.

DISCUSSION

Several studies have been conducted since the identification of the novel coronavirus disease to understand the behavior of the virus and elucidate the ways to manage and prevent the disease. Children generally present with less severe symptoms than adults, although the reasons for such difference have not been entirely uncovered.^{3,4} The severity of COVID-19 increases with the affinity with angiotensin-converting-enzyme, of which children express lower levels than adults.⁵

Most of the patients included in the study (75%) had good outcomes, with symptoms ranging from mild to moderate. The two patients (25%) who required referral to an ICU had comorbidities. Fever was the most common clinical sign. Coughing and dyspnea were the most frequent symptoms. Similar findings were reported in a retrospective study by Dong X, et al., (2020), in which 731 of 2143 Chinese children suspected for SARS-CoV-2 infection (34.1%) tested positive for the disease. The authors concluded that 90% of the patients developed asymptomatic, mild or moderate disease. As in our study, no significant difference was found in the distribution of the disease in terms of sex.⁶ Our results are in agreement with the meta-analysis published by Chang T-H, et al., (2020), in which the authors analyzed the spectrum of clinical manifestations of children with COVID-19. The most common findings seen in the 93 patients included in the abovementioned study were fever, coughing, and dyspnea; 98% had mild to moderate disease; 12% had diarrhea; mortality was extremely low (0.1%).⁷

Although every patient with comorbidities in our study required hospitalization, there is no clear association described in the literature between comorbidities and worse outcomes in individuals with COVID-19. Garazzino S et al. (2020) carried out a multicenter retrospective study involving 62 hospitals in Italy and looked into the clinical and epidemiological aspects of SARS-CoV-2 infection in a pediatric population. The study included 168 patients with SARS-CoV-2 infection, of which 110 (65.1%) required hospitalization and 33 (19.6%) had comorbidities. Twenty-three of the 33 patients with chronic disease (69.6%) required hospitalization; 87 of 135 previously healthy patients (64.4%) also required hospitalization. According to Fisher's exact test, the difference in the number of patients with preexisting underlying conditions and previously healthy patients requiring hospitalization was not statistically significant ($p = 0.68$).⁸ The difference in relation to our outcomes was possibly caused by the smaller size of our sample and the scarcity of studies about comorbidities potentially associated with severe disease in children.

Table 1. Clinical, imaging, and progression characteristics of the included patients.

Clinical Variables	Patient 1	Patient 2	Patient 3	Patient 4	Patient 5	Patient 6	Patient 7	Patient 8
Age	12 days	1 year and 4 months	4 months	1 month	1 year and 2 months	1 year	4 months	7 months
Sex	Female	Female	Male	Male	Female	Male	Female	Male
Contact with subjects suspected for COVID-19	Yes	No	No	No	No	No	Yes	No
Fever spike	39°C	Temperature not measured before admission	38.2°C	Afebrile	Afebrile	Afebrile	Temperature not measured before admission	Afebrile
Duration of fever	4 days	5 days	4 days	Afebrile	Afebrile	Afebrile	1 day	Afebrile
Coughing	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Coryza	No	Yes	Yes	No	No	Yes	No	No
Wheezing	No	Yes	No	No	Yes	Yes	No	No
Rales	No	Diffuse crackling rales	No	Diffuse crackling rales	Diffuse crackling rales	Diffuse crackling rales	Diffuse crackling rales	Diffuse crackling rales
Retractions/ use of accessory muscles	No	Furcula, intercostal and subdiaphragmatic retractions	No	Intercostal and subdiaphragmatic retractions	Intercostal and subdiaphragmatic retractions	Intercostal and subdiaphragmatic retractions	Intercostal and subdiaphragmatic retractions	Furcula, intercostal and subdiaphragmatic retractions
Imaging findings	Diffuse infiltrate	Diffuse infiltrate	Unaltered	Diffuse infiltrate	Diffuse infiltrate	Unaltered	Unaltered	Diffuse infiltrate
Respiratory insufficiency	No	Yes	No	No	No	No	No	Yes
ICU support	No	Yes	No	No	No	No	No	Yes
Diarrhea	No	No	No	No	No	No	Yes	No
Comorbidities/ social vulnerability	No	Wheezing	Prior viral encephalitis with neurological impairment. Gastrostomy created during hospitalization	No	Tracheostomy for subglottic stenosis (Grade III)	No	No	Cerebral palsy
Death	No	No	No	No	No	No	No	No
Required orotracheal intubation	No	Yes	No	No	No	No	No	Yes
Length of hospitalization	9 days	3 days. Referred to another service.	32 days	4 days. Referred to another service.	7 days	1 day	7 days	Still hospitalized at the end of the study

In our study, a neonatal patient aged 12 days had SARS-CoV-2 infection (age at which the patient was brought to the hospital). Infection and diagnostic tests occurred after birth and the patient progressed favorably during her stay at the pediatric ward. Her main signs and symptoms were fever and desaturation inconsistent with her clinical condition, since at no time did she present signs of respiratory distress. Imaging findings revealed significant bilateral diffuse interstitial infiltrates. She was equipped with a nasal cannula to provide supplemental oxygen at a rate of 1 L/min. The patient and her parents were placed in isolation. She progressed well and was discharged, and has not been back at the hospital since.

Our analysis has its limitations, since the hospital in which the patients received care is not a referral center for COVID-19; suspected and confirmed cases of SARS-CoV-2 infection must be referred to other centers. Therefore, the data related to signs, symptoms, imaging alterations, patient management and outcomes reflect only the period for which the patients were in our hospital, at which time deaths were not recorded.

The importance of case reports lies in the comparison between the most prevalent signs and symptoms of disease observed in individual studies and current literature. Our study stands as a contribution to the description of the signs,

symptoms, imaging alterations, and progression of COVID-19 seen in pediatric patients diagnosed with COVID-19 in Brazil.

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