

Early clearance of severe acute respiratory syndrome-coronavirus 2 in a 9-month-old infant: A case report

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ABSTRACT

Although COVID-19 affects people of all ages, relatively few cases of infants have been reported. In the majority of the cases, the course of the disease is milder. However, little is known about the duration of illness in infants compared to adults and the role of protective factors. This study reports a case of a 9-month-old infant infected with severe acute respiratory syndrome-coronavirus 2, which showed a shorter disease course. He had acquired the infection from his father. This case highlights the essential role of breastfeeding and other vaccinations in strengthening the immune system of infants to clear the virus.

Key words: Asymptomatic, COVID-19, Infant, Rapid recovery, Severe acute respiratory syndrome-coronavirus 2

Coronaviruses are a large group of single-stranded, enveloped ribonucleic acid (RNA) viruses, mostly infecting animals. Some of them, like coronavirus disease (COVID-19) agent severe acute respiratory syndrome-coronavirus 2 (SARS-CoV-2), jumped the species barrier and have infected humans to cause large outbreaks. COVID-19 has now reached every nook and corner of the world. Although more than 14 million cases have been affected worldwide (as of July 15, 2020), a relatively fewer number of pediatric COVID-19 cases are confirmed. In the case of infants, it is even rarer. Data indicate that COVID-19 is less frequent and less severe in children compared to adults [1-5]. It showed no gender predilection in infants compared to a higher prevalence in males compared to females in adults [1,2]. Children more often have gastrointestinal symptoms compared to adults [1,3]. Here, we would like to narrate a case of a 9-month-old male infant who was diagnosed with COVID-19.


CASE REPORT

Nasal and throat swab samples were collected from a 9-month-old boy infant along with his seven other family members on April 14, 2020. This was a part of the contact tracing of an index case (infant's father) diagnosed with COVID-19 on April 4, 2020. On April 15, on real-time reverse transcriptase polymerase chain reaction (PCR), SARS-CoV-2 RNA was detected in the infant's sample with a threshold cycle (Ct value) of 32.3 for HKU-ORF1b

gene of SARS CoV-2. The baby was brought to the tertiary center immediately after the result was available. He did not present with any symptoms of chill or shivering, cough, sneeze, irritability, drowsiness or vomiting, and loose stools.

On examination, the kid appeared healthy, afebrile, and alert. An axillary temperature of 37°C, a heart rate of 140/min, and a respiratory rate of 38/min were recorded. There were no red rashes on his body and no redness in his eyes was noted. Physical examination of the baby was normal for his age, and all the systems were within normal limits. The infant was hospitalized in the COVID-19 isolation ward to avoid infecting others. There was no history of any major illnesses, and he achieved the milestones within time. The weight and length of the baby were 8 kg and 72 cm, respectively. With his head circumference within 0 to -1 SD, he was at 12th centile for the weight for age and 64th centile for length for age. He was mostly on breastfeeding along with occasional complementary feedings. He was vaccinated regularly as per the National Immunization Schedule.

Keeping in view of his healthy status, his throat and nasal swabs were again collected on April 17 and were tested for COVID-19 at a tertiary center. This time no SARS-CoV-2 RNA was detected by RT-PCR for E, ORF-1b, and RdRp gene. Repeat swabs were collected on April 19 and he reported negative for the 2nd time. He was discharged on April 22 and sent home with the advice of close monitoring for any signs of fever or respiratory symptoms and home isolation for another 2 weeks. Daily phone call with a standardized questionnaire was carried out for 2 weeks.

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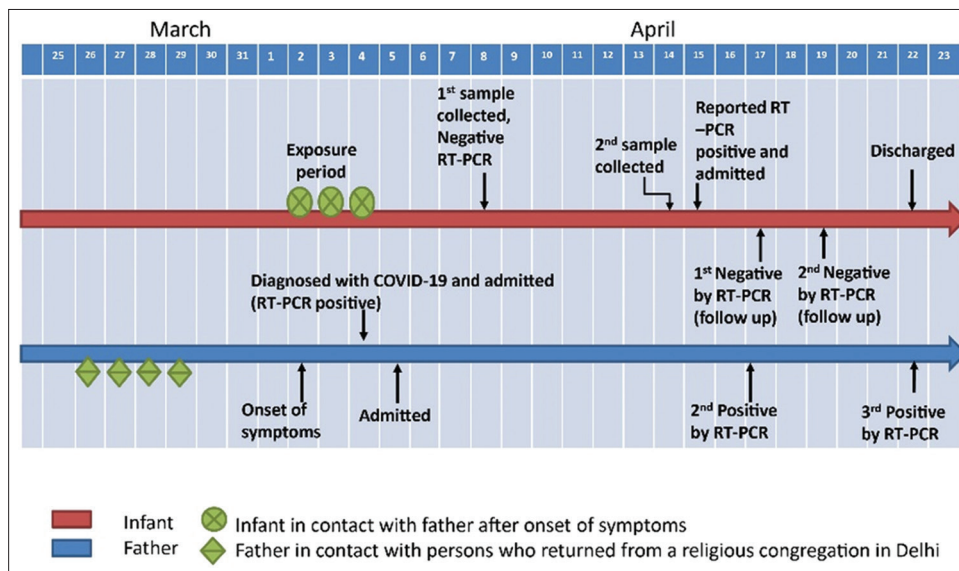


Figure 1: Timeline of exposure of the infant and course of the disease

Tracking the source of the patient's infection

On April 4, 2020, a 40-year-old man presented to OPD with a history of high fever, sore throat, and dry cough since April 2. He gave a history of contact with a person from March 26 to March 29 recently and was tested positive for COVID-19. Sample was collected on March 4 and sent for COVID-19 testing. He was diagnosed with COVID-19 (with Ct of 26.3 for HKU-ORF1b) and was subsequently admitted to the COVID-19 isolation ward. The contact tracing was started. Nasal and throat swabs of all his family members (8 persons) were collected on April 6 and 14 and were sent for COVID-19 testing. Only his 9-month-old infant son came positive while all other samples were negative. Since the child or any of the other family members did not travel during this time, the infant had most likely acquired COVID 19 from his father.

DISCUSSION

Most of the coronaviruses infecting humans usually cause mild upper respiratory symptoms in immunocompetent subjects. Exceptions being SARS-CoV, Middle East respiratory syndrome coronavirus, and more recently SARS-CoV-2 responsible for causing the ongoing pandemic of COVID-19. Among the confirmed cases, only 0.93% are found to be in the age group <10 years [3,5]. Of the patients in the age group of <18 years, 4.4% were asymptomatic [4].

The number of reported cases in infants can be a tip of the iceberg, and the actual rate in infants could be much higher due to its mild or asymptomatic presentation. They are mostly detected by contact tracing, as was in this case. However, most of the studies do not throw light on the duration of illness in children and infants as compared to adults. Here, in this case, we have seen a very early clearance of the virus from the respiratory samples. To the best of our knowledge, this case was recorded as the fastest to recover in India. Wölfel *et al.* observed that virus could be isolated from the respiratory tract from day 1 to day 28 after the onset of

symptoms with a peak on day 4 [6]. The kid was in contact with his symptomatic father for 3 days (April 2–4, Fig. 1), though he came negative for COVID-19 on a sample taken on April 8 (first contact tracing) but came positive on the 2nd sample collected on April 14, that is, on 10–12 days of exposure. On the 4th day of diagnosis (April 17, 2020), his sample was RT-PCR negative for the virus. This was confirmed by a repeat testing 2 days afterward (Fig. 1). Although the RT PCR positivity lasted for a short period (April 14–17), he might have become positive between April 9 until he was detected positive eventually (i.e., April 14).

Although many factors have been implicated for milder consequences of pediatric COVID-19, the actual reason is not yet apparent. The entry of the virus is facilitated by the binding of virus spike protein to angiotensin-converting enzyme 2 (ACE2) receptors. It is speculated that children are less sensitive to SARS-CoV-2 because the maturity and function (e.g., binding ability) of ACE2 in children may be lower than that in adults [3,7]. Moreover, as children are frequently exposed to respiratory viruses (many RNA viruses, e.g., RSV and influenza), it can increase serum antibody level and offer cross-protection [3,4,7,8]. de Rose *et al.* from Italy proposed the possibility of cross-protective effect of various pediatric vaccines [7,9]. In the current case also, the baby received multiple vaccines since birth, and a vaccination-associated unspecific immune enhancement related cross-protection can play a role in early viral clearance. Breastfeeding might also have an important role to play in reducing the virulence in infants. In this case, the baby had a history of full immunization and was breastfed.

Moreover, “cytokine storm” which is often associated with higher morbidity and mortality in adults may be uncommon in infants as the immune system is still developing [7].

CONCLUSION

Further research is needed to find out immunological and other factors that may be responsible for a milder course and shorter duration of COVID-19 in infants.

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