Case report

More reliability of suspicious symptoms plus chest CT-scan than RT-PCR test for the diagnosis of COVID-19 in an 18-days-old neonate

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I N T R O D U C T I O N

In December 2019, the emerging disease was declared as a global emergency and was named COVID-19 [1]. The first definitive case of the disease in Iran was announced in two adults on 19 February, 2020 [2]. According to the report of the Department of Diseases of Shahroud Deputy of Health on 21 February, 2020, the first suspected case and the first definite adult with COVID-19 in Shahroud were diagnosed on February 20, 2020.

Until March 1, there were 3 infants and 230 cases of COVID-19 in the age group of under 18 worldwide [3]. Based on recent studies in children, close contact with symptomatic and asymptomatic patients is the main route of transmission and most infected children have mild or no symptoms making the diagnosis more difficult [4,5]. The present study investigated an 18-days-old neonate referred to a hospital in Shahroud with clinical evidence and imaging findings indicated viral pneumonia of COVID-19.

C A S E  P R E S E N T A T I O N

The patient was an 18-days-old Iranian neonate girl with current weight of 3600 g referred to the Bahar hospital with symptoms of respiratory distress, cyanosis, fever and cough. The neonate was born by cesarean delivery on February 10, 2020 in Khatam hospital with birth weight of 3020g. The newborn had no medical history, except for neonatal icterus and two-day phototherapy in the Khatam hospital (10–12 February, 2020).

The neonate had nasal congestion, cough and wheezing on February 26, 2020 and was admitted to the isolated room of the NICU ward at Bahar hospital due to the progression of symptoms towards worse cough, lethargy, respiratory distress, fever,

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cyanosis, respiratory rate more than 65 times per minute and impaired breastfeeding; The initial diagnosis of pneumonia was made on February 28. The results of the patient’s initial tests are shown in Table 1. In addition, blood type and O2 saturation were O+ and 74 % respectively.

The chest x-ray (Fig. 1A) and HRCT-Scan without contrast (Fig. 1B) were performed from the infant’s chest on 29 February 2020. Consolidation with air bronchograms were seen in medial segments of the upper and middle lobes of the right lung and the lingula region. There was no evidence of pleural effusion or mediastinal lymphadenopathy. Due to the patient’s chest X-ray and CT scan and the ongoing epidemic of COVID-19, the infant was referred to the ICU of the specialized COVID-19 hospital of Shahroud on 01-March and was admitted to an isolation room.

Careful monitoring of vital signs, blood oxygen saturation, blood glucose and necessary supportive measures were performed. According to the pediatrician sub-specialist’s prescription and considering the possibility of late bacterial pneumonia, the intravenous vancomycin 36 mg (q8 hr) (30 mg/kg/day) and cefotaxime 180 mg (q12 hr) (100 mg/kg/day) were prescribed from the first day until discharge, also the soluble Oseltamivir capsule and Hydroxychloroquine tablet were prescribed 20 mg (daily) (5.5 mg/kg/day); Cardiac monitoring was performed in the ICU while taking Hydroxychloroquine, and no significant signs were noted like QT prolongation. Furthermore, the oxygen therapy was performed by the oxy-hood. The RT-PCR for SARS CoV-2 of throat swab specimen was negative on 29 February 2020. Laboratory tests of the fourth day (2 March, 2020) showed in Table 1. The blood culture was negative after 48 h of bacterial growth (Staphylococcus aureus and Streptococcus pneumonia and other common microorganisms), but no tests were performed to detect the flu and other viruses.

After admission and starting the treatment, the neonate’s fever was abated and repeat chest CT-Scan show there was a lower alveolar consolidation on the sixth day of hospitalization (March 4, 2020), but there was still consolidation in the middle lobe of the right lung (Fig. 1C). The neonate was without fever for more than 4 days; and clinical symptoms and chest radiographic findings indicated the improved respiratory and vital status. On day 7th of hospitalization, the newborn was discharged from hospital with prescription of oral azithromycin syrup 100 mg (1.5cc daily) and oral ranitidine syrup 75 mg (0.5 cc twice a day). The patient was hospitalized with an initial diagnosis of pneumonia. Due to the patient’s condition, along with the viral causes of pneumonia such as coronavirus and typical bacterial causes, atypical factors were also considered. Therefore, azithromycin was added to the treatment.

The result of a second pharyngeal swab on March 12 was positive for SARS CoV-2. According to the medical history, the 3-years-old sister and 34-years-old father had mild cold symptoms with fever, cough and lethargy on February 23, 2020 and were under outpatient treatment without hospitalization. They had close contact with a person with symptoms of cough, and lethargy 1 week after the birth of the baby (17/02/2020) and then have not had any contact with other person except their family. The nasopharynx swab test was performed on neonate’s sister, and the nasopharynx and nasal swab test on parents on March 18 and the results of all family tests were negative.

In our study, the identified case or cases of the disease in contact with this patient and even his family were not identified. We know that many patients are asymptomatic, and the strong hypothesis is that the patient also received the disease from asymptomatic individuals.

Table 1
Laboratory test results of the neonate.

| Laboratory Tests | 29 February 2020 | 1 March 2020 | 2 March 2020 | 4 March 2020 | Normal Ranges |
|------------------|-----------------|-------------|-------------|-------------|---------------|
| **chemistry**    |                 |             |             |             |               |
| Blood Sugar      | 91              | 113         | 86          | 86          | Mg/dL         |
| Phosphorus       | –               | –           | 5.8         | –           | Mg/dL         |
| Na*              | 138             | 132         | 136         | 134         | Mg/dL         |
| K                | 4.6             | 4.0         | 5.1         | 4.4         | mgEq/L        |
| Creatinine       | 0.5             | 0.3         | 0.3         | 0.5         | Mg/dL         |
| Urea             | 19              | 10          | 19          | 8           | Mg/dL         |
| Calcium          | 11.5            | –           | 9.8         | –           | Mg/dL         |
| Magnesium        | –               | –           | 1.9         | Mg/dL       |
| Sgot (AST)       | –               | –           | 27          | –           | IU/L          |
| Sgpt (9)         | –               | –           | 15          | –           | IU/L          |
| LDH              | –               | –           | 664*        | –           | IU/L          |
| **serology**     |                 |             |             |             |               |
| CRP              | Negative        | 5           | 4           | Negative    | Mg/L          |
| **Hematology**   |                 |             |             |             |               |
| RBC              | 4.06            | 4.07        | –           | > 106/mm3   |
| Hb               | 14.7            | 14.4        | 14.1        | –           | g/dL          |
| Ht               | 42.5            | 40.8        | 41.6        | –           | %             |
| Mcv              | 102*            | –           | 102.2*      | –           | fl            |
| Mch              | 36              | –           | 34.6*       | –           | pg            |
| Mchc             | 34              | –           | 33.8        | –           | g/dl          |
| Esr 1h           | 8               | –           | mm          | –           |               |
| Platelets        | 395000          | 410000      | 389000      | –           | mm3           |
| Wbc              | 12200*          | 10100*      | 10100       | –           | mm3           |
| Neutrophils      | –               | 30          | 41          | –           | %             |
| Lymphocytes      | –               | 56          | 55          | –           | %             |
| Monocytes        | –               | 7           | 7           | –           | %             |
| Eosinophil       | –               | 2           | 2           | –           | %             |

SGPT: Serum Glutamic Pyruvic Transaminase; Sgot: Serum Glutamic Oxaloacetic Transaminase; CRP: C-reactive protein; RBC: Red Blood Cell; ESR: Erythrocyte Sedimentation Rate; Hb: Hemoglobin; Hct: Hematocrit; MCV: Mean Corpuscular Volume; MCH: Mean Corpuscular Hemoglobin; MCHC: Mean Corpuscular Hemoglobin Concentration; LDH: Lactate Dehydrogenase; Wbc: White Blood Cell.

* Values not within normal range.
Discussion

Despite the fact that most adults infected with COVID-19 have symptoms, most infected children have no symptom or some mild symptoms that could make diagnosis difficult [5]. As was seen in this case, the newborn first had very mild symptoms that developed within a few days and resulted in the isolation. In the case of a 6-month-old infant case with COVID-19 in Singapore [6], the infant had no suspicious symptoms other than a transient temperature of 38.5 degrees Celsius and the rRT-PCR for all pathogens were negative on admission day. Then test of blood samples and stool specimen was positive for COVID-19 on day 2 and 9 of admission respectively. Another study of 5 neonates and an infant 2 months of age with COVID-19 in France revealed that patients had mild symptoms and at least fever on admission, like our patient [7].

The definitive diagnosis of the disease is using the RT-PCR or genetic sequence isolated from throat swab or blood samples [4] but there is also the possibility of false-negative cases using the RT-PCR. In this case, based on the strong clinical suspicion of COVID-19, the second RT-PCR test was repeated [8] that its result was positive. In a study by Xiaotong W. et al. [9], despite the negative result of the RT-PCR on the first day, the CT-Scan of chest showed a ground-glass opacity (GGO) in the right lung. The throat swab was repeated two days later and then the RT-PCR result became positive [9].

COVID-19 has nonspecific clinical manifestations; hence, its initial diagnosis and suspicion depend on epidemiological factors, such as definitive contact with infected people and recent travel to infected areas within the past 14 days [4,10]. In a study by MinWei et al. in China [10], among 9 infants under one year of age infected with COVID-19 at least a member of their family was infected. This case has not been in contact with anyone other than the family and clinical staff during the first 18 days of life there was no suspicious sign of COVID-19 neither in mother nor neonate during the delivery. The hypothesis on the transmission of virus from the family remains ambiguous because the interval between first sign in the neonate and test in the family members is longer than the incubation period and no tests have been performed on hospital staff. Family sampling was not possible at the beginning of the neonate's hospitalization due to the lack of laboratory kits and sampling facilities in the beginning of epidemic.

Conclusion

In our patient, who was an 18-days-old Iranian neonate girl suspected with COVID-19, RT-PCR test of Nasopharynx swab was negative for the first specimen on 29 February and then the second specimen was positive on March 12. Any way clinical signs and symptoms plus chest CT-scan are more reliable than RT_PCR test for the diagnosis of COVID-19 in this case.

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Authors’ contributions

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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