Neonatal and Pediatric Medicine
ISSN: 2572-4983
Ahmad, Neonat Pediatr Med 2023, 9:6
Review Article
Open Access

Pediatric Patients with Moderate Signs and Symptoms of Disease may Develop Unrelated Dengue

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Abstract

The number of children infected with the 2019 novel coronavirus disease caused by severe acute respiratory syndrome coronavirus surged amid the outbreak of the Omicron strain. Dengue fever has been reported in severe cases of COVID-19 and in children and neonates with multisystem inflammatory syndrome. Dengue fever is recognized as one of the manifestations of MIS, but so far there have been few overview reports. We retrospectively analyzed four infants younger than 3 months with infection who were treated at our institution during the outbreak of the Omicron strain. Most of the patients were in good condition, but dengue fever was observed in all four cases. Dengue fever may also be observed in infant patients with mild symptoms. The clinical course should be carefully monitored and the patient should be monitored.

Keywords: Early infantile; Dengue; Multisystem inflammatory syndrome

Introduction

Novel coronavirus disease 2019 (COVID-19), caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), was first reported in Wuhan, China. Early reports suggest that children are less likely to become infected and may have fewer symptoms after infection [1]. However, this situation has changed with the advent of more virulent strains. As the number of children infected increases, the number of severe cases also increases, and it is recognized that the new coronavirus infection is a threat to children. The 2022 Omicron outbreak infected a large number of children and increased the number of patients requiring medical care, including hospitalization. Additionally, reports from Europe and the United States showed that in May 2020, some children with a history of COVID-19 had persistent fever, rash, lymphadenopathy, diarrhea, and elevated inflammatory biomarkers. was reported to show symptoms similar to Kawasaki disease. Ferritin, CRP, D-dimer, etc [2]. This condition is called childhood multisystem inflammatory syndrome (MIS-C). Although MIS-C is recognized in pediatric cases, there are still few reports of cases in early infancy known as neonatal MIS (MIS-N). Despite the need for appropriate treatment, there are no reports yet describing the general clinical course of preterm infants, including mild cases, and the laboratory tests that should be monitored [3].

We previously experienced a case in early infancy in which symptoms rapidly deteriorated 4-5 days after onset. The incident involved a 15-day-old boy. He was admitted to our hospital because of fever and malnutrition. Blood tests on his admission showed no obvious abnormal findings [4]. His respiratory status had not worsened, but he continued to have fever and increased peripheral chills. A chest X-ray and a blood test were performed on the 7th hospital day. Radiographs showed evidence of pneumonia, and blood tests showed results suggestive of hypercytokinemia. After witnessing this case in an infant at the beginning of the novel coronavirus disease (COVID-19) outbreak in Japan, we investigated an early infant case within 3 months of age due to maxillary a detailed follow-up and multiple COVID-19 blood tests were conducted [5]. Dyspnea or dyspnea, even if mild, with fever and decreased food intake or activity. Therefore, we were able to obtain data on the general clinical course of preterm infants, including mild cases [6].

This study reports four cases of COVID-19 in preterm infants who presented with mild symptoms, no evidence of MIS-C/MIS-N or dyspnea, but elevated serum markers of MIS, including ferritin.

Record patient characteristics such as age, weight, sex, prenatal information (gestational age, birth weight, maternal vaccinations during pregnancy, diet), symptoms (fever, cough, runny nose, anorexia), laboratory data. Blood tests were performed at admission and approximately 4–5 days after admission [7]. The patient's background and course, and the results of blood tests performed were examined based on previous reports. Patient data were collected retrospectively via electronic records at the Japanese Red Cross Society Ishinomaki Hospital. A written declaration of consent was obtained from the legal guardian. These four of her patients were enrolled from January 2022 until he May. Approval was obtained from the Ishinomaki Red Cross Hospital Ethics Committee [8].

Cases

A 38-day-old girl was admitted to our department complaining of SARS-CoV2 infection, nasal discharge, and cough. She was born by vacuum delivery at 41 weeks' gestation and her birth weight was 3348 g. During the first few days of her oxygen therapy, she exhibited transient tachypnea, but she was discharged without further complications. Her mother had not received the SARS-CoV2 vaccine during pregnancy. When she was 30 days old, a relative who later tested positive for SARS-CoV2 visited her family [9]. Two days later, she developed a runny nose and cough. SARS-CoV2 PCR results were positive for her 4 days before she was hospitalized. The patient slept poorly because her nasal discharge increased. On the day of her admission, her oxygen saturation (SpO2) was 92-94%. On physical examination, the patient weighed 4488 g. She had a temperature of 36.5°C, a room air SpO2 of

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Received: 01-June-2023, Manuscript No: nnp-23-102200; **Editor assigned:** 07-June-2023, Pre-QCNo: nnp-23-102200(PQ); **Reviewed:** 21-June-2023, QCNo: nnp-23-102200; **Revised:** 23-June-2023, Manuscript No: nnp-23-102200(R); **Published:** 30-June-2023, DOI: 10.4172/2572-4983.1000315

Citation: Ahmad R (2023) Pediatric Patients with Moderate Signs and Symptoms of Disease may Develop Unrelated Dengue. Neonat Pediatr Med 9: 315.

97%, a heart rate of 130-140 beats/min, and no respiratory distress. She had no crackling or wheezing on auscultation. Her chest X-ray showed no signs of pneumonia, bronchiolitis, or heart failure. Even without the above specific symptoms, a blood test revealed an elevated aspartate transaminase (AST) level (146 IU/L). Alanine transaminase (ALT), 87 IU/L; lactate dehydrogenase (LDH), 370 IU/L. and ferritin, 570ng. After her admission, the patient's general condition worsened slightly. On day 10 after initiation (day 4 of hospitalization), her general condition and blood work improved [10].

AST, 91 IU/L; ALT, 82 IU/L; LDH, 300 IU/L; ferritin, 368 ng/ml. The patient was discharged on her 11th day, and on her 20th day her outpatient clinic blood test results continued to improve. AST, 68 IU/L; ALT, 53 IU/L. LDH, 313 IU/L; ferritin, 286 ng/ml.

A 54-day-old girl was hospitalized with pale stools due to SARS-CoV-2 infection. She was born at the 41st week of gestation with a birth weight of 2830g. Her mother had received two doses of SARS-CoV2 vaccine late in her pregnancy. No abnormalities were noted during the perinatal period or at 1-month follow-up. Thirty-six days after she gave birth, her mother tested positive for SARS-CoV2. Her mother and daughter were separated at home and the infant was switched from breastfeeding to formula feeding. On the first day, she had a positive PCR test result for SARS-CoV2, which turned her stool grey. On her admission, the patient appeared well and had no difficulty breathing or feeding. Blood tests showed a normal biliary system and normal liver enzymes, but elevated serum ferritin levels as follows.

Total bilirubin (0.6 mg/dL), gamma-glutamyl transpeptidase (63 IU/L), AST (73 IU/L), ALT (68 IU/L), LDH (254 IU/L), ferritin (398 ng/ ml). She was coughing, but her general condition was good. She was observed to have no worsening of her laboratory values on day 4 and her stools had returned to normal. On day 5, the patient was discharged, and on day 12, outpatient blood tests showed improvement.

Discussion

The novel coronavirus disease (COVID-19) epidemic began in February 2020 and by June 2022 has caused nearly 9 million infections and 31,000 deaths. In the early days of the epidemic in Japan, among hospitalized cases, 1,038 pediatric patients with COVID-19 did not require positive pressure ventilation management and only 2.1% required oxygen administration. Additionally, 17 of 1038 (1.6%) patients were younger than 3 months of age. However, the number of pediatric cases increased after the outbreak of the Omicron strain, which is more contagious than previous strains. Children under the age of five are generally reported to have mild symptoms. Newborns, on the other hand, have more severe symptoms than infants. As our hospital is the only pediatric inpatient facility in the region, most children who require hospitalization for SARS-CoV-2 infection come to us. Criteria for admission included underlying medical conditions, onset before 3 months of age, and other difficulties with home care. In our region, the Omicron strain was first confirmed in January 2021, and the number of pediatric cases requiring hospitalization has increased in recent months. Although none of the cases in this study had genomic analysis performed to identify the causative strain, they all occurred during a pandemic caused by the Omicron strain. In our case, most of the patients were well, with fever, upper respiratory symptoms such as runny nose and cough, gastroenteritis, and malnutrition, but progressive hypoxemia and apnea attacks. I had no proof. At a time when Japan had previously had no confirmed cases of COVID-19 in newborns, no patient experienced a worsening of symptoms after hospitalization due to the acceptance of "excessive triage" of symptoms and laboratory findings. In contrast, dengue fever was observed in all four cases, more frequently than previously observed in patients <21 years of age. Serum ferritin levels peaked 5–7 days after onset, but there was no concomitant elevation of WBC, CRP, AST, ALT, or LDH. In most cases, symptoms resolved within 2-4 days of onset, regardless of ferritin levels. Additionally, transaminase elevations were observed in 2 of 4 cases. In both cases, the initial blood test reading was the highest and improved over time.

SARS-CoV-2 has been reported to be present in monocytes of COVID-19 patients. Because serum ferritin is secreted by macrophages after induction by inflammatory cytokines, its levels may be a more sensitive marker of acute inflammatory responses in COVID-19 than in other viral infections. Furthermore, it has been suggested that ferritin itself acts as a proinflammatory cytokine that activates nuclear factor kappa B. Therefore, ferritin induced by inflammatory cytokines may further induce the production of inflammatory cytokines. Moreover, elevated ferritin levels may be partially due to desaturation in these children.

Conclusion

We carefully observed four mildly symptomatic patients who had slightly elevated ferritin or other markers of inflammation, and found that unless clinical laboratory data showed progressive deterioration within 1 week of onset, , which is usually found to exhibit a steady state. If dengue fever is observed in an infant COVID-19 patient, the clinical course should be closely monitored.

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