



Acute COVID-19 Case with Myocardial Involvement in Adolescent with Two-Dose mRNA Vaccination

ABSTRACT

COVID-19 infection usually causes mild symptoms in children. Mortality and morbidity of the disease have decreased with the widespread use of vaccines. COVID-19 vaccines are generally known to protect against the disease and its complications. In this case report, a thirteen-year-old patient who came to the pediatric emergency department with chest pain, received two doses of BNT162b2 (Pfizer-Biontech), and was diagnosed with acute COVID-19-associated myocarditis is presented. With this case, it was emphasized that it may be necessary to make vaccination reminder doses at shorter intervals in order to evaluate those with chronic diseases separately from healthy children and to maintain effective protection against COVID-19.

Keywords: COVID-19, myocarditis, vaccine

Although respiratory system findings are usually at the forefront of coronavirus disease 2019 (COVID-19) in children, other system findings are also frequently seen. Cardiac involvement is critical among the extrapulmonary systems, and mortality rates have been reported to be higher in these patients. SARS-CoV-2 can affect the heart primarily or secondarily. It causes damage to myocytes directly via angiotensin-converting enzyme 2 (ACE-2) receptors or indirectly by triggering hypoxia or systemic inflammation (1-3). Cardiac involvement rates associated with COVID-19 in childhood have been reported between 0.6-29% (3-5). Although cardiac involvement may be seen in children during the active period of COVID-19 or in multisystem inflammatory syndrome in children (MIS-C) associated with COVID-19, with appropriate treatment, results are good and long-term sequelae haven't been reported (5).

In this case report, a thirteen-year-old patient who came to the pediatric emergency department (PED) with chest pain, received two doses of BNT162b2 (Pfizer-Biontech), and was diagnosed with acute COVID-19-associated myocarditis is presented.

CASE

A thirteen-year-old male patient previously diagnosed with type 1 diabetes mellitus (DM) and Hashimoto's thyroiditis was admitted to the PED with complaints of chest pain and fever. Chest pain started four days ago and increased with effort. The patient was vaccinated with two doses of BNT162b2 (Pfizer-Biontech), the last dose of which was 130 days ago. Vital signs at admission were heart rate 125/min, blood pressure 110/70 mmHg, body temperature 38.4°C, and respiratory rate 20/min. Cardiovascular system and other system examinations were normal. The patient's posterior anterior chest X-ray and electrocardiography (ECG) were normal, and the troponin I value was 1.92 ng/mL (N: <0.059 ng/mL). Oropharyngeal-nasopharyngeal swab was taken from the patient for respiratory viral panel polymerase chain reaction (PCR). No other pathogen was detected except SARS-CoV-2 positivity. COVID-19 IgG result was 145 IU/mL (positive).

The patient was isolated in the pediatric infection service after the COVID-19 PCR test was positive. Three hours later, a repeated troponin I test showed elevated levels (2.88 ng/mL). The patient's echocardiography (ECHO), performed with the preliminary diagnosis of acute myocarditis, was normal except for minimal insufficiency with a flow velocity of 2 m/sec

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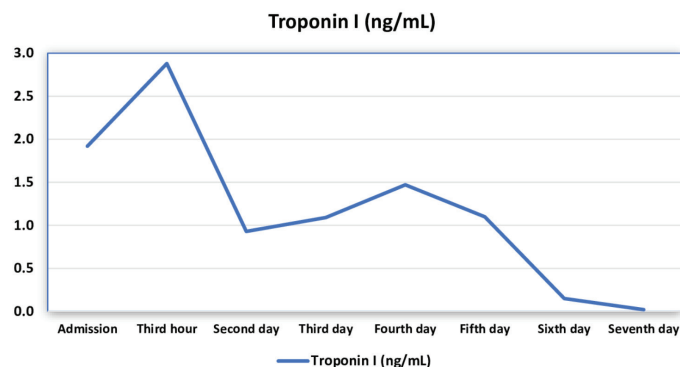


Figure 1. Patient's troponin I values.

in the tricuspid valve. The patient was hospitalized and followed up with a cardiac monitor, rhythm evaluation with ECG, and daily troponin I control performed every 12 hours (Figure 1).

The patient, whose complaints regressed, was discharged on the 7th day of follow-up. When he came for the control on the 20th day after discharge, he had no active complaints and his repeated ECHO was also normal. Informed consent was obtained from the parent and child.

DISCUSSION

In this case report, we present a 13-year-old male patient who was vaccinated with 2 doses of BNT162b2 (Pfizer-Biontech) and was diagnosed with active COVID-19-associated acute myocarditis, who presented to the PED with symptoms of chest pain and fever.

COVID-19 infection usually causes mild symptoms in children. Extrapulmonary involvement is less common in children than in adults. It has been reported that approximately 16% of children with active COVID-19 have cardiac involvement and only 12.5% of them have high-sensitivity cardiac troponin T elevation (5). Myocarditis is usually diagnosed by means of established histologic criteria, but this has not been the case in patients with COVID-19. Therefore, myocarditis should be considered in patients with COVID-19 who have acute heart failure, cardiogenic shock, myocardial dysfunction, or elevated Tn levels without coronary ischemia (1). COVID-19-related myocarditis in children usually has a good prognosis (5). Our patient's chest pain resolved after bed rest, his repeated ECHO was normal, and the patient was discharged with full recovery on the 7th day of hospitalization.

Cases of myocarditis associated with COVID-19 vaccines have been reported in the literature. Especially after mRNA vaccines, the risk of myo/pericarditis is high in boys aged 12-17 years and usually presents on the 2nd day after vaccination (6). Our patient was vaccinated with 2 doses of BNT162b2 (Pfizer-Biontech) and the last dose was administered approximately 4.5 months ago. Therefore, it was thought that myocarditis was not related to the vaccine. Because no other pathogen was detected in the respiratory tract PCR test, active COVID-19-associated acute myocarditis was considered in the patient.

In diseases affecting the immune system, the risk of severe COVID-19 is higher than in healthy individuals, even if the case is fully vaccinated (7). Thyroid hormones are effective in regulating the innate immune response, and it has been shown that those

with thyroid disease have higher proinflammatory cytokine levels than healthy individuals. Therefore, the risk of severe SARS-CoV-2 infection increases in thyroid patients (8). COVID-19 is also more severe in patients with DM (9). In a study comparing the efficacy of the Pfizer-BioNTech vaccine in adult patients with Type 2 DM with the control group, it was stated that a strong immune response was observed in both groups; however, the antibody level of the group with DM was found to be lower than the group without DM (10). Our patient was previously diagnosed with type 1 diabetes mellitus (DM) and Hashimoto's thyroiditis. Despite being vaccinated, the course of COVID-19 infection with cardiac involvement may be related to comorbidities. The patient's chronic diseases affecting the immune system (Type 1 DM and Hashimoto's thyroiditis) may have reduced the effectiveness of the vaccine.

Centers for Disease Control and Prevention data showing the efficacy of the vaccine in children aged 12-17 with normal immunity showed that 2 doses of the Pfizer-BioNTech vaccine provided a high level (>90%) protection against COVID-19-related hospitalizations within 149 days after the second dose (11). It is important that our patient presented with active COVID-19-related cardiac involvement only 130 days after the last dose of the vaccine. This suggests that in the presence of chronic diseases affecting the immune system, it may be necessary to review the vaccine dose intervals and to monitor the antibody responses.

CONCLUSION

COVID-19 infection usually causes mild symptoms in children. Mortality and morbidity of the disease have decreased with the widespread use of vaccines. COVID-19 vaccines are generally known to protect against the disease and its complications. Here, a case of active COVID-19 with cardiac involvement despite two doses of the BNT162b2 vaccine is presented. With this case, it was emphasized that it may be necessary to make vaccination reminder doses at shorter intervals in order to evaluate those with chronic diseases separately from healthy children and to maintain effective protection against COVID-19.

Informed Consent: Written informed consent was obtained from the patients who agreed to take part in the study.

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