Recurrence of Acute Myocarditis Temporally Associated with Receipt of the mRNA Coronavirus Disease 2019 (COVID-19) Vaccine in a Male Adolescent

Prashant K. Minocha, MD[1], Donna Better, MD[2], Rakesh K. Singh, MD, MS[1], and Tasneem Hoque, MD[2]

We report a case of a 17-year-old male adolescent with a recurrence of acute myocarditis 4 months after an initial episode of acute myocarditis negative for severe acute respiratory syndrome coronavirus 2 and 48 hours after receiving his second dose of the Pfizer-BioNTech coronavirus disease 2019 messenger ribonucleic acid vaccine.

See related articles p 5, p 26, and p 317

The Pfizer-BioNTech coronavirus disease 2019 (COVID-19) messenger ribonucleic acid (mRNA) vaccine has an efficacy of 95% at preventing severe COVID-19, with a low reported incidence of serious adverse events during phase 2/3 global clinical trials.[1] On December 11, 2020, the US Food and Drug Administration (FDA) issued an Emergency Use Authorization for the Pfizer-BioNTech vaccine for the prevention of COVID-19 in persons 16 years of age and older. On May 10, 2021, the FDA issued an Emergency Use Authorization for the Pfizer-BioNTech vaccine for persons 12-16 years of age.[2] We describe a case of an adolescent male patient who had recurrence of acute myocarditis temporally associated with receipt of a second dose of the Pfizer-BioNTech mRNA COVID-19 vaccine.

Case Presentation

A 17-year-old male adolescent with no significant medical history came to medical attention in January 2021 with chest pain consistent with myocarditis. Serum troponin level peaked at 5.06 ng/mL (normal <0.04 ng/mL). Cardiac magnetic resonance imaging (cMRI) showed 2 small areas of delayed gadolinium enhancement of the left ventricular myocardium (Figure 1). Electrocardiogram (EKG) showed diffuse ST-segment changes. Respiratory viral pathogen panel polymerase chain reaction (PCR) testing including severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) as well as SARS-CoV-2 nucleocapsid IgG and IgA was negative. He received supportive care and was discharged after 6 days of hospitalization with normal cardiac testing, including serum troponin, EKG, and echocardiogram at 2-week follow-up. On April 15, 2021 he received his first dose of the Pfizer-BioNTech COVID-19 mRNA vaccine without any side effects noted.

One day after receiving the second dose of the Pfizer-BioNTech COVID-19 mRNA vaccine on May 7, 2021, he developed fever (T_{max} 101.3°F) and body aches that responded to acetaminophen. The following day, he developed sudden onset of severe, burning left-sided chest pain that radiated to the left shoulder and the upper left arm. He reported that the chest pain worsened with exertion and movement and was similar to that experienced during his previous episode of myocarditis. He denied any other symptoms.

The patient presented to our emergency department hemodynamically stable; however, EKG revealed diffuse ST-segment elevations. Initial laboratory test results showed a serum troponin of 2.3 ng/mL, C-reactive protein of 29 mg/L (normal 0-5 mg/L), and erythrocyte sedimentation rate of 5 mm/h (normal <15 mm/h). Respiratory pathogen panel PCR testing including SARS-CoV-2 was negative. SARS-CoV-2 nucleocapsid IgG and IgA were negative and SARS-CoV-2 IgM antibody for the spike protein was positive, consistent with recent immunization. Rheumatologic testing including antinuclear antibody test and rheumatoid factor was negative.

He was admitted to the pediatric intensive care unit for telemetry and observation. Initial echocardiogram revealed normal biventricular systolic and diastolic function and no evidence of regional wall motion abnormalities or an effusion. Telemetry revealed occasional isolated premature ventricular contractions. Troponin peaked at 51.37 ng/mL. cMRI showed low normal left ventricular ejection fraction (53%), trivial pericardial effusion, and sub-epicardial late gadolinium in the same distribution as seen in the previous episode but with interval increased enhancement (Figure 2). His chest pain improved with nonsteroidal anti-inflammatory drug treatment and supportive care, and he was discharged after 6 days of hospitalization. At the

CDC	Centers for Disease Control and Prevention
cMRI	Cardiac magnetic resonance imaging
COVID-19	Coronavirus disease 2019
EKG	Electrocardiogram
FDA	Food and Drug Administration
mRNA	Messenger ribonucleic acid
PCR	Polymerase chain reaction
SARS-CoV-2	Severe acute respiratory syndrome coronavirus 2

From the [1]Division of Pediatric Cardiology, Hassenfeld Children's Hospital, NYU Langone; and [2]Division of Pediatric Cardiology, NYU Long Island School of Medicine, Mineola, NY

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