Cardiology in the Young

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A paediatric case of myopericarditis post-COVID-19 mRNA vaccine

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Brief Report

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Abstract

Myopericarditis is a condition, which primarily involves the pericardium, with minimal myocardial involvement. In myopericarditis, chest pain, elevated cardiac enzymes, and electrocardiographic changes occur. Although COVID-19 mRNA vaccines significantly contribute to preventing the COVID-19 disease, rarely myocarditis and/or pericarditis may develop due to these vaccines. We present a previously healthy 14-year-old male patient who developed myopericarditis after receiving the second dose of the COVID-19 mRNA vaccine.

The incidence of myopericarditis in children is unclear. Pericarditis and myocarditis usually occur together because their etiologic agents are the same.[1] Many cases may be subclinical; cardiac symptoms and signs may be obscured by systemic manifestations of viral infection. It is sometimes difficult to distinguish the chest pain that occurs in myopericarditis from ischaemic pain.[2] Pericarditis is diagnosed by typical chest pain, the sound of pericardial friction, and diffuse ST changes. If cardiac enzymes are elevated in patients presenting with chest pain, coronary pathology, myocarditis, or myopericarditis should be considered.

COVID-19 mRNA vaccines (Pfizer-BionTech and Moderna) have shown excellent efficacy in the clinical trials conducted in adults less than a year after the COVID-19 virus was identified. Rare cases of myocarditis and pericarditis have been reported in the United States since April, 2021, particularly in adolescents and young adults, after the mRNA COVID-19 vaccination.[3] Therefore, these complications must be kept in mind. We aimed to contribute to the literature by presenting a case who presented with chest pain and diffuse ST elevation on electrocardiography and was diagnosed with myopericarditis due to COVID-19 mRNA vaccine.

Case report

A 14-year-old male patient with no previously known disease was admitted to the emergency department of our hospital with chest pain that woke him up at night. The chest pain started after the second dose of BNT162b2 COVID-19 mRNA vaccine he received 3 days ago, and his pain was reducing when bending over and increasing when lying down. When the patient applied to our emergency department, his vital signs were stable.

Diffuse ST elevation was present in his electrocardiography (Heart rate 88/minute, PR interval 0.16 seconds, QTc: 0.39 seconds, diffuse ST elevation, on day 1, negative T wave on day 3, normal Electrocardiography (ECG) findings on day 5) (Fig 1a, b and c); in his examinations, white blood cells were detected as 13 × 10e3/ul, C-reactive protein as 8.3 mg/dl (normal: 0–0.5), troponin as 10.991 ng/L (normal: 0–11.6), creatine kinase-MB fraction as 52.25 ng/ml (normal: 0.6–6.3), and NT-proBNP as 176 pg/ml (normal: 70–133). The nasopharyngeal SARS-CoV-2 PCR test was negative. Chest radiography and echocardiography results were normal. In the selective coronary angiography performed for diagnostic purposes, no pathology was detected in the left and right coronary arteries (Fig 2a and b). Non-steroidal anti-inflammatory drugs and gastroprotective therapy were started. Restriction of physical activities was recommended. The chest pain resolved after 1 day, and the cardiac markers decreased: troponin to 3683 ng/L, creatine kinase-MB fraction to 6.44 ng/ml. The patient was hospitalised and followed up for a week. One week later, the patient had normal cardiac enzymes, no pathological ECG findings, and no complaints; he was discharged with non-steroidal anti-inflammatory drug treatment and recommended to come for follow-up the next week.

Discussion

Myopericarditis primarily means pericarditic syndrome and is responsible for the majority of cases. Contrarily, perimyocarditis primarily means myocarditic syndrome. Elevated cardiac enzymes reflect myocardial lesions. Cardiac enzymes elevate in both pericarditis and myocarditis. Classical diagnostic criteria for acute pericarditis include typical chest pain, pericardial friction sound, diffuse ST segment elevation, PR depressions, and pericardial effusion.[4] The

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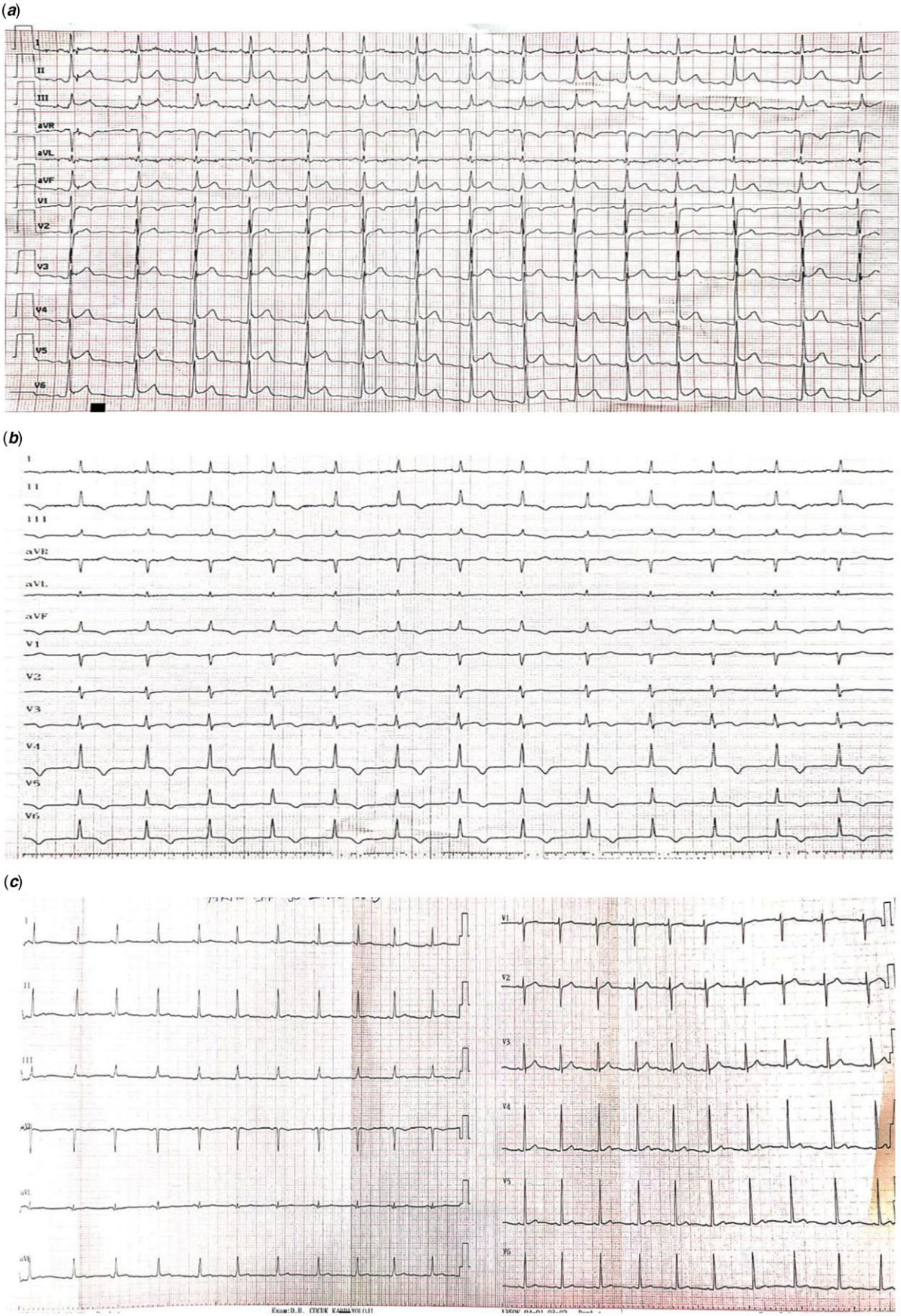

Figure 1. (***a***): Diffuse ST elevation, (***b***): negative T waves, (***c***): normal ECG.

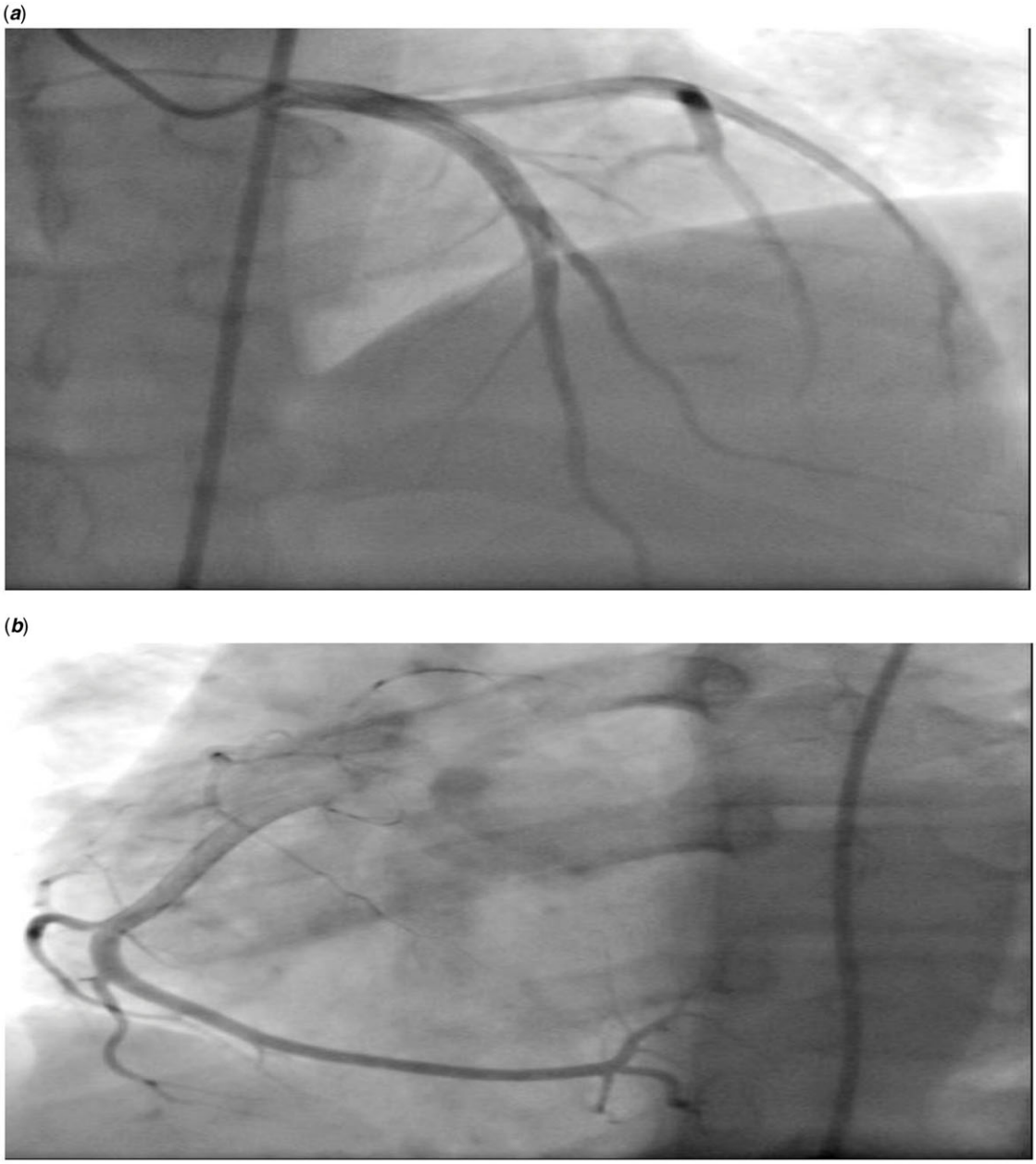

Figure 2. (***a***): Normal left coronary artery, (***b***): normal right coronary artery.

clinical diagnosis of myopericarditis can be confirmed by detection of elevated serum cardiac enzyme levels (creatine kinase-MB fraction or troponin) or new-onset focal or diffuse left ventricular function depression.[5] Symptomatic patients with myopericarditis may have fatigue, reduced exercise capacity, palpitations secondary to cardiac arrhythmias, and pleuritic chest pain. In most patients, symptoms are similar to pericarditis. High markers of inflammation, such as C-reactive protein, should always be investigated to confirm the clinical suspicion. Acute pericarditis or myopericarditis are severe inflammatory diseases; therefore, C-reactive protein positivity is expected.

In myopericarditis, ST segment elevation on ECG at admission is more common than in acute pericarditis (approximately 90%). Localized ST elevationand T wave inversion before ST segment normalisation are atypical ECG findings. In the absence of overt myocardial failure, the management of myopericarditis is similar to acute pericarditis; in low-risk cases of acute pericarditis, outpatient treatment is recommended.[6]

COVID-19 mRNA vaccines (Pfizer-BionTech and Moderna) have shown excellent efficacy in terms of safety and clinical efficacy in the clinical trials conducted in adults less than a year after the COVID-19 virus was identified. The American Academy of Pediatrics (AAP) and the American Heart Association (AHA) approved the recommendations of the Centers for Disease Control and Prevention (CDC), reiterating that the potential benefits of the COVID-19 vaccine outweigh the risks of rare post-vaccine myocarditis or pericarditis, and recommended the COVID-19 vaccine for everyone over 12 years of age.[7]

Post-vaccination myocarditis was first reported after the smallpox vaccination in 1957.[8] Increasing cases of myocarditis

and pericarditis have been reported in the United States since April, 2021, particularly in adolescents and young adults, after the mRNA COVID-19 vaccination.[3] In a study, it was confirmed by the CDC that after 322 million doses of COVID-19 vaccines, 79 children aged 16–17 years and 196 young adults aged 18–24 years had myocarditis and/or pericarditis.[9] The US military reported 23 cases of myocarditis and/or pericarditis after 2.8 million doses of COVID-19 mRNA vaccine.[10]

In the evaluation of 29 cases that developed myocarditis and/or pericarditis due to mRNA COVID-19 vaccine, it was found that 13 patients were under the age of 18 years, while the other patients were over the age of 18 years. All of the patients were male.[11]

The risk of cardiac complications associated with SARS-CoV-2 infection is much greater than the risks associated with the vaccine.

Although myopericarditis often develops due to viral infections or autoimmune mechanisms, rarely it may develop after vaccination. It was determined that myocarditis and/or pericarditis developed at a higher rate in the COVID-19 mRNA vaccine than in the non-mRNA COVID-19 vaccines. We would like to state that especially after the second dose of the COVID-19 mRNA vaccine, reactions such as myocarditis and/or pericarditis may develop, but the vaccine should not be abandoned due to these side effects, because it is our most important weapon under current conditions. In the light of our current knowledge, everyone over the age of 12 years should be vaccinated, but both healthcare professionals and the public should be aware of the very rare complications of vaccines, which respond well to treatment.

Authors' contributions. MT and AA: Concept, patient management, radiosurgery, manuscript writing, review, critical evaluation, submission; MD and CA: Patient management, critical evaluation ofmanuscript; MT: Patient management, critical evaluation of manuscript, endocrinological management; AA, and CA: patient management; MD, and CA: Radiology support, patient management; MT and MD: Patient management, literature review; MT: Literature review and administration support. AA: will act as guarantor for this paper.

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Conflicts of interest. None.

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