CLINICAL IMAGE

Myocarditis associated with COVID-19 vaccination in three male teenagers

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COVID-19 is a serious worldwide healthcare issue mostly due to a lack of population immunity, high infectivity, and numerous mutations. Vaccinations are crucial for controlling the spread of COVID-19 and their benefits outweigh the potential risks of usually mild adverse events. However, myocarditis was reported in some vaccine recipients.[1,2]

Three previously healthy males (17 years old) were admitted to our hospital due to a sudden chest pain. The symptom occurred shortly (1–10 days) after vaccination with BNT162b2 vaccine (Supplementary material, *Table S1*). On admission, troponin levels were significantly elevated in all patients, with peak concentrations on the first day, and C-reactive protein was elevated in one of the patients. B-natriuretic peptide, creatine kinase, and white blood cell count were all within the reference range. Twelve-lead electrocardiography (ECG) showed negative T waves in the inferior leads and flat T waves in V6 in one of the patients but no abnormalities were observed in the 2 remaining patients (FIGURE 1A). On echocardiography, all patients had normal global and regional systolic function with the ejection fraction (EF) above 60%, and no pericardial effusion was found. Computed tomography of the coronary arteries was performed in one of the patients and it did not reveal any pathological changes. Cardiac magnetic resonance (CMR) carried out within 5 to 10 days since the symptom onset indicated that cardiac function was normal (EF 55%–60%), and no myocardial edema was observed. However, late gadolinium enhancement (LGE) showed a myocarditis-like pattern in all patients (FIGURE 1B and 1C). One of the patients exhibited pericardial effusion with pericardial enhancement on the LGE sequences (FIGURE 1D). All patients had negative real-time polymerase chain reaction tests for common cardiotropic viruses and SARS-CoV-2. However, antibody testing revealed high titers of immunoglobulin (Ig) G and IgA against the SARS-CoV-2 spike protein in all 3 patients. Based on the clinical presentation, a diagnosis of myocarditis associated with COVID-19 vaccination was made. Bed rest and thromboprophylaxis with enoxaparin were ordered. A complete resolution of the symptoms and troponin level normalization were observed within a few days, and all the patients were discharged home.

Recent data show that the risk of myocarditis in patients vaccinated against COVID-19 is 3 times higher than in the nonvaccinated ones.[1,2] Male adolescents are affected more than female teenagers, and myocarditis is more likely to develop following the second dose.[2] However, in our report, 2 patients developed the symptoms after the first dose of the vaccine. In a majority of papers published so far, the diagnosis of myocarditis was based on CMR and the modified Lake Louise Criteria.[3,4] In our case, CMR showed no signs of edema in any of the patients, which might indicate a milder course of the disease. However, a longer observation period is required to confirm this. The specific mechanism of COVID-19 vaccine–induced myocarditis and individual predispositions to cardiovascular events remain unknown. All our patients had a high titer of anti–SARS-CoV-2 antibodies (measured 12–23 days after the vaccination). The published data usually indicate only a modest increase in IgA antibodies after the vaccination.[5] Some authors reported higher anti spike protein IgA antibodies in males than in females. A possible correlation between IgA antibody concentration and susceptibility to postvaccination myocarditis requires further investigation.

SUPPLEMENTARY MATERIAL

Supplementary material is available at www.mp.pl/paim.

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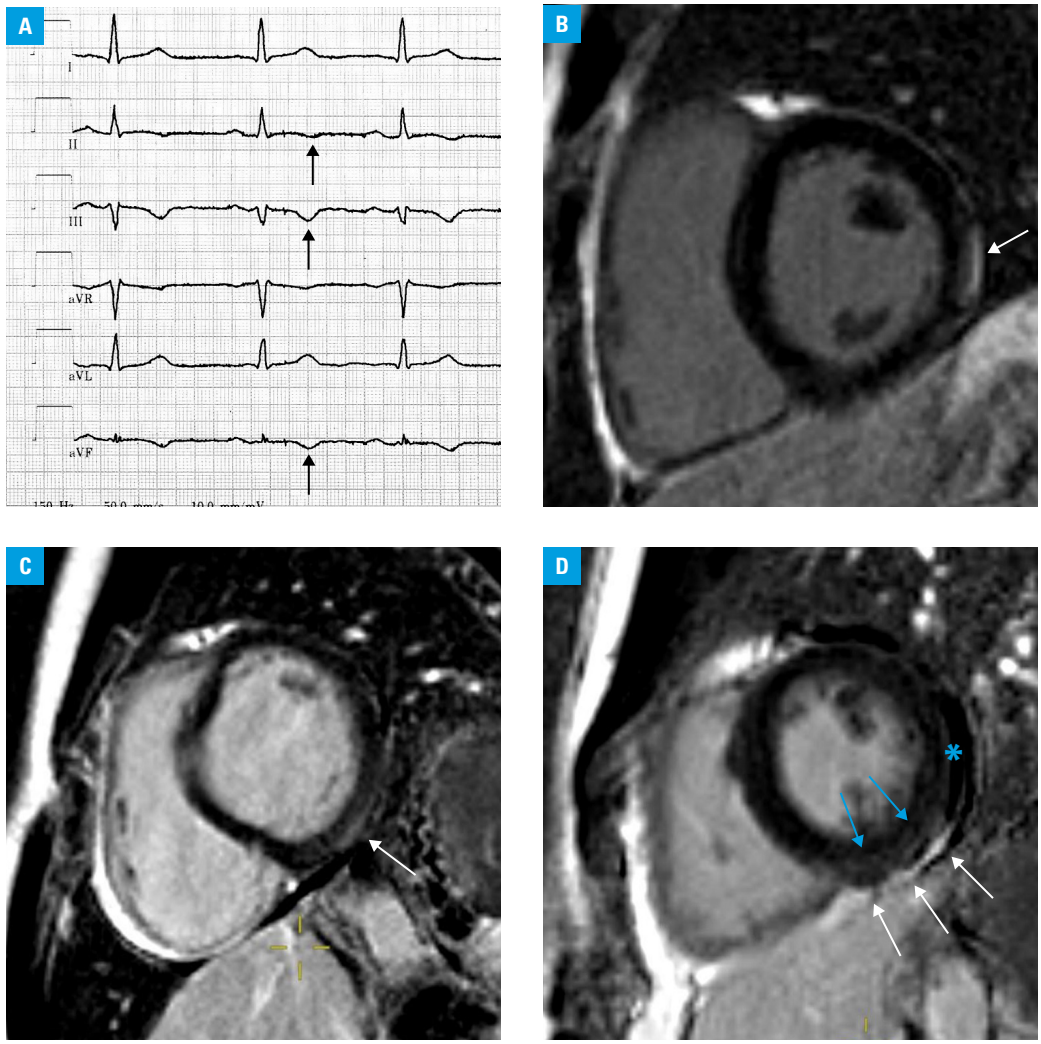

FIGURE 1 **A** – electrocardiography, negative T waves in inferior leads (black arrows); **B** – cardiac magnetic resonance (CMR), subepicardial fibrosis (arrow); **C** – CMR, subepicardial fibrosis (arrow); **D** – CMR, pericardial fibrosis (white arrows), diffuse myocardial fibrosis (blue arrows), and pericardial effusion (asterisk)

ARTICLE INFORMATION

CONFLICT OF INTEREST None declared.

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