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Recurrent MRI-documented myocarditis following Pfizer-BioNTech SARS-CoV-2 vaccination

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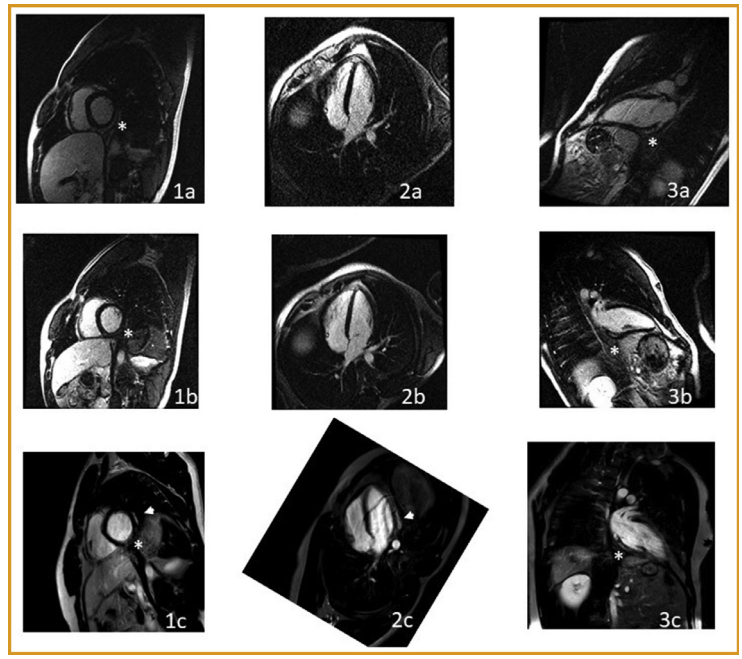

FIG. 1.

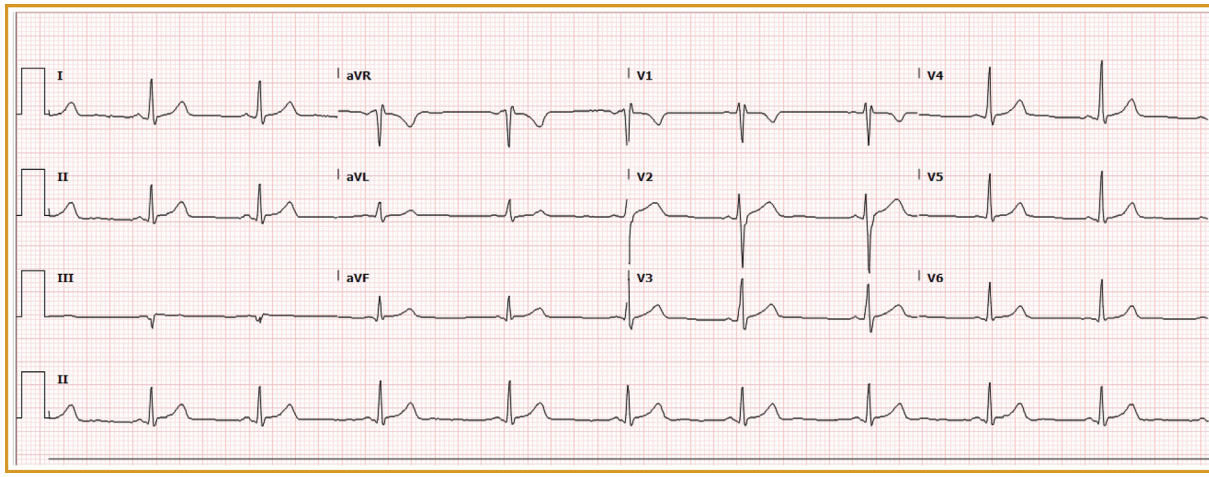

FIG. 2.

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We report the case of a 23-year-old Caucasian man with a history of myocarditis diagnosed clinically and by cardiac magnetic resonance imaging (MRI) in 2017, showing inferior/inferolateral scar in the epicardium (asterisk, Fig. 1, Column 1a-b, 3a-b). Though no serology was obtained, the etiology was thought to be viral. Four years later, he re-presented complaining of a 2-day history of sharp, substernal chest pain. It was exacerbated by exertion and lying flat. He denied recent illnesses, sick contacts, or prior SARS-CoV-2 infection. He had received his second dose of the Pfizer-BioNTech SARS-CoV-2 vaccine three days prior to symptom onset.

Resting EKG revealed ST segment elevations in V2-V3 with concave T-waves and no PR segment depression (Fig. 2). ST segment elevations were less pronounced compared to an EKG from outside hospital several hours before. Troponin-I levels peaked at 6.795 ng/mL. C-reactive protein level peaked at 4.845 mg/dl. His white blood cell count and differential were within normal limits. His aspartate transaminase was elevated at 62 U/L with a normal alanine transaminase. A bedside transthoracic echocardiogram demonstrated preserved left ventricle (LV) systolic function, normal LV cavity size and wall thickness, normal wall motion, and no pericardial effusion. His coronary angiography revealed no significant disease. Work-up for viral etiology, excluding Echovirus and Coxsackievirus which were not tested, was negative. Other than a positive antinuclear antibody, rheumatologic studies were negative. He was diagnosed with recurrent myocarditis.

Repeat cardiac MRI revealed a new area of late gadolinium enhancement of the basal anterolateral wall restricted to the epicardium (arrow) seen on short axis (Fig. 1, Column 1c) and 4-chamber views (Fig. 1, Column 2c). Residual old scar of the basal inferior and inferolateral wall (involving the epicardial myocardium) was visualized (asterisk). The LV ejection fraction on cardiac MRI was 56%, like his cardiac MRI in 2017. Six months later, a repeat cardiac MRI showed an ejection fraction of 64%. However, the LV had new hypokinesis of the mid-inferior and inferolateral segments.

We suspect the etiology of his recurrent myocarditis was incited by his Pfizer-BioNTech SARS-CoV-2 vaccination. Cases of myocarditis following SARS-CoV-2 vaccination have been reported. In one study, the monthly rate of first-time diagnosis of myocarditis increased from pre-vaccination months.[1] The CDC has now recognized an elevated risk of myocarditis in recipients of the mRNA SARS-CoV-2 vaccines.[2] Our case is unique as our patient had recurrent MRI-documented myocarditis following his second Pfizer-BioNTech SARS-CoV-2 vaccination in contrast to previous reports of subjects with an initial diagnosis of myocarditis.[1]

The mechanism by which myocarditis occurs post-vaccination remains unclear. One hypothesis suggests that specific triggers may result in autoimmune inflammation of the myocardium.[3] Although the target of autoantibodies is uncertain, we suspect that the SARS-CoV-2 vaccine functioned as the trigger resulting in recurrent myocarditis in our patient.

This case should not deter vaccination in patients with a history of myocarditis. The risk of myocarditis after vaccination has yet to be shown to outweigh the benefits. Further research should identify subgroups that may or may not benefit from SARS-CoV-2 vaccination.

DECLARATION OF COMPETING INTEREST

The authors report no conflicts of interest related to this material. The authors affirm that this is original work and is not being considered for publication elsewhere. All authors contributed to manuscript creation and editing. We have no disclosures of sources of funding.

CREDIT AUTHORSHIP CONTRIBUTION STATEMENT

Philip Bucur: Writing – original draft. **Corey Smith:** Writing – original draft. **Wael AlJaroudi:** Writing – review & editing. **Adam E. Berman:** Writing – original draft.

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