



Cardiothoracic Imaging

Acute myocarditis after a second dose of the mRNA COVID-19 vaccine: a report of two cases

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ABSTRACT

We report two cases of myocarditis, in two young and previously healthy individuals, temporally related to the second dose of the mRNA-COVID-19 vaccine. Both patients developed acute chest pain, changes on electrocardiogram (ECG), and elevated serum troponin within two days of receiving their second dose. Cardiac magnetic resonance (CMR) findings were consistent with acute myocarditis.

1. Introduction

Myocarditis encompasses a broad range of immune processes that may cause functional and/or structural abnormalities in the myocardium. The majority of cases of myocarditis result from viral infections. Non-infectious etiologies of myocarditis are rare and have been reported with systemic inflammatory conditions and after drugs and vaccinations.¹ While myocarditis after vaccination has been reported in the literature, establishing causality remains elusive.² There have been a few reports of myocarditis after the mRNA COVID-19 vaccine.^{3–5} Herein, we report two cases of myocarditis occurring after the second dose of the mRNA COVID-19 vaccine.

2. Case description

2.1. Case 1

A previously healthy 25-year-old man presents to the hospital after receiving the second dose of the mRNA-1273 SARS-CoV-2 immunization (Moderna). On the first day after the second dose the patient developed subjective fever and chills. Six hours after the onset of fevers, the patient noticed substernal chest pain and as result reported to the hospital. His physical examination revealed a fever of 39.1 °C, blood pressure of 129/75 mmHg, pulse of 76 bpm, a respiratory rate of 20, and oxygen saturation of 98% on room air. An electrocardiogram (ECG) revealed diffuse

mild concave ST elevations with no reciprocal changes. Initial laboratory evaluation showed an elevated troponin I of 14 ng/mL (normal <0.032 ng/mL), an elevated C-reactive protein (CRP) of 25 ng/mL (normal 0–0.5 ng/mL), and erythrocyte sedimentation rate (ESR) of 25 mm/h (normal <15 mm/h). Nasopharyngeal SARS-CoV-2 PCR was performed twice and was negative; the patient also denies any history of infection with COVID-19. The patient was admitted and underwent coronary angiography that showed normal coronary arteries. An echocardiogram showed normal function and no significant valvular disease; ejection fraction was 55%. Troponin levels continued to rise, peaking at 20.4 ng/mL on hospital day 2 and declined to 9.5 ng/mL by the time of discharge on the morning of hospital day 3, at which point his chest pain had resolved.

The patient was referred for cardiac magnetic resonance imaging (MRI) to evaluate for myocarditis. Cardiac MRI (Fig. 1) was performed on a 3-T scanner [Magnetom Vida, Siemens Healthcare] six days after the second dose of vaccine. Cine images showed normal left ventricular function. Short axis (A) and four-chamber long axis (B) post-contrast inversion recovery images showed subepicardial late gadolinium enhancement in the anterolateral wall of the mid and apical left ventricle. Short axis native T1 (C) and T2 (E) maps showed corresponding increased T1 (1450–1550 ms; normal: 1100–1300) and T2 (54–60 ms; normal: 40–50⁶) signal intensity, respectively. Measured T1 (D) and T2 (F) values of the normal intraventricular septum was 1200–1300 and 43–46 ms, respectively. Per the 2018 Lake-Louise

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