

Recurrent mRNA (BNT162b2) Covid-19 Vaccine-Associated Pericarditis in an Elderly Man with Multiple Comorbidities

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Received August 03, 2021; Revised September 05, 2021; Accepted September 13, 2021

Abstract Myocarditis and pericarditis are known adverse effects from mRNA Covid-19 vaccines and are seen in young men usually after the second dose of vaccine. We report a case of recurrent pericarditis in a 67 year old man with history of diabetes and chronic kidney disease that occurred with both vaccine doses, with the second episode associated with interval development of small pericardial effusion and moderate pleural effusion. Patient did not seem to have concomitant myocarditis as he did not have any troponin leak. He was managed with colchicine and prednisone with resultant improvement of his inflammatory markers on follow up.

Keywords: pericarditis, Covid-19 vaccine, recurrent pericarditis, pericardial effusion

Cite This Article: Angel Goenawan, Frank Kussaga, Kenneth Schwartz, and Seema D'Souza, "Recurrent mRNA (BNT162b2) Covid-19 Vaccine-Associated Pericarditis in an Elderly Man with Multiple Comorbidities." *American Journal of Medical Case Reports*, vol. 9, no. 12 (2021): 709-713. doi: 10.12691/ajmcr-9-12-12.

1. Introduction

Almost 4 billion people worldwide have received at least one dose of a COVID vaccine. With the rise in vaccination coverage there has been an increase in adverse events reported to the Vaccine Adverse Event Reporting System (VAERS). As of April 2021, increasing cases of myocarditis and pericarditis seen after mRNA COVID-19 vaccines have been reported through the VAERS, the majority of the cases are seen among male adolescents and young adults. We report a case of pericarditis related to mRNA (BNT162b2) Covid-19 Vaccine in an elderly man with chronic comorbidities.

2. Case Description

A 67 year old man with a history significant for hypertension, diabetes, hyperlipidemia, and chronic kidney disease stage IV/V presented with a substernal chest pain that woke him up from sleep, described as sharp pressure, radiated to the back, with 6/10 intensity, associated with shortness of breath and increased intensity with deep breathing. There was no change in pain intensity with position change. Aspirin and nitroglycerin provided only partial relief. He reported that he never had chest pain like this before. He was physically active. Social history is notable for a former smoker with a

40-pack year history who quit 4 years ago. On exam, he was afebrile, with a pulse of 61, blood pressure (BP) 176/83 mmHg, respiratory rate 20 and saturating 97% on room air, he was in no acute distress, neck without elevated jugular venous pressure, lung was clear to auscultation, heart was regular with grade 1-2/6 systolic murmur on left sternal border and leg without any swelling. EKG showed ectopic atrial rhythm, multiple premature atrial complexes (PACs), left ventricular hypertension (LVH), and prolonged QTc interval (Figure 1). Echocardiogram showed normal LV size, function, and systolic function, with ejection fraction (EF) of 55-60%, mild-moderate tricuspid regurgitation without any pericardial effusion (Figure 2). Laboratory study was significant for WBC 12.3/cumm, hemoglobin 10.8 g/dl, D-dimer 370 ng/dl, BUN 63 mg/dl, creatinine 4.6 mg/dl, magnesium 1.5 mg/dl, troponin i 0.04 ng/dl and 0.06 ng/dl, and pro-BNP 25.000 pg/dl. Ventilation perfusion scan (V/Q scan) showed low probability of pulmonary embolism. Initial chest X-Ray (CXR) showed no acute cardiopulmonary finding but repeated CXR revealed small bilateral pleural effusion with mild hazy opacities in left lower lobe. He was treated initially as unstable angina and given aspirin, statin and intravenous heparin. Intravenous heparin was eventually discontinued as pain was more pleuritic and was not consistent with ischemic chest pain. After 2 days, his chest pain improved and the patient was discharged home with outpatient follow up.

2 weeks later, he came back with complaints of a similar sensation of chest pain for 3 days. This was

accompanied by a dry cough that exacerbated the chest pain. Deep breathing and positional change also aggravate the pain with associated dyspnea on exertion. He reported that he had his second mRNA Covid-19 vaccine (BNT162b2) dose 3 days prior and upon further questioning he also had his first vaccine 5 days prior to the onset of the first chest pain. On exam BP 127/62 mmHg, pulse 54, RR 16, and temperature 98.2 with 97% saturation on room air, he was comfortable and in no acute distress, neck without elevated jugular venous pressure, chest was clear to auscultation, heart was regular with known systolic murmur and friction rub was heard on left sternal border. Laboratory study was significant for WBC 11.9/cumm, hemoglobin 9.7 g/dl, BUN 81 mg/dl, creatinine 5.0 mg/dl, troponin 0.03 ng/ml, CRP > 9.0 mg/dl, ESR 94 mm and pro-BNP 12.800 pg/ml.

Additional autoimmune panel was ordered, with negative ANA, RF, hepatitis C and HIV screening. EKG showed sinus bradycardia with LVH and repolarization abnormality (Figure 1). Repeated echocardiogram showed interval development of a small pericardial effusion (Figure 2). CXR revealed enlarged cardiac silhouette and increasing bilateral pleural effusions and atelectasis. Further imaging with chest CT without contrast showed moderate bilateral pleural effusions with dependent atelectasis, and cardiomegaly with moderate pericardial effusion (Figure 3). Blood culture was negative. His symptoms were suggestive of pericarditis, likely of inflammatory origin, with temporal correlation with his mRNA covid-19 vaccine. He was treated with colchicine and prednisone with clinical improvement. Follow up CRP 2 weeks after treatment was 2.3 mg/dl.

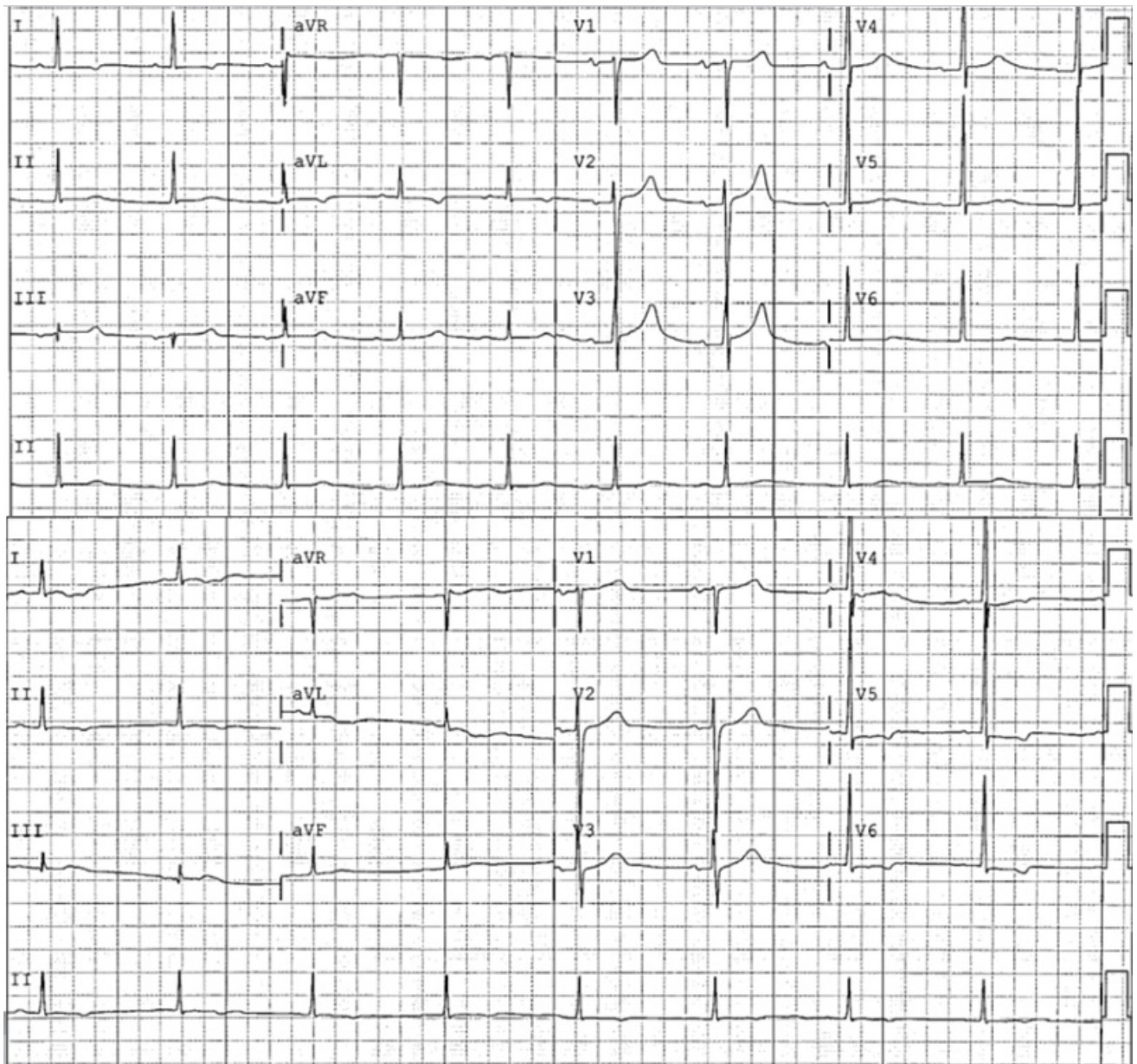


Figure 1. EKG (top 4/13/21): sinus rhythm with prolonged PR interval, probable left atrial abnormality, LVH and non-specific T wave abnormalities on lateral leads. (bottom 5/1/21): sinus bradycardia, probable left atrial abnormality, LVH with repolarization abnormality, borderline prolonged QTc interval, minor change from previous tracing

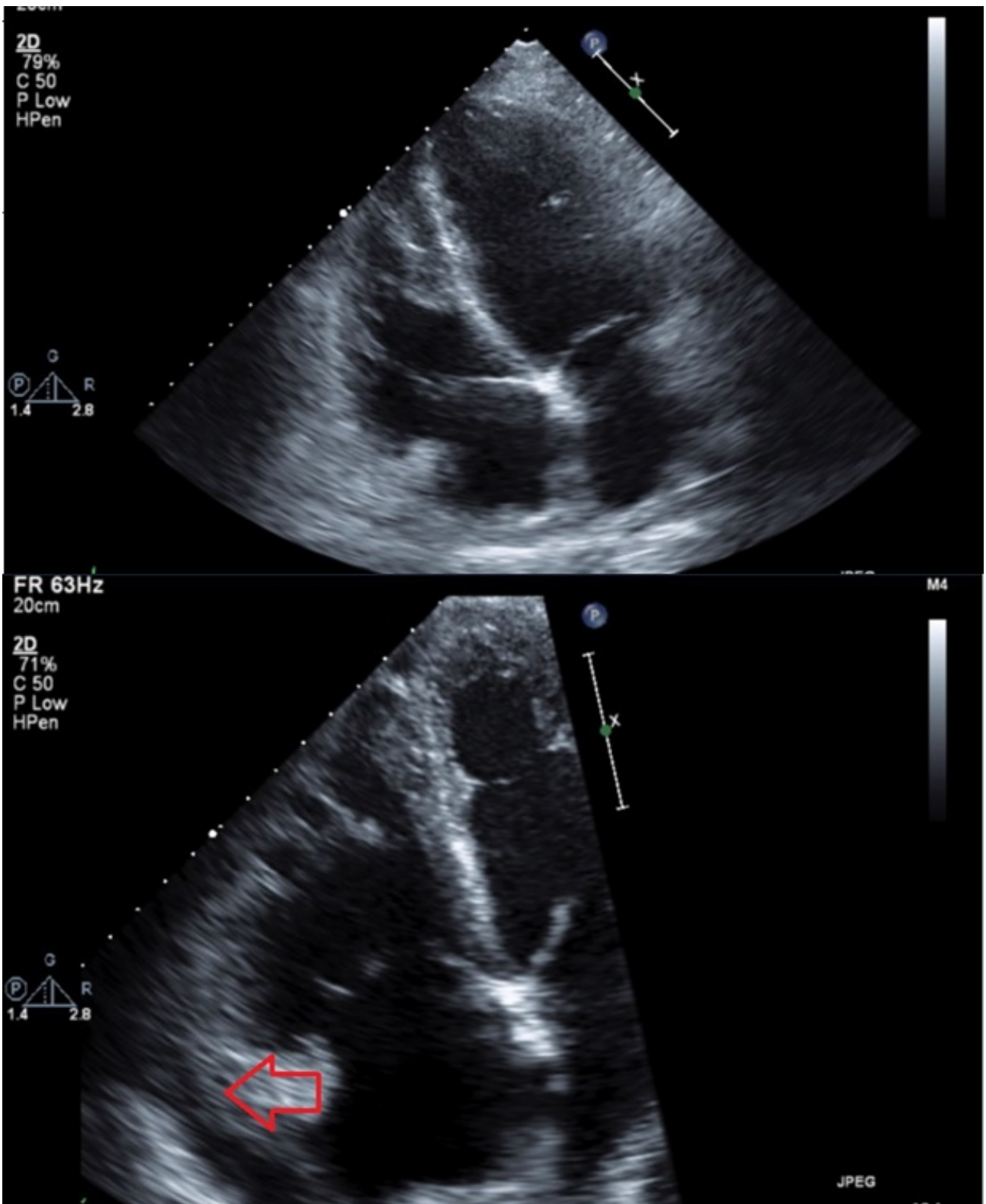


Figure 2. Transthoracic echocardiogram subcostal 4 chamber view. Top image without effusion and bottom image showed interval development of small pericardial effusion on the right ventricle wall (red arrow)

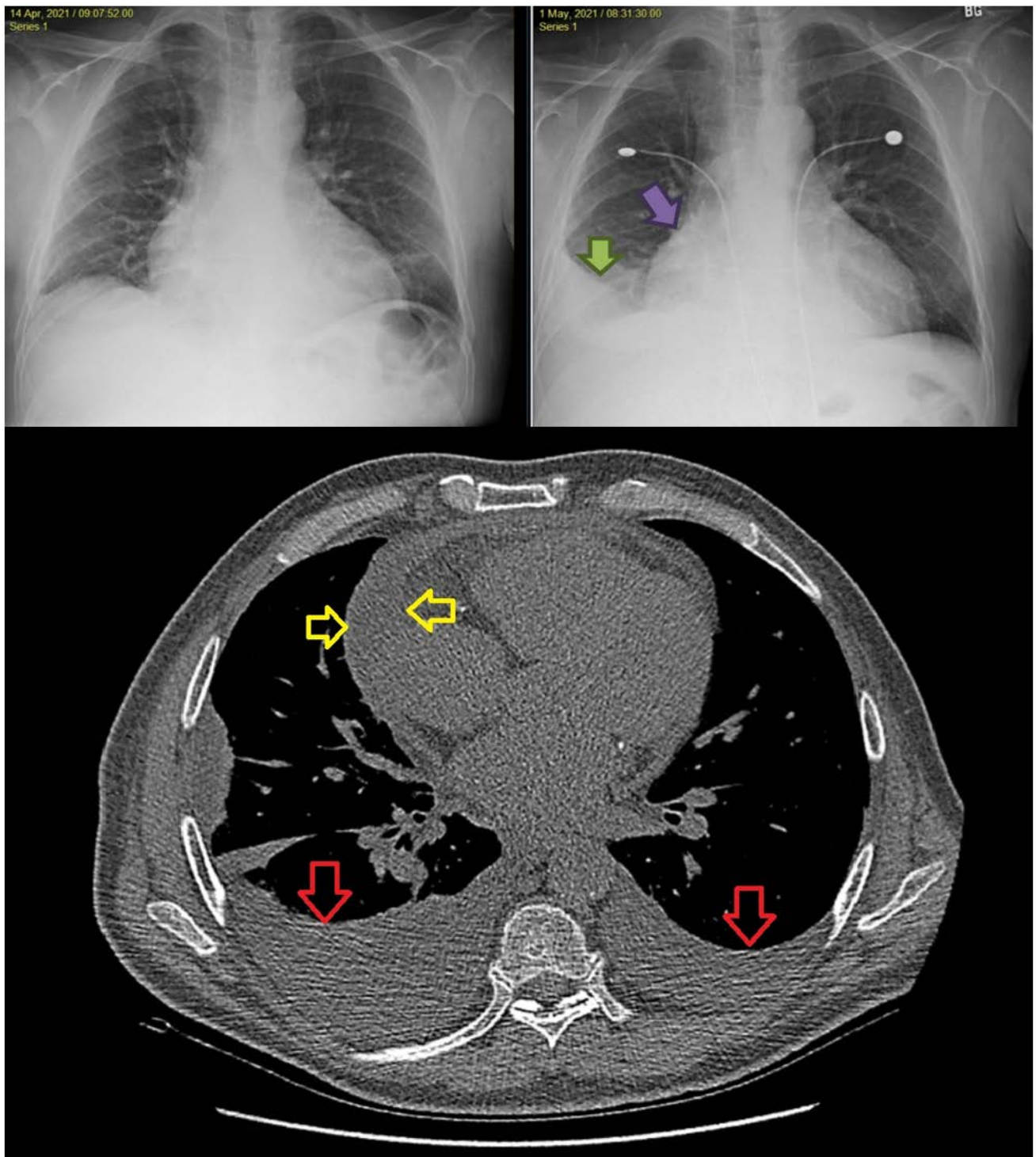


Figure 3. Chest radiograph images from 4/14/21 (top left panel) showed linear, hazy opacity in the left lower lobe and small bilateral pleural effusions. Chest radiograph from 5/1/21 (top right panel) showed enlarged cardiac silhouette (purple arrow) and increasing bilateral pleural effusions and bilateral lower lobe atelectasis or small infiltrates, right greater than left (green arrow). CT chest image (bottom panel) reveals the presence of cardiomegaly and moderate pericardial effusion (yellow arrows). There are also moderate bilateral pleural effusions (red arrows)

3. Discussion

With more than 190 million people infected worldwide with SARS-CoV-2 and over 4 million death tolls, it was necessary to create and distribute safe and effective vaccination to curb the pandemic. FDA has approved emergency use authorization of 3 available vaccines in the US, starting on December 11th, 2020 with the first m-RNA vaccine, Pfizer-BioNTech Covid-19 Vaccine

(BNT162b2) for adults aged 16 years or older. This was followed shortly by Moderna Covid-19 Vaccine (mRNA-1273) on December 18th, 2020 for use in individuals aged 18 or older. The last approved vaccine was Janssen Covid-19 Vaccine on February 27th, 2021 for individuals aged 18 or older. [1]

The SARS-CoV2 has trimetric spike protein on the outer membrane of the virus and using biophysical assays, Wrapp et al. studied that this protein binds at least 10

times more tightly to the host cells than the corresponding spike protein of the previous SARS-CoV. These studies proved to provide valuable information on key targets for potential therapies and diagnostics. [2] The first developed mRNA vaccines include both BNT162b2 Vaccine and mRNA-1273. BNT162b2 vaccine is a lipid nanoparticle-formulated, nucleoside-modified RNA that encodes the SARS-CoV2 full-length spike. [3] In the expedited multinational, placebo-controlled, observer-blinded, clinical efficacy and efficacy trial, a total of 43,548 participants aged 16 years or older were randomized to receive two doses of vaccine, 21 days apart with results of 95% efficacy and relatively low side effects profile. Reported short-term effects include mild-moderate pain at the injection site, fatigue and headache and serious adverse events were low and comparable between the two groups. [3]

Our patient had an atypical chest pain, described as sharp, pleuritic in nature however without worsening pain with positional changes, typical ECG changes nor friction rub on initial presentation, making it harder to establish the diagnosis of pericarditis. However, on his second hospitalization, there was a notable change in his clinical symptoms and findings. He had more of a typical pericarditis chest pain, with friction rub heard on examination, and new evolving pericardial effusion on imaging. Pericarditis is a clinical diagnosis that can be established with fulfillment of at least 2 out of 4 criterias. He does not seem to have concomitant myocarditis as he presented without shortness of breath, significant EKG changes, imaging study of focal or diffuse depressed LV function or elevated cardiac enzymes.

We were not convinced that his diagnosis of pericarditis is related to uremia, as it is highly unusual that the level of uremia of 80 would cause pericarditis like in this patient, especially in the presence of elevated inflammatory markers. Moreover, the pericarditis has a more likely temporal timeline relation with administration of both mRNA Covid-19 vaccines. CDC has released its warning of myocarditis or pericarditis being reported as a rare side effect following mRNA vaccine administration more commonly following the second dose of vaccine, mainly in adolescent and young adults. However, the effects are usually mild and well-responded to medications and vaccinations are still encouraged to prevent Covid-19 infection. [4] A temporal relation between second BNT162b2 vaccine dose and development of myocarditis was reported in detail by Ammirati, et al. in a patient with previous SARS-CoV-2 infection. [5] Cardiac involvement is a highly-observed phenomena in Covid-19 infection. With the vaccine containing mRNAs that code spike

glycoprotein of the virus, it is possible that there is a certain immunogenic similarity between viral protein of SARS-CoV-2 and cardiac structure that cause injury. On the other hand, non-specific inflammatory reaction to the vaccine is also possible. [5,6]

This report adds valuable data to post-vaccination adverse events national database with documentation of isolated recurrent pericarditis with both doses of the BNT162b2 vaccine in a Covid-19 naive patient. This report also helps to confirm that administering the vaccine would still be relatively safe as the adverse event is relatively mild and responds well to treatment, even in the setting of an elderly man with multiple chronic comorbidities.

Funding Sources

All authors declare no source of funding in the writing of this case report.

Disclosures

All authors have nothing to disclose.

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