CASE REPORT

Case Report: Acute myocardial infarction with acute left ventricular failure and acute renal damage following mRNA-1273 vaccination: Possible adverse effect of COVID-19 vaccination? [version 1; peer review: awaiting peer review]


1Ibn Sina Medical College Hospital, Kallyanpur, Dhaka, 1216, Bangladesh
2Department of Public Health, North South University, Bashundhara, Dhaka, 1229, Bangladesh
3Public Health Professional Development Society (PPDS), Dhaka, 1215, Bangladesh
4Nutrition and Clinical Services Division (NCSD), International Centre for Diarrhoeal Disease Research, Bangladesh (icddr,b), Mohakhali, Dhaka, 1212, Bangladesh
5Infectious Disease Hospital, Mohakhali, Dhaka, 1212, Bangladesh
6Pi Research Consultancy Center, Bongshal, Dhaka, 1000, Bangladesh
7Institute of Statistical Research and Training (ISRT), University of Dhaka, Dhaka, 1000, Bangladesh

Abstract

Background: Evaluating potential vaccine side effects is often a prerequisite to combat the coronavirus disease 2019 (COVID-19) pandemic more effectively in a low-resource setting where herd immunity could be the most feasible option.

Case report: Here, we present, an 80-year-old man with multiple comorbidities was admitted into the coronary care unit at Ibn Sina Medical College Hospital (Dhaka, Bangladesh) with severe central chest pain and respiratory distress after receiving the first dose of Moderna vaccine on July 26, 2021. On admission, his blood pressure was 110/70 mmHg, pulse 90 beats/min, respiratory rate 22 breaths/min, temperature 36.7°C. He had a vesicular breath sound with bilateral basal crepitations and normal heart sounds. On the ECG, significant changes were observed. Other lab findings were significant troponin-I: 1.72 ng/ml, trace protein and glucose in the urine, total white blood cell count: 12820/cm³; HbA1c, 7.5%; serum creatinine, 1.56 mg/dl; serum electrolytes: sodium 133 mmol/L, chloride 92 mmol/L. The patient had a medical history of prior myocardial
infarction, diabetes mellitus, and hypertension but no chronic kidney disease, cerebrovascular disease, or bronchial asthma. After admission, he was treated conservatively with necessary medications and monitored periodically. The patient was diagnosed with acute myocardial infarction with left ventricular failure with acute kidney injury on chronic kidney disease with diabetes mellitus and hypertension. He was discharged from the hospital on day six with proper medicinal support with full recovery.

**Conclusions:** Though acute cardiac complications following COVID-19 vaccines are unusual, this case report can contribute to further molecular research to identify the possible role of vaccine compounds in triggering such complications among the general population.

**Keywords**

NSTEMI, Acute Renal Damage, COVID-19, Case Report, Moderna Vaccine

---

**Corresponding author:** Md. Utba Rashid (utba.rashid777@outlook.com)

**Author roles:**

- **Hossain MA:** Conceptualization, Data Curation, Formal Analysis, Funding Acquisition, Investigation, Methodology, Project Administration, Resources, Software, Supervision, Validation, Visualization, Writing – Original Draft Preparation, Writing – Review & Editing
- **Rashid MU:** Conceptualization, Investigation, Methodology, Supervision, Visualization, Writing – Original Draft Preparation, Writing – Review & Editing
- **Barsha SY:** Data Curation, Formal Analysis, Investigation, Methodology, Resources, Visualization, Writing – Original Draft Preparation
- **Khan MAS:** Conceptualization, Formal Analysis, Methodology, Software, Supervision, Validation, Writing – Original Draft Preparation
- **Haque MMA:** Data Curation, Formal Analysis, Investigation, Resources, Software, Validation, Writing – Original Draft Preparation
- **Rahman ML:** Funding Acquisition, Methodology, Project Administration, Supervision, Visualization, Writing – Review & Editing
- **Hossian M:** Investigation, Methodology, Resources, Software, Validation, Writing – Original Draft Preparation
- **Bhuiyan AM:** Conceptualization, Supervision, Visualization, Writing – Review & Editing
- **Nabi MH:** Conceptualization, Supervision, Validation, Visualization, Writing – Review & Editing
- **Hawlader MDH:** Conceptualization, Funding Acquisition, Project Administration, Resources, Supervision, Visualization, Writing – Review & Editing

**Competing interests:** No competing interests were disclosed.

**Grant information:** The author(s) declared that no grants were involved in supporting this work.

**Copyright:** © 2022 Hossain MA et al. This is an open access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

**How to cite this article:** Hossain MA, Rashid MU, Barsha SY et al. Case Report: Acute myocardial infarction with acute left ventricular failure and acute renal damage following mRNA-1273 vaccination: Possible adverse effect of COVID-19 vaccination? [version 1; peer review: awaiting peer review] F1000Research 2022, 11:617 https://doi.org/10.12688/f1000research.109496.1

**First published:** 06 Jun 2022, 11:617 https://doi.org/10.12688/f1000research.109496.1
Introduction
Coronavirus disease 2019 (COVID-19), a SARS-CoV-2 RNA virus-associated acute respiratory syndrome, arose in Wuhan, China, in December 2019 and spread rapidly throughout the world. Since its Initiation on March 24, 2021, it has affected 246,951,274 people and resulted in approximately 5,004,855 deaths (World Health Organization, 2022). For more than a year, experts worldwide have been confronted with significant challenges in their efforts to treat the disease. COVID-19 therapy research involved repurposing existing medications and the emergence of new treatments and vaccines. Approximately 24 COVID-19 vaccines have been granted emergency approval in various countries, including Comirnaty (BNT162b2), Moderna COVID-19 Vaccine (mRNA-1273), AstraZeneca COVID-19 Vaccine (AZD1222); also known as Covishield, Sputnik V, CoronaVac, BBIBP-CorV, EpiVacCorona, Convidicea (Ad5-nCoV), Covaxin (China) (COVID-19 Vaccine Tracker | RAPS, n.d.). Due to the critical necessity to halt the spread of COVID-19 infections, the traditional procedures for approving novel drugs/vaccines were unable to be completed. These vaccines were approved on an emergency basis before completing all three phases of clinical testing (Wouters et al., 2021). This is a compelling rationale to continue accumulating robust scientific proof for these vaccines by surveillance of adverse outcomes in the public following vaccination. Moreover, the in-depth analysis of the vaccine side effects will further bolster the government’s efforts towards minimizing vaccine myths as well as changing notions in accepting vaccines to curb this situation more tactfully (Haque et al., 2021; Hawlader et al., 2022).

On December 18, 2020, the Moderna COVID-19 vaccine received emergency authorization for use based on a robust phase three study data (Moderna COVID-19 Vaccine | FDA, n.d.). Moderna observed a 1% rate of major adverse events (Clinical Trial Data | Moderna COVID-19 Vaccine (EUA), n.d.). These significant adverse occurrences were classified as mortality, a life-threatening negative event, inpatient hospitalization, a chronic or considerable impairment in performing routine living functions, or a fetal anomaly or congenital disability (Moderna COVID-19 Vaccine | FDA, n.d.). Additionally, they reported no change in the number of thrombotic episodes between groups (Clinical Trial Data | Moderna COVID-19 Vaccine (EUA), n.d.). So far, there are just a few published reports of primary adverse responses (for Disease Control, 2020; Waheed et al., 2021). This case report discusses a possible severe bad reaction and examines whether a significant adverse reaction can be attributed to the COVID-19 vaccine.

Case report
After following all the protocols at an authorized vaccination center, an otherwise healthy 80-year-old man with a medical history of prior myocardial infarction (inferolateral), diabetes mellitus, and hypertension received the first dose of the Moderna vaccine on July 26, 2021.

A few hours after vaccination, the patient developed severe central chest pain with respiratory distress at night. The pain was sudden in onset, not relieved by glyceryl tri-nitrate spray, gradually increased, and continued for two days until admission to the coronary care unit (CCU) at Ibn Sina Medical College and hospital (Dhaka, Bangladesh), a tertiary care private hospital of Bangladesh. Previously, in 2012, the patient was diagnosed as a case of myocardial infarction (MI) with five blockages detected in three major coronary vessels on coronary angiography. But the patient didn’t consent for coronary artery bypass grafting due to his extreme age. Since then, he has been using glyceryl tri-nitrate 2–3 sprays daily to relieve angina (it varied depending on activities). He was also on regular medication, including a combined tablet (tab) of amlodipine and atenolol (5 mg + 50 mg) once daily for hypertension, injection insulin human 30/70 (18 units in the morning and 12 units at night) daily for diabetes mellitus, and a combined tab of aspirin and clopidogrel (75 mg + 75 mg) once daily for secondary prevention to prevent similar attacks. He took both anti-diabetic medications for 30 years and the other drugs for 20 years. He had no history of chronic kidney disease, cerebrovascular disease, or bronchial asthma. He was not an alcoholic, but he failed to cease smoking. (Patient’s attendant was told that he was a very irregular smoker, but the patient was elderly and couldn’t specify the amount.)

On admission, the patient’s blood pressure was 110/70 mmHg (normal range of blood pressure: less than 130/85 mmHg), pulse 90 beats/min (normal range of pulse rate: 60-90 beats/min), respiratory rate 22 breaths/min (normal range of respiratory rate: 12–16 breaths/min), temperature 36.7 °C (normal range of temperature: 36.1°C to 37.2°C). He had a vesicular breath sound with bilateral basal crepitations and normal heart sounds. A 12-lead ECG revealed right bundle branch block (tall R wave in v1) (Figure 1), deep Q waves (>1 mm) in leads II, III, aVF, v3–v6, T wave inversion in the lead II, III, v1, v3–v6. Other lab findings were significant troponin-I, 1.72 ng/ml; urine routine microscopy showed trace protein and glucose (normally, protein and glucose levels in urine should be zero); HbA1c, 7.5% (normal range: 4.5–6.2%); serum creatinine, 1.56 mg/dl (normal range for male: 0.60–1.30 mg/dl); serum electrolytes: sodium 133 mmol/L (normal range: 136–148 mmol/L), chloride 92 mmol/L (normal range: 96–107 mmol/L). The lipid profile and complete blood count reports showed normal findings except for a slightly elevated total white blood cell 12820/cm³ (normal range for adult: 4000–11000/cm³).
After admission, the patient was treated conservatively with injection (inj.) of enoxaparin (40 mg), inj. furosemide (20 mg), inj. actrapid (100 IU), tablet (tab) aspirin (75 mg), tab clopidogrel (75 mg), tab trimetazidine dihydrochloride modified release (35 mg), and tab ivabradine (5 mg).

On the second day, laboratory tests were significant for serum albumin (3.00 g/dl) (normal range: 3.40–5.00 g/dl). On day four after admission, echocardiography was done and showed mild concentric left ventricular hypertrophy, mild mitral regurgitation, and mild left ventricular systolic dysfunction (ejection fraction -48%).

After thorough investigation, the patient was diagnosed with acute left ventricular failure (Killip Class-II) with non-ST elevated myocardial infarction with acute kidney injury on chronic kidney disease with diabetes mellitus with hypertension and old myocardial infarction (inferolateral).

After five days of staying in the CCU, the patient improved gradually and was discharged with some medications such as human insulin 30/70 injection, tablet (tab) linagliptin (5 mg), combined tab of aspirin and clopidogrel (75 mg + 75 mg), tab rosuvastatin (20 mg), tab trimetazidine dihydrochloride (35 mg), tab carvedilol (6.25 mg), combined tab of furosemide and spironolactone (40 mg + 50 mg), combined tab of furosemide and spironolactone (40 mg + 50 mg) and follow-up advice after seven days with complete blood count, random blood sugar, serum creatinine, serum electrolytes, and serum albumin reports.

Discussion

The Centers for Disease Control (CDC) estimates that over 800,000 people suffer from MI each year (Fryar et al., 2012), with the incidence occurring at 33% or more in people aged 75 years or more (Yazdanyar & Newman, 2009). This case study examines an unfortunate case of recurrent MI with acute left ventricular failure (ALVF) with acute kidney injury (AKI) after receiving the first dose of the Moderna vaccine (mRNA-1273 SARS-CoV-19 vaccine) in an 80-year-old man who was diabetic, hypertensive, and had a previous history of MI (inferolateral). This incidence does not suggest that the COVID-19 vaccine is directly responsible for MIs, but could be a contributory cause by increasing the heart’s workload (Boivin & Martin, 2021).

After the initial trial of mRNA-1273 SARS-CoV-19 vaccine Moderna, typical side effects have been reported, such as a feeling of discomfort at the injection site (92%), exhaustion (70%), fever (15.5%), armpit swelling, or soreness (19.8%), and nausea and vomiting (23%) (Boivin & Martin, 2021). While these adverse effects were considered minor by Moderna, they could be significant stressors for older persons, particularly those with comorbidities. There was concern in Norway that vaccinations with the Pfizer (BNT162b2 mRNA COVID-19 vaccine) vaccine, another mRNA vaccine, were linked to increased mortality in older persons, with 23 fatalities. An inquiry into these deaths revealed that some of the above-mentioned side effects might have contributed to the ends of “frail patients” (Torjesen, 2021). Though not
common, a few cases of MI have been reported in the wake of the mRNA-1273 SARS-CoV-19 vaccine. According to Boivin et al., a 96-year-old woman in the United States had an MI one hour after receiving her first dose of Moderna COVID-19 (Boivin & Martin, 2021). Barsha et al. from Bangladesh reported a case of a 77-year-old man not having any traditional risk factors for heart diseases, who developed acute non-ST segment elevation myocardial infarction after two days of mRNA-1273 SARS-CoV-19 vaccination with Moderna (Barsha et al., 2021). According to the CDC, there have been more than 9,367 reports of mortality following the COVID-19 immunization, with no evidence of a relationship to the vaccine until November 5, 2021 (Selected Adverse Events Reported after COVID-19 Vaccination | CDC, n.d.). However, no research on any of these cases has been published, impeding our capability to understand the circumstances behind these fatalities. In India, few reports of deaths in the media due to cardiac arrest after vaccination came from Indian media. The first one occurred in a 43-year-old patient, while the other two occurred in two individuals aged 65 and 75 years (Kumar et al., 2021). But these patients had pre-existing cardiac problems; hence, according to the district and state adverse events following immunization (AEFI) committees, their deaths could be assumed to be coincidental to vaccination (Kumar et al., 2021).

There is not enough of a dearth of rigorously conducted scientific studies that could report proving a definitive link between COVID-19 immunization and MI. However, a possible link could be argued as vaccination can trigger inflammatory and immunological reactions and thrombosis, if a pre-existing prothrombotic condition is present (Greinacher et al., 2021). A study found 11 instances of unexpected thrombotic events and thrombocytopenia 5–16 days after an AstraZeneca immunization (ChAdOx1 nCoV-19 vaccine) (Greinacher et al., 2021). The majority of these (nine individuals) were healthy females with a median age of 36. They experienced thrombotic events such as cerebral venous thrombosis, splanchnic-vein thrombosis, pulmonary embolism, and other types of thrombosis. They found that all vaccinated individuals experienced immune thrombotic thrombocytopenia caused by platelet-activating antibodies against platelet factor 4 (PF4), which clinically resembled autoimmune heparin-induced thrombocytopenia.

Similarly, Scully et al. documented 23 venous thrombosis and thrombocytopenia events after receiving the first dose of the ChAdOx1 nCoV-19 vaccination (AstraZeneca). The median age of these individuals was 46 years, with the majority being female (60%). They also mentioned PF4-dependent thrombocytopenia as a cause of thrombotic events (Scully et al., 2021).

According to a systematic analysis of global risk factors for heart failure, ischemic heart disease was the most significant underlying contributor to acute heart failure admissions in more than 50% of patients in high-income regions and eastern and central European regions (Arrigo et al., 2020). Hypertension was also found to be a consistent factor of heart failure in 17% of patients of the world (Arrigo et al., 2020). Both of these factors were present in our case. These two risk factors might have influenced the development of acute left ventricular failure with MI following the recurrent attack of MI on the day of vaccination, which occurred coincidentally after COVID-19 vaccination.

Acute kidney injury is defined by a sudden decline in kidney function, evidenced by a rise in serum creatinine level with or without decreased urine output. Acute kidney injury is caused by several conditions, including advanced age, diabetes mellitus, and heart failure (Risch & Hess, 2013). In this case, multiple risk factors may have aggravated acute renal damage. In our case, a low blood volume following heart failure might have led to a sharp decline in kidney function, which subsequently recovered after management.

In this study we explored a case of acute MI with ALVF and critical renal damage AKI after mRNA-1273 SARS-CoV-19 vaccination Moderna COVID-19 vaccination in an elderly older patient with a history of previous MI, coronary artery disease, diabetes mellitus, and hypertension. It is natural to expect that older people with many comorbidities might be affected by potential side effects of vaccination against COVID-19 vaccinations’ possible side effects. However, as the patient had multiple comorbidities, we assume that MI with ALVF and acute renal injury might coincide and the event is less likely to be a consequent of COVID-19 vaccination. We acknowledge that a single case report or case series cannot attribute pathology to the vaccination causality of adverse events with the vaccine. Even large-scale investigations of possible AEFIs, such as those carried out using the Bangladesh government’s Suspected Adverse Event Reporting Form (Directorate General of Drug Administration (DGDA), 2021), can only uncover associations, not causation. Nevertheless, the current findings might increase public awareness of the possibility of a Moderna COVID-19 vaccine-related adverse event and motivate others to report similar cases wherever they arise. In summary, the findings of the current investigation of a critical and severe event following mRNA vaccination against COVID-19 should alert the international scientific community regarding the possibility of such events, particularly among vaccine recipients with multiple comorbidities or pre-existing ischemic heart disease.
Consent
Written informed consent for publication of the clinical details and images was obtained from the patient’s relatives as patient was not in a good physical state to give interview.

Data availability
All data underlying the results are available as part of the article and no additional source data are required.

Reporting guidelines

References
The benefits of publishing with F1000Research:

- Your article is published within days, with no editorial bias
- You can publish traditional articles, null/negative results, case reports, data notes and more
- The peer review process is transparent and collaborative
- Your article is indexed in PubMed after passing peer review
- Dedicated customer support at every stage

For pre-submission enquiries, contact research@f1000.com