A case report: symptomatic pericarditis post-COVID-19 vaccination

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Background
The Coronavirus disease 2019 (COVID-19) pandemic has led to the rapid development of COVID-19 vaccine. The Centers for Disease Control and Prevention (CDC) has recently reported increase in myopericarditis incidence post-COVID-19 vaccination. Post-vaccination myopericarditis as side effect has been reported, however, is infrequent. We described a case of pericarditis post-first dose of Pfizer-BioNTech vaccine.

Case summary
A patient presented with typical symptoms of pericarditis and related electrocardiogram and echocardiogram changes, 7 days post receiving the first dose of COVID-19 vaccine. No other causes were identified from series of investigations. Patient had good symptomatic relief with non-steroidal anti-inflammatory medication.

Discussion
The incidence of pericarditis post-vaccination is rare, with limited reporting in previous literatures. No causal relationship has yet to be established due to small number of cases. The benefits of COVID-19 vaccination currently outweigh the side effect profile and are recommended as the first-line approach to control the current pandemic.

Keywords
Case report • COVID-19 • Vaccine • Myopericarditis • Pericarditis

Learning points
- Inflammatory heart disease, including myocarditis and pericarditis, is an acknowledged side effect of mRNA type of COVID-19 vaccine.
- Majority cases of myopericarditis secondary to vaccination responded well with short course of anti-inflammatory therapy and minimal intervention.
- The Centers for Disease Control and Prevention (CDC) continues to recommend COVID-19 vaccine as myopericarditis incidence post-vaccination remains to be low and the benefits currently outweigh the risk; however, the decision should be patient-specific and includes multi-disciplinary discussion.

Introduction
The novel Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) infection was first identified in December 2019 and has since been declared as a global pandemic by the World Health Organisation (WHO). The overwhelming burden of Coronavirus disease 2019 or better known as COVID-19 has led to rapid development of the COVID-19 vaccine. The Pfizer-BioNTech and Moderna vaccines subtype were developed on the basis of modified messenger RNA that encodes the SARS-CoV-2 ‘spike proteins’, an important protein located on the outer surface of the virus.

The common side effects of the COVID-19 vaccine include fatigue, myalgia, headache, and local reaction. More serious side effects, such as severe allergic reaction, are seen in ~1 in 100,000 people. However, as these vaccines are relatively new, the documented long-
term side effects profile were limited.\(^3\) Inflammatory cardiac disease, including pericarditis and myocarditis post-vaccination, has been reported in multiple literatures; however, it remained as rare side effects of vaccination.

The Centers for Disease Control and Prevention (CDC) has recently reported the increase in cases of myocarditis and pericarditis after mRNA subtype of COVID-19 vaccination since April 2021 in the USA. Cases reported through the Vaccine Adverse Event Reporting System (VAERS) were mostly in male adolescents and young adults aged 16 years or older, and more often within several days after the second dose of COVID-19 vaccine.\(^4,5\)

In this report, we described a case of pericarditis following the first dose of Pfizer-BioNTech COVID-19 vaccine.

**Timeline**

| Date                  | Event                                                                 |
|-----------------------|-----------------------------------------------------------------------|
| 7 days prior to admission | Patient received first dose of COVID-19 vaccination (Pfizer-BioNTech). |
| Day 1 admission       | First symptoms of sharp, positional chest pain (worse on lying flat), shortness of breath, and cough. Presented to the emergency department, electrocardiogram showed sinus tachycardia, with widespread concave ST elevation (lead I, II, III, AVL, AVF, and V2–V6) and reciprocal ST depression. Hospital admission. |
| Day 2 admission       | COVID-19 PCR testing negative. Echocardiogram showed 1.1-cm pericardial fluid surrounding the entire heart. Treated with non-steroidal anti-inflammatory and paracetamol. Resolution of symptoms. |
| Day 3 admission       | Discharge from hospital. Repeat echocardiogram showed resolution of pericardial fluid. |
| 7 weeks post-admission | Repeat echocardiogram showed resolution of pericardial fluid. |

**Case presentation**

A 66-year-old Caucasian man presented to the hospital with positional sharp chest pain at rest, which was worse on lying flat and was associated with shortness of breath and cough. Medical history included type 2 diabetes mellitus, depression, and previous transient ischaemic attack. He had no documented drug allergy or previous allergic reaction. He received the first dose of Pfizer-BioNTech vaccine 7 days prior to developing the described symptoms.

On admission, he was tachycardic and hypotensive, with heart rate 116 and blood pressure 85/60. The rest of vital signs were within the normal range—respiratory rate 16, oxygen saturation 97% on room air, and he was afebrile. Clinical examination was unremarkable with normal heart sounds, non-raised jugular venous pressure, and no pericardial rub were heard on auscultation. Chest X-ray was normal. Electrocardiogram (ECG) showed tachycardia, with widespread concave ST elevation in most leads (lead I, II, AVL, AVF, and V4–V6) and the Spodick’s sign—down-sloping TP segment best-visualized in lead II and V2–V6 (Figure 1). The laboratory investigations were as follows—borderline leukocytosis and neutrophilia—white cell count of \(10.4 \times 10^{9}/\text{L}\) (\(4–10 \times 10^{9}/\text{L}\)) and neutrophils of \(8.08 \times 10^{9}/\text{L}\) (\(2–7 \times 10^{9}/\text{L}\)), elevated C-reactive protein of 94 mg/L (0–5 mg/L), urea 9.8 mmol/L (2.5–7.8 mmol/L), and creatinine 107 \(\mu\text{mol}/\text{L}\) (62–106 \(\mu\text{mol}/\text{L}\)). COVID-19 swab was negative. Blood culture showed no significant growth. First serum troponin was negative <0.01 and the second level 3 h later was slightly raised 0.08 \(\mu\text{g}/\text{L}\) (<0.04 \(\mu\text{g}/\text{L}\)). Atypical and serology screen including viral hepatitis, Cytomegalovirus (CMV), Human immunodeficiency virus (HIV), and Aspergillus were unremarkable except for previous past Epstein-Barr virus (EBV) infection. QuantiFERON and Autoimmune screen were negative.

Echocardiogram showed pericardial fluid around entire heart measuring up to 1.5 cm with no evidence of cardiac tamponade, and good left and right ventricular function with mild basal septal hypertrophy (Figure 2). Patient was treated with paracetamol and ibuprofen three times daily as inpatient, and showed clinical improvement after 2 days. Patient was discharged home after 3 days of hospital admission. Repeat echocardiogram a month later showed resolution of pericardial fluid (Figure 3), and repeat ECG showed normal sinus rhythm (Figure 4). Patient’s case was discussed with an immunologist, who advised the patient not to receive the second dose of the vaccine, due to his possible susceptibility to immune-related vaccine reaction.

**Discussion**

Pericarditis is defined as the inflammation of pericardial sac and is recorded in approximately five percent of patients presented to the emergency department with non-ischaemic chest pain.\(^5\) The diagnosis is established based on at least two of the following criteria: (i) chest pain typically characterizes as sharp and positional, (ii) pericardial friction rub, (iii) characteristic ECG changes (widespread ST
depression), or (iv) pericardial effusion. More definitive diagnosis could be achieved by cardiac magnetic resonance or pericardiocentesis and pericardial biopsy; however, such studies are rarely done in majority of patients with uncomplicated acute pericarditis.

The aetiology of acute pericarditis can be generally classified as infectious and non-infectious causes, and largely dependent on epidemiological background, patient population, and clinical setting. Approximately up to 50% of cases in developed countries are diagnosed as idiopathic or post-viral cause.6

The overwhelming burden of SARS-CoV-2 infection has led to rapid development of COVID-19 vaccines. A study published in the New England Journal of Medicine (NEJM) has showed that two-dose regimen of BNT162b2 (Pfizer-BioNTech) has 95% efficacy for protection against COVID-19 in the persons 16 years of age or older.7 The Centers for Disease Control and Prevention has recently reported the increase in cases of myocarditis and pericarditis since April 2021 in the USA.4 Up to 31 May 2021, a total of 528 cases has been reported through VAERS after receiving both doses of the mRNA-based COVID vaccine, with calculated incidence rate of 8.6% per million doses in 21-day risk interval.8

A paediatric case series reported acute myopericarditis in seven healthy male adolescents aged 14–19 years old, within 4 days after receiving the second dose of Pfizer-BioNTech vaccine. All seven patients had rapid resolution of their symptoms, with three of them treated with non-steroidal anti inflammatory drugs (NSAIDs) only and four of them received intravenous immune globulin (IVIG) and corticosteroids.9

Another case report described a case of 62-year-old man with history of familial Mediterranean fever (FMF) treated with prophylactic colchicine. He presented 8 days after receiving the first COVID-19 vaccine—vaccine type not disclosed in the report. In this case, patient was unstable on admission requiring urgent pericardiocentesis. The authors were able to exclude FMF as the cause of pericarditis.10

As vaccination programme for COVID-19 is still in the early phase, data on the pericarditis incidence secondary to COVID-19 vaccine in
Majority of cases has a short course of disease and requiring minimal medical intervention. CDC continues to recommend COVID-19 vaccination and advocate for health practitioners to continue reporting all cases of myopericarditis post-COVID-19 vaccination to VAERS. SARS-CoV-2 infection is highly contagious, and COVID-19 can lead to severe respiratory syndrome leading to hospitalization and increased mortality and morbidity risk. The demonstrated benefits of COVID-19 vaccine far outweigh the possible risks, and currently, the most promising approach to curb the COVID-19 pandemic.

Conclusions

Based on the interval report produced by CDC, the incidence of myopericarditis post-COVID-19 vaccination pericarditis remains to be low similar to incidence of myopericarditis post-vaccination of any type. The majority of cases has a short course of disease and requiring minimal medical intervention. CDC continues to recommend COVID-19 vaccination and advocate for health practitioners to continue reporting all cases of myopericarditis post-COVID-19 vaccination to VAERS. SARS-CoV-2 infection is highly contagious, and COVID-19 can lead to severe respiratory syndrome leading to hospitalization and increased mortality and morbidity risk. The demonstrated benefits of COVID-19 vaccine far outweigh the possible risks, and currently, the most promising approach to curb the COVID-19 pandemic.

Lead author biography

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Supplementary material

Supplementary material is available at European Heart Journal - Case Reports online.
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