

## Post-mRNA COVID-19 Vaccination Myocarditis

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### ABSTRACT

A new trend of myocarditis among young adults who received mRNA vaccines for COVID-19 is emerging. We present the case of a young adult who presented with chest pain 3 days after the second dose of Pfizer-BioNTech COVID-19 vaccine. He had elevated troponin I and C-reactive protein levels at the time of admission. Electrocardiogram (ECG) and echocardiogram findings were unremarkable. The patient improved with conservative management and was discharged home the next day.

### LEARNING POINTS

- Myocarditis is rare but is increasingly being reported in young adults post vaccination for COVID-19.
- Patients usually present with chest pain, elevated troponin and/or inflammatory markers.
- The condition carries a good prognosis and patients usually recover with supportive care.

### KEYWORDS

COVID-19, myocarditis, COVID-19 vaccine

### CASE DESCRIPTION

A 27-year-old male presented to our emergency room with sharp, central, non-radiating chest pain associated with fatigue, 3 days after his second dose of Pfizer-BioNTech COVID-19 vaccine. The patient did not report any fever, chills, diaphoresis, upper or lower respiratory tract infection symptoms, nausea, vomiting or diarrhoea. He did not have any history of acute COVID-19 infection. Vitals were within normal limits. The physical examination was unremarkable. The ECG showed normal sinus rhythm without any ST-T changes. Chest x-ray showed no acute cardiopulmonary process. The patient was given aspirin 325 mg oral once and the symptoms resolved.

Laboratory data showed elevated troponin I (0.245 ng/ml, normal 0–0.028 ng/ml) and C-reactive protein (44.2 mg/l, normal 0.0–8.0 mg/l) (Table 1).

Troponin I peaked (0.391 ng/ml) 6 hours after the initial troponin. The echocardiogram showed a normal ejection fraction of 60% and no regional wall motion changes or pericardial effusion. The patient was monitored overnight in the hospital. Telemetry showed no arrhythmias. The patient was discharged home the next day.

### DISCUSSION

A new trend of myocarditis among young adults who received mRNA vaccines for COVID-19 is emerging<sup>[1]</sup>. According to the Centers for Disease Control and Prevention (CDC) Vaccine Adverse Event Reporting System (VAERS), as of June 19th 2021, there have been 1,068 cases of myocarditis reported after administration of various vaccines since 1991<sup>[1,2]</sup>. Out of these, 778 cases of myocarditis have been



Laboratory test	Value	Reference range
Troponin I	0.245	0–0.028 ng/ml
WBC	10	4–11 K/ $\mu$ l
Hb	15	13.5–17.5 g/dl
Platelets	127	140–400 K/ $\mu$ l
Total bilirubin	2.0	0.2–1.2 mg/dl
Direct bilirubin	0.7	0–0.4 mg/dl
Alanine aminotransferase (ALT)	18	0–55 U/l
Aspartate aminotransferase (AST)	23	0–35 U/l
Alkaline phosphatase	62	30–150 U/l
C-reactive protein (CRP)	44.2	0.0–8.0 mg/l
ESR	7	0–14 mm/hr
D-dimer	<0.27	<0.49 $\mu$ g/ml
ANA screen	Negative	Negative

Table 1. Key laboratory findings supporting the diagnosis

reported post COVID-19 vaccination (predominantly Pfizer-BioNTech and Moderna) which constitutes 72.9% of all reported cases [2]. Cases of myocarditis have also been reported post vaccination for smallpox (20.3%), anthrax (5.9%), influenza (4.9%), typhoid (2.7%) and hepatitis B (2.4%)<sup>[2]</sup>. The initial reports of the condition came from the Times of Israel which reported 62 cases of myocarditis post Pfizer-BioNTech vaccination in Israel<sup>[3]</sup>. Cases of myocarditis following vaccination have been reported from the US military as well<sup>[4]</sup>. Initial case reports in the medical literature were reported from Europe<sup>[5, 6]</sup>. A case series of 7 cases was reported from the USA<sup>[7]</sup> and 6 cases were reported later from Israel<sup>[8]</sup>.

The first case of myocarditis post COVID-19 vaccination in the medical literature was reported in a 39-year-old from Europe and he made a good recovery with anti-inflammatory treatment<sup>[5]</sup>. Ammirati et al. reported a case of myocarditis in a 59-year-old patient who presented after his second vaccination dose with chest pain, elevated C-reactive protein and troponin and made a spontaneous recovery<sup>[6]</sup>.

The 7 cases reported by Marshall et al. were aged between 14–19 years old<sup>[7]</sup>. All of these had elevated troponin. Six patients received non-steroidal anti-inflammatory drugs (NSAIDs) and 4 were treated with steroids and IVIG<sup>[7]</sup>. All of them made a good recovery<sup>[7]</sup>.

Abu Mouch et al.<sup>[8]</sup> reported 6 cases aged between 16–45 years. All of these had elevated C-reactive protein and troponin levels as well<sup>[8]</sup>. All of them were treated with NSAIDs and colchicine and made a good recovery<sup>[8]</sup>.

The literature shows that post-vaccination myocarditis seems to be reported more in young adults, within 2–4 days of vaccination and that most patients improve with conservative management<sup>[7, 8]</sup>. Identifying the condition promptly is necessary as we can avoid unnecessary and expensive investigation in these patients. A causal association between the mRNA vaccines and myocarditis is unknown. Its pathophysiology is currently undetermined and needs to be further investigated.

Our patient was a young male who had symptoms within 3 days after his second vaccination dose. The elevated troponin I and C-reactive protein levels suggested ongoing myocarditis. Our patient did not have any symptoms suggestive of an ongoing viral infection. The diagnosis of post-COVID-19 vaccination myocarditis was made based on his medical history, the temporal association with vaccination, laboratory data and medical literature review. Since he recovered in a short time, we did not pursue any further expensive investigations.

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