

# ST-Segment Elevation Acute Myocardial Infarction Associated to Covid-19 Vaccination in A Healthy Young Adult with Normal Coronary Arteries

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**ABSTRACT:** Despite the beneficial effects of anti-COVID-19 vaccination, monitoring its safety has identified potential cardiac adverse events, mainly myocarditis and pericarditis. The case of a healthy 32-year-old male patient who developed acute myocardial infarction (AMI) 48 hours after the second dose of anti-COVID-19 mRNA vaccine (BNT162b2) is reported. This is the first reported case in the literature of an AMI associated to post-COVID-19 vaccination with mRNA vaccine (BNT162b2) in a healthy young adult without coronary risk factors and normal coronary arteries. Despite this adverse event, the continuation of the anti-COVID-19 vaccination campaign is encouraged due to the benefits it brings.

**KEYWORDS:** ST-segment elevation acute myocardial infarction; COVID-19 vaccination; Inferior myocardial infarction.

## Introduction

There are scant reported data on the risk of acute myocardial infarction (AMI) related to the anti-COVID-19 vaccines [1-5].

Since vaccines became more available to the general public around the world, more data will be gathered on potential coronary side effects, and other thrombotic events.

The mechanisms of thrombotic events related to anti-COVID-19 vaccines are still poorly understood.

More data on safety and possible side effects will be required.

Therefore, the first case in the literature of ST-segment elevation AMI is reported, with onset less than 48 hours after the second dose of anti-COVID mRNA vaccine (BNT162b2) in a young healthy male patient without coronary risk factors and with normal coronary arteries.

This case report should in no way decrease awareness and fade enthusiasm about vaccination against COVID-19.

## Case Report

Approximately 24 hours after the application of the second dose of anti-COVID mRNA vaccine (BNT162b2), a previously healthy 32-years-old male reported typical, mild, oppressive, retrosternal pain, lasting for 15 minutes at rest which subsided spontaneously.

The chest pain with similar characteristics appeared again the next day, but it was more intense, lasted longer and it was associated with sweating, nausea and vomiting.

The patient self-medicated with aspirin 125mg at home and went to the emergency department where he was found to be anxious, restless.

The patient did not have any chronic inflammatory disease, hypertension, diabetes mellitus, hyperlipidaemia, nor any other known comorbidity.

The ECG showed ST-segment elevation in leads D2, D3 and AVF and ST segment depression in V1, V2 and V3 (Figure 1).

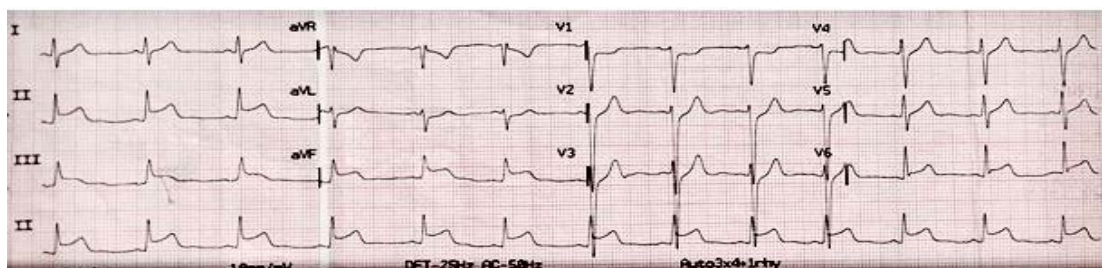


Figure 1. Depicts a 12 leads conventional electrocardiogram (ECG) showing ST-segment elevation in inferior leads (DII, DIII, aVF), and ST-segment depression in V1-V3.

The ultrasensitive troponin I dosage was 2572ng/L (NV: <19ng/L).

Other inflammatory markers, and routine laboratory blood analysis were within normal limits.

The patient tested negative for SARSCoV-2 by PCR.

The echocardiography showed mild inferior hypokinesis.

The coronary angiography showed only mild irregularities with non-significant coronary lesions (Figure 2A and 2B).

The patient was discharged home in good condition a week later with atenolol, aspirin, and atorvastatin, and a follow-up outpatient consultation was scheduled.

Written informed consent was obtained from our patient.



**Figure 2.** Shows the coronary angiography of the patient, 2A shows the left coronary artery in RAO view, and 2B shows the right coronary artery in LAO view both of them with only mild irregularities with non-significant coronary lesions.

## Discussion

We report the case of a healthy 32-year-old male patient with no previously known cardiovascular disease who developed AMI within 48hs after the second dose of anti-COVID-19 mRNA vaccine (BNT162b2).

It is noteworthy that, AMI was not reported as an adverse event of the vaccine initially in the preliminary reports of anti-COVID-19 mRNA vaccines.

To the best of our knowledge, this is the first reported case of an AMI associated to post-COVID-19 vaccination with mRNA vaccine (BNT162b2) in a healthy young adult without coronary risk factors and normal coronary arteries.

A review of the literature reported some cases of AMI associated with anti-COVID-19 vaccines with different features and patient characteristics.

For example, Sanci E, et al. [1] reported a 22 years old female patient with shortness of breath and chest pain post-COVID-19 vaccination with mRNA vaccine (BNT162b2).

The ECG demonstrated an ST-segment elevation in the inferior and in the anterior leads

that completely resolved within some minutes, and without troponin I elevation.

The patient also had normal coronary arteries, and was found to be allergic to egg and tomato.

The authors concluded that the patient had an episode of Kounis syndrome type I.

Therefore, although this mentioned patient [1] had ST-segment elevation in the ECG, did not develop a segmental AMI because the cardiac enzymes were not elevated and the ECG changes disappeared within minutes [1].

A series of 2 AMI cases were reported by Sung JG, et al. [2] in older patients aged 68 and 42 years old, respectively.

They both had cardiovascular risk factors, and the older one had pre-existent coronary artery disease.

Both of them had their AMI episodes after anti-COVID-19 vaccination with mRNA-1273 and were treated with percutaneous coronary intervention and stent implantation [2].

An AMI was also reported early after the first dose of anti-COVID-19 vaccination with mRNA-1273 in a 96-year-old patient with coronary risk factors, but no history of previously known coronary heart disease [3].

Bardenheier BH, et al. [5] observed in their study of 8,371 patients who had one dose of mRNA vaccine, that only one subject developed AMI after (BNT162b2) vaccination [5].

Their patient was a 56-years old man who presented serious morbidities, namely, coronary artery bypass grafting, hypertension, hyperlipidaemia and diabetes mellitus [5].

Unlike our present case, most of these AMI patient post-vaccination already had different degrees of pre-existing coronary disease.

Therefore, it is uncertain if they were direct results of the anti-COVID-19 vaccine or an acceleration of underlying coronary artery alterations by factors such as stress related to vaccination issues.

Post-vaccine acute myocarditis is also a possible differential diagnosis in the present case presentation.

However, we believe that the differential diagnosis of acute myocarditis is inconclusive in our patient because of the segmental nature of the ECG changes and the echocardiographic findings.

The ECG demonstrated ST-segment elevation in the inferior leads, and the echocardiography demonstrated mild inferior wall hypokinesis.

Unfortunately, cardiac MRI was not available in our hospital at that time.

Undoubtedly, it would have given us more helpful and specific cardiac changes.

This is an important limitation of the present case, however the fact that no diffuse changes were observed in the ECG and echocardiography, in addition to the clear segmental changes that were present, makes the myocarditis diagnosis unlikely.

This is the first reported case of an AMI associated to post-COVID-19 vaccination with mRNA vaccine (BNT162b2) in a healthy young adult without coronary risk factors and normal coronary arteries.

Our present case emphasizes in the setting of vaccination the potential for isolated coronary artery thrombi, even in those with no underlying coronary stenosis.

In addition, it highlights the importance of a low threshold for cardiac investigation and coronary angiography even in young adults with chest pain after anti COVID-19 vaccination, and a multidisciplinary approach to decision making.

### Funding

None to declare.

### Conflict of interests

None to declare

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