

## Kounis syndrome associated with BNT162b2 mRNA COVID-19 vaccine presenting as ST-elevation acute myocardial infarction

### INTRODUCTION

Vaccination is considered the key process of immunization against the ongoing pandemic. The mass vaccination process has started with different vaccine types, varying globally. Because of the accelerating vaccination efforts worldwide, the possibility of rare adverse effects happening has increased. Over 100 million COVID-19 vaccine doses has been administrated in Turkey (1).

Although it is known that the adverse effects of COVID-19 vaccines have low incidence (2), allergic side effects are possible similar to any other medication. Although a wide spectrum of symptoms can be seen, from mild allergic complaints to angioedema, Kounis syndrome is one with undesirable effects. Hypersensitivity coronary disorder was originally described in 1991 by Kounis as acute coronary syndrome associated with an allergic reaction (3). This syndrome has been reported with different SARS-CoV-2 vaccines (4, 5); and to the best of our knowledge, we present the first Kounis syndrome after an mRNA vaccine.

### CASE REPORT

We present the case of a 22-year-old woman with no known co-morbid diseases who had previous egg and tomato allergy and no known prior drug allergies. The patient presented to our emergency department with complaints of "palpitations" and "uneasiness of the chest" after her first dose of COVID-19 vaccine (BNT162b2, Pfizer–BioNTech). Complaints started approximately after 15 minutes of vaccination.

### CASE REPORT

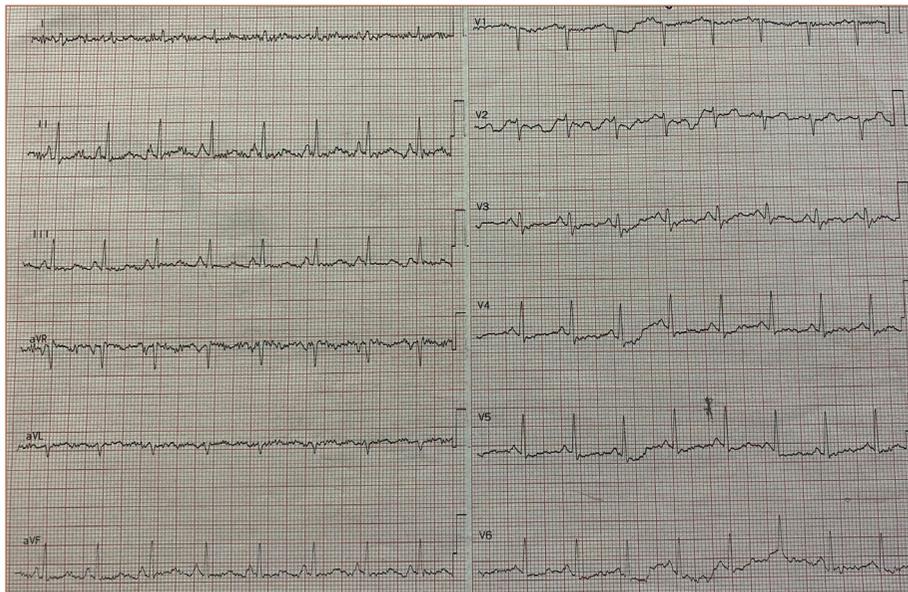


Figure 1. The patient's initial ECG presenting sinus tachycardia

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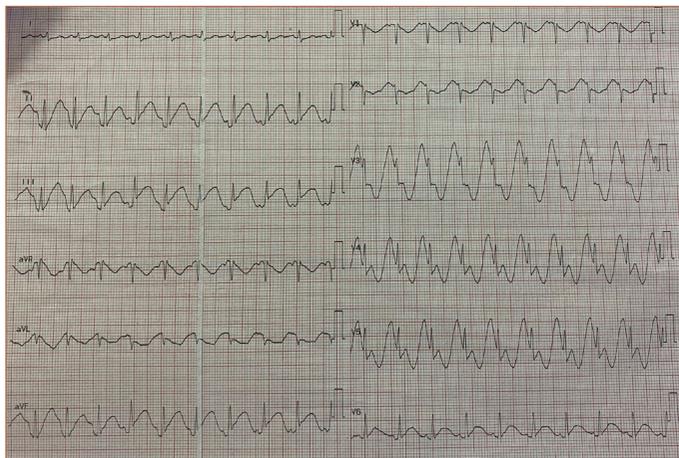
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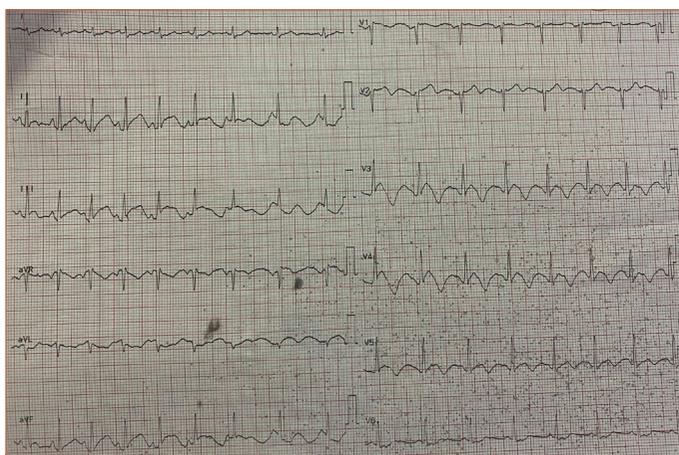


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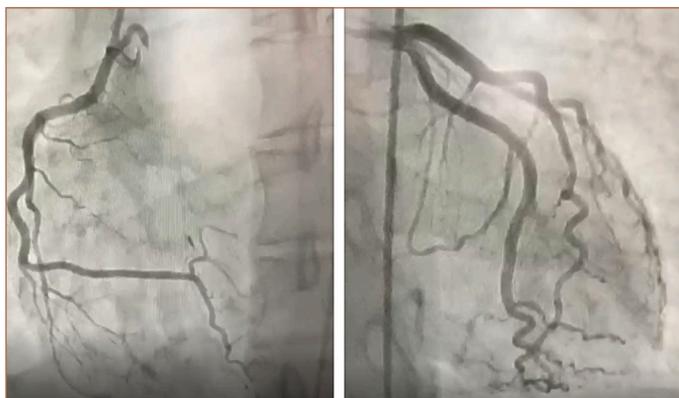
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**Figure 2. The patient's follow-up ECG during increased complaints showing ST segment elevations in anterior and inferior derivations**



**Figure 3. The patient's ECG after resolution of chest pain complaints showing T-wave inversions**



**Figure 4. Coronary angiography imaging showing normal coronary arteries**

On admission, vital signs were stable besides a mild tachycardia with blood pressure 120/70 mm Hg, heart rate 108/min, oxygen saturation 99%, body temperature 36.5°C. The initial ECG showed sinus tachycardia (Fig. 1). During follow-up, the patient had increased complaints

including shortness of breath and chest pain. The follow-up ECG showed ST-segment elevations in the inferior and anterior derivations (D2, D3, avF, V3-6) (Fig. 2). Asetil salisilic acid 300 mg, pheniramine maleate 45.5 mg, and dexametasone 8 mg were administrated. Bed-side transthoracic echocardiography showed no abnormalities, and the patient's complaints regressed within 5 minutes of onset. After the resolution of the chest pain, the ECG showed T wave inversion in anterior derivations (Fig. 3).

Troponin-I was 0.003 ng/mL (reference: <0.016 ng/mL). Complete blood count, urea, creatinine, glucose, electrolyte parameters, and C-reactive protein were all within normal ranges.

The patient has been admitted to the coronary intensive care unit, and coronary angiography showed no abnormalities (Fig. 4). She was diagnosed with type 1 Kounis syndrome. The patient had no further events during the hospital stay and was discharged in good condition.

## DISCUSSION

To the best of our knowledge, this is the first case of an allergic reaction that resulted in ST-segment elevation secondary to mRNA-based coronavirus vaccine. Allergic reactions result from Kounis syndrome reported with other vaccines such as inactive COVID-19 vaccines (4, 5). Furthermore, similar to these cases, myocardial infarction after Moderna vaccination, which also might be a Kounis syndrome, has been reported previously (6).

Kounis syndrome is the concurrence of acute coronary syndrome with conditions associated with mast cell activation, including allergic or hypersensitivity and anaphylactic or anaphylactoid mechanisms (7). This syndrome's pathophysiology is linked to inflammatory mediators, such as histamine; neutral proteases, including tryptase, chymase, and cathepsin-D; arachidonic acid products; platelet-activating factor; and a variety of cytokines and chemokines released during the mast-cell activation and classified into three variants (8). Type 1 patients have no risk factor for ischemic heart diseases and pathophysiological changes linked to coronary artery vasospasm. Type 2 patients have pre-existing atheromatous diseases and pathophysiological changes described with plaque erosion resulting in vasospasm or infarction. Finally, type 3 patients have previous coronary artery stents, and stent thrombosis occurs owing to platelet activation. Our patient was identified as the type 1 variant owing to a lack of a previous history of heart disease, and coronary angiography showed no coronary thrombosis or stenosis. The type 1 variant has a better prognosis, which we observed in our patient.

Kounis syndrome is fundamentally linked to allergic reactions and should be expected to be seen in patients prone to allergy. Our patient had previous tomato and egg allergies, which suggests that she could have unknown drug or vaccine allergies that can manifest easily because of her atopic nature. Furthermore, coronary angiography

showed no abnormalities which suggests this was a short coronary vasospasmic episode, most likely because of allergy.

Vaccines are the most important measure to prevent mass casualties in epidemics. Considering that the numbers in the vaccination process are significant, it is possible to encounter numerically more allergic events than with other medications. Vaccines are generally recognized as safe, and adverse allergic events are rare (2). Although these adverse allergic events often do not have serious consequences, major events should be reported. The case we present is important because it is the first report of Kounis syndrome developed against the mRNA vaccine.

Careful attention to allergic events that may occur in the short-term after vaccination will be beneficial in preventing undesirable consequences.

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**Informed consent:** Written informed consent have been obtained from the patient.

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