

# Myocardial infarction post COVID-19 vaccine – coincidence, Kounis syndrome or other explanation – time will tell

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## Summary

A case of ST elevation myocardial infarction reported post Coronavirus disease 2019 (COVID-19) vaccine. Probably premature to draw a link between COVID-19 vaccine and myocardial infarction.

## Keywords

COVID-19 vaccine, myocardial infarction, excipients

## Case description

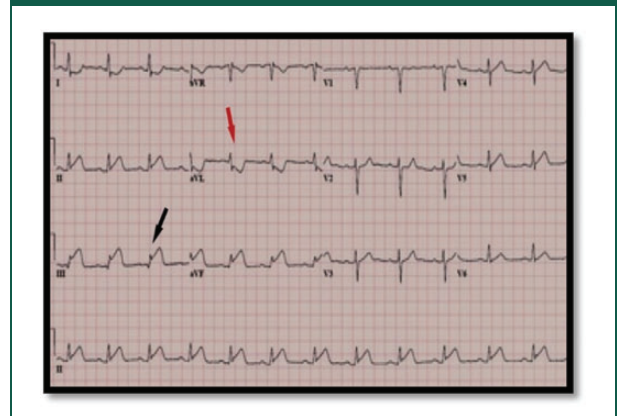
A 62-year-old woman with a medical history of diabetes mellitus, hypertension and dyslipidaemia presented to the emergency department complaining of central chest pain that started approximately 1.5 hours after receiving her first dose of the COVID vaccine (AZD1222 – Oxford University and AstraZeneca). The chest pain radiated to her left shoulder and neck and associated with fascial numbness. She denied loss of consciousness, headache, nausea or vomiting. No previous history of coronary artery disease or allergic reaction to any substances. Her medications included Lisinopril 10 mg once daily, atorvastatin 40 mg once daily and insulin glargine. She had never smoked and denied alcohol consumption. Her first ECG showed ST elevation in inferior leads (II, III and AVF) and reciprocal ST segment depression in lead I and AVL (Figure 1). Bedside echocardiography showed an inferior wall motion abnormality and preserved systolic function of left ventricle. Her initial high-sensitivity cardiac troponin T test (hs-cTnT) was 40 ng/l (normal < 15 ng/l), with a peak of 200 ng/L. Treated as a case of ST elevation myocardial infarction (STEMI) with dual antiplatelet and heparin. Coronary angiography showed a critical stenosis of middle segment of right coronary artery (Figure 2(a)). Drug eluting stent was deployed with Thrombolysis In Myocardial Infarction III flow (TIMI III flow) (Figure 2(b)). No recurrent chest

pain or arrhythmias during hospital stay and patient discharged home three days later.

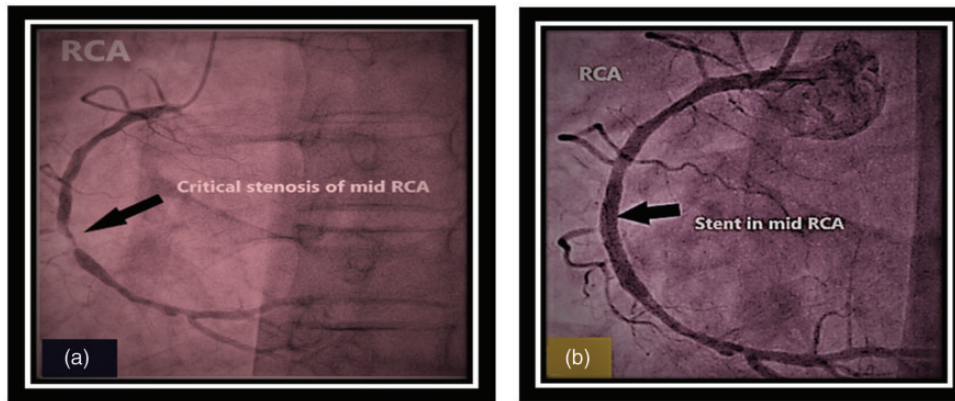
## Discussion

On 11 March 2020, the World Health Organization announced that Coronavirus disease 2019 (COVID-19) was a pandemic. Since that time, the hunt for a COVID-19 vaccine took place in order to beat the disease in the long term. Fortunately, a few COVID-19 vaccines received emergency use authorisation (EUA) including AZD1222, an Adenoviral vector vaccine, developed by Oxford University and AstraZeneca.<sup>1</sup> The use of vaccines can control and prevent the spread of infectious disease and effectively eliminate them and their sequels.<sup>2</sup> On 4 January 2021, the AZD1222 vaccine was received outside of clinical trials for the first time. An interim analysis of four randomised controlled trials regarding the safety and efficacy of the AZD1222 vaccine against SARS-CoV-2 showed vaccine efficacy of 70.4% after two doses and protection of 64.1% after at least one standard

**Figure 1.** ST elevation in lead II, III and AVF (black arrow) and ST depression in I and AVL (red arrow).



**Figure 2.** (a) Critical stenosis of middle segment of RCA – black arrow. (b) Drug eluting stent inserted to middle segment of RCA – black arrow. RCA: right coronary artery.



dose with no safety concerns. A total of 23,848 participants were recruited and vaccinated across the four studies in the United Kingdom (UK), Brazil and South Africa and 11,636 participants met the inclusion criteria for the primary analysis. The majority of participants were aged 18–55 years and 12.2% were aged 56 years or older. Moreover, 60% of participants were female; 91% of participants in the UK and 66% of participants in Brazil were white.<sup>3</sup> The incidence of serious adverse events was low and similar in the AZD1222 and control groups. During AZD1222 trials, no myocardial infarction was registered as a complication of AZD1222 vaccine.<sup>3</sup>

We have read the article by Boivin et al. who reported a case of 96-year-old woman who experienced a STEMI 1 hour after her first Moderna COVID-19 vaccination. Another case was reported in India of a STEMI two days post AZD1222 vaccine in a healthy 63-year-old man.<sup>4</sup> Our case is probably the third reported case in the literature of a myocardial infarction after COVID-19 vaccine.

Vaccines are considered the most effective medications in public health. During vaccination an allergic reaction may occur and can result in vaccine-associated side effect and usually difficult to tell whether the reaction was caused by the vaccine itself or by other factors. Excipients are substances added to vaccines to improve stability, increase solubility and improve absorption and they are a major contributors to the development of IgE-mediated anaphylactic reactions during vaccination.<sup>5</sup> Kounis syndrome is an allergic reaction to various substances including excipients resulting in acute coronary syndrome.<sup>6</sup> This can be a potential explanation of myocardial

infarction after COVID-19 vaccine. Another possible explanation suggested by Griener et al. was through a prothrombotic immune thrombocytopenia induced by vaccine which has similarity to heparin-induced thrombocytopenia leading to thrombotic manifestation.<sup>7</sup>

In April, the European Medicines Agency reviewed 86 reported cases related to the AstraZeneca vaccine and found a potential link between the vaccine and the thrombus formation (cerebral venous sinus thrombosis, splanchnic vein thrombosis) and reported that these events should be listed as a very rare but possible side effect of AstraZeneca vaccine.<sup>8</sup>

We present a case of STEMI following 1.5 hours after AZD1222 COVID-19 vaccination. It is probably still too early to conclude that the vaccine can be the cause of myocardial infarction in these few cases reported in the literature. Since myocardial infarction is a frequent diagnosis in daily practice and mass vaccination against COVID-19 took place, a coincidence can be an explanation. Kounis syndrome could be a potential mechanism to explain, if any, the link of myocardial infarction post vaccine.

We think that these few reported cases should not discourage the vaccine campaign against COVID-19; however, monitoring of evolving data should be taken seriously to delineate any possible link and its mechanism.

## Conclusion

Although we reported a case of myocardial infarction following AZD1222 COVID-19 vaccine, it is early to

attempt correlation of similar outcome of COVID-19 vaccine without solid information and data.

#### Declarations

**Competing Interests:** None declared.

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**Ethics approval:** Written informed consent for publication was obtained from the patient.

**Guarantor:** OM (Ossama Maadarani).

**Contributorship:** OM conceived the idea for the case report and wrote it. ZB provided the editorial input. All authors were involved in managing the patient bedside.

**Provenance:** Submitted; peer reviewed by Arshiya Singhal

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