Myocarditis following rAd26 and rAd5 vector-based COVID-19 vaccine: case report

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Abstract

SARS-CoV-2 vaccines provide a safe solution with a major impact on reducing the spread of the virus and mild side effects. Research has shown rare cases of myocarditis after mRNA vaccines. This study presents a 29-year-old male with chest pain after 48 h of receiving rAd26 and rAd5 vector-based COVID-19 vaccine (Sputnik V vaccine). The electrocardiogram revealed ST-segment elevation. Also, the laboratory screening was remarkable for elevated cardiac Troponin-I level, and leukocytosis; and echocardiography depicted severe left ventricular systolic dysfunction. Overall, endomyocardial biopsy proved lymphocytic myocarditis such that the patient was successfully treated with immunosuppressive and guideline-directed medical treatment.

Keywords SARS-CoV-2; Gam-COVID-Vac; Sputnik V vaccine; Cardiovascular; Complication

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Introduction

Following the outbreak of the COVID-19 pandemic, many efforts have been made to produce an effective vaccine to control the disaster. The vaccination programme against SARS-CoV-2 started in early December 2020 and has had a significant impact on reducing the spread of the virus and mortality.¹,² Although vaccines are safe, technical workgroups of COVID-19 vaccine safety should assess vaccine safety data since the start of the vaccination programme.³

Meanwhile, few cases of myocarditis after mRNA COVID-19 vaccines have been reported. To the best of our knowledge, there is not any report of myocarditis after the rAd26 and rAd5 vector-based COVID-19 vaccines. Collaboration between infectious diseases, cardiology, and rheumatology specialists is needed to guide diagnosis, treatment, and management of myocarditis. Although most cases of myocarditis post-COVID-19 vaccine appear to be mild, follow-up of cases seems necessary.

This report presents a case of myocarditis after the second dose of the heterologous rAd26 and rAd5 vector-based COVID-19 vaccine (Sputnik V COVID-19 vaccine) in a previously healthy 29-year-old man.

Case report

A 29-year-old man presented to the Emergency Department with chest pain and generalized malaise. He was restless from the chest pain and described it as a feeling of pressure on his chest that worsens by inspiration. Two days earlier, he received the second dose of the Sputnik V COVID-19 vaccine. He was previously well, and his medical history was unremarkable. He did not drink alcohol or use illicit drugs. During the examination, he was afebrile and had a heart rate of 110 b.p.m., blood pressure of 95/60 mmHg, and oxygen saturation of 95% on room air. The heart rhythm was sinus tachycardia, and 53
was noted on auscultation. The jugular venous pressure was 5 cm of water. Vesicular breath sounds were heard in all lung fields. The patient had no swelling in his legs, and the remainder of the examination was unremarkable. An electrocardiogram (ECG) showed ST-segment elevation in precordial leads (V3–V4) (Figure 1). He was admitted to the cardiac care unit with a stable condition with no need for vasopressors, mechanical ventilators, or circulatory support. The peak Troponin-I level was 3.04 ng/mL (normal range: <0.02 ng/mL), white blood cell count of 13 500 per mm$^3$, and normal C-reactive protein and erythrocyte sedimentation rate. In addition, two PCR of swabs taken from his upper respiratory tract returned negative for SARS-CoV-2 (Table 1). Meanwhile, the chest radiograph did not show any abnormal findings related to pneumonia, abscess, pulmonary oedema, lung masses, cavitory lung lesions, pleural effusion, or any other abnormalities. Echocardiography indicated normal left ventricular (LV) size.

![Figure 1](image.png)

**Figure 1** An electrocardiogram showed ST-segment elevation in precordial leads.

| Table 1 Laboratory data | Variable | Values | Reference range |
|-------------------------|----------|--------|-----------------|
| Haemoglobin (g/dL)      | 18.6     | 14.0–17.5 |
| Haematocrit (%)         | 55.8     | 41.5–50.4  |
| White cell count (per mm$^3$) | 13 500 | 4000–11 000 |
| Platelet count (per mm$^3$) | 230 000 | 150 000–450 000 |
| Sodium (mEq/L)          | 136      | 135–145  |
| Potassium (mEq/L)       | 4.2      | 3.5–5.5  |
| Urea nitrogen (mg/dL)   | 28       | 10–50   |
| Creatinine (mg/dL)      | 0.9      | 0.9–1.3 |
| Glucose (mg/dL)         | 94       | 70–100  |
| Troponin-I (ng/mL)      | 3.04     | <0.02   |
| Calcium                 | 8.3      | 8.6–10.3 |
| Albumin (g/dL)          | 4.3      | 3.8–5.1 |
| N-terminal pro-B-type natriuretic peptide (pg/mL) | 320 | <120 |
| D-Dimer (ng/mL)         | 340      | Negative <500 |
| ESR (mm/h)              | 5        | 1–25    |
| CRP (mg/L)              | 8        | Up to 5 |
| Lactate dehydrogenase   | 240      | 225–500 |

CRP, C-reactive protein; ESR, erythrocyte sedimentation rate.
Cardiac index (L/min/m²) 2.4
Cardiac output, Fick method (L/min) 4.6
Pulmonary artery pressure (mean) (mmHg) 18/10 (12.6)
Right ventricular pressure (mmHg) 18/0–5
Mean right atrium pressure (mmHg) 4
Pulmonary vascular resistance (Woods) 0.5
Systemic vascular resistance (Woods) 18.5
Systemic oxygen saturation (%) 95
Mixed venous oxygen saturation (%) 79
designed with two recombinant adenovirus vectors. According to an interim analysis of a randomized controlled phase 3 trial in Russia, the Sputnik V vaccine is safe and well tolerated. After injecting this vaccine, the most common adverse event was pain at the injection site, hypothermia, headache, and muscle and joint pain.\textsuperscript{3,10}

Myocarditis is an extremely rare phenomenon that has been reported infrequently following the vaccine administration of influenza, smallpox, and the human papillomavirus. Generally, it is hard to explain the underlying mechanism because of its rarity.\textsuperscript{11–13} Because SARS-CoV-2 mortality is high around the world, the development of a vaccine is an urgent task. Vaccination will restrict the spread of COVID-19 and reduce mortality. Given the abundant benefits of the COVID-19 vaccine, and the low incidence of clinically significant complications, we encourage immunization with vaccination. According to the myocarditis following the COVID-19 vaccine, ongoing surveillance is required to evaluate the occurrence of rare adverse events. Therefore, clinicians should be vigilant to provide prompt diagnosis and treatment for this purpose.

**Ethics approval**

All procedures performed in studies involving human participants were following the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

**Informed consent**

Informed consent was obtained from the individual participant included in the study.

**Conflict of interest**

The authors declare that they have no conflict of interest.

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**Supporting information**

Additional supporting information may be found online in the Supporting Information section at the end of the article.

**Video S1. Supporting Information**

**Video S2. Supporting Information**

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