

CASE REPORT

The first report of 2:1 atrioventricular block following COVID-19 vaccination

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Abstract

A 65-year-old man became ill a few days after being vaccinated against the COVID-19 by the Sinopharm vaccine. Laboratory investigations, trans-thoracic echocardiography, and chest computed tomography scanning (CT-scan) retrieved normal results. The patient's electrocardiogram showed sinus rhythms with 2:1 AV-block and a narrow QRS complex. Coronary angiography showed mild coronary artery disease.

KEYWORDS

arrhythmia, AV block, SARS-CoV-2, vaccine

1 | INTRODUCTION

The coronavirus infection disease 2019 (COVID-19), the recent pandemic ravaging the world, is a serious health threat to mankind. Current research on COVID-19 vaccines shows that most of their known side effects are mild and self-limiting and do not require any specific treatment.^{1,2} However, some rare and partially recognized side effects of these vaccines may create serious life-threatening conditions. There are various types of atrioventricular (AV) conduction disorders. Second-degree type 2 AV block (mobiz II), including 2:1 AV block, results from the sudden failure of AV conduction without a progressive increase in the AV conduction time.³ In this case report, we presented a patient who developed 2:1 AV block a few days after being vaccinated for COVID-19.

2 | CASE PRESENTATION

A 65-year-old man, without a noticeable health condition or history of serious diseases, was referred to

the emergency department of our hospital (Shohada Hospital). His main complaints were dizziness and mild dyspnea. The patient's symptoms started a few days after receiving a COVID-19 vaccine (Sinopharm).

The patient's vital signs were as follows: blood pressure = 100/60 mmHg, respiratory rate = 15 breaths per minute, pulse rate = 37 beats per minute (bpm), oxygen saturation (room air) = 98%, and body temperature = 37°C. During lung clinical examination, auscultation was clear, and cardiovascular examination revealed no murmur. Laboratory investigations retrieved normal results (Table 1). The initial 12-lead electrocardiography (12-lead ECG) showed sinus rhythms with 2:1 second-degree AV block (2:1 AV block), a narrow QRS complex, a ventricular rate of 37 bpm, and an atrial rate of 74 bpm (Figure 1).

Chest CT-scan showed no abnormality (Figure 2). Trans-thoracic echocardiography showed normal left ventricular size and left ventricular systolic and diastolic functions (LVEF = 55%). Also, the size and systolic function of the right ventricle were normal. There were no signs of valvular diseases, and pulmonary artery pressure (PAP) was normal (PAP = 15–20) (Figure 3).

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TABLE 1 Laboratory findings in a patient who developed 2:1 AV block after COVID-19 vaccination

Parameters	Result	Normal range	Unit
White blood cell count	8	4.50–11	10 × 3/μl
Neutrophil count	45%	35–70	%
Lymphocyte count	25%	20–50	%
Red blood cell count	5.4	4.70–6.10	10 × 6/μl
Platelet count	251	150–450	10 × 3/μl
Hematocrit	45.3	41–52	%
Hemoglobin	14.5	12–16	g/dl
Sodium	138	135–145	mmol/L
Potassium	4.4	3.5–5.1	mmol/L
Calcium	9.1	9–10.5	mg/dl
Magnesium	2	1.3–2.1	mEq/L
Creatinine	0.95	0.5–1.20	mg/dl
Blood urea nitrogen	27	12–45	mg/dl
Glucose	90	70–100	mg/dl
D-dimer	0.1	0–0.45	μg/ml
C-reactive protein	0.6	Less than 1.0	mg/dl
Troponin	0.1	0–0.8	ng/ml
Aspartate transaminase	39	17–60	U/L
Alanine aminotransferase	27	0–49	U/L

The patient underwent coronary angiography, which showed mild coronary artery disease without significant arterial stenosis (Figure 4). A temporary pacemaker (TPM) was inserted, and the patient was closely observed for several days afterwards, showing no AV block improvement. Therefore, a permanent pacemaker (PPM) was finally installed. After 1 week of admission to the hospital, the patient was discharged with a good general condition, and he was recommended to visit for the follow-up.

According to ethical guidelines, informed consent (in Persian, his national language) was obtained from the patient. Also, the patient was followed up for 1 month after admission, and he was recommended to visit every 6 months to check the performance of the PPM.

3 | DISCUSSION

Vaccination is regarded as the best preventive intervention against the COVID-19 infection and is believed to save millions of lives each year.² Several brands of COVID-19 vaccines have been developed, including Sinopharm⁴ that works based on the virus inactivating technology and

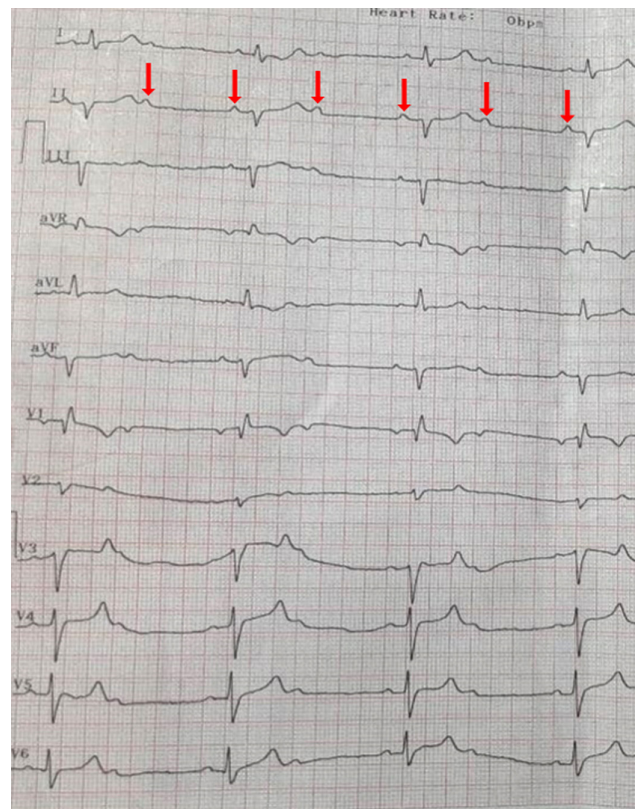


FIGURE 1 Findings of 12-lead electrocardiography in a patient receiving the first dose of the Sinopharm COVID-19 vaccine. The red arrow on the lead II shows the P wave with 2:1 AV block

promotes immunity by introducing inactivated SARS-CoV-2 viruses into the body.²

The most commonly reported side effects of this vaccine include headache, myalgia, and fever, which are generally mild and self-limiting with no requirement for treatment.⁵ Limited studies have reported an association between the COVID-19 infection and AV block.^{6–8} However, there are no reports suggesting an association between AV block and COVID-19 vaccines. In this study, we presented the case of a 65-year-old man who developed 2:1-AV block a few days after receiving a COVID-19 vaccine. The patient did not present extensive systemic, myocardial, or coronary involvement. There is little information on the cardiac complications of COVID-19 vaccines. Whether AV block development in our patient was secondary to an exaggerated inflammatory response or not remains unknown. Currently, there are limited guidelines on how to treat these patients. The American College of Cardiology (ACC) and American Heart Association (AHA) recommend cardiac pacemaker insertion for patients with second-degree AV block only if they present with symptomatic bradycardia, regardless of the site or type of the block.⁹ Considering the unpredictable course of second-degree AV block, a

FIGURE 2 Patient's lung CT-scan showed no pulmonary involvement

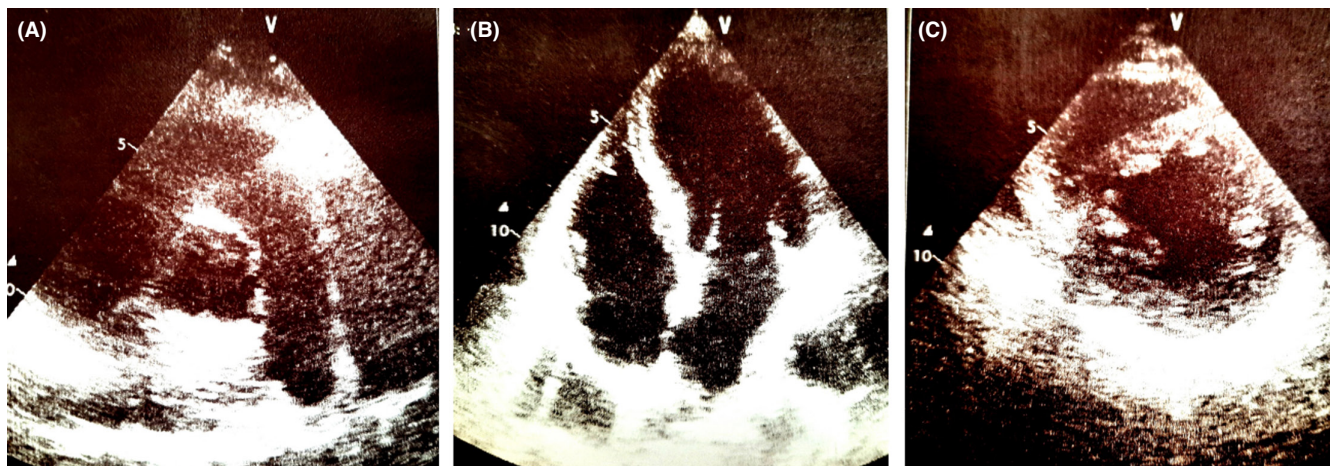
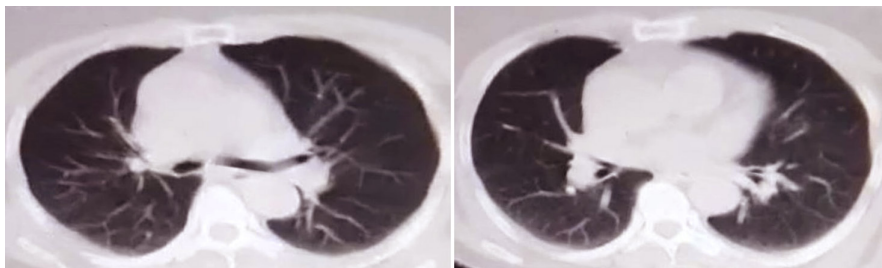
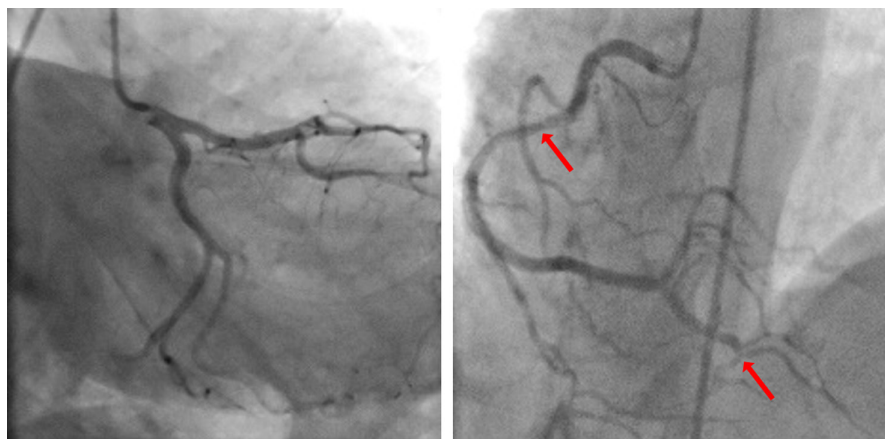


FIGURE 3 No abnormality was observed in the transthoracic echocardiography of a patient presenting with 2:1 AV block after COVID-19 vaccination. (A) The supra-sternal view, (B) The apical four-chamber view, and (C) The parasternal short-axis view

FIGURE 4 Patient's coronary angiography results. The red arrow shows insignificant stenosis in the right coronary artery



PPM was implanted for our patient based on a consensus decision-making.

In future studies, two issues should be addressed. First, the cardiac complications of COVID-19 vaccines should be more thoroughly evaluated to divulge the pathophysiology of the conduction disorders caused by these vaccines. Second, a suitable therapeutic method should be designed for the patients developing AV block after COVID-19 vaccination.

ACKNOWLEDGMENTS

Not applicable.

CONFLICT OF INTEREST

There is no conflict of interest.


AUTHOR CONTRIBUTIONS

EMN and SSA participated equally in case analysis and drafting the manuscript.

CONSENT

Written informed consent was obtained from the patient to publish this report in accordance with the journal's patient consent policy.

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