



Heart Block in Coronavirus-2019: A Case Report

Alireza Heidari-Bakavoli¹, MD; Seyed Hamed Banihashem Rad^{1,*}, MD

¹Vascular and Endovascular Surgery Research Center, Mashhad University of Medical Sciences, Mashhad, IR Iran

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ABSTRACT

Introduction: One of the common extrapulmonary involvements in COVID-19 is the cardiovascular system. The reported cases of arrhythmias were mainly among patients with such symptoms as dyspnea, palpitation, chest tightness, and syncope. This study aimed to present a COVID-19 case with gastrointestinal symptoms who developed complete Atrioventricular (AV) block.

Case Presentation: The patient was a 19-year-old man with an active lifestyle and no previous illnesses who was admitted to the local hospital due to fever, fatigue, constipation, and one episode of syncope. In the primary evaluation, he had bradycardia and elevated C-Reactive Protein (CRP). In addition, the Real-Time fluorescence Polymerase Chain Reaction (RT-PCR) was positive for SARS-COV-2. Thus, he was referred to a tertiary hospital for management. The electrocardiogram revealed complete AV block and elevated cardiac troponin I level. However, echocardiography was normal. The patient was admitted to the intensive care unit and a temporary pacemaker was inserted. Then, the patient was transferred to the COVID ward and stayed there for nine days. During the admission, cardiac rhythm became sinus and an improvement was observed in the patient's general condition. Thus, he was discharged. In two weekly follow-up visits after discharge, the patient was asymptomatic and the ECG did not change. Follow-up echocardiography was also normal.

Conclusions: Cardiac involvement may occur in healthy individuals without cardiac risk factors and respiratory or cardiac presentations due to COVID-19 infection.

1. Introduction

Coronavirus Disease 2019 (COVID-19) infection is caused by a corona virus emerged in December 2019. Thus, a pandemic was announced by the World Health Organization (WHO) in March 2020 (1). Based on the report by WHO, 243.5 million confirmed COVID-19 cases were reported and the mortality reached 4.9 million worldwide by 26 October 2021 (2). Currently, there is no definite treatment for the disease and healthcare authorities have focused on preventing the spread of the disease through social distancing, personal protection, and comprehensive vaccination (3).

COVID-19 had a wide spectrum of symptoms ranging from asymptomatic to severe respiratory failure and multiple organ dysfunction. The most common symptoms of COVID-19 infection are associated with pulmonary

involvement (4). The most common presentations include fever, cough, dyspnea, headache, sore throat, and rhinorrhea (5). Suspicious patients are tested using Real-Time Fluorescence Polymerase Chain Reaction (RT-PCR) (6). Pulmonary involvement is also assessed by Spiral High Resolution Computed Tomography (HRCT) scan. The most common primary finding in HRCT scan is Ground Glass Opacification (GGO) with peripheral and posterior distribution (7). The extrapulmonary manifestations of COVID-19 include thrombosis, myocardial involvement, arrhythmias, acute coronary syndrome, acute kidney involvement, gastrointestinal involvement, liver involvement, hyperglycemia, ketosis, neurological involvement, and ophthalmic and skin involvement (8). Myocardial involvement has been detected in 20 - 30% of COVID-19 infected patients, as well (9, 10). In a previous study, arrhythmias in form of new onset atrial fibrillation, heart block, or ventricular arrhythmias were reported in 17% of hospitalized patients with COVID-19 and 44% of those admitted to Intensive Care Unit (ICU) due to the disease (11). In addition, heart block was previously

*Corresponding author: Seyed Hamed Banihashem Rad, Vascular and Endovascular Surgery Research Center, Mashhad University of Medical Sciences, Mashhad, Iran, Cellphone: +98-9105005594, Email: banihashemradh971@mums.ac.ir.

reported in COVID-19 infected patients with respiratory involvement without elevated cardiac enzymes or acute coronary syndrome (12, 13). This study aims to present a 19-year-old man with the gastrointestinal manifestations of COVID-19, complete Atrioventricular (AV) block, and elevated cardiac enzymes.

2. Case Presentation

The patient was a 19-year-old man who worked as a shepherd. His current condition started with fever, fatigue, constipation, and abdominal pain three days before admission in the local hospital. He experienced a syncope before reaching the hospital and had bradycardia at the time of admission. The laboratory assessments in the local hospital included Complete Blood Count (CBC), which revealed the White Blood Cell (WBC) count of $4800/\mu\text{L}$ (normal range: $4500 - 11000/\mu\text{L}$), no apparent neutropenia, and elevated serum level of C-Reactive Protein (CRP) (43.1 mg/L). Due to the suspicious clinical presentations, the patient underwent RT-PCR for COVID-19, which was positive. Thus, the patient was referred to a tertiary hospital for the management of bradycardia and COVID-19.

At the time of admission in the Cardiac Care Unit (CCU) at Ghaem Hospital on 27 August 2020, high grade complete AV block with a scape rhythm with the Right Bundle Branch Block (RBBB) pattern was observed on Electrocardiogram (ECG). A suspicious ST elevation was also detected in V1 and V2 leads on ECG (Figure 1-A). Therefore, cardiac troponin was tested, which was found to be elevated (24.1 ng/mL). Due to the patient's age and compatibility of the findings with myocarditis due to the COVID-19 infection, the patient was not scheduled for coronary angiography. The scape rhythm increased during the admission. On echocardiography, the Ejection Fraction (EF) was 55% with no remarkable findings. Moreover, spiral lung High Resolution Computed Tomography (HRCT) revealed peripheral patchy GGO (Figure 1-B). Furthermore, laboratory assessments revealed an elevated CRP level, WBC count of $5600/\mu\text{L}$, normal serum electrolytes, and

cardiac troponin I = 24.1 ng/mL . Due to the complete AV block, the patient was candidate for the Electrophysiology Study (EPS), but he refused to undergo the procedure. Thus, a Temporary Pacemaker (TPM) was inserted for the patient. The AV block was transient and improved during the admission. Therefore, the patient was transferred to the COVID ward for the management of his infection. During his nine-day stay in the COVID ward, the patient received Azithromycin, Beta-interferon, and Dexamethasone 4 mg every 12 hours. The patient was discharged with reduced CRP level, EF of 55%, and Normal Sinus Rhythm (NSR). However, he was asked to perform the cardiac follow-up.

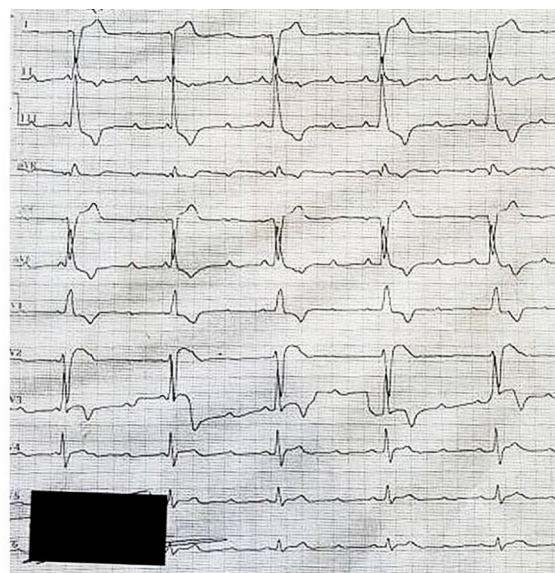
One week after discharge, the patient referred for his first follow-up visit. The ECG findings at the follow-up visit included NSR and right axis deviation, which might indicate left posterior hemi block and rSR' in V1. However, no sign of complete RBBB was observed (Figure 2-A). In the second follow-up after discharge, the patient was in good physical conditions with the New York Heart Association (NYHA) functional class 1, and no change was observed in the ECG. The 24-hour holter monitoring also showed an NSR. The patient also underwent echocardiography, which was normal with the EF of 55 - 60%. The patient was requested to abstain from vigorous physical activities for at least three months. After three months, he was asymptomatic and echocardiography was normal with the EF of 55 - 60%. Additionally, ECG indicated narrow QRS duration with normal axis and normal P-R interval (Figure 2-B).

3. Discussion

Cardiac involvement in COVID-19 has been reported in the literature (12-14). The currently reported cases of cardiac involvement and arrhythmia due to the COVID-19 infection have been limited to patients with either apparent cardiomyopathy or respiratory symptoms with no laboratory or imaging signs of cardiac involvement (12, 13, 15, 16). The current case was a young previously healthy man with an active lifestyle who was presented with the gastrointestinal manifestations of COVID-19, laboratory



B-peripheral ground glass opacification(GGO)



A-ECG at the time of admission

Figure 1. Electrocardiogram and Spiral Lung High Resolution Computed Tomography at the Time of Admission GGO, Ground Glass Opacification

Figure 2. ECG at the One-Week and Three-Month Follow-ups

Figure 2 A. ECG one week after discharge. Normal Sinus Rhythm and RAD with rSR' in V1. B. ECG after three months. NSR with normal axis, narrow QRS, and normal P-R interval.

signs of cardiomyopathy, and complete AV block.

The mechanisms of AV block in the patient under the present investigation might include metabolic disorders, enhanced vagal tone due to severe pain, sleep or carotid sinus manipulation during nursing care, and side effects of medications (14). In case of enhanced vagal tone, the manifestations of AV block mainly include intermittent first or second degree blocks (17, 18). However, high degree AV blocks may indicate a more severe pathology (15). In the present case, considering the increased CRP level, cardiac troponin, chest CT scan findings, and history of coronary artery diseases or sudden cardiac death in the patient and his family, the first cause of complete AV block could be COVID-19-related myocarditis and the second less probable cause might be coronary thrombosis that is seen in COVID-19 infection (19, 20). Unfortunately, cardiac magnetic resonance imaging was not available in the hospital and, consequently, the diagnosis of myocarditis could not be confirmed based on the existence of myocardial edema. Furthermore, due to patient's refusal to undergo EPS, the exact origin of the block could not be determined. Nonetheless, considering the benign process of the condition and lack of significant AV dysfunction, the origin of the block was more probable to be the AV node. All in all, the underlying cause of the complete AV block was suggested to be the cardiac structural changes due to the COVID-19 infection. In another case report, second degree AV block

was observed in a 71-year-old male who had COVID-19 infection with respiratory symptoms. Unlike the present case, cardiac troponin was negative in the previous case and the arrhythmia was not improved after 14 days. The difference between the results might be attributed to the older age of the previous case as well as his positive history of cardiac diseases (20).

The ECG of the present case revealed a high grade AV block with a scape rhythm and the RBBB pattern. It was previously emphasized that ECG findings in COVID-19 infection might include atrial fibrillation and brady-tachy syndrome with persistent ST-T changes that were not associated with increased troponin I levels and might be related to pericarditis (21). RBBB is a less common finding in COVID-19, which was reported to result from massive pulmonary embolism in one case (21). In the present case, however, RBBB was not associated with pulmonary embolism and might originate from cardiac involvement due to the COVID-19 infection.

3.1. Conclusions

To the best of our knowledge, this study presented the first case of a healthy young adult presenting with a high degree AV block due to COVID-19 without respiratory manifestations. The findings should raise concern regarding cardiac involvement in COVID-19-infected patients with extrapulmonary symptoms.

3.2. Ethical Approval

IR.MUMS.REC.1400.141

3.3. Informed Consent

A written informed consent form was obtained from the patient for publishing the case report.

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Authors' Contribution

S.H.B.R developed the original idea and the protocol, abstracted and analyzed the data, wrote the manuscript, and was a guarantor. A.H.B contributed to the development of the protocol, abstracted the data, and prepared the manuscript.

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There is no conflict of interest.

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