Paroxysmal Atrioventricular Block in a Relatively Young Patient with COVID-19

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Abstract:
Cardiac involvement has been reported in patients with COVID-19. We herein report a 41-year-old man who presented with recurrent paroxysmal atrioventricular block without showing significant cardiac injuries or comorbidities. The patient was diagnosed with COVID-19 and admitted to our hospital, where he was noted to have paroxysmal atrioventricular block. Cardiac biomarkers, echocardiography, and cardiac magnetic resonance imaging findings were fairly normal. An endomyocardial biopsy performed before the implantation of a permanent pacemaker revealed mild myocardial fibrosis without inflammatory infiltrates. The unusual myocardial involvement of the novel coronavirus was suspected.

Key words: COVID-19, bradycardia, atrioventricular block

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Introduction

Although the hallmarks of COVID-19 are respiratory symptoms, the involvement of other systems, including the cardiovascular system, has been documented (1). In one study, approximately 16.7% of COVID-19 patients had cardiac arrhythmias (2); however, the effects of the disease on the conduction system of the heart have not been well reported.

We herein report a relatively young patient who developed recurrent paroxysmal atrioventricular block without features of significant myocardial injury or other comorbidities and required permanent pacemaker implantation.

Case Report

A 41-year-old Japanese man presented with a 6-day history of a high-grade fever, cough, and dyspnea. Although he had never undergone a medical checkup, it turned out that he had diabetes mellitus but no other significant comorbidities. He had never experienced syncope or dizziness.

On arrival at our hospital, he had a high-grade fever (38.5 °C) and tachycardia (120 beats/min); he weighed 118.0 kg and had a body mass index of 35.6 kg/m². Chest computed tomography revealed multifocal bilateral infiltrates (Fig. 1). His clinical features were highly suggestive of COVID-19, and an antigen test for severe acute respiratory syndrome-coronavirus-2 (SARS-CoV-2) was performed, which yielded a positive result. His electrocardiogram on admission showed a normal sinus rhythm with normal PR (190 ms) and QRS (92 ms) intervals. No acute ST-T changes were noted (Fig. 2). His blood tests were remarkable with elevated liver enzyme levels (GOT 151 U/L, GLT 187 U/L), inflammatory markers (CRP 4.2 mg/dL), and HbA1c (7.8%). Other blood tests, including white blood cell counts, electrolytes, and his thyroid function, were normal.

Treatment with intravenous infusion of dexamethasone (6.6 mg/day) was initiated, and the disease course was good, except for recurrent paroxysmal atrioventricular block detected by telemetry from the second day of admission. Bradycardia lasted only a few seconds and caused no symptoms; thus, he was closely followed up without implanting a pacemaker. In the course of treatment, he showed no find-
We herein report a patient with COVID-19 who developed recurrent paroxysmal atrioventricular block that required implantation of a permanent pacemaker. To our knowledge, this is the first report of a COVID-19 patient who underwent CMR imaging and an endomyocardial biopsy before a permanent pacemaker was implanted. Disorders of the atrioventricular node occur occasionally in critically ill COVID-19 patients (3, 4). However, our patient showed only moderate symptoms of COVID-19. Kir et al., reported a similar case of transient atrioventricular block in a young patient who presented with normal transthoracic echocardiography findings and troponin I levels (5). In our case, in addition to these examinations, CMR and an endomyocardial biopsy were performed, and none of these examinations indicated significant cardiac involvement.

The telemetry strip on day 10 showed Wenckebach type atrioventricular block that developed into paroxysmal atrioventricular block, and the block occurred recurrently, and he experienced about 5.6 s of asystole without symptoms on day 10 of admission (Fig. 4). These episodes of atrioventricular block occurred regardless of whether he was awake or sleeping and occurred spontaneously in the absence of triggers that might stimulate parasympathetic activity, such as vomiting, micturition and intense coughing.

The patient was not on any medications with negative chronotropic effects. We therefore decided to implant a permanent pacemaker on day 10. Before implanting the pacemaker, we performed coronary angiography and an endomyocardial biopsy of the right ventricular septum. Coronary angiography revealed no significant lesion. A histological examination revealed mild myocardial fibrosis but no significant inflammatory infiltrates (Fig. 5). After the pacemaker was implanted, he continued to improve clinically and was discharged home on day-15.

Discussion

We herein report a patient with COVID-19 who developed recurrent paroxysmal atrioventricular block that required implantation of a permanent pacemaker. To our knowledge, this is the first report of a COVID-19 patient who underwent CMR imaging and an endomyocardial biopsy before a permanent pacemaker was implanted. Disorders of the atrioventricular node occur occasionally in critically ill COVID-19 patients (3, 4). However, our patient showed only moderate symptoms of COVID-19. Kir et al., reported a similar case of transient atrioventricular block in a young patient who presented with normal transthoracic echocardiography findings and troponin I levels (5). In our case, in addition to these examinations, CMR and an endomyocardial biopsy were performed, and none of these examinations indicated significant cardiac involvement.

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Figure 2. A 12-lead electrocardiogram on presentation showing a normal QRS and PR interval.

Figure 3. (A) T2-weighted cardiac magnetic resonance imaging showing no obvious myocardial edema. (B) Late gadolinium enhancement is not seen.

Figure 4. Telemetry strip on day 10 showing about 5.6 s of asystole with advanced atrioventricular block. The sinus rate slowed down progressively during ventricular asystole. The time was 9:31 a.m., and the patient was awake.

The authors state that they have no Conflict of Interest (COI).

Arrhythmias can be recurrent or persistent; permanent pacemaker implantation might therefore be required for such patients.
Figure 5. (A) Hematoxylin and Eosin staining. No myocyte hypertrophy, disarrangement or lymphocyte infiltration are detected. (B) Azan staining. Mild perivascular exclusive myocardial fibrosis can be seen, but this is probably due to his diabetes mellitus, not myocarditis.

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References