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Clinical Notes

A child with the Omicron variant coronavirus disease 2019 pneumonia complicated with arrhythmia

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Various types of cardiac involvement have been reported in pediatric coronavirus disease 2019 (COVID-19) cases, including acute myocardial injury, heart failure, myocarditis, arrhythmia, cardiomyopathy, and multisystem inflammatory syndrome in children (MIS-C). Most of those reports were published before the global dissemination of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) Omicron variant.[1] Although the Omicron variant may be more transmissible, the clinical presentation might be less severe than prior variants.[2] Here, we describe a child with the Omicron variant COVID-19 who developed a rare cardiac complication. Parental consent was obtained for this case report.

A 10-year-old boy with chronic idiopathic urticaria and autism spectrum disorder was transferred to our hospital for COVID-19 pneumonia, impaired renal function, and elevated liver enzymes. He had diarrhea, vomiting, anorexia, and fever for 2 days. His urticaria was treated with daily 10 mg prednisolone for 2 months. A nasal swab specimen for polymerase chain reaction (PCR) confirmed the presence of SARS-CoV-2 (Ct values; 19 for N1 and 14 for N2), which was subsequently sequenced as the Omicron variant, BA.1. A chest computed tomography (CT) scan revealed a granular shadow and ground-grass opacity at the posterior segment of the right lung. On admission, vital signs were within normal limits. Physical examination revealed conjunctival hyperemia, periumbilical tenderness, and urticarial lesions on both forearms. Cervical lymphadenopathy, oral mucosal changes, and peripheral extremity changes were not seen. Chest and heart examinations were unremarkable. Laboratory findings demonstrated a white blood cell count of 12 140/mm^3 with 88.6% neutrophil, blood urea nitrogen 32.2 mg/dL creatinine 0.98 mg/dL, creatine kinase (CK) 977 U/L, CK-MB 16 U/L (1.6%), aspartate aminotransferase 105 U/L, alanine aminotransferase 119 U/L, lactate dehydrogenase 534 U/L, C-reactive protein 14.82 mg/dL and D-dimer 2.0 μg/mL. The rest were unremarkable. The initial diagnosis was COVID-19 pneumonia with moderate dehydration. The child was rehydrated with intravenous fluid, and a stress dose of hydrocortisone was administered and tapered down for the history of prolonged steroid use. His renal function and elevated liver enzymes improved gradually. On day 3 of admission, however, he developed tachycardia at a rate of 130 beats per minute (b.p.m.) over several minutes. He did not present with any additional symptoms. The electrocardiogram (ECG) found inverted P waves in lead II, III, and aVF, and Wenckebach second-degree atrioventricular (AV) block (Fig. 1a). Coronavirus 2019-related myocarditis was suspected. Biochemical examination showed CK 192 U/L, CK-MB 47 U/L, creatinine 0.69 mg/dL, high sensitivity troponin T 0.028 ng/mL (normal value ≦ 0.014) and brain natriuretic peptide (BNP) 262.9 pg/mL. Electrolyte levels were within normal limits. The cardiothoracic ratio, which was 43% on admission, increased to 56%. Echocardiography revealed preserved left ventricular contraction and grade 1 mitral regurgitation. Pericardial effusion, wall motion abnormalities, and changes in ventricular geometry were not seen. On day 4 of admission, tachycardia resolved gradually to 80 b.p.m. with an ectopic atrial rhythm in the ECG (Fig. 1b). At this point, we suspected ectopic atrial tachycardia with a Wenckebach second-degree AV block and cardiomegaly due to fluid overload. Furosemide 10 mg was given two times. On day 5 of admission, arrhythmia was no longer observed. On day 6 of admission, the BNP level decreased to 12.3 pg/mL, and the cardiothoracic ratio improved to 48%. We thought that the child was not affected by significant myocarditis based on the rapid resolution and unremarkable echocardiographic findings, although the diagnosis was not definitively ruled out without cardiac magnetic resonance imaging assessment. Severe acute respiratory syndrome coronavirus 2 might have caused transient ectopic atrial tachycardia and second-degree AV block. On

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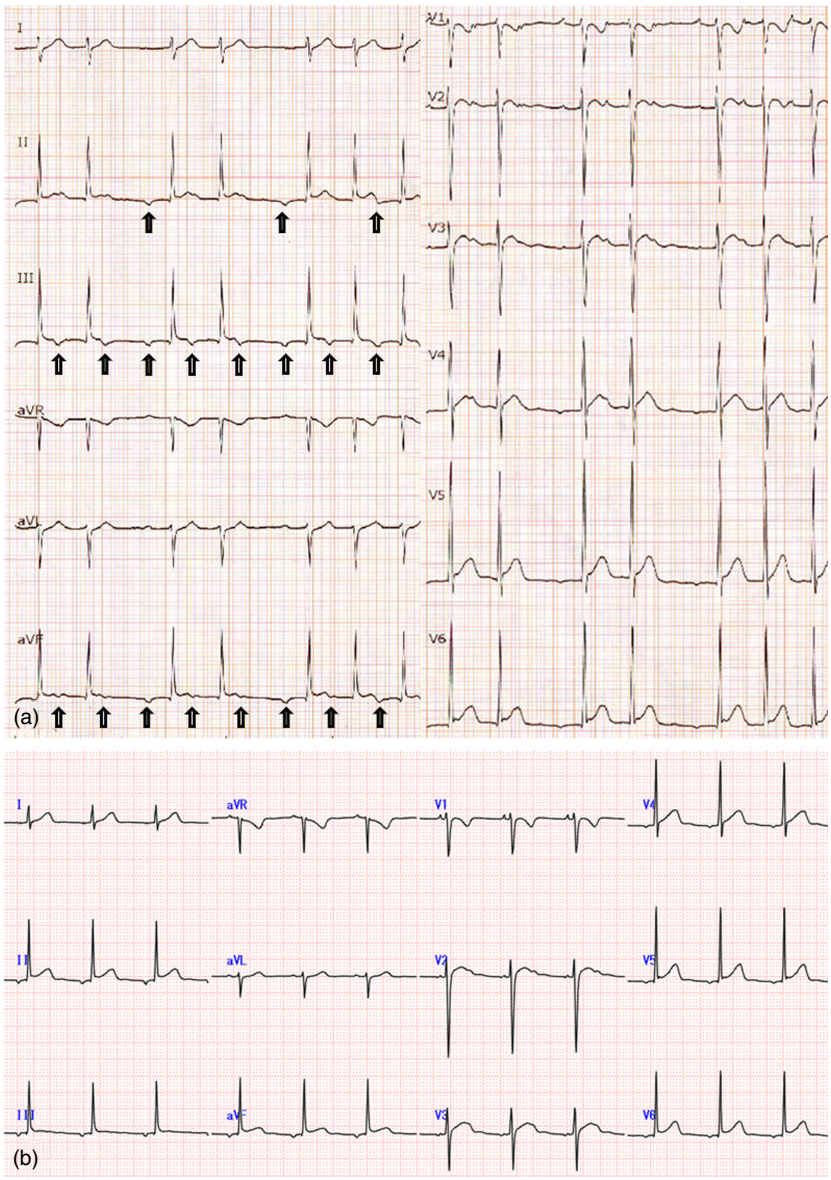

Fig. 1 Tachycardia with inverted P wave in lead II, III, and aVF, and second-degree AV block on day 3 of admission (a). Ectopic atrial rhythm on day 4 of admission (b).

day 13 of admission, he child was discharged home. One month after his discharge, he was well without any complications.

Limited data are available on the incidence of arrhythmias and elevation of cardiac biomarkers in children with COVID-19 mainly before the emergence of the Omicron variant. Small-sized studies in 2020 reported that 16–26% of hospitalized pediatric COVID-19 cases had arrhythmia, which included non-sustained ventricular tachycardia, premature ventricular contraction, supraventricular tachycardia, AV block, and bundle branch blocks.[3,4] For cardiac biomarkers, 12% of pediatric COVID-19 cases showed elevated troponin T levels.[4] Most of those cardiac complications in children were reported to be benign except for MIS-C compared to adult cases.[4]

In this note, we reported the first pediatric Omicron variant COVID-19 pneumonia with arrhythmia. Although the Omicron variant seemed to be mild in children, cardiac involvement requires attention, and further studies are needed.

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Disclosure

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Author contributions

S.K., A.O., and K.T. treated the patient and S.K. and Y.H. drafted the manuscript. All authors critically reviewed and revised the manuscript and agreed on all aspects of this work.

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