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Clinical Notes

A case of classical Kawasaki disease with severe acute respiratory syndrome coronavirus 2 infection in Japan

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Key words COVID-19, Kawasaki disease, multisystem inflammatory syndrome in children (MIS-C), SARS-CoV-2.

The coronavirus disease 2019 (COVID-19) pandemic caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection is widespread worldwide. Recently, pediatric cases of severe SARS-CoV-2 infection with Kawasaki disease-like symptoms were reported in the USA and European countries.[1] This is known as multisystem inflammatory syndrome in children (MIS-C) and has a pathogenesis different from that of classical Kawasaki disease. However, there are only a few reports of patients with classical Kawasaki disease with concurrent SARS-CoV-2 infection.[2] Here, we report such a case of pediatric classical Kawasaki disease with SARS-CoV-2 infection.

A 10-month-old boy was referred to our hospital due to poor oral intake and a fever persisting for 2 days. During consultation, bilateral conjunctival injection, redness of the lips, cervical lymphadenopathy, erythema of the trunk, redness of the Bacillus Calmette Gurin inoculation site, and peripheral edema of the fingers were observed. No coughs or abnormalities on chest radiography were observed. The results of a blood examination are shown in Table 1. Based on the medical examination findings, he was diagnosed with Kawasaki disease. He also tested positive for the SARS-CoV-2 RNA test using TRCReady® SARS-CoV-2 (Tosoh, Tokyo, Japan) at the time of hospitalization. He was subsequently diagnosed with SARS-CoV-2 infection. His mother had nasal snuffle and olfactory dysfunction 2 days before, and she also had a fever. She was diagnosed with SARS-CoV-2 infection on the same test as her son. He did not attend a nursery school, so it was suspected that he was exposed to SARS-CoV-2 from his mother. For the Kawasaki disease, since the severity score was low, intravenous immunoglobulin at 1 g/kg and aspirin at 30 mg/kg/day were started without concomitant corticosteroid use. The fever disappeared the day after treatment initiation, and the other symptoms of Kawasaki disease disappeared promptly. No coronary artery lesions were observed on echocardiography (all coronary artery diameter z-scores <2.5). Regarding SARS-CoV-2 infection, the patient presented with a runny nose and cough from the second day of hospitalization and they did not worsen. The hemodynamics were normal, and no findings suggestive of abnormal coagulation were noted. He was discharged on hospital day 13.

In Japan, a case of Kawasaki disease that developed 8 weeks after the onset of SARS-CoV-2 infection was reported.[3] However, we report for the first time a case that had concurrent occurrence of SARS-CoV-2 infection and Kawasaki disease in Japan. The course was similar to that of general Kawasaki disease, with no aggravation.

Table 1 Results of blood examination

WBC	16 660/μL
Seg	57.0%
Band	5.5%
Lym	30.5%
Mono	6.0%
RBC	513 x10^4/μL
Hb	11.5 g/dL
Plt	42.2 x10^4/μL
TP	7.0 g/dL
Alb	4.7 g/dL
T. Bil	0.3 mg/dL
D. Bil	0.1 mg/dL
AST	44 U/L
ALT	16 U/L
LDH	351 U/L
CK	117 U/L
CRP	3.81 mg/dL
Na	136 mEq/L
K	4.8 mEq/L
Cl	103 mEq/L
Ca	10.1 mg/dL
P	6.0 mg/dL
Mg	2.3 mg/dL
BUN	10 mg/dL
Cre	0.23 mg/dL
UA	5.4 mg/dL
Glu	100 mg/dL
NT-Pro BNP	710 ng/L
D-dimer	1.2 μg/mL

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The symptoms of MIS-C, which have been recently reported in the USA and European countries, often develop after SARS-CoV-2 infection and have similarities to Kawasaki disease. However, patients with MIS-C tend to be older than those with classical Kawasaki disease and often present with gastrointestinal symptoms, heart failure, and shock symptoms; therefore, it is considered to be a disease with a different pathology from classical Kawasaki disease.[1] In the current case, the patient was less than 1 year old and did not progress to severe disease. Therefore, this was considered a classical Kawasaki disease.

Classical Kawasaki disease occurs frequently in Japan, and the number of patients with Kawasaki disease in Japan has not increased after the COVID-19 pandemic. On the other hand, in a survey of patients with Kawasaki disease in Japan who had their SARS-CoV-2 antibody levels measured, 4% had the anti-SARS-CoV-2 antibody, which may be higher than that of ordinary people.[4]

To the best of our knowledge, this is the third globally reported case of classic complete Kawasaki disease that developed at the acute phase of SARS-CoV-2 infection. In severe cases of SARS-CoV-2 infection in adults, the immune response may produce excess inflammatory cytokines, and cytokine storms may cause multiple organ failure.[5] Therefore, cases of Kawasaki disease that develop at the same time as SARS-CoV-2 infection could become severe. However, in our patient, as in previous reports,[2] the symptoms of Kawasaki disease improved rapidly with standard treatment. This might suggest that SARS-CoV-2 infection is less likely to overactivate the immune system both in normal children and those with Kawasaki disease.

In the future, further case accumulation and immunological investigation will be required.

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Disclosure

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Informed consent

Informed consent for publishing this report was obtained from the patient's parents.

Author contributions

E.M. was responsible for writing the manuscript. D.S., S.Y., S.E., and K.I. helped draft the manuscript. All authors have read and approved the final version of this manuscript.

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