Multisystem Inflammatory Syndrome in children (MIS-C) following COVID-19: a mild case presentation without cardiovascular involvement

Multisistemski vnetni sindrom pri otrocih (MIS-C) po COVID-19: blag potek bolezni brez prizadetosti srčno-žilnega sistema

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Abstract

Multisystem Inflammatory Syndrome in Children (MIS-C) is a rare but serious condition associated with prior SARS-CoV-2 infection. It typically presents with systemic inflammation, mimicking Kawasaki disease, and can affect multiple organ systems, with cardiovascular involvement being particularly significant. We present the case of a 6-year-old Caucasian boy who was admitted with fever and systemic signs but without cardiovascular involvement. The patient responded favourably to intravenous immunoglobulin (IVIG) and aspirin, with full recovery. This case highlights the importance of early diagnosis and assessment of MIS-C severity to guide treatment.

Keywords: MIS-C, COVID-19, paediatric inflammatory syndrome, IVIG, Kawasaki-like syndrome, SARS-CoV-2.

Izvleček

Multisistemski vnetni sindrom pri otrocih (MIS-C) je redko, vendar resno stanje, povezano s predhodno okužbo z virusom SARS-CoV-2. Običajno se kaže s sistemskim vnetjem, ki je lahko podobno Kawasakijevi bolezni, in lahko prizadene več organskih sistemov, pri čemer je posebej pomembna prizadetost srčno-žilnega sistema. Predstavljamo primer šestletnega dečka bele rase, ki je bil sprejet v bolnišnico zaradi povišane telesne temperature in sistemskih znakov, vendar brez prizadetosti srčno-žilnega sistema. Bolnik se je ugodno odzval na zdravljenje z intravenskim imunoglobulinom (IVIG) in acetilsalicilno kislino ter je popolnoma okreval. Primer poudarja pomen zgodnje postavitve diagnoze in ocene resnosti MIS-C za ustrezno usmerjanje zdravljenja.

Ključne besede: MIS-C, COVID-19, pediatrični vnetni sindrom, IVIG, Kawasakijevi bolezni podoben sindrom, SARS-CoV-2.

Time point	Clinical events
4 weeks before admission	Upper respiratory tract infection
Day 1	Onset of high-grade fever (around 39–39.6°C) and abdominal pain
Day 4	Hospital admission (20 April 2025); clinical examination revealed mucocutaneous findings; laboratory tests showed elevated inflammatory markers, and imaging demonstrated pleural effusion and abdominal free fluid
Day 4	Initial echocardiography showed normal cardiac structure and function
Day 4–5	MIS-C diagnosed and intravenous immunoglobulin (2 g/kg) administered
Hospital days 5–7	Serial echocardiographic assessments remained normal; progressive clinical improvement
Prior to discharge	Development of thrombocytosis, low-dose aspirin initiated, fingertip desquamation observed
Discharge	Patient discharged in stable condition
Three-week follow-up (14 May 2025)	Complete clinical recovery, normalisation of laboratory markers; repeat echocardiography remained normal

TABLE 1. SUMMARY OF THE KEY CLINICAL EVENTS, DIAGNOSTIC EVALUATIONS AND MANAGEMENT.
TABELA 1. POVZETEK KLJUČNIH KLINIČNIH DOGODKOV, DIAGNOSTIČNIH PREISKAV IN ZDRAVLJENJA.

Introduction

Multisystem Inflammatory Syndrome in Children (MIS-C) is a post-infectious hyperinflammatory condition temporally associated with SARS-CoV-2 infection. It is characterised by persistent fever, systemic inflammation, and involvement of at least two organ systems. While cardiac involvement is commonly reported and significantly contributes to morbidity, cases without cardiovascular involvement can present a diagnostic and therapeutic challenge. Cardiac manifestations are reported in approximately 70–80% of MIS-C patients, with varying degrees of myocardial dysfunction, coronary artery changes, or valvular abnormalities (1–6). However, mild cases with predominantly mucocutaneous or gastrointestinal findings have been increasingly recognised (5–10). According to the Centers for Disease Control and Prevention (CDC), diagnostic criteria for MIS-C include:

- Age under 21 years
- Fever ≥38.0°C lasting ≥24 hours
- Laboratory evidence of inflammation (e.g., CRP, ESR)
- Multisystem (at least two) organ involvement (e.g., cardiac, renal, respiratory, haematological, gastrointestinal, dermatological, or neurological)
- No alternative plausible diagnoses
- Positive for current or recent SARS-CoV-2 infection or COVID-19 exposure during the four weeks before symptom onset

We report a mild case of MIS-C in a 6-year-old Caucasian boy with prominent dermatological and mucocutaneous features, systemic inflammation, but without any cardiovascular involvement on repeated evaluations. The patient was treated with IVIG, and aspirin was introduced because of developing thrombocytosis.

Case description

A 6-year-old Caucasian boy presented to the hospital on 20 April 2025 with high-grade fever (39.0–39.6°C, measured every six hours) persisting for four days, along with abdominal pain. There was no prior diagnosis of cardiovascular disease, and physical examination did not reveal any abnormal cardiovascular findings. The mother reported a history of an upper respiratory tract infection approximately one month before presentation.

A timeline summarising the key clinical events, diagnostic evaluations and management is presented in Table 1.

Clinical examination revealed:

- Polymorphous rash on the face with macules and papules (non-pruritic)
- Bilateral non-purulent conjunctivitis
- Inflammation of the oral mucosa, including strawberry tongue and erythematous lips
- Erythema of the extremities
- Bilateral cervical lymphadenopathy

Imaging studies:

- Chest and abdominal ultrasonography revealed bilateral pleural effusions (5 mm on each side)

Test	Result	Normal Range
WBC	14.33 × 10^9/L	4.5–13.5
Neutrophils (Abs)	12.07 × 10^9/L	2.25–7.91
Neutrophils (%)	84.2%	50–70%
Lymphocytes (%)	10.9%	25–40%
Platelets	119 × 10^9/L	150–450 × 10^9/L
RDW-CV	15%	11.5–14.5%
CRP	232.83 mg/L	<6 mg/L
Ferritin	249 µg/L	30–200 µg/L
D-Dimer	6.97 µg/mL	<0.5 µg/mL
PT	12.5 s	11–13.5 s
PI	117.1%	70–100%
INR	0.95	0.8–1.2
APTT	32.6 s	25–35 s
Fibrinogen	2.69 g/L	2–4 g/L
SARS-CoV-2 IgG	329.6 AU/mL	<50 AU/mL

TABLE 2. LABORATORY INVESTIGATIONS AT PRESENTATION.

TABELA 2. LABORATORIJSKI IZVIDI OB PREZENTACIJI.

SARS-CoV-2 IgG: 329.6 AU/mL (positive; reference value <50 AU/mL)
Serologies (23/04/2025 15:35): Negative for Leptospira IgM/IgG, Leishmania IgG, Parvovirus B19 IgG/IgM, Brucella IgM/IgG

Test	Result	Normal Range
CBC	Normal	—
ESR	17 mm/hr	0–20 mm/hr
CRP	<0.5 mg/L	<6 mg/L
ALT	15 U/L	7–55 U/L
AST	29 U/L	10–40 U/L
GGT	14 U/L	9–36 U/L
ALP	169 U/L	44–147 U/L
T. Bilirubin	10 µmol/L	<21 µmol/L
Direct Bilirubin	Normal	—
Creatinine	24 µmol/L	27–62 µmol/L (child)

TABLE 3. FOLLOW-UP LABORATORY INVESTIGATIONS.

TABELA 3. LABORATORIJSKI IZVIDI OB KONTROLNEM PREGLEGU.

- A total of 100 mL of free fluid was noted in the abdomen
- Hepatomegaly: liver edge palpable 2–2.5 cm below the costal margin

Echocardiographic Evaluation:

- **Atrial and Ventricular Septa:** Intact
- **Chamber Dimensions:** Right and left atrial and ventricular sizes within age-appropriate range
- **Valvular Assessment:** Mitral, tricuspid, aortic, and pulmonary valves structurally normal; no regurgitation or stenosis
- **Great Vessels:** Normal diameters; no abnormalities observed
- **Pulmonary Veins:** Normal drainage into the left atrium
- **Pericardial Space:** No effusion or cysts
- **Left Ventricular Ejection Fraction (LVEF):** 70%
- **Doppler Flow Patterns:** Normal across all valves and vessels
- **Coronary Arteries:** Normal origins and course; no abnormalities noted
- **Summary:** The findings confirmed the continued absence of cardiovascular involvement.

Diagnosis and clinical course

The diagnosis of MIS-C was made based on the CDC and WHO criteria, including persistent fever, multisystem involvement (skin, mucosa, GI, and haematological), elevated inflammatory markers, positive SARS-CoV-2 serology, and exclusion of other infectious causes.

The patient was admitted to the hospital on 20 April 2025. Given the mild nature of the presentation and absence of cardiovascular involvement, the patient received a single dose of IVIG (2 g/kg). No cardiovascular involvement was identified on three separate echocardiographic assessments.

Following the development of thrombocytosis, low-dose aspirin (5 mg/kg/day) was initiated. Desquamation of the fingertips was observed prior to discharge, reinforcing the MIS-C diagnosis. The patient improved progressively and was discharged in stable condition.

The patient returned for follow-up evaluation three weeks post-discharge on 14 May 2025. Clinical reassessment confirmed complete resolution of previous symptoms, with no fever, mucocutaneous changes, or abdominal complaints.

All laboratory markers had normalised (Table 3).

These findings confirmed biochemical recovery and absence of ongoing inflammation.

Echocardiographic Evaluation:
A repeat echocardiogram was performed on 14 May 2025 to evaluate any delayed cardiac involvement. The findings were entirely within normal limits.

Echocardiography Findings:

- **Atrial and Ventricular Septa:** Intact
- **Chamber Dimensions:** Right and left atrial and ventricular sizes within age-appropriate range
- **Valvular Assessment:** Mitral, tricuspid, aortic, and pulmonary valves structurally normal; no regurgitation or stenosis

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Summary: The findings confirmed the continued absence of cardiovascular involvement.

Discussion

This case underscores the heterogeneous clinical presentation of MIS-C. While most studies describe prominent cardiovascular involvement, including myocarditis, ventricular dysfunction, and coronary artery abnormalities (1–7), our patient exhibited a milder form of the syndrome with predominant dermatological, gastrointestinal, and haematological features. The absence of cardiac involvement despite significant systemic inflammation aligns with reports indicating that MIS-C encompasses a wide clinical spectrum, ranging from Kawasaki-like illness to severe shock and organ failure (7, 9).

Epidemiologically, MIS-C remains rare but clinically significant. Reported incidence rates vary from 2 to 5 cases per 100,000 children, with the median age between 8 and 11 years (2, 6). Boys are slightly more commonly affected, and the majority of patients present approximately four to six weeks after exposure to SARS-CoV-2. Global studies indicate substantial variability in severity: around 60–80% show cardiac involvement, 40–50% require intensive care, and mortality remains below 2% with appropriate treatment (1–6). In contrast, non-cardiac or mild phenotypes are less frequently documented but are increasingly recognised as distinct subgroups, often characterised by mucocutaneous and gastrointestinal manifestations without myocardial injury (5, 10).

Phenotypically, MIS-C can be broadly divided into three clinical clusters: (1) Kawasaki-like presentations, (2) shock or myocarditis-dominant forms, and (3) mild systemic inflammatory phenotypes without cardiac dysfunction (6, 7, 10). Our case clearly falls within the third phenotype, characterised by mucocutaneous findings, elevated inflammatory markers, and good response to IVIG monotherapy without the need for corticosteroids. Recognition of these phenotypes is clinically important, as they guide risk stratification, monitoring frequency, and therapeutic intensity.

IVIG remains the cornerstone of MIS-C treatment, particularly in cases overlapping with Kawasaki disease (8). In our patient, the favourable response to IVIG monotherapy supports its efficacy in less severe presentations. The later onset of thrombocytosis and desquamation aligns with the convalescent phase of inflammatory syndromes, reaffirming the diagnosis. Troponin levels were not elevated, and echocardiography revealed no myocardial dysfunction or coronary artery changes on serial assessments performed by a paediatric cardiologist. Although serial inflammatory markers were not obtained repeatedly during the inpatient course, the marked reduction in CRP from 232.83 mg/L at admission (20 April 2025) to less than 0.5 mg/L at the three-week follow-up, paralleling clinical defervescence and resolution of mucocutaneous findings, is consistent with an effective inflammatory response to IVIG.

The differentiation between MIS-C and Kawasaki disease remains challenging. Both conditions share fever, mucocutaneous involvement, and elevated inflammatory markers; however, MIS-C is more often associated with gastrointestinal symptoms, lymphopenia, and elevated D-dimer levels, whereas thrombocytosis and coronary artery aneurysms are more common in Kawasaki disease (8, 9, 11, 12). In this case, normal cardiac findings, the absence of coronary involvement, and the timing following SARS-CoV-2 exposure support MIS-C rather than classic Kawasaki disease.

Globally, post-pandemic analyses suggest that the frequency of MIS-C is decreasing in parallel with widespread population immunity, but diagnostic precision remains crucial since many children now show positive serology from past infection or vaccination (6). Therefore, detailed exclusion of other infectious and autoimmune conditions, as done in this case, remains essential.

This case contributes to the growing body of evidence that not all MIS-C presentations necessitate intensive care or combination immunosuppressive therapy. Careful assessment, serial echocardiography, and tiered management according to severity are essential for achieving full recovery while avoiding overtreatment. Continued reporting of such mild, non-cardiac cases is valuable to refine future diagnostic criteria and management pathways. A limitation of this report is the absence of interval CRP or ESR measurements between admission and the three-week follow-up, as clinical improvement during hospitalisation was monitored primarily on clinical grounds. Serial biochemical sampling in future cases would help to characterise the kinetics of inflammatory resolution following IVIG in mild, non-cardiac MIS-C.

Conclusions

MIS-C remains a challenging diagnosis, especially in its milder forms lacking cardiac involvement. This case underscores the need for thorough clinical and laboratory evaluation and sup-

ports the use of IVIG alone in non-severe presentations. Monitoring for evolving features, such as desquamation and haematological changes, is crucial in confirming the diagnosis and tailoring therapy.

Data Availability Statement

All data relevant to this case report are included within the article. Additional inquiries can be directed to the corresponding author.

Ethics Statement

Written informed consent was obtained from the patient's legal guardian for the publication of this case report and any accompanying images.

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Ethical Considerations

This study was approved by the Ethics Committee.

Consent to Report

All images were obtained with the approval of the patient's parents and solely for scientific reporting and communication. Written informed consent was obtained.

Declaration of conflicting interests

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