

# Two adult cases of multisystem inflammatory syndrome associated with SARS-CoV-2



Karolina Mieczkowska, BS,<sup>a</sup> Tian Hao Zhu, MD,<sup>a</sup> Lauren Hoffman, MD,<sup>a</sup> Rachel C. Blasiak, MD, MPH,<sup>a</sup> Kenneth J. Shulman, MD,<sup>b</sup> Mathew Birnbaum, MD,<sup>a</sup> David H. Ciocon, MD,<sup>a</sup> Rithu Srikantha, MD,<sup>a</sup> and Beth N. McLellan, MD<sup>a</sup>  
*Bronx and White Plains, New York*

**Key words:** COVID-19; dermatology; Kawasaki disease; multisystem inflammatory syndrome in adults (MIS-A); multisystem inflammatory syndrome.

## INTRODUCTION

Since the emergence of SARS-CoV-2 worldwide, various manifestations and sequelae have been reported, including COVID-19-associated Kawasaki-like multisystem inflammatory syndrome in children. This dysregulated immune sequela often presents with features of hypotension or shock, cardiac dysfunction, arterial or venous thromboembolism, gastrointestinal discomfort, and protean skin manifestations.<sup>1</sup> More recently, the Centers for Disease Control and Prevention has acknowledged an increasing incidence of multisystem inflammatory syndrome in adults (MIS-A). The diagnostic criteria for MIS-A includes individuals aged  $\geq 21$ , positive SARS-CoV-2 testing indicating recent infection, multi-organ dysfunction without severe respiratory illness, and elevated inflammatory markers.<sup>2</sup> We describe 2 adult patients with signs and symptoms compatible with MIS-A for which dermatologic findings were the presenting symptoms.

## CASE REPORTS

### Case 1

A 32-year-old man with no significant past medical history presented to the emergency department (ED) with 3 days of subjective fevers, right groin lymphadenopathy confirmed by computed tomography imaging, and an erythematous, burning rash localized to the palms and soles (Fig 1, A). He had experienced symptoms consistent with COVID-19 2 months previously (fever, anosmia and ageusia, myalgias, and cough) but was not tested by polymerase chain reaction (PCR) for SARS-CoV-2 at that time. He was

### Abbreviations used:

ED:	emergency department
MIS-A:	multisystem inflammatory syndrome in adults
PCR:	polymerase chain reaction

started on trimethoprim-sulfamethoxazole for suspected groin cellulitis of unclear etiology. Over the following week, he developed mild facial swelling, nonexudative bilateral conjunctival injection, lingual erythema, palatal petechiae, diffuse lacy erythematous rash, significant palmar desquamation (Fig 1, B), acral paresthesias, and there was a notable absence of respiratory symptoms. Drug reaction with eosinophilia and systemic symptoms was considered but because the fevers, lymphadenopathy, and onset of rash preceded the use of trimethoprim-sulfamethoxazole, this diagnosis was not pursued. He returned to the ED, where a further work-up included a negative SARS-CoV-2 PCR on DNA from a nasopharyngeal swab in the presence of anti-SARS-CoV-2 IgG antibody positivity, transaminitis (aspartate aminotransferase, 125 U/L; alanine transaminase, 297 U/L), direct hyperbilirubinemia (2.1 mg/dL), and elevated inflammatory markers, including fibrinogen (597 mg/dL), procalcitonin (0.26 ng/mL), ferritin (706 ng/mL), erythrocyte sedimentation rate (91 mm/hr), C-reactive protein (44.7 mg/dL), D-dimer (334 ng/mL), and IL-6 (48.9 pg/mL). Tachycardia was also present, which prompted an echocardiogram revealing a mildly decreased ejection fraction (55%) and some pericardial effusion. A punch biopsy from

From the Albert Einstein College of Medicine, Department of Medicine, Division of Dermatology<sup>a</sup>; Dermopath Diagnostics.<sup>b</sup>

Funding sources: None.

Correspondence to: Dr. Beth N. McLellan, MD, 3411 Wayne Avenue 2<sup>nd</sup> Floor, Suite D, Bronx, NY 10467. E-mail: [bmcllella@montefiore.org](mailto:bmcllella@montefiore.org).

JAAD Case Reports 2021;10:113-5.

2352-5126

© 2021 by the American Academy of Dermatology, Inc. Published by Elsevier, Inc. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

<https://doi.org/10.1016/j.jidcr.2021.02.015>



**Fig 1.** **A**, Erythematous, nonpruritic, burning rash on the palms and soles. **B**, Subsequent desquamation on the palms one week later.

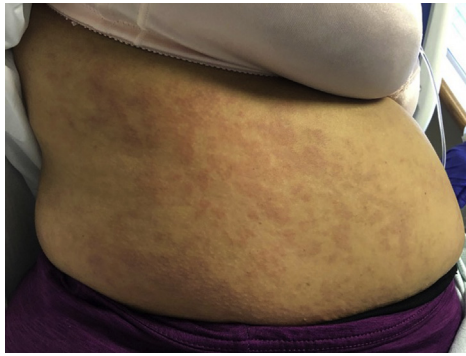
the patient's back was performed revealing perivascular mononuclear lymphocytic infiltrate with a few eosinophils and parakeratosis.

While the patient's symptoms and laboratory tests began to improve during the following week, he subsequently developed fever (101.4 °F) and diarrhea, and was therefore admitted. Laboratory results revealed leukocytosis (16,900 cells/ $\mu$ L), thrombocytosis (509/nL), and persistently elevated inflammatory markers. A chest radiograph was normal, and repeat echocardiogram revealed slightly increased pericardial effusion. All other infectious work-up tests were negative. Repeated SARS-CoV-2 PCR on DNA from a nasopharyngeal swab was positive, and, in light of the constellation of findings, the patient was diagnosed with post-COVID-19 MIS-A. A CT angiogram of the heart was performed, which showed no evidence of coronary artery aneurysm. The patient received therapy with enoxaparin and intravenous methylprednisolone (2 mg/kg). Following discharge on a 2-week prednisone taper, the patient had a complete recovery.

## Case 2

A 43-year-old female with no significant past medical history presented to the ED with a 10-day history of myalgias, headache, and recurring fevers despite antipyretic use, accompanied by cough for 5 days and a pruritic rash for 3 days. Physical findings included decreased breath sounds at the right lung base with x-ray findings suggestive of a right

basilar pneumonia and an erythematous, morbilliform eruption, which began on the palms and upper extremities and subsequently spread to the trunk and lower extremities sparing the face, suggestive of a viral exanthema (Fig 2). In addition to leukocytosis (21,500 cells/ $\mu$ L) and increased inflammatory markers, including C-reactive protein (28.3 mg/dL), erythrocyte sedimentation rate (63 mm/hr), ferritin (985.8 ng/mL), D-dimer (3.23  $\mu$ g/mL), IL-6 (94.9 pg/mL); the presence of transaminitis (aspartate aminotransferase, 94 U/L; alanine transaminase, 185 U/L; alkaline phosphatase, 158 U/L), and direct hyperbilirubinemia (1.3 mg/dL) prompted an abdominal ultrasound, which revealed hepatomegaly, hepatic steatosis, and trace pericholecystic fluid. Notably, PCR for SARS-CoV-2 on DNA from a nasopharyngeal swab was negative in the presence of positive SARS-CoV-2 serology. She had not previously had symptoms suggestive of COVID-19. The patient's hospital course was complicated by distributive shock requiring vasopressors with subsequent acute kidney injury and cardiomyopathy accompanied by a decreased ejection fraction (40%) and a rise in troponin levels (0.16 ng/mL). Extensive infectious and autoimmune work-up was unrevealing. Given minimal respiratory involvement and no improvement with broad-spectrum antibiotics, a post-COVID hyperinflammatory response was suspected. The patient showed clinical improvement with initiation of methylprednisolone (40 mg twice a day) and heparin, with resolution of cutaneous findings and



**Fig 2.** Erythematous, morbilliform eruption, which began on the bilateral palms and upper extremities and spread to the trunk and lower extremities, sparing the face.

laboratory tests indicating normalization of hepatic and renal function. She was transitioned to apixaban and prednisone with a 4-week taper with full recovery.

## DISCUSSION

Multisystem inflammatory syndrome is a newly recognized condition associated with SARS-CoV-2, which shares features of Kawasaki disease, toxic shock syndrome, and hemophagocytic lymphohistiocytosis, which are closely linked to underlying immune dysregulation.<sup>3</sup> In contrast to the acute cytokine storm observed in the early phase of COVID-19, MIS-A has been observed to occur later in the disease progression, often after an initial recovery period when nucleic acid testing may be negative but antibody testing remains positive, representing post-infectious processes as observed in our 2 patients.<sup>2</sup>

A case series published by the Centers for Disease Control and Prevention revealed common clinical signs and symptoms of MIS-A, which includes fever (75%), cardiac symptoms such as chest pain or palpitations (38%) with cardiac abnormalities (100%), gastrointestinal symptoms (81%), and dermatologic manifestations (31%).<sup>2</sup> More importantly, most individuals had minimal respiratory symptoms, hypoxemia, or radiographic abnormalities, distinguishing MIS-A from hospitalized adults with severe COVID-19. The 2 cases described here demonstrate similar findings, including multiple extrapulmonary organ involvement in the setting

of markedly elevated laboratory markers of inflammation.

Skin involvement can be a helpful clue to clinicians when diagnosing MIS.<sup>4,5</sup> Few detailed dermatologic descriptions exist but include generalized erythematous or violaceous maculopapular eruption, erythema multiforme-like eruption, palmoplantar desquamation, conjunctival injection, strawberry tongue, acral or facial swelling, and mucositis.<sup>2,3,6,7</sup> We report 2 patients with MIS-A, who initially presented with exanthema, with one further developing acral desquamation and conjunctival involvement. Prompt recognition of MIS in both cases led to successful treatment with systemic steroids. Although no standardized guidelines exist for this condition, additional positive outcomes have been reported with intravenous immunoglobulin and the IL-6 inhibitor tocilizumab.<sup>2,3</sup> Because of the potential treatments that might benefit these patients, clinicians should have a heightened awareness that certain cutaneous presentations can be indicative of more underlying systemic involvement after SARS-CoV-2 infection.

## Conflicts of interest

None declared.

## REFERENCES

1. Chiotos K, Bassiri H, Behrens EM, et al. Multisystem inflammatory syndrome in children during the coronavirus 2019 pandemic: a case series. *J Pediatr Infect Dis Soc*. 2020;9:393-398.
2. Morris SB, Schwartz NG, Patel P, et al. Case series of multisystem inflammatory syndrome in adults associated with SARS-CoV-2 infection - United Kingdom and United States, March-August 2020. *MMWR Morb Mortal Wkly Rep*. 2020;69:1450-1456.
3. Shaigany S, Gnirke M, Guttmann A, et al. An adult with Kawasaki-like multisystem inflammatory syndrome associated with COVID-19. *Lancet*. 2020;396:e8-e10.
4. Chowdhary A, Joy E, Plein S, Abdel-Rahman SE. Multisystem inflammatory syndrome in an adult with SARS-CoV-2 infection. *Eur Heart J Cardiovasc Imaging*. 2020;jeaa232.
5. Kofman AD, Sizemore EK, Detelich JF, Albrecht B, Piantadosi AL. A young adult with COVID-19 and multisystem inflammatory syndrome in children (MIS-C)-like illness: a case report. *BMC Infect Dis*. 2020;20:716.
6. Sokolovsky S, Soni P, Hoffman T, Kahn P, Scheers-Masters J. COVID-19 associated Kawasaki-like multisystem inflammatory disease in an adult. *Am J Emerg Med*. 2021;39:253.e1-253.e2.
7. Cherif MY, de Filette JMK, André S, Kamgang P, Richert B, Clevenbergh P. Coronavirus disease 2019-related Kawasaki-like disease in an adult: a case report. *JAAD Case Rep*. 2020;6:780-782.