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The Many Faces of COVID19 Infection: A Case of Multisystem Inflammatory Syndrome in Adults (MIS-A)

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INTRODUCTION

- Multisystem Inflammatory Syndrome (MIS) is a severe inflammatory complication of SARS-CoV-2 infection that was initially described in children and adolescents. There have been several case reports describing a similar syndrome in adults, referred to as MIS in adults (MIS-A).
- A 39-year-old woman with a past medical history of hypertension and obesity presented to the emergency department with complaints of weakness, syncope, diarrhea, and oliguria for the past two days.
- She was admitted to the ICU for management of shock and acute renal failure.

CASE DESCRIPTION

Vital signs: 96.4F, 96/69 mm Hg, 98 bpm, 19 breaths/minute, SPO2 97% on room air.

Physical Exam: Non-toxic appearing, no acute distress, dry mucous membranes. Otherwise, her exam is unremarkable.

DIAGNOSTIC WORK UP

Labwork: leukocytosis, acute kidney injury, lactic acidosis, metabolic acidosis, and elevated creatinine kinase, ferritin, D-dimer, CRP, and interleukin-6.

Microbiology: Blood and urine cultures were negative. **SARS-CoV-2 PCR was positive.** SARS-CoV-2 antibody testing was negative.

Imaging: Echocardiogram showed hyperdynamic left ventricle and moderate left ventricular hypertrophy, but was otherwise normal. CT scan of the chest, abdomen, and pelvis was unremarkable.

HOSPITAL COURSE

- Treated with IV fluids, multiple vasopressors, stress dose steroids, and broad-spectrum antibiotics due to concern for septic shock.
- Intubated due to severe metabolic acidosis and impending respiratory failure.
- Started on continuous renal replacement therapy due to worsening acute renal failure

- Developed atrial fibrillation with rapid ventricular response that was refractory to two cardioversions.
- Her COVID test returned positive. This along with her clinical picture of multi-organ involvement, severe inflammation with relative lack of respiratory disease raised suspicion for MIS-A. She was treated with pulse dose corticosteroids, IVIG, and tocilizumab.
- She developed acute ischemia of the right hand due to a right radial thrombus.
- Found to have new anisocoria with decreased responsiveness. MRI of the head was negative for a stroke.
- Unfortunately, on day 4 the patient suffered from cardiac arrest, which was unable to be reversed.

DISCUSSION

- Per the Center for Disease Control (CDC), MIS-A is diagnosed by the following criteria:
 1. Hospital admission in patients 21 and older
 2. A previous or current positive COVID-19 test during hospital admission or in the last 12 weeks
 3. Severe dysfunction of at least one non-lung organ system (eg, low blood pressure, shock, cardiac abnormalities, arterial or venous blood clots, thromboembolism, liver damage)
 4. Test results indicating severe inflammation (eg, elevated C-reactive protein, ferritin, D-dimer, interleukin-6)
 5. The absence of severe respiratory disease
- Potential pathways mediating this hyperinflammatory response include direct viral tissue damage, endothelial damage and thromboinflammation, dysregulation of immune response, and dysregulation of the RAAS pathway.
- Patients with MIS-A may not have a positive SARS-CoV-2 PCR or antigen test results. Thus, antibody testing may be needed to confirm prior SARS-CoV-2 infection.
- Of the few case reports of MIS-A, patients have been treated with IVIG, corticosteroids, and tocilizumab.



CT scan of the chest which demonstrated relatively clear lungs.

CONCLUSION

- MIS-A is a severe illness requiring hospitalization in adults with COVID-19 infection that is characterized by extrapulmonary organ(s) dysfunction with lab evidence of inflammation and an absence of severe respiratory disease.
- MIS-A has a heterogenous presentation, often characterized by severe multi-organ inflammation requiring multidisciplinary care.
- More research is needed to elucidate the pathogenesis and management of this rare and potentially fatal disease.

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