



## CASE REPORT

# Abdominal Pain, a Red Herring for Multisystem Inflammatory Syndrome in Children (MIS-C): A Case Report

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### Keywords

COVID-19, Pediatric, Fever, Inflammation, SARS-CoV-2, MIS-C, Primary care

### Introduction

In the United States (U.S.) beginning in late April to early May 2020, cases of severe illness and in rare cases death associated with SARS-CoV-2, the virus that causes COVID-19, were reported among previously healthy children and adolescents [3]. Later named Multisystem Inflammatory Syndrome (MIS-C), this illness was initially described in the United Kingdom followed by Spain, Italy, and France, though the current characterization of MIS-C is limited [1-3]. In the United States, over 200 patients with this disease have been described in 26 states with four pediatric deaths as of late May [1-3]. MIS-C is described as a severe inflammatory syndrome with Kawasaki like features in children under the age of 21 with laboratory evidence of current or past exposure to SARS-CoV-2 as evidenced by a positive SARS-CoV-2 PCR or SARS-CoV-2 antibody test or exposure to persons with Covid-19 in the last four weeks [4]. The following symptoms have been observed in varying severities among the previously described patients with differing presentations; prolonged fever of > 38 Celsius (longer than 24 hours), hypotension, respiratory distress, multi-organ involvement requiring hospitalization (> 2 systems, cardiac, respiratory, renal, hematologic, gastrointestinal, dermatologic, and neurologic), elevated inflammatory markers (CRP, ESR, procalcitonin, fibrinogen, ferritin,

d-dimer, LDH, IL-6), elevated neutrophils, reduced lymphocytes, and low albumin [4,5]. Many of these cases featured a Kawasaki-like syndrome in the setting of a positive SARS-CoV-2 PCR [4,5]. Some cases occurred in children with laboratory evidence of past infection where the infection was potentially contracted from an asymptomatic contact and the children and their caregivers were unaware of the infection [5]. Many of these children had no underlying medical conditions [5]. Atypical cases can also occur where children test negative for the SARS-CoV-2 PCR, but laboratory evidence is found to be characterized by the presence of past infection as evidenced by positive antibodies for SARS-CoV-2 [5]. In order to get timely and optimal care for these young patients, it is important that health care providers keep all these presentations in mind. This case describes a 14-year-old female initially presenting to her primary care provider with abdominal pain and was treated for a suspected urinary tract infection but was later admitted to the hospital and diagnosed with MIS-C in less than 24 hours. This atypical presentation leading to a complicated hospitalization and resulting cardiac complications underscores the importance of identifying and understanding the course of MIS-C as represented by this case in order to guide future diagnosis, treatment, and referral in a family practice setting. This will ultimately aid in providing timely and optimal care for children during the current pandemic. The importance of discussing MIS-C as cases continue to rise in the community are especially important as decisions are being made by both families and policy makers to send children back to school.



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**Table 1:** Lab trends from day zero-day ten.

LAB TEST	COVID-19 PCR	WBC	HGB/HCT	PLTS	LDH	Ferritin	COVID-19/1gM/IgG	Urinalysis	Blood Type
Day									
0	ND								
1	ND								
2		10.06	11.4/35.2	336					
3						224	positive		
4		10.14	10.7/32.2	353 (H)		945			
5									
6		16.27	10.1/30.2	443 (H)	826 (H)	1327 (H)			
7				500 (H)	789 (H)	1100 (H)			
8		19.9 (H)	9.7/28.5 (L)	628 (H)	687 (H)	705 (H)	positive	negative	AB+
9									
10									

ND = Not Detected

**Table 2:** Follow up labs were drawn and noted.

LAB TEST	AST/ALT	ALKPhos	CRP	D Dimer	Fibrinogen	INR	PT/PTT	Triglycerides	SED rate/ANA
Day									
0									
1	hemolyzed/9	14.3 (H)			1.1		11.1/22.8		/negative
2									/positive
3									
4									125 (H)/
5									
6	230/126 (H)	80 (L)	3.2 (H)	0.98 (H)	469 (H)	1.0	10.9/26.2	206 (H)	130 (H)/
7	150/109 (H)	80 (L)	1.7 (H)						
8									
9									
10									

## Case Description

MW is a 14-year-old African American obese female patient at a primary care practice in suburban Maryland. She has been a patient at the private practice for eight years and her past medical history is noted in [Table 1](#). She regularly seeks primary care at the practice with her mother, grandmother and sibling who all reside together. This particular clinic has SARS-CoV-2 PCR testing readily available for patients and drive-up testing for anyone twice per week. In the summer of 2020 (day zero) the patient was seen for her monthly follow up for Attention Deficit Disorder but also had complaints of allergies, fever, headache, ear pain, and abdominal pain. Physical exam revealed the following: Weight 201 pounds, temperature 100.2 Fahrenheit, and pulse of 127. Physical exam noted injected eyes, boggy turbinates, and diffuse abdominal pain. The patient was treated for allergic rhinitis with Xyzal and was given Tylenol for fever. Bactrim was prescribed for a presumptive Urinary Tract Infection (UTI) and a urine sample was collected for urinalysis and culture. SARS-CoV-2 PCR testing was

provided for the entire family at this visit including MW. The SARS-CoV-2 PCR test was negative (reported on day one) and the urinalysis was abnormal with 2+ WBC esterase, 1+ protein, 1 + ketones, and 2+ occult blood (reported on day two). The microscopic urine showed > 30 WBCs and the culture grew mixed urogenital flora > 100,000 colony units per mL. MW was discharged home from the family practice on day zero, but symptoms worsened after a dose of Bactrim and the patient suffered a syncopal episode resulting in her being taken to a local emergency room. Upon arrival at the emergency room MW complained of a band like headache, diffuse abdominal pain, conjunctivitis, and fever. She was noted to be tachycardic and hypotensive. MW went into cardiac arrest, was resuscitated, and diagnosed with urosepsis versus pyelonephritis. Due to concerns about MIS-C, the patient was tested and found to be positive for the Anti-SARS-CoV-2 antibody. At this point patient MW was transferred to a children's hospital for specialty care. She was given intravenous Bactrim for pyelonephritis which resulted in her going into cardiac arrest.

She was resuscitated and transferred to the pediatric intensive care unit where she was weaned off of vasopressors and given one dose of Intravenous Immunoglobulin (IVIG). She was then transferred to a subacute unit where she continued to receive Tylenol, albuterol, enoxaparin, and ibuprofen. The antibiotic was changed to aztreonam beginning day two. MW's condition continued to improve clinically, and she was discharged on day seven with a prescription for levofloxacin to complete the 10-day course.

Although MW improved clinically her white blood cell count continued to trend upwards during her hospitalization. Her ferritin level also remained elevated at the time of discharge. [Table 1](#) and [Table 2](#) note lab trends from day zero-day ten. Upon discharge from the hospital, the patient followed up at the primary care practice on day eight with a new diagnosis of MIS-C s/p IVIG. Clinically the patient appeared well but had complaints of fatigue and headache. On the physical exam weight was 194 pounds (down six pounds since day zero), temp 98.4, respirations 18, and pulse oximetry 98 percent. MW was continued on levofloxacin for pyelonephritis and Tylenol for headache. MW was also given referrals to cardiology and rheumatology. Follow up labs were drawn and noted in [Table 2](#). MW was seen on day ten to review lab results and was clinically stable. At this time, cardiology's completed referral report was available. The reported noted trivial tricuspid and mitral valve regurgitation. MW was also placed on a Holter monitor to assess for any cardiac abnormalities as the patient had complaints of palpitations. No SBE prophylaxis or activity restrictions were recommended. Cardiology's plan at the time of discharge was to see her again in one month.

## Conclusion

It is still unclear if MIS-C is a post-infectious complication or a primary complication of SARS-CoV-2, the virus that causes COVID-19. However, MW had a negative SARS-CoV-2 PCR test on day zero although she tested positive for Anti-Sars-CoV-2 antibody on day one. Anecdotally MIS-C can present at any time but has been seen anywhere from one to six weeks following infection and may overlap with an acute respiratory COVID-19 presentation [1,2]. Although it can appear similar to Kawasaki's Disease (KD) many have described cases of MIS-C that fall outside the typical age group (younger) and ethnicity (Asian) of the classic KD patient [5].

It is not clear if this syndrome is unique to children or if it also occurs in adults with COVID-19 or COVID-19 exposure. A high percentage (23 percent to 28 percent) of children with MIS-C in Europe and the United States had comorbidities including asthma, obesity, cardiovascular disease, and immunosuppression [4,6]. MW's comorbidities included asthma, allergies, pre-diabetes, and obesity. Although mortality in children with COVID-19 admitted to critical care units remains low at less

than five percent, racial and ethnic disparities in rates of infection and mortality have already been recognized [7]. Furthermore, there has been a disproportionate impact on African Americans during this pandemic related to existing health care disparities [9]. As testing becomes more available and as primary care physicians begin to prepare to conduct back to school exams and vaccinations, it is important to consider antibody testing in children under the age of 21 such as MW who may have a negative SARS-CoV-2 PCR test but was positive for Anti SARS-CoV-2 antibody. These children who have positive antibodies or known exposure to SARS-CoV-2 are at increased risk of developing MIS-C and therefore they should be monitored closely especially when presenting to primary care with atypical symptoms such as abdominal pain and fever.

Studies in the U.S. found that the majority of patients under the age of two with MIS-C symptoms had a previously positive or currently active SARS-CoV-2 PCR test. However, one third tested negative for SARS-CoV-2 PCR but tested positive for the SARS-CoV-2 antibody IgG/IgM [9]. Cardiovascular complications are common with MIS-C [9]. It is unclear if MW's hypotension that required vasopressors was an adverse effect of the antibiotics or related to the MIS-C. Broad spectrum antibiotics are recommended especially when MIS-C is overlapped with severe bacterial infections such as MW's pyelonephritis/urosepsis [5]. In addition, MW's suspected allergies caused multiple changes in antibiotics which complicated her hospital course. Due to her need for vasopressors, she is now at risk for coronary artery aneurysms and is currently being followed closely by cardiology and with follow up echocardiograms.

Twenty-five percent of the participants in the Feldestein, et al.'s study had the same ethnicity and age as MW and greater than one third were obese [9]. These characteristics in exposed children may increase their risk for acquiring MIS-C. Finally, up to 30 percent of COVID-19 PCR testing may be a false negative [8]. When children are exposed to COVID-19 positive relatives they may test negative but ultimately develop antibodies. The development of SARS-CoV-2 IgM antibodies along with other acute conditions may predispose children to MIS-C after exposure to COVID-19. Retest of all household contacts that tested negative initially should be completed. All MIS-C symptoms should be followed up immediately in children that may have possible exposure to COVID-19. All children that have been in contact with COVID-19 positive individuals and test negative for COVID-19 by PCR should receive SARS-CoV-2 antibody testing especially if the patient has comorbidities or an acute infection.

## Author Disclosure

No relevant financial affiliations or conflicts of interest.

All authors contributed equally to writing of this case report.

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