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A Multisystem Inflammatory Syndrome in Children (MIS-C) with Kidney Involvement: A Case Report

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Abstract

Worldwide the incidence and severity of COVID-19 within the pediatric population is markedly lower when compared to their counterpart in the general population. The disease creates a spectrum of presentations ranging from asymptomatic ones, to Multisystem Inflammatory Syndrome in Children (MIS-C). The majority of COVID-19 cases do not progress to MIC-S with the etiology of this progression largely unknown. Two major themes within the realm of MIC-S are the demanding course of the disease and its good prognosis [1-3].

Keywords: Multisystem Inflammatory Syndrome in Children (MIS-C); Pediatrics SARS-CoV-2 infection; MIS-C with AKI; MIS-C with kidney involvement

Introduction

In December, 2019, the culprit of the COVID-19 pandemic, severe acute respiratory syndrome coronavirus (SARS-CoV-2), was first reported in China. Most children who have become infected with the virus, developed a mild illness, while some had a rather complicated disease course. The experiences of Pediatricians with growing literature support, paved the path for the introduction of MIC-S, on April 25, 2020. This transient Covid-induced syndrome, was defined by the World Health Organization (WHO) as the presence of fever lasting more than 3 days, and at least 2 clinical signs of multisystem involvement (cardiac, gastrointestinal, renal, dermatologic or hematologic) in a child or adolescent aging 0-19 years. An evidence of current or previous SARS-CoV 2 infection, elevated inflammatory markers with no evidence of microbial cause of the inflammation were prerequisites to the diagnosis. MIS-C can lead to shock with multi-organ failure requiring intensive care admission. Recognition of the spectrum of disease presentation, treatment and prognosis is paramount to reducing the morbidity and mortality associated with the disease [4,5].

Case Presentation

We report a case of an eight year old girl, previously healthy, who was referred to our COVID unit, due to COVID-19 infection. Her history goes back to approximately 45 days prior to her presentation to our unit, when her entire family tested positive to the COVID-19 virus. At that time, she only had two episodes of fever and was not tested to the COVID-19 virus.

She at first, presented to another hospital one day prior to her referral, with a 4 days Hx of high grade fever reaching 39˚C axillary, associated with 2 episodes of non projectile non bilious vomiting and 3 episodes of watery non mucoidy non bloody diarrhea.

Upon her presentation (Figure 1) to the other hospital, she was found to be somnolent but arousable, tachycardiac and her physical examination was remarkable for purulent tonsilitis. Blood, urine and CSF cultures were taken and started on Ceftriaxone. A few hours later the patient started to desaturate and became hypotensive vasopressors started and intubation was done. Once her PCR for COVID-19 came positive, she was transferred to our unit due to the lack of a COVID unit in the previous hospital.

Upon her arrival to our hospital, she was found to have generalized edema and was still hypotensive, so the dose of the vasopressor was incremented, and an urgent TTE and a cardiologist was consulted, TTE done showed good contractility and early signs of myocarditis.

Labs done and were positive for MIS-C with heart, kidneys, liver and lungs involvement (Table 1).

Table 1: Investigations done on admission.

CBCD	
Total white blood cells	20.6 10^9/L
Hemoglobin	11 g/l
Hematocrit	31.8%
Platelet	75.9 cu/mm^3
MCV	83.8 fl
Biochemistry	
Random serum glucose	
Creatinine	3.32 mg/dL
BUN	62 mg/dL
Na+	127 mmol/L
K+	4.71 mmol/L
CL-	95 mmol/L
HCO3	12.6 mmol/L
Ca+	7.3 mg/dL
Mg+	2.5 mg/dL
P	6.75 mg/dL
LDH	486 IU/L

Total serum bilirubin	2.53 mg/dL
Direct serum bilirubin	2.53 mg/dL
Albumin	25 g/L
Globulin	21 g/L
SGOT	215 IU/L
SGPT	75 IU/L
Alkaline phosphatase	141 IU/L
GGT	83 IU/L
CPK	3860 IU/L
CK- MB	136
Troponin	0.29
Pro BNP	>35,000
IL-6	4451 pg/mL
Ferritin	1618 ng/mL
ESR	30 mm/hr
Procalcitonin	>100 ng/mL
Coagulation	
Fibrinogen	
PT	15.1 sec
Activity	41%
INR	1.12
PTT	44.5
D-Dimer	23.6 microg/ml
Blood gas	
pH	7.06
PCO2	43
PO2	64
HCO3	11.3
Saturation	85%
SARS-CoV-2 serologies	
IgG SARS-CoV-2 immunoglobulin	7.9
IgM SARS-CoV-2 immunoglobulin	1.2

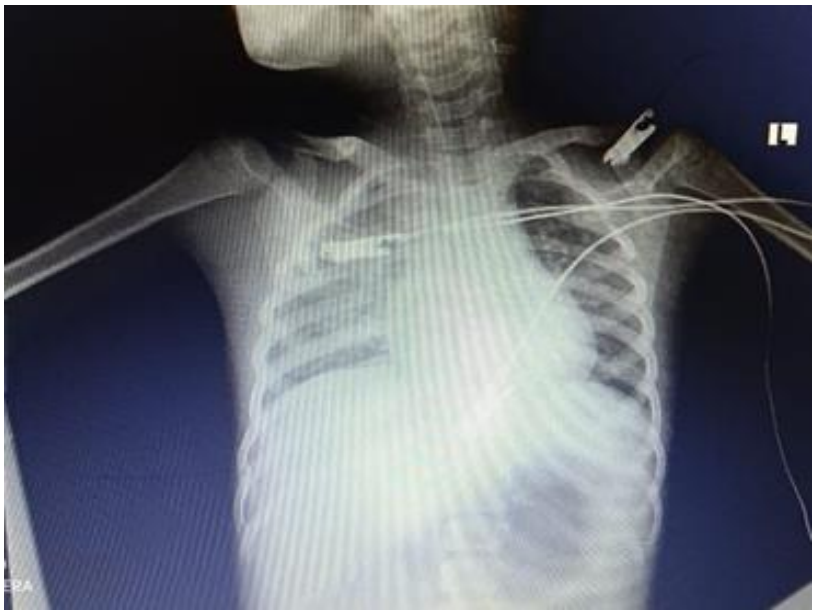

Figure 1: Chest XR upon admission.

Antibiotics were adjusted to her creatinine clearance level and pulse steroid [Solumedrol (30mg/kg/day)] for 3 days was started along with lovenox (20mg/dose) SQ BID, and IVIG was given once. The patient´s kidney function was severely diminished, Lasix was being given to the decreased UOP with minimal result. She underwent dialysis in the following day, despite treatment.

After staying for 4 days in the COVID PICU, she was transferred to the regular PICU once her PCR came negative.
On day 5 of hospitalization, a marked improvement clinically and biomedically was observed, so several medications were tapered: Lovenox was made to one dose daily, Solu Medrol was made to (2mg/kg/day) BID for the following 5 days, and she became off the vasopressor by the end of the day. Furthermore, feeding was started PNGT.

TTE repeated on day 6 of hospitalization, showed decrease in the cardiac contractility, so as recommended by the cardiologist consulted, she was began on Dobutamine. During the afternoon of the same day, she developed an episode of fever reaching 39.2, so blood and urine cultures were taken and another broad spectrum antibiotic was added for coverage. She was gradually weaned from the mechanical intubation and extubated on day 8 of hospitalization and kept on O2 by nasal canula.

On day 9, Lasix´s dose was decreased to (1mg/kg/day) BID, along was the continuous tapering of Solu Medrol every 5 days. On day 11 of hospitalization, she was transferred to the regular pediatric floor, once Dobutamine and Lasix were stopped, and sips of water were allowed and tolerated. She continued the full course of antibiotics and had chest physiotherapy done to improve her recovery and was discharged after 23 days of hospitalization.

Discussion

The SARS-CoV-2, identified in late 2019, is usually mild in children, but in rare cases, children may be severely affected. In April 2020, reports from the United Kingdom documented a presentation in children similar to incomplete Kawasaki disease (KD) or toxic shock syndrome. After which, there have been reports of similar cases in other parts of the world, which has been termed as multisystem inflammatory syndrome in children (MIS-C). MISC is a relatively rare complication of COVID-19 in children, occurring in <1 percent of children with confirmed SARS-CoV-2 infection [6].

MIS-C usually presents with fever in 100% of the cases, Gastrointestinal symptoms (abdominal pain, vomiting, diarrhea) in 60 to 100% just similar to our patient's presentation who presented with a 4 days Hx of high grade fever reaching 39°C axillary, associated with non-projectile non bilious vomiting and watery non mucoidy non bloody diarrhea. In addition to Mucous membrane involvement (purulent erythematous tonsils) (27-76%).

Upon arrival, the patient was somnolent (present in 29-58% of MIS-C cases). She arrived with respiratory distress that required invasive ventilation (28-52%). Tachycardia and hypotension were also seen, reflecting cardiac involvement, which called for an urgent TTE to be done, that showed good contractility but early signs of myocarditis along with elevated cardiac enzymes (51-90%).

Kidney function was also diminished with a creatinine level of 3.32 mg/dL (8-52%), during her stay in hospital her kidney function deteriorated and she underwent urgent dialysis [7,8]. To our knowledge, the first case report detailing renal failure in MIS-C was published on Nov 2020 by Lee Melissa et al. who reported a case of 15-year-old female previously healthy who presented with abdominal pain, vomiting, and diarrhea, and was subsequently diagnosed with multisystem inflammatory syndrome in children (MIS-C) with acute renal failure [9].

Patient was given IVIG which is the mainstay treatment for MISC, along with steroids and anticoagulant therapy, this lead to a cease of symptom progression and ignition of her gradual clinical and biological improvement [10,11].

Conclusion

MIS-C is a rare complication of COVID-19 infection in pediatrics, with a broad spectrum of presentation and different organs involved. Nowadays, its crutial to have a high level of suspicion of the disease for early management. Fortunately, most cases of pediatric MIS-C have good prognosis [2].

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