

MIS-C: A CASE STUDY

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ABSTRACT

MIS-C is a recently recognized illness in children which is associated with COVID-19 infection. The full spectrum of the disease is not yet clear and therefore it is necessary understand the characteristics of this syndrome. I have come across a child diagnosed with MIS-C. A 12-year-old male with nor previous significant medical history was brought to hospital with the chief complaints of joint pain since 3 days with difficulty in walking, fever since 2 days (fever to 103°F), abdominal pain and the child has not passed stools since 2 days. Other clinical features were running nose, facial puffiness, abdominal bloating, lethargy, weakness, shortness of breath. The vital signs were checked and found that temperature, pulse and respiratory rate were increased. The Oxygen saturation was 95% when brought to emergency department. Laboratory values showed that there was Leukocytosis(152000/cmm), thrombocytopenia(135000/cmm), hyponatremia(128.55 mm/L), and hypokalemia(3.2 mm/L). CRP (C-reactive protein) was elevated(201.20 mg/dL), and an elevated D-dimers level (1086 ng ml), the anti SARS-CoV-2 antibody was reactive and RT-PCR (reverse-transcription polymerase chain reaction) was negative. MRI study of pelvis with both hip joints revealed Grade-I sprain/edema involving ligamentum capitis femoris/ ligamentum teres of right hip joint with mild right hip joint effusion. The child was administered intravenous antibiotics (Ceftriaxone 2gm, bd), intravenous steroids (Methylprednisolone 500mg, od), antiallergic medication (Pheniramine maleate 1mg, sos), analgesic (Diclofenac sodium, 75mg, TDS). Other medications included antacids, antiemetics and DNS with MVI for a total of 5 days. Then supportive treatment was given and was discharged home after 7 days of hospital stay.

Keyword: - MIS-C, Early recognition, COVID-19, Kawasaki disease, Inflammation

1. INTRODUCTION

MIS-C is an emerging topic of discussion this year. Multisystem inflammatory syndrome in children (MIS-C) is a serious condition that is associated with COVID-19. During the first wave of COVID-19, MIS-C was first identified in April 2020 by doctors at various pediatric hospitals in the United Kingdom and the United States. The cases were increasing in previously healthy children who showed Kawasaki disease-like features with severe inflammation. These cases occurred in children testing positive for current or recent infection by COVID-19. The COVID-19 case was confirmed by RT-PCR or serological assay [1]. Out of many children who got infected with COVID-19, only a few of them had got sick with MIS-C. Doctors around the globe are still learning about MIS-C and how it affects children. It is essential to characterize this syndrome and its risk factors, to understand causality, and describe treatment interventions. It is not yet clear the full spectrum of disease, and whether the geographical distribution in Europe and North America reflects a true pattern, or if the condition has simply not been recognized elsewhere. There is therefore an urgent need for collection of standardized data describing clinical presentations, severity, outcomes, and epidemiology. [3]

2. CASE DEFINITION

MIS-C is defined as;

- An individual aged <21 years presenting with fever, laboratory evidence of inflammation, and evidence of clinically severe illness requiring hospitalization, with multisystem (>2) organ involvement (cardiac, renal, respiratory, hematologic, gastrointestinal, dermatologic or neurological); AND
- No alternative plausible diagnoses; AND
- Positive for current or recent SARS-CoV-2 infection by RT-PCR, serology, or antigen test; or COVID-19 exposure within the 4 weeks prior to the onset of symptoms [1]

As per preliminary case definition given by WHO;
Children and adolescents 0–19 years of age with fever > 3 days
AND two of the following:

1. Rash or bilateral non-purulent conjunctivitis or muco-cutaneous inflammation signs (oral, hands or feet).
2. Hypotension or shock.
3. Features of myocardial dysfunction, pericarditis, valvulitis, or coronary abnormalities (including ECHO findings or elevated Troponin/NT-proBNP),
4. Evidence of coagulopathy (by PT, PTT, elevated d-Dimers).
5. Acute gastrointestinal problems (diarrhea, vomiting, or abdominal pain).

AND

Elevated markers of inflammation such as ESR, C-reactive protein, or procalcitonin.

AND

No other obvious microbial cause of inflammation, including bacterial sepsis, staphylococcal or streptococcal shock syndromes.

AND

Evidence of COVID-19 (RT-PCR, antigen test or serology positive), or likely contact with patients with COVID-19.[3]

3. EPIDEMIOLOGY

- As of October 1, 2020, the number of patients meeting the case definition for MIS-C in the United States surpassed 1,000. In 2021, this number surpassed 2,000 as of February 1, 3,000 as of April 1, and 4,000 as of June 2.[2]
- Ratio of deaths was very low compared to the disease.[2]
- The median age of patients with MIS-C was 9 years. Half of children with MIS-C were between the ages of 5 and 13 years.
- 62% of the reported patients with race/ethnicity information available occurred in children who are Hispanic or Latino (1,246 cases) or Black, Non-Hispanic (1,175 cases).
- 99% of patients had a positive test result for SARS CoV-2, the virus that causes COVID-19. The remaining 1% of patients had contact with someone with COVID-19.
- 60% of reported patients were male.

4. ETIOLOGY

- Idiopathic etiology[3]
- Recent or current infection with COVID-19.
- Immunosuppression
- An underlying condition, with chronic lung disease (including asthma) & cardiovascular disease

5. CLINICAL FEATURES

Signs and symptoms of multisystem inflammatory syndrome in children (MIS-C) include those below, though not all children have the same symptoms.[4]

- Fever that lasts 24 hours or longer
- Vomiting
- Diarrhea
- Abdominal pain
- Skin rash
- Feeling unusually tired
- Tachycardia
- Tachypnea
- Red eyes
- Redness or swelling of the lips and tongue
- Redness or swelling of the hands or feet
- Headache, dizziness or light headedness
- Enlarged lymph nodes

Emergency warning signs of MIS-C include;

- Severe stomach pain
- Difficulty breathing
- Cyanosis
- Confusion
- Inability to wake up or stay awake

6. DIAGNOSTIC EVALUATION

Laboratory Testing

- Testing aimed at identifying laboratory evidence of inflammation as listed in the Case Definition section is warranted.
- Similarly, SARS-CoV-2 detection by RT-PCR or antigen test is indicated.
- Where feasible, SARS-CoV-2 serologic testing is suggested, even in the presence of positive results from RT-PCR or antigen testing. Any serologic testing should be performed prior to administering intravenous immunoglobulin (IVIG) or any other exogenous antibody treatments.

Other Evaluations

Given the frequent association of MIS-C with cardiac involvement, many centers are performing cardiac testing including, but not limited to:

- Echocardiogram;
- Electrocardiogram;
- Cardiac enzyme or troponin testing (per the center's testing standards); and
- B-type natriuretic peptide (BNP) or NT-pro BNP.

Other testing to evaluate multisystem involvement should be directed by patient signs or symptoms. Additionally, testing to evaluate for other potential diagnoses should be directed by patient signs or symptoms.

7. MANAGEMENT

At this time, there have been no studies comparing clinical efficacy of various treatment options. Treatments have consisted primarily of supportive care and directed care against the underlying inflammatory process. Supportive measures have included:

- Fluid resuscitation
- Inotropic support
- Respiratory support and in rare cases, extracorporeal membranous oxygenation (ECMO).

Anti-inflammatory measures have included the frequent use of IVIG and steroids. The use of other anti-inflammatory medications and the use of anti-coagulation treatments have been variable. Aspirin has commonly been used due to concerns for coronary artery involvement, and antibiotics are routinely used to treat potential sepsis while awaiting bacterial cultures. Thrombotic prophylaxis is often used given the hypercoagulable state typically associated with MIS-C.[5]

8. PREVENTION

Since the MIS-C is linked to COVID-19, it is very important to prevent the children from getting sick with this virus. Here are some ways to protect the children from getting sick. [6]

- Get the child vaccinated when the vaccine is available
- If the child is aged 2 or older, they have to wear a mask in indoor public areas
- Children with underlying disease or weak immune system due to medications should continue to take all precautions even if they are vaccinated.
- Avoid close contact with people who are sick
- Keeping distance from others is especially important for people who are at higher risk of getting very sick.
- Avoid going outdoors or confined palces
- Avoid indoor spaces that do not offer fresh air from the outdoors as much as possible
- Wash your hands often with soap and water for at least 20 seconds especially after you have been in a public place, or after blowing your nose, coughing, or sneezing.
- Avoid touching your eyes, nose, and mouth with unwashed hands.
- Monitor the children for any symptoms and warning signs

- If someone in the family gets sick, keep them away from children

9. CASE ANALYSIS

A 12-year-old male with no previous significant medical history was brought to hospital with the chief complaints of joint pain since 3 days with difficulty in walking, fever since 2 days (fever to 103°F), abdominal pain and the child has not passed stools since 2 days. The child had a history of coming in contact with an adult with COVID-19 1 month back. Upon physical examination it was found that the child was having running nose with mucoid discharge and facial puffiness. There was abdominal bloating. There was associated lethargy, weakness and shortness of breath but no report of chest pain or vomiting. The vital signs were checked on initial assessment with a temperature of 103°F, heart rate of 130 beats per minute, respiratory rate of 44 breaths per minute and blood pressure was 90/58 mm of Hg. Oxygen saturation was 95% when brought to emergency department.

Blood samples were obtained and sent for investigations. The culture reports were negative. The patient was noted to have Leukocytosis(152000/cmm), thrombocytopenia(135000/cmm), hyponatremia (128.55 mm/L), and hypokalemia (3.2 mm/L). CRP (C-reactive protein) was elevated (201.20 mg/dL), and an elevated D-dimers level (1086 ng ml), Additionally, the patient had a anti SARS-CoV-2 antibody Reactive and RT-PCR (reverse-transcription polymerase chain reaction) was negative. 1.5T MRI study of pelvis with both hip joints revealed Grade-I sprain/edema involving ligamentum capitis femoris/ ligamentum teres of right hip joint with mild right hip joint effusion.

After thorough evaluation the doctors prescribed intravenous antibiotics (Ceftriaxone 2gm, bd), intravenous steroids (Methylprednisolone 500mg, od), antiallergic medication (Pheniramine maleate 1mg. sos), analgesic (Diclofenac sodium, 75mg, TDS). Other medications included antacids, antiemetics and DNS with MVI for a total of 5 days. Then supportive treatment was given according to the symptoms. Non pharmacological measures of pain relief, assistance in ambulation and self-care activities, adequate periods of rest between activities. High calorie diet was given and advised to avoid raw and unpeeled fruits and vegetables. The parents were given reassurance and counselled about the condition of the child to reduce anxiety. The child was discharged home after 7 days of hospital stay.

10. CONCLUSIONS

During my clinical posting, I came across a child diagnosed with MIS-C. As we have limited information about these cases, it is the need of the hour to share about such cases. During the first wave of the pandemic there were less cases of children infected with COVID-19 in India. But during the second wave there was dramatic increase in cases. Though there few deaths, some of the children developed MIS-C. Children who were previously healthy developed SARS-CoV-2 infection, and some of whom became critically ill with multisystem involvement. There is yet more research required to know about why children are presenting with this condition. Early detection and management are crucial to prevent complications.

11. REFERENCES

- [1]. Centers for Disease Control and Prevention, "Health advisory on multisystem inflammatory syndrome in children (MIS-C) associated with coronavirus disease 2019," 2019, View at: <https://emergency.cdc.gov/han/2020/han00432.asp>
- [2]. Centers for Disease Control and Prevention, Health Department-Reported Cases of Multisystem Inflammatory Syndrome in Children (MIS-C) in the United States, June 2021, <https://www.cdc.gov/mis/cases/index.html>
- [3]. World Health organization, Multisystem inflammatory syndrome in children and adolescents temporally related to COVID-19, May 2020, <https://www.who.int/news-room/commentaries/detail/multisystem-inflammatory-syndrome-in-children-and-adolescents-with-covid-19>
- [4]. Mayo Clinic, Multisystem inflammatory syndrome in children (MIS-C) and COVID-19, <https://www.mayoclinic.org/diseases-conditions/mis-c-in-kids-covid-19/symptoms-causes/syc-20502550>
- [5]. Centers for Disease Control and Prevention, Information for Healthcare Providers about Multisystem Inflammatory Syndrome in Children (MIS-C), <https://www.cdc.gov/mis/hcp/index.html>
- [6]. Centers for Disease Control and Prevention, "How to protect yourself & others", <https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/prevention.html>
- [7]. Helen Kest , Ashlesha Kaushik, et al., Multisystem Inflammatory Syndrome in Children (MIS-C) Associated with 2019 Novel Coronavirus (SARS-CoV-2) Infection, Volume 2020.