

A case of Multisystem Inflammatory Syndrome in Children (MIS-C)

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ABSTRACT

Multisystem inflammatory syndrome in children (MIS-C) is a systemic disorder involving persistent fever, extreme inflammation and organ dysfunction, which is temporally associated with exposure to COVID-19. onset may be delayed or contemporary with ongoing SARS-CoV-2 infection. Here we present a case of 4-year-old girl, who was presented with high grade fever, bilateral non-purulent conjunctivitis, generalized macular rash, dry and cracked lips with strawberry tongue, abdominal pain and diarrhoea, having contact with patient of COVID-19. She had neutrophilic leukocytosis with thrombocytosis and very high inflammatory markers, CXR demonstrated bilateral peripheral patchy opacities, RT-PCR for COVID-19 was negative. According to diagnostic criteria this patient was diagnosed as Multisystem inflammatory syndrome in children (MIS-C) which is temporally associated with COVID-19 and treated successfully.

Key words: Multisystem inflammatory syndrome in children (MIS-C), SARS-CoV-2, COVID-19.

Introduction

Coronavirus disease 2019 (COVID-19) is defined as illness caused by a novel coronavirus named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) which was first identified in Wuhan, Hubei province, China in December 2019¹. Since then, COVID-19 has become a worldwide health problem threaten the life of people. On 11 March 2020, the World Health Organization (WHO) classified the outbreak as a pandemic². COVID-19 infection has been reported in all age groups though the clinical characteristics, disease progression and outcome in children so far appeared milder. But a new serious of COVID-19 presentation emerged in late April in the form of Paediatric inflammatory multisystem syndrome temporally associated with COVID-19 (PIMS-TS). Since the first reports from London, UK, in late April, 2020, many countries including the USA, France, Italy reports such cases³⁻⁶

Multisystem inflammatory syndrome in children (MIS-C), or paediatric inflammatory multisystem syndrome (PIMS/PIMS-TS), is a rare systemic illness involving persistent fever and extreme inflammation following exposure to SARS-CoV-2, the virus responsible for COVID-19⁷. The case definition for MIS-C includes the children 0-19 years age, who have Fever and elevated inflammatory markers for 3 days or more and have any two of the following: (A) rash or bilateral non-purulent conjunctivitis or mucocutaneous inflammation signs (oral, hands, or feet); (B) hypotension or shock; (C) features of myocardial dysfunction, pericarditis, valvulitis, or coronary abnormalities; (D) evidence of coagulopathy (elevated prothrombin time, partial thromboplastin time, and elevated D-dimers); and (E) acute gastrointestinal problems (diarrhoea, vomiting or abdominal pain) and exclusion of other microbial cause of inflammation.

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The child should have evidence of SARS-CoV-2 positive RT-PCR, antigen test, or serology; or any contact with patients with COVID-19⁸. Knowledge of this newly described syndrome is evolving rapidly⁹. Its clinical features may appear somewhat similar to Kawasaki disease, a rare disease of unknown origin that typically affects young children, in which blood vessels become inflamed throughout the body. It can also show features of other serious inflammatory conditions of childhood, including toxic shock syndrome and macrophage activation syndrome¹⁰. Here we have reported such a case of MIS-C in this pandemic situation of COVID-19 who had clinical presentation similar to Kawasaki disease.

Case report

A 4-year-old girl with no significant past medical history presented with fever for 5 days which was continued and highest recorded temperature was 104°F. Along with fever she developed generalized macular rash, abdominal pain and diarrhoea. With these complaints the child was admitted in pediatric department of Anwer Khan Modern Medical College hospital. There was no family history of vasculitis, autoimmune disorders. However her one of family member had a brief febrile upper respiratory infection 3 weeks back, who was diagnosed as a case of COVID-19. On examination she was lethargic, febrile with temperature 104° F. She had bilateral non-purulent conjunctivitis, dry and cracked lip with strawberry tongue, macular rash in the back, legs including buttock which was non palpable not blanch on pressure, peeling of skin in both palms and soles including nails. Her respiratory rate was 30 breaths per minute, heart rate was 120 beats per minutes, Blood pressure was 80/50 mm of Hg and SpO₂ was 97% in room air and there was no sign of meningeal irritation. The laboratory findings showed neutrophilic (85%) leukocytosis with thrombocytosis and very high ESR (102 mm in 1st hr), CRP (123 mg/dl), S. Feritin (523ng/dl) and D-dimer (0.95 mg/dl). Her CXR demonstrated bilateral peripheral patchy opacities with no focal consolidation, effusion. Though she had tachycardia, her color doppler echocardiography was normal, no coronary aneurysm noted, blood culture had no growth and RT-PCR for COVID-19 was negative. The baby was treated with

antibiotic Inj. Meropenam intravenous 500mg 8 hourly, intravenous immunoglobulin (IVIG) 28 gm (2 gm/kg) IV infusion over 10 hours single dose and aspirin initially 700mg (50 mg/kg/day) plus inj. Dexamethasone 6mg/day up to the defervesce. No anti-viral therapy was given. After 6th day of treatment all the inflammatory markers were normalized and the patient was improved remarkably and discharged with aspirin 75mg (5mg/kg/day) for 8 weeks and advised an echocardiogram after 1 month.



Figure 1: Cracked lip and Strawberry tongue



Figure 2: Peeling of skin of fingers

Discussion

In the current COVID-19 pandemic, there have been increasing observations of an inflammatory illness occurring in children; most reports were 4–6 weeks after the peak of COVID-19 infections in the affected population^{11,12}. On April 2020, first reported case of a 6-month-old infant, presenting with persistent fever and minor respiratory symptoms, who was diagnosed as Kawasaki disease and had a positive RT-PCR result for SARS-CoV-2¹³. On April 24, 2020, the UK National Health Service had issued an alert on an emerging paediatric inflammatory multisystem disorder.

Though clinical features vary in Children with MIS-C but all affected children have persistent fever, □ other clinical features vary^{7,14}. Most common symptoms are abdominal pain, diarrhea and vomiting⁷. This rare syndrome shares some common features with other paediatric inflammatory conditions like Kawasaki disease(KD) and streptococcal toxic shock syndrome¹⁰. The differential diagnosis for a previously healthy 4-year-old child with prolonged fever, mucocutaneous findings, multisystem involvement, and markedly elevated inflammatory biomarkers is broad, including a wide range of infectious, post infectious, and autoimmune inflammatory diseases. During this pandemic situation, there has been a remarkable increase in the number of reported cases similar to our patient, which at best overlap with the findings previously diagnosed as KD. One center in Italy reported a 30-fold increase of KD cases during the COVID-19 outbreak as compared to the previous years⁵. Reports from Europe and the USA describe numerous children with MIS-C similar to KD^{15,16}. In compare MIS-C to KD our patient shared several manifestations of both the diseases. However gastrointestinal symptoms, very high inflammatory markers are unusual for KD⁵. Though this patient had thrombocytosis which is common in KD, but thrombocytopenia is more common in MIS-C¹⁷.

Our patient met the diagnostic criteria for MIS-C (according to WHO definition) with negative SARS-CoV-2 RT-PCR. Because MIS-C usually manifests 3-4 weeks after SARS CoV-2 infection this is why many children were negative RT-PCR at the time of MIS-C evaluation⁵. In U.K. only a third of the patients were RT PCR positive for COVID-19, however a very high number of kids tested positive for coronavirus antibodies⁶. There is a recommendation

that RT-PCR negative patient should have serological test done, but facilities for doing serological test is not available here. Various clinical complications can occur like heart failure, acute respiratory failure, acute kidney injury and increased blood coagulation, shock may take place. Coronary artery abnormalities can develop, ranging from dilatation to aneurysms¹⁷.

All children with MIS-C should be managed with multidisciplinary approach (paediatric intensive care, paediatric infectious disease, cardiology, rheumatology/immunology)¹⁸. In a study in Italy all patients were administered intravenous immunoglobulin at 2 g/kg¹⁹. Based on risk stratification, patients were also treated with aspirin at 30-50 mg/kg per day for 5 days followed by 3-5 mg/kg/day for 8 weeks. Corticosteroids Inj. methylprednisolone at 10-30 mg/kg per day for 3 days, followed by a tapering of oral steroid 1-2 mg/kg over 2 weeks may also considered in MIS-C patients presents like KD²⁰. Our case is one of a few MIS-C cases diagnosed in Bangladesh. The patient improved dramatically on sixth day after treatment because of early identification and intervention. This life-threatening disease has proved fatal in under 2% of reported cases. Early recognition and prompt specialist attention are essential⁷.

Conclusion:

COVID-19 children have milder symptoms in majority cases. But this new serious complication (MIS-C) needs intensive care and treatment especially with IVIG and corticosteroids.

Conflict of interest: None.

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