Case Series

Co-existence of multisystem inflammatory syndrome in children associated with COVID-19 and scrub typhus infection: a case series

Sarbani M. Roy*, Sushama Sahoo

Department of Pediatric Medicine, Malda Medical College and Hospital, Malda Town, West Bengal, India

Received: 20 November 2021

Revised: 13 December 2021

Accepted: 14 December 2021

*Correspondence:

Dr. Sarbani M. Roy,

E-mail: misra.sarbani@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

We are in the midst of pandemic of corona virus disease (COVID-19), caused by the novel coronavirus severe acute respiratory syndrome corona virus-2 (SARS-CoV-2). A clinical entity with hyperinflammatory syndrome, defined by World Health Organization (WHO) as multisystem inflammatory syndrome in children (MIS-C) and adolescents, temporarily related to COVID-19, is being reported in this pandemic from several countries. MIS-C has overlapping clinical features of Kawasaki disease (KD). KD has been described in association with various organisms including dengue, scrub typhus. MIS-C with concomitant infection has rarely been reported in literature till date. We report on ten sick pediatric patients presented with clinical features of MIS-C, in whom diagnosis of concomitant scrub typhus were also made. This retrospective study was conducted in the department of pediatric medicine of a medical college, in a district town of West Bengal, India. SARS-CoV-2 immunoglobulin G level was elevated in all of them and they were also positive with Scrub typhus serology. We reviewed and analysed their basic informations, clinical manifestations, epidemiological history, laboratory findings, treatment and short term outcome. Median age was 24 months (range 4 months-8 years), male: female was 1:1. All the patients survived. Concomitant tropical infection in a patient with MIS-C may play an important role in determining the prognosis of such patients. Early detection and intervention will result in better management and intact survival of them.

Keywords: MIS-C, Kawasaki disease, Scrub typhus, Concomitant infection, SARS-CoV-2

INTRODUCTION

Coronavirus disease-2019 (COVID-19) has been a global health crisis. It was reported first in Wuhan, China in December 2019, thereafter rapidly spread to affect many countries worldwide. The clinical characteristics, disease progression and outcome in children appear milder compared to older individual.¹ Children younger than 18 years have been reported to constitute only a small proportion of cases of COVID-19. Initial reports described an asymptomatic or milder illness in children.

Several countries thereafter noticed a new hyper-inflammatory syndrome affecting a small percentage of children, temporally associated with novel coronavirus

severe acute respiratory syndrome corona virus-2 (SARS-CoV-2). This condition appears to share features with pediatric inflammatory diseases such as Kawasaki disease (KD) and toxic shock syndrome (TSS).² The new clinical entity was defined by the World Health Organization (WHO) as the multisystem inflammatory syndrome in children (MIS-C) and adolescents temporally related to COVID-19 and also by centers for disease control and prevention (CDC).^{3,4} Though little is known about the epidemiology, cases of MIS-C seem to appear few weeks after the COVID-19 infection.

SARS-CoV-2 related MIS-C is a dreaded complication that is seen more often in children than in adults.⁵ MIS-C is characterized by persistent fever, abdominal pain,

vomiting, diarrhoea, as well as mucocutaneous, cardiovascular, hematological, musculoskeletal, and neurological manifestations, among others.³ MIS-C in association with SARS-CoV-2 infection, shares some clinical features with KD, TSS, macrophage activation syndrome, and other inflammatory processes as in the so-called cytokine storm.^{3,4,6}

Prompt recognition and understanding proper aetiologies and adequate treatment would have long term effect in the child's prognosis.

CASR SERIES

Case 1

The patient presented to us with fever of 10 days duration and repeated episodes of convulsions of 24 hours duration and encephalopathy. There was also severe pneumonia associated with. Patient was shifted to intensive care unit (PICU), non-invasive respiratory support was given to him along with other symptomatic management. He stayed in PICU for 5 days with total duration of hospital stay was 21 days.

Case 2

This patient had history of fever for 10 days, pain abdomen for 5 days, episodic convulsion and shock. Eschar was present. Vasoactive drugs and respiratory support was given. Patient stayed in PICU for 7 days, total duration of hospital stay was 15 days.

Case 3

The patient presented to us with fever of 6 days, repeated convulsions for 2 days. Encephalopathy was present. She stayed in PICU for 3 days with respiratory support, and stayed in hospital for 7 days.

Case 4

He was a 4-month-old baby, had fever for 7 days and had respiratory symptoms suggestive of severe pneumonia. He was shifted to PICU, arrhythmia was detected and managed. Eschar was present. She stayed in PICU for 7 days with respiratory support, and stayed in hospital for 15 days.

Case 5

This patient had fever for 4 days, repeated episodes of convulsions for 2 days and encephalopathy. Skin rashes and conjunctival changes were present. Managed effectively in general ward.

Case 6

This 8-month-old female baby had history of fever for 10 days and presented with respiratory symptoms suggestive

of severe pneumonia. Her leucocyte count was high with neutrophilic predominance, urine examination suggestive of urinary tract infection. Treated in general ward.

Case 7

The patient presented with fever for 10 days, puffiness, anasarca, episodic convulsions, and encephalopathy. This patient stayed in hospital for 10 days.

Case 8

This 11-month-old female baby had history of fever for 5 days, diarrhoea for 5 days, and vomiting for 2 days. Maculopapular skin rashes were present for 2 days also. Managed accordingly in general ward for 10 days.

Case 9

This patient had fever for 10 days, repeated episodes of vomiting for 1 day and episodic convulsions. His encephalopathy was improved with symptomatic management. He stayed in hospital for 10 days.

Case 10

This 8-year-old female patient had history of fever for 4 days with history of convulsions for 1 day and altered sensorium for 1 day. Managed accordingly in general ward, her total duration of stay in hospital was 15 days.

Figure 1: Age distribution.

Figure 2: System involvement.

DISCUSSION

Clinical and laboratory parameters of MIS-C mimic KD. KD has been described in association with infections: dengue, scrub typhus and leptospirosis. MIS-C, associated with SARS-CoV-2 with concomitant infection has rarely been reported in literature, after extensive search we could find about single a case report on this rare association.⁷

Our study was a retrospective and observational study, conducted in department of pediatric medicine of a Government Medical College, in a district town of West Bengal, India. Age group included was 1 month to 12 years. All the patients admitted with fever >4 days, symptoms, signs, laboratory markers in favour of a hyperinflammatory condition, had positive serology for SARS-CoV-2 immunoglobulin G (IgG), and for scrub typhus immunoglobulin M.

The median age was 24 months (range: from 4 months to 8 years) (Figure 1). Male and female were equal in numbers (1:1). Mean duration of fever before presentation was 7.6 days (range 4 days to 10 days). KD like features was present in 1 (10%), and eschar was present in 2 (20%) of them. Anasarca was present in 1 (10%).

Organ system involvement included central nervous system (CNS) in 7 patients (70%), cardiovascular system in 3 (30%) patients, and respiratory system in 3 (30%) patients, gastrointestinal in 3 (30%) patients, renal in 1 (10%) (Figure 2). Neurologic features included convulsions (n=7, 70%), and features of meningitis/meningoencephalitis (n=5, 50%). Gastrointestinal features were (n=3, 30%) diarrhoea, vomiting and pain abdomen. Respiratory distress and pneumonia were noted in 3 patients (30%).

4 (40%) patients needed intensive care managements: 2 (20%) of them for respiratory support (poor sensorium) and 2 (20%) patients for cardiovascular support (shock in one and arrhythmia in the other). Non-invasive oxygen therapy was needed in 8 (80%) patients. Hypoalbuminemia with anasarca was present in 1 (10%) who was treated with intravenous albumin. One (10%) patient had high urine pus cell and red blood cells, but urine culture was negative. Neutrophilia was present in 1 (10%). Anemia is noted in 1 (10%). No patient required blood component therapy). C-reactive protein (CRP) and D dimer were elevated in all (n=10, 100%).

Management with antibiotics, corticosteroids, immunoglobulin was given to all along with the symptomatic management. 2 (20%) patients had coronary artery changes on echocardiography received low molecular weight heparin therapy.

Intravenous doxycycline /oral azithromycin was given to them when serology came positive to scrub typhus, and that resulted in rapid improvement of their symptoms. All these patients responded very well to management and

survived, however, 2 (20%) patients had mild neurological sequelae in the form of decreased speech fluency.

There was no pre-existing morbidity in our cohort.

CONCLUSION

MIS-C associated with SARS-CoV-2 is serious and life-threatening illness in previously healthy children. Several tropical infections may mimic MIS-C or may coexist with it. With the emergence of MIS-C and increased reporting of such cases, physicians should be aware of the different phenotypes of hyperinflammatory features associated with COVID-19 and MIS-C.

Concomitant infections play an important role in determining the prognosis of COVID infection and MIS-C and hence maintaining a low threshold of suspicion is necessary.

In the Indian context, with a high incidence of ongoing tropical we definitely need an increased awareness about any association or coexistence of a tropical infection, such as dengue, scrub. Awareness about the possibility of MIS-C with other concomitant infections, their prompt diagnosis and timely management will improve the prognosis, reduce their mortality and morbidity and facilitate their intact survival. Early and appropriate intervention will also aid in reduction of the irrational use of antibiotics, to establish the necessary antibiotic stewardship.

ACKNOWLEDGEMENTS

Authors would like to acknowledge the college authority for their constant support in academics and patient management as well.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: Not required

REFERENCES

1. Balasubramanian S, Rao NM, Goenka A, Roderick M, Ramanan AV. Coronavirus disease [COVID-19] in children - What we know so far and what we do not. *Indian Pediatr.* 2020;57(5):435-42.
2. Bhat CS, Gupta L, Balasubramanian S, Singh S, Ramanan AV. Hyperinflammatory Syndrome in Children Associated With COVID-19: Need for Awareness. *Indian Pediatr.* 2020;57(10):929-35.
3. Multisystem inflammatory syndrome in children and adolescents with COVID-19. 15 May 2020 Scientific brief: World Health Organisation. Available at: <https://www.who.int/publications-detail/multi-system-inflammatory-syndrome-in-children-and-adolescents-with-covid-19>. Accessed on 31 May 2020.

4. Centers for Disease Control and Prevention. Emergency preparedness and response: Health alert network. 2020. Available at: <https://emergency.cdc.gov/han/2020/han00432.asp>. Accessed on 22 May 2020.
5. Verdoni L, Mazza A, Gervasoni A. An outbreak of severe Kawasaki-like disease at the Italian epicentre of the SARS-CoV-2 epidemic: An observational cohort study. *Lancet.* 2020;395:1771-8.
6. Royal College of Pediatrics and Child Health. Guidance– Pediatric multisystem inflammatory syndrome temporally associated with COVID-19, 2020. Available at: <https://www.rcpch.ac.uk/resources/guidance-pediatric-multisystem-inflammatory-syndrome-temporally-associated-covid-19>. Accessed on 05 May 2020.
7. Gupta A, Gill A, Sharma M, Garg M. Multi-System Inflammatory Syndrome in a Child Mimicking Kawasaki Disease. *J Trop Pediatr.* 2021;67(3):fmaa060.

Cite this article as: Roy SM, Sahoo S. Co-existence of multisystem inflammatory syndrome in children associated with COVID-19 and scrub typhus infection: a case series. *Int J Contemp Pediatr* 2022;9:112-5.