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CASE REPORT

MIS-C and dengue a recipe for prolonged cardiac dysfunction

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ABSTRACT
Multisystem inflammatory syndrome in children (MIS-C), temporally related to SARS CoV-2, is a potentially serious illness in children that appears to be a delayed, post-infectious complication of COVID-19 infection. Multisystem inflammatory syndrome (MIS-C) is an odd illness that we have recently seen in children. Certain illnesses, such as dengue and rickettsial fever, alarmingly resemble the clinical signs of COVID-19. There are documented instances of dengue and COVID-19 coinfection. In the current study, an 8-year-old male child presented with acute onset high-grade fever of 8 days duration, abdominal pain, and vomiting. On examination, the child features suggestive of shock with petechial rashes over the trunk and legs with tender hepatomegaly. Investigations showed NS-1 positive thrombocytopenia. In spite of adequate fluid management with crystalloids and colloids, the child did not improve and hence started on dopamine. Cardiac evaluation was showed pericardial effusion around RA and RV with intrapericardial clot and EF of 40-45%. In view of fever, cardiac dysfunction, and shock possibility of MIS-C, relevant investigations sent were suggestive of MIS-C. The WHO released diagnostic criteria for this novel entity shortly after it was recognised. Because we are now experiencing an epidemic, dengue was taken into consideration due to the presence of rash, mild ascites, hepatomegaly, and thrombocytopenia. In conclusion, the coexistence of MIS-C along with tropical infections in India can predispose to severe cardiac dysfunction that adversely affects prognosis and care.
Keywords: *Multisystem inflammatory syndrome (MIS-C), COVID-19, Cardiac evaluation, Thrombocytopenia, Cardiac dysfunction*

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INTRODUCTION

A potentially dangerous condition in children, multisystem inflammatory syndrome in children (MIS-C), also known as paediatric multi-system inflammatory syndrome temporally associated with SARS CoV-2 (PMIS or PIMS-TS), seems to be a delayed, post-infectious consequence of COVID-19 infection. The symptoms of MIS-C are diverse and impact multiple body systems and organs. Numerous kids exhibit signs of Kawasaki disease or toxic shock syndrome, which causes the coronary arteries to expand or develop aneurysms. Additionally, typical symptoms include gastrointestinal symptoms, rash or red eyes, and cardiac inflammation, which are often accompanied by low blood pressure and reduced heart function. These symptoms may manifest in various combinations. The WHO and other societies released diagnostic criteria for this novel entity shortly after it was recognised [1, 2].

The main goal of all these guidelines was to rule out infectious causes, especially toxic shock syndromes caused by streptococci and staphylococci. However, compared to toxic shock syndromes, other tropical illnesses such as dengue, malaria, enteric fever, chikungunya, leptospira, and rickettsial infections are more prevalent differentials in India. Overdiagnosis of MIS-C became widespread later in the epidemic, although underdiagnosis was a problem in the early stages. This was caused, in part, by prior clinical

experience, increased media, scientific literature, and conference discussion of MIS-C, as well as the high population frequency of SARS-CoV-2 antibodies. Fortunately, since Omicron's introduction, MIS-C cases have significantly decreased [3].
Coexistence of MIS-C with severe dengue results in severe cardiac dysfunction which can cause morbidity and can be life threatening. MIS-C and dengue produce independent antibody dependent enhancement (ADE) which are capable of causing severe cardiac dysfunction [4]. The clinical manifestations of MIS-C, which include fever, abdominal pain, rash, and organ dysfunction, can make diagnosing severe dengue and other tropical illnesses challenging. A precise diagnosis at admission may become even more challenging during overlapping coepidemics of various disorders. Because management approaches for many disorders vary, this could negatively impact their outcome. There have been recent reports of diagnostic conundrums between dengue and MIS-C [5]. Herein we describe a eight-year-old male child with presenting as MIS-C and coinfection with dengue infection leading to became a fatal case of cardiac dysfunction.

CASE REPORT

8 year old male child brought with complaints of fever since 1 week and pain abdomen and vomiting since 2 days. On examination the child features suggestive of shock with petechial rashes over trunk and legs with tender hepatomegaly. Diagnosis of dengue shock syndrome was considered and resuscitated with fluid bolus and continued on fluid management as per dengue protocol. Investigations showed NS 1 positive, thrombocytopenia. In spite of adequate fluid management with crystalloids and colloids the child did not improve hence started on dopamine. Cardiac evaluation done showed pericardial effusion around RA & RV with intrapericardial clot & EF of 40-45%. In view of fever, cardiac dysfunction and shock possibility of MIS-C was considered and relevant investigations sent were suggestive of MIS-C. Child was treated as per IAP MIS-C protocol. Repeat ECHO showed features suggestive of myocarditis. Child was electively intubated in view of decompensated shock and Adrenaline, dobutamine was added for the same. Child improved clinically by day 7 of admission and was extubated and managed on HFNC. Consecutive ECHO showed improvement in EF from 25% to 55% hence dobutamine was gradually tapered and stopped. Child was discharged with oral Steroids and aspirin and was advised ECHO on follow up.

DISCUSSION

In India, the dengue virus is responsible for 12 million cases annually and frequently results in paediatric hospitalisations during the monsoon season [6]. It is important to distinguish it from MIS-C because it has a number of clinical and laboratory characteristics with MIS-C. Hospitalised dengue patients and MIS-C patients were compared in the Randhawa et al. study that was published in this edition of the Journal [7]. While dengue patients experienced a higher frequency of petechiae, hepatomegaly, headache, and myalgia, MIS-C patients reported a considerably higher prevalence of rash, mucocutaneous alterations, conjunctival injection, and gallop rhythm. Comparing laboratory characteristics, it was shown that dengue patients had lower platelet counts, higher haemoglobin (Hb), and aspartate aminotransferase/alanine transaminase (AST/ALT) levels, whereas MIS-C patients had considerably higher levels of C-reactive protein (CRP) and interleukin-6 (IL-6).
In contrast to what is typically observed in clinical practice, the study dengue patients had a surprisingly lower prevalence of rash (22%) and a higher mean white cell count (4900) [8].
We report 8-year-old male paediatric patients who satisfied the requirements for MIS-C linked to dengue infection. An 8-y-old male child, presented with acute onset high grade fever since 1 week, abdominal pain, and vomiting. In this study, we have found that the MIS-C diagnosis criteria mandates exclusion of other focus of infection [9]. In tropical countries the high prevalence of infections and their coexistence pose a serious diagnostic challenge. MIS-C warrants accelerated care with IVIG and high dose of pulse steroid therapy, which has long term morbidity and affects prognosis.
Dengue fever can have varying degrees of cardiac involvement which contributes to the seriousness of illness, morbidity and mortality. The co-existence of MIS-C and dengue may severely affect cardiac function as in the index case [10]. Child had severe cardiac dysfunction with ejection fraction as low as 25%, shock requiring prolonged inotropic support for 15 days, beside regular therapy and monitoring with ECHO. A high index of suspicion, watchful eye and close monitoring with ECHO studies helps in early identification, appropriate therapy and effective care of the patients to improve the outcome. Three clinical categories were identified by Bautista-Rodriguez et al. in an international cohort of 183 patients with MIS-C: shock, Kawasaki-like disease, and incomplete/atypical Kawasaki-like disease, which was characterised by fever and systemic inflammation [11]. Shock patients were more likely to exhibit

thrombocytopenia, elevated ferritin, D-dimer, C-reactive protein (CRP), and N-terminal pro-B-type natriuretic peptide (NT-proBNP). Additionally, they frequently experienced cardiac involvement, including valvulitis and left ventricular failure. These patients were more likely to need inotropic assistance and a ventilator, and up to 55% of them needed to be admitted to the intensive care unit [12].

MIS-C was considered in our child as the child met the WHO criteria. Dengue was considered because of presence of rash, minimal ascites, hepatomegaly, thrombocytopenia and as we are in epidemic. Ideally dengue confirmation was by RT-PCR; however, as per Ministry of Health and Family Welfare Department (MHFWD), Govt. of India [4], even dengue IgM by MAC-ELISA will be considered as confirmed case. As clinical features overlap, children should be tested for both viruses in India. Feldstein et al. reported their study of MIS-C in the United States, there is only 70 % that PCR was positive [13]. The increased detection of MIS-C in the later part of our surveillance period may be due to a delayed onset after infection rather than an increase in community transmission, as evidenced by the recent emergence of reported cases in several countries during the decline of the Covid-19 epidemic in those locations [14, 15, 16, 17, 18]. The majority of reports of hospitalised children with Covid-19 in China indicate that their condition is nonsevere, which is surprising given the dearth of published accounts of illnesses comparable to MIS-C occurring in China.1,40 reasons of this phenomenon are not well understood, but they could include host characteristics, early immunomodulator treatment, insufficient reporting, or variations in infection rates in children.

CONCLUSION

MIS-C linked to dengue is a severe and potentially fatal condition that affects children who were previously healthy. There are other tropical illnesses that can coexist with or mimic MIS-C. Since MIS-C has become more common and more instances are being reported, doctors need to understand the various hyperinflammatory characteristic phenotypes linked to MIS-C. The prognosis of MISC and dengue is significantly influenced by concurrent infections, so it's crucial to keep a low threshold of suspicion. We undoubtedly need to raise awareness regarding any associations or coexistence of tropical infections, like dengue and scrub, given the large occurrence of chronic tropical diseases in India. Knowledge of the potential for MIS-C to coexist with other concurrent infections, as well as the importance of early detection and treatment, will enhance prognosis and lower mortality reduce morbidity and support their continued survival. The coexistence of MIS-C along with tropical infections in India, can predispose to severe cardiac dysfunction that adversely affects prognosis and care.

Highlights

- Coexistence of MIS-C and dengue is common in India and pose challenges in management.
- Anticipate severe cardiac dysfunction as both diseases cause cardiac dysfunction.
- Consider severe inflammatory disorders like MIS-C and others in critically ill children.

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