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A challenging case of multisystem inflammatory syndrome in children related to coronavirus Disease-19 hospitalized under adult medical service

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ABSTRACT

Data on multisystem inflammatory syndrome in children (MIS-C) related to coronavirus disease-19 (COVID-19) is increasing in the current COVID-19 pandemic. We present a 16 year old male who was hospitalized in July 2020 under adult medical service due to Kawasaki-like disease symptoms. Diagnosis of MIS-C related to COVID-19 was established by clinical features, elevated inflammatory markers, and positive SARS−COV 2 immunoglobulin G. We encourage all clinicians especially who practice adult medicine to be familiar with signs and symptoms of MIS-C to avoid delayed diagnosis and complications.

Introduction

The novel coronavirus, which was temporarily named "2019 novel coronavirus (2019- nCoV)," emerged in Wuhan, China. As of February 24, 2020, 79331 confirmed cases, and 2618 deaths due to coronavirus disease-19 (COVID-19) have been reported worldwide [1]. The occurrence rate is relatively low in people 21 years old and younger [2,3]. Recent reports from the North America and European countries on Kawasaki-like disease or multisystem inflammatory syndrome in children (MIS-C) possible association with COVID-19 [4–7]. The majority of patients tested positive for SARS-CoV-2 infection by RT-PCR, antibody testing, or both, and had an epidemiologic link to a person with COVID-19 [7]. However, the presence of the specific SARS-CoV-2 antibody alone may not be sufficient to explain the causal relationship in which COVID-19 evokes an abnormal immunological response leading to MIS-C [6]. Researches had reported cases of an alarming apparent side effect of COVID-19 in children, sometimes between two and four weeks after the infection [7]. The majority of the children were previously healthy, 80 % of the children who developed the condition required intensive care, 2 % had died, many of the children developed cardiovascular (kawasaki like) and clotting problems and many had gastrointestinal symptoms. Patients may presented with a persistent fever and a constellation of symptoms including hypotension, multiorgan (e.g., cardiac, gastrointestinal, renal, hematologic, dermatologic and neurologic) involvement, and elevated inflammatory markers [5,7]. As the literature on MIS-C related to COVID-19 is limited, we believe our case will increase the awareness of clinicians about MIS-C related to COVID-19 especially who practice adult medicine.

Case presentation

We present a 16 year old male who presented to hospital in July, 2020 with a 7 day history of fever, diarrhea, vomiting, and generalized abdominal pain. The symptoms were associated with bilateral knee joint pain, pleuritic chest pain for 5 days.

Four weeks ago, the patient and his parents had upper respiratory tract infection (URTI) like symptoms which were resolved completely within one week without seeking medical attention.

His physical exam at that time revealed blood pressure 102/60 mmHg, temperature 39.2 C, heart rate 98 beats/minute, respiratory rate 20 breath/minute, and oxygen saturation at 98 % room air.

Significant findings included bilateral conjunctivitis, fissuring of lower lip, hypopigmented macular rash on the chest, and bilateral elbow and knee effusion (Fig. 1)

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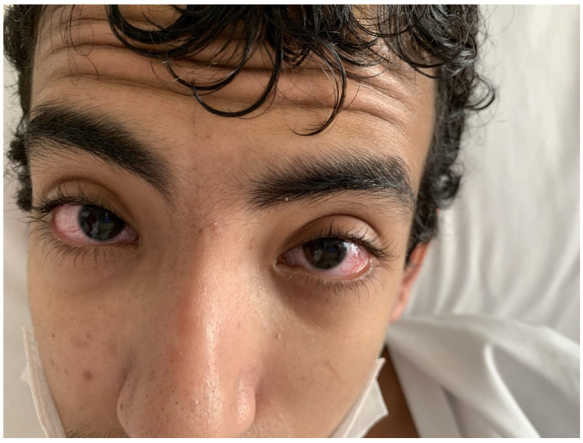

Fig. 1. Bilateral conjunctivitis on the first day of hospitalization.

A complete blood count showed white blood cell count 7,200 with absolute lymphocyte count of 628, hemoglobin 12,6 g/dl, platelets 140,000. He was found to have BUN 5,1 mmol/l, serum creatinine 59 umol/l, high sensitivity serum troponin 1,070 ng/l, serum ferritin 1412ug/l, D-dimer 0.79 mg/l, C-reactive protein (CRP) 131.6 mg/l. Nasopharyngeal SARS-COV2 PCR was negative twice with 2 days apart. ECG showed normal sinus rhythm. Transthoracic Echocardiography

showed hypokinesia of inferior wall with ejection fraction of 45 %. Patient was hospitalized in adult medical floor based on our hospital protocol and intravenous antibiotics were initiated (Ciprofloxacin and metronidazole). On day 3 of hospitalization, he subsequently developed hypotension with blood pressure 83/50 mmHg which responded appropriately to fluid resuscitation. At that time, Infectious diseases consultation was requested who they suspected multisystem inflammatory syndrome in children (MIS-C) likely related to COVID-19 based recent history of URTI and patient's clinical features. SARS-COV2 immunoglobulin G test was obtained then Empiric intravenous immunoglobulin (IVIG) and tocilizumab (interleukin-6 inhibitor) were given. Later, he was found to have positive SARS-COV2 immunoglobulin G.

He improved significantly within 72 h with near complete resolution of his symptoms (Fig. 2).

Prior leaving the hospital, CBC, coagulation profile, D-dimer, CRP, ferritin and troponin level were normalized. Patient has continued to do well with no recurring symptoms.

Discussion

Our case is one of the few survived cases of MIS-C related to COVID-19 in Saudi Arabia. Our case met the case definition of MIS-C (Age 0–19 years, persistent fever $\geq$ 3 days, multiorgan involvement, Kawasaki like symptoms, and elevated inflammatory markers) [8]. It is a disease of pediatrics age group which makes the diagnosis usually challenging for clinicians who practice adult medicine. It is usually made by clinical features along with positive RT-PCR, antibody testing, or both [7]. The diagnosis was challenging as our patient was hospitalized under adult medical care while he is still in pediatrics age group especially with twice negative nasopharyngeal SARS-COV2 PCR. Later, positive SARS-COV2 immunoglobulin G has helped us to confirm the diagnosis in our patient.

Hospitalization and close attention is recommended in all case of MIS-C as the disease can progress rapidly. IVIG, IL-6 or IL-1 inhibitors have been used in cases of myocardial dysfunction with favorable prognosis [7]. Additionally, many reports have shown positive response when immunomodulators such us IL-1 and IL-6 inhibitors used in critically ill patients with evidence of cytokines storm syndrome [9–11]. Due to evidence of myocardial dysfunction and cytokines storm syndrome in our case, three doses of IVIG and one dose of tocilizumab were given with excellent prognosis.

Fig. 2. Significant improvement of bilateral conjunctivitis post intravenous immunoglobulin and tocilizumab.

We propose that clinicians who practice adult medicine should be familiar with the signs and symptoms of MIS-C and start therapy as soon as possible if needed.

Consent

Informed consent obtained.

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Author contributions

HA and NA contributed to conception and design of the study, acquisition and analysis of data, and drafting a significant portion of the manuscript. ST, NR, and EA contributed to conception and design of the study, and acquisition and analysis of data. AA contributed to acquisition and analysis of data. MS contributed to conception and design of the study, acquisition and analysis of data, and drafting a significant portion of the manuscript.

Declaration of Competing Interest

The authors report no declarations of interest.

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