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Case report

SARS-CoV-2 infection associated severe dilated cardiomyopathy in a 4-week-old infant

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ABSTRACT

Multisystem inflammatory syndrome in children (MIS-C) is a rare but serious complication associated with COVID-19. It can lead to an inflammatory process in multiple body parts, including the heart, lungs, kidneys, and the brain. In this review, we describe the case of a 4-week-old infant with severe isolated systolic dysfunction who was found to be positive for COVID-19. He did not have the multi-system inflammatory syndrome in children (MIS-C) commonly associated with COVID-19 infection.

Introduction

Children are less commonly affected by SARS-CoV-2 infection; however, an increasing number of patients have been hospitalized with acute heart failure and multi-system inflammatory state and majority of them were found to test positive for SARS-CoV-2 [1]. Our case reports a 4-week-old male infant found to have severe dilated cardiomyopathy. Interestingly, he tested positive for SARS-CoV-2 within 10 days of initial presentation.

Case report

A 4-week-old male infant with no significant past medical history was referred to the cardiology clinic in the summer of 2020 for evaluation of cardiomegaly found on a CXR obtained by his general pediatrician. He presented to his pediatrician with tachypnea, increased work of breathing, occasional coughing, poor feeding, and irritability. He was born at term without complications. He had normal newborn screen. On Physical exam, he was in moderate distress with the following vital signs: heart rate of 172 bpm, RR of 68 and blood pressure of 91/64. Lungs were clear to auscultation bilaterally with mild tachypnea and mild sub sternal/subcostal retractions and grunting intermittently. Precordium was hyperdynamic and auscultation revealed a normal S/1 and S/2 with a gallop present. No click, rub, or murmur was heard. Abdomen exam was soft and non-distended with normo-active bowel sounds. Peripheral pulses were 2+ and full throughout with no radial-femoral delay. Extremities were warm and well-perfused with no cyanosis, clubbing or edema noted.

EKG obtained at the cardiology office showed normal sinus rhythm with left axis deviation at a rate of 176 bpm. PR interval normal at 100 ms and QTc normal at 379 ms. Right atrial enlargement and left ventricular hypertrophy with strain were present. Echocardiogram showed severely dilated Left Ventricle with severe dysfunction (Fractional Shortening of 11 %). The Patient was then transferred to the Pediatric Intensive Care Unit (PICU). On admission to the PICU pro-brain natriuretic peptide (pro-BNP) and troponin T were elevated at ~ 35000 and 293 ng/L, respectively. Initial work up included CBC, CMP, UA, TSH, Lactic acid, and a Carnitine level, all of which were unremarkable. Respiratory Infectious Disease Panel (RIDP) testing for the following pathogens (influenza virus A and B, parainfluenza virus 1–4, respiratory syncytial virus, rhinovirus, adenovirus, enterovirus, metapneumovirus, Mycoplasma pneumonia, Chlamydophila pneumoniae and Bordetella Para pertussis, Parvo virus, Coxsackie virus) was negative. SARS CoV-2 PCR obtained during this admission was negative.

The patient was started on anti-congestive medications (Milrinone, Captopril, Digoxin, Lasix and Aldactone). He improved clinically throughout his hospital stay. EKG was performed daily and showed persistent sinus rhythm with no arrhythmias. Echocardiography repeated prior to discharge revealed slight

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improvement of dilated cardiomyopathy with fractional shortening of 13.2 %.

The patient was discharged after 7 days in a stable condition. 3 days after discharge, he was seen by his pediatric cardiologist for a follow up; at that time, he was found to have tachypnea, increased work of breathing and hematochezia. Repeat echocardiogram showed improvement of FS to 15 %. He was re-admitted for closer monitoring of his respiratory status and for evaluation and management of hematochezia. During the second admission (within 10 days of initial presentation), PCR testing for SARS-CoV-2 RNA was positive and Anti-SARS-CoV-2 antibodies testing was negative confirming active COVID-19 infection. His respiratory distress improved with diuresis and his hematochezia improved with formula change and the patient was discharged with stable vital signs and good oral intake.

The patient has been followed by his pediatric cardiologist every 4–6 weeks since discharge with gradual improvement in his systolic function with his most recent echocardiogram at 5 months of age showing FS of 35 %.

Discussion

COVID-19 infections tend to be less severe in children compared to adults [1,2]. In general, pediatric patients with COVID-19 have an excellent prognosis and typically recover within one to two weeks after disease onset [2].

COVID -19 may result in cardiac injury through multiple potential mechanisms, including cardiomyocyte injury due to acute inflammatory response, viral invasion leading to cellular damage or Ischemic injury in the presence of severe hypoxia because of acute lung injury [3].

Our patient had severe dilated cardiomyopathy leading to severe systolic dysfunction without other findings of the multi-system inflammatory syndrome in children (MIS-C) commonly associated with COVID-19 infection. He responded well to anti-congestive medications with return to normal heart function. We believe that the constellation of symptoms (fatigue with feeds, occasional cough) and the confirmatory PCR testing for SARS-CoV-2, and the negative work up for other causes strongly supports an infectious etiology of our patient's cardiac dysfunction. There has been only one case reported for an infant with SARS-CoV-2 associated severely dilated cardiomyopathy [4].

With evidence of positive SARS CoV-2 PCR (10 days from initial presentation) and negative COVID-19 antibodies, and with a completely negative work up for other potential etiologies and given the variable clinical manifestations of COVID-19, we think that this is a unique case of isolated systolic dysfunction and severe dilation with COVID-19.

Contributions

MB, acquisition of data and drafting the article. ME, acquisition of data and drafting the article. DA, drafting the article, grammar check. RF, revising the article with final approval before submission.

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Ethical approval

No ethical violations have been committed.

Consent

Consent was obtained from the patient's mother.

Declaration of Competing Interest

The authors report no declarations of interest.

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