Case Report

Corona virus myocarditis in pediatric age group: a rare manifestation of pandemic

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ABSTRACT

Myocarditis is an uncommon disease of adult and pediatric age group, characterized by inflammatory cell infiltrates, myocyte necrosis, or myocyte degeneration due to a myriad of causes and resulting in variable degrees of myocardial dysfunction. Which may be caused by infections, connective tissue disorders, granulomatous diseases, toxic agents or can be idiopathic. Viral infections are the most common etiology accounting for more than 50-60% of cases, particularly enterovirus (Coxsackie virus) and adenovirus groups. The disease is typically sporadic but may be epidemic. Manifestations of myocarditis range from asymptomatic or nonspecific generalized illness to acute cardiogenic shock and sudden death. In our case 10-year-old boy presented with history of fever and cough of 2 days duration. On examination patient found to be having tachycardia and tachypnea without other signs of heart failure. chest x-ray suggestive of bilateral pneumonia, ECG showed features of Myocarditis without any echocardiographic or cardiac enzyme abnormality. Child tested positive for corona virus rapid antigen test. Started on Favipiravir, corticosteroids and managed symptomatically. Child's heart rate normalized over a period of 4 days. Patient subsequently discharged with the advice of follow up echocardiography.

Keywords: Myocarditis, Corona virus, Favipiravir, Corticosteroids

INTRODUCTION

Myocarditis has been defined by the world health organization/international society and federation of cardiology as an inflammatory disease of the heart muscle diagnosed by established histological, immunologic, and immunobiological criteria.¹ Insights into its clinical manifestation and treatment in both adults and children have been the subject of a number of recent reviews.²⁻⁷ It is caused primarily by numerous infectious agents, but it may also accompany autoimmune disease, hypersensitivity reactions, and toxins. Diphtheria often causes myocarditis in countries without widespread immunization.⁸ Although enteroviruses have classically been identified as the prime viral agent, new techniques to extract viral genome from myocardium with polymerase chain reaction techniques have in both children and adults revealed previously unrecognized viruses such as adenovirus, parvovirus B19, human

herpesvirus 6, hepatitis C, Epstein-Barr virus, and cytomegalovirus.^{2,3} Interestingly, the pattern of identified viral pathogens in myocarditis has evolved over the last 20 years from enteroviruses and adenoviruses to primarily parvovirus and herpesvirus 6. Endomyocardial fibroelastosis, a once frequent cause of infantile dilated cardiomyopathy that is now rarely seen, was linked to the mumps virus via viral polymerase chain reaction analysis of archived pathological sample, suggesting that its reduced prevalence might be attributed to immunization.² During covid-19 pandemic after ruling out other possible causes of Myocarditis, with evidence of COVID-19 infection and clinical presentation diagnosis of Coronavirus induced myocarditis can be made.

CASE REPORT

A 10-year-old boy presented with history of fever and cough of 2 days duration. Child was

neurodevelopmentally appropriate for age. Child was conscious, oriented, interactive, afebrile. On examination patient found to be having tachycardia (pulse rate:162 bpm), tachypnoea (respiratory rate: 34 cpm) without other signs of heart failure and was hypoxic (Spo₂-88% at room air). Anthropometric measurements were within centiles for age and sex. Systemic examination: cardiovascular system-S1, S2 heard normally with tachycardia without evidence of murmur; respiratory system-reduced air entry in bilateral corresponding areas with occasional fine crept heard all over lung field; rest systemic examination: normal. The child was investigated to look for possible causes of hypoxia with disproportionate tachycardia for age. In view of prevailing pandemic flue like symptoms, child was tested for COVID-19 antigen and RTPCR tests. Chest x-ray suggestive of bilateral pneumonia, ECG showed features of Myocarditis without any echocardiographic or cardiac enzyme abnormality (Tn I-<0.1 ng/ml, CK-MB-<2 ng/ml, myoglobin-<20 ng/ml). Child tested positive for corona virus rapid antigen test as well as RTPCR test. The child's hemogram was normal (hemoglobin concentration: 11.2 gm/dL; hematocrit: 37.9%; total leukocyte count: 6900/mm³; platelet count: 262000/mm³) with normal renal function tests (BUN:20, creatinine: 0.9) with elevated LDH:347 U/L, CRP-8.4 mg/L, ESR-40 mm at the end of 1st hour; normal total bilirubin (0.2 md/dl) and SGOT (40U/L), SGPT (32 U/L). Started on supplemental oxygen by nasal prongs at 6L/min along with favipiravir, corticosteroids and managed symptomatically. Diagnosis of Corona virus induced myocarditis was considered by excluding other possible causes tachycardia and myocarditis. Child's heart rate normalised over a period of 4 days and weaned off from oxygen support. Patient subsequently discharged with the advice of follow up echocardiography.

Figure 1: Diffuse inhomogeneous opacity in bilateral lung fields.

Figure 2: Follow up chest X-ray of resolved pneumonia.

DISCUSSION

Acute heart failure is clearly a dissonant clinical feature of COVID-19 infection in children that is known to be less frequent and less severe than in adults and with very low mortality.^{16,17} Besides its unusual nature, the main characteristic of COVID-19 acute myocarditis is its association with major multisystem inflammatory syndrome, mimicking a well-known pediatric entity, the Kawasaki disease. Currently three case definitions issued from the world health organization, the centres for disease control and prevention and the royal college of paediatrics and child health related to this emerging inflammatory condition during COVID-19 pandemic exist. Those definitions identify the multisystem inflammatory syndrome in children (MIS-C) or the pediatric inflammatory multisystem syndrome (PIMS).¹³ All three case definitions include either partial or full criteria for Kawasaki disease and evidence of COVID-19 diagnosis (clinical and/or biological-serology/PCR). Kawasaki disease's, which affect mostly young children of less than 5 years of age, has typical clinical features including: (1) prolonged fever, (2) conjunctivitis, (3) dry cracked lips, (4) cervical adenopathy (5) diffuse skin rash involving the trunk and extremities, subsequent desquamation of the tips of the toes and fingers, and (6) edema. In addition to classical manifestations of Kawasaki disease, MIS-C patients, who are much older, display digestive symptoms, shock and myocardial involvement more frequently.¹⁸ Kawasaki disease pathophysiology refers to a systemic arteritis with the most severe complication being coronary aneurysm. Kawasaki disease can follow by a few days or weeks a wide range of infection involving numerous viruses such as EBV, MERS- and SARS-CoV-1, H1N1 influenza and other respiratory illnesses.

In a somewhat confusing fashion, the American heart association's contemporary definitions of cardiomyopathies classify myocarditis as an inflammatory cardiomyopathy but also lists the same infectious causes of dilated cardiomyopathy as those found with myocarditis.⁹ This conundrum typifies myocarditis. Its myriad presentations range from minimal symptoms to severe heart failure and sudden death. It is commonly associated with typical abnormalities observed in ECGs, cardiac imaging, and cardiac biomarkers, but it may exist in the absence of those abnormalities. It is a disease defined by observable myocardial pathology but may be present despite normal-appearing cardiac biopsies. Recent descriptions of a short outbreak of acute myocarditis in otherwise healthy children raise the hypothesis of additional critical complications of SARS-CoV-2 infection.

CONCLUSION

Corona virus induced myocarditis is rare entity in the prevailing pandemic of COVID-19. There are vast number of causes of myocarditis in pediatric age group including viruses, bacteria, parasite. Diagnosis was made depending upon clinical presentation and evidence of COVID-19 infection. Viral myocarditis if treated properly will have good outcome without long term sequelae.

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