ISSN: 2320-5407 Int. J. Adv. Res. 9(04), 715-722

Journal Homepage: - www.journalijar.com

Article DOI: 10.21474/IJAR01/12756
DOI URL: http://dx.doi.org/10.21474/IJAR01/12756

RESEARCH ARTICLE

CHILD WITH TWO ATTACKS OF COVID-19, PRESENTED WITH KAWASAKI DISEASE IN THE SECOND COVID-19 ATTACK

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Manuscript Info

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Manuscript History
Received: 16 February 2021
Final Accepted: 19 March 2021
Published: April 2021

Abstract

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Introduction: -

Kawasaki diseases (KD) after the onset of the covid-19 disease has been reported in many pediatric patients 35, 36 .

KD disease first described in 1967 is characterized by a multisystem involvement with acute inflammatory processes in small and medium vessels, most common affecting coronary arteries 1, 2. If Kawasaki patients left untreated, it can lead to multiple complications and even sudden death 1. KD usually affects children, above 6 months old and younger than 5 years old, and it is the second most common vasculitis seen in this population, with 1.5 times predominately in boys more than in girls 1.

KD incidence is different between countries; the incidence is 10 to 30 times higher in northeast Asian countries, including Japan, China, and South Korea than in the United States and Europe 1, 3, 4. The incidence in the USA of KD is estimated to be between 17.5 and 20.8 per 100,000 children with an age younger than 5 years, while in Europe it is about 5-10/100,000 3 .

KD is usually a clinical diagnosis, its presentation with a large variety of signs and symptoms, so it may resemble other viral and bacterial infections 1. The clinical diagnosis is made by identifying the signs and symptoms, and sometimes supplemented by laboratory parameters that aid in the final diagnosis. 5 .

There are criteria to establish the diagnosis of KD, which includes the presence of fever for five or more days associated with 4/5 of the following criteria: non-exudative conjunctivitis, cervical lymphadenopathy, erythema and cracking lips, or polymorphic rash 6. Cardiac complications (mainly coronary artery aneurysm) are the most important complication of KD disease to be followed. 1.

The hyperinflammatory response caused by (COVID-19) disease in children, along with aneurysmal changes in the coronary arteries, is similar to KD 31.

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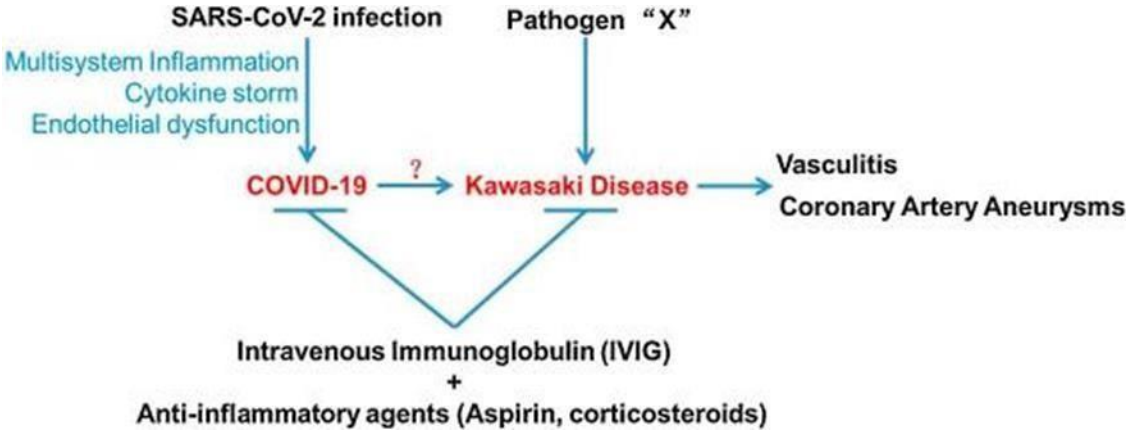
Although it is still early to confirm the association between KD and COVID-19 infections, there are studies that show the incidence of KD cases during spring and winter, suggesting its association with some types of viral infections, such as those by adenovirus, enterovirus, parvovirus, rhinovirus, varicella, Epstein Barr, measles, and dengue 10-27.

Studies have described an association between viral respiratory infections and KD, ranging from 9% to 42% of patients having a positive test for viral respiratory infection within 30 days before the diagnosis of KD 15, 25-27..

Data from adult patients with COVID-19 in China showed a significant increase in cardiac enzymes (troponin), a parameter that is associated with an increase in mortality. It has been reported that, in COVID-19 patients, the microvascular damage of the heart causes perfusion effects, vessel hyper permeability, and vasospasm, leading to myocardial injury 28.

There is possible hypothesis that link between COVID-19 and Kawasaki Disease (KD) is shown in the below diagram:



Case presentation:-

We are reporting a case of an 18 month old boy, who previously had a history of COVID-19 disease (positive swab), presented to the ER with a history of fever for 5 days and skin Rash for 2 days.

His condition began 5 days before presentation when he began to have fever, which was documented reaching up to 40C, continuous, partially responded to antipyretic, spiking every 3 hours, more at night; he also had skin rash 2 days before presentation in the form of maculopapular, which began on the trunk and progressed to the extremities and face, was associated with redness in both eyes, and he reduced his oral intake.

Also, his mother mentioned that he was refusing to walk, crying when he pulled to stand, with no change in the level of consciousness, nor abnormal movements.
No diarrhea or vomiting**.**
Four days prior to his presentation, he sought medical advice According to his mother, he was diagnosed with otitis media and was then discharged home after being given oral antibiotics and antipyretics. No history of contact with a sick patient or similar disease in his family.

Past medical history:
He was born via C-section due to a previous CS, at full term, with no NICU admission. He had a history of recurrent otitis media, no history of allergies or hospital admission.

He was infected with COVID-19 nine months ago, which manifested as a fever for two days and was treated at home, He did not require hospital admission. His parents and two older sisters were also infected (as manifested by easy fatigability, loss of taste and smell, no respiratory symptoms, and they did not need hospitalization).

In addition, his parents got the COVID vaccine one month before his presentation.
At this presentation, both parents and older sisters are doing fine. Asymptomatic (COVID-19 results are negative)

On examination:
(at the time of the presentation)
T: 39. HR 130 SpO2: 100%. BP 92/58. RR 23
Weight 9 kg, height 68 cm
He looks uncomfortable, conscious, moving four limbs.
CNS: normal power, tone and reflexes
CVS: normal heart sounds, no murmur
Chest: bilateral equal air entry with no added sounds
Abdomen: soft, lax with no palpable organomegaly
Head and neck: Non-exudative red eyes enlarged tonsils, congested throat and congested right ear. Red cracked libs, strawberry tongue, and about 2 cm palpable left cervical lymph nodes
Skin: maculopapular rash on the trunk and lower limbs, with no desquamation.

Investigations:
CBC: WBC: 10.20 NE: 4.1 (41.29%) LY: 3.8 (37.28%) EOS: 1.42 (13.9%)
HB: 10.98 MCV: 71.47. MCH 23.42. RDW 12.07 Platelets: 475
Renal function test: within normal range
Liver function test: within normal range
CRP: 15.59. ESR 96
The ECG was normal for his age.

Imaging:
Chest X-ray: bilateral lung infiltration
An echocardiogram was done and showed:
Dilated left coronary artery (3.96 mm) z score + 5.1 (figure 1) The right coronary artery is normal (figure 2)
Normal biventricular sizes and function (figure 3)
Competent valves
There was no coarctation of aorta.
No pericardial effusion
Small ASD secondum (shunting left to right)
The rest of the study is normal.

Hospital course:
The patient was admitted to the COVID ward, and a COVID-19 swab was taken, yielding a positive result (twice).
Kawasaki diagnosis was established and echo done and showed dilatation of LCA.
Patient Received One dose of IVIG 2 mg/kg, Aspirin (anti-inflammatory dose 60 mg/kg)
The Fever did not return after IVIG, and the rash was gone within 24 hours.
On day 10 of his disease, a covid-19 swab was repeated, which was negative, and the child was discharged home in good condition.

Figure 1:-

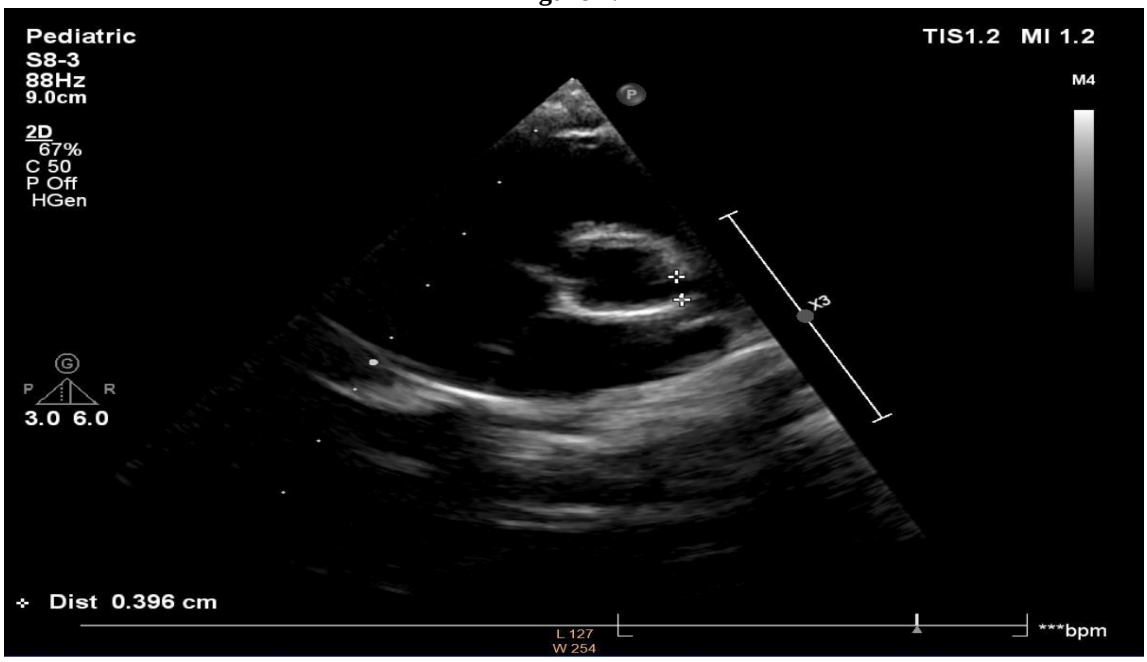


Figure 2:-

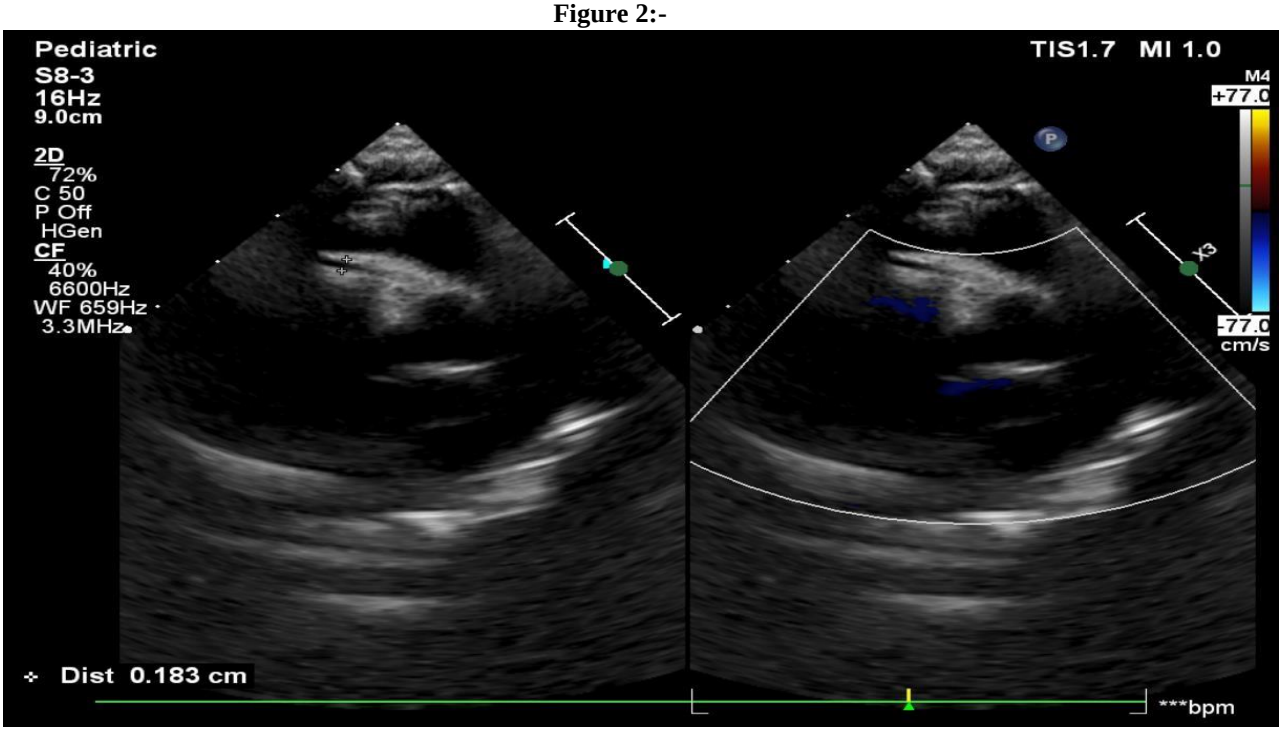
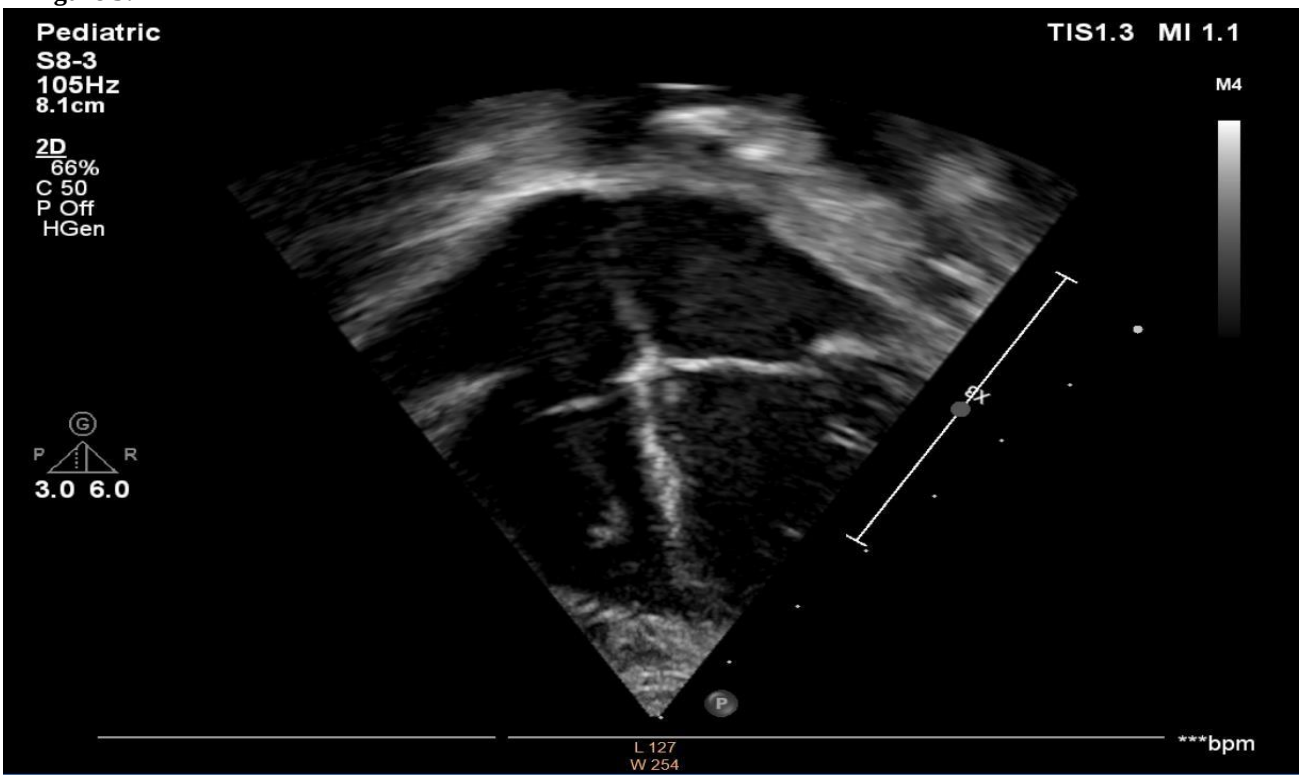


Figure 3:-



Discussion:-

Kawasaki disease (KD), also known as mucocutaneous lymph node syndrome and Kawasaki syndrome, is an acute febrile illness of early childhood characterized by vasculitis of the small and medium-sized arteries, given its predilection for the coronary arteries. As there is a potential for the development of coronary artery aneurysms and thus sudden death.

Coronary artery aneurysm develops in approximately 25% of untreated cases; appropriate treatment decreases this risk to 3-5% 38.

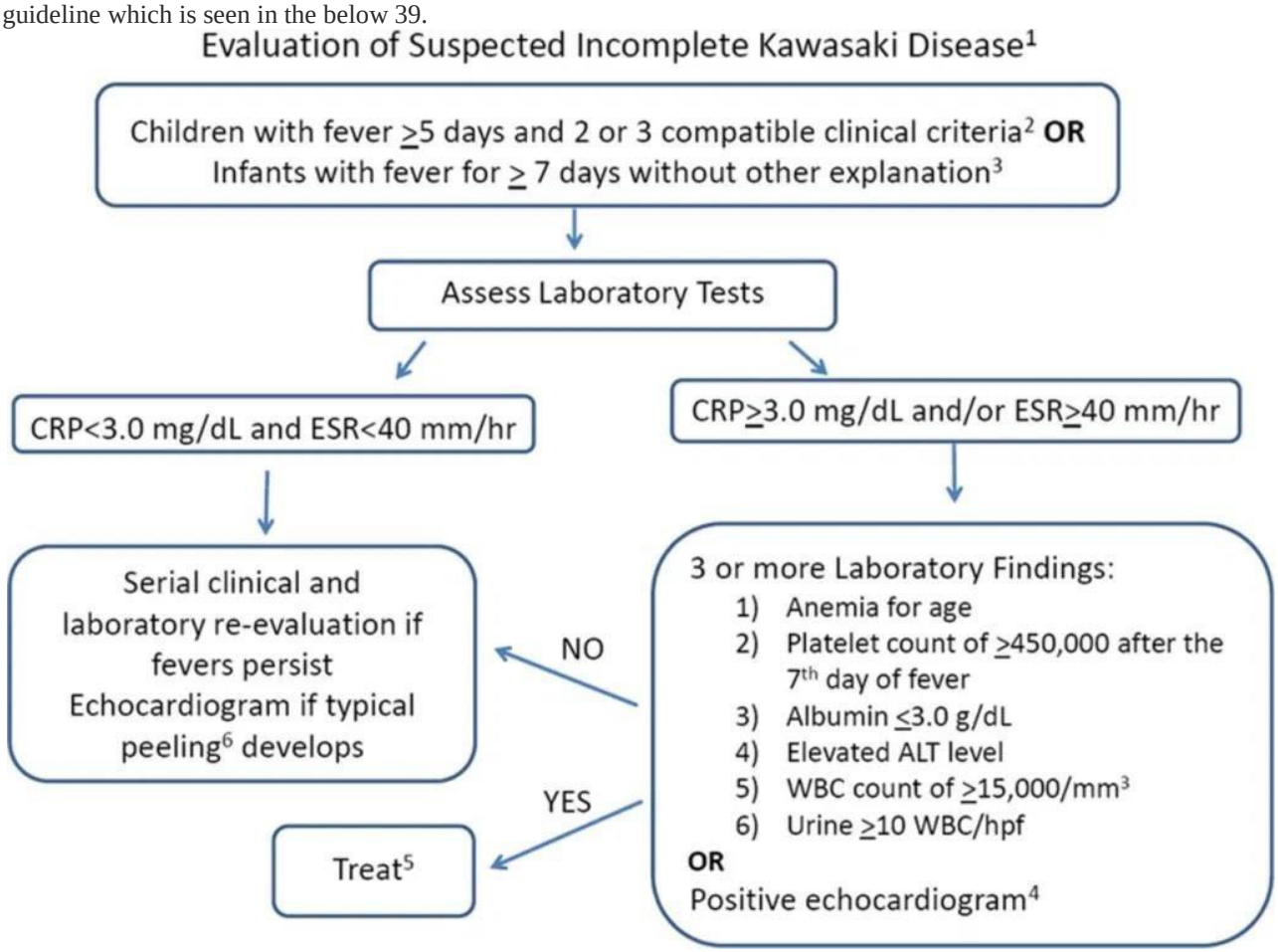
There are two forms of KD: complete and incomplete. Diagnosis of complete KD requires fever of at least 5 days' duration along with 4 of 5 of the principal clinical features.

The principal clinical features are as follow:

1. Extremity changes
2. Polymorphous rash
3. Oropharyngeal changes
4. Bilateral, nonexudative, limbic sparing, painless bulbar conjunctival injection
5. Acute unilateral nonpurulent cervical lymphadenopathy with lymph node diameter greater than 1.5 cm

Incomplete KD is diagnosed when a patient presents with fever for 5 days or longer, with 2 or 3 of the principal clinical features, and laboratory findings suggestive of the disease or echocardiographic abnormalities. Suggestive laboratory findings include elevated erythrocyte sedimentation rate (ESR), elevated C-reactive protein (CRP), hypoalbuminemia, anemia, elevated alanine aminotransferase (ALT), thrombocytosis, leukocytosis, and pyuria.

The American Heart Association (AHA) suggests an algorithm for the diagnosis of incomplete KD in the most recent guideline which is seen in the below 39.



Echocardiography is the study of choice to evaluate the coronary artery aneurysm. Serial echocardiograms should be obtained as follows:

1. At the time of KD diagnosis
2. 1-2 weeks after the onset of the illness
3. 5-6 weeks after the onset of the illness 39 .

The etiology of KD remains unknown. There has been a strong suspicion that the etiology of KD is infectious. However, no single infectious agent has been implicated. However, autoimmune reactions and genetic predisposition have been suggested as possible etiologic factors 39.

In May 2020, a lot of cases of COVID-19 with a multisystem inflammatory syndrome with characteristics of KD in children were described by the department of health of the city of New York 34. Despite the lack of details inherent to these types of reports, describing the exact nature and severity of the cases admitted in a hospital environment is still a challenge.34, 35, 36

The incidence of Kawasaki Disease after the start of the epidemic was increased by around 30 times in children as seen in one study from Bergamo, an Italian city widely affected by the COVID-19 epidemic. The children diagnosed during this period showed evidence of immune response to the virus, were older, had a higher rate of cardiac involvement, characteristics of macrophage activation syndrome, and required steroid treatment. 35

As noticed, the presentation of COVID-19 infections cases has a wide variation of signs and symptoms, such as fever, fatigue, myalgia, cough, sore throat, runny nose, congestion, and shortness of breath. In more severe cases, symptoms can include gastrointestinal alterations and patients can progress to respiratory failure, shock, coagulation dysfunction, and renal injury. In addition to the cases with clear and detectable signs and symptoms, completely asymptomatic infections can occur 36.

In our patient, the symptoms that led to requesting the COVID-19 screening test were high grade fever, skin rash, and the radiological findings, which showed bilateral lung infiltration.

The clinical course and presentation of the patients in this study were mild apart from high grade fever. Throughout hospitalization, he showed no remarkable respiratory symptoms and was treated with a single dose of 2 g/kg of intravenous immunoglobulin (IVIG) and acetylsalicylic acid (ASA 60 mg/kg/day divided four times a day).

Post-discharge recommendations for monitoring included echocardiography after 2 weeks and 4-6 weeks after the treatment and to continue on a low dose of Aspirin 5mg/kg/day 31.

Medical entities and researchers have increased their attention to the association between COVID-19 infections and possible complications in children. More detailed descriptions about the clinical course of this population are still necessary.

Finally, COVID-19 can infect children more than once and a high index of suspicion of Kawasaki disease after onset of COVID-19 should be considered for any child with positive COVID-19 and fulfill the KD criteria.

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