

Surgical Management of a Vascular Complication in A Pediatric Patient With Kawasaki-Like Disease Due to Association of SARS-Cov-2 and Dengue

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Citation: Argotti Zumbana RD, Acosta DBF, Rivadeneira AFM, Panchana MGD and Quiñonez Leon JC (2021) Surgical Management of a Vascular Complication in a Pediatric Patient with Kawasaki-Like Disease Due to Association of SARS-CoV-2 and Dengue. Arch Med Vol.13 No.9:41

Abstract

Background: Severe acute respiratory syndrome coronavirus 2 in association with other pathologies can trigger systemic alterations that can compromise life in pediatric patients. A multidisciplinary management for this case is required since the information available from severe acute respiratory syndrome coronavirus 2 is constantly updated.

Case presentation: We describe the first case in Ecuador of bilateral forefoot and left-hand amputation due to vascular complication with necrosis in an Afro-descendant pediatric patient with Kawasaki-like disease caused by the association of Corona virus disease 2019 and Dengue.

Conclusion: The identification of progression of the syndrome is important for the correct therapeutical management.

Keywords: Severe acute respiratory syndrome coronavirus 2; Kawasaki-like disease; Dengue; Amputation

Received: August 20, 2021; **Accepted:** September 06, 2021; **Published:** September 13, 2021

Abbreviations

COVID-19: Corona Virus Disease 2019; SARS-CoV-2: Severe Acute Respiratory Syndrome Coronavirus 2; KD: Kawasaki Disease; MIS-C: Multi-systemic Inflammatory Syndrome in Children

Introduction

The COVID-19 virus which causes the SARS-CoV-2 (Severe Acute Respiratory Syndrome Coronavirus 2) belongs to a family of viruses that mostly affects animals but can sometimes be transmitted to persons [1]. The recent appearance of COVID-19 and consequently SARS-CoV-2 has led to the current pandemic which is a global sanitary crisis [2]. In children, respiratory affection suggests a more benign illness, but in these patients the appearance of MIS-C (Multi-systemic Inflammatory Syndrome in Children) can be seen, it is associated to shock and myocardial dysfunction. Several coagulopathies have been described, which might be caused by the inflammatory state itself [3-5].

Since April 2020 we have evidenced that MIS-C shares several characteristics with KD (Kawasaki Disease). Both diseases are predominantly seen in male patients, but KD has a predilection

for Asian children and MIS-C for afro-descendants and Latin-Americans [6-9]. On the other hand, in the Ecuadorian provinces that have a warm-humid and tropical weather Dengue fever is endemic during the months of November until May. COVID-19 has been associated with Dengue and the development of MIS-C with symptoms and characteristics like KD that can cause death [10].

The goal of this publication is to describe the first known case in Ecuador, in particular the surgical management performed due to the vascular complications seen in this patient who led to the amputation of bilateral forefoot and left hand. Also, it is important to acknowledge the Kawasaki like presentation that can be seen due to the association between COVID-19 and Dengue fever.

Case Presentation

A 5-year-old female patient who is an afro-descendent with history

of being hospitalized for 16 days in another Hospital. The patients' chief complaints were fever 40°C, abdominal pain and dyspnea. Dengue serology was IgM positive. On the second day fever persists, generalized edema and hemodynamic decompensation appear which warrant orotracheal intubation. Supraventricular tachycardia was also seen which was controlled with electric cardio version. On the 9th day COVID-19 PCR test was negative. At the 10th day a COVID-19 rapid test was performed which was positive for both IgM and IgG. At the 16th day of hospitalization there was a cardiac arrest which successfully reverted after 5 minutes of Advanced CPR. After the cardiac arrest, hypertension developed and skin colour changes were seen in the distal region of the inferior limbs and the left hand which progressed to ischemia and necrosis, reason why the patient is referred to a third level Institution (Our hospital) (Figures 1a-1c).

Important laboratory values

Ferritin: 996 ng/mL. D-dimer: 6,4 ug/mL, CKMB 53, CPK 243, CRP 8,6 and a PRO-BNP of 933. CT where ground-glass opacifications are seen (Figure 2) and Echocardiogram shows pericardial

effusion. Also, an echo-doppler was performed on the left upper extremity where diminished blood flow can be seen (Figure 3).

The patient's diagnosis was Arterial thrombotic disease of the upper and lower extremities, MIS-C, Heart failure and lung disease secondary to SARS-CoV-2. The patient had a multidisciplinary management by: Pediatric and Plastic surgery, P-ICU and Pediatric Orthopaedic. At the 28th day it was decided to manage it surgically and the patient underwent amputation of the affected areas (Figure 4).

After the surgery, the patient was hospitalized during an additional 2 weeks where she received broad spectrum antibiotic coverage and had a favourable evolution which led to her discharge. The patient was then followed with regular controls in the outpatient clinic.

Discussion

The COVID-19 infection can be asymptomatic or develop into the SARS-CoV 2 disease. This is a respiratory infection with an important compromise of the hematopoietic system and consequently hemostasis, leading to cardiovascular



Figure 1 (a and b) Right and left lower limbs with distal necrosis. (c) Left upper limb with distal necrosis.

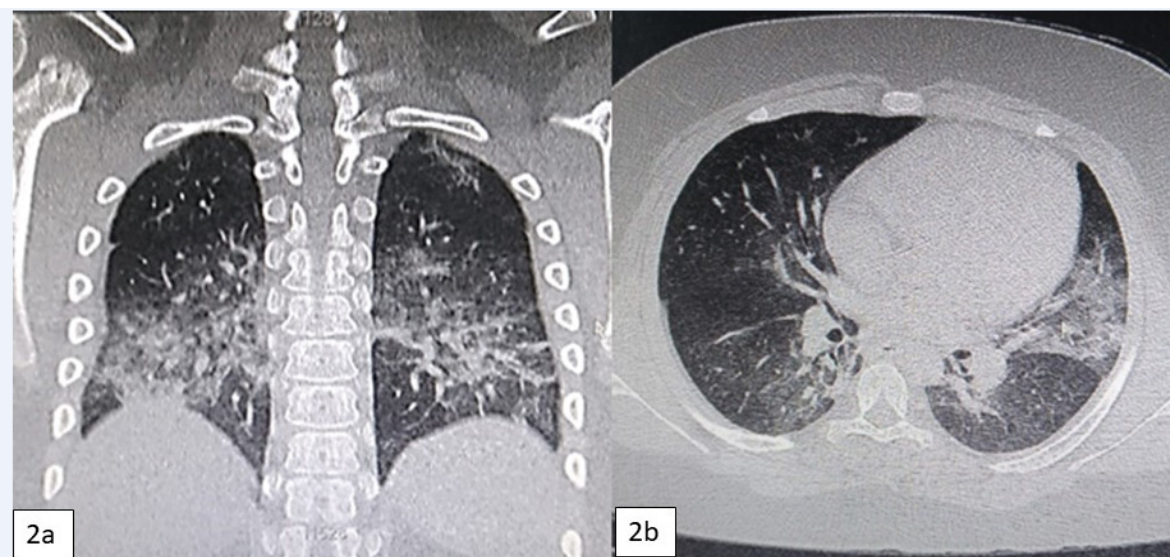


Figure 2 (a) CT coronal view. (b) CT axial view.

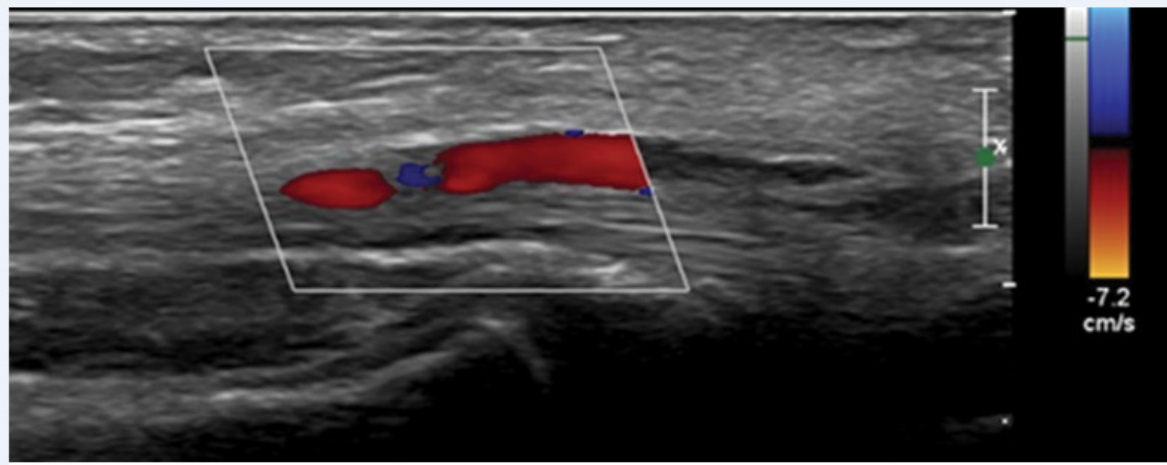


Figure 3 Echo-Doppler of the left upper extremity where diminished blood flow can be seen at the forearm level.

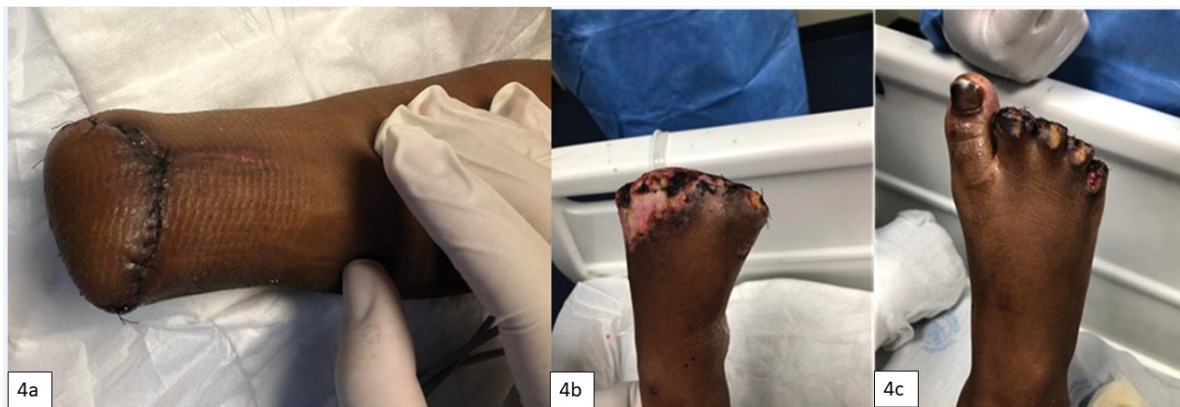


Figure 4 (a) Left hand at the level of the distal third of the diaphysis. (b and c) feet at the forefoot level.

complications. A rise of the D-dimer and procoagulant levels are seen, which are associated to a higher mortality [11,12].

KD is considered a primary vasculitis that predominantly affects children. It is a medium and small size artery vasculitis. The most described complication is the coronary artery aneurysm, which can be related to myocarditis. Most of the cases require Pediatric ICU support in the acute setting. The etiology of KD is unknown, but the presence of a virus might be the trigger in children genetically predisposed [13].

Esper F et al. and Chang LY et al. in their published studies mention that there is the association of the KD and COVID-19 in the pediatric population. On the other hand, in the study by López P et al. a relation between Dengue fever and COVID-19 is suspected. Due to the similarity in presentation between COVID-19 and Dengue a prompt diagnosis is not always possible, also important to mention is that Dengue antibodies can cross-react with COVID-19 [14-16].

According to the WHO (World Health Organization) pediatric patients in Europe and North America have been hospitalized in

the P-ICU because of MIS-C sharing characteristics with KD and Toxic Shock Syndrome. Multi-organic insufficiency and shock can develop, where NSAIDs, Corticoids and Immunoglobulin's have been used. [17].

The results of the laboratory tests support the association between COVID-19 and MIS-C, because patients with this disease show elevated values of procalcitonin, ferritin, D-dimer, Neutrophils and CRP, which account for infection and inflammation.

The immunologic affection can lead to diffuse endothelial inflammation and consequent capillary damage which is seen as vascular lesions in hands and feet [18]. When the vascular damage causes peripheral gangrene, the correct therapeutic management is amputation [19].

Conclusion

The identification of progression of the syndrome is important for the correct therapeutical management. It is imperative to keep in mind the variable presentations seen in children, the possibility of a MIS-C and complications. In our case the surgical management

was favorable. According to the information published, where we find similarities with the clinical presentation of our patient, a negative COVID-19 test does not necessarily exclude the presence of this disease, especially when there is a positive IgM result for Dengue Fever. Based on the premise that afro-descendants are predisposed for the development of MIS-C and the presence of Dengue and COVID-19 simultaneously, the Kawasaki-like disease would be explained.

The multidisciplinary management of this patient took place in the P-ICU, and it was based in anticoagulants, immunosuppressors,

immunoglobulins, steroids and interleukin and phosphodiesterase inhibitors. The stability of the patient was achieved with this regimen; the amputation was performed avoiding a septic focus.

Recommendations

It is important to describe all the available details related to the COVID-19 and Dengue association, since there is a lack of information. This way all the experiences are shared, leading to a bigger data base and ultimately a better and prompt diagnosis, as well as a correct management of complications.

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