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“Inflammatory peritonitis in a child with COVID-19”

Paula H. Takegawa^a, Márcia Cavalaro Silva^a, Caroline Belluco^a, Thalita Mitsunaga^a,
 Patrícia Pegolo^a, Márcio L. Miranda^a, Marcelo Barciela Brandão^b, Ricardo Vilela^b,
 Marcela Silva Castro^b, Fernanda Junqueira^b, Joaquim Bustorff-Silva, MD, PhD^{a,*}

^a Division of Pediatric Surgery, Department of Surgery, State University of Campinas Medical School, Rua Tessalia Vieira de Camargo, 181, Cidade Universitária, 13083-887, Campinas, SP, Brazil

^b Pediatric Intensive Care Unit, Department of Pediatrics, Clinical Hospital, State University of Campinas Medical School, R. Vital Brasil, 251, Cidade Universitária, 13083-888, Campinas, SP, Brazil

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ABSTRACT

COVID-19 is the disease caused by SARS-CoV-2 coronavirus infection (Severe acute respiratory syndrome coronavirus 2). Although its most prevalent symptoms are respiratory, there are descriptions of gastrointestinal manifestations in children, but the presentation as an acute abdomen is rare. We report the case of a 6-month-old infant who was admitted with a diagnosis of intestinal obstruction and generalized peritonitis with no apparent cause, in whom a SARS-CoV-2 rt-PCR search was positive. We have not found descriptions of similar cases in the literature so far.

1. Introduction

COVID-19 is the disease caused by SARS-CoV-2 coronavirus infection, that emerged in China in December 2019 and spread around the world with a constant increase in the number of cases and deaths. The fatality rate is lower in children than in adults. In children, the most common symptoms are fever (47.5%), followed by cough (41.5%), nasal symptoms (11.2%), diarrhea (8.1%) and nausea/vomiting (7.1%) [1]. Although the main transmission is through respiratory secretions, there is evidence of the virus being present in the stools [2]. As the pandemic progresses, a greater number of cases with gastrointestinal manifestations has been described, with such manifestations being more frequent in severe cases of COVID-19 [3] and also in children under 3 years of age [4].

While abdominal pain is a frequent complaint in children, the presentation of COVID-19 as an acute abdominal condition is rare. Recently, a pediatric multisystem inflammatory syndrome (P-MIS) has been associated with COVID in children. Besides being a serious life-threatening condition, this syndrome often presents with gastrointestinal symptoms [5], which can mimic acute abdominal conditions [6]. There are reports of acute abdomen in children with Covid-19, usually associated with diarrhea and vomiting, eventually simulating generalized peritonitis similar to complicated appendicitis with intestinal perforation. In most of the reported cases, as CT-scans showed no signs of pneumoperitoneum or changes that indicated a surgical approach, conservative treatment was instituted [7]. To our knowledge this is the first report of initial presentation as severe inflammatory acute abdomen associated with intestinal obstruction related to SARS-CoV-2 infection in Brazil or elsewhere in the world.

The purpose of this article is to report an unusual manifestation of COVID-19 in children. The Free and Informed Consent Term was signed by the person responsible and this report was approved by the CEP.

* Corresponding author.

E-mail addresses: paula.tkg@gmail.com (P.H. Takegawa), macavalaro@gmail.com (M.C. Silva), carol.belluco@hotmail.com (C. Belluco), thalimitsu@gmail.com (T. Mitsunaga), pegolo@hotmail.com (P. Pegolo), marciomiranda@hc.unicamp.br (M.L. Miranda), mbrandao@globo.com (M.B. Brandão), rvilela@hc.unicamp.br (R. Vilela), marcelascastro@gmail.com (M.S. Castro), fermdjunqueira@gmail.com (F. Junqueira), bustorff@unicamp.br (J. Bustorff-Silva).

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2. Case report

A 6-month-old, previously healthy male infant, was admitted to the hospital with severe and progressive abdominal distension and pain, vomiting and interruption of bowel movements. He had been treated in the previous 6 days because of fever and a runny nose, without other associated symptoms. Two days before admission, he started to present the abdominal symptoms. On admission, he no longer had coughing or other respiratory complaints. His mother reported respiratory symptoms (runny nose, nasal obstruction and anosmia) not accompanied by fever or dyspnea.

Upon admission to the Pediatric Intensive Care Unit (PICU) of the Hospital de Clinicas da Unicamp in Campinas – SP, Brazil, he was tachycardic (170–180 bpm), eupneic (40 rpm), normotensive (104 × 78 mmHg), afebrile (36.2 °C) with sensory alteration and drowsiness, opening the eyes only when manipulated. Physical examination disclosed a distended, hyper tympanic abdomen with global reduction of bowel sounds, rebound tenderness and signs of peritonitis (Fig. 1). Rectal examination did not recover any stool or blood. Upon arrival the patient had already received about 60ml/kg of crystalloid solution.

In view of this condition, an initial diagnostic of septic shock associated with acute abdomen was made. Intestinal intussusception, internal hernia or acute appendicitis, were considered as possible causes. Laboratory tests showed thrombocytopenia, lymphopenia, and elevated Ferritin and CRP (Hb: 15.8 Ht: 49.6% Leukocytes: 8240 (650 metamyelocytes, 2630 rods, 4280 segmented, 490 lymphocytes, 160 monocytes) Platelets: 99,000; Ferritin: 930ng/dL; CRP: 254mg/dL; TGO: 78U/L, TGP: 41U/L). Abdominal ultrasound disclosed free perihepatic fluid in the right iliac fossa and flank, associated with moderate gastric and intestinal distension, with normal intestinal walls and reduced peristalsis. Radiological examination was compatible with bowel obstruction, displaying air-fluid levels, reduced air in the lower abdomen and absence of pneumoperitoneum (Fig. 2). Chest X-ray was normal. The child was intubated and placed under ventilatory support, infectious screening tests were collected, fluid and antimicrobial therapy were started and evaluation by the Pediatric Surgery team was requested. Due to the clinical and radiological signs of acute abdomen and to the rapid deterioration in the clinical status, a decision was made to proceed with urgent surgery.

Exploratory laparotomy discovered a moderate amount of a thick fibrin-purulent ascites diffusely adherent to the liver surface, anterior gastric and duodenal wall, and to a lesser extent to the small bowel and colon (Fig. 3); there were no signs of acute appendicitis, intestinal invagination, Meckel's diverticulum or any other signs of intestinal suffering or perforation. Prophylactic appendectomy and intensive irrigation of the abdominal cavity with warm saline were performed and peritoneal fluid and mesenteric lymph nodes were collected for posterior culture.

On the first postoperative day it was reported that the rt-PCR taken before surgery had been positive for SARS-CoV-2. Search for respiratory syncytial virus, blood cultures and ascitic fluid cultures were negative. A definitive diagnosis of idiopathic primary peritonitis associated with COVID-19 and intestinal sub occlusion was made.

The patient had an uneventful postoperative course, being extubated 24 hours after the surgical procedure. Bowel movements returned after 48 hours of fasting and oral feedings were slowly reintroduced. He was discharged from the ICU four days after admission with a normal abdomen, normal bowel habits, tolerating oral diet, without recurrence of abdominal distension or vomiting.

3. Discussion

We present the first report of a case of inflammatory acute abdomen with intestinal sub occlusion associated with COVID-19 in a pediatric patient. Although abdominal pain is a common complaint in children, this is not a common symptom found in patients diagnosed with COVID-19.

The fact that this child's condition started with fever and runny nose, common symptoms of COVID-19, and the presence of a relevant family history, suggests that SARS-CoV-2 may be involved in the etiology of this picture. However, there is always the possibility



Fig. 1. Severe abdominal distention.



Fig. 2. Admission upright abdominal X-ray showing bowel distension and air-fluid levels.

that the gastrointestinal manifestations and the detection of the virus represent only a time coincidence in a pandemic scenario, and not an etiological relationship. In the present state of knowledge, it is very difficult to establish firmly a causal relationship in cases like the present one.

In adult patients, gastrointestinal manifestations are present in about 3% of cases, with anorexia, diarrhea and vomiting being the most prevalent [3,8]. Studies suggest that SARS-CoV-2 infects the gastrointestinal tract via the angiotensin II-converting enzyme receptor, which is present in enterocytes in the ileum and colon. Viral RNA has also been isolated in the stool of patients with COVID-19, suggesting possible transmission via the fecal-oral route as well [3].

The recently described multisystem inflammatory syndrome, an acute and severe disorder occurring in children and adolescents, probably associated with SARS-CoV-2, is currently being discussed. Diagnosis is based on well-established criteria by the Centers for Disease Control (CDC) [9] and by the World Health Organization (WHO) [10] and it presents with severe manifestations, requiring ICU admission, use of vasoactive drugs and treatment with immunoglobulins [11]. The present case, despite meeting the CDC inclusion criteria, did not meet to WHO criteria and also did not follow the clinical course described in children with this syndrome.

To date, no published reports of children admitted to PICU for COVID-19 related acute abdomen requiring exploratory laparotomy could be found. In the United Kingdom, eight children who presented with atypical symptoms of appendicitis, were diagnosed with COVID-19. Imaging findings were in line with terminal ileitis and so they were not operated [12]. In the present case, abdominal X-ray was compatible with intestinal obstruction, which, together with the rapid deterioration of the child's clinical status determined the need for urgent surgery.

A systematic review carried out with 38 studies to describe the clinical, laboratory and radiological characteristics in children with COVID-19 concluded that their clinical manifestations may differ from the adult patient [1]. Lymphopenia as found in the present case, although common in adults [13] and apparently associated with severe disease [14], is not a common manifestation in the pediatric patient (12.9% of cases). Also, as in the case described here, the vast majority of pediatric patients have a more favorable clinical course with less morbidity and mortality rates [1].

In the present case, the need for surgical intervention could be questioned, had the diagnosis of COVID-19 been known in advance. However, the surgical team was faced with a rapidly deteriorating child with clinical and radiological signs of acute intestinal obstruction, without an apparent cause. This picture only is a classical indication for emergency surgical exploration. Also, in the early days of the pandemic, the lack of knowledge about the manifestations of this disease in children, would not recommend expectant management. Lessons learned, the information obtained from this case points to the need to maintain a high degree of suspicion of



Fig. 3. Intraoperative images showing normal bowel and the presence of a fibrinopurulent secretion over the liver surface.

COVID-19 in children with atypical manifestations of acute abdomen, especially while the pandemic lasts, not only to properly guide the treatment, but also to protect the teams involved.

Informed consent

Informed consent was obtained from the mother stating that she completely understands that her baby's medical information will be published in a scientific journal, avoiding any possibility of identification. Also, the consent states that she, the mother, understands that the text and any pictures published in the article will be freely available on the internet and may be seen by the general public, will appear on other websites or in print and may be translated into other languages. The consent was included in the file of the patient.

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Authorship

All authors certify that they meet the current ICMJE criteria for authorship.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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