



Case report

Large intestinal perforation secondary to COVID-19: A case report

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ABSTRACT

Introduction: COVID-19 infection is generally characterized by the presence of respiratory symptoms. However, a small percentage of these patients also have gastrointestinal symptoms and complications that are associated with high morbidity and mortality.

Presentation of case: A 50-year-old male patient with COVID-19 infection was being treated for COVID-19 and pneumonia in the ICU. He presented with gastrointestinal symptoms, and the computed tomography (CT) scan revealed a hollow viscus perforation. Ultimately, the patient was taken to surgery, where a spontaneous perforation was found in the right colon. The defect was sutured with separate stitches. There were no complications postoperatively.

Discussion: Although respiratory symptoms are the most common presentation of COVID-19, about 18% of these patients may present with gastrointestinal symptoms. However, an even smaller percentage of critically ill patients may develop serious gastrointestinal complications such as perforation of the large intestine. This unusual complication requires immediate diagnosis and surgical management.

Conclusion: At the time of the COVID-19 pandemic, physicians must recognize COVID-19 in patients presenting gastrointestinal symptoms. A high degree of clinical suspicion enables timely diagnosis and management, thereby preventing major complications.

1. Introduction

COVID-19 is a new disease caused by SARS-CoV-2 that has been spreading throughout the world since December 19, creating a global pandemic. It results in severe acute respiratory syndrome (SARS). To date, there have been more than 202 million confirmed cases, and more than 4.2 million deaths secondary to COVID-19 [1].

It has been well established that the majority of COVID-19 patients have fever and respiratory signs and symptoms. However, a portion of them may present with extrapulmonary manifestations, such as gastrointestinal symptoms [2]. We aimed to present a case of a patient with COVID-19 and spontaneous perforation of the right colon that required surgical management. This case report was written in accordance with the Surgical Case Report (SCARE) criteria [3].

2. Case report

A 50-year-old male patient was referred to the emergency department due to an eight-day episode of fever, cough, dyspnea, and rapid deterioration that required orotracheal intubation. The only relevant aspect of his medical history was type I obesity (BMI: 33 kg/m²). Reverse transcription-polymerase chain reaction (RT-PCR) by nasopharyngeal swab revealed that the patient was positive for SARS-CoV-2. His chest X-ray showed diffuse alveolar interstitial infiltrates in both lung fields, while his chest computed tomography (CT) showed extensive ground glass infiltrates (Figs. 1 and 2). Laboratory tests showed: leukocytes, 14,060; neutrophils, 86%; lymphocytes, 6.6%; hemoglobin (Hb), 15; platelets, 284,000; lactate dehydrogenase (LDH), 1180; C-reactive protein (CRP), 81. His management involved an antibiotic regimen, which included cefepime, linezolid, and dexamethasone. He was then transferred to the intensive care unit (ICU).

During his hospitalization, he was subjected to tube feeding using

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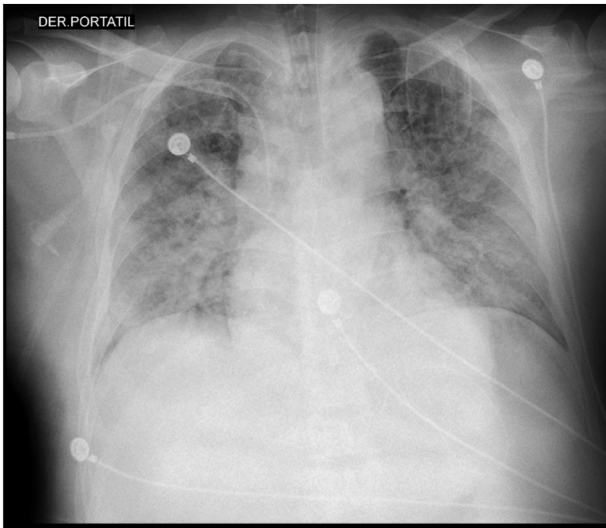


Fig. 1. An anteroposterior (AP) chest radiograph showing diffuse alveolar interstitial infiltrates in both lung fields. The infiltrates are predominantly in the lower third zones of both lungs.

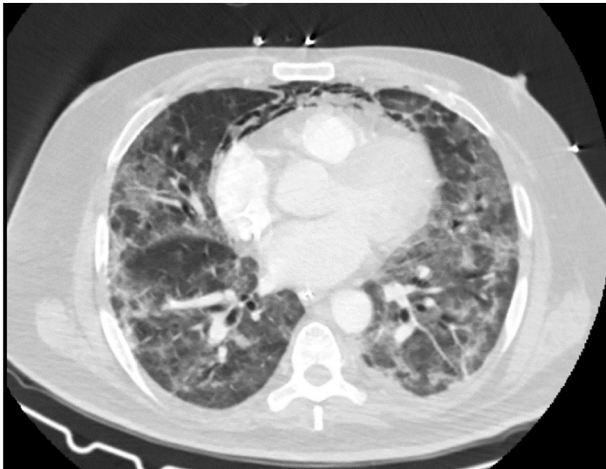


Fig. 2. Chest tomography (CT) scan (axial section, lung window) showing extensive ground glass infiltrates in both lung fields.

enteral nutrition (EN), low-dose vasopressor management with norepinephrine (0.2 $\mu\text{g}/\text{kg}/\text{min}$), hemodialysis due to impaired renal function, and a change in antibiotic to meropenem and vancomycin. The patient's clinical status progressively improved. On day 14 of hospitalization the vasopressor support was removed, and withdrawal of mechanical ventilation was considered. However, 24 h later, he had a significant drop in Hb (9.5 to 6.8), which was associated with abdominal distention and melanic stools. A total of 2 U of packed red blood cells (pRBC) were transfused; intravenous omeprazole was administered; and an esophago-gastroduodenoscopy (EGD) was requested, which revealed antral gastritis and erosive duodenitis without evidence of active bleeding. Nonetheless, the patient had an increased abdominal distension, fever (38 °C), and elevated white blood cells and CRP. An abdominal CT was requested, and it showed pneumoperitoneum associated with free peritoneal fluid (Fig. 3). Given these findings, general surgery with an exploratory laparotomy was performed. A scant pneumoperitoneum, generalized fecal peritonitis, and a 2-cm perforation in the hepatic flexure of the colon were found. Enterorrhaphy was performed with separate stitches using absorbable monofilament suture material and lavage of the cavity. However, due to the considerable edema of the

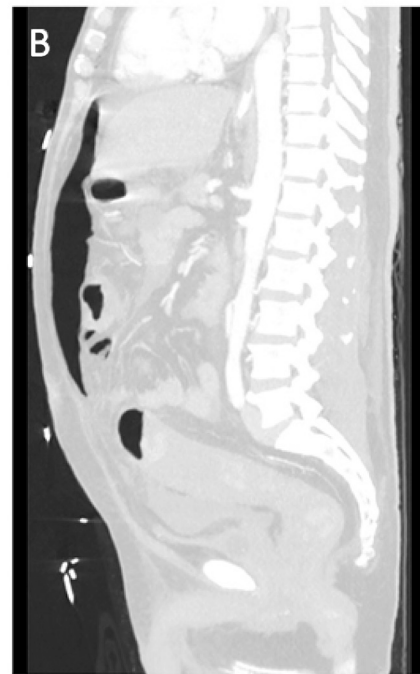
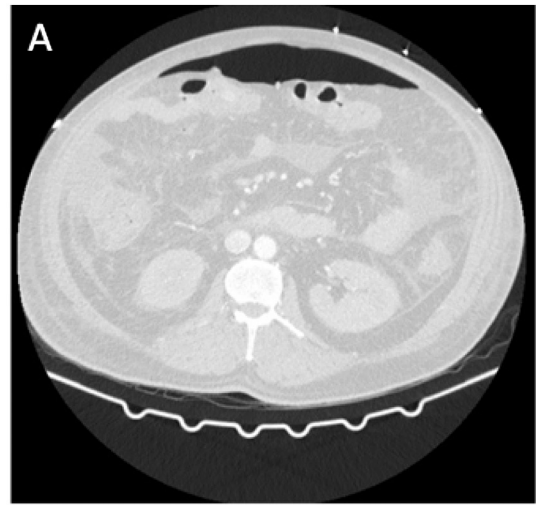


Fig. 3. Abdominal CT in axial (A) and sagittal (B) sections showing pneumoperitoneum and free fluid in the abdominal cavity.

intestinal loops and severe peritonitis, a vacuum-assisted closure (VAC) was placed, thereby enabling us to carry out a second planned exploration. Around 72 h later, the patient underwent a new intervention. This involved a new peritoneal lavage that achieved adequate control of the peritonitis without showing new leaks in the enterorrhaphy or other sites. Hence, the abdominal wall was closed. Additionally, the need to perform a resection with anastomosis or ostomy was avoided.

After the procedure, the patient's acute gastrointestinal symptoms resolved without requiring further interventions and without presenting with new episodes of gastrointestinal bleeding. He did, however, require tracheostomy for prolonged intubation, total parenteral nutrition (TPN), and gastrostomy due to swallowing disorders. After day 54 of hospitalization, hemodialysis was suspended, and four days later, mechanical ventilation, antibiotics, and TPN were withdrawn. Finally, the patient was discharged on day 78 of hospitalization with home care. In week 6 of outpatient follow-up, the tracheostomy and gastrostomy were removed due to resolution of his swallowing disorder, and at his last medical check-up, which occurred three months after the event, the patient did not show any symptoms. He then carried out his daily

activities without difficulty.

3. Discussion

COVID-19 has become a pandemic that is characterized by a high mortality rate, which mostly involved critically ill patients. Although fever, cough, and dyspnea are among the most common symptoms of patients with COVID-19, gastrointestinal manifestations have been increasingly recognized in this group of patients [4]. In fact, about 18% of COVID-19 patients have gastrointestinal symptoms. The most common are loss of appetite (26.8%), diarrhea (11.5%–12.5%), nausea/vomiting (6.3%–10.2%), and abdominal pain (2.3%–9.2%) [5–7]. Gastrointestinal bleeding has been reported in 4% to 13.7% of infected patients [6]. Additionally, patients have positive viral RNA tests in feces even after their respiratory samples tested negative. This finding suggests a possible fecal-oral transmission [5,7,8].

The prevalence of gastrointestinal symptoms has also been higher in patients with severe disease compared with those with mild disease (16.6% vs 11.7%, respectively). On the other hand, gastrointestinal perforations caused by COVID-19 are usually rare, and the currently available evidence comes solely from case reports.

This case report describes a patient with severe acute respiratory failure secondary to a SARS-CoV-2 infection. During his hospitalization in ICU, a spontaneous colonic perforation without mechanical obstruction was detected. There are several possible reasons for developing gastrointestinal symptoms in a COVID-19 patient. First, the virus interacts with ACE-2 receptors. The ACE-2 protein, a cellular receptor for SARS-CoV-2, is abundantly expressed in the glandular cells of the gastric, duodenal, and rectal epithelia, thus suggesting that ACE2 receptors can act as the entry points of the viral particles that cause digestive symptoms. Second, the virus can directly or indirectly affect the digestive system through a chain reaction of inflammatory factors and viremia that directly injure the intestinal mucosa. Third, the virus itself can affect the intestinal flora, which perform a variety of important metabolic and immune functions. Thus, disruption of the intestinal flora can lead to digestive symptoms [2,9]. Other probable causes of symptoms and perforation include autonomic neuropathy of the colon secondary to a virus-related neuronal injury, local ischemia triggered by hypercoagulability, elevated levels of von Willebrand factor in response to the endothelial damage leading to vascular thrombosis, and compromised hemodynamics in a patient with severe COVID-19 pneumonia that can lead to non-occlusive ischemia [10,11].

Suspicion of a bowel perforation in patients is generally based on history and physical examination findings. However, in a critically ill patient in the ICU, the confirmatory diagnosis is made based on images. Abdominal CT is the examination of choice because it identifies the site of the perforation in approximately 85% of cases [12]. If the patient's hemodynamic status does not enable CT to be performed safely, other imaging modalities can be used, such as simple abdominal radiography or ultrasound [13].

Treatment in these cases must be surgical. Most of the reported cases of colonic perforation in critically ill patients with COVID-19 have been managed with colectomy [14–18]. De Nardi et al. reported a 53-year-old patient with COVID-19 infection who had a perforation in the ascending colon during his hospitalization. It was managed with right hemicolectomy with ileo-transverse anastomosis. Ultimately, the patient was discharged without complications [14]. Khin Phyu et al. reported a similar case in a 91-year-old patient who was also managed with right hemicolectomy. However, the patient died two days later [15]. Two studies reported perforation of the right colon in two patients with COVID-19 after being treated with an IL-6 receptor antagonist. Both patients underwent right hemicolectomy, and one of them required ileostomy. However, both patients survived [16,17]. Corrèa et al. describe an 80-year-old patient with COVID-19 who presented with acute respiratory and gastrointestinal manifestations. The patient underwent a right closed thoracostomy for right pneumothorax. They then

subsequently underwent an exploratory laparotomy where four punctiform lesions required a rectosigmoidectomy with an end colostomy. However, the patient died on the second postoperative day [18].

Based on these cases and on our experience, we decided not to perform any resection due to the size of the lesion and the characteristics of the edges. We performed enterorrhaphy at the perforation site and lavage of the cavity. We set up a VAC system to enable a second revision where new sites of ischemia, perforation, or dehiscence of the suture were ruled out, thereby allowing for closure of the abdominal cavity and avoiding the need for an intestinal resection with anastomosis or ostomy. This is a surgical strategy that we use frequently. It is safe and is associated with lower morbidity rates [19].

Since no intestinal resection was performed, no histological sample was obtained that would allow us to verify the inflammatory reaction and tissue damage triggered by the virus. There were also no fecal RT-PCR tests performed that would have allowed us to correlate the severity of digestive symptoms with the presence of viral RNA in stool samples. These are the limitations of the study that should be taken into account in future studies or reports regarding gastrointestinal perforations in critically ill patients due to COVID-19. However, due to a small number of cases, we believe that this report contributes to a better understanding of the diagnosis and management of colonic perforations in this patient group.

4. Conclusion

COVID-19 infection is a disease characterized by fever and respiratory symptoms. However, it can also present with extrapulmonary manifestations, such as gastrointestinal symptoms with severe complications. Therefore, physicians must recognize these symptoms and their complications early to enable immediate diagnosis and timely treatment.

Abbreviations

COVID-19	Coronavirus 2019
SARS-CoV-2	Type 2 coronavirus causing severe acute respiratory syndrome
ICU	Intensive care unit
BMI	Body mass index
RT-PCR	Reverse transcriptase polymerase chain reaction
CT	Tomography
Hb	Hemoglobin
LDH	Lactate dehydrogenase
CRP	C-reactive protein
EN	Enteral nutrition
pRBC	Packed red blood cells
EGD	Esophagogastroduodenoscopy
VAC	Vacuum-assisted closure system
TPN	Parenteral nutrition
ACE-2	Angiotensin-converting enzyme 2

Consent

Written informed consent was obtained from the patient and his family members for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

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The study is exempt from ethical approval in our institution.

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CRedit authorship contribution statement

Study conception and design: Carlos Andres Muñoz. Acquisition of data: Michael Zapata Palomino. Analysis and interpretation of data: Carlos Andres Muñoz, Claudia Isabela Gómez, Michael Zapata Palomino. Drafting of manuscript: Carlos Andres Muñoz, Claudia Isabela Gómez. Critical revision: Adolfo González-Hadad, Mario Alain Herrera, Luis Fernando Pino, Carlos Andres Muñoz. All authors read and approved the final manuscript to submit.

Declaration of competing interest

The authors declared no conflict of interest.

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