Colonic ischemia and perforation: The aftermath of COVID-19

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Introduction

The coronavirus disease (COVID-19) is an infectious disease caused by the newly discovered coronavirus SARS-CoV-2. During the COVID-19 pandemic we have seen the wide spectrum of this disease and the consequences that may deteriorate the patient in the short term. The gastrointestinal tract is a key site of infection of SARS-CoV-2, where it may predispose to thromboembolic complications, such as acute mesenteric and colonic ischemia and perforation. Even though, the exact mechanism by which the COVID-19 induces mesenteric and colonic ischemia is not known, both of them have a high mortality rate. Therefore, prompt suspicion, early recognition and timely treatment are essential to improve the outcomes in such patients. We hereby present our experience with a patient with colonic ischemia and perforation undergoing treatment for COVID-19. This case highlights the diagnostic barriers and treatment dilemmas in critically ill patients during the COVID-19 pandemic.

Case Presentation

A 36-year-old male patient arrived to the ER a 9-day course of fever and cough and recent onset of dyspnea. His past medical history included hypertension. Real-time PCR of nasopharyngeal swabs tested positive for SARS-CoV-2, and a chest X-ray showed multifocal bilateral lung opacities (Figure 1). Laboratory tests were as follows: WBC 9.900; neutrophil count, 92%; Hb 10.2; Lactate 0.6; CRP 15.8; IL-6 82. Hydrocortisone (50 mg PO QD) and enoxaparin (90 mg QD subcutaneously) were started, along with broad-spectrum antimicrobial treatment with meropenem 1 gr IV QD, as well as oxygen supplementation and cPAP. On day 14, the patient developed rapid respiratory deterioration in the context of acute respiratory distress syndrome (ARDS), and was admitted to the ICU requiring intubation. During his stay in the ICU, tracheostomy was performed and treatment with hydrocortisone was maintained, while parenteral nutrition, heparine, cefepime and ganciclovir were started. In addition, he required vasopressor support with noradrenaline.

As his clinical conditions progressively deteriorate the patient was transferred for extracorporeal membrane oxygenation (ECMO) after 1 month since admission. After 2 days in the ECMO unit, the patient complained of melenic feces, abdominal pain and severe distension. Physical examination signs of peritoneal irritation were not detected. A colonoscopy was scheduled, which showed bleeding in the cecum, and a clip was placed with success.

On day 40, the patient complained of abdominal pain; at clinical examination, signs of peritoneal irritation were detected. A CT scan (Figure 1) showed free air in the abdominal cavity, distension of the large bowel, and perforation of the cecum. In addition, a lot of free fluid in abdominal cavity was reported. The patient underwent emergent laparotomy: intraoperative findings revelaed perforation on the anterolateral aspect of the cecum with abundant free faecal fluid (Figure 2). Neither obstruction of the distal colon nor distension of the small intestine was noted.

A right colectomy with primary ileo-transverse anastomosis was performed and two abdominal drains were placed. Gross pathological examination revealed a markedly enlarged bowel with thinner walls, with 1 cm solution in the cecum. Microscopic examination showed a transmural granulocytic inflammation with edema of mucosa and submucosa layers, and fibrinous-granulocytic periviscerits (Figure 3). No thrombosis or vasculitis was observed. The presence of viral nucleic acid, searched in paraffin-embedded tissue from the surgical specimens, was not confirmed by the real-time reverse transcriptase–polymerase chain reaction (rRT-PCR) analysis. On PO day 10, the patient developed fever and abdominal pain with signs of peritoneal irritation, an urgent laparotomy was perfomed founding a multiple sites of microperforation and an intraabdominal hematoma (1500 cc) with not apparent site of bleeding, primary closure of the perforations was performed and a loop ileostomy was made.

Discussion

Coronavirus disease (COVID-19) caused by severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) has surpassed more than 207 cases worldwide and caused more than 4.35 million deaths in 222 countries, as of August 14, 2021 (1). Respiratory manifestations, such as fever, cough and dyspnea, are the most common symptoms in patients with COVID-19. However, extra-pulmonary manifestations, including gastrointestinal (GI) involvement, such as nausea and vomiting, diarrhea, abdominal pain and GI bleeding, may be present in up to 15% of patients (2,3). These findings may be related to the presence of angiotensin-converting enzyme 2 (ACE2), the major receptor of SARS-CoV-2 in the epithelial cells of the GI tract (4). Additionally, COVID-19 is associated with coagulopathy and vasculitis, which correlate with the disease severity and increase the risk of mortality (5). The underlying mechanisms of systemic thrombosis and ischemia in patients with COVID-19 are still unclear, and factors such as direct viral endothelitis, complement-mediated vascular injury, and autoimmunity have been proposed (6). Ischemic colitis as a consequence of COVID-19 appears to occur in patients presenting with severe respiratory illness (7,8). Thromboembolic events in the GI system related to COVID-19 have been associated with intestinal and colonic perforation (3,9–11). Gastrointestinal ischemia associated with COVID-19 has a high rate of mortality, therefore prompt imaging evaluation and monitoring should be done when suspected (2).

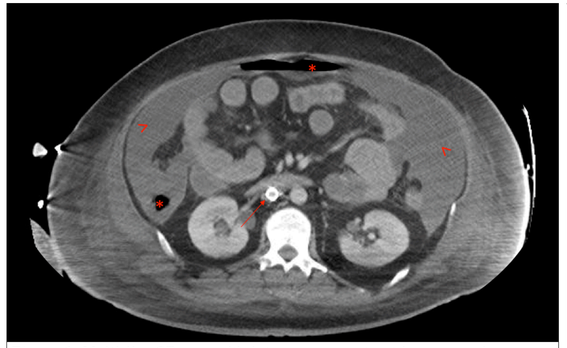


Figure 1. Multislice CT scan with intravenous contrast in venous phase, observing neumoperitoneum (*) as well as free fluid with high density suggestive of purulent content (arrow head), as well as ECMO canula in the IVC (arrow)

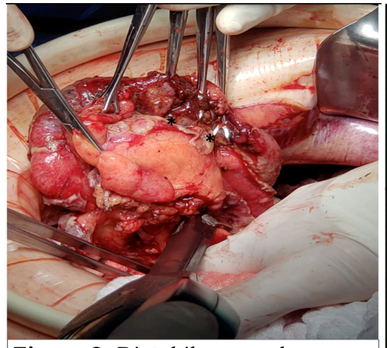


Figure 2. Distal ileum and cecum showing the 2 cm perforation (*)

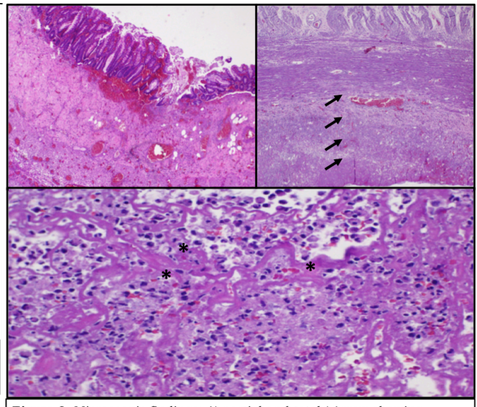


Figure 3. Microscopic findings: A) partial and total (Arrow showing transmural necrosis) necrosis of the intestinal mucosa and acute inflammation (*) (4x, H&E); B and C) areas of necrosis (20x, H&E) C).

Conclusion

The GI tract is a key site of infection of SARS-CoV-2, where it may predispose to thromboembolic complications, such as acute mesenteric and colonic ischemia and perforation. Considering the high mortality rate of GI ischemia in setting of COVID-19, physicians are encouraged to have a very high clinical suspicion index and low threshold for cross-sectional imaging and clinical screening of GI symptoms, given that some of the aforementioned complications may require emergent surgical intervention.

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