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Superior Mesenteric Artery Thrombosis and Acute Intestinal Ischemia as a Consequence of COVID-19 Infection

Authors' Contribution:

Study Design A
Data Collection B
Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
Literature Search F
Funds Collection G

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Conflict of interest: None declared

Patient: Male, 55-year-old
Final Diagnosis: Acute intestinal infarction • COVID provoked thromboembolism • superior mesenteric artery thrombosis
Symptoms: Abdominal pain • diarrhea • nausea
Medication: —
Clinical Procedure: Exploratory laparotomy • primary anastomosis • small bowel resection • thromboembolectomy
Specialty: Gastroenterology and Hepatology • General and Internal Medicine • Surgery

Objective: Unusual clinical course

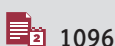
Background: The novel COVID-19 disease caused by the SARS-CoV-2 virus is a highly infectious disease that originated in Wuhan, China, and has rapidly spread throughout the world. In addition to respiratory complications, the virus has also been implicated in damage to other organ systems as well as coagulopathy. The present report describes the first presumptive case of COVID-19-associated acute superior mesenteric artery thrombosis and acute intestinal ischemia.

Case Report: A 55-year old man presented to the emergency department with nausea, generalized abdominal pain and diarrhea; he denied having a fever or any respiratory symptoms. Computed tomography (CT) of the abdomen and pelvis revealed bilateral pulmonary ground-glass opacities. He tested positive for SARS-CoV-2, and was treated with hydroxychloroquine, azithromycin and ceftriaxone, and was discharged home after five days of inpatient treatment. One week later, the patient returned with recurrent nausea, vomiting and worsening diffuse abdominal pain. A CT scan of the abdomen showed a 1.6-cm clot, causing high grade narrowing of the proximal superior mesenteric artery and bowel ischemia. The patient emergently underwent exploratory laparotomy, thromboembolectomy and resection of the ischemic small bowel. A post-operative complete hypercoagulable workup was unrevealing.

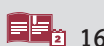
Conclusions: Despite the absence of respiratory symptoms, patients infected with SARS-CoV-2 may show atypical presentations, such as gastrointestinal symptoms. Clinicians managing patients with suspected or confirmed SARS-CoV-2 infection during the COVID-19 pandemic should monitor these patients for potential complications that may arise from this disease.

MeSH Keywords: Blood Coagulation • COVID-19 • Embolism and Thrombosis • SARS Virus • Thrombophilia

Full-text PDF: <https://www.amjcaserep.com/abstract/index/idArt/925753>



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Background

The novel 2019 coronavirus disease (COVID-19), which is caused by infection with the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), was first reported in Wuhan, China, in December 2019 [1]. Since that time, the COVID-19 pandemic has spread rapidly around the world in an exponential fashion and has caused many deaths [1]. Although efforts to recognize and manage SARS-CoV-2 infections have focused primarily on respiratory complications, some patients with COVID-19 infection may experience gastrointestinal manifestation of this disease [2–4]. The present report describes a patient with COVID-19-associated acute mesentery artery thrombosis and acute intestinal ischemia, a presumptive late complication of SARS-CoV-2 infection.

Case Report

A 55-year-old man with a medical history of hypertension presented to the emergency department with a 4-day history of nausea, generalized abdominal pain and diarrhea. The patient denied fever, cough, shortness of breath, vomiting, hematochezia, melena, pain in response to food intake or similar symptoms in the past. Initial vital signs were significant for a rectal temperature of 38.4°C and an oxygen saturation of 87% on room air. The patient was administered three liters of supplemental oxygen via nasal cannula, which improved his oxygen saturation to 100%. A physical examination revealed scattered rhonchi on bilateral lower lung fields; a soft abdomen with mild generalized tenderness on deep palpation, but no guarding or rebound tenderness. Initial laboratory testing was significant for a platelet count of $10^5 \times 10^9/L$ and a D-dimer concentration of 3.4 nmol/L. A chest radiograph showed right basilar infiltrate. Computed tomography (CT) of the abdomen and pelvis with intravenous (IV) and oral contrast showed ground glass opacity in the middle lobe of the right lung, both lower lobes and the peripheral lateral lingual, with distribution suggestive of COVID-19 pneumonitis. His gastrointestinal system showed no acute findings, including changes associated with obstruction or inflammatory disease. The patient was subsequently placed on airborne isolation in a negative pressure room. A real-time reverse transcriptase-polymerase chain reaction (RT-PCR) test of a nasopharyngeal swab specimen using the Roche fully automated COBAS® 6800 System, authorized by the Food and Drug Administration (FDA), showed that the patient was positive for SARS-CoV-2 nucleic acid, confirming the diagnosis of COVID-19. Testing was negative for influenza A and B viruses. In accordance with the COVID-19 treatment protocol of our hospital, the patient was started on treatment with hydroxychloroquine, azithromycin and ceftriaxone. A stool sample was negative for *Clostridium difficile*. After 5 days of inpatient treatment, the patient reported resolution of his diarrhea; however,

he continued to experience mild diffuse abdominal pain. An abdominal radiograph yielded negative findings. The patient had an uncomplicated inpatient course and was discharged home and instructed to take cefpodoxime for two additional days and to self-isolate for 2 weeks.

One week following his discharge from the hospital, the patient returned to the emergency department with recurrent nausea and vomiting and worsening generalized abdominal pain. He was placed on airborne isolation due to his recent diagnosis of COVID-19 pneumonia. A physical examination found that his vital signs were significant for sinus tachycardia and tachypnea. In addition, generalized abdominal tenderness was observed on light palpation, along with guarding and hypoactive bowel sounds. Initial laboratory studies were significant for a white blood cell (WBC) count of $12.46 \times 10^9/L$ and a serum lactic acid concentration of 0.68 mmol/L. A CT scan of the abdomen and pelvis with IV contrast showed the development of a low density clot, 1.6 cm in length, causing high grade narrowing of the proximal superior mesenteric artery (SMA). Multifocal alveolar opacities were also observed in the lung bases. The patient was started on anticoagulation with continuous heparin infusion. After consultation with the general surgery and vascular surgery departments, the patient underwent an emergency exploratory laparotomy and SMA thromboembolectomy. Eight inches of necrotic small bowel were resected, followed by primary anastomosis. The patient tolerated the procedure well. Eight hours after the procedure the continuous heparin infusion was resumed, and the patient remained in the surgical unit for post-operative care. A complete hypercoagulable workup, which included measurements of protein C, protein S and anti-thrombin, yielded negative findings.

Discussion

SARS-CoV-2 infection primarily targets the lungs, causing pneumonia. Common symptoms at presentation include fever, cough and shortness of breath. In the absence of respiratory symptoms, however, patients may present atypically, as did the patient in the present study. The virus and COVID-19 disease do not only affect the lungs but can also damage other organ systems, as well as causing coagulopathy [5–7]. COVID-19 may represent a transient hypercoagulable state, resulting in the potential development of vascular thromboembolic events, such as deep vein thrombosis and pulmonary embolism. Although the exact pathogenesis of COVID-19-associated hypercoagulopathy remains unclear, elevated D-dimer levels and coagulation abnormalities have been consistently reported in COVID-19 patients [8–11]. For example, clinically significant coagulopathy, multiple cerebral infarcts, and the presence of antiphospholipid antibodies have been reported in three patients with confirmed COVID-19 who were

admitted to an intensive care unit in China, findings suggesting COVID-19 related hypercoagulability [12]. The patient described in this report, who had a recent SARS-CoV-2 infection, had been newly diagnosed with acute mesenteric thrombosis and acute intestinal ischemia. The absence of major predisposing factors for thromboembolic formation in this patient suggested a causal relationship between COVID-19 and hypercoagulability, a potentially devastating consequence of the disease that remains incompletely understood.

Coagulopathy and elevated D-dimer levels at the time of hospital admission for COVID-19 have been associated with a poor clinical course and a higher inpatient mortality rate [13,14]. Management of COVID-19 hypercoagulopathy can be challenging, due to the acuteness of the illness and the dearth of high-quality studies that could guide prevention or treatment of the thromboembolic complications of the disease. A general approach has been recommended for all in-hospital COVID-19 patients presenting with coagulopathy. These interventions should include pharmacological thromboprophylaxis, preferably with intravenous unfractionated heparin or low molecular weight heparin (LMWH), unless contraindicated [13–15].

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Doses should be based on coagulation activity and organ function, with larger doses considered for overweight and obese patients [15]. Management of COVID-19 patients should include regular monitoring of a coagulation panel, as well as platelet counts and D-dimer levels, as these parameters can be helpful in determining prognosis and titrating dosages of anticoagulation agents in these patients [13–15].

Conclusions

Thromboembolic complications of COVID-19 are important, as coagulation dysfunction is one of the major causes of death in patients with severe COVID-19 infection [15,16]. Clinicians managing patients with suspected or confirmed SARS-CoV-2 infection during COVID-19 pandemic should monitor these patients for potential late complications, as delayed diagnosis can lead to increased patient morbidity and mortality.

Conflict of interest

None.