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Single Case

Ischemic Colitis and Small Bowel Ischemia in a Vaccinated Patient with Mild COVID-19 Infection: A Case Report

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Bowel ischemia · Ischemic colitis · Abdominal pain in COVID-19

Abstract
Introduction: COVID-19 infection can cause bowel ischemia, with an incidence ranging from 0.22% to 10.5. The COVID-19 vaccine reduces respiratory symptoms and the need for cardiopulmonary support. However, its effects on other manifestations, such as bowel ischemia, have not been extensively studied. Despite having mild respiratory symptoms and receiving three doses of the COVID-19 vaccine, our patient developed ischemic colitis after her first infection and small bowel ischemia following her second infection. ***Case Presentation:*** An 86-year-old woman presented to the emergency department (ED) with abdominal pain after a mild COVID-19 infection. She was admitted with ischemic colitis, but conservative treatment failed. In the operating room, her entire colon was found to be ischemic, necessitating a total colectomy with end ileostomy. Nine months later, she returned to the ED with mild respiratory symptoms and severe right upper quadrant pain. Imaging revealed pneumoperitoneum and a mid-abdominal abscess. An emergency laparotomy revealed small bowel perforation, with final histology confirming ischemia. The patient had received three doses of the COVID-19 vaccine and was on therapeutic anticoagulation for a history of pulmonary embolism. ***Conclusion:*** COVID-19 may increase the risk of bowel and colon ischemia even after vaccination. Patients presenting to the ED with severe abdominal pain and a recent COVID-19 infection should be carefully evaluated for ischemic events.

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Introduction

Since the emergence of COVID-19, it has become clear that the respiratory system is not the only organ system affected. Bowel ischemia, though rare, has been reported as a complication of COVID-19, with an incidence ranging from 0.22% to 10.5% [1]. Nearly all reported cases have occurred in patients with severe respiratory disease requiring ICU admission. Bowel ischemia in patients with mild respiratory symptoms is less common. The COVID-19 vaccine has proven effective in reducing the severity of respiratory symptoms, but its effect on other COVID-19 complications, such as bowel ischemia, remains largely undocumented. In this case, we report a patient who developed ischemic colitis after her first COVID-19 infection and small bowel ischemia after a second infection, despite having mild respiratory symptoms and being vaccinated with three doses of the COVID-19 vaccine.

Case Presentation

An 86-year-old woman presented to the hospital in April 2023 with abdominal pain that had started 4 h prior. She had tested positive for COVID-19 3 days earlier and had been experiencing mild respiratory symptoms. She confirmed having received three doses of the COVID-19 vaccine. In the emergency department (ED), the abdominal pain was localized to the left lower quadrant. She reported no changes in bowel habits or rectal bleeding. Upon examination, she had a high heart rate and normal oxygen saturation on room air, though her blood pressure was borderline at 96/58 mm Hg. Abdominal examination revealed slight distension with diffuse tenderness but no signs of peritonitis. Initial laboratory tests showed an elevated white blood cell count and mildly increased lactic acid. Abdominal X-rays were normal, but a CT scan revealed fecal impaction and pancolitis (Fig. 1a), without bowel perforation or collections.

We admitted the patient to the ICU and started her on broad-spectrum antibiotics. Despite aggressive resuscitation, her condition worsened, with increasing white blood cell counts and rising lactic acid levels. Repeat imaging showed progression of the colitis. She was taken to the operating room, where the colon was noted to be pale, edematous, and inflamed. A subtotal colectomy with end ileostomy was performed. She was transferred back to the ICU for close monitoring. During her hospital stay, she developed a pulmonary embolism and was started on heparin, later switched to warfarin before discharge. Histopathology of bowel specimen showed diffuse acute ischemic mucosal colitis with reparative changes (Fig. 2a, b).

She underwent a successful ileostomy reversal 6 months after her admission. Two months after that, she developed mild respiratory symptoms and tested positive for COVID-19 again. She was treated with supportive care but returned to the ED 3 days later with severe epigastric and right upper quadrant pain, along with fever and hypotension. A CT scan revealed pneumoperitoneum, a mid-abdominal abscess, and suspected pneumatosis intestinalis (Fig. 1b). During an exploratory laparotomy, phlegmonous small bowel loops were found in the lower right quadrant. The ileorectal anastomosis was still intact. A small bowel resection was performed, with the creation of a new end ileostomy. Pathology confirmed ischemic enteritis with perforation and fibrinopurulent peritonitis (Fig. 2c, e). The patient's postoperative course was complicated by the development of a surgical site infection, which required further intervention. Despite this setback, the patient gradually improved and was eventually discharged with appropriate follow-up care and nutritional support.

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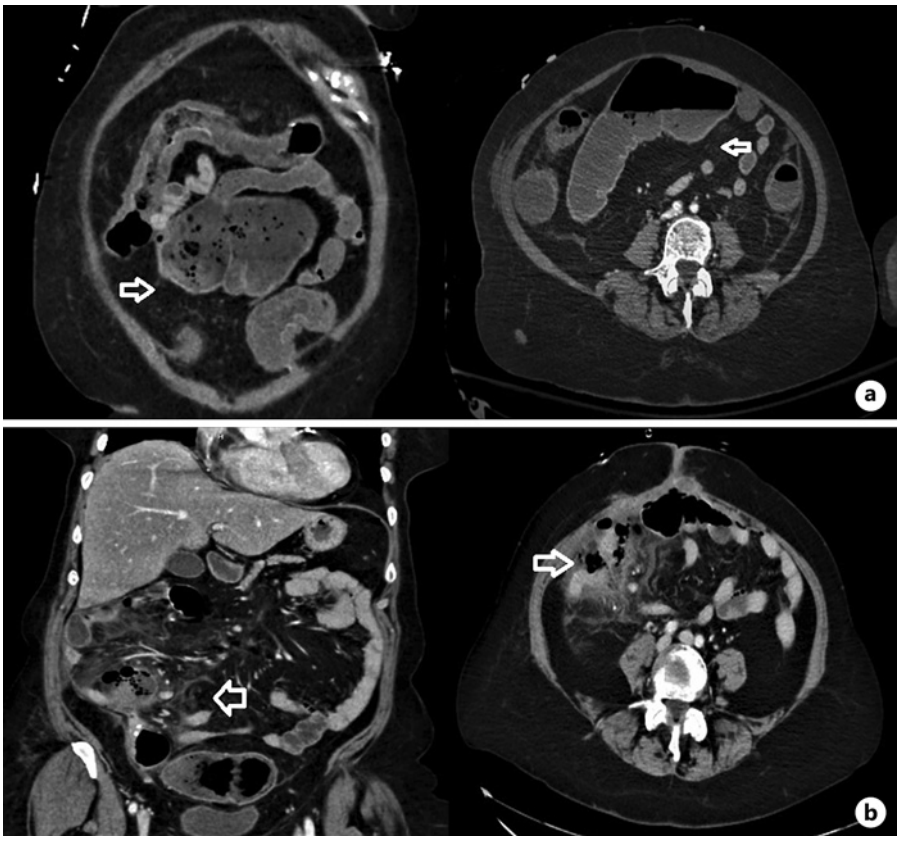

Fig. 1. CT images during emergency department presentations. **a** Coronal and axial images from the first presentation showing fecal impaction, a redundant cecum, and thickened colon wall (white arrow). **b** Coronal and axial images from the second presentation showing small bowel phlegmon formation, pneumoperitoneum, and pneumatosis intestinalis (white arrow).

Discussion

Thrombosis associated with COVID-19 infection tends to occur more frequently in patients with severe respiratory symptoms requiring hospitalization. In contrast, venous and arterial thromboembolism associated with COVID-19 is relatively rare in outpatients with mild symptoms [1]. Recent data indicate that bowel ischemia related to COVID-19 is generally not caused by large vessel thrombosis [2]. Imaging studies from reported cases, such as CT scans, often reveal patent mesenteric vessels, and intraoperative findings in patients operated for bowel ischemia related to COVID-19 infection typically show a strong superior mesenteric artery pulse. Several theories have been proposed to explain this phenomenon. The SARS-CoV-2 virus affects bowel tissue directly by binding to ACE2 receptors on enterocytes, resulting in cellular damage [3]. Furthermore, the virus inhibits ACE2, causing elevated IL-6 levels that trigger a cytokine storm which case further damage to enterocyte. The invasion of endothelial cells by the virus itself leads to inflammation and the release of procoagulant factors, contributing to a hypercoagulable state [4]. Additionally, severe hypoxia caused by COVID-19 activates the hypoxia-inducible factor pathway, which increases blood viscosity and further raises the risk of thrombosis [5].

Clinical trials, including ATTACC, ACTIV-4a, and REMAP-CAP, have demonstrated that therapeutic doses of heparin improve outcomes in non-critically ill hospitalized

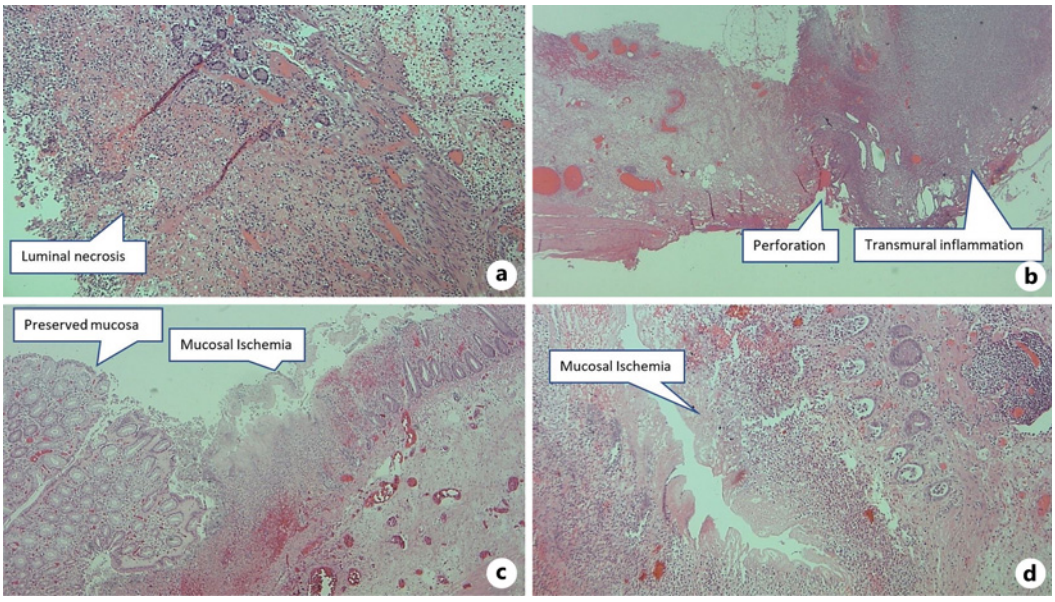

Fig. 2. Histologic section stained with hematoxylin and eosin showing small bowel with luminal surface necrosis (**a**) and small bowel tissue with transmural inflammation and abscess leading to perforation (**b**). **c** Relatively preserved colonic mucosa (left) with adjacent mucosal ischemia and necrosis (right). **d** Colonic ischemia with crypt withering, mucosal necrosis, and basal inflammation.

COVID-19 patients comparing to usual prophylactic dose [6]. For nonhospitalized patients, current guidelines advise against routine anticoagulation unless there are specific indications [7]. While COVID-19 vaccinations have significantly reduced infection rates and disease severity, their impact on the incidence of bowel ischemia remains unclear [8].

In this case, the patient presented with ischemic colitis during her initial encounter and subsequently developed small bowel ischemia upon her second presentation, despite being on therapeutic anticoagulation and exhibiting only mild respiratory symptoms. Comprehensive investigations excluded alternative etiologies of hypercoagulability, including antiphospholipid syndrome and coagulation factor deficiencies. This case underscores the potential for atypical thrombotic complications associated with COVID-19, even in the context of established prophylactic measures. Further studies are warranted to elucidate the underlying pathophysiological mechanisms and to identify risk factors predisposing to such uncommon clinical manifestations.

Conclusions

Ischemic events involving the bowel and colon may still occur in vaccinated individuals with a history of COVID-19 infection. Special attention should be given to patients presenting to the ED with severe abdominal pain following the recent COVID-19 infection, as they may be at increased risk for ischemic complications. The CARE Checklist has been completed by the authors for this case report, attached as online supplementary material (for all online suppl. material, see https://doi.org/10.1159/000545495).

Statement of Ethics

Ethical approval for this case report was reviewed and deemed unnecessary by Henry Ford Providence Hospital – Southfield MI campus as per their guidelines. Written informed consent was obtained from the patient for the publication of this case report, including all accompanying images and data. All identifying details of the patient have been anonymized to maintain confidentiality and privacy.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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Author Contributions

Maryam Aleissa: preparing the manuscript and generating the data. Ernesto Drelichman: preparing in the manuscript and data analysis. Jasneet Bhullar: principle investigator and supervising and editing the manuscript.

Data Availability Statement

All data generated or analyzed during this study are included in this article and its online supplementary material files. Further inquiries can be directed to the corresponding author.

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