



Colonic and Rectum Infarction in the Covid19 Pandemic: A Case Series from an Uncommon Event

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Abstract

Background: By the end of May 2021, 170 million cases and 3.54 million death from Covid-19 infection have been reported. The high affinity of virus particles to ACE-2 receptors in different body organs can cause varied clinical manifestations and complications. Ischemic colitis and necrosis are some rare complications of Covid-19 infection with high morbidity and mortality resulting from colonic hypoperfusion. Different underlying mechanisms for ischemic colitis in Covid-19 patients have been described, including hypercoagulable state, inflammatory responses, microthrombosis, and non-occlusive intestinal ischemia due to shock, hypoxemia, and low cardiac output.

Case Presentation: here, we presented three patients with ischemic colitis and one rectal necrosis as a rare presentation of gastrointestinal complication of SARS-CoV-2 infection. All of our patients presented with abdominal pain and tenderness and received a standard regimen of antibiotics, anticoagulation, and ventilation support.

Conclusion: Ischemic colitis is one of these rare but with high mortality manifestations, which presents with non-specific signs and symptoms. Hence, ischemic colitis should be kept in mind in patients with Covid-19 infection and abdominal pain, which necessitates further evaluations.

Keywords: Abdominal CT scan, COVID-19, Rectum infarction

1. Background

In December 2019, the severe acute respiratory syndrome (SARS-CoV-2) virus, the cause of coronavirus disease 2019 (Covid-19), spread in Wuhan, China. SARS-CoV-2 has less mortality rate than its two predecessors, SARS-CoV and MERS-CoV, but it spreads faster than both. Virus high contagious nature and worldwide spread forced the world health organization (WHO) to declare it a pandemic in March 2020. Although fever, dry cough, dyspnea, and myalgia are the most common signs and symptoms of the disease, other clinical manifestations like the cerebral, peripheral limb, and intestinal thrombosis have been reported, which are associated with the disease severity and poor outcomes (1, 2).

Although intestinal ischemia and acute abdomen are rare complications of Covid-19 infection, their high morbidity and mortality make them a challenging situation (3). The hypercoagulability state due to Covid-19 infection has been described in some reports (3, 4). In addition, due to virus particles' affinity to the ACE-2 receptors on endothelial cells, Covid-19 can cause direct and indirect vascular or endothelial damage (5). Furthermore, hypoxemia, viral sepsis, immobility, and sometimes vasculitis have been attributed to Covid-19 vascular dysfunction and ischemia in different organs (6).

Therefore, due to the rare presentation, high

morbidity, and mortality of intestinal ischemia and acute abdomen in Covid-19 patients, we represented a case series of ischemic colitis in three patients and rectal necrosis in one case with confirmed COVID-19 infection.

2. Case Presentation

Here we represented four patients with ischemic colitis. Patients aged 38-89 years were admitted to Imam Reza hospital, a Covid-19 referral center in Mashhad University of Medical Sciences, Mashhad, Iran, from 1st of April 2020 to 1st of March 2021.

Basic information, clinical presentation, examination, and pre-operation laboratory findings are shown in Table 1.

2.1. Case 1

The first patient was an 89-year-old woman who presented with severe dyspnea and abdominal pain. Dyspnea without cough was her dominant respiratory symptom which started seven days before hospitalization and abdominal symptoms. She was admitted to the intensive care unit (ICU) because of severe dyspnea, decreased O₂ saturation (86% without O₂ therapy), nausea, hematemesis, and rectorrhagia. She had generalized abdominal pain without any abnormal findings in abdominal physical examination. Chest X-ray showed no

Table 1. Baseline information and laboratory findings

	Case 1	Case 2	Case 3	Case 4
Age	89	84	73	38
Gender	female	female	Male	female
comorbidities	HTN	no	No	no
Temperature (°C)	37	36.5	37.1	38.1
Heart rate /min	110	95	72	90
Respiratory rate/min	18	19	12	14
SPO2 (%)	86	93	88	92
Blood pressure (mmHg)	140/90	90/60	118/80	120.7
WBC (white blood cell)	19.7	10.3	24.1	24.5
Neutrophil (%)	89.5	85	96.7	91.6
Lymph (%)	4.8	10	1.6	4.5
hemoglobin	13.5	9.1	10.1	11
platelet	210	335	367	271
Na	138	136	133	140
K	3.6	6.1	4.9	3.9
Urea	33	137	135	26
creatinine	1	2.1	1.7	0.6
C-reactive protein	155.5	147	116	80
PT (prothrombin time)	15	14.3	15	14
PTT (partial thromboplastin time)	24.3	52	35	31
INR (international normalized ratio)	1.31	1.19	1.3	1.2
PH	7.33	7.1	7.32	7.35
PCO2	47.1	39.8	31.3	47.1
HCO3	24.5	12.6	16.4	26.5
ICU (intensive care unit)	Yes	Yes	Yes	no
Outcome	Expired	Expired	Improved	Improved

pneumoperitoneum but revealed disseminated patchy opacities as classic lung involvement of Covid-19 infection (Figure 1). Because of discordance between clinical and imaging findings, a spiral abdominal and pelvic CT scan was performed, which showed intraperitoneal free fluid at the left side of the rectum, rectum wall thickening, and rectum intramural gas, indicating full-thickness necrosis and perforation of the rectum (Figure 2). Laboratory findings are shown in Table 1.

After preoperative management, she was transferred to the operation room. Intraoperative findings were pelvic pus collection, perforation, and yellow necrosis in the anterior wall of the rectum (Figure 3). Due to the extension of necrosis and the patient's condition, abdominoperineal resection

(APR) was performed. Unfortunately, the patient expired 24 hours later in ICU.

2.2. Case 2

The second patient was an 84-year-old female who attended the emergency department with abdominal pain, diarrhea, nausea, and vomiting. Her pain was progressive and worsened since the day before admission. She had five days history of dyspnea before abdomen discomfort. Vital signs examination showed a pulse rate of 95 beats/minute. She was afebrile and had a respiratory rate of 19 breaths/minute and blood pressure of 90/60 mmHg. Her oxygen saturation was 87% at rest but increased to 94% after oxygenation therapy.

Other physical examination findings were mild

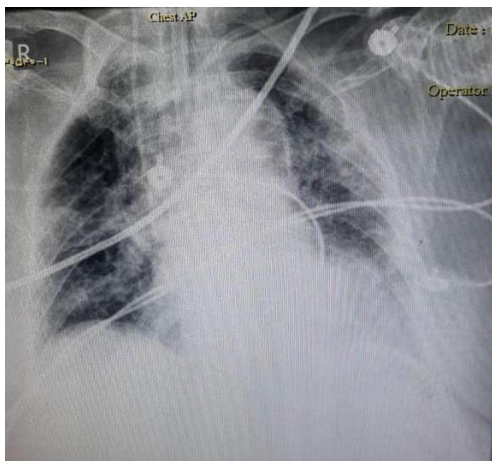


Figure 1. Patient chest x-ray; disseminated patchy opacities are shown



Figure 2. Intra-peritoneal free fluid, rectum wall thickening, and rectal intramural gas are shown

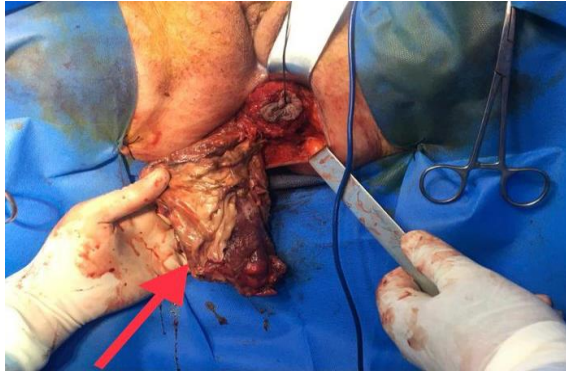


Figure 3. Yellow necrosis at the left and anterior wall of the rectum

abdominal distension, generalized tenderness, and use of accessory breathing muscles. Due to the unfavorable general condition, the patient was admitted to ICU. Chest X-ray revealed bilateral ground-glass opacities as the classic finding of lung involvement by Covid-19 infection, but no pneumoperitoneum was detected. Apart from moderate free fluid accumulation in the pelvis, no other positive findings were reported in the abdominal ultrasound sonography. Mild anemia, elevated urea, creatinine, CRP (C-reactive protein) levels, hyperkalemia, and acidosis were abnormal laboratory findings. The details of laboratory findings are listed in Table 1. Due to generalized abdominal tenderness, free fluid accumulation, and laboratory findings such as metabolic acidosis, she underwent an explorative laparotomy. Intraoperative findings were black ischemia in all parts of the colon. Therefore, a total colectomy and end ileostomy was performed. She expired two days after surgery.

2.3. Case 3

The third patient was a 73-year-old male who presented with abdominal pain and tenderness. Five days before abdomen discomfort, he had a history of dyspnea. On the day of admission, Covid-19 PCR had a positive result, and he had a low oxygen saturation level (88%). Vital signs were stable and within the normal limits. Due to the low oxygen saturation level, he was admitted to ICU. After oxygen therapy, the O₂ level increased from 88% to 93%. On physical examination, no abdominal guarding or rebound tenderness was detected. The chest X-ray showed scattered round, patchy opacities in the right lung. Leukocytosis with neutrophilic dominance, mild anemia, metabolic acidosis, and elevated CRP were the main findings of laboratory investigations. Finally, due to abdominal tenderness, he underwent an explorative laparotomy. Sigmoid was ischemic and perforated. Hartman procedure with sigmoid resection and end colostomy was performed. He improved one week after surgery and was discharged from the hospital.

2.4. Case 4

The last patient was a 38-year-old female without any medical history. She was an infectious disease specialist who had been working in the Covid-19 prevention center since the beginning of the pandemic. She was referred to our department for deterioration of her abdominal pain 2-3 days ago. Her medical records revealed a history of Covid-19 infection with severe respiratory symptoms and ICU admission 14 days ago. At initial presentation, she was febrile with stable hemodynamic status, and her oxygen saturation was 92% at rest. A general abdominal tenderness with left lower quadrant preference was detectable on physical examination. Neutrophil dominant leukocytosis, mild anemia, hypernatremia, and elevated CRP were remarkable findings of laboratory results. With peritonitis confirmation, she was transferred to the operation room for laparotomy. Sigmoid ischemia and perforation were confirmed during the operation, and a Hartman procedure with end colostomy was performed. She improved and was discharged ten days after the operation.

3. Discussion

Ischemic colitis is a condition that occurs as a consequence of changes in the systemic circulation, anatomic or functional vasculature, which leads to colon hypoperfusion (3, 7). Blood flow reduction reaches a level that is insufficient for cell metabolism; hence, an acidotic cell environment develops, leading to mucosal injury, cellular ischemia, and necrosis (3, 8, 9). It is believed that injury is caused by hypoperfusion and reperfusion damage (7).

Ischemic colitis etiologies are divided into two groups; occlusive (e.g., acute embolic and thrombotic occlusion) and non-occlusive pathologies (small-vessel disease or hypoperfusion secondary to shock, heart failure, or hemodialysis) (3). Patel et al. summarized four mechanisms of acute mesenteric ischemia in COVID-19 patients; acute embolisms, mesenteric thrombosis, acute arterial thrombosis, and non-occlusive mesenteric ischemia (10). Due to the limited blood supply, splenic flexure and rectosigmoid junction are the most vulnerable sites for ischemic colitis. However, due to the rich blood supply of the rectum, rectal ischemia is very rare (3, 7).

In all four cases of this study, ischemic colitis and necrosis were confirmed by laparotomy. However, superior and inferior mesenteric artery pulsations were detectable during the operation. Pulsatile arteries ruled out occlusive arterial ischemia as a possible cause of colonic ischemia.

ACE-2 receptors are expressed broadly on intestinal cells. Therefore, due to the high affinity of SARS-CoV-2 particles to these receptors, it is predicted that inflammatory responses to viral particles occur along with intestinal wall necrosis,

mucosal damage, or perforation (2).

SARS-CoV-2 is attributed to a hypercoagulable state and thromboembolic event in patients with severe Covid-19 infection. The current presentations include pulmonary embolism, deep vein thrombosis, and rarely mesenteric ischemia (8). arterial and venous abdominal thrombosis are prothrombic consequences of COVID-19 (11). However, Bhayana et al. found that intestinal necrosis is mainly attributed to the small vessel and microthrombosis rather than the mesenteric thromboembolic events in Covid-19 infection (12). These in situ thrombosis can be explained by the increased level of von-Willebrand factors, which can lead to endothelial damage. Moreover, virus particles' affinity to the endothelial cells can cause epithelial damage (13, 14).

In addition to the two described mechanisms, non-occlusive intestinal ischemia attributed to low cardiac output, septic shock, and hypoxemia is probably another underlying pathology for non-occlusive ischemic colitis in Covid-19 patients. Paul et al. stated that the use of inotropic drugs to regulate hemodynamic state might be attributed to intestinal vasoconstriction and hypoperfusion (8, 15).

We only found six articles on mesenteric ischemia due to SARS-CoV-2 infection. Moreover, we did not find any article about rectal necrosis due to Covid-19 infection, which makes our case series unique.

4. Conclusion

As the pandemic develops, more clinical presentations of Covid-19 infection appear that require further investigations. Ischemic colitis is one of these rare but with high mortality manifestations, which presents with non-specific signs and symptoms like abdominal pain, bloody diarrhea, nausea, and vomiting. Hence, ischemic colitis should be kept in mind in patients with Covid-19 infection and abdominal pain, which necessitates further evaluations.

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Footnotes

Conflicts of Interest: The authors declare no conflict of interest.

Authors contribution: All authors participated in this case series equally and took public responsibility for the content.

Ethical consideration: The patients consented

verbally to publish the cases, including image publication.

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