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### Case Series

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# Intestinal ischemia in the COVID-19 era: case series from peripheral healthcare centre

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#### **ABSTRACT**

Coronavirus disease-2019 (COVID-19) caused by SARS-CoV-2 (severe acute respiratory syndrome coronavirus 2) has caused global health crisis. Initially considered a respiratory tract pathogen, it can cause multiple organ dysfunction. It has also been described to predispose to venous and arterial thromboembolism; however, limited published data is available regarding mesenteric thrombosis COVID-19. We report 6 cases of COVID-19 positive patients with mesenteric/intestinal ischemia. These patients were examined with variables including demographics, laboratory blood tests including coagulation panels, medical and surgical history, comorbidities, and postoperative follow-up period.

Keywords: Mesenteric ischemia, COVID-19, D-Dimer, Laparotomy

#### INTRODUCTION

Coronavirus disease-2019 (COVID-19) caused by SARS-CoV-2 (severe acute respiratory syndrome coronavirus 2) has caused global health crisis. Initially considered a respiratory tract pathogen, it can cause multiple organ dysfunction. It has also been described to predispose to venous and arterial thromboembolism; however, limited published data is available regarding mesenteric thrombosis COVID-19.

We report 6 cases of COVID-19 positive patients with mesenteric/intestinal ischemia. These patients were examined with variables including demographics, laboratory blood tests including coagulation panels, medical and surgical history, comorbidities, and postoperative follow-up period.

#### **CASE SERIES**

This is a retrospective observational study analyzing the clinical characteristics and outcomes of six COVID-19

positive patients. Six patients aged 26-85 presented to our institution from 1st March to 1st May and were diagnosed with COVID-19 pneumonia, subsequently developing mesenteric vascular complications. None of our patients included had any history of thromboembolism nor risk factors that could justify the presentations. We found that 6 patients fulfilled clinical and radiologic criteria for intestinal ischemia (Table 1). All patients presented with gastrointestinal (GI) symptoms. All patient were evaluated with abdominal contrast-enhanced computed tomography scan. Three demonstrated evidences of ischemic colitis with marked wall edema and layered enhancement involving either the whole large bowel or the right colon. Three had evidence of ischemia (thin wall with reduced enhancement or signs of pneumatosis intestinalis) involving either the small bowel or the colon (Figure 1 and 2) Among the latter 3, thromboembolic filling defects in the inferior mesenteric artery and superior mesenteric vein were found in 2. Three patients had presented with pneumoperitoneum with perforation peritonitis with ischemia. D-dimer was elevated in all patients. Two of them had comorbidities such as diabetes mellitus and

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hypertension. One of the patient presented with breathlessness with abdominal pain. By the end of the

follow-up date (23 Sep, 2021), there were no complications and only 2 deaths.

Table 1: Summarizing clinical characteristics of the COVID-19 patients with AMI.

Age/ sex (years)	Medical history	Presenting signs and symptoms	Timing of AMI diagnosis	Imaging findings	Other thrombosis sites	Treatment	Outcome
52/m	No	Acute abdominal pain	10 days	Dilated distal ileal loops	No	Laparotomy, resection of gangrenous distal ileal segment and ETE ileoileal anstomosis	Recovered
26/f	No	Abdominal distension, vomiting and fever	15 days	Moderate dilated edematous large bowel with ischemic changes	No	Laparotomy, resection of gangrenous ascending and transverse colon (Rt Hemicolectomy) ileo colic anastomosis	Death
45/f	No	Fever, breathlessnes s, abdominal pain and vomiting	5 days	Pneumoperit oneum with dilated edematous distal bowel loops	No	Laparotomy, resection of distal gangrenous ileal segment with loop ileostomy	Recovered
30/m	No	Acute abdominal pain, fever	12 days	SMV thrombosis extending upto portal vein and splenic vein with edematous proximal bowel loops	No	Laparotomy with proximal gangrenous jejunal segmental resection done with jejunojejunostom y and feeding jejunostomy	Recovered
37/m	DM/ HTN	Acute abdominal pain and fever	7 days	IMA thrombosis with pneumoperit oneum and dilated small bowel loops	No	Laparotomy with total colectomy of patchy gangrenous perforated large bowel with diversion loop ileostomy	Recovered
85/f	DM/ HTN	Severe abdominal pain with breath- lessness, hypotension	15 days	Dilated stomach, jejunum with pneumatosis intestinalis, air within portal system-SMA thrombosis	No	Laparotomy with massive small bowel gangrene resection with jejunostomy	Death



Figure 1: Small bowel gangrene.

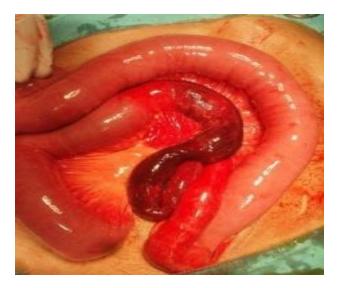


Figure 2: Jejunal gangrene in SMA thrombosis.

## **DISCUSSION**

Facing a pandemic emergency is a very hard challenge, beginning with the difficulties of employing accurate diagnostic tools.<sup>1</sup>

Gastrointestinal symptoms have been described shortly after the SARS CoV-2 outbreak and reported to be self-limiting in the vast majority of patients, but with the possibility of being linked to a high risk of complications. Furthermore, there is growing evidence of a link of COVID-19 to coagulopathy.<sup>2,3</sup>

Acute mesenteric ischemia is a rare abdominal emergency and is associated with high rates of morbidity and mortality. Prompt diagnosis requires a high index of suspicion and early contrast computed tomography imaging. The exact pathological mechanism leading to the complication of AMI in COVID-19 is not well understood at present, possibilities include-direct invasion of bowel tissue by the virus given expression of angiotensin

converting enzyme 2 on enterocytes, the target receptor for SAR-Cov-2 or viral infection of the endothelial cell leading to diffuse endothelial inflammation or increased procoagulant factors like factor VIII, von Willebrand factor, fibrinogen or virus induced cytokine storm leading to coagulation and fibrinolysis activation. 4-6 Additional explanations for the hypercoagulability may be the presence of high numbers of prothrombotic circulating macrovesicles which are cytoplasmic micro particles stemming from platelets or monocytes and neutrophil extracellular traps (NETs) released from activated neutrophils, constitute a mixture of nucleic DNA, histones and nucleosomes. Treatment of this life-threatening condition includes surgical resection of the necrotic bowel. restoration of blood flow to the ischemic intestine and supportive measure like gastrointestinal decompression, fluid resuscitation, hemodynamic support. Health care providers should have high index of suspicion regarding this life-threatening complication of COVID-19 so that timely intervention can be done.

GI symptoms have been described in 10% of patients with COVID-19. In most cases these symptoms are mild and self-limiting, even if they seem to increase the risk of complications. We found that GI symptoms at admission could also be the expression of an underlying intestinal ischemia.<sup>7</sup>

A state of hypercoagulability has been found via D-dimer test in most of the COVID-19 patients admitted to intensive care units.<sup>8</sup> Quantitative D-dimer has already been proposed as the best single marker of hypercoagulability in COVID-19 patients, as well as a negative prognostic marker.

#### **CONCLUSION**

No final conclusions can be drawn from such a small number of patients due to the ongoing characteristic of the pandemic. However, our experience suggests that a high level of suspicion for intestinal ischemia should be maintained in COVID-19 patients presenting with GI symptoms or with arising abdominal pain because this complication could account for an increase mortality risk. Nevertheless, in this subset, a D-dimer elevation should not only trigger prompt prophylactic use of anticoagulants, but also lead to consider an early abdominal computed tomography scan in patients with suggestive symptoms or biochemical markers of intestinal ischemia. Additional analysis will help to define the role of SARS-CoV-2 in the pathogenesis of such a detrimental manifestation.

Health care providers should have high index of suspicion regarding this life-threatening complication of COVID-19 so that timely intervention can be done.

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