Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Case report

Massive gastrointestinal bleeding in a patient with COVID-19

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ABSTRACT

Despite the emerging data about the thrombophilic effect of the novel coronavirus [1] , the relation between coagulation disorders and the COVID-19 pandemic is still not well understood. Various studies pointed to the significant role of the COVID-19 induced cytokine storm in development of the hypercoagulable state which leads to serious thromboembolic complications [2,3] . Some studies report the development of severe immune thrombocytopenia induced by the novel coronavirus [4] . Other studies found a correlation between COVID-19 disease and the development of disseminated intravascular coagulation (DIC) [5].

Patients with severe COVID-19 disease have an increased risk for development of gastrointestinal bleeding (GI) which may be related to stress [6] , critical illness or mechanical ventilation [7] . Further studies showed the ability of the novel coronavirus to infect the epithelial cells of the GI tract [8] . Moreover, some data pointed to the ability of the virus even to infect the endothelium of blood vessels [9]. The relation between the COVID-19 pandemic and GI bleeding deserves more studies [10]. We present a case of GI bleeding in a patient with severe COVID-19 disease. We assume that COVID-19 disease can be a predominant factor for the development of DIC and GI bleeding.

Introduction

The prothrombotic outcomes of severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) have already been extensively reported [1]. However, the pathophysiology that may help elucidate the clinical correlation between coagulation disorders and the coronavirus disease 2019 (COVID-19) remains unclear. According to several clinical studies, COVID-19-induced cytokine storm might trigger hypercoagulable state and thromboembolic events [2,3]. The impact of COVID-19 on immune thrombocytopenia development is also emphasized [4]. In addition, a strong correlation is presumed to exist between COVID-19 and disseminated intravascular coagulation (DIC) [5].

Moreover, gastrointestinal (GI) bleeding in COVID-19 increases the risk of irreversible stress [6], critical illness, or mechanical ventilation [7]. COVID-19 might invade the epithelial cells of the GI tract [8]. Several clinical data highlighted the ability of COVID-19 to infect the endothelial cells [9]. However, current clinical studies have not unraveled the mechanisms responsible for inducing GI bleeding in patients with COVID-19 [10]. Here, we present a case of GI bleeding in a patient with severe COVID-19. Our findings will encourage the scientific community to validate the presumed clinical correlation between COVID-19 and DIC/GI bleeding.

Case presentation

A 75-year-old African-American male patient arrived in the emergency room with fever, cough, and nausea, preceded by malaise for 2 weeks. He had a past medical history of insulin-dependent diabetes, hypertension, and dyslipidemia. He received treatment for his symptoms and was discharged with a follow-up prescription. After 3 days, he re-developed shortness of breath, thereby readmitted for further treatment. Chest x-ray revealed interval worsening of bilateral, predominantly bibasilar, interstitial, and alveolar opacities.

Acute respiratory distress syndrome occurred; thus, supplemental oxygen therapy, intubation, and medical management were provided. The reverse transcription–polymerase chain reaction (RT-PCR) test revealed that he was positive for COVID-19. The medical management relied on azithromycin combined with hydroxychloroquine. However, acute renal failure developed in a few days; thus, he received heparin-free continuous renal replace-

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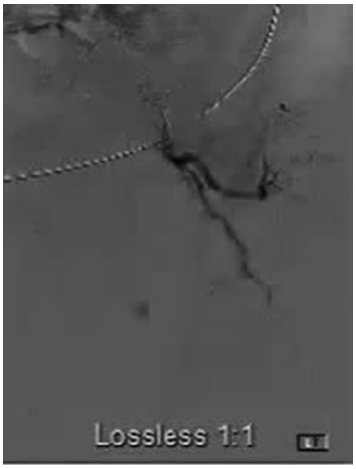

Fig. 1. A 2.4-french progreat microcatheter and a 0.014 synchro microwire were coaxially loaded through a tuohy valve into a 5-french catheter. The microcatheter was advanced into the superior rectal branches and dsa performed. These branches were embolized using gelfoam pledgets.

ment therapy (CRRT). After 9 days, he was extubated. When his renal function markedly improved, he was transferred to the medicine floor.

Within a week of receiving CRRT, the patient developed hematochezia and became hemodynamically unstable. In the intensive care unit (ICU), he was assessed and diagnosed with hemorrhagic shock requiring massive blood transfusion, intubation (for airway protection), and inotropic support. Contrast-enhanced abdominal and pelvic computed tomography (CT) revealed bibasilar airspace disease in scanned lung zones and a fat-containing ventral abdominal wall hernia with bowel loops. The diagnostic assessment excluded the possibility of incarceration and active GI bleeding. Thereafter, the patient underwent resuscitation in the ICU, followed by a repeat CT assessment, which ruled out the development of bleeding episodes.

Unfortunately, the bleeding reoccurred; hence, an interventional radiologist initiated a pelvic arteriography. The inferior mesenteric artery angiogram and superior rectal artery (SRA) angiography did not indicate any active contrast extravasation. The patient, however, underwent transcatheter gel-foam embolization of the SRAs. Meanwhile, active contrast extravasation from the rectal branches was detected in the left hypogastric arteriogram. The distal internal pudendal arteriogram affirmed a suspicious distal flow with possible anastomosis to middle rectal branches. Hence, the patient underwent coil embolization of possible middle and inferior rectal collaterals of the internal pudendal artery. A prostatic arteriogram confirmed the existence of contrast extravasation from the middle rectal artery; hence, gel-foam slurry and coil embolization were applied (Fig. 1). The embolization procedure effectively controlled the bleeding episode. After 5 days, the patient was extubated, transferred back to the medicine floor, and later discharged to a skilled nursing facility.

Discussion

Our case report confirms that GI bleeding can adversely impact the (Table 1) course and outcomes of hospitalization in patients with COVID-19. COVID-19 is a predominant factor attributing to the development of DIC and GI bleeding.

Clinical investigation on the mechanism of COVID-19-related lung injury continues [11,12]. Currently, the impact of COVID-19 on the structure and function of the GI tract remains poorly understood. Tian et al. (2020) identified several GI manifestations of COVID-19 in 2023 patients. GI symptoms ranging from nausea to severe GI bleeding were found in 79% of these patients. Real-time PCR from fecal samples was more effective in detecting SARS-CoV-2 than RT-PCR. The diagnostic assessment further revealed nucleocapsid protein and angiotensin-converting enzyme-2 in the GI epithelium of a patient with COVID-19 [13]. Yang et al. (2020) reported GI bleeding in 4% of patients with COVID-19 in Wuhan Jinyintan Hospital. They further confirmed that GI bleeding is associated with a higher mortality risk and a worse adverse prognosis [8]. Thus, these findings further hint the impact of COVID-19 on the GI tract.

Table 1
Admission vs. event laboratory results.

	Admission	Event
D-Dimer	2.3 mcg FEU/mL	>20.00 mcg FEU/mL
Platelet Count	262 thou/mcL	93 thou/mcL
WBC	8.10 thou/mcL	22.2 thou/mcL
Hemoglobin	14.7 g/dL	8.9 g/dL
Hematocrit	41.7%	41.3%
PT	13.7 s	24.7 s
INR	1.1	2.3
Fibrinogen level	615 mg/dL	198 mg/dL

The deleterious impact of COVID-19 on blood vessels may increase GI bleeding risk in patients with COVID-19. The recent reports about COVID-19 pathogenesis affirm hypercoagulability as a possible prognostic outcome of this disease [14–16]. Accordingly, many clinical studies emphasize on anticoagulant therapy to prevent and treat coagulopathy in COVID-19 scenarios [16,17]. In another study, COVDI-19 had a deleterious impact on the structure and function of the vascular endothelium [9]. Lee (2020) further advocated that COVID-19 contributes to the development of fulminant DIC while disrupting the coagulation pathway [5]. The case-control study by Martin et al. (2020) reported a 60% prevalence of rectal tube-related rectal ulcers and an 80% prevalence of gastroduodenal ulcers in patients with COVID-19 [22]. They advocated conservative management to guide the treatment of COVID-19-related GI bleeding. Moreover, the case-control study by Trindade et al. (2020) confirmed the mortality predisposition of patients with COVID-19 with GI bleeding during hospitalization [23].

SARS-CoV-2 is a deleterious respiratory virus that discreetly disrupts the human body systems [18–21]. Thus, prospective studies aim to determine the effect of COVID-19 on various organ systems. Deepening our knowledge on COVID-19 is the key to curb the progression of COVID-19 worldwide.

In conclusion, our findings support the claim that SARS-CoV-2 infection can trigger episodes of DIC and GI bleeding. Future studies should investigate the potential of COVID-19 to disrupt the structure and function of the coagulation pathways, blood vessels, and epithelial cells in the GI tract. These assessments will help identify new and comprehensive prevention and treatment approaches to improve the mortality rate and prognostic outcomes of COVID-19.

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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