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Acute mesenteric ischemia in covid-19 disease: A case report

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Abstract

This case report explores acute mesenteric ischemia (AMI) in COVID-19 patients, showcasing this as a significant vascular complication from the infection. We discuss two instances of COVID-19-associated AMI, validated through comprehensive imaging and lab tests. The first case is a 54-year-old male with pre-existing hypertension and diabetes who presented with severe abdominal pain and symptoms consistent with COVID-19. The second involves a 65-year-old female with a history of heart disease, similarly, displaying acute abdominal symptoms. Surgical exploration in both cases confirmed mesenteric arterial thrombosis, indicative of a hypercoagulable state induced by COVID-19. These findings emphasize the need for healthcare providers to consider gastrointestinal symptoms as potential indicators of severe COVID-19 complications. Early recognition and appropriate diagnostic imaging are crucial in managing these cases effectively, potentially reducing mortality. The paper highlights the broader systemic effects of COVID-19, stressing the importance of vigilance and rapid response to manage not only the primary respiratory symptoms but also the less common but equally critical vascular complications like AMI. This study contributes to a growing body of evidence that COVID-19 can cause severe systemic complications, necessitating a comprehensive approach to treatment and management.

Keywords: COVID-19 Complications; Acute Mesenteric Ischemia; Thrombosis; Coagulation Disorders.

1. Introduction

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, since that time the world is facing a pandemic which is currently ongoing [1]. Coronavirus Disease 2019 (COVID19) can occur with a variety of complications during infection. The manifestations of this disease range from mild symptoms to severe illness. The most frequently reported clinical manifestations of COVID19 are fever, myalgia, cough, dyspnea and, less commonly, headache, diarrhea, nausea and vomiting. In addition to respiratory complications, the virus has also been linked to damage to other organ systems as well as coagulopathy.

In this article, we present 2 cases of acute mesenteric ischemia (AMI), which were positive for COVID on the nasopharyngeal polymerase chain reaction test.

2. Case 1

A 54-year-old male patient followed for hypertension and diabetes.

Admitted to the emergency room for management of diffuse abdominal pain.

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The history of his illness goes back to 7 days with the appearance of a fever not quantified with cough and respiratory discomfort with the appearance of a peri-umbilical abdominal pain 2 days ago without transit disorder or rectal bleeding.

General clinical examination finds a conscious patient tachycardic at 130 BPM normo tense and febrile at 39°.

Abdominal examination reveals a soft abdomen with epigastric and peri-umbilical tenderness and defense.

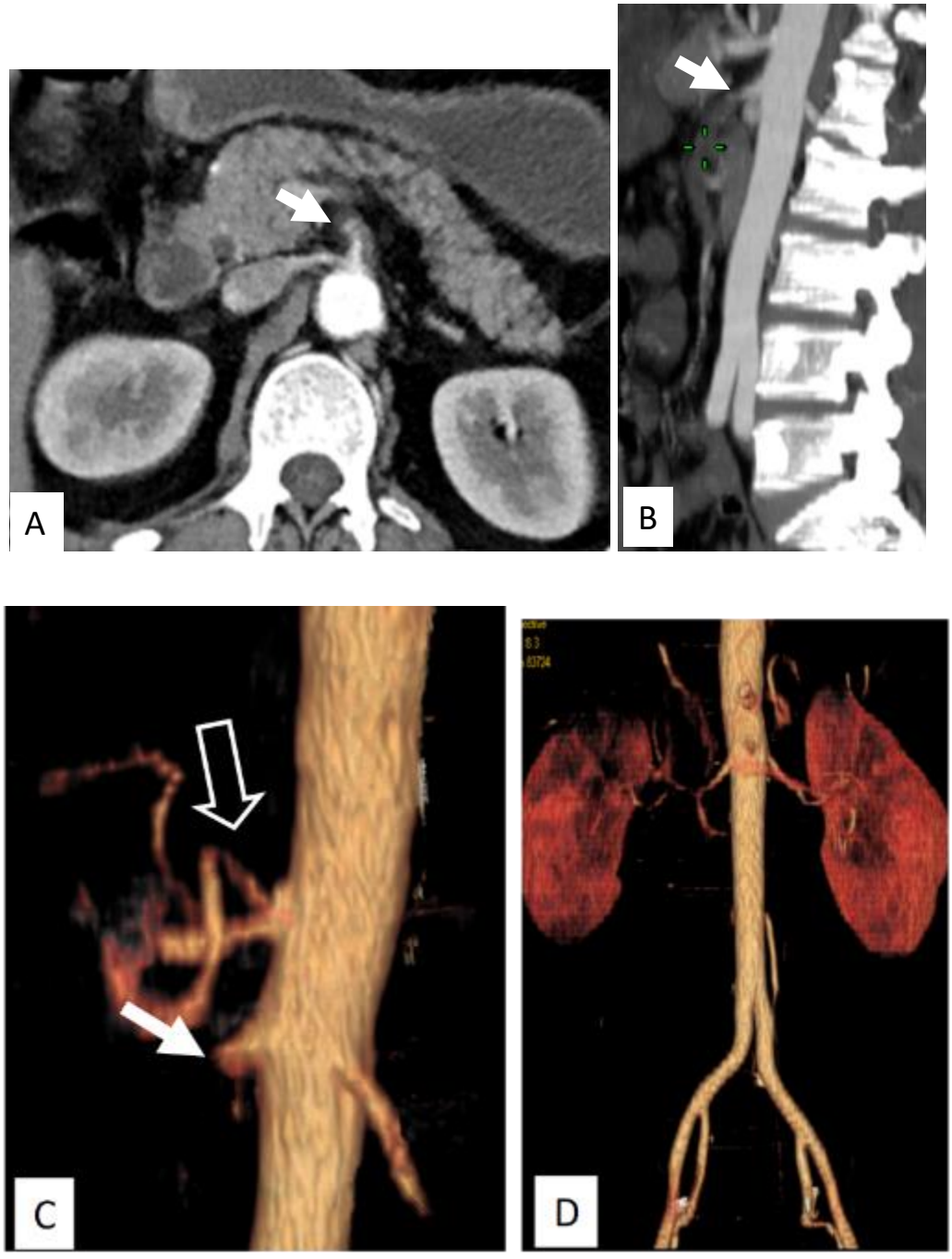

Figure 1 Axial CT section at arterial time (A), in MPR reconstruction (B), and VR (C-D)

Abrupt opacification of the superior mesenteric artery from its emergence, without distal recovery (white arrow) Good opacification of the other visceral vascular trunks (ceolia trunk: hollow arrow).

Thoracoabdominal angioscan: occlusion of the superior mesenteric artery (Figure 1) responsible for a defect in enhancement of the intestinal wall (Figure 2), defect in enhancement of a superior polar branch of the splenic artery responsible for splenic infarction (Figure 2), with covid pulmonary involvement estimated at 25-50%.

biological workup: hyperleukocytosis at 59,400 with PNN predominance (75.5%) CRP at 106 mg/l

The patient was taken to the operating room for surgical exploration.

In dorsal decubitus under general anesthesia, after a classical draping, median laparotomy straddling the umbilicus, plane by plane opening, evisceration (small intestine on the right and transverse colon on the top) then placement of a Gosset type auto-static retractor, opening of the posterior parietal peritoneum at the level of the duodeno-jejunal angle, dissection and control of the superior mesenteric artery, after heparinization by the general route the superior mesenteric artery was clamped on both sides, then a transverse arteriotomy was made, embolectomy of the AMS with the Fogarty probe bringing back fresh thrombi, at the end heparinization of the AMS then closure of the arteriotomy.

Exploration of the coves finds a suffering of the small intestine without necrosis zone with preserved peristalsis. After correct hemostasis, peritonization and placement of a retroperitoneal redon drain, the abdominal wall was closed plane by plane.

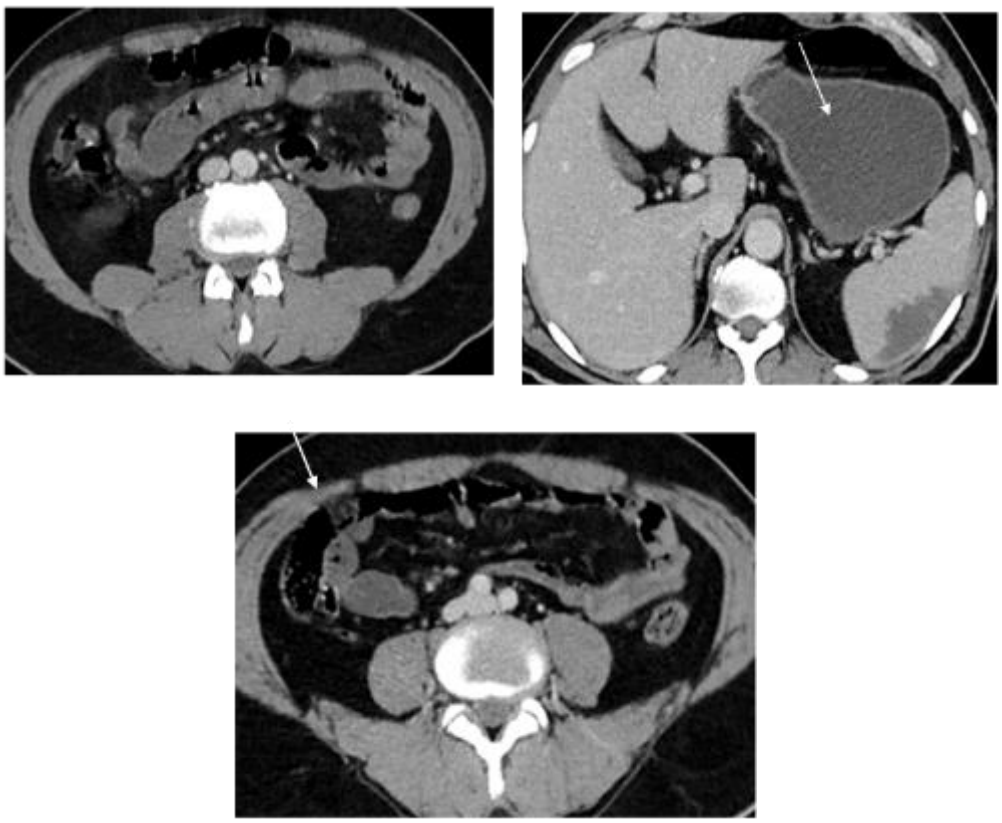

Figure 2 Axial CT sections at venous time:

Extensive enhancement defect of the intestinal and gastric wall (white arrows) Upper polar, triangular, peripheral splenic hypodense area related to splenic infarction (white triangle).

2.1. Case 2

Female patient, 65 years old, followed for a cardiopathy under treatment, operated 20 years ago for a lithiasis gallbladder.

Admitted to the emergency room for respiratory distress with acute abdominal pain dating back to 12 hours before her admission motivating her consultation with her cardiologist who suspected a mesenteric ischemia and then referred her to our center for further management.

On admission, the patient was conscious, tachycardic at 140 BPM, BP 90/50 with cold extremities, diffuse abdominal tenderness with no trace of blood on rectal examination.

on biological examination, the leukocytes were 12,700 with a predominance of PNN (84.2%)

urea 0.79 g/l, creatinine 28 mg/l, albumin 29 g/l, alkaline reserve 14 mmol/l, CRP 79.1 mg/l

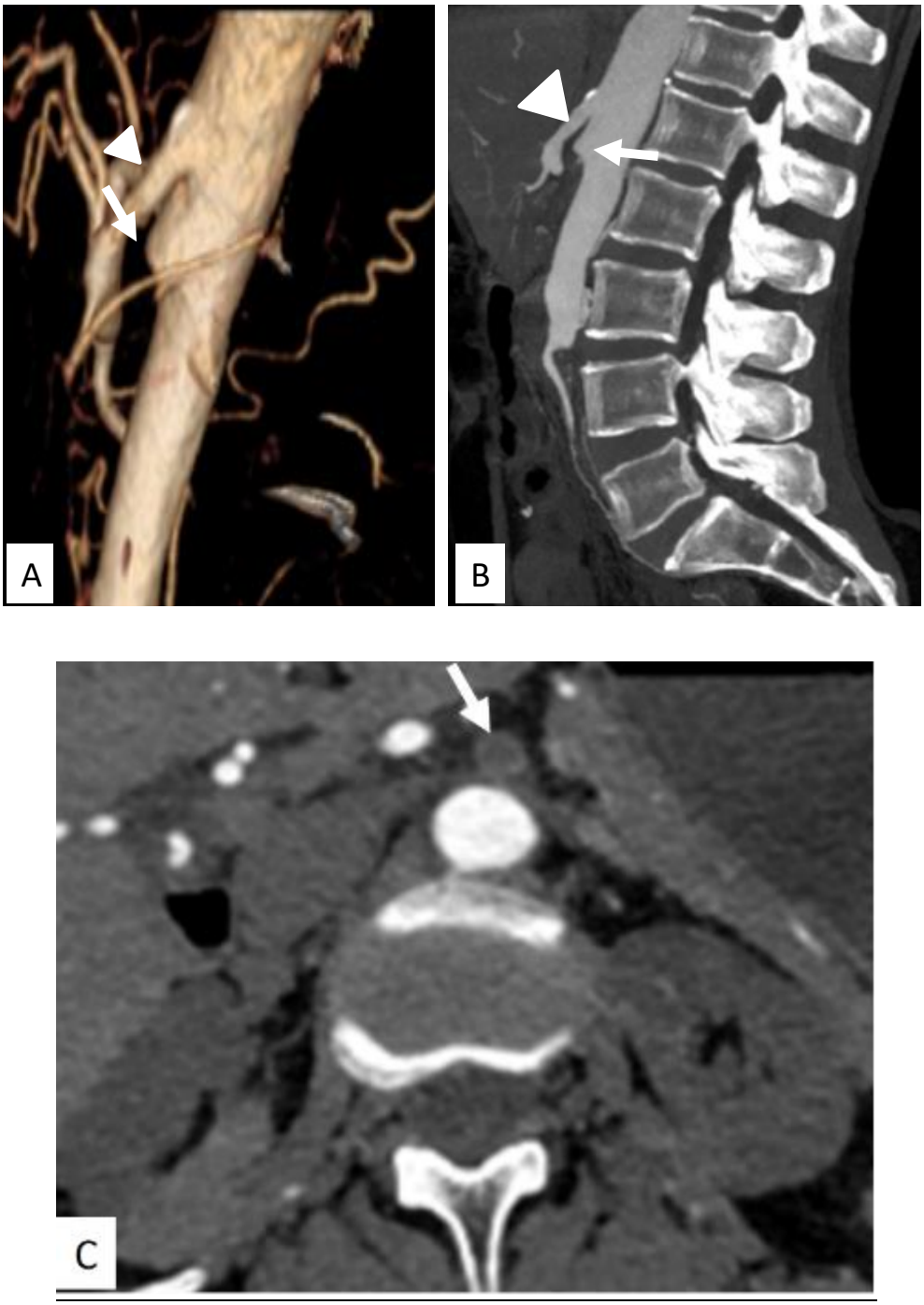

Figure 3 Arterial time-lapse scans, in RV (A) MPR (B), and axial native (C) reconstruction**.**

Abrupt opacification defect of the superior mesenteric artery from its emergence, without distal recovery (white arrow); Good opacification of the other visceral vascular trunks (ceolia trunk: white triangle).

Figure 4 Axial CT sections at venous time

Extensive enhancement defect of the pelvic ileal wall (white arrows); Peripheral triangular hypodense plaques related to infarction in the upper polar splenic area (white triangle) and bilaterally in the renal area (dotted arrows).

An RT-PCR SARS COV 2 test was performed and came back positive.

Abdominal angio scanner showed a mesenteric infarction with digestive ischemia extended to the ileal intestines (Figure 3-4)

Thoracic CT scan showed bilateral ground-glass foci in the lungs ranging from 10% to 30% in extent.

The patient was sent to the operating room for surgical exploration.

In dorsal decubitus under general anesthesia, median laparotomy straddling the umbilicus enlarged above and below the umbilical.

On exploration: absence of distressing fluid, presence of an ischemic and suffering but viable small intestine, pale ascending colon, transverse colon, descending colon and sigmoid and rectum are unremarkable.

Approach of the superior mesenteric artery at its origin, after dissection and control of the MSA, general heparinization, clamping of the MSA on both sides, then transverse arteriotomy and embolectomy with the Fogarty probe of the MSA bringing back fresh thrombi with recovery of a good flow and good reflux of the MSA.

After local heparinization of the MSA, the arteriotomy was closed with a hemiovert. After good hemostasis, a suction drain and another drain were placed at the level of the Douglas cul-de-sac and then closed plane by plane.

3. Discussion

COVID-19 is a viral infection caused by (SARS-CoV2). It is an RNA virus that enters the body's cells via the angiotensin-converting enzyme receptor, which is widely expressed in the body (2,3); most abundantly in pulmonary alveolar epithelial cells, small intestinal enterocytes and vascular endothelium (4)

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 patients 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].

Apart from deep venous thrombosis and pulmonary embolism (PE), acute mesenteric ischemia (AMI) has been reported in severe COVID-19 patients (4). AMI is a devastating complication with a high mortality rate, so high suspicion, early detection, and prompt treatment are essential to avoid the morbidity and mortality associated with this disorder. The exact pathological mechanism underlying the complication of AMI in COVID-19 is currently unknown.

Allegedly, four mechanisms, individually or in various combinations could explain this devastating complication in severe COVID-19.

First, a coagulation disorder (hypercoagulability) induced by systemic inflammatory state, endothelial activation, hypoxia and immobilization may lead to mesenteric vascular thrombosis. The evidence available at present has not conclusively demonstrated large mesenteric vessel (arterial or venous) thrombosis. Preliminary pathological evidence has shown bowel necrosis with small vessel thrombosis involving the submucosal arterioles, thereby pointing to an in-situ thrombosis of small mesenteric vessels rather than an embolic event (4).

In COVID-19-related coagulopathy, many phenomenons are evoked and probably intertwined, including excess inflammation linked to the massive release of cytokines, platelet activation, vascular stasis and endothelial dysfunction. Pre-existing co-morbidities also contribute to thrombotic events (8). Lymphopenia with elevated lactate dehydrogenase and markers of inflammation such as CRP, ferritin and interleukin-6 (IL-6) are frequently observed (9). The inflammatory syndrome contributes to fibrinogen elevation. It may be correlated with the risk of thrombosis. The severity of the disease is more variably associated with changes in prothrombin time (PT) or active partial thromboplastin time (APTT) (10). Our patients presented with elevation of inflammatory markers such as CRP, lactate as well as acute renal failure and hepatic cytolysis. They also had a low PT indicating the severity of the condition. Abdominal manifestations, particularly gastrointestinal, have been frequently reported in patients with COVID-19. These manifestations can be explained by: direct viral infection, small vessel thrombosis or non-occlusive mesenteric ischemia (4).

Second, elevated levels of von Willebrand Factor have been reported in severe COVID-19. von Willebrand Factor is released from Weibel-Palade bodies in response to endothelial damage. Vascular endothelium expresses angiotensin converting enzyme 2, the target receptor for severe acute respiratory syndrome 2 (SARS-CoV-2), which possibly explains the endothelial cell tropism of SARS-CoV-2 and subsequent endothelial dysfunction or damage with resultant vascular thrombosis (11).

Third, expression of angiotensin converting enzyme 2 on enterocytes of small bowel, the target receptor for SAR-Cov2, may result in intestinal tropism and direct bowel damage (12)

Finally, the shock or hemodynamic impairment often associated with severe COVID-19 pneumonia can lead to a non-occlusive mesenteric ischemia.

Although readily available, Computed tomography angiography (CTA) is the imaging test of choice for diagnosing AMI. The CTA performed to detect PE may need to be extended to cover the abdomen so that both the chest and abdomen are scanned in the same examination. This might come at the cost of a higher radiation dose but given the severity of AMI, it's worth the trade-off.

A recent review of the literature of patients with acute mesenteric ischemia due to viral infection such as COVID19 (13) found that among 13 patients, 4 had concomitant thrombosis at other sites: stroke, portal and mesenteric vein thrombosis, splenic and renal infarcts, and superior portal and mesenteric vein thrombosis. In our patients, mesenteric infarction was associated with multiple patches of splenic, limb and renal infarction.

4. Conclusion

Acute mesenteric ischemia is a serious complication of Covid 19 viral infection; It can be a mode of revelation or a late complication of the disease occurring during hospitalization. Our cases are added to the cases previously described in the literature, aiming at detecting and grouping the different systemic manifestations of this viral infection.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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