

Acute mesenteric ischemia in patient after COVID-19: a case report

Isquemia mesentérica aguda em paciente pós-COVID-19: um relato de caso

Matheus Costa Morais¹, Luana Almeida Abreu¹, Camila Silva Abreu¹, David Filipe Silva da Cruz²,
João Paulo Lemos da Silveira Santos²

ABSTRACT

Introduction: COVID-19 is a disease caused by SARS-CoV-2 that progresses with a predominance of respiratory symptoms. Studies have elucidated to clarify the pathophysiology and clinical manifestations resulting from viral infection, in view of the repercussion of the theme and its notoriety worldwide. Although the respiratory system is the primary focus of infection the forms of extrapulmonary involvement of the pathology have gained prominence. Thromboembolic events associated with COVID-19 have been evidenced in the medical literature, resulting from the alteration of the coagulation cascade and the exacerbated inflammatory response. **Discussion:** We present below the case of a 56-year-old woman who developed severe abdominal pain after COVID-19 infection. Abdominal tomography showed occlusion of the superior mesenteric artery. The patient underwent exploratory laparotomy, which is the primary approach for acute vascular abdomen. **Conclusion:** Mesenteric ischemia represents an example of thromboembolic diseases that had their profile of differentiation after the COVID-19 pandemic. Previously, some triggering precedents, such as cardiovascular impairment. Currently, the incidence profile has been changed, with SARS-CoV-2 infection being one of the new causal predisposing factors.

Keywords: Mesenteric ischemia; COVID-19; Thromboembolic events.

¹ Faculdade Atenas. Sete Lagoas, Minas Gerais, Brasil.

² Hospital Nossa Senhora das Graças. Sete Lagoas, Minas Gerais, Brasil.

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Dr. Mário Benedito Costa Magalhães
Faculty of Health Sciences at the
University of Vale do Sapucaí
Pouso Alegre/MG, Brazil.

Corresponding Author:

Matheus Costa Morais
E-mail: moraismatheus800@gmail.com

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RESUMO

Introdução: A COVID-19 é uma doença ocasionada pelo SARS-CoV-2 que cursa com predomínio de sintomas respiratórios. Estudos elucidaram a fisiopatologia e as manifestações clínicas decorrentes da infecção viral, tendo em vista a repercussão da temática e sua notoriedade em âmbito mundial. Embora o sistema respiratório seja o foco primário da infecção, as formas de acometimento extrapulmonares da doença têm ganhado destaque. Eventos tromboembólicos associados à COVID-19 foram evidenciados na literatura médica, consequentes da alteração da cascata de coagulação e pela resposta inflamatória exacerbada. **Discussão:** Apresentamos a seguir o caso de uma mulher de 56 anos, que evoluiu com dor abdominal intensa após infecção por COVID-19. A tomografia abdominal evidenciou oclusão da artéria mesentérica superior. Paciente foi submetida à laparotomia exploratória, abordagem primordial para o quadro de abdome agudo vascular. **Conclusão:** A COVID-19 representa um novo predisponente causal para doenças tromboembólicas, como a isquemia mesentérica, atuando em sinergismo com os fatores de risco previamente conhecidos. Alguns precedentes desencadeantes, como o comprometimento cardiovascular, permanecem sendo os principais causadores de isquemia mesentérica. Todavia, atualmente, a infecção pelo SARS-CoV-2 representa um acréscimo ao perfil de incidência já estabelecido.

Palavras-chave: Isquemia mesentérica; COVID-19; Eventos tromboembólicos.

INTRODUCTION

COVID-19 is caused by a single-stranded RNA virus, called SARS-CoV-2¹. The infection results in a severe hemostatic disorder secondary to the inflammatory response, typically seen in patients with sepsis². In view of this, several comorbidities can be triggered by this disease, such as metabolic, cardiovascular, respiratory and coagulation disorders¹.

Hemostatic dysfunction with maintenance of a hypercoagulable state is responsible for the development of thromboembolic events associated with COVID-19³. Therefore, a high incidence of associated thrombotic events is observed in patients. The prevention and treatment of thromboembolic complications are not fully elucidated, resulting in high difficulty in managing the dysfunction³. Thus, constant patient assessment and the adoption of precise strategies are useful measures to minimize the risk of progression to thromboembolism⁴.

We present in this report the case of a patient who developed mesenteric ischemia after SARS-CoV-2 infection. The main objective is to contribute to the dissemination of thromboembolic complications related to infection by the coronavirus, discussing the diagnosis, treatment and developments, in addition to elucidating the importance

of the topic for the medical practice. We emphasize that the clinical information, as well as the tests that will be presented, were obtained with the patient's authorization, expressed through a previously signed free and informed consent form.

CASE REPORT

HAFTC, 56 years old, female, hypertensive, using Losartan and Hydrochlorothiazide, with a history of recent hospitalization at Hospital Nossa Senhora das Graças, in Sete Lagoas-MG, due to infection by COVID-19, where she stayed for 5 days in the Intensive Care (ICU), with hospital discharge on 11/24/2020.

Admitted to the same service, on 11/25/2020, complaining of diffuse and intense abdominal pain, without association with nausea, vomiting, diarrhea, respiratory symptoms or other clinical complaints. She showed significant clinical decline within 24 hours. Abdominal tomography suggested a picture of an acute vascular abdomen, with obstruction of the distal branches of the Superior Mesenteric Artery (SMA), in addition to showing pneumatosis, which corresponds to free gas in the intestinal wall (Figures 1 and 2).

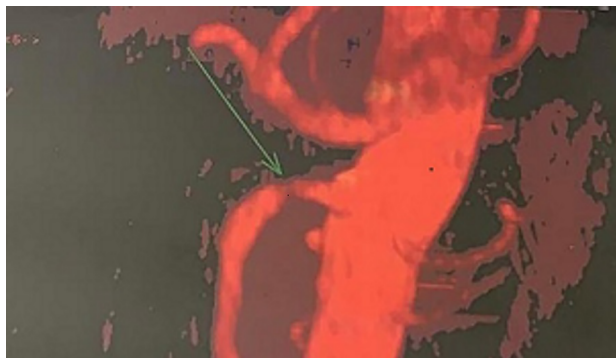


Figure 1. Abdominal tomography showing an acute vascular abdomen, with obstruction of the distal branches of the Superior Mesenteric Artery (SMA).

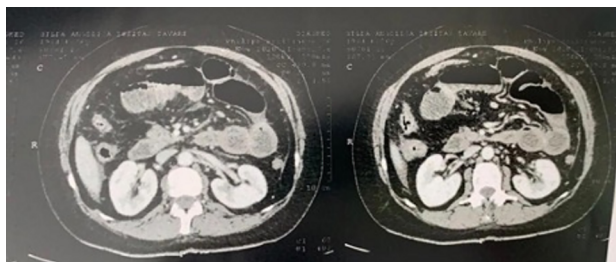


Figure 2. Abdominal tomography demonstrating the presence of pneumatosis, confirming the severity of the patient's condition.

She was referred to the operating room already in a condition of hemodynamic instability with respiratory repercussions. Undergoing exploratory laparotomy, terminal ileum ischemia of approximately 1 meter was identified. An enterectomy of the ischemic segment was performed, and a primary end-to-end anastomosis was performed 30cm from the ileocecal valve, with no evidence of perforation of the intestinal loop. Anatomopathological results showed an intestinal segment with usual folding mucosa, without vegetating or depressed lesions. In addition, it demonstrated the absence of foci of degeneration, desquamation of the lining epithelium and previous vascular disease.

She evolved clinically unstable in the immediate postoperative period, using high-dose vasoactive amines, antibiotic therapy and therapeutic dose enoxaparin. She progressed with improvement in clinical parameters, extubated on the 5th postoperative day (POD), with withdrawal of vasoactive drugs on the same date and start of enteral diet with good progression. Febrile peaks were presented from the 9th POD onwards, a new CT scan of the abdomen was performed, showing collection in the mesogastrium region, extending to the suprapubic region, followed by diarrhea and persistence of febrile peaks. She underwent relaparotomy on the 11th POD, which showed ischemia of the distal segment of the remaining jejunum, close to the ileocecal valve, with perforation of small bowel loops and anastomotic dehiscence, which resulted in gross contamination of the abdominal cavity.

An excision of approximately 25cm of the distal jejunum and remaining ileum was performed, the cavity was

cleaned and a double-mouth jejunostomy and ileostomy were performed, with the distal mouth juxtaposed to the cecum. Laparostomy was maintained for 72 hours, with a new surgical approach to cleaning the cavity and closing the abdominal wall. She remained in intensive care, with an improvement in the clinical picture, a functioning colostomy on the 2nd POD, an oral diet was started on the 3rd POD. She progressed in good general condition, being discharged from the ICU on 12/21.

She had a fever in the ward, identified urinary tract infection by multidrug-resistant bacteria, improved after parenteral antibiotic therapy. Opted for maintaining full anticoagulation. Hospital discharged on 12/28.

In the follow-up, the patient evolved in good general condition, afebrile, without any infectious changes. Tolerating oral diet, functioning ostomy with soft stools. Still in rehabilitation with a multidisciplinary team of nutrition, physiotherapy and speech therapy due to sequelae of prolonged hospitalization.

DISCUSSION

COVID-19, caused by SARS-CoV-2, is a viral disease with severe symptoms of acute respiratory syndrome¹. The pathophysiology of the disease involves intense inflammatory conditions associated with hematological disorders, such as changes in the coagulation cascade and blood stasis, which predispose to arterial and venous thrombosis¹. This hemostatic dysfunction has been described as a state of Disseminated Intravascular Coagulation (DIC) and consumption coagulopathy, resulting from COVID-19 infection in its severe inflammatory state². DIC is associated with a set of laboratory alterations: decrease in platelet count, increase in fibrin degradation products (ogen), such as D-dimer, as well as low fibrinogen².

Studies point to the effectiveness of adopting pharmacological prophylaxis of Venous Thromboembolism as a potential reducer of vascular damage in patients hospitalized for COVID-19⁵. However, despite the use of this practice, the thrombotic risk is still high⁴. Therefore, for a complete treatment, assessment of thrombotic risk and prevention of thromboembolic events is necessary, even if optimal doses for anticoagulation have not yet been established⁴.

Extrapulmonary complications are also associated with involvement by SARS-CoV-2⁵. Symptoms related to the Gastrointestinal Tract (GIT) may be recurrent⁶, as happened in the case of the patient. The hypercoagulable state associated with COVID-19 can lead to the formation of obstacles to the vascularization of the GI tract, resulting in Acute Mesenteric Ischemia (AMI)⁷.

Acute Mesenteric Ischemia (AMI) is defined as the occurrence of an abrupt interruption of the mesenteric blood flow, which results in the absence of oxygen supply to the intestinal tissue⁸. With prolonged reduction in blood supply, intestinal loops can progress to necrosis and progress to peritonitis⁸. Due to its low aortic incision angle and its

narrow path, the SMA is a vulnerable anatomical point for emboli fixation, which are usually located 3 to 10 cm from the origin of the artery⁹, as shown on the CT of the case.

Acute mesenteric ischemia is a rare manifestation associated with COVID-19, although it is difficult to measure the exact estimate of its occurrence, due to inherent difficulties in the patient selection process and diagnostic limitations¹⁰. The pathophysiology of digestive involvement in patients with COVID-19 is associated with the presence of ACE2 receptors in enterocytes, which can be directly contaminated by SARS-CoV-2¹⁰. Numerous alterations in the balance of the coagulation cascade have been demonstrated in patients hospitalized for COVID-19 with increased values of fibrinogen, D-dimers and coagulation factors V and VIII¹⁰. Age is directly related to the highest incidence, with AMI being responsible for 10% of cases of acute abdomen in patients over 70 years of age¹¹. Mortality is reduced with immediate treatment of symptoms, early diagnosis and effective surgical intervention, procedures that represent the pillars of modern treatment⁹ and which have been adopted in the treatment of the condition.

The clinic presented by patients with acute mesenteric ischemia is consistent with severe abdominal pain⁷, as shown in this case. The chronology of symptoms can evolve with diarrhea, hematochezia or melena, nausea and vomiting¹¹. Patients with heart diseases, such as atrial fibrillation, dysrhythmias and aortic atherosclerosis, are more vulnerable to the development of mesenteric embolism⁹. Due to the absence of hematological changes and pre-existing vascular disease in the anatomopathological result, the diagnostic hypothesis of AMI caused by COVID-19 came from the correlation between viral infection and hypercoagulability, which constitutes a new risk factor for thromboembolic diseases.

Due to the limitation of clinical and laboratory findings, Multidetector Computed Tomography (MDCT) is the gold standard for diagnosis¹¹. The use of angiotomography allows assessing the potential for revascularization and the possibility of restoring blood flow⁹. This imaging test has significant accuracy, which makes it possible to exclude other causes of acute abdominal pain¹¹. Due to the patient's clinical suspicion, MDCT was the method of choice for investigating the condition, since it allows the visualization of occlusive lesions and assessment of the severity of intestinal ischemia.

Kirkpatrick et al. (2003)¹² revealed that in the presence of advanced AMI, MDCT findings reflect irreversible ischemia (intestinal dilation and thickness, reduction or absence of visceral enhancement, pneumatosis intestinalis, and portal venous gas) and intraperitoneal free air. The patient in the case presented intestinal pneumatosis, which attested to the severity of the condition.

The optimized treatment of AMI consists of three guiding actions that involve the adoption of antibiotic therapy, revascularization of the non-necrotic intestinal portion and surgical excision of necrotic intestinal tissue¹³. Revascularization can be performed through thrombolysis,

conventional surgical approach and endovascular therapy¹³. The latter has shown improvement in short-term morbidity and mortality, however, the long-term experience in acute conditions has not been well established¹¹. Endovascular therapy is indicated in some cases of mesenteric ischemia, especially in those with a chronic course, through the placement of a stent/angioplasty, which requires active surveillance and follow-up interventions¹⁴. The intra-arterial injection of thrombolytics, through diagnostic and therapeutic angiography, is currently little used¹⁵.

Due to the severity and instability of the patient's admission condition, associated with the infeasibility of the bowel loops requiring enterectomy, the conventional surgical approach was chosen. After adopting this approach, the patient progressed with significant improvement and favorable evolution, and is currently in the recovery process.

CONCLUSION

Due to the high number of people infected by COVID-19 in the current context and the susceptibility to thromboembolic events caused by this pathology, a change in the profile of patients affected by mesenteric ischemia can be expected. Previously, the majority were elderly and already had some heart disease, such as atrial fibrillation and atherosclerotic diseases, now transitioning to a mixed scenario, where young patients with no associated comorbidities are also affected.

This article aims to alert the surgical medical community about the emergence of cases associated with a previous viral infection, to enable prophylaxis, early diagnosis and adequate treatment of AMI associated with COVID-19.

AUTHORS' CONTRIBUTION

Conceptualization, Research, Methodology, Visualization & Writing - Analysis and Editing: Matheus Costa Morais; Luana Almeida Abreu; Camila Silva Abreu. Project Management, Supervision & Original Draft Writing: Matheus Costa Morais; Luana Almeida Abreu; Camila Silva Abreu; David Filipe Silva da Cruz. Validation, Software: David Filipe Silva da Cruz; João Paulo Lemos da Silveira Santos. Resources & Financing Acquisition: David Filipe Silva da Cruz. Data Curation & Formal Analysis: David Filipe da Cruz; João Paulo Lemos da Silveira Santos.

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