

A prospective study to test the correlation between recent or past coronavirus disease 2019 infection and mesenteric venous vascular occlusion

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Received: 25 September 2023

Revised: 2 October 2023

Accepted: 2 October 2023

Published: 7 December 2023

The Egyptian Journal of Surgery 2023, 42:1145–1149

Introduction

The severe acute respiratory syndrome-causing coronavirus 2 (SARS-CoV-2) has been identified by the World Health Organization as coronavirus disease 2019 (COVID-19). The coagulation abnormalities and thromboembolic events linked to COVID-19 have also been investigated in other research. The elevated risk of hypercoagulability, disseminated intravascular coagulation, and thromboembolic events in COVID-19 patients has been noted by these investigations.

The relationship between COVID-19 and mesenteric vascular occlusion (MVO) has been examined in a number of research. The pro-coagulant characteristics of the virus, according to the authors, could be a factor in the mesenteric blood arteries becoming blocked.

Patients and methods

This is a prospective study that was performed on 50 adult patients who were admitted to El-Demerdash Hospital presenting with MVO. They were subdivided into three groups; group I: COVID-negative, group II: previous COVID infection, and group III: COVID-positive. Each patient was assessed thoroughly through full medical and surgical history, laboratory tests, and imaging studies.

Follow-up of patients on a daily basis from admission till discharge and recording the progressive notes for each patient especially success of conservative treatment, need for surgical intervention, ICU admission, morbidity or mortality.

The collected data were revised, coded, tabulated, and introduced to a PC using a statistical package for social science (SPSS Statistics for Windows, Version 27.0.1. Armonk, NY: IBM Corp.). Frequency and Percentage were used for presenting qualitative data. χ^2 test and Fisher Exact test were used to analyze qualitative data. *P* value less than 0.05 was considered statistically significant.

Results

The study found that 24% of MVO cases were COVID-negative, 28% had a previous COVID infection, and 48% were COVID-positive. There was a significant association between COVID infection and MVO ($P < 0.001$). There was no significant difference between the three groups in terms of demographic factors or associated comorbidity. However, a significantly higher proportion of patients in group III required surgical intervention and had a higher mortality rate compared with the other groups ($P < 0.05$).

Conclusion

In conclusion, the present study implies that COVID-19 patients are at risk of developing mesenteric vascular occlusion and that the underlying mechanism associated with the two requires further investigation. The study highlights the need for physicians to monitor COVID-19 patients closely for the condition and that early detection and appropriate treatment could be critical in improving patient outcomes.

Keywords:

acute intestinal ischaemia, coronavirus disease 2019, hypercoagulability, mesenteric vascular occlusion, thrombo-embolic events

Egyptian J Surgery 42:1145–1149

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1110-1121

Introduction

The severe acute respiratory syndrome-causing coronavirus (SARS-CoV-2) has been identified by the World Health Organization as coronavirus disease 2019 (COVID-19) [1].

When one or more of the mesenteric blood arteries get blocked, an uncommon but serious condition known as

mesenteric vascular occlusion develops. It can result in intestinal damage and death if untreated [2].

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The relationship between COVID-19 and mesenteric vascular occlusion (MVO) has been examined in a number of research. Four COVID-19 patients who experienced MVO were the subject of a study that was described in the Lancet Gastroenterology and Hepatology [3]. The pro-coagulant characteristics of the virus, according to the authors, could be a factor in the mesenteric blood vessels becoming blocked.

The coagulation abnormalities and thromboembolic events linked to COVID-19 have also been investigated in other research [4,5]. The elevated risk of hypercoagulability disseminated intravascular coagulation, and thromboembolic events in COVID-19 patients has been noted by these investigations. Thrombosis dysfunction and increased levels of D-dimer and fibrin breakdown products have been linked to the severity of COVID-19 and the presence of systemic inflammation [6].

Acute pulmonary embolism and deep vein thrombosis are two additional thromboembolic events that have been linked to an increased risk in COVID-19 patients [7]. It is significant to remember that the precise processes by which COVID-19 causes a hypercoagulable state and causes MVO are currently poorly understood [7].

Additionally, venous thromboembolism brought on by venous stasis has been connected to COVID-19 individuals [8]. As COVID-19 infection spread, more and more thromboembolic complications were being reported in medical literature.

Aim

To correlate between MVO and recent or past COVID-19 infection.

Patients and methods

- (1) Study type: This is a prospective study.
- (2) Study Setting: El-Demerdash Hospital.
- (3) Study Population: 50 adult patients that were admitted to El-Demerdash hospital presenting with MVO.

Inclusion criteria

- (1) Adult patients aged 18 years old or older.
- (2) Patients suffering from mesenteric venous only occlusion.

Exclusion criteria

- (1) Age under 18 years old.

- (2) Patients suffering from mesenteric arterial occlusion.
- (3) Patients with risk factors of MVO such as atrial fibrillation.
- (4) Patients with a known past history of hypercoagulable state such as recurrent Deep Venous Thrombosis (DVT), pulmonary embolism, stroke or repeated abortions.
- (5) Patients on anticoagulation therapy for any cause.

Ethical considerations

Written informed consent was obtained from patients, after approval of the research ethics committee of Faculty of medicine, Ain Shams University, Cairo, Egypt.

Study tools

- (1) Full personal and clinical history and thorough clinical examination.
- (2) Laboratory investigations.
- (3) Complete blood count (CBC) and platelet count.
- (4) Bleeding and clotting time.
- (5) Prothrombin time and activated partial thromboplastin time.
- (6) D-dimer.
- (7) Protein C and S.
- (8) Antiphospholipid antibody.
- (9) Liver function tests.
- (10) COVID-19 antibody titre by rapid test (IgG and IgM).

Imaging

- (1) Computed tomography (CT) scan abdomen with mesenteric angiography.
- (2) MRA for patients with contraindication to contrast administration.
- (3) Follow-up of patients on daily basis from admission till discharge and recording the progressive notes for each patient specially success of conservative treatment, need for surgical intervention, ICU admission, morbidity or mortality.

Statistical analysis and statistical package

The collected data were revised, coded, tabulated and introduced to a PC using statistical package for social science (SPSS Statistics for Windows, Version 27.0.1. Armonk, NY: IBM Corp.). Frequency and Percentage were used for presenting qualitative data. χ^2 test and Fisher Exact test were used to analyze qualitative data. *P*-value less than 0.05 was considered statistically significant.

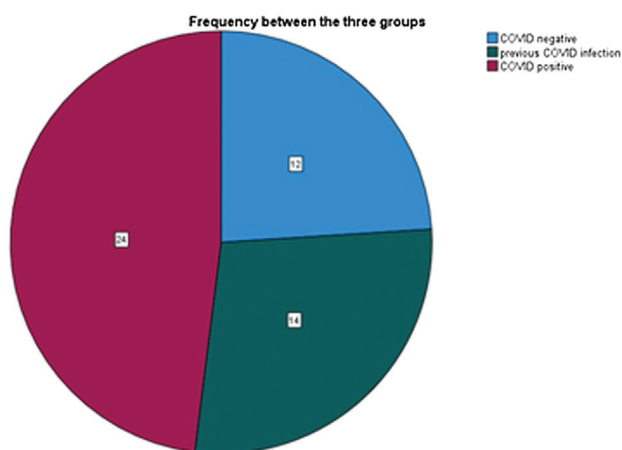
Results

The present study included 50 patients who were presented with mesenteric venous vascular occlusion. They were divided into three groups according to the result of rapid test for COVID-19 infection. Group I included 12 (24%) patients who were COVID-19 negative, group II included 14 (28%) patients with previous COVID-19 infection while group III included 24 (48%) patients who were COVID-19 positive.

The present study revealed that 24% of the MVO cases were COVID negative, 28% had previous COVID infection and 48% were COVID positive (Fig. 1).

Comparison between frequency of MVO with COVID negative (group I) and COVID positive (groups II and III). Twelve (24%) MVO patients were COVID negative while 38 (78%) patients were either COVID positive or had previous COVID infection. There was highly significant difference ($P < 0.001$) in MVO cases associated with COVID infection (groups II and III) and those who were COVID negative.

Figure 1



Showing coronavirus disease association with mesenteric vascular occlusion.

The present study used χ^2 and Fisher-Freeman-Halton Exact tests to compare between the three groups as regards the followings:

Demographic data (sex and age)

Comparison between the three groups as regards the age and sex, showed no significant difference in the three groups ($P > 0.05$) (Table 1).

Associated comorbidities

Comparison between groups as regards presence or absence of associated comorbidity; revealed no significant difference between the three groups ($P > 0.05$) (Table 2).

Type of treatment

Comparison between the three groups as regards the type of treatment either conservative or surgical treatment. It was shown that the need for surgical intervention was significantly higher in group III as compared with other groups ($P < 0.05$) (Table 3).

Patient's outcome

Comparison between the three groups as regards the mortality rate was significantly higher in group III as compared with other groups ($P < 0.05$) (Table 4).

Discussion

The correlation between COVID-19 and mesenteric vascular occlusion occurrence has been a topic of interest in recent research. While there is limited specific research on this correlation, there are studies that have explored the vascular complications associated with COVID-19 [9].

According to the results of the current investigation, there was no statistically significant difference between patients' demographic characteristics (age and sex), associated co-morbidities, and the presence of MVO. This outcome was consistent with a research by Al-Qahtani and colleagues that found no statistically significant difference in the mean ages of men and women (54.318.8 years vs. 53.921.5 years, $P = 0.96$) [10].

Table 1 Comparison of three groups as regards the age and sex

Data	Group I	Group II	Group III	P value
N (%)	12 (24)	14 (28)	24 (48)	–
Age (y)	43.5±25.5 (18–69)	55.1±8 (47–63)	51.3±7.5 (44–59)	0.95
Sex (%)				0.90
Males	6 (50)	8 (57)	12 (50)	
Females	6 (50)	6 (43)	12 (50)	

P greater than 0.05 insignificant P less than 0.05 significant.

Table 2 Comparison of three groups as regards associated comorbidity

Data	Group I	Group II	Group III	P value
Associated co-morbidities (%)				
Frequency	4 (33.3)	6 (42.8)	10 (41.7)	
No	2 (16.7)	2 (14.3)	0	
One	6 (50)	4 (28.6)	6 (25)	
Two	0	2 (14.3)	8 (33.3)	0.86
Three	1.17	1.14	1.5	
Mean number				
Types				
Diabetes mellitus	4 (28.6)	2 (12.5)	10 (27.8)	
Hypertension	6 (42.8)	8 (50)	12 (33.3)	
Morbid obesity	4 (28.6)	6 (37.5)	14 (38.9)	
Total	14	16	36	

P greater than 0.05 insignificant P less than 0.05 significant.

Table 3 Comparison of three groups as regards requirement of treatment

Treatment	Group I	Group II	Group III	P value
Conservative	10	10	2	<0.001
Surgical	2	4	22	

P greater than 0.05 insignificant P less than 0.05 significant.

On the other hand, a study that was published in the Journal of Clinical Medicine in 2021 looked on the prevalence of mesenteric ischemia in COVID-19 patients who were hospitalized. Six of the 333 individuals in the research had mesenteric ischemia, according to the diagnosis. According to the statistical analysis, mesenteric ischemia was linked to advanced age, comorbidities such diabetes and cardiovascular disease, and more severe COVID-19 disease [11].

According to the recent study, group III had the highest mortality rate when compared with the other two groups. This matches Al-Qahtani and colleagues study from 2022 which noted that COVID-19 has been proven to affect the Gastrointestinal tract (GIT) and increase problems and fatalities [10].

As a result, individuals with COVID-19 may experience acute mesenteric ischemia (AMI), and the symptoms may be difficult for doctors to understand, leading to a delayed diagnosis and increased mortality [12,13].

In hospitalized COVID-19 patients, thromboprophylaxis should be strongly considered due to the greater incidence of COVID-19-related thromboembolic events, as well as the associated morbidity and death [14].

According to studies that have examined mortality rates for mesenteric vascular occlusion in general, these rates are substantial, ranging from 30 to 70%,

Table 4 Comparison of three groups as regards patient's outcome

Groups	Group I	Group II	Group III	P value
Survived	10	12	8	0.001
Died	2	2	16	

P greater than 0.05 insignificant P less than 0.05 significant.

depending on a number of variables like age, comorbidities, the timing of diagnosis, and the use of the proper management. The 90-day death rate in one retrospective multicenter study by Costa and colleagues, which included 263 primary acute mesenteric ischemia patients with a mean age of 73 years, was 49.4% [15].

In the current study, it was shown that group III required much more surgical intervention than the other two groups when comparing the three groups' types of treatment. There were no available research that dealt with this issue.

Conclusion

In conclusion, the present study implies that COVID-19 patients are at risk of developing mesenteric vascular occlusion and that the underlying mechanism associating the two requires further investigation. The study highlights the need for physicians to monitor COVID-19 patients closely for the condition and that early detection and appropriate treatment could be critical in improving patient outcomes.

Recommendation

The study highlighted the need for increased awareness of the risk of mesenteric vascular occlusion in COVID-19 patients. Patients infected with COVID-19, especially those who exhibit symptoms such as abdominal pain and nausea, should be closely monitored for mesenteric vascular occlusion.

Nevertheless, additional research is required to pinpoint the precise mechanism underlying this link. As a result, physicians must exercise extreme caution while dealing with COVID-19-infected patients and keep a close eye out for MVO symptoms and signs.

Acknowledgements

None.

Ethical declarations

Ethical approval: The study was conducted in accordance with the ethical standards established by the Ethics Committee of the Faculty of Medicine, Ain Shams University.

Funding: None.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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