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## Case report

# Successful vascular interventional management of superior mesenteric vein thrombosis in a patient with COVID-19: A case report and review of literature ☆☆☆

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## ABSTRACT

Coronavirus disease (COVID-19) is associated with thrombosis formation in various vessels, including those in the abdomen. In this case report, we present a COVID-19 infected patient who had developed abdominal discomfort. The patient underwent magnetic resonance imaging, which showed signs of thrombosis formation in the superior mesenteric vein (SMV). After conservative treatment failed, the patient was considered for vascular intervention. The SMV clot underwent thrombolysis via the infusion of reteplase (dose 6 mg stat, followed by 1 mg every hour) through a 5F perfusion Cather (Cragg-McNamara, 20 cm). Control venography showed near-complete recanalization. The patient was discharged with oral anticoagulants. Our case report is one of the first incidents of successful vascular intervention in SMV thrombosis in the setting of COVID-19.

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## Introduction

The novel coronavirus disease (COVID-19) predominantly presents with mild to moderate involvement of the lower respiratory tract, which presents as a viral pneumonitis [1]. Recently, case reports, case series, and post-mortem autopsies have shown that the virus tends to induce the formation

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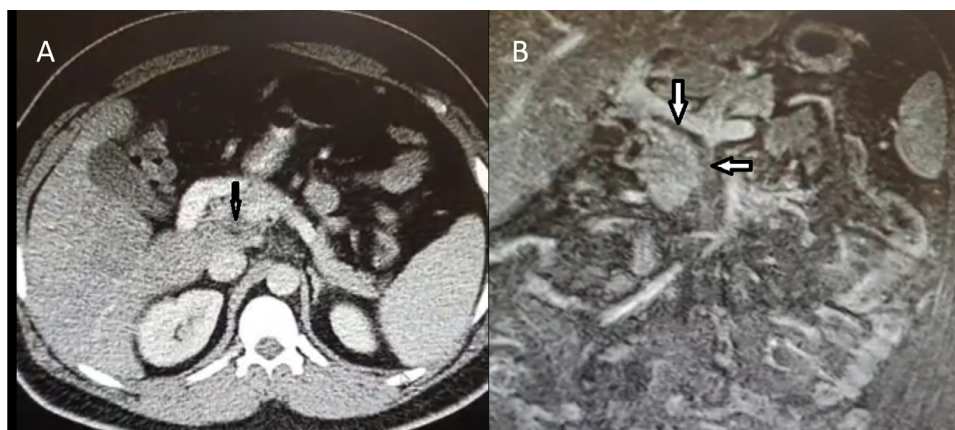
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**Fig. 1 – (A) Computed tomography taken on admission showed a complete filling defect of the superior mesenteric vein (Black arrow). (B) Abdominal magnetic resonance venography taken on the second day of the admission showed thrombosis in the portal and superior mesenteric veins (white arrows).**

of micro-thrombi in various vessels, namely the pulmonary vessels [2]. Studies have shown that this increase in the tendency of the cloth formation may be due to increased inflammatory signaling, increase serum levels of the von Willebrand factor, increased expression of angiotensin-converting enzyme 2, or even vascular endothelial damage [3]

In the present manuscript, we report a young individual who experienced superior mesenteric vein thrombosis following COVID-19 infection. This complication is rarely reported, and in those limited cases existent, conservative treatment has been utilized. Thus we report the first incidence of using interventional methods to treat SVM thrombosis in the setting of COVID-19.

## Case report

A 35-year-old healthy male presented to the emergency department with a chief complaint of epigastric pain radiating to the posterior since three days earlier. The patient did not report any episodes of diarrhea, vomiting, or gastrointestinal bleeding. The patient did complain of chronic constipation. The pain did not increase with defecation or physical activity, but the patient reported increased severity of pain after meals, which had led the patient to reduce the oral intake of food and fluids.

The patient had a history of 5 pack-year smoking and had no history of previous episodes of thromboembolism in his immediate family. The patient was diagnosed with COVID-19 13 days before presentation, resided in home-quarantined, and was treated with Azithromycin tablets and Naproxen suppositories.

The patient had stable vital signs on physical examination (blood pressure: 120/80, respiratory rate: 15, the pulse rate: 75),

and was not febrile. In a physical examination of the abdomen, bowel sounds were normal; the abdomen was not distended, a mild tenderness was existent in the epigastric region and right upper quadrant. The rectal examination revealed an empty rectum. Bedside abdominal sonography of the abdomen did not reveal a significant finding. Blood samples were collected from the patient, and consultation was made with the surgery department. The patient was hospitalized for further diagnostic investigation.

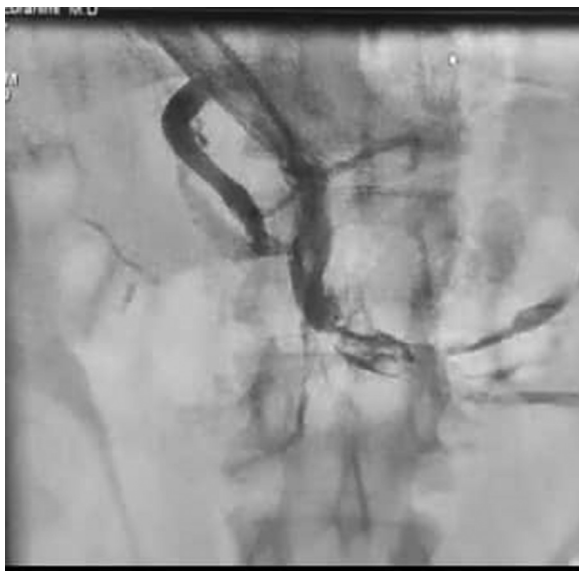
Abdominopelvic computed tomography with iv contrast revealed small bowel wall thickening and a diffuse filling defect in the superior mesenteric vein with partial extension to the portal vein. More is presented in Fig. 1.

Abdominal magnetic resonance venography confirmed complete thrombosis in SMV and partial thrombosis of the portal vein. More is presented in Fig. 1.

All of the hematologic laboratory tests for hypercoagulable states such as malignancy, polycythemia vera, protein C deficiency, protein S deficiency, and antithrombin III deficiency were normal. The patient was put on conservative treatment. He received Heparin with a dosage of 1200 U/H and was also treated with metronidazole and ceftriaxone. The patient was put on an NPO diet for two days. On the third day, the patient did not tolerate oral intake. Thus vascular intervention was considered.

The Right branch of the portal vein was accessed through a percutaneous, US-guided transhepatic approach using an 18-G Chiba needle; then, a hydrophilic guidewire was advanced distally to the splenic vein. A 6F vascular sheath was inserted into the right portal vein; then, two 5F cobra catheters were inserted into the SMV. Selective superior mesenteric venography was performed and revealed an extensive filling defect in the SVM (Fig. 2).

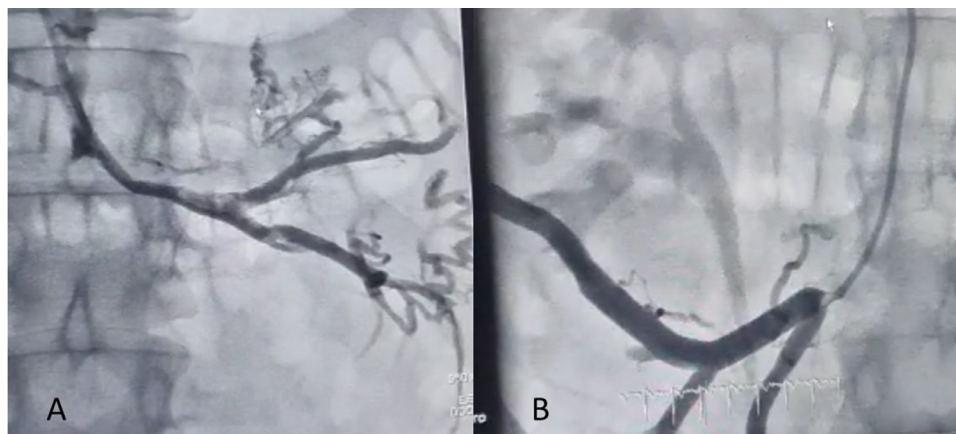
The SMV clot underwent thrombolysis via the infusion of reteplase (dose 6 mg stat, followed by 1 mg every hour) through a 5F perfusion Cather (Cragg-McNamara, 20 cm)



**Fig. 2 – Selective superior mesenteric venography performed on the second day of admission showed complete obstruction of superior mesenteric vein.**

in a proper position for 24 hours. The second venography, which was performed 24 hours after the first one, showed incomplete thrombolysis. It was decided to continue thrombolysis through a perfusion catheter with an injection of tpa (dose 1 mg every hour) for the following 24 hours. After 24 hours of control, venography revealed significant recanalization of the SMV. Afterward, successful suction of the remaining clot was performed by a thrombosuction syringe (Merit) and near complete recanalization was achieved (Fig. 3).

The postoperative course was uneventful, and all signs and symptoms resolved after the treatment. Control color doppler ultrasonography of portomesenteric vessels showed complete recanalization superior mesenteric and portal vein. The patient was discharged with oral anticoagulants.



**Fig. 3 – Superior mesenteric venography showed complete recanalization of the proximal (jejunal branch) (A) and distal (ileal branch) (B) of the superior mesenteric vein.**

## Discussion

Gastrointestinal manifestations of COVID-19 may be more maleficent in the elderly, as it is more likely that the symptoms will be caused by dehydration and shock and vascular event. [4].

Notably, some case reports have shown that abdominal discomfort in the setting of COVID-19 may be due to thrombosis formation in abdominal vessels. Barry et al. presented a case, a 79-year-old woman presented with fever, diarrhea, and abdominal discomfort. CT imaging with venous enhancement showed a thrombosis formation in the distal part of the upper mesenteric vein, which had extended to the spleno-mesaraic trunk. Thrombosis formation was also seen in the upper mesenteric artery and jejunal artery. The obstruction of the named vessels had caused massive ischemic damage in the intestines, and the patient passed away after surgery performed to resect the necrotic segments [5].

Filho et al. reported a 33-year-old obese patient infected with COVID-19 who presented with epigastric pain. The patient had an abdominal CT scan performed, which showed thickening of the fat adjacent to the inferior mesenteric vein. The vein itself had an engorged appearance with reduced luminal density, suggesting venous thrombosis formation. The patient was put on conservative treatment and was discharged five days after hospitalization [6].

The cases above were unique as none of the subjects had any pre-disposing hematologic condition for thrombosis formation. However, the chance of thrombosis formation may be further increased in cases with an already existing pre-disposing factor. Two cases of superior mesenteric vein thrombosis were reported in which the patients had pre-existing lupus anticoagulant [7] present in their blood samples [8,9].

It is important to mention that our patient had the formation of a massive thrombosis in the SMV, which had extended to the portal vein. This condition is usually associated with neoplasms and disseminated intravascular coagulation [10]. Our patient did not have any of the condi-

tions above, and laboratory test results and blood smears did not show any evidence of the existence of disseminated intravascular coagulation (DIC). In conclusion, all patients with unusual signs should undergo thorough evaluation, and interventional methods could be considered for their treatment.

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### Patient consent

Written informed consent was acquired from the patient. Institutional review board of Shahid Beheshti University of Medical Sciences approved this study.

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### Availability of data and material

Requested data will be available based on reasonable request.

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### Code availability

N/A

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### Authors' contributions

All authors contributed equally to the study.

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