



Superior Mesenteric Artery Thrombosis in COVID-19 Patient

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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Case Study

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ABSTRACT

COVID-19 infection increases risk of thrombosis both arterial and venous systems. Many organs of arterial thrombosis were reported. We reported a case of superior mesenteric artery thrombosis in a COVID-19 pneumonia patient who presented with abdominal pain and leukocytosis. The patient required exploratory laparotomy, bowel resection and superior mesenteric artery thromboembolectomy. In postoperative period, the patient continued anticoagulation for long term treatment.

Keywords: COVID-19; superior mesenteric artery thrombosis; anticoagulation; thromboembolectomy.

1. INTRODUCTION

COVID-19 disease caused by SARS-CoV-2 virus infection usually effects the respiratory system.

The COVID-19 patients increase risk of thrombosis especially in critically ill patients. Thrombotic events involve both arterial and venous systems [1]. There are many reports

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demonstrating deep vein thrombosis and pulmonary embolism [2]. Reportedly, the incidence could occur up to one-third in critically ill patients [3]. The pathogenesis of thrombosis has yet been well established. The reports involving arterial thrombosis are less. The literatures regarding arterial thrombosis include stroke, acute limb ischemia, and acute coronary syndrome [1]. The superior mesenteric artery (SMA) thrombosis has also been reported in only a small number and almost all the reports were case reports [4-6].

We reported a case of SMA thrombosis with bowel gangrene in a COVID-19 pneumonia patient presenting severe abdominal pain and required exploratory laparotomy, bowel resection and SMA thromboembolectomy. The patient agreed to publish her case by completing the consent form of the Institutional Review Board.

2. Case Report

A 72-year-old female with COVID-19 has admitted for pneumonia treatment for 10 days. Her regimen of treatment included oral Favipiravir and intravenous dexamethasone. Two days earlier, she developed mild abdominal pain and her symptom was progress in severity. Clinical abdomen showed soft and generalized tender. Laboratory showed leukocytosis as white blood cell count $44,450 \text{ mm}^3$ (44.45×10^9 per L) with neutrophils count 93.7%. Contrast enhanced CT was performed and demonstrated low density thrombosis of SMA after middle colic branch along to distal segment of SMA (Fig. 1.). No enhancing contrast in distal ileum and caecum was showed suspecting gangrenous segment. Minimal intraabdominal free fluid and no free air were detected.

The patient was started intravenous unfractionated heparin in bolus dose then continuous infusion. The patient was transferred from community hospital and consequently arrived at our Covid intensive care unit. There, reassessment for the patient was carried out and abdominal sign was generalized tender and guarding. The patient underwent an emergency exploratory laparotomy. Intraoperative findings included gangrene in of distal ileum (approximately 50 centimeters), caecum and ascending colon. Pulse in proximal SMA was diminished while distal SMA was absent. Consequently, a resection of gangrenous segment of small bowel, colon was performed followed by surgical SMA thromboembolectomy

was completed via anterior approach at base of transverse mesocolon. Thrombosis in SMA was detected which required SMA thromboembolectomy utilizing 3 Fr embolectomy balloon catheter resulted in good inflow and back bleeding succeeded by arteriotomy closure with prolene 6-0 interrupted fashion followed by temporary closure abdomen with vacuum dressing. However, anastomosis was not performed.



Fig. 1. Contrast enhanced CT demonstrated thrombosis of SMA (white arrow)

The second operation was planned in the next 2 days. Postoperative period, the patient was continuously perfused intravenous heparinization and improved in abdominal pain. The leukocytosis decreased to $14,210 \text{ mm}^3$ (14.21×10^9 per L) with neutrophils count 86.3%. Two days after the operation, the patient underwent re-exploratory laparotomy. Intraoperative findings showed no further gangrene of small bowel and large bowel. Later, end-to-side anastomosis between ileum and transverse colon was performed. Primary abdominal closure was performed. Patient was allowed oral diet in postoperative day 3. The patient was given continuous anticoagulant by vitamin K antagonist. The patient was discharged 8 days after surgery. Her respiratory symptoms have

been improved but still required home oxygen support. One month after discharge, home oxygen support could be discontinued. The patient was planned to keep INR level 1.5-2.5 time at least 6 months after surgery.



Fig. 2. The resection part of distal ileum and caecum and ascending colon necrosis

3. DISCUSSION

Thrombotic events in COVID-19 patients have been reported. Incidence of venous thromboembolism is high and requires for prophylaxis especially in critically ill cases. Arterial thrombosis was also reported with acute limb ischemia, ischemia stroke and myocardial infarction in most of the cases. SMA thrombosis has been reported in only a small number and most reports are case reports. The signs and symptoms of mesenteric thrombosis are non-specific. The most frequently presenting symptom was abdominal pain [3-4]. The diagnosis should be concerned in patients with sudden onset of abdominal pain and the pain is out of proportion to the physical examination findings. Other symptoms were nausea, diarrhea, and abdominal distension [7]. Some reports demonstrated that patients presented deterioration of conscious level. Laboratory investigations showed metabolic acidosis and increasing serum lactate level [6]. However, all the laboratory parameters could be within normal limits. Contrast enhanced CT is the investigation of choice for diagnosis [8-9]. In some cases, SMA thrombosis can occur concurrently with splanchnic vein thrombosis or other arterial thrombosis such as cerebrovascular vessel and

coronary arteries [8-10]. Because SMA thrombosis is life-threatening condition, prompt management affects outcomes of treatment. High index of suspicion is needed because of no specific signs, symptoms or laboratory. SMA thrombosis can occur in hospitalization or even posthospitalization periods [11].

The pathogenesis for thrombosis in the COVID-19 patient is not well understood. Many possible mechanisms were proposed such as inflammation induced hypercoagulable state consisting of endothelium injury, activation of the coagulation cascade or inhibit fibrinolysis [12-13].

The goal of treatment is rapidly restoring blood flow to the intestines. The initial treatments are anticoagulant and broad-spectrum antibiotic. However, management relies on clinical examinations and findings on CT scan. In cases of peritonitis on physical examination or small bowel ischemia on CT scan, the patients required laparotomy with small bowel resection and surgical SMA thromboembolism [8,10]. Endovascular treatments such as endovascular thrombectomy and catheter-directed thrombolysis were reported and mostly followed by laparotomy due to worsening abdominal symptoms. Conservative treatment with anticoagulant may be successful in case of bowel hypoperfusion and was a treatment option for moribund cases [8]. In our case, the patient had peritonitis and CT scan showed bowel necrosis. As a result, laparotomy was necessary. The resection of non-viable distal ileum and right-side colon then surgical SMA thromboembolism were performed. The patient was planned for a secondary operation due to unreliable zone of bowel. On the second operation, no further bowel ischemia was detected so end-to-side anastomosis was done without complication. Anticoagulant for long term treatment after restoration of blood flow is not consensus in terms of both drug of choices and duration for treatment [14-15]. It still requires further study.

4. CONCLUSION

SMA thrombosis is a rare complication in COVID-19 patients. Diagnosis is challenging due to lack of specific symptoms. CT scan is an investigation of choice. The treatment is restoring blood flow to intestine and resection of necrotic area with anticoagulation therapy.

CONSENT

All authors declare that 'written informed consent was obtained from the patient (or other approved parties) for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editorial office/Chief Editor/Editorial Board members of this journal.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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