Indian Journal of Clinical Biochemistry
https://doi.org/10.1007/s12291-022-01067-3

CASE REPORT

An Unusual Presentation of Superior Mesenteric Venous Occlusion in Mild COVID-19

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Received: 27 May 2022 / Accepted: 3 July 2022
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Abstract
SARS-CoV-2, an etiological agent of COVID-19, has been reported to inflict remarkably diverse manifestations in different subjects across the globe. Though patients with COVID-19 predominantly have fever, respiratory and constitutional symptoms, atypical presentations are becoming increasingly evident.

COVID-19 may predispose to both venous and arterial thromboembolism due to excessive inflammation, hypoxia, immobilization, and diffuse intravascular coagulation in moderate to severe symptomatic cases. In this case report, we are reporting thromboembolic complications of COVID-19 in a mild symptomatic subject incidentally diagnosed with mesenteric venous occlusion with no abdominal symptoms.

Early recognition of the abdominal symptoms, diagnosis, initiation of anticoagulants, and timely surgical intervention may improvise the outcome in a patient with COVID-19 infection-induced mesenteric thrombosis. Superior mesenteric artery and venous thrombosis may lead to subsequent ischemia necessitating emergency laparotomy. Thus, the usage of low-dose anticoagulants in all the patients of COVID-19 irrespective of the categorization into mild, moderate, and severe COVID-19 disease should be considered.

Keywords SARS-CoV-2 · COVID-19 · Thrombosis · Thromboembolism · Pulmonary embolism

Introduction

In the third wave, COVID-19 pandemic has re-emerged as a threat to humankind. The SARS-CoV-2 infection has spread rapidly throughout the world, with varied presentations leading to 6.28 million deaths across the globe (at the time of writing) [1]. Apart from the respiratory manifestations of the novel COVID-19 virus, many case reports have suggested the extra-pulmonary manifestations of the virus. In this regard, deep vein thrombosis has been reported in up to 25–50% of COVID-19 patients requiring intensive care, with mortality rates as high as 30–40%. Although less frequent, other thrombotic events such as intestinal, cerebral, and peripheral limb thrombosis have also been reported predominantly in severe patients [2–4].

Mesenteric venous thrombosis, a rare condition, is estimated to occur in 0.002-0.06% of hospital admissions, and unlike mesenteric arterial thrombosis, is associated with prothrombotic and primary states of hypercoagulability [5]. Mesenteric venous occlusion has also been reported in the incidence of intestinal tuberculosis caused by *M. tuberculosis* which could persist and may result in delayed hypersensitivity, and in conditions such as sepsis [6–8].

It is stated that SARS COVID-19 infection leads to inflammation, endothelial injury by a viral affinity for angiotensin-converting enzyme ACE2 receptors in the respiratory tract, heart, gastrointestinal tract and distal vasculature. This results in direct viral toxicity, endothelial dysfunction with thrombo-inflammation. The activation of the tissue factor pathway causes excessive thrombin and fibrin formation. The expression of angiotensin-converting enzyme (ACE 2) on the enterocytes of the small bowel which is the target site for SARS-CoV 2 is known to cause damage leading to mesenteric ischemia [9].

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Published online: 10 August 2022

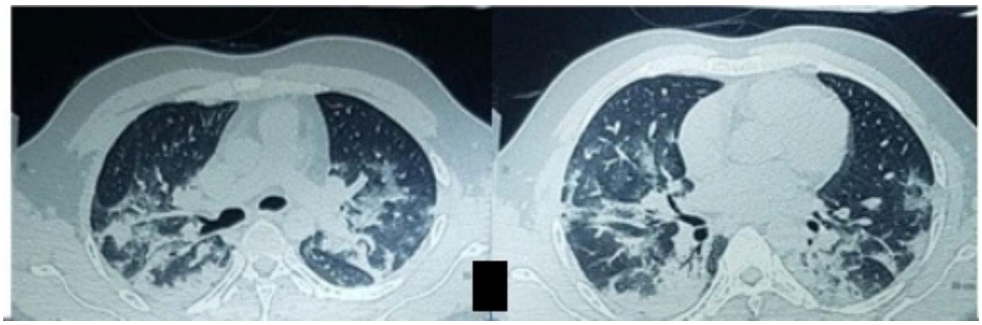

Fig. 1 Inhomogenous ground glass opacities with reticular stranding noted in bilateral lungs predominantly in the bilateral lower lobes with areas of patchy consolidation

On the other hand, critical illness may cause a hypercoagulable state due to immobilization, mechanical ventilation, central venous access devices, and nutritional deficiencies. Hypoxia in severe COVID-19 may stimulate thrombosis by increasing blood viscosity and a hypoxia-inducible transcription factor-dependent signalling pathway which causes an increase in pro- coagulant factors like von Willebrand factor, fibrinogen, factor VIII, and virus-induced cytokine storm (raised IL-6, IL-1-Beta and TNF alpha) leading to coagulation [10]. The presence of prothrombotic circulating microvesicles and neutrophil extracellular traps (NETs) also contributes to hypercoagulability [11].

Case Report

A 31-year-old male patient, non-smoker, non-alcoholic, and with no previous comorbidities, presented to the Department of Respiratory Medicine at Sir Gangaram Hospital, New Delhi with complaints of shortness of breath and non-productive cough since one week. The patient refused any history of fever, chest pain, hemoptysis, or contact with a COVID − 19 patient. The patient had oxygen saturation of 94% on room air at the time of admission. Chest X-ray showed patchy opacities in bilateral lungs involving all the three zones. High resolution computed tomography (HRCT) chest showed bilateral patchy peripheral opacities with ground glassing predominantly in the lower lobes with areas of patchy consolidation (Fig. 1).

Nasopharyngeal and throat swabs were taken for COVID-19 RT PCR test considering the possibility of COVID-19 in the pandemic situation which was found to be positive. Upon screening for inflammatory markers, elevated levels of D-dimer (2.15 mg/L) (reference level:<0.5 mg/L) were observed. However, the CRP(C-reactive protein) levels in addition to S.ferritin (254 ng/mL) and lactatedehydrogenase levels were found to be normal.

Routine blood investigations showed normal cell counts and deranged liver enzymes. The patient had no abdominal

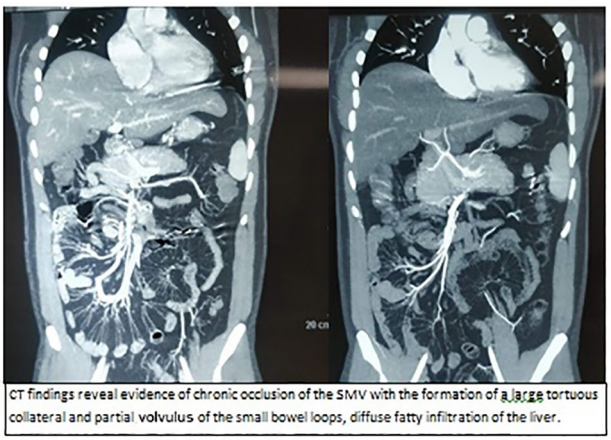

Fig. 2 CT findings reveal evidence of chronic occlusion of the Superior Mesenteric Vein with the formation of a large tortuous collateral and partial volvulus of the small bowel loops, and diffuse fatty infiltration of the liver

complaints, but ultrasound abdomen was done in view of deranged liver enzymes, which showed tortuous venous collateral in the right side mesentery and superior mesenteric vein could not be visualized suggesting the possibility of chronic mesenteric venous occlusion following which CT angio-abdomen was done which suggested chronic occlusion of the Superior Mesenteric Vein (SMV) with the formation of a large tortuous collateral and partial volvulus of the small bowel loops (Fig. 2).

As our patient had no abdominal symptoms and remained haemodynamically stable, patient was immediately started on anticoagulants, and gastroenterology and gastrosurgery opinion was sought. Other possibilities of malignancy and locally intra-abdominal inflammatory processes like pancreatitis, inflammatory bowel disease, connective tissue diseases and nephrotic syndrome along with inherited conditions (myeloproliferative disorders, inherited thrombophilia) and other coagulation disorders were ruled out, and a possible diagnosis of thromboembolic complication due to COVID-19 was considered.

Discussion

COVID-19 pneumonia is associated with an increased risk of thrombosis. It is prudent to monitor prothrombin time (PT), activated partial thromboplastin time (aPTT), platelet count, and D-dimer concentrations in severe COVID-19 infection. The rise in the level of D-Dimer has been associated with elevated mortality rates in hospitalized cases of COVID-19. In general, pre-existing cardiac disease, obesity, peripheral artery disease, advanced age and trauma are the major risk factors for acute mesenteric arterial occlusion[12].

Acute Mesenteric Ischemia (AMI) is a sudden disruption in the blood supply within the mesenteric circulation, and patients present with more symptoms, than signs in such case. The causes of Acute Mesenteric Ischemia (AMI) are arterial embolism/thrombosis (60–70%), non- occlusive (20–30%), and venous occlusion accounts for 5–10% of the cases[13]. The imaging modality used to diagnose Acute Mesenteric Ischemia is CT Angiography with specificity > 95%, findings of intestinal pneumatosis, portal venous gas, lack of bowel wall enhancement, and ischemia of other organs should raise the suspicion of Acute Mesenteric Ischemia(14–15).

The other thrombophilic aetiologies such as the antiphospholipid syndrome, inherited thrombophilia, hyperhomocysteniemia, myeloproliferative neoplasms, protein C, protein S, and anti-thrombin III deficiencies along with Factor V Leiden mutation and G20210A mutation in the prothrombin gene and acquired factors such as nephrotic syndrome, inflammatory bowel diseases, connective tissue diseases should be ruled out to make the diagnosis of COVID-19 associated thrombosis [16]. Mesenteric artery or vein thrombosis may lead to mesenteric ischemia, necessitating surgical resection of necrotic small bowel and initiation of anticoagulation. The management protocol of thrombotic mesenteric arterial occlusion includes fluid resuscitation, adequate analgesia, anticoagulation, and treatment with broad-spectrum antibiotics after which the patient should be immediately taken up for emergency laparotomy to visualize for any necrotic bowel[12].

An unexplained sudden onset of persistent abdominal pain in the COVID-19 pandemic scenario should raise the suspicion of mesenteric ischemia, and a COVID-19–related prothrombotic state should be considered. In this regard, D-dimer estimation constitutes a highly sensitive investigation for the prothrombotic state of COVID – 19 infection.

A review of literature by Balraj Singh [17] on the incidence of Acute Mesenteric Ischemia in patients with COVID-19 infection reported thirteen cases of acute mesenteric ischemia with ten patients requiring surgical resection of the necrotic small bowel. Six out of thirteen patients reported by Balraj *el al*. had pre-existing comorbidities, while seven patients had no prior co-morbidities [17]. The other sites of thrombosis (portal and mesenteric vein thrombosis, splenic and renal infarct) were also described in four patients in the referred article (17–18).

A combined case of the superior mesenteric artery (SMA) and superior mesenteric vein (SMV) occlusion related to COVID-19 infection has been also reported by U. Amaravathi *el al*. as the first case report from Asia (18–19), and in the light of these recent evidences, our case report becomes even more relevant.

Considering the rise in the number of case reports describing the thrombotic complications of COVID-19, the use of anticoagulants should be incorporated as a management protocol for all the patients of COVID-19 along with regular monitoring of their symptoms, inflammatory markers, and response to treatment even upon discharge.

Conclusions

Although knowledge of the COVID-19 disease is rapidly advancing, the available treatment regime and management remains undefined. Considering this case report, we propose that abdominal symptoms could also be attributed to the manifestation of COVID-19 and therefore requires examination in addition to the respiratory system examination. It is vital to keep mesenteric ischemia in the differential diagnosis of unexplained abdominal pain in Covid-19 patients. In all the patients with COVID-19 disease, routine anticoagulation with low molecular weight heparin should be considered irrespective of the categorization of the patient into mild, moderate, and severe categories of the COVID-19 infection. The low molecular weight heparins (LMWHs) like enoxaparin and tinzaparin sodium can also be used for the management of thromboembolism (20–21). The regular monitoring of coagulation tests may help to prevent thrombotic complications. Mesenteric thrombosis should be suspected if the patient has abdominal pain or distention, vomiting with increased inflammatory markers, or even deranged liver enzymes, as seen in our case. Mesenteric arterial thrombosis may result in mesenteric ischemia, and early diagnosis and intervention is lifesaving. COVID-19 associated thromboembolic events continue to be one of the causes of mortality and morbidity. Hence, pharmacologic thrombo-prophylaxis should be strongly considered for all hospitalized COVID-19 patients and should also be continued on discharge.

Acknowledgements We acknowledge BITS-Pilani for funding and DBT, Government of India for RLS fellowship to KS. We also acknowledge the patient for giving us the informed consent for the publication of the case report. SB acknowledges Sir Ganga Ram Hospital for their support.

Declarations

Conflict of interest Corresponding author on behalf of all authors declare no conflict of interest.

Ethics approval Ethics approval was not obtained due to standard clinical treatment.

Consent to participate Written informed consent was obtained from the patient.

Consent for publication Written informed consent was obtained from the patient for publication of this case and accompanying images.

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Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s12291-022-01067-3.