

# Acute Mesenteric Ischemia in a COVID-19 Patient from Nepal: A Case Report and Review of Literature

Sunil Basukala<sup>1</sup>, Ayush Tamang<sup>1</sup>, Ujwal Bhusal<sup>1</sup>, Shriya Sharma<sup>1</sup>, and Samundra Gurung<sup>1</sup>

<sup>1</sup>Nepalese Army Institute of Health Sciences College of Medicine

May 17, 2022

## Abstract

Acute Mesenteric Ischemia (AMI) is a life-threatening complication that may occur in COVID-19 patients. It should be suspected in COVID-19 patients complaining of severe abdominal pain. This report highlights a case of AMI with patent mesenteric vessels in CECT, and the importance of monitoring hospitalized patients along with thromboembolism prophylaxis.

## ABSTRACT

Acute Mesenteric Ischemia (AMI) is a life-threatening complication that may occur in COVID-19 patients. It should be suspected in COVID-19 patients complaining of severe abdominal pain. This report highlights a case of AMI with patent mesenteric vessels in CECT, and the importance of monitoring hospitalized patients along with thromboembolism prophylaxis.

## INTRODUCTION

The ongoing coronavirus disease-2019 (COVID-19) pandemic has entered its third year, with over 418 million cumulative cases as of Feb 2022 [1]. COVID-19 is caused by Severe Acute Respiratory Syndrome-Corona Virus-2 (SARS-CoV-2) which can present as asymptomatic infection to severe acute respiratory distress syndrome (ARDS) [2]. Although COVID-19 mostly affects the respiratory system, it can also present with extrapulmonary manifestations [3,4]. These conditions include thrombotic complications, myocardial dysfunction and arrhythmia, acute coronary syndromes, acute kidney injury, gastrointestinal symptoms, hepatocellular injury, hyperglycemia and ketosis, neurologic illnesses, ocular symptoms, and dermatologic complications [3].

COVID-19 is known to induce a hypercoagulable state leading to both micro- and macrovascular thrombosis, which affects both the venous and arterial system [5]. However, arterial occlusion of the mesentery in the context of COVID-19 has only been reported by few articles. Acute mesenteric ischemia (AMI) has been defined as “a sudden onset of small intestinal hypoperfusion, which can be due to occlusive or nonocclusive obstruction of the arterial blood supply or obstruction of venous outflow” [6]. The incidence of AMI in critically ill COVID-19 patients has been reported ranging from 3.8 to 4% [7,8]. The overall mortality in COVID-19 patients with gastrointestinal (GI) ischemia was 38%[9].

Here we present a case of AMI in a COVID-19 patient. To our knowledge, this is the first case reported from Nepal. We report this case in line with the updated consensus-based surgical case report (SCARE) guidelines [10].

## 2. CASE PRESENTATION

A 57-year-old female presented to the emergency department with a complaint of acute abdominal pain for three days. The pain was acute in onset, crampy, non-radiating, and increasing in severity, which used

to be aggravated after ingestion of food and accompanied with palpitation and vomiting with no known resolving factors. She had three episodes of vomiting during the last two days. The patient had not passed stool or flatus since the last two days prior to hospitalization. The patient had no past medical history of diabetes, hypertension, hyperlipidemia, or prior thrombotic events. However, she was a chronic smoker and on medication for COPD for the past ten years.

On her arrival to the emergency department, her pulse rate was 130 beats per minute, regular; oxygen saturation 85% on room air; blood pressure 95/70 mmHg, body temperature 38.7° C, and respiratory rate 22 breaths/min. The baseline electrocardiography showed tachycardia with sinus rhythm. Screening for COVID-19 was done using a rapid antigen test kit and was found to be positive. It was followed by a reverse transcription-polymerase chain reaction (RT-PCR) test, which was positive as well. On her physical examination, her abdomen was distended with diffuse tenderness. There was diffuse guarding and rigidity all over the abdomen. Bowel sounds were absent. Digital rectal examination revealed a normal sphincter tone with a collapsed rectum and absent fecal stain on the gloved finger.

She was immediately administered crystalloids and supplemental oxygen at 4 litres/min. Nasogastric tube decompression and Foley catheterization were done. Her laboratory parameters showed leukocytosis with raised amylase. Liver function test revealed total bilirubin 2.20 mg/dL, conjugated bilirubin 0.9 mg/dL and alkaline phosphatase 674 U/L (Table 1). Her Arterial Blood Gas (ABG) analysis showed metabolic acidosis with raised lactate level.

**Table 1: Table showing laboratory parameters**

S. No.	Parameters	Normal range	During laparotomy
	WBC count ( $\times 10^9$ cells/L)	3.5–9.5	13
	Neutrophil (%)	50–70	80
	Lymphocyte (%)	20–40	15
	Hemoglobin (g/dL)	12–16	13.3
	Platelet count ( $\times 10^9$ cells/L)	125–350	229
	Hematocrit (%)	36–48	-
	Total Bilirubin (mg/dL)	0.3–1.2	2.2
	Direct Bilirubin (mg/dL)	<0.2	0.9
	AST (U/L)	5–45	10
	ALT (U/L)	5–40	15
	Albumin (g/L)	3.5–5.5	3.9
	Amylase (U/L)	0–140	216
	Lipase (U/L)	0–60	58
	Blood sodium level (mEq/L)	135–145	138
	Blood potassium level (mEq/L)	3.6–5.2	4.4
	Blood calcium level (mg/dL)	8.5–10.5	6.9
	Blood urea nitrogen (mg/dL)	8–20	54
	Creatinine (mg/dL)	0.5–1.2	0.6
	FDP D-dimer ( $\mu\text{g/mL}$ )	<0.5	0.8

On radiological examination, Supine abdominal X-ray showed prominent dilated small bowel loops and the absence of a completely visible colon while multiple air-fluid levels were visible in the small bowel loops in

upright abdominal X-ray, pointing towards small bowel obstruction (Figure 1).





**Figure 1. Plain abdominal X-ray: (A) Multiple air-fluid levels visible in the small bowel loop in in erect view ; (B)Prominent dilated small bowel loops seen in supine view**

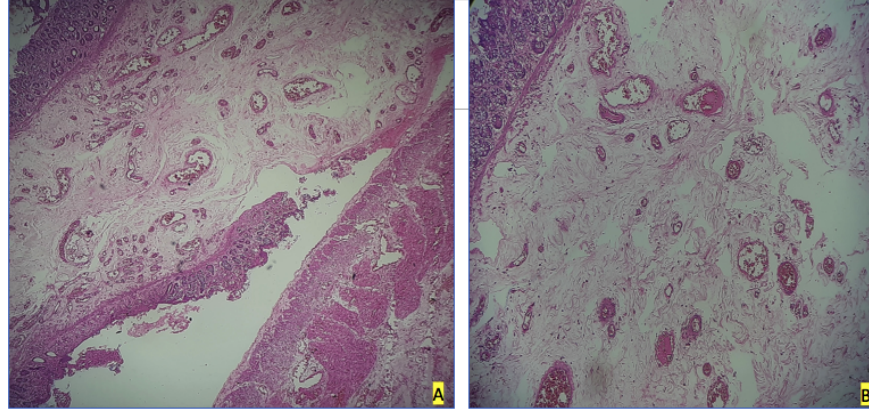
Ultrasonography of the abdomen and pelvis was unremarkable with minimal free fluid in the pelvis. Urgent Contrast Enhanced Computed Tomography (CECT) scan was performed which confirmed collection of fluid in the right iliac fossa, pelvis and along the anterior surface of the liver. It was however unremarkable and no specific findings were documented supportive of mesenteric ischemia. Despite aggressive fluid management, analgesics and intravenous antibiotics, the condition of the patient did not improve. Hence, the patient underwent emergent laparotomy. Intraoperatively, greenish fluid and gangrenous small bowel starting from 20 cm distal to the duodenojejunal flexure to 15 cm proximal from the ileocolic junction was seen (Figure 2). Tissue decay with blackish discoloration of the intestine was found which is suggestive of AMI. Resection of the gangrenous segment of the bowel with double barrel loop ileostomy was performed.



**Figure 2.** Gangrenous bowel segments (white arrows) seen intraoperatively.

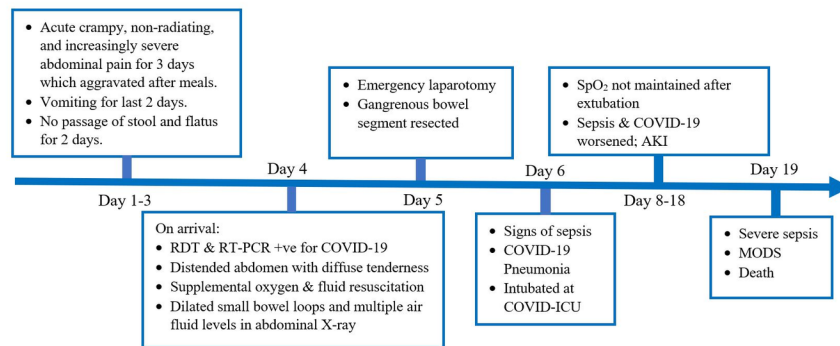
The patient was then shifted to the COVID surgical intensive care unit (ICU) without extubating. She received Meropenem IV 1gm and Vancomycin IV 500 mg twice daily along with low molecular weight Heparin 60 mg twice daily the following day.

She was started on Total Parenteral Nutrition (TPN) from a central line the following day. The histopathological report showed small bowel necrosis with microthrombi in the lamina propria and the submucosa with glandular necrosis (Figure 3).



**Figure 3.** (A) Section shows mucosal denudation with decreased crypts in the lamina propria. Submucosa appears edematous with dense acute inflammatory cells (4× magnification); (B) Section shows hyalinized blood vessels with microthrombi formation (40× magnification).

On sixth postoperative day, the patient developed COVID pneumonia and was reintubated in COVID ICU. Her condition slowly worsened as she developed sepsis and Acute Kidney Injury (AKI). She expired on 14th post-operative day due to severe sepsis and Multi-organ Dysfunction Syndrome in ICU. The timeline of events and interventions are summarized in figure 4.



**Figure 4. Timeline of events and interventions** (RDT: Rapid Diagnostic Test; RT-PCR: Reverse Transcriptase Polymerase Chain Reaction; ICU: Intensive Care Unit; AKI: Acute Kidney Injury; MODS: Multi-organ Dysfunction Syndrome).

### 3. DISCUSSION

Although, COVID-19 mostly affects the respiratory system, GI-related complaints are seen in up to 38% of patients [11]. A large meta-analysis of more than 18,000 patients from around the world suggested that diarrhea was the most common (11.5%) GI symptom, followed by nausea and vomiting (6.3%), then abdominal pain (2.3%) [12]. In critically ill patients with COVID-19, GI-complications are seen in 74 to 86% which can include transaminitis, feeding intolerance, cholecystitis, pancreatitis, colonic pseudo-obstruction, and even life-threatening mesenteric ischemia [7]. AMI is the sudden onset of small intestinal hypoperfusion and patients most commonly present with acute abdominal pain requiring emergent surgical intervention.

The exact pathophysiology of bowel ischemia in critically ill patients with COVID-19 remains uncertain. Pathogenesis of thrombotic events in the context of COVID-19 include endothelial inflammation, thrombin formation, complement activation and initiation of the immune response [13,14]. Gross arterial and venous thrombosis, microvascular thrombosis and even non-occlusive mesenteric ischemia have been suspected responsible for fatal bowel wall necrosis [9]. Additionally, ICU admissions, high doses of vasopressors, hemodynamic instability, metabolic derangements, positive pressure ventilation, and viral enteritis should also be considered as contributory factors for bowel wall ischemia in COVID-19 patients [7,9].

A systematic review showed radiologically detectable arterial/venous thrombosis was not identified in more than half of patients with ischemic bowel [9]. Such patients develop mesenteric ischemia despite patent and well-perfusing proximal and mesenteric vessels on CT [7,8,15]. Likewise, CECT of our patient showed patent mesenteric vessels suggestive of non-occlusive mesenteric ischemia. Nevertheless, CECT should be considered in any cases of COVID-19 with prominent GI signs and symptoms, especially those admitted in ICU. CECT can also be helpful in detecting associated vascular findings and identifying those patients who may benefit from percutaneous endovascular thrombectomy as well [16].

The most common finding in COVID-19 associated coagulopathy is an increase in D-dimer levels. Abnormally elevated D-dimer has been found to be reported in up to 46.4% of all COVID-19 patients with prevalence higher among critically ill ICU patients (60%) than non-severe patients (43%) [17]. Various studies have reported different cutoff scores of D-dimer correlating with poor outcomes. Zhang et al. [18] examined 343 cases and showed that D-dimer levels of over 2.0  $\mu\text{g/mL}$  could predict mortality with a sensitivity of 92.3% and a specificity of 83.3%. Furthermore, study by Rostami et al. [19] showed an increase in D-dimer and fibrinogen concentrations in the early stages of COVID-19 disease with a 3 to 4-fold rise linked to poor prognosis. A meta-analysis by Parisi et al., on 25,719 hospitalized COVID-19 patients showed that anticoagulant use was associated with 50% reduced in-hospital mortality risk [20]. Therefore, D-dimer and fibrinogen levels should be monitored, and all hospitalized patients should undergo thromboembolism prophylaxis with an increase in therapeutic anticoagulation in certain clinical situations [5].

#### 4. CONCLUSION

AMI is a life-threatening complication that may occur in COVID-19 patients. AMI should be suspected in COVID-19 patients complaining of severe abdominal pain in addition to pulmonary symptoms. Even in such cases CECT scan may show patent mesenteric vessels. Early diagnosis and prompt treatment are crucial for patient survival. Monitoring of D-dimer and fibrinogen levels should be done in hospitalized COVID-19 patients along with thromboembolism prophylaxis.

#### References

1. WHO Coronavirus (COVID-19) Dashboard. WHO. (2022). .
2. Waleed MS, Sadiq W, Azmat M: Understanding the Mosaic of COVID-19: A Review of the Ongoing Crisis. *Cureus*. 2020, 12:e7366. 10.7759/cureus.7366
3. Gupta A, Madhavan M V, Sehgal K, et al.: Extrapulmonary manifestations of COVID-19. *Nat Med*. 2020, 26:1017–32. 10.1038/s41591-020-0968-3
4. Basukala S, Rijal S, Karki S, Basukala B, Gautam AR: Spontaneous gallbladder perforation in patient with COVID-19—a case report and review of literature. *J Surg Case Reports*. 2021, 2021:rjab496. 10.1093/jscr/rjab496
5. Iba T, Levy JH, Levi M, Connors JM, Thachil J: Coagulopathy of Coronavirus Disease 2019. *Crit Care Med*. 2020, 48:1358–64. 10.1097/CCM.0000000000004458
6. Tendler DA, Lamont JT: Overview of intestinal ischemia in adults. *UpToDate*; 2020.
7. Kaafarani HMA, El Moheb M, Hwabejire JO, et al.: Gastrointestinal Complications in Critically Ill Patients With COVID-19. *Ann Surg*. 2020, 272:e61–2. 10.1097/SLA.0000000000004004

8. El Moheb M, Christensen MA, Naar L, et al.: Comment on ‘Gastrointestinal Complications in Critically Ill Patients With COVID-19’: An Update. *Ann. Surg.* 2021, 274:e821–3. 10.1097/SLA.0000000000004337
9. Keshavarz P, Rafiee F, Kavandi H, Goudarzi S, Heidari F, Gholamrezanezhad A: Ischemic gastrointestinal complications of COVID-19: a systematic review on imaging presentation. *Clin Imaging.* 2021, 73:86–95. 10.1016/j.clinimag.2020.11.054
10. Agha RA, Franchi T, Sohrabi C, et al.: The SCARE 2020 Guideline: Updating Consensus Surgical CAse REport (SCARE) Guidelines. *Int J Surg.* 2020, 84:226–30. <https://doi.org/10.1016/j.ijssu.2020.10.034>
11. Pamplona J, Solano R, Soler C, Sàbat M: Epidemiological approximation of the enteric manifestation and possible fecal-oral transmission in COVID-19: A preliminary systematic review. *Res Sq. Published Online First:* 2020. 10.21203/rs.3.rs-33873/v1
12. Silva FAF da, Brito BB de, Santos MLC, et al.: COVID-19 gastrointestinal manifestations: a systematic review. *Rev Soc Bras Med Trop.* 2020, 53:e20200714. 10.1590/0037-8682-0714-2020
13. Magro C, Mulvey JJ, Berlin D, et al.: Complement associated microvascular injury and thrombosis in the pathogenesis of severe COVID-19 infection: A report of five cases. *Transl Res.* 2020, 220:1–13. 10.1016/j.trsl.2020.04.007
14. Akbari H, Tabrizi R, Lankarani KB, et al.: The role of cytokine profile and lymphocyte subsets in the severity of coronavirus disease 2019 (COVID-19): A systematic review and meta-analysis. *Life Sci.* 2020, 258:118167. 10.1016/j.lfs.2020.118167
15. Gartland RM, Velmahos GC: Bowel Necrosis in the Setting of COVID-19. *J Gastrointest Surg Off J Soc Surg Aliment Tract.* 2020, 24:2888–9. 10.1007/s11605-020-04632-4
16. Azouz E, Yang S, Monnier-Cholley L, Arrivé L: Systemic arterial thrombosis and acute mesenteric ischemia in a patient with COVID-19. *Intensive Care Med.* 2020, 46:1464–5. 10.1007/s00134-020-06079-2
17. Guan W-J, Ni Z-Y, Hu Y, et al.: Clinical Characteristics of Coronavirus Disease 2019 in China. *N Engl J Med.* 2020, 382:1708–20. 10.1056/NEJMoa2002032
18. Zhang L, Yan X, Fan Q, Liu H, Liu X, Liu Z, Zhang Z: D-dimer levels on admission to predict in-hospital mortality in patients with Covid-19. *J Thromb Haemost.* 2020, 18:1324–9. 10.1111/jth.14859
19. Rostami M, Mansouritorghabeh H: D-dimer level in COVID-19 infection: a systematic review. *Expert Rev Hematol.* 2020, 13:1265–75. 10.1080/17474086.2020.1831383
20. Parisi R, Costanzo S, Di Castelnuovo A, de Gaetano G, Donati MB, Iacoviello L: Different Anticoagulant Regimens, Mortality, and Bleeding in Hospitalized Patients with COVID-19: A Systematic Review and an Updated Meta-Analysis. *Semin Thromb Hemost.* 2021, 47:372–91. 10.1055/s-0041-1726034

### Hosted file

Figures.docx available at <https://authorea.com/users/437606/articles/569450-acute-mesenteric-ischemia-in-a-covid-19-patient-from-nepal-a-case-report-and-review-of-literature>