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Case Report

A rare case of COVID-19 related stomach gangrene after an abortion: a case report

Komal Gupta, Gopal Puri, Jnaneshwari Jayaram, Muhammed Huzaifa, Kamal Kataria*

Department of Surgical Disciplines, All India Institute of Medical Sciences, New Delhi, India

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***Correspondence:**
Dr. Kamal Kataria,
E-mail: drkamalkataria@gmail.com

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ABSTRACT

A 25 year old female had presented with complaints of severe epigastric pain with abdominal distension and vomiting for 4 days. She had undergone medical termination of pregnancy for a missed abortion of 5 weeks of gestation 5 days prior. The patient's COVID-19 RT PCR was found to be positive. Her CECT showed covid related changes in bilateral lungs and pneumoperitoneum. Stomach was distended. Other small bowels appeared normal. Patient underwent emergency laparotomy. Two third of stomach appeared gangrenous with a perforation in the posterior wall of stomach so she underwent a subtotal gastrectomy. She had features of covid associated coagulopathy (CAC) with high D-dimer (520 ng/ml), thrombocytosis (up to 705,000/mcl), high activated partial thromboplastin time (aPTT) (up to 55.6 sec) and high prothrombin time (PT) (up to 27.9 sec and INR 2.11) for which low molecular heparin was given. Stomach is a highly vascular organ. Gangrene of the stomach has been very rarely reported. CAC is known to lead to both arterial thrombus and venous thromboembolism. COVID-19 related abortions have also been reported though the exact mechanism not certain but CAC could be one of them.

Keywords: COVID-19, Coagulopathy, ARDS, CAC, Abortion, Stomach gangrene

INTRODUCTION

COVID-19 pandemic has impacted the lives of almost everyone in some way or another in the world currently. Even though COVID-19 is responsible for respiratory symptoms most commonly, it can have implications that need the attention of specialists from various medical and surgical fields.[1] With the wide of array of physiological changes in various organ systems of the body which occur during the COVID-19 viremia and the widespread community transmission of COVID-19 affecting high risk individuals with preexisting surgical and medical comorbidities, have both been responsible for such variable clinical course requiring a multi-disciplinary team management in such cases.[2] We are reporting such a similar case of COVID-19.

CASE REPORT

A 25 year old female had presented to our emergency department with complaints of severe epigastric pain with abdominal distension since 4 days. She had severe nausea and repeated episodes of vomiting of dark brown colored vomitus material. She also had obstipation for 3 days. She had no cough or fever. Patient had history of bleeding per vaginum for 5 days which had started after she consumed tablet mifepristone per orally and tablet misoprostol per vaginally for a missed abortion of 5 weeks of gestation. There was no history of instrumentation and dilatation and curettage for the medical termination of pregnancy (MTP).

On examination at presentation, the patient was conscious. She had tachycardia and dehydration but did

not have hypotension and was maintaining blood saturation at room air. Her abdomen appeared distended, soft to touch but epigastric tenderness was present on deep palpation. No diffuse rebound tenderness and guarding was present. No abdominal lump or hepatosplenomegaly was noted. Bowel sounds were present but decreased in intensity. Digital rectal examination was normal. On per vaginal examination, no fresh bleeding or foul-smelling discharge was present and the cervical os was closed. Her respiratory examination had evidence of bilateral basal crepitations in the lungs.

Patient was initially resuscitated with intravenous fluid bolus with which her hemodynamic status had improved. Further hydration was provided with close monitoring of urine output. She was started on broad spectrum antibiotics and antiemetics. She was advised to stay nil per oral. Nasogastric tube was inserted, and 1 liter of dark brown gastric content was evacuated and then she was given gastric lavage through the nasogastric tube. Her blood investigation profile revealed raised white cell count. Her abdominal X-ray showed a distended stomach, but no dilated bowel loops were seen. She underwent a point of care ultrasound which revealed gross distension of the stomach and duodenum. Uterus appeared normal in size and no retained products of conception were found.

Meanwhile the patient's COVID-19 RT PCR was found to be positive. She was shifted to our dedicated COVID-19 isolation wards. There she underwent a CECT chest and abdomen, which showed covid related changes in bilateral lungs which is interstitial thickening, ground glass opacities and air trapping in bilateral lower lobes. There was evidence of free air in peritoneum. Stomach and duodenum up to D2 segment was distended with fluids. Other small bowels appeared normal. Left pelvic ectopic kidney was present (Figure 1).

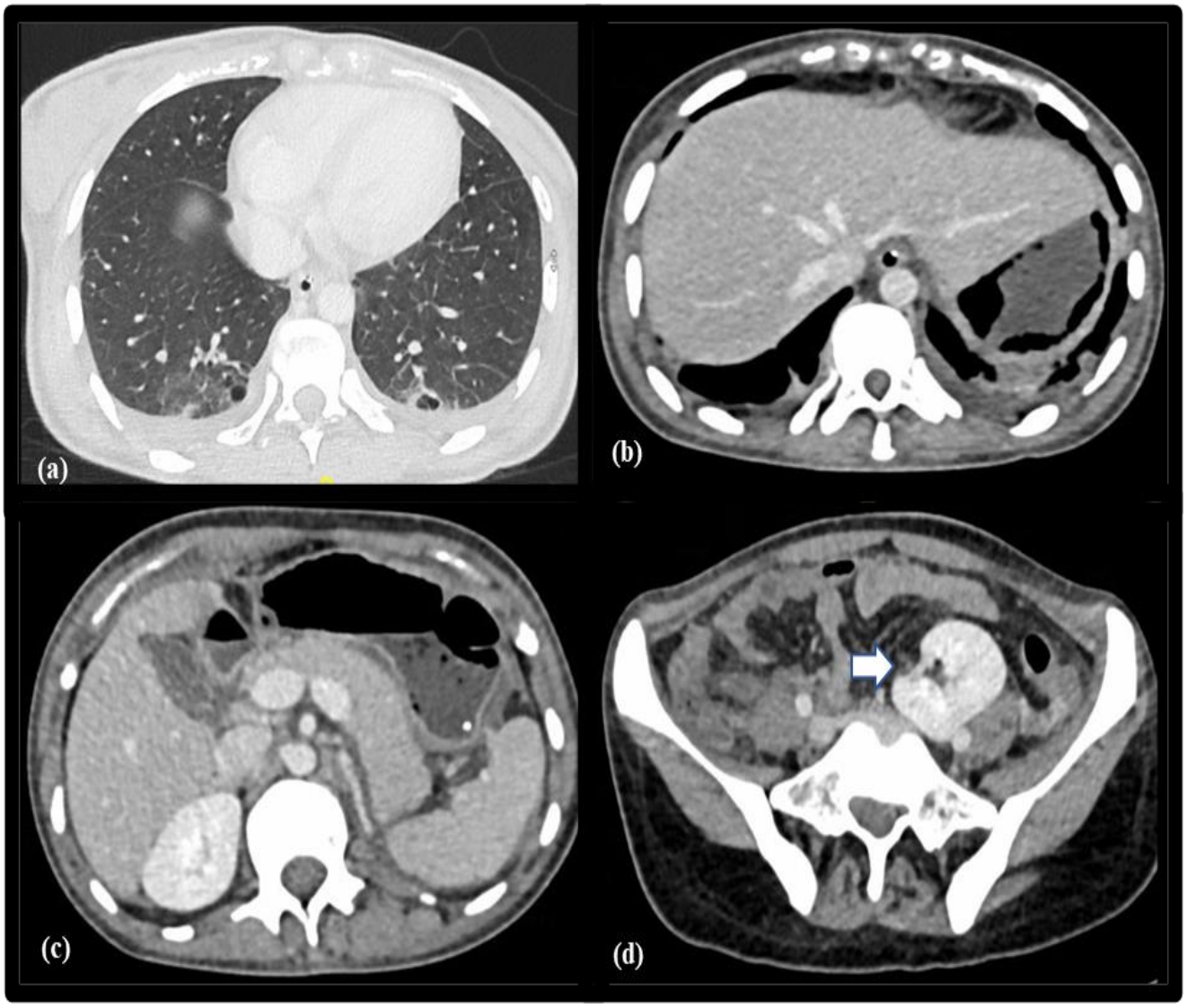

Figure 1: CECT scan showing (a) interstitial thickening, ground glass opacities and air trapping in bilateral lower lobes consistent with COVID-19, (b) free air in lesser sac, (c) distension and thinning of the stomach wall, (d) left pelvic ectopic kidney(arrow).

Patient was taken for emergency surgery. Special precautions as per COVID 19 guidelines were followed. Surgeons wore all personal protective equipment (PPE) including sterile gown worn over hazmat suit, face shields, gloves and N95 masks as per our hospital policy. Intraoperatively it was found that almost two third of stomach appeared pale and gangrenous with a perforation 1*1 cm in the posterior wall over the proximal body of the stomach. Lesser sac had a bilious and purulent collection. D1 and D2 segments of duodenum were distended. She underwent a subtotal gastrectomy with feeding jejunostomy and esophageal drain placement. She was kept under close observation in the postoperative period. Her post surgery chest X rays showed evidence of diffuse pneumonic patches in bilateral lungs. On post-operative day 3 she had the presence of bile in her drain.

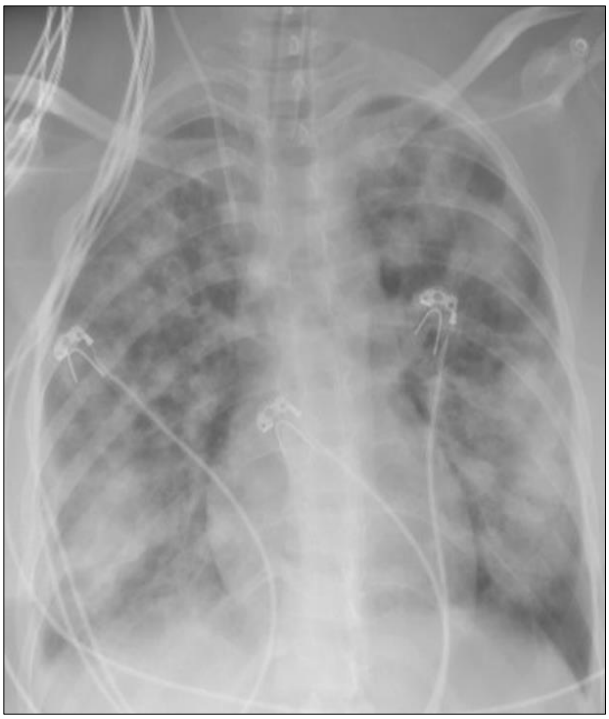

Figure 2: Chest X-ray showing bilateral opacities predominantly in lower lung zones.

Patient was taken up for an emergency laparotomy again. Intraoperatively the resection line on the duodenal end had gangrenous changes. Thorough peritoneal lavage and excision of the gangrenous part was done, and a duodenal drain was placed in the 3rd segment of the duodenum. Patient was kept on a mechanical ventilator post operatively. She had severe COVID related pneumonia and was managed by our critical care team (Figure 2). She had features of COVID associated coagulopathy (CAC) with high D-dimer (5.2 µg/ml), platelet count was normal at the time of presentation but thrombocytosis (up to 705,000/mcl) manifested few days later followed by thrombocytopenia (up to 32,000/mcl), high activated partial thromboplastin time (aPTT) (up to 55.6 sec) and high prothrombin time (PT) (up to 27.9 sec and INR 2.11) for which low molecular heparin was given. Over time the patient had some improvement in her lung function but there was difficulty in weaning her off ventilatory support. She underwent tracheostomy later in view of prolonged intubation. Patient developed superadded bacterial septicemia and died after almost 1 month in ICU.

Pathological evaluation of the operated specimen revealed gangrenous changes in the stomach. It showed areas of loss of mucosa, deep ulceration covered with fibrinous exudates along with thinning of the whole wall. Infarction related changes were seen in all layers of the specimen. Intermittent areas of viable mucosa were also seen (Figure 3). There was no evidence of malignancy in the specimen.

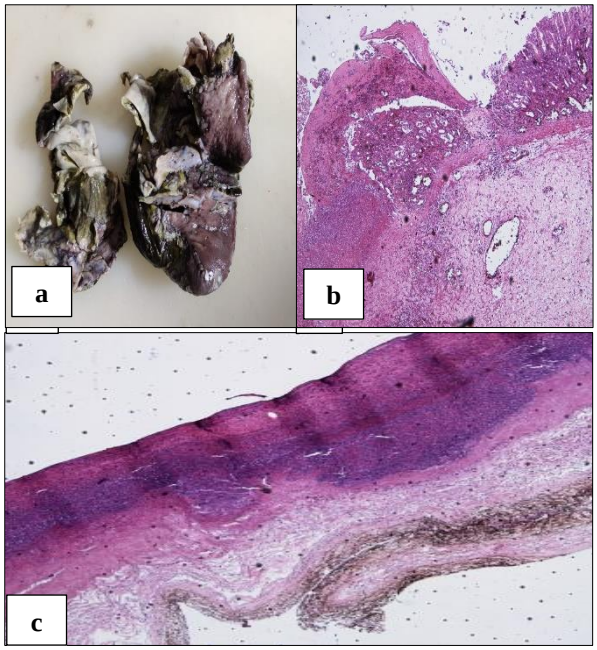

Figure 3: (a) gross specimen showing gangrene of stomach, (b) transition from normal mucosa to denuded mucosa, ulceration filled with fibrinous exudate (deep erosions), (c) gangrenous segment showing thinning of the entire wall, infarction, mucosal erosion.

DISCUSSION

Stomach is a highly vascular organ. Gangrene of the stomach has been very rarely reported. 2 most common causes of stomach gangrene are corrosive injury and mechanical compromise of the vascularity in cases of herniation. In our patient there was no history of corrosive intake. Intraoperatively the gastroesophageal junction was found to be normal without any mucosal or gangrenous changes so corrosive injury is less likely. Mechanical compromise occasionally occurs in cases who have herniation through a natural defect like diaphragmatic hernia or iatrogenic defect like mesenteric window during intestine surgery especially via retro colic

window made during Roux en-Y repair.[3] There was no such history present or finding observed intra-operatively. Other less common causes of stomach gangrene are vascular causes and infectious necrotizing gastritis. These two are the potential causes of stomach gangrene in our patient.

CAC has all 3 components of Virchow's triad being affected, endothelial injury, increased circulating prothrombotic factors leading to hypercoagulable state and stasis due to immobilization during hospitalization. It is known to lead to both arterial thrombus and venous thromboembolism. There has been few reports of intestine gangrene in COVID-19 patients but none of stomach gangrene.[4] Our patient had typical coagulation abnormalities associated with CAC which is high D-dimer level, high PT and aPTT values and thrombo-cytosis.[5] So the possibility of CAC is likely in this patient.

Table 1: Comparison of clinical and laboratory features of COVID-19 associated coagulopathy and close differentials.

Parameters	DIC	SIC	CAC	APS	TMA(HUS/TTP)
Platelet count	↓↓	↓↓	↔/↓/↑	↓	↓
PT/INR	↑↑↑	↑↑	↑↑↑	↔	↔
APTT	↑↑↑	↑↑	↑	↑	↔
Fibrinogen	↓↓↓	↓↓	↑↑↑	↔	↔
D-dimer	↑	↑↑	↑↑↑*	↔	↔
Anti-thrombin	↓	↓	↓/↔	↔	↔
Activated complement system/VWF	-	-	+	-	±
Anti-phospholipid antibody (APLA)	-	-	+	+	-
Pro-inflamatory cytokines (IL-6,IL1b)	↑	↑	↑	↔	↔
Thrombo-embolism	Micro-Thrombosis	Micro-Thrombosis	Micro/venous/arterial Thrombosis	Micro/venous Thrombosis	Micro/venous/arterial Thrombosis
Bleeding	++	+	-	-	-
Cause of coagulopathy	Endothelial cell/Macrophage	Endothelial cell/Macrophage	Endothelial cell/Macrophage	APLA	Complement System

CAC covid associated coagulopathy, DIC disseminated intravascular coagulation, SIC sepsis-induced coagulopathy, HPS hemophagocytic syndrome, APS antiphospholipid syndrome, TMA thrombotic microangiopathy, aHUS atypical hemolytic uremic syndrome, TTP thrombotic thrombocytopenic purpura, PT prothrombin time, aPTT activated partial thromboplastin time, VWF von Willebrand factor, IL interleukin *Could be 6 times the ULN"

Table 2: Thrombo-embolic complications of COVID 19 Associated Coagulopathy.

Studies	Country	No. of Patients	Incidence of DVT	Incidence of PE	Incidence of VTE	Other Reported Compli-cations	D-Dimer Levels (mg/ml)	Fibrin-ogen Levels (g/l)
Lodigiani, 2020	Italy	388	1.3 (0.6-3.0)	2.6 (1.4-4.7)	4.1 (2.6-6.6)	Catheter-related Thrombosis, Overt DIC	NA (1.62-40.90)	NA
Llitjos, 2020	France	26	53.8 (35.5-71.2)	23.1 (11.0-42.1)	69.2 (50-83.5)	Superficial Vein Thromb-osis	1.75 (1.13-2.85)	7 (6.4-7.4)
Helms, 2020	France	150	2 (0.7-5.7)	16.7 (11.6-23.4)	18.7 (13.2-25.7)	Limb Ischemia, Mesenteric Ischemia	2.27 (1.16-20.0)	6.99 (6.08-7.73)

Continued.

Studies	Country	No. of Patients	Incidence of DVT	Incidence of PE	Incidence of VTE	Other Reported Compli-cations	D-Dimer Levels (mg/ml)	Fibrin-ogen Levels (g/l)
Mazzaccaro, 2020	Italy	32	3.1 (0.6-15.7)	65.6 (48.3-79.6)	68.8 (51.4-82.0	Superficial Vein Thrombosis	3.70 (0.0-8.50)	5.85 (4.50-7.20)
Moll, 2020	USA	210	3.3 (1.6-6.7)	1.0 (0.3-3.4)	4.3 (2.3-7.9)	-	NA	NA
Mei, 2020	China	256	1.6 (0.6-3.9)	0.4 (0.1-2.2)	2.0 (0.8-4.5)	-	5.1 (3.1–8.3)	NA
Maatman, 2020	USA	109	23.9 (16.8-32.7)	0.9 (0.2-5.0)	28.4 (20.8-37.5)	Catheter-related thrombosis	8.45 (3.21-9.73)	5.75 (4.35-6.51)

Elevated D-dimer level was the first laboratory parameter indicative of altered hemostasis in COVID-19 that caught attention. Patients with severe disease and amongst non survivors D-dimer was found to be higher compared to non-severe cases and survivors.[6] Zhang et al used a 2.0 µg/ml cutoff for D-dimer which predicted in hospital mortality with a sensitivity of 92.3% and specificity of 83.3%.[7] Although CAC resembles disseminated intra-vascular coagulation (DIC) and other hypercoagulable states in terms of presentation but there are certain differences in the laboratory parameters which are summarized in Table 1.[8-10] One of the key features of CAC is absence of hemorrhagic complications. Venous thromboembolism (VTE) has been found as a frequent presentation of CAC, which is usually associated with high D-dimer, high fibrinogen levels (Table 2).[11,12] Presence of VTE is associated with poor prognosis in these patients with pulmonary embolism further worsening the pulmonary function. In the absence of contraindications, prophylactic low molecular weight heparin is advised to be started for all hospitalized COVID-19 patients, especially those with severe disease admitted in ICU.[13] In a study in COVID-19 patients rate of stroke was found to be 1.6 percent and myocardial infarction in 8.9 percent.[14] These patients had higher rates of mortality and unfavorable functional outcome.[15]

In our patient there is possibility of antiphospholipid syndrome (APS) given the history of abortion just before the onset of abdominal symptoms. Hypercoagulable state in APS is well known to involve various vascular beds including gastrointestinal.[16] APS is associated with presence of antiphospholipid antibodies, thrombocytopenia, anemia and high aPTT (Table 1). Though APS cannot be confirmed as the cause of abortion and stomach gangrene in our patient as some of these tests were not performed.[17] Though it can be emphasized here that hypercoagulability due to any cause is a well-known risk factor for abortion and COVID-19 related abortions have been reported though the exact mechanism not certain but CAC could be one of them.[18]

Currently the gastrointestinal manifestations like gastritis and diarrhea of COVID-19 have been well established. With angiotensin-converting enzyme 2 (ACE-2) being a receptor for COVID-19, which is present in gastrointestinal tract and on vascular endothelium and smooth muscle cells making it a target for direct invasion of the virus.[19] This could be the cause of infectious necrotizing gastritis. Though there are pathogens like *Campylobacter jejuni* who involve gastrointestinal tract and are known to cause abortions and pathogens like *Clostridium sordellii* who are known to cause toxic shock syndrome after abortion with involvement of multiple organs including gastrointestinal tract.[20,21] But none of such pathogens were found in the blood culture of the patient (early use of broad-spectrum antibiotics could be a cause of false negative blood culture).

Whatever the etiology of the stomach gangrene, it can be emphasized that the covid 19 had a vital role to play in the management of the patient. Ranging from the restriction of movement, decreased visibility and tactile sensation which are some of the problems faced by surgeons while performing surgery wearing ppe to covid-19 related pneumonia and septicemia which led to the ultimate demise of the patient

CONCLUSION

COVID-19 and its various clinical manifestations and its interaction with varied disease processes is yet to be revealed in its full extent. CAC has been responsible for affecting multiple organs and increasing the morbidity and mortality in these patients. Various drugs and their effects in COVID-19 patients can be unpredictable at times. Thus, this disease can be managed most effectively in a multidisciplinary team approach with various specialists tackling different issues as they arise.

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