

## Postpartum Multiple Colon Perforation after Cesarean Section in COVID-19 Patients: A Case Series

### Abstract

**Introduction:** Gastrointestinal symptoms are present in 50% of polymerase chain reaction (PCR)-positive COVID-19 patients. In addition, bowel abnormalities are a common finding of COVID-19, and bowel-wall disorder is reported in 31% of computed tomography images of COVID-19 patients. **Case History:** We report three postpartum cases with colon perforation after Cesarean section and positive PCR for SARS-CoV-2-RNA and during the main peak of COVID-19 pandemic, who were managed by early detection, laparotomy, and effective treatment and were discharged and followed up. **Conclusion:** A colonic perforation could be considered as one of the causes of abdominal pain especially in women with a past surgical history as well as patients with infectious diseases such as COVID-19. Therefore, abdominal and pelvic ultrasound or x-ray was strongly recommended for postpartum women with abnormal abdominal distension, gastrointestinal symptoms, and pain to prevent possible fetal complications.

**Keywords:** Bowel perforation, case report, COVID-19, gastrointestinal symptoms

### Introduction

Anorexia, diarrhea, vomiting, nausea, abdominal pain, and gastrointestinal bleeding are the most common gastrointestinal symptoms of COVID-19.<sup>[1]</sup> Based on the literature, more than 28% of patients with COVID-19 showed gastrointestinal symptoms, and in 50% of positive patients, the fecal culture of SARS-CoV-2-RNA was positive.<sup>[2-4]</sup> Moreover, bowel abnormalities are a common finding during the abdominal imaging of COVID-19 patients,<sup>[2,5]</sup> and bowel-wall abnormalities were reported in 31% of computed tomography (CT) images.<sup>[5]</sup>

Bowel perforation usually involves caecum and right hemi-colon without any mechanical obstruction in 80%–90% of cases.<sup>[6]</sup> Colon perforation typically presents with severe, progressive abdominal pain, sepsis, and multiple organ failure signs.<sup>[7]</sup> The common symptoms of the disease are abdominal pain (80%), abdominal tenderness (62%), nausea and vomiting (60%), constipation (40%), and fever (37%).<sup>[6]</sup> In ultrasound, pneumoperitoneum might be observed and differential diagnosis such as Ogilvie's syndrome (OS), *Clostridium difficile* (C. diff)

colitis, volvulus, and a possible ischemic event should be considered for these patients.<sup>[7]</sup>

Gastrointestinal symptoms were the most common extra-respiratory presentations of novel coronavirus (COVID-19).<sup>[1,8-10]</sup> COVID-19 virus invades gastrointestinal epithelial cells and caused infectious outcomes in patients<sup>[1]</sup> and caused intestinal damage such as colon perforation due to COVID-19 infection.<sup>[2,5,11,12]</sup> We aimed to present three colon perforation cases after cesarean sections that have COVID-19 infection and vascular-engaged disease comorbidity.

### Case History

The summary of the patients' characteristics and blood tests of the three studied cases is presented in Tables 1 and 2.

#### Case 1

The patient was an Iranian, 24-year-old G1P1 woman who referred to the hospital with abdominal pain complaint. Because of decreased fetal movement (FM), decreased fetus heart, and thick meconium, she underwent Cesarean section (CS) and delivered baby, which was admitted to neonatal intensive care unit with Apgar

**Monireh Mirzaie,  
Sara Lotfi,  
Zahra Yazdi,  
Azadeh Asgarian<sup>1</sup>,  
Marzieh Savari**

*Department of Obstetrics and Gynecology, Clinical Research Development Unit, School of Medicine, <sup>1</sup>Department of Nursing, Clinical Research Development Unit, Nekouei-Hedayati-Forghani Hospital, Qom University of Medical Sciences, Qom, Iran*

**Received:** 12-Aug-2022

**Accepted:** 28-Aug-2022

**Published:** 23-Nov-2022

#### Address for correspondence:

*Dr. Marzieh Savari,  
Department of Obstetrics and Gynecology, Clinical Research Development Unit, School of Medicine, Nekouei-Hedayati-Forghani Hospital, Qom University of Medical Sciences, Qom, Iran.  
E-mail: marzieh.savari@gmail.com*

#### Access this article online

##### Website:

www.jwacs-jcoac.com

DOI: 10.4103/jwas.jwas\_170\_22

##### Quick Response Code:



**How to cite this article:** Mirzaie M, Lotfi S, Yazdi Z, Asgarian A, Savari M. Postpartum multiple colon perforation after cesarean section in COVID-19 patients: A case series. J West Afr Coll Surg 2022;12:130-5.

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**Table 1: The patients' characteristics**

Characteristics	Patient 1	Patient 2	Patient 3
Nationality	Iranian	Iranian	Afghanistan
Age (years)	24	38	31
Gravidity	G1P1	G3P3	G5P5
Main complaint	Abdominal pain	Severe abdominal pain, abdominal tenderness and distension, percussion	Abdominal pain, lack of defecation, increased amylase and lipase
Cause of CS	Decreased FM and thick meconium	High blood pressure, nonresponse to labetalol, FHR decrease, severe preeclampsia, and fetal distress	Decreased FHR
Readmitted after CS	2 days	7 days	4 days
First finding	Free fluid in the abdominal and pelvic cavities	Ileus diagnosis, dilated intestinal loops, fluid accumulation (700 cc), collection as GI perfusion	Brief fluid in the RLQ space, partial fluid in the pelvis, diffuse dilatation of the small and large intestines
First diagnosis	Collection as GI perfusion	Peritonitis	Peritonitis due to free fluid in the abdominal space
Medication			
Antibiotics	Ampicillin, clindamycin, gentamicin, piperacillin-tazobactam, vancomycin, cephalixin	Vancomycin and metronidazole	Ampicillin and vancomycin
Others	Apotel, meropenem, enoxaparin, mefenamic acid	Meropenem, heparin, enoxaparin, anticoagulants	Enoxaparin and mefenamic acid
CT	Left lung involvement	Right pleural effusion with mild adjacent, pleural effusion	Pulmonary embolism
PCR	Positive	Positive	Positive
SpO <sub>2</sub>	94%	98%	92%
Other complications	Extensive visceral rupture	Fluid accumulation with septa suggesting collection in the lower right side of the abdomen, free fluid with right paracolic gutter and hypogastria regions, uterus enlargement and endometrial thickening	Dilated small intestinal loops
Final diagnosis	Gangrene and multiple perforations of the right colon	Scum perforation	Ruptures of the right colon and scum
Operations	Laparotomy + ileocolic anastomosis + rinsing and drainage	Hemicolectomy, ileostomy, and colostomy	Exploratory laparotomy, right colectomy, ileostomy, colostomy
Other operations	Wound dehiscence repair in abdominal wall		Extraction of 3L of serous fluid
Hospitalisation duration	15 days	24 days	12 days

CS: Cesarean section, CT: computed tomography, FHR: fetal heart rate, GI: gastrointestinal, PCR: polymerase chain reaction, RLQ: right lower quadrant, SpO<sub>2</sub>: oxygen saturation

8/10 and 9/10 in the first and fifth minute after delivery. The patient was admitted to the postpartum department with labour pain complaint 2 days after CS. Nausea, cough, abdominal tenderness, distention, lack of defecation, and gas were the patient's symptoms, but headache, fever and vomiting, and shortness of breath were not reported.

The primary vital symptoms at admission were blood pressure (BP): 110/90, respiratory rate (RR): 30, pulse rate (PR): 140, T: 36.5, and oxygen saturation (SpO<sub>2</sub>): 98%. She

has a history of diabetes, and she use metformin and one dose of enoxaparin. The patient has body mass index > 30 and emergency CS and has venous thromboembolism 3+; she received enoxaparin (mean arterial pressure [MAP] 60 mg/0.6 mL) and cefazolin (MAP, 250 mg every 8 h).

Emergency ultrasound on the first day showed that the internal organs were normal and the uterus was postpartum. Moreover, any space-occupying lesions in the uterine parenchyma and solid mass at the adnexa were not observed, but free fluid in the

**Table 2: Urine and blood tests of the three studied cases**

Tests	Case 1	Case 2	Case 3
White blood cells (n)	34.3	24/7	19900
Hemoglobin (g/L)	11	9/3	3.72
Platelet (n)	369	695	11.2
Fasting blood sugar (µg/L)	62	92	35
Blood urea nitrogen	46	31	32
Creatinine (µmol/L)	0.9	1.2	0.9
Sodium (mg/L)	138	135	135
Potassium (mg/L)	4	3.8	3.8
Erythrocyte sedimentation rate (mm/h)	125	125	99
C-reactive protein (mg/L)	193	125	3+
Albumin (g/dL)	2.8	3.8	-
Total protein (g/dL)	4.2	6.7	-
International normalized ratio	1.1	1.05	1
D-dimer (µg/mL)	-	3309	3201
Partial pressure of carbon dioxide (mmHg)	30.4	45	30.9
Bicarbonate (µmol/L)	17.8	29.5	22.6
Prothrombin time (s)	13.9	13.1	
Partial thromboplastin time (s)	39	105	125
Platelet/thrombocyte (n)		639	364000
Amylase (U/L)		67	98
Lipase (U/L)		54	88
UA analysis			
Protein (g/dL)	2+	Normal	
Sugar (mg/dL)	Trace	Normal	
Blood	3+	Normal	
Red blood cell (n)	Many	Normal	
White blood cells (n)	4-6	Normal	

abdominal and pelvic cavities and evidence of the collection were observed. Therefore, because of abdominal pain, fever, tachycardia, tachypnoea as well as leucocytosis 21.9 with 95% neutrophils, medications such as acetaminophen and ampicillin, clindamycin and gentamicin antibiotics were started for the patient. In addition, piperacillin-tazobactam and vancomycin injections were started.

Because of T: 39.3 and SpO<sub>2</sub>: 94%, lung CT was conducted, and left lung involvement was detected, and the COVID-19 polymerase chain reaction (PCR) was reported positive at the same time. In CT report, increased reticular marking in both lungs is seen and right pleural effusion, COVID-19 and embolism ruled out. Ascites was observed in the abdominal cavity and intestinal loop and the colon was dilated. Ascites was observed in the abdominal cavity and intestinal loop and the colon was dilated. Uterus is enlarged with some decreased density in the lower segment, and free fluid in the pelvic cavity is reported.

At the second day, abdomen and pelvis CT scan with and without contrast showed extensive visceral rupture and peritoneum; the patient was prepared for open abdominal laparotomy with peritonitis preoperative diagnosis. But the after-operation diagnosis was gangrene and multiple perforations of the right colon. Laparotomy, right

colectomy, and ileocolic anastomosis were the operation types and then she transferred to intensive care unit (ICU) and piperacillin-tazobactam, vancomycin, heparin, and milk of magnesia syrup was started.

On the third day with erythrocyte sedimentation rate = 125, C-reactive protein = 193 and fever (38°C), she is still monitored in the ICU, and on the fourth day, albumin 20% (vial, daily) is ordered and laxative is stopped. She received piperacillin-tazobactam, vancomycin, heparin, vitamin C, and albumin at the ICU.

Because of the leucocytosis, meropenem injection is started, and vancomycin is continued and piperacillin-tazobactam is discontinued. Then she was transferred to the surgical ward, with BP: 110/60, PR: 80, RR: 19, and T: 36.8. On the fifth day, the Foley catheters and nasopharyngeal tube were removed by the surgeon. On the seventh day, fluid diet is started, and the patient's drain is removed. On the eighth day of hospitalisation, acetaminophen tablets were given for the patient, and she received one acetaminophen (Apotel 1g made by Darupkhsh Co., Tehran, Iran) injection due to a fever of 39.3.

Vancomycin was stopped at the ninth day, but due to leucocytosis (white blood cells = 18.2), ultrasound and abscess examination was ordered again. After 3 days, on the 12th day of hospitalisation, the patient was prepared for operation, repairing the abdominal wall. On the 13th day, with preoperative diagnosis, she underwent wound dehiscence repair in the abdominal wall.

During the operation, the midline and Pfannenstiel line of operation that exposed to dehiscence were explored and the fascia debrided and repaired. On the next day, the surgeon added Ondansetron tablets, acetaminophen because of abdominal pain and diclofenac suppositories because of fever of 38.5, which then reduced to 36.8.

Finally, fifteen days after hospitalisation, she was discharged after removing two sutures. Vital symptoms at discharge were BP: 110/70, RR: 19, PR: 87, T: 36.6, and SpO<sub>2</sub>: 98%. She had taken MAP enoxaparin for 7 days, cephalixin, and mefenamic acid.

## Case 2

A 38-year-old woman with G3P3 referred to the hospital 1 week after CS because of severe abdominal pain. She had CS 1 week before admission at gestational age 38W + 6D by labour pain and rupture of membrane due to high blood pressure 170/102, nonresponse to labetalol, fetal heart rate (FHR) decrease, severe preeclampsia, and fetal distress. After CS, she was treated with magnesium sulfate and misoprostol, and after the control of BP, she was discharged and prescribed captopril 50 bis in die (twice a day) and amlodipine 5 daily.

At the readmitting time, the patient did not have defecation and gas passage since the last 5 days. The patient has nausea

without fever, vomiting, headache, and shortness of breath. On physical examination, abdominal tenderness, abdominal distension, and percussion are tympanic completely. But tenderness rebounds, and guarding did not observe.

The primary vital symptoms were BP: 120/70, PR: 130, RR: 19, T: 36/9, and SpO<sub>2</sub>: 98%. The patient has an asthma history without medication, CS history in the previous week.

The patient is admitted with ileus diagnosis and abdominal. Pelvic ultrasound, standing and supine abdominal x-rays, and infectious counselling requested for patient. The ultrasound in the first day showed that the intestinal loops were completely dilated and contained visible photo-material, and the pelvis was full of gas. Suboptimal examination showed fluid accumulation of about 700 cc in the pelvis.

CT with oral contrast on the second day showed a very severe pneumoperitoneum appearance and a collection that was probably gastrointestinal (GI) perfusion of interabdomen. Therefore, the patient undergoes laparotomy with an initial diagnosis of peritonitis. But the final diagnosis was scum perforation, and she has undergone hemicolectomy, ileostomy, and colostomy. During laparotomy, the uterus, ovaries, and fallopian tubes were examined, which were normal, and the site of uterine incision was completely intact.

On the second day of hospitalisation, the content of the ostomy bag was tested for *Clostridium Difficile*, for which the culture was negative. Moreover, the PCR for COVID-19 was positive.

On the third day of hospitalisation, despite receiving meropenem, vancomycin, and metronidazole because of high leucocytosis, the patient reports symptoms of sputum, cough, incentive spirometry, and chest physiotherapy begins. On the next day, the patient was advised to continue the previous treatment because of high RR and bilateral pleural effusion and sputum and shortness of breath. The patient was also given daily calcium, albumin, daily Aldactone, and Amlodipine 5 bis in die (twice a day) due to pleural effusion that was seen in the lung CT.

On the fifth day of admission, the patient RR was recorded between 30–31 and she underwent R/O regarding pulmonary thromboendarterectomy. Then, heparin is stopped, and enoxaparin and anticoagulants are started. The lung CT reported that right pleural effusion with mild adjacent, abdominopelvic and lung CT passive atelectasis is noted. Suggestive of pancreatic size prominence is seen. Uterus enlargement and endometrial thickening are detected. Moderately intraperitoneal free fluid with right paracolic gutter and hypogastria region prominence is present. Mesenteric fat stranding is noted. Based on CT results, serum amylase (amylase = 67) and transvaginal ultrasound and gynaecologic infection were checked and did not observed cervical motion tenderness and vaginal foul-smelling discharges.

On abdominal and pelvic ultrasound on the 12th day, fluid accumulation with septa was observed, suggesting collection in the lower right side of the abdomen with approximately 500 cc volume. On the 17th day, abdominal and pelvic ultrasound was conducted again and an immature collection with fat-stranding diffuse mesenteric was observed in the uterus anterior with an irregular edge of 101 × 37 × 120 and an approximately 240 cc volume. In addition, slight fluid accumulation is seen in the paracolic gastric.

The patient was discharged based on normal test reports and the improvement in the general condition with medication on the 24th day.

### Case 3

A 31-year-old patient, G5P5 from Afghanistan, without any history of disease underwent cesarean section due to decreased FHR. She had four vaginal deliveries and had a history of blood pressure. Four days after CS, she was referred to the hospital with abdominal pain as a chief complaint, as well as a lack of defecation and suspicious symptoms of ileus and increased amylase and lipase. She had anorexia but the patient did not report fever, nausea and vomiting, shortness of breath, and respiratory distress. The primary vital symptoms were BP: 120/70, PR: 110, RR: 18, and T: 36. In physical examination, head, neck, limbs, and chest were normal, and in abdomen, a surgical scar observed due to a cesarean section and also had abdominal distension, but there was no tenderness, rigidity, or guarding in the touch of the abdomen.

On the first day of hospitalisation, laboratory test was conducted, and standing and supine abdominal radiography were recommended. She received enoxaparin and mefenamic acid. In addition, abdominal and pelvic ultrasounds showed brief fluid in the right lower quadrant space, partial fluid in the pelvis, and diffuse dilatation of the small and large intestines.

The patient was admitted to the ICU with suspicion of pulmonary embolism and COVID-19 infection due to shortness of breath, tachypnoea, tachycardia, and decreased sedation in the ICU on the third day of hospitalisation. Vital signs were: PR: 110, RR: 35, BP: 160/86, and SpO<sub>2</sub>: 92%, and without mask, it increased to 99% after receiving simple oxygen mask. Meanwhile, PCR test was requested for the patient.

On the fourth day of hospitalisation, a positive PCR result was reported. D-dimer and troponin for R/O pulmonary embolism were requested for patients that the test showed D-dimer 3201 and troponin <1.5. The CT angiography did not show evidence of filling defect in the pulmonary arteries. In the fourth-day ultrasound, the uterus was heterogeneous and a significant free fluid was observed in the abdominal space. Moreover, the small intestinal loops were dilated and the fluid filled with oedema and increased generalised wall thickness; the central part



of abdomen and the epigastrium was full of gas. These symptoms were evidences of peritonitis, and so CT scan was recommended. The CT scan of the abdomen and pelvis by injection showed mild hepatomegaly, distension in GI loop that extended to the distal of colon due to subobstruction, and mild ascites, as well as enlarged uterus with low attenuation in uterus due to hematoma or primary abscess formation. Abdominal tenderness was not observed but because of tachypnoea, tachycardia, the abdominal fluid is taped that was with high viscosity and yellow–green colour. Therefore, the patient has undergone exploratory laparotomy with the initial diagnosis of peritonitis. During laparotomy, multiple ruptures of the right colon and scum were seen. Finally, the patient underwent exploratory laparotomy, right colectomy, ileostomy, and colostomy. The uterus was checked, which was normal, and there was no evidence of dehiscence and necrosis. During surgery after midline incision, about 3 L of serous fluid was extracted, and evidences of perforation were obvious in the anterior and medial scum by 3 cm distance from the right colon.

The pathological samples from caecum, ileum, and appendix were showed severe acute or chronic inflammation and partial transmural infarction. Obliterated appendicopathy with peri-appendicitis proximal and distal surgical margins showed uninvolved infarction and eight regional lymph nodes with reactive change without evidence of malignancy.

During the sixth to ninth day after hospitalisation, troponin, potassium, tachycardia and SpO<sub>2</sub> were checked and managed. After the stability of patients on the 10th day, she was discharged from ICU and at the 12th day was discharged from hospital, with normal vital signs.

## Discussion

We report three postpartum cases of colon perforation after CS and during the main peak of COVID-19 pandemic, which is well managed by early detection, laparotomy, and good treatment. Gastrointestinal perforation is the most dangerous extra-respiratory complication of COVID-19 viruses, and there are documented features of this disease.<sup>[3,5,13,14]</sup> Patients of all three studies have three common risk factors including COVID-19 infection, vascular-engaged disease comorbidity (including blood pressure, diabetes), and experienced the first CS delivery. However, it may be that the COVID-19 infection precipitated fetal distress and caused consequence CS in these three patients, and following CS and COVID-19 infection, the colon perforation occurred.

In a study by Giuffrè *et al.* two (8%) colon perforation occurred in 25 consecutive inpatients with COVID-19.<sup>[2]</sup> In addition, a case of right colon perforation due to acute over-distension in intestinal system is reported during the recovery of COVID-19 by De Nardi.<sup>[13]</sup>

The mechanism and physiopathology of colon perforation due to COVID-19 infection are not well known. Nevertheless, neuro-invasive propensity,<sup>[13,15]</sup> entrance of virus to the cytoplasm of gastrointestinal epithelial cells and creating infections,<sup>[1,13]</sup> and intestinal vein thrombosis<sup>[16]</sup> are the common demonstrated features of coronaviruses that should be considered for possible pathogenesis mechanism.<sup>[13,15]</sup> Moreover, the engagement of epithelial colonic cells by the coronavirus is one of the main causes of colon obstruction due to dilation and finally the perforation of bowel. In addition, angiotensin-converting enzyme 2 protein is one of the cell receptors for SARS-CoV-2 that are available in the glandular cells of gastric, duodenal, and rectal epithelia. This protein and receptors are related to tendency of SARS-CoV-2 to gastrointestinal tract and COVID-19 symptoms.<sup>[3]</sup> Nevertheless, in another pilot study, the potential role of thrombosis and the consequent hypoxic intestinal damage in intestinal-related disease pathogenesis are showed.<sup>[2]</sup>

In addition to gastrointestinal mechanism of SARS-CoV-2 and its association with colon perforation, there are some other risk factors for postpartum women.<sup>[17,18]</sup> Bowel perforation especially in caecum is one of the most severe consequences of paralytic ileus and OS.<sup>[17]</sup> Intestinal perforation or other fatal complications are the outcomes of OS in the absence of proper diagnosis and treatment.<sup>[18]</sup> These problems are the most important factors for functional bowel obstruction after cesarean section that occurs 24–48 h after surgery.<sup>[17,19,20]</sup> OS that is defined as acute colonic pseudo-obstruction is the clinical syndrome of acute large bowel or caecal dilation without any mechanical cause.<sup>[17,21]</sup> This syndrome is a rare outcome and commonly occurred after laparoscopic procedures, spinal anaesthetic operations, or after caesarean in postpartum women<sup>[17,18]</sup> as well as underlying illness and infection.<sup>[6]</sup>

## Conclusion

A colonic perforation could be considered as one of the causes of abdominal pain especially in women with a past surgical history such as CS. Moreover, in infectious diseases epidemic such as COVID-19, the bowel perforation may be increased and need more evaluation in patients with severe abdominal pain due to vein thrombosis and other mechanism of gastrointestinal involvements. Therefore, abdominal and pelvic ultrasound or x-ray strongly recommended for postpartum women with abnormal abdominal distension and pain. Paying attention to initial gastrointestinal symptoms by early diagnosis and emergency imaging are the most important practices for the management and treatment of these patients to prevent possible fetal complications.

## Financial support and sponsorship

Nil.

## Conflict of Interest

There are no conflicts of interest.

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