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Posterior Duodenal Perforation as COVID-19 Complication

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Abstract

Coronavirus disease 19 (COVID-19) is known for its respiratory symptoms, cough, and fever. Gastrointestinal symptoms such as abdominal pain, diarrhea, and vomiting are also observed in COVID-19. Gastrointestinal bleeding, peptic ulceration, and peptic ulcer perforation have also been reported in several COVID-19 cases. This paper describes a 76-year-old woman presented with dyspnea and generalized abdominal pain. According to symptoms and imaging results, peritonitis was considered, and an emergency laparotomy was performed for the patient. A posterior duodenal ulcer was detected during surgery. The patient died after two days of operation.

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Background

The first case of coronavirus was detected in December 2019 in Wuhan, China, and the number of cases rapidly spread around the world.[1] The first case in Iran was reported on February 19, 2020, in Qom.[2] Patients with coronavirus disease 2019 (COVID-19) may have no symptoms or a wide range of symptoms such as fever, cough, acute respiratory distress syndrome, septic shock, and death. According to studies, 2.3%-4.0% of infected patients required ventilation support.[3]

Perforation is a well-known complication of duodenal ulcers, and anterior duodenal perforation is the most common complication. The signs of peritonitis, including generalized abdominal pain in the epigastric region, fever, anorexia, nausea, and vomiting are observed in duodenal perforation. Posterior duodenum perforation is rare and includes less than 30% of duodenal perforations.[4] In these cases, the intestinal fluid may pass through the para-colic space and cause back pain, retro-colic abscess, retroperitoneal abscess, and scrotal abscess.[5,6] Emergency surgery should be performed in patients with duodenum perforation and those with the signs of peritonitis.

Duodenal perforation and peritonitis symptoms have been reported in several patients with COVID-19, but none of them was found in the posterior duodenum wall. Although performing surgery is still controversial in patients with COVID-19 because of secondary infections, surgery should be performed in these patients if there is any risk of death.

Case Presentation

A 76-year-old female came to our hospital complaining of dyspnea and cough. She was a known case of diabetes mellitus, ischemic heart disease, and hypertension. Further, she had a history of pelvic surgery, vertebral column surgery, and coronary vessel angiography. She did not give a history of long-term use of nonsteroidal anti-inflammatory drugs or anticoagulants, and there was no history of gastric ulcer or chronic epigastric pain. She was consuming a Metoral tablet (50 mg daily) and an atorvastatin tablet (20 mg daily). The polymerase chain reaction was performed, and the result was positive for COVID-19. She stayed in our hospital for twenty days and was discharged with a saturation of O_2 (SaO_2) = 95%. Two days later, she returned to the hospital with right upper quadrant abdominal pain, worsening respiratory symptoms, cough, and tachycardia. Her vital signs were SaO_2 = 70%, respiratory rate (RR) = 35, heart rate (HR) = 101, temperature (T) = 37 ˚C, and blood pressure (BP) = 140/92 mm Hg. Generalized and

rebound abdominal tenderness were detected in the physical examination. The laboratory data are listed in Table 1. We required Mediastinum, abdomen, and chest computed tomography (CT), and the obtained findings were ground-glass opacities in the bilateral peripheral lung parenchyma, which is suggested for late-stage COVID-19, cardiomegaly, dilated ascending aorta, abdominal ascites, and pneumoperitoneum. Peritonitis was considered, and thus emergency surgery was performed for the patient. The posterior perforation of the duodenum was observed during the surgery. Pus liquid was removed from the abdominal cavity, and then the ulcer perforation was sutured. Next, the abdominal cavity was washed with normal saline, and drainage was placed. After surgery, the wound was bandaged daily, and several medications were prescribed to the patient, including remdesivir, dexamethasone, heparin, Tazocin, Tavanex, enoxaparin, and norepinephrine. The patient was in a good condition after surgery. The laboratory data are presented in Table 2. After two days of operation, she had respiratory distress and loss of consciousness with SaO_2 = 70%, HR = 95, RR = 32, and BP = 157/117, and then the patient expired.

Table 1. Laboratory Data of the Patient in the First Day (Before Surgery)

Test	Result
WBC	21 f
RBC	3.76 mill/mm^3
Hb	10.5 g/dL
Hct	34.3%
MCV	91.22 fL
MHC	27.93 pgm
Platelet	389 000/mm^3
Blood sugar	294 mg/dL
ESR	4 mm/h
D-dimer	2417 ng/mL
BUN	39 mg/dL
Creatinine	0.8 mg/dL
Serum Na	137 mEq/L
Serum K	4 mEq/L
Serum Ca	9.5 mg/dL
AST	16 U/I
Albumin	3.1gr/dL
ALT	10 U/I
ALP	230 IU/L
Troponin I	<0.1 ng/mL
CPK	49 U/L
LDH	565 U/mL
CRP	5.4 mg/mL
pH	7.41
PCO_2	39.5 mmHg
PO_2	40 mmHg
HCO_3	25 mmol/L
SaO_2	75%

Note. WBC: White blood count; RBC: Red blood cell; Hb: Hemoglobin; Hct: Hematocrit; MCV: Mean corpuscular volume; MHC: Major histocompatibility complex; ESR: *Erythrocyte sedimentation rate*; BUN: *Blood* urea nitrogen; Na: Sodium; K: Potassium; Ca: Calcium; AST: Aspartate aminotransferase; ALT: Alanine aminotransferase; ALP: *Alkaline* phosphatase; CPK: Creatinine Phosphokinase; LDH: *Lactate dehydrogenase*; CRP: *C-reactive protein*; PCO_2: Partial pressure of carbon dioxide; PO_2: Partial pressure of oxygen; HCO_3: Bicarbonate

Discussion

This paper reported a case of COVID-19 presented with generalized abdominal pain and respiratory symptoms to our hospital. An emergency laparotomy was performed under general anesthesia according to suspected duodenal perforation. It has been suggested that surgery should be avoided in COVID-19 patients for the safety of medical staff and the prevention of the patient from acquiring secondary infections, but in this patient, emergency surgery was immediately performed due to detected peritonitis symptoms.[7]

Gastrointestinal (GI) bleeding occurs in 4%-13.7% of patients with COVID-19 who have GI symptoms.[8,9] GI bleeding is associated with epithelial injury in the esophagus, peptic ulcer disease, and severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) detection in the epithelial cells of GI. The first emergency surgery performed on a COVID-19 patient was on a 71-year-old man with no history of peptic ulceration with abdominal pain and respiratory symptoms. In surgery, duodenal bulb ulcer perforation was observed, and after the operation, he recovered well.[10] In a case-control study conducted on patients with GI bleeding who had either COVID-19 or not, initial symptoms were the same in both groups. Moreover, the most common reasons for upper and lower GI bleeding were peptic and rectal ulcers due to rectal tubes, respectively.[11]

GI bleeding in patients infected with COVID-19 may have several causes as follows[12]:

- Direct invasion of SARS-CoV-2 in GI epithelium because of the presence of express angiotensin-converting enzyme 2 as an entry factor;
- Coagulopathy after cytokine storm and systemic inflammation causing GI bleeding;
- Administration of interleukin 6 (IL-6) inhibitors, corticosteroids, and non-steroid anti-inflammatory agents.

There is a report about anterior duodenum perforation associated with IL-6 inhibitors. A 72-year-old man was presented with severe respiratory symptoms and admitted to the intensive care unit. Several doses of sarilumab (400 mg IV) were given to him in the treatment course. After a few hours, he developed abdominal pain. However, emergency surgery was performed for the patient, but 17 days after the operation, he died from cardiorespiratory insufficiency.[12]

In Saudi Arabia, there is a report of a duodenum

Table 2. Laboratory Data of the Patient After Surgery

Test	Result
WBC	17.73 f
RBC	3.41 mill/mm^3
Hb	9.8 g/dL
Hct	33%
MCV	97.07 fL
MHC	28.74 pgm
Platelet	179 000 /mm^3
Blood sugar	125 mg/dL
BUN	54 mg/dL
Creatinine	1.4 mg/dL
Serum Na	139 mEq/L
Serum K	4.3 mEq/L
CRP	19.4 mg/mL
PH	7.15
PCO_2	39.5 mm Hg
PO_2	48 mm Hg
HCO_3	32 mmol/L
SaO_2	70%

Note. WBC: White blood count; RBC: Red blood cell; Hb: Hemoglobin; Hct: Hematocrit; MCV: Mean corpuscular volume; MHC: Major histocompatibility complex; ESR: *Erythrocyte sedimentation rate*; BUN: *Blood* urea nitrogen; Na: Sodium; K: Potassium; Ca: Calcium; AST: Aspartate aminotransferase; ALT: Alanine aminotransferase; ALP: *Alkaline* phosphatase; CPK: Creatinine Phosphokinase; LDH: *Lactate dehydrogenase*; CRP: *C-reactive protein*; PCO_2: Partial pressure of carbon dioxide; PO_2: Partial pressure of oxygen;

perforation in a 23-year-old man with COVID-19 infection without respiratory symptoms. He was admitted to the hospital with sudden abdominal pain, nausea, and vomiting. Although a laparotomy was performed for the patient, he died after the surgery.[13]

There is also another report of duodenal perforation in a 73-year-old male patient with COVID-19 presented with severe respiratory symptoms. Although an emergency laparotomy was performed, he died after surgery because of pneumonia.[14]

We used laparotomy surgery for our patient. According to some reports of a high rate of severe pneumonia in COVID-19 patients after laparotomy, some surgeons have recommended the laparoscopic approach because of a low risk of respiratory failure and complications of the laparotomic incision.[15]

Our patient and the patients mentioned in previous reports had no clear underlying cause related to duodenum perforation. Our patient had no history of corticosteroid and NSAID consumption or previous epigastric pain and peptic ulcer disease. Furthermore, contrary to previous reports, our patient had experienced the posterior perforation of the duodenum, which is very rare and requires further investigation to determine whether it is related to COVID-19. Posterior duodenal perforation is also extremely rare in healthy individuals, thus it may be a sign or complication of COVID-19. It is important to note that, regardless of the patient's respiratory status, any signs of peritonitis should be closely monitored, and early surgery should be performed in accordance with protocols that protect surgical personnel from COVID-19.

Conclusion

COVID-19 not only affects the respiratory system but also causes gastrointestinal complications such as peptic ulcer, peptic ulcer perforation, and GI bleeding. Therefore, the accurate monitoring of COVID-19 patients presenting with GI symptoms helps prevent unwanted complications by performing an emergency surgery when necessary.

Authors' Contribution

AT and FO. contributed to the manuscript and design. The manuscript was written by all authors. All authors read and approved the final manuscript.

Conflict of Interest Disclosures

The authors declare that they have no competing interests.

Ethical Approval

Informed consent statement was obtained from the patient for the publication of this report.

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