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Case report

Gastric mucormycosis in a COVID-19 patient with severe lung involvement: a case report

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Abstract

Background: Mucormycosis (zygomycosis) is a rare opportunistic and life threatening infection that almost always affect immunocompromised patients. The Covid-19 associated mucormycosis is a new condition that has been described with high mortality rates. Gastrointestinal mucomycosis is a rare condition and stomach is the more common site in gastrointestinal mucomycosis.

Case presentation: Presented case is a 41 year old cigarette smoker and diabetic man, who presented with Covid_19 lung involvement. Consequently, he developed with gastrointestinal bleeding and gastric mucormycosis was detected for him.

Conclusions: Evaluating the clinical data and rare features of COVID-19 patients and studying the behavior of the disease is crucial for early detection and management of diseases.

Introduction

Mucormycosis (zygomycosis) is a rare opportunistic and life-threatening infection that almost always affects immunocompromised patients. This infection was caused by the zygomycetes class of fungi, Mucorales order, etc. Rhizopus, Mucor, Rhizomucor and Absidia species. These organisms are commonly found on the floor, in decaying organic matter such as vegetables, in animal feces and in the soil. The most frequent mode of transmission is inhalation of the spores followed by implantation of the fungi into the skin lesion, such as burns and ingestion of the spore, and the rarest mechanism is direct intravenous transmission. Common sites of mucormycosis are rhino-orbito-cerebral and lung (1-3).

Risk factors for mucormycosis include malignancies, transplantation, prolonged neutropenia, uncontrolled diabetes mellitus (DM), iron overload, prolonged corticosteroid therapy, intravenous drug abuse, prematurity, and malnutrition. The most common risk factor for mucormycosis is prolonged uncontrolled diabetes mellitus (3-7).

Gastrointestinal mucomycosis is a rare condition and accounts for only 7% of mucormycosis; the stomach is the most common site in gastrointestinal mucomycosis, followed by the colon and ileum. The prognosis of gastrointestinal

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mucormycosis is poor, and the mortality rate is approximately 85% (4).

Since the onset of the COVID-19 pandemic in December 2019, new aspects of the disease have been discovered. An increasing number of COVID-19-associated mucormycosis cases, a condition that has been described with high mortality rates, have been reported since 2020 following the COVID-19 pandemic in many countries, especially India; the vast majority of these cases were of the Rhino-orbito-cerebral type (1, 8, 9).

Although systemic corticosteroids lead to decreased mortality in patients with severe COVID-19, they may put patients at risk of opportunistic fungal infections such as mucormycosis (10, 11). In addition to immunosuppressive therapy in COVID-19 patients, multiple inflammatory pathways and inflammatory cytokines predispose COVID-19 patients to opportunistic fungal infections (12).

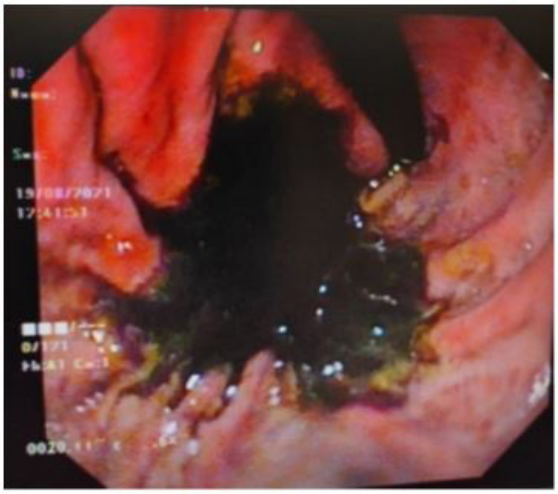

Figure 1: *Circumferential black–greenish ulcer in the fundus*

Treatment of mucormycosis includes the combination of surgical debridement and antifungal therapy(13).

We report a patient with locally advanced gastric mucormycosis during admission due to COVID-19 with severe lung involvement.

Case presentation

A 41-year-old male cigarette smoker with uncontrolled DM, hypertension (HTN) and hyperlipidemia (HLP) was admitted to Namazee Hospital, a referral center in Shiraz, Iran, with dyspnea and malaise and a diagnosis of COVID-19 infection. His high-resolution computed tomography (HRCT) showed approximately 90% lung involvement. At the time of admission, he was intubated due to respiratory distress, and COVID-19-approved management according to the national guidelines at that time, including dexamethasone 8 mg intravenous daily, was started. One week later, he presented with melena and had a hemoglobin drop from 12.1 to 9.4 mg/dl in serial laboratory data checking; after initial resuscitation with intravenous saline, pantoprazole and packed red blood cell transfusion, esophagogastroduodenoscopy was performed, which showed a circumferential black–greenish ulcer in the fundus (Figure 1). Biopsy was taken, and mucormycosis was confirmed in the biopsy report. An abdominal CT scan showed diffuse wall thickening of the stomach. Amphotericin B liposomal IV was started, and then he was shifted to the operating room. At surgical exploration, involvement of the fundus by mucormycosis with extension to the posterior wall of the stomach, diaphragm and splenic hilum was seen (Figure 2); total gastrectomy, splenectomy, Roux-en-Y esophagojejunostomy and jejunojejunostomy were performed. Histopathology showed severe infection of wide septate hyphae with right angular branching consistent with simultaneous mucormycosis of the stomach and diaphragm

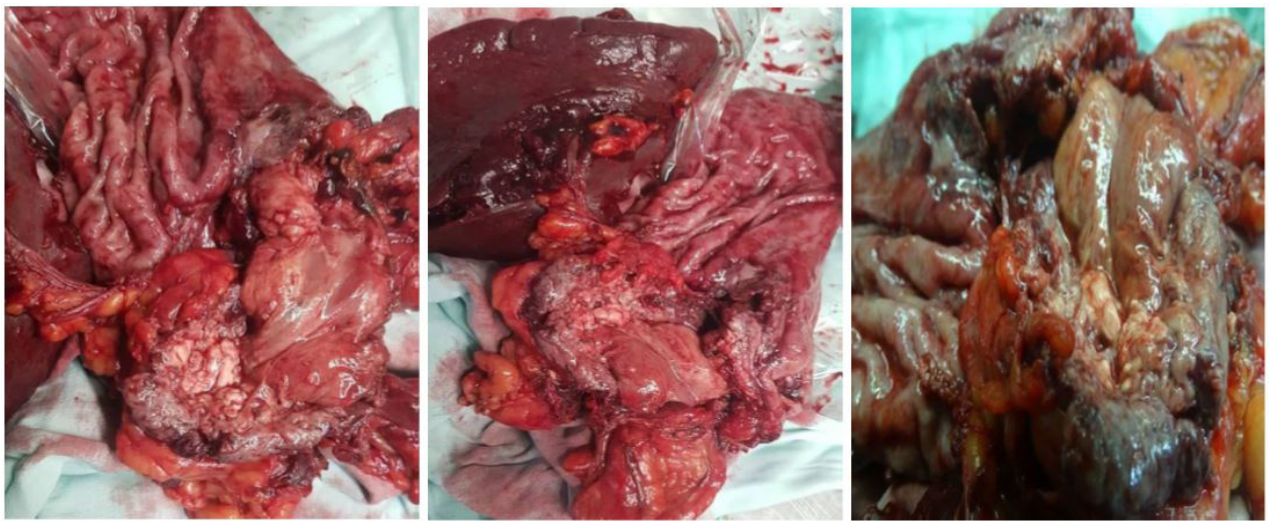

Figure 2: *Involvement of the fundus by mucor mycosis with extension to posterior wall of the stomach, diaphragm and splenic hilum in surgical exploration*

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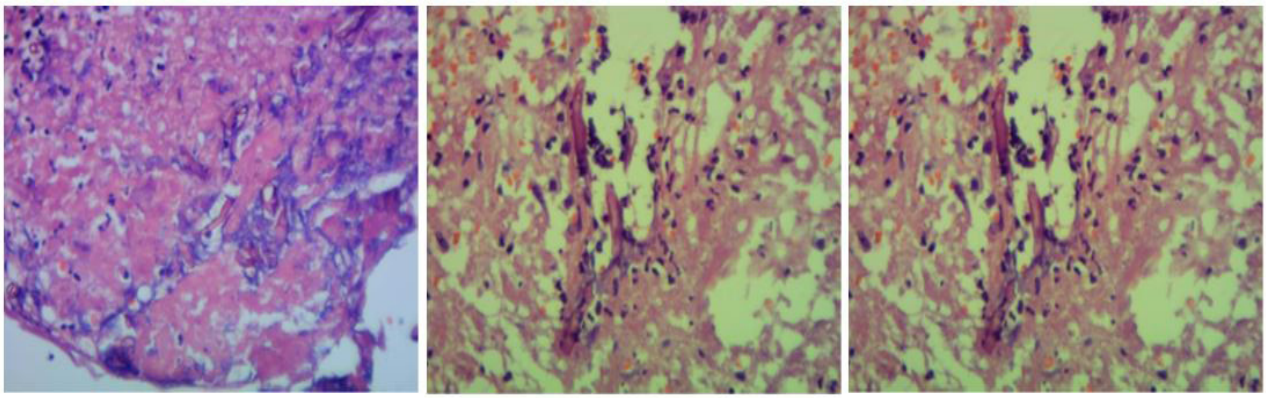

Figure 3: *Histopathology showed severe infection with wide septate hypha with right angular branching in histopathology in favor of mucormycosis*

(Figure 3). Unfortunately, despite liposomal amphotericin, surgery and initial recovery in the ICU, our patient died two weeks later due to disseminated sepsis with bacterial superinfection with Acinetobacter baumannii.

Discussion and Conclusion

Mucormycosis is a rare and fatal opportunistic infection that occurs in the vast majority of cases in immunocompromised patients. The most common risk factor for mucormycosis is prolonged uncontrolled diabetes mellitus with or without DKA. Other predisposing factors, including solid organ or stem cell transplantation, hematologic malignancies, major trauma, burn, steroid use, iron overload, severe neutropenia, long-term antibiotic use, renal disease, AIDS, SLE, malnutrition, injection drug use and low birth weight infants, are also mentioned in the literature (7, 14, 15). Gastrointestinal mucormycosis accounts for only 7% of cases. The most common site of gastrointestinal involvement is the stomach, followed by the colon, ilium and esophagus. Haider A. Naqvi and colleagues presented gastric mucormycosis in a patient with DM and CKD; esophagogastroduodenoscopy revealed an ulcerative mass with exudate in the fundus (14). Kulkarni et al. reported a case of gastric mucormycosis in a 50-year-old diabetic man with chronic alcoholism; he presented with abdominal pain and distention, vomiting and fever. There was generalized guarding and rigidity. During the operation, there was a large 4x4 cm perforated ulcer in the gastric body that was covered with greenish-gray exudate (16). In rare cases, the disease has been reported in people without immune deficiencies or any risk factor. Prabudh Goel and colleagues reported gastrointestinal mucormycosis with ascending colon involvement and perforation in a 10-year-old boy without any risk factors. He presented with RLQ abdominal pain, abdominal distension and bilious vomiting (13). Additionally, Gurbir Sehmbey and colleagues reported a case of gastric mucormycosis in a 48-year-old healthy man without any significant past medical problems; he was admitted with transpelvic gunshot and underwent abdominal surgery. Approximately two weeks later, he developed coffee-ground output from the nasogastric tube, so esophagogastroduodenoscopy was performed, which revealed a grayish coating large ulcer with an irregular border at the body and fundus of the stomach (17).

After the COVID-19 pandemic, many cases of mucormycosis concurrently with COVID-19 or in the post-COVID-19 period were reported (1). The vast majority of them presented with rhino-orbito-cerebral involvement. Only a few cases of COVID-19-associated gastrointestinal mucormycosis have been reported, which were all in the form of ilium and colon involvement. Mayank Jain et al. reported a 57-year-old diabetic woman with simultaneous ileocolic trunk thrombosis causing acute mesenteric ischemia and ileocolic mucormycosis approximately three weeks after COVID-19 pneumonia (18). Additionally, Ravinder Pal Singh et al. presented a 48-year-old immunocompetent intensive care physician with sigmoid mucormycosis and perforation approximately three weeks after COVID-19 pneumonia (19).

Malakar reported an 82-year-old man who presented with upper gastrointestinal bleeding after complete recovery from COVID-19. He received high-dose oral prednisolone for 21 days 2 months before this event. His upper gastrointestinal endoscopy and biopsy were suggestive of gastric mucormycosis. This Indian case was successfully managed with antifungal therapy without any surgery (20).

Our patient had COVID-19-associated gastric mucormycosis that occurred during COVID-19 pneumonia management. Our patient's risk factors were diabetes melilotus and the use of corticosteroids and broad-spectrum antibiotics. The role of the SARS-CoV-2 virus directly in the development of mucormycosis is unclear and needs more studies in the future.

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Ethics declarations: Informed consent was obtained from the patient to publish this case report.

Contributions: FE, RN, ZKh, ARK were contributors of writing the first draft of the manuscript. MhN completed surgical excision in this case. NO performed the histological examination of the lesion. All authors read and approve the final manuscript.

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