



COVID-19 and spontaneous esophageal perforation: a case report

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Abstract: Pulmonary manifestations of the novel coronavirus, COVID-19, have been discussed heavily in the literature, however, there have been minimal reports regarding extra-pulmonary manifestations of the disease to date. In particular, there has been no literature to date discussing the pathophysiology or incidence of esophageal perforation in the COVID-19 patient. This case report describes a 65-year-old COVID-19 positive male presenting with a case of spontaneous esophageal perforation. The patient underwent esophagogastroduodenoscopy (EGD) with stent placement followed by thoracoscopic evacuation of gastric contents from the pleural spaces and mediastinal drainage. His clinical course was unique in that his esophageal perforation management was complicated by logistical and technical challenges due to COVID-19 infection. Several precautions were required before, during and after each test or intervention performed on the patient. This created a challenging set of circumstances which had not been dealt with in the past. Nevertheless, after a two-week hospital stay, the patient was discharged in stable condition with plans for outpatient follow-up and removal of stent. This case report provides an unusual presentation of esophageal perforation in a patient with concurrent COVID-19 infection while highlighting the special techniques required to diagnose and treat the patient.

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Introduction

While COVID-19 has been classified as a predominantly respiratory illness, some patients have had involvement of other organ systems including neurological, gastrointestinal and hematological symptoms (1). Pneumomediastinum, thoracic empyema as well as mediastinal lymphadenopathy have been reported in COVID-19 patients (2,3). There has been no association described in the literature between COVID-19 and esophageal perforation. This case report describes an esophageal perforation in a patient with COVID-19. We present the following case in accordance with the CARE reporting checklist (available at <https://aoe.amegroups.com/article/view/10.21037/aoe-20-60/rc>).

Case presentation

This is a 65-year-old male with history of previous distal esophageal perforation from vomiting (Boerhaave's type) treated with a fully covered esophageal stent and gastrojejunostomy tube in 2017. The esophageal stent was removed a few weeks after placement and healing confirmed with an esophagram. In April 2020, he presented to the emergency department with intractable nausea and vomiting. This had started two days earlier with an episode of hematemesis followed by dyspnea and intermittent fevers. There was no history of foreign body ingestion or onset of symptoms after a specific meal. His only home medications were a proton-pump inhibitor and sucralfate. An initial

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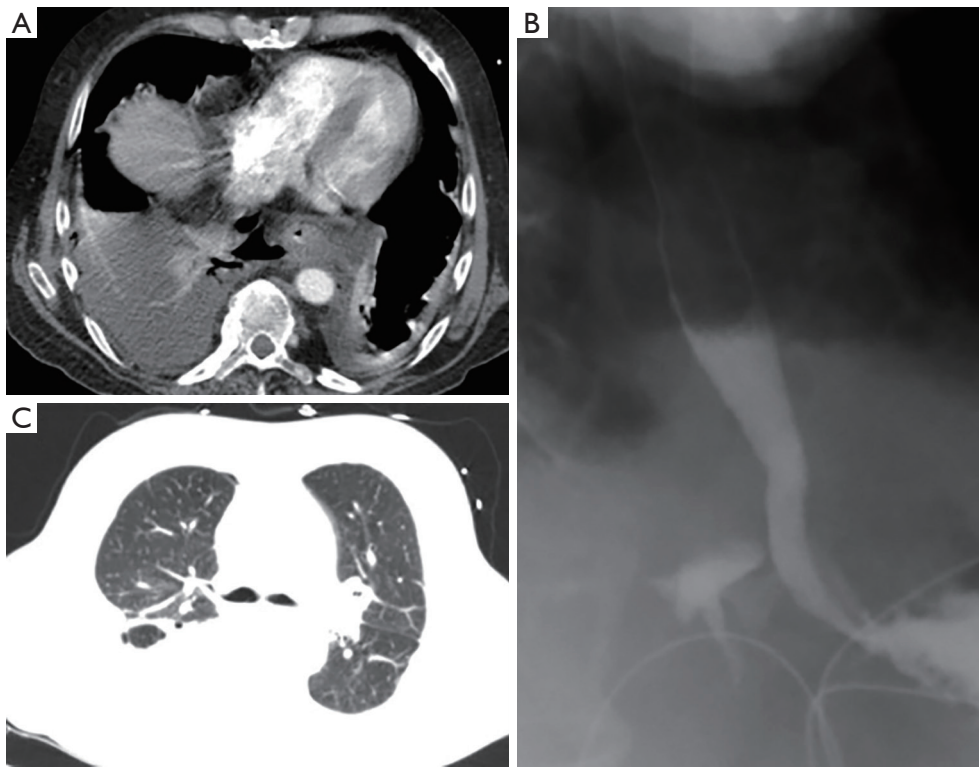


Figure 1 (A) Esophagram upon presentation revealing leak of contrast material into right posterior chest; (B) initial computed tomography (CT) scan showing bilateral effusions; (C) initial CT scan showing lack of classic radiological findings of COVID-19.

chest X-ray was obtained which demonstrated bilateral lower lobe effusions with no other radiolucent material to suggest a foreign body. Laboratory abnormalities included leukocytosis of 17,400, acute kidney injury (creatinine of 1.6 mg/dL), hypokalemia (potassium of 2.7 mmol/L) and lactic acidosis of 2.4 mmol/L. D dimer was slightly elevated and anion gap was 16. A CT scan performed to evaluate for pulmonary embolism in the emergency department revealed extra-luminal air posterior and to the right of the esophagus concerning for a perforation and bilateral effusions. He was transferred to our institution for a higher level of care.

On arrival, his vitals were: pulse 65 beats per minute, blood pressure 93/56 mmHg, SpO₂ 100% and temperature of 36.5 °C. On review of systems he endorsed some dyspnea and malaise. He was retired and reported living a relatively isolated life in a small rural town. He had a history of alcoholism in the past, but currently consumed 2–3 alcoholic drinks per day and did not use tobacco. He reported a lessened desire to consume alcohol in the days prior to presentation with no heavy alcohol abuse leading up to the vomiting event. He had diminished breath

sounds bilaterally, a soft abdomen and well healed midline laparotomy incision and gastrostomy site. A CT scan with IV and oral contrast showed severe esophageal edema at the distal third with a complex pleural fluid collection in the posterior mediastinum suspicious for perforation (*Figure 1A*). A water soluble contrast esophagram demonstrated obvious leakage of contrast material confirming esophageal perforation (*Figure 1B*). He met screening criteria for COVID-19, including fevers, malaise and cough, therefore a COVID-19 test was performed via nasopharyngeal swab in the intensive care unit upon arrival. The rapid qualitative RT-PCR test resulted as positive. His CT scan did not have any of the classic findings of COVID-19 (*Figure 1C*).

He was taken emergently to the operating room. The esophagogastroduodenoscopy (EGD) revealed a 2–3 mm perforation at 39 cm from the incisors at the 4 o'clock right posterolateral position, with the gastroesophageal junction at 40 cm from the incisors (*Figure 2*). There was no previous stent or signs of a foreign body noted that could have caused a traumatic erosion. Because of the

perforation having occurred almost 48 hours prior and due to the relatively small size of the defect, it was felt that an esophageal stent was the best option to address the perforation. An EndoMaxx (Merit Medical, South Jordan, UT, USA) 23×150 millimeter fully covered esophageal

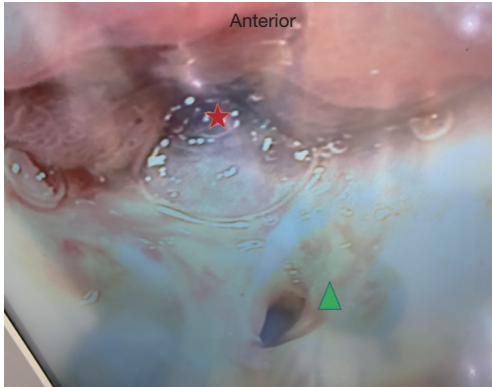


Figure 2 Esophagogastroduodenoscopy; star denotes gastroesophageal junction, triangle represents perforation at right posterior esophagus.

stent was deployed successfully with fluoroscopic guidance (*Figure 3A,3B*). A gastrojejunostomy tube was endoscopically placed through the patient's previous gastrostomy site. Bilateral thoracoscopic evacuation of gastric contents and mediastinal drainage was performed, left followed by right. There was extensive contamination of gastric contents into the pleural spaces, more significant on the right. A LigaSure device (Medtronic, Dublin, Ireland) was used to open the pleura around the esophagus near the site of the perforation to allow drainage of the mediastinum. Nasogastric tube decompression of the stomach along with gastric gravity decompression via gastrojejunostomy tube was continued until post-operative day 8, when a repeat esophagram was performed to evaluate for leak, which was negative (*Figure 3C*). He was initiated on a clear liquid diet and then advanced to full liquids. His chest tubes were removed on post-operative days 10 and 11 sequentially following further demonstration of clinical stability.

Infectious disease service was consulted and suggested using clinical markers to track COVID-19 infection including IL-6 and CRP (4). His CRP initially drawn on

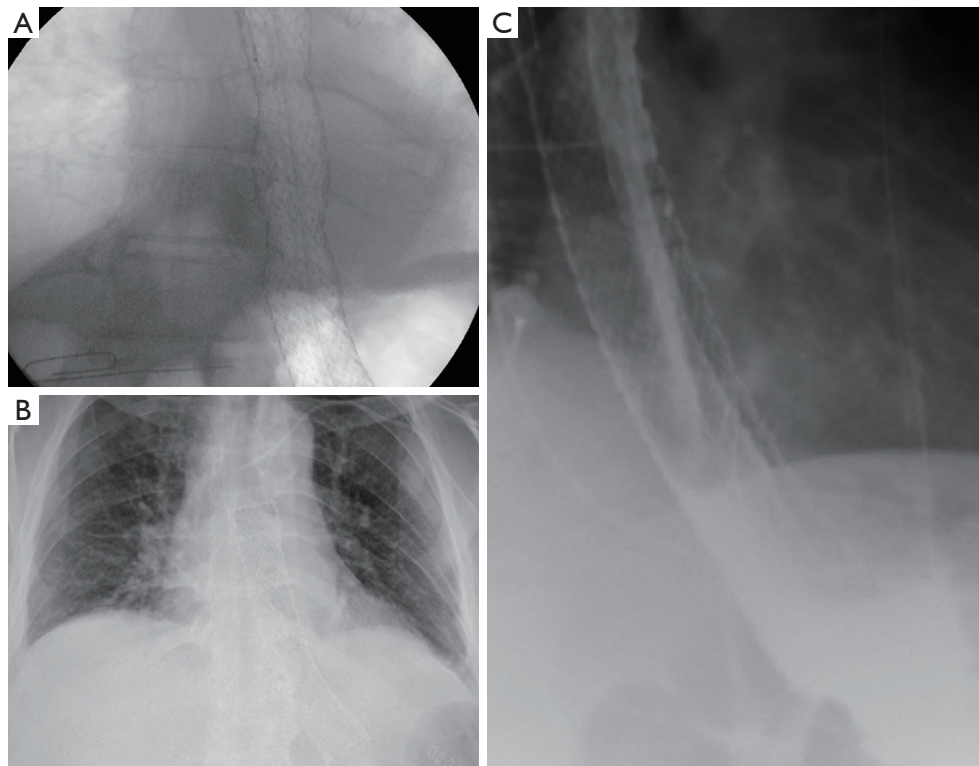


Figure 3 Clockwise from left. (A) Stent placement under fluoroscopic guidance, paperclip denotes gastroesophageal junction; (B) chest X-ray on day 13 with stent and no radiographic evidence of COVID-19 infection; (C) esophagram on day 8.

post-operative day 4 was 105.10 mg/L and IL-6 on post-operative day 5 was elevated to 145.7 pg/mL. These trended downward to a value of 12.90 mg/L and 26.1 pg/mL respectively, on post-operative day 7 when a repeat COVID-19 test resulted as negative suggesting clinical resolution of COVID-19 infection.

He remained on the COVID-19 isolation floor throughout his hospital stay. Our patient refused alcohol withdrawal prophylaxis and never showed signs of alcohol withdrawal. He was maintained on antibiotics and anti-fungal agents for 13 days and was discharged home with oral antibiotic and anti-fungal treatment on post-operative day 13 in good condition with plans to remove the esophageal stent and repeat his esophagram in 4 weeks.

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patient.

Discussion

To our knowledge, this is the first case report describing spontaneous esophageal perforation in a patient who concurrently presented with COVID-19.

The patient's chest X-ray, as well as CT scan did not reveal any of the classic radiologic findings of COVID-19 (*Figure 1C*). It has been noted that the radiological findings of ground glass opacities are more commonly located in the lower lobes in a subpleural distribution (5), which may have been obscured by the bilateral effusions in our patient caused by the esophageal perforation. Bronchoscopy performed at the time of surgery demonstrated extensive mucous production bilaterally. This suggests our patient may have had pulmonary signs of COVID-19, which were likely subclinical and not the primary manifestation of the disease.

Most Boerhaave's perforations are seen preferentially on the left side, due to structural weakness at that portion of the esophagus (6). Spontaneous recurrences are rare (7). Given his history of emesis, we anticipated the perforation on the left posterior location, but clearly spontaneous perforations can occur on either side, which emphasizes the importance of pre-operative imaging.

It is also important to note challenges in caring for patients with COVID-19 and esophageal pathology. We administered fluid conservatively to prevent pulmonary edema. We also faced challenges with obtaining an

esophagram given that our fluoroscopy suite lacked negative pressure air clearance. To combat this, we taped off the doorways, wore N95 equipment for airborne precautions throughout the procedure and terminally cleaned the room afterwards. Assessment and management of esophageal perforations is time sensitive due to rapid progression of mediastinal sepsis. Although the patient had COVID-19, he was able to undergo diagnosis and treatment in an expeditious manner, and no health care providers involved in the case subsequently contracted COVID-19.

This case report depicts an esophageal perforation in a patient with COVID-19. It is important to note that this patient had a prior history of esophageal perforation as well as risk factors for recurrent esophageal perforation, however, little is known about extra-pulmonary manifestations of COVID-19. While there has been no conclusive evidence linking esophageal perforations as a complication or presentation of COVID-19, more research and observation of COVID-19 patients is required to determine whether any association exists.

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Footnote

Reporting Checklist: The authors have completed the CARE reporting checklist. Available at <https://aoe.amegroups.com/article/view/10.21037/aoe-20-60/rc>

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Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at <https://aoe.amegroups.com/article/view/10.21037/aoe-20-60/coif>). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patient for publication of this case report and accompanying

images. A copy of the written consent is available for review by the editorial office of this journal.

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