Case Report

# Acute Esophageal Necrosis and Duodenal Disease in the Setting of Recently Initiated Chemotherapy

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## Abstract

### Introduction
Acute esophageal necrosis (AEN), commonly referred to as "black esophagus" or Gurvits syndrome, is a rare condition characterized by diffuse black mucosa in the distal esophagus. Most often, the patient is an older male with multiple comorbidities, presenting with upper gastrointestinal bleeding. The exact pathogenesis is unclear, but it is often thought to be secondary to acute vascular hypo-perfusion or ischemia of the esophageal mucosa in critically ill patients with certain secondary comorbid conditions such as renal insufficiency, diabetes mellitus, dyslipidemia, coronary artery disease, malnourishment, alcohol abuse, or association with an underlying malignancy.

### Case Presentation
We present a case of AEN in a 78-year-old female following the recent start of a chemotherapy regimen with carboplatin and paclitaxel two weeks prior. The patient underwent EGD and was found to have AEN throughout the entirety of her esophagus with necrosis and eschars seen up to the second part of the duodenum. The patient initially improved after receiving blood transfusions, being made nil-per-os, and starting proton pump inhibitor (PPI) therapy, but she ultimately died given the severity of her clear cell uterine cancer and other comorbidities.

### Conclusion
Although it is rare that initiation of chemotherapy leads to AEN, it should be considered as a potential etiology.

### Keywords
acute esophageal necrosis; Gurvits syndrome; black esophagus; duodenal necrosis; chemotherapy; paclitaxel; carboplatin

## Introduction
Acute esophageal necrosis (AEN), also known as "black esophagus" or Gurvits syndrome, is a rare multifactorial condition characterized by a full circumference black esophagus on an upper endoscopy. Patients may present with dysphagia, nausea, vomiting, syncope, upper gastrointestinal bleeding, and epigastric abdominal pain. The exact pathogenesis remains unclear, but it is hypothesized to be secondary to acute vascular hypo-perfusion or ischemia of the esophageal mucosa in critically ill patients with certain secondary comorbid conditions. These comorbidities include renal insufficiency, diabetes mellitus, dyslipidemia, coronary artery disease, malnourishment, vascular disease, alcohol abuse, liver cirrhosis, or an association with an underlying malignancy.[1-7] The most widely accepted causative explanation is a "2-hit" hypothesis that describes a low-flow vascular event that makes the esophageal mucosa susceptible to injury secondary to pepcin or acid reflux.[2,3] AEN has an estimated prevalence of 0.01%-0.28% and has become more fre-

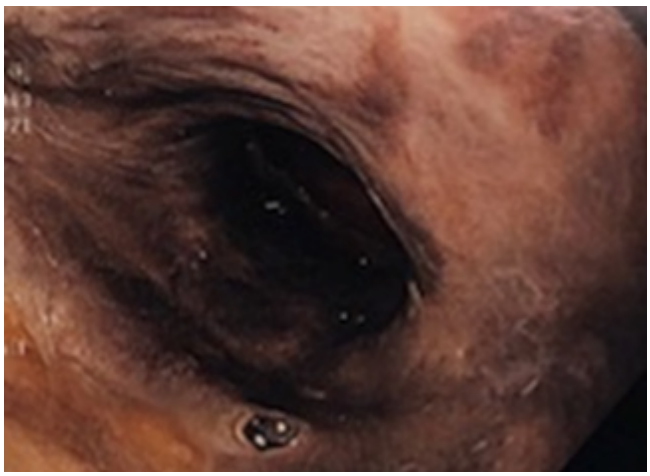

**Figure 1.** Acute esophageal necrosis is seen in the mid-esophagus. This patient had AEN seen throughout the entirety of her esophagus during an upper endoscopy.

quently diagnosed due to the more widespread availability of endoscopy.[2-4]

Herein, we report a case of AEN in a 78-year-old female who was started on chemotherapy with carboplatin and paclitaxel two weeks prior to presentation with symptoms including nausea, dysphagia, syncope, and mucosal bleeding.

## Case Presentation

A 78-year-old female with a past medical history of clear cell uterine cancer, started on carboplatin and paclitaxel 2 weeks prior, presented to the emergency department (ED) after visiting her oncologist's office where she had an episode of syncope. Per the patient's son, they were at their 2-week visit after starting chemotherapy with carboplatin and paclitaxel when she became very pale and had a syncopal event. Upon arrival to the ED, the patient was found to have a blood pressure of 92/50 mmHg (her baseline according to her son), a white blood cell count of $0.6x10^9$/L, hemoglobin of 6.3 g/dL, platelet count of 7 x 103/uL, pancytopenia, and lactic acid of 10.2 mmol/L, with associated anion-gap metabolic acidosis. The patient was also noted to have decreased renal function with a creatinine of 3.0 mg/dL.

The patient reported severe, sharp, mid-epigastric abdominal pain that radiated to both her right upper quadrant and her left upper quadrant. She had been taking 3-4 naproxen a day for pain but denied any other blood thinner use. Upon examination, she was found to have petechiae present throughout her bilateral upper- and lower-extremity as well as evidence of mucosal bleeding. When moved by nursing, she was found to have melenic stools and had positive fecal occult blood testing. The patient reported nausea and non-bloody, non-bilious vomiting that had been constant since her chemotherapy was started despite taking aprepitant and palonosetron. The patient also noted that she had recent difficulty swallowing and could not tolerate much food orally.

The patient previously had repeated large-volume ascites, with 4 liters removed the week prior. Previous computed tomography (CT) of the abdomen and pelvis showed evidence of a tumor in the sigmoid colon measuring about 2.2 cm as well as soft tissue nodules found in her stomach with omental caking and peritoneal carcinamatosis. Her CA-125 was found to be mildly elevated to 74 U/mL.

Given the patient's pancytopenia in the ED, she was treated with 2 units of both platelets and packed red blood cells (pRBCs) and was admitted to the intensive care unit. Her hemoglobin increased to 8.6 g/dL, but given her continued bleeding her hemoglobin the next morning was 6.6 g/dL and she required another unit of pRBCs. On day 2 of her inpatient stay, the patient underwent esophagogastroduodenoscopy and AEN was noted throughout the esophagus, characterized by a diffusely dense “black esophagus” (**Figures 1 and 2**).

There was no evidence of perforation or active bleeding. A 4-5 cm hiatal hernia was noted

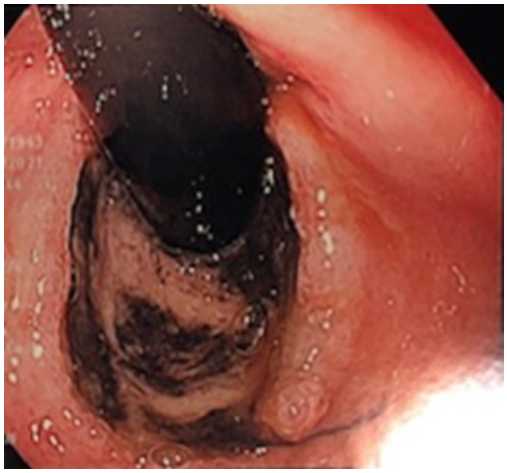

**Figure 2.** A 4-5 cm hiatal hernia was noted on the EGD retroflexion with acute esophageal necrosis seen in the distal third of the esophagus.

(**Figure 2**). The stomach was overall unremarkable, although some gastric folds in the body appeared plethoric (**Figure 3**). Scattered ischemia characterized by necrosis and eschars as well as scattered small amounts of red blood cells on mucosa adjacent to several scattered ulcers without active bleeding, were noted throughout the duodenum (**Figure 4**). The patient was continued on intravenous proton pump inhibitor (PPI) therapy with pantoprazole twice daily and was made nil-per-os (NPO). She was transitioned to an oral PPI twice daily when she could tolerate it.

She reported lower extremity pain after the endoscopy procedure, and lower extremity Doppler ultrasound showed a small partially occlusive deep vein thrombosis of the left popliteal vein. On day 5 of her inpatient stay, a repeat lower extremity Doppler ultrasound showed a non-occlusive thrombus in the right common femoral, superficial femoral, and posterior tibial veins. Given the patient's continued active melena and increased hypercoaguability, the decision was made to place an inferior vena cava filter. The patient continued to have melena after the procedure and had an episode of pulseless electrical activity due to an unclear cause; during this time her family decided to stop life-saving measures.

## Discussion

AEN is rare with a predilection for men, and an estimated prevalence of 0.01%-0.28%.[2-4] Men are 4 times more likely to develop AEN and the incidence increases with age, peaking in the seventh decade.[5] While the pathogenesis appears to be multifactorial, the “2-hit” hypoth-

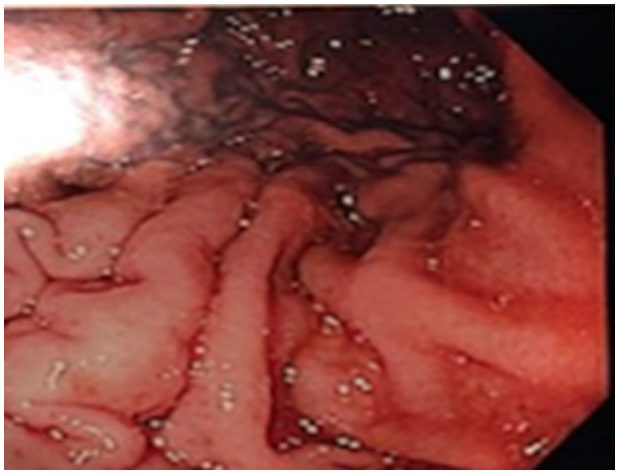

**Figure 3.** Plethoric gastric folds are seen during an endoscopy with stigmata of bleeding and no active bleeding.

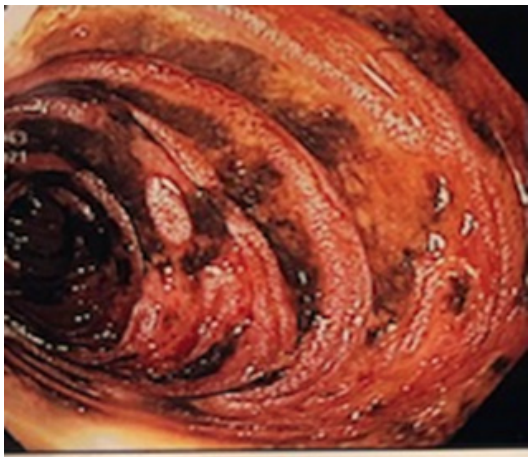

**Figure 4.** Scattered necrosis/eschars are seen throughout the second part of the duodenum during upper endoscopy.

esis describing a low-flow vascular event and an acute inciting event resulting in esophageal injury remains the most popular etiology. AEN preferentially affects the distal esophagus, likely secondary to its decreased vascularization, and it stops abruptly at the gastroesophageal junction with proximal extension occurring in 34% of cases.[5,6] Our patient was also found to have necrosis in her duodenum, which can be present in up to 50% of cases.[2,8,9] Duodenal ischemia could be secondary to gastric mucosal injury and low blood supply as seen in our patient as well as the celiac artery being a common blood supply and the second and third part of the duodenum being a watershed area.[8,9] The characteristic appearance of diffuse, black esophageal mucosa is sufficient for diagnosis with biopsy being supportive, but not necessary.[5-7] Exclusion criteria include caustic ingestion, trauma, radiotherapy, and infections.[5,10] Given the critical nature of this patient's disease course, Zollinger-Ellison syndrome was not further investigated with biopsies.

In Gurvits et al, they found that AEN was more common in geriatric males with presentation of gastrointestinal hemorrhage.[2] All patients in their study had hypoalbuminemia and anemia. They also observed renal insufficiency and hyperglycemia in 90% of their patients.[2] Our patient was a geriatric female, she presented with gastrointestinal hemorrhage, a hemoglobin of 6.3 g/dL, albumin of 1.0 g/dL, and hyperglycemia from 146 to 200 mg/dL that was treated with insulin.

Management of AEN and duodenal disease usually consists of intravenous hydration, keeping the patient NPO, and aggressive intravenous PPI therapy until the patient clinically improves and can tolerate an oral diet. Red blood cell transfusion is needed for anemic patients. Nasogastric tubes should not be placed as it can increase the risk of perforation.[5,6,11] Our patient was managed in this manner. If the patient does not clinically improve, total parenteral nutrition can be used until dysphagia resolves and the esophageal mucosa heals.[5] Typically, repeat endoscopy will show normal esophageal mucous membrane and duodenal mucosa within 1-2 weeks.[12] Overall mortality is dependent on the underlying medical condition of the patient but can approach 38%.[11,13]

Malignancy is present in 10% of patients with AEN.[7] While most reported malignancies involve esophageal, pharynx/orynx, pancreatic, colon, and other gastrointestinal etiologies, we did not find a clear cell uterine cancer case reported in our literature review. Given the fact that malignancy is associated with cachexia, which can lead to hypoalbuminemia and immune dysregulation, there is often a decrease in mucosal healing that increases the chance of necrosis when the patient is exposed to an acute event per the “2-hit” hypothesis.[3,7] AEN often follows therapeutic interventions, including chemotherapy or surgery.[7] Vijay et al presented the case of a patient who was found to have AEN 4 days after starting chemotherapy with gemcitabine, dexamethasone, and cisplatin.[1] In our literature review, there were no cases of AEN with our patient's chemother-

apy regimen with carboplatin and paclitaxel, which had been started 2 weeks prior to her presentation. AEN has also been reported in individuals with hypercoagulable states, as in our patient with uterine cancer who later developed multiple deep vein thromboses.[6,7] Our patient had metastatic cancer to the colon and omentum but was not investigated for Lynch syndrome given her critical illness.

## Conclusion

This case demonstrates that AEN should be considered in those with recent changes in their medications, including starting a new chemotherapy regimen with carboplatin and paclitaxel. Both male and female patients with serious co-morbidities and sudden onset syncope, GI hemorrhage, and dysphagia should be considered for endoscopy as they may have AEN.

### Patient Consent

The patient provided informed consent.

### Conflicts of Interest

The authors declare they have no conflicts of interest.

Drs Dabb, Jansen van Rensburg, and Yusuf are employees of HCA Florida Trinity Hospital, a hospital affiliated with the journal's publisher.

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