

Mysterious Case of the Blue Abdomen

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ABSTRACT

Methemoglobinemia is a disease process triggered by various inciting factors. In this case, we looked at a patient presenting with a blue abdomen. We theorized that this discoloration is caused by an atypical presentation of methemoglobinemia precipitated by nitric oxide formation in a patient with colorectal cancer.

Keywords: Methemoglobinemia; Blue abdomen; Colorectal cancer; Carcinogenesis

Introduction

Colorectal cancer (CRC) is the 3rd leading cause of cancer death in the United States in men and women¹. Although 10% of CRC cases are due to hereditary conditions, the majority are sporadic. Colonic carcinogenesis is believed to be multifactorial and many genetic and environmental factors such as smoking, alcohol consumption, and western diet may affect its occurrence². Previous studies^{3,4} have suggested an association between *H.pylori* infection and an increased risk of colorectal cancer, as well as an association between *H.pylori* and immune thrombocytopenia⁵ with improvement of thrombocytopenia after treatment of *H.pylori*⁶.

Case Presentation

A 20-year-old, Ashkenazi-Jewish-female with past medical history of chronic immune thrombocytopenia (ITP) partially resistant to treatment presented to the emergency department (ED) complaining of 2 months abdominal pain and significant weight loss (10 Kg) over a period of 6 months. During the preceding 2 months, she presented to the ED 3 times with

complaints of abdominal pain, nausea and vomiting. This included an admission where she underwent gastroscopy which demonstrated severe gastritis with positive *Helicobacter Pylori* (HP). Platelets at this time were 25 K/uL. Abdominal X-ray demonstrated dilated small bowel loops with air fluid levels and was admitted for hospitalization. The following day, after clinical improvement, treatment for HP was initiated and she was released home, assuming the X-ray findings were the result of gastroscopy air insufflations.

Upon the most recent visit, vitals signs were normal. On physical exam, blue discoloration of the abdomen was noticed (**Figure 1**).

The abdomen was distended but soft, with diffuse tenderness and no rebound or guarding. Laboratory workup was unremarkable except for a platelet count of 124 K/uL. An abdominal computed tomography (CT) scan with oral and intravenous contrast demonstrated a dilated obstructed large bowel with a suspicious concentric mass at the hepatic flexure (**Figure 2**).



Figure 1: Blue Discoloration of the Abdomen.



Figure 2: Abdominal Computed Tomography (CT) scan with oral and intravenous contrast demonstrated a dilated obstructed large bowel with a suspicious concentric mass at the hepatic flexure.

She was urgently taken to the operating room for an exploratory laparotomy. The abdominal skin was bluish in color. Upon entering the abdomen, the small and large bowels were markedly dilated. In addition, the ascending colon and terminal ileum were ischemic. A small, indurated mass was defined at the hepatic flexure as the cause of the complete bowel obstruction (**Figure 3**).

The colon distal to the obstruction was pink and viable. There were several enlarged lymph nodes in the mesentery of the ascending colon. No gross metastasis to the liver or peritoneum were identified. A right colectomy with end-ileostomy was performed. During her hospitalization, the platelet count was low. The patient clinically improved over the following days. The ileostomy was pink and functional. The bluish discoloration of her abdomen improved. On postoperative day 11, she was discharged. The pathology report showed a signet cell mucous-producing carcinoma of the ascending colon invading the muscularis propria into the peri-serosal fat present at the radial

resection margin with 3 affected lymph nodes out of a total of 18 resected. The final pathologic stage was stage 3 adenocarcinoma.

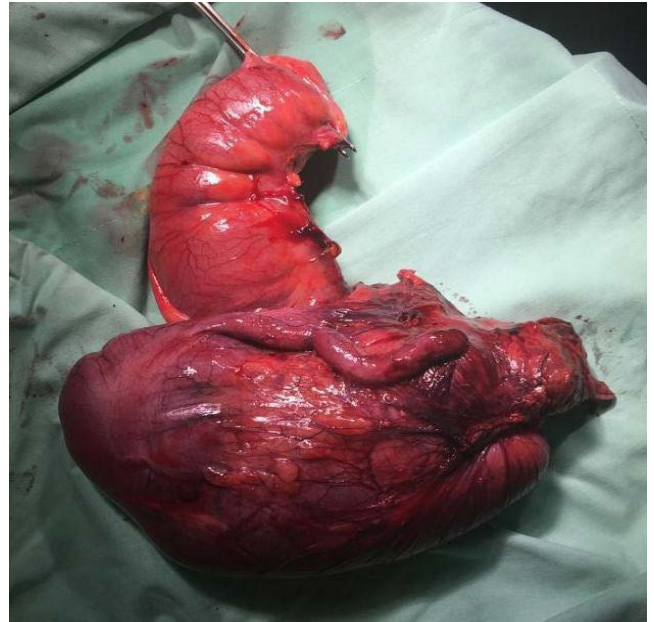


Figure 3: Hepatic flexure of the complete bowel obstruction.

Conclusion

Atypical presentations of complex disease processes will continue to present to the emergency department. Early diagnosis of these cases, especially cancer, will improve outcomes. In this specific case of the 20-year-old female with abdominal pain, there are several disease processes at play and associations to be drawn. The first is between *H.pylori* and CRC as well as *H.pylori* and thrombocytopenia which has also been demonstrated in previous studies. However, the more unique and perhaps novel presentation in this case is attributed to the blue discoloration of the abdomen. Why was it blue? - we have a theory. Although we were unable to find specific literature linking nitric oxide production in CRC, nitric oxide has been previously shown to be a signaling molecule that can be elevated in tumors⁷. Increased levels of nitric oxide can also precipitate methemoglobinemia. In this case, the methemoglobinemia presented as truncal cyanosis causing the abdomen to be blue!

During surgery, the patient appeared to have abdominal obesity and the intra-abdominal wall coloration was normal, therefore in addition to the ischemic bowel appearing blue/black, the skin discoloration was localized to the outer abdominal wall. The blue discoloration improved and resolved within days after removal of the tumor. Methemoglobin level was measured at some point during the first 24 hours of admission and was 1.8 (normal value less than 3.0). Pulse oximetry and blood coloration were normal.

We have described an interesting case presentation of a patient with a blue abdomen. Further studies involving the production of nitric oxide from CRC and the resultant localized methemoglobinemia are warranted to support our theory.

References

1. U.S. Cancer Statistics Working Group. U.S. Cancer Statistics Data Visualizations Tool, based on 2021 submission data (1999-2019): U.S Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute. 2022.

2. Wilmink AB. Overview of the epidemiology of colorectal cancer. *Dis Colon Rectum* 1997;40(4):483-493.
3. Vasilios P. Helicobacter pylori and colorectal neoplasia: Is there a causal link? *World J Gastroenterol*. 2016;22(2):649-658.
4. Zhang Y, Hoffmeister M, Weck MN, Chang-Claude J, Brenner H. Helicobacter pylori infection and colorectal cancer risk: evidence from a large population-based case-control study in Germany. *Am J Epidemiol* 2012;175(5):441-450.
5. Kuwana M. Helicobacter pylori-associated immune thrombocytopenia: Clinical features and pathogenic mechanisms. *World J Gastroenterol* 2014;20(3):714-723.
6. Asahi A, Kuwana M, Suzuki H, Hibi T, Kawakami Y, Ikeda Y. Effects of a Helicobacter pylori eradication regimen on anti-platelet autoantibody response in infected and uninfected patients with idiopathic thrombocytopenic purpura. *Haematologica* 2006;91(10):1436-1437.
7. Luanpitpong S, Chanvorachole P. Nitric Oxide and Aggressive Behavior of Lung Cancer Cells. *Anticancer Res* 2015;35(9):4585-4592.