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Signet Ring Cell Carcinoma Presenting as Terminal Ileitis: A Case Report

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Abstract

Background: Primary signet ring cell carcinoma (PSRCC) is a rare, aggressive subtype of colorectal cancer with limited literature coverage that often affects young adults. Its nonspecific presentation and delayed diagnosis contribute to its poor prognosis.

Case Presentation: A 23-year-old male presented with two weeks of abdominal pain, nausea, vomiting, and constipation. CT imaging revealed a small bowel obstruction at the terminal ileum, with an extensive workup showing an elevated carcinoembryonic antigen as the only other abnormality.

Interventions: After failed decompression, further imaging confirmed complete obstruction. The patient underwent laparotomy with right colectomy and ileocolic anastomosis, revealing an obstructing mass.

Outcomes: Pathology showed poorly differentiated adenocarcinoma with signet ring features at the ileocecal valve, showing full penetration into the serosa and involving the appendix.

Conclusion: PSRCC should be considered in young patients with nonspecific abdominal complaints. Although CEA is not routinely used in screening, it was valuable in this case with otherwise negative testing which allowed narrowing of the differential.

Keywords: Primary signet ring cell carcinoma (PSRCC); Colorectal cancer (CRC); Carcinoembryonic antigen (CEA)

Introduction

In the late 1990s, colorectal cancer (CRC) was the fourth leading cause of cancer-related death among men and women under the age of 50 in the United States and despite the implementation of more rigorous screening guidelines, it has since become the leading cause of cancer-related death in men under the age of 50 and the second leading cause of death in women under the age of 50 [1]. Amongst the various types of CRC, adenocarcinoma is the most common, accounting for approximately 90% of all CRC cases [2]. The primary histological variants of colorectal adenocarcinoma include classical adenocarcinoma, mucinous adenocarcinoma, and signet-ring cell carcinoma [3].

Primary Signet Ring Cell Carcinoma (PSRCC) is a rare and aggressive subtype of colorectal cancer, named for its classic signet ring shape due to the accumulation of mucin in the cytoplasm which displaces the nuclei to the periphery [4]. PSRCC was first described in the 1950's with a reported incidence rate of 0.1-2.4% but currently accounts for less than 1% of all CRC cases [5]. The mean age at diagnosis of PSRCC is reported as 46.9 years, significantly younger than the mean age typically observed in other colorectal cancer subtypes [4]. While 96% of PSRCCs are located in the stomach, they may also arise in other organs such as the breast, gallbladder, pancreas, urinary bladder, and large bowel [6]. Thus, involvement of the small intestine is exceedingly rare. In this report, we present the case of a 23-year-old male diagnosed with PSRCC of the ileocecal valve after initial imaging suggested possible Crohn's disease.

Case Presentation

A 23-year-old African American male with a history of alcohol, cannabis, and tobacco use presented to the Emergency Department with abdominal pain, nausea, vomiting, and constipation over the last two weeks. Upon arrival, the patient was tachycardic with a heart rate of 125 beats per minute and in hypertensive urgency, which was managed with intravenous (IV) hydralazine. Physical exam revealed diffuse abdominal pain without point tenderness at McBurney's point, a negative Murphy's sign, and bowel sounds present in all four quadrants. Labs showed hypochloremia, hyponatremia, hypokalemia, elevated creatinine, and hemoconcentration. Patient denied hematochezia, melena, hematemesis, dyschezia, rectal bleeding, weight loss, fever, or chills. Lactulose and an enema were administered, with no relief. At this time a Computerized Tomography (CT) of the abdomen and pelvis was performed. CT revealed a mechanical small-bowel obstruction (SBO) with a transition point at the terminal ileum, accompanied by wall thickening extending from the terminal ileum through the mid-ascending colon. Additionally, air-fluid levels were observed from the proximal jejunum to the terminal ileum, with decompression of the colon. Due to the SBO, an enteric tube was inserted and placement was confirmed with abdominal radiography. The patient was subsequently transferred into the inpatient unit for further evaluation.

On hospital day 2, following gastroenterology consultation, a comprehensive diagnostic workup was initiated to evaluate for possible gastrointestinal and systemic inflammatory pathology. The workup included testing for *Clostridioides difficile* toxin, stool culture, fecal calprotectin, inflammatory bowel disease (IBD) panel, and carcinoembryonic antigen (CEA) levels. Inflammatory markers such as erythrocyte sedimentation rate and C-reactive protein were also obtained. Additional investigations included serum lactic acid and iron studies to assess for hemoconcentration. Results of the comprehensive workup were unremarkable except for an elevated CEA level. A Doppler ultrasound of the mesenteric vessels was performed to evaluate for potential vascular abnormalities. However, the study was significantly limited by extensive bowel gas, which obscured visualization of the celiac artery, superior mesenteric artery, inferior mesenteric artery, and hepatic artery. Despite these limitations, the splenic artery was successfully visualized and demonstrated normal flow characteristics. Small bowel series was performed and suggested a distal SBO at the terminal ileum most consistent with terminal ileitis. These findings raised concern for potential Crohn's disease. On day 3 a repeat CT abdomen was performed and demonstrated distended small bowel loops with retained oral contrast along with failure to transit into the large intestine. No pneumoperitoneum was observed.

On hospital day 4, a laparotomy with a right colectomy was performed. The surgery began with a midline abdominal incision followed by dissection into the peritoneum. The intraperitoneal compartment was eviscerated and 6-7 cm of distended edematous small bowel was noted. Attention was then turned to the terminal ileum, cecum, and ascending colon. A completely obstructing mass was identified in the mid-ascending colon, associated with surrounding inflammatory changes and a pronounced desmoplastic reaction. The mass demonstrated a dense inflammatory adherence to the adjacent retroperitoneum. The liver and peritoneum were free of any lesions. The remaining small intestine and colon also appeared grossly unremarkable. An enterotomy was performed approximately 12 cm proximal to the terminal ileum, through which 3 liters of fecalized fluid were evacuated and followed by irrigation due to spillage of fecal material. The enterotomy site was closed using a powered stapling device with a blue load cartridge. The hepatic flexure was mobilized and dissected utilizing a combination of blunt dissection, electrocautery, and advanced hemostatic sealing devices. Following identification of the middle colic artery, the transverse colon was transected with a powered stapling device with a green load cartridge and excised portions were sent to pathology. A side-to-side, functional end-to-end ileocolonic anastomosis was subsequently constructed and one 15 french JP drain was placed prior to incision closure.

Pathology report of the right colon, terminal ileum, and appendix resection revealed invasive poorly differentiated mucinous adenocarcinoma with prominent signet cell formation arising at the ileocecal valve with luminal extension into the adjacent terminal ileum. Carcinoma extended the full thickness of the bowel and involved the serosa layer. Carcinoma was also present on the serosal surface and outer wall of the appendix. Histopathological examination revealed the presence of lymphovascular and perineural invasion. All 13 of the 13 sampled lymph nodes demonstrated metastatic adenocarcinoma. Negative margins were noted. Tumor size was 5 x 3.5 x 1.8 cm with a pTNM classification of pT4a, pN2b.

Following the surgery the patient had an unremarkable postoperative course and was managed symptomatically. On hospital day 9, the patient underwent an esophagogastroduodenoscopy with biopsy of the upper GI tract. At the level of the esophagus, gross examination revealed no evidence of varices, Barrett's esophagus, Schatzki's ring, or hiatal hernia. Histopathologic evaluation of the esophagus demonstrated mild chronic esophagitis, without evidence of intestinal metaplasia, dysplasia, or malignancy. Examination of the gastric cardia, fundus, body, antrum, and pylorus were notable for mild and diffuse, non-erosive, nonbleeding erythema. Histopathological findings of the stomach confirmed mild chronic gastritis with no evidence of dysplasia or malignancy. Immunohistochemical staining for *Helicobacter pylori* was negative. The first and second part of the duodenum were grossly unremarkable. Histologic evaluation showed preserved villous architecture, a normal distribution of chronic inflammatory cells, and an absence of acute inflammation, dysplasia, or malignancy.

Post-procedure the patient passed flatus, had a bowel movement, and was discharged with instructions to follow-up with GI and oncology outpatient

Discussion

Primary signet ring cell carcinoma is a rare and aggressive subtype of adenocarcinoma that accounts for less than 1% of colorectal cancers [5]. Due to its insidious clinical presentation and delayed diagnosis, PSRCC carries an unfavorable prognosis [9]. This subtype often presents with vague, nonspecific symptoms that can mimic a range of conditions, including inflammatory bowel disease, amebiasis, and gastroenteritis.

In this case, the patient's nonspecific abdominal complaints initially resulted in a broad but unrevealing workup. In order to achieve a thorough diagnostic evaluation, an extensive panel of tests was performed. This included measurement of CEA to assess for potential malignant processes, an IBD panel to evaluate for immune-mediated pathology, iron studies to investigate for underlying hematologic derangements, and microbiological assays aimed at identifying infectious etiologies. CEA is generally recommended for treatment monitoring rather than for screening, given its poor sensitivity and specificity, and it is typically used as a prognostic marker to assess treatment response rather than to identify malignancy [7,8]. However, as demonstrated in this case, one can see the benefits of its use in developing a diagnosis, not just blind screening, especially in scenarios where vague symptoms obscure a definitive diagnosis.

This case is not isolated, as there have been reports of PSRCC misdiagnosed as Crohn's disease, both on imaging and colonoscopic evaluation, with the correct diagnosis established only after histopathologic confirmation [10]. Notably, CEA testing was not incorporated into the diagnostic evaluation of that case, which may have contributed to delays in diagnosis. Earlier utilization of CEA could have shortened the diagnostic timeline, allowing for more timely intervention and potentially improved outcomes.

Particular attention should be given to individuals with barriers such as limited resources, poor health literacy, or the absence of a known family history, all of which were observed in our patient. These barriers often create significant gaps in healthcare delivery and in the absence of thorough evaluation, such gaps are more likely to be filled with bias or assumption rather than objective clinical evidence. A more extensive and deliberate diagnostic workup therefore serves as an important safeguard against these disparities, ensuring that care is guided by concrete findings rather than preconceived notions

Conclusion

This case illustrates the diagnostic challenge posed by PSRCC, particularly in younger patients presenting with nonspecific abdominal complaints or findings resembling Crohn's disease. The overlap in clinical and radiographic features may obscure recognition of an underlying malignancy, leading to delays in diagnosis and treatment. Incorporation of CEA testing, when interpreted in conjunction with imaging and histopathology, may contribute to a more comprehensive evaluation and facilitate earlier identification of colorectal carcinoma in select cases.

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