

Perforated Diverticulitis: An Unexpected Twist in the Plot

David Hovel MD, Bernardo Melamud MD, and Eran Israeli MD

Department of Gastroenterology, Wolfson Medical Center, Holon, Israel

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Colorectal cancer (CRC) is the most common gastrointestinal cancer and in early stages it may progress without any symptoms. Clinical symptoms may be discrete. Only approximately 15–30% of CRC patients present with symptoms of acute abdomen such as perforation, obstruction, lower gastrointestinal bleeding, or formation of an abscess [1]. These complications are common in the older population, typically in their sixth and seventh decade of life, while a worse prognosis is associated with their manifestation. CRC manifests without any symptoms in early stages or with non-specific clinical symptoms such as abdominal discomfort or change of bowel habits [2]. Perforation is the second most common reason for emergent surgery associated with colorectal carcinoma, with an incidence of 2.6–12% [3]. Intestinal perforation may be found either at the site of the tumor or on a more proximal site caused by distention of the bowel due to colonic obstruction.

Diverticular disease is a common problem in western countries. Its prevalence increases with age, varying from approximately 5% in patients younger than 40 years and increasing to 50–66% in those older than 80 years [4]. The disease affects the sigmoid and descending colon in more than 90% of the patients. Diverticulitis may be uncomplicated, with bowel wall thickening and/or adjacent intra-abdominal fat stranding, or complicated, with the presence of bowel

perforation with free intra-abdominal air, abscess, or fistula [5].

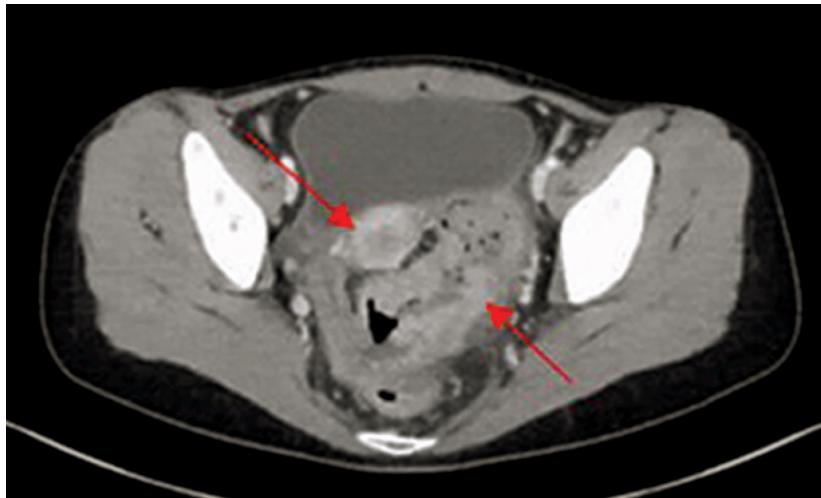
We present a case of colon cancer initially presumed to be complicated diverticulitis based on a computed tomography (CT) scan in a young patient.

PATIENT DESCRIPTION

A 35-year-old woman presented to the emergency department (ED) with complaints of lower abdominal pain, fever 38°C and aggravating constipation, which first appeared 6 months ago. She denied any infectious illness. Her past medical history included epilepsy, which was treated with carbamazepine 600 mg twice daily. Physical examination revealed abdominal guarding. Laboratory tests included complete blood count, liver enzymes, renal function tests, and mild hyponatremia of 125 mmol/l that was normalized during her hospitalization with normal saline solution 0.9%. Abdominal ultrasound was unremarkable. A CT without contrast showed a thickened sigmoid colonic wall with fatty infiltration, extra-luminal bubbles, and fluid air levels indicating an inflammatory process in sigmoid colon secondary to presumed contained perforated diverticulitis. Intravenous ciprofloxacin 250 mg and clindamycin 300 mg twice daily were started. The fever normalized and the abdominal pain improved thereafter. A month after her discharge from the hospital, she was referred back to the ED with complaints of bloody diarrhea, abdominal pain, and fever of 38°C. A positive *Clostridium difficile* toxin was found on a stool test, oral metronidazole 500 mg twice daily was started with resolution of her symptoms. After 3 weeks,

she started to complain on perfused diarrhea, a stool toxin for *C. difficile* tested positive again, and she was treated with oral vancomycin 125 mg four times daily with resolution of her symptoms. During her hospitalization she complained of severe abdominal pain and a fever of 38.4°C was measured. Blood analysis showed C-reactive protein levels of 11 mg/dl with a normal white blood cell count and normal lactate levels. Her abdominal examination revealed peritoneal irritation. Emergent CT of the abdomen with contrast showed a diffuse thickened sigmoid colonic wall with secondary luminal stenosis, intraluminal prominence and extra-luminal infiltration to the adjacent fatty tissue [Figure 1].

She underwent an urgent diagnostic laparoscopy, which revealed murky peritoneal fluid with a small intestinal loop adherent to the sigmoid colonic wall. Peritoneal lavage was performed. Peritoneal fluid culture revealed growth of *Escherichia coli* (*E. coli*) and *Enterococcus faecalis*. The patient was treated with intravenous amoxicillin clavulanate 1 gram thrice daily. Due to the findings on abdominal CT a sigmoidoscopy was preformed, which revealed an edematous mass with narrowed intestinal cavity. Multiple biopsies were obtained, which is most frequently associated with constriction of the lumen of the colon by a stenosing annular CRC. Our patient underwent a repeat colonoscopy that showed a circular ulcerated 5 cm polypoid lesion in the sigmoid colon, which narrowed the intestinal cavity. Biopsies from this lesion revealed a tubular adenoma with high-grade dysplasia and foci of intramucosal carcinoma. Due to these findings a sigmoidectomy

Figure 1. Computed tomography image showing an apple core sign

was performed and histology revealed a moderately differentiated colonic adenocarcinoma invading the entire colonic wall and reaching the peri-colic fatty tissue.

COMMENT

One area of persisting controversy deals with whether an association exists between diverticulitis and advanced colonic neoplasm, and if so, is there an increased incidence of colonic neoplasm in patients diagnosed with diverticulitis. There is a common practice of performing a colonoscopy in the first year after discharge to every hospitalized patient who was diagnosed with acute diverticulitis. This issue is quite controversial. Studies may show confounding results due to different methods of diagnosis of diverticulitis and grading severity. Fogelstrom et al. [4], recently showed that patients with CT-verified complicated diverticulitis (modified Hinchey \geq Ib) had a significantly higher risk for colon cancer compared to patients with an uncomplicated first time diverticulitis. They did not find it necessary to perform a follow-up colonoscopy in patients with an uncomplicated diverticulitis with no other risk factors. Our case underlines the unusual presentation of CRC in a young patient, which masked itself as a perforated diverticulitis and

highlights the need for follow-up colonoscopy, especially in these cases.

CONCLUSIONS

Colorectal cancer can have different manifestations and should always be in the differential diagnosis in cases of complicated diverticulitis, especially in the young population. Gastroenterologists and surgeons should be aware of this potential diagnosis, as early diagnosis can prevent unnecessary mistreatment.

Correspondence

Dr. B. Melamud

Dept. of Gastroenterology, Wolfson Medical Center, Holon 5822012, Israel
Phone: (972-3) 502-8499
Fax: (972-3) 502-8867
email: dr.bernardo@gmail.com

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Capsule

Variable malaria susceptibility

In humans, there is a distinct geographical signature in the subsets of immune cells responding to malaria parasites. The development of effective malaria vaccines has been hampered by substantial geographic variability in immunity to the pathogen *Plasmodium falciparum*. These differences likely result from the combined effects of genetics and environment. de Jong et al. experimentally infected both malaria-naïve Europeans and Africans known to have variable susceptibilities to malaria with *P. falciparum*. Using mass cytometry, RNA sequencing, and machine learning, the authors

developed profiles for circulating immune cells both before and after inoculation. Before infection, an enhanced activation state of both innate and adaptive immune cells correlated with protection. After infection, African patients with controlled parasitemia responded more rapidly, with enhanced levels of distinct subsets of immune cells, including CD4+ T cells, innate-like T cells, and plasmacytoid dendritic cells.

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Eitan Israeli