

## *Clostridium difficile* Small Bowel Enteritis Occurring after Total Colectomy

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(See the editorial commentary by Silva on page 1432)

***Clostridium difficile* infection is usually associated with antibiotic therapy and is almost always limited to the colonic mucosa. Small bowel enteritis is rare: only 9 cases have been previously cited in the literature. This report describes a case of *C. difficile* small bowel enteritis that occurred in a patient after total colectomy and reviews the 9 previously reported cases of *C. difficile* enteritis.**

*Clostridium difficile* infection is often associated with antibiotic therapy and is almost always limited to the colonic mucosa. Small bowel enteritis is rare: only 9 previous cases are cited in the literature. We report a case of *C. difficile* enteritis occurring in a patient after total colectomy and review the previously reported cases.

A 26-year-old man presented on 13 September 1997 with watery diarrhea, nausea, vomiting, and abdominal cramps of 1 day's duration. The patient reported that he had been changing his ileostomy bag every 1–2 h during the 24 h prior to presentation. He had been hospitalized 2 weeks previously for repair of a hernia. The hernia repair was complicated by abdominal wall cellulitis, for which he was treated with amoxicillin–clavulanic acid for 10 days.

The medical history was significant for ulcerative colitis, for which he underwent a total colectomy due to toxic megacolon

2 years prior to presentation. In addition, he had undergone liver transplantation for sclerosing cholangitis in 1992. The medications he was receiving on admission included cyclosporine and prednisone. Vital signs were notable for an initial systolic blood pressure of 80 mm Hg, pulse of 180 beats/min, respirations of 24 breaths/min, and a temperature of 39.2°C. On abdominal examination, he had mild bilateral lower-quadrant tenderness with no appreciable organomegaly or peritoneal signs. The patient had voluminous clear output from his ileostomy, as reported above.

Laboratory studies upon admission revealed a WBC count of 25,000 cells/mm<sup>3</sup> with 84% neutrophils, 1% bands, and 10% lymphocytes. His hemoglobin and platelet levels were 17.8 g/dL and 394,000 platelets/mm<sup>3</sup>, respectively. The findings of urinalysis, amylase, lipase, and renal and liver function test values were all within normal limits. An acute abdominal series revealed no obstruction, free air, or dilated loops of bowel.

The patient began empirical therapy with piperacillin-tazobactam and ciprofloxacin for presumed sepsis. Abdominal CT showed postsurgical changes and an abdominal wall seroma near the site of the recent abdominal wall hernia repair. This fluid collection was percutaneously drained. The fluid was serous and did not yield any organisms on culture. No other intraabdominal pathological findings were noted radiographically.

Following resuscitative efforts, the patient stabilized and his blood pressure became normal. Blood, urine, and stool cultures were performed and did not yield any organisms. The results of a rotavirus antigen detection assay and assay for stool leukocytes were negative. Stool was subsequently reported to be positive for *C. difficile* toxin A by use of an enzyme immunoassay. The broad-spectrum antibiotics were withdrawn and replaced with oral metronidazole (500 mg t.i.d.), which resulted in prompt resolution of the symptoms (within 24 h). On the third hospital day, the patient was discharged to home, and he continued therapy with metronidazole to complete a 10-day course.

A comprehensive review of the English-language literature was performed for cases of *C. difficile* small bowel enteritis. Only 9 cases of small bowel enteritis caused by *C. difficile* have been reported (table 1). A majority of patients had prior gastrointestinal surgery, and 3 had undergone total colectomy. Three patients had inflammatory bowel disease. All but 2 had recently received antibiotics. The majority of patients were treated with vancomycin, either alone or in combination with metronidazole. The outcome in 6 cases was death. The current patient had undergone total colectomy, had recently received antibiotics, and was treated with metronidazole; this patient is

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**Table 1. Cases of small bowel enteritis caused by *Clostridium difficile*.**

Reference	Patient age/sex	Medical comorbidities	Abdominal surgery	Recent antibiotics	Treatment	Outcome
[1]	23 years/F	Crohn's disease	Partial colectomy	No	Vancomycin	Resolution
[2]	4 months/F	None	None	No	Vancomycin	Resolution
[3]	70 years/M	Transitional cell carcinoma of the bladder, ischemic heart diseases, chronic obstructive pulmonary disease	Bladder irradiation, cystectomy	Yes	Vancomycin	Death
[4]	69 years/M	Rectal carcinoma	Abdominal perineal resection of the rectum	Yes	Supportive	Death
[5]	53 years/M	Ulcerative colitis	Total colectomy, proctectomy, and ileostomy	Yes	Metronidazole-vancomycin	Death
[6]	66 years/M	Colon carcinoma, rectal carcinoma, type II diabetes mellitus, peptic ulcer disease	Right hemicolectomy, abdominal perineal resection of the rectum	Yes	Metronidazole-vancomycin	Death
[7]	71 years/M	Colon carcinoma, prostate adenocarcinoma	Total colectomy with ileorectal anastomosis, prostatectomy	Yes	Metronidazole-vancomycin	Death
[8]	65 years/M	Chronic liver insufficiency, calcium oxalate nephropathy, end-stage renal disease	Jejunum-ileal bypass	Yes	Metronidazole-vancomycin, total abdominal colectomy with resection of diseased ileum	Death
[9]	56 years/F	Crohn's disease, duodenal ulcer	Proctocolectomy, several small bowel resections and ileostomy revisions, vagotomy and antrectomy with gastrojejunostomy	Yes	Metronidazole, partial jejunal resection	Resolution
PR	26 years/M	Ulcerative colitis	Hepatic transplantation, total colectomy	Yes	Metronidazole	Resolution

**NOTE.** PR, present report.

the second to survive *C. difficile* small bowel enteritis after total colectomy.

Recent antibiotic treatment, recent hospitalization, gastrointestinal manipulation, and old age, which are known risk factors for *C. difficile* colitis, also appear to be risk factors for *C. difficile* small bowel enteritis. Patients with inflammatory bowel disease are more prone to *C. difficile* colonization and colitis and may also be more prone to *C. difficile* small bowel enteritis.

Although the pathogenesis of *C. difficile* small bowel enteritis is not clearly established, it is likely that the same sequential events that are required for colitis occur in small bowel enteritis. Because the majority of cases occurred after treatment with antibiotics, disruption of small bowel flora is likely needed to establish infection. It has been hypothesized that the small bowel may become susceptible to infection secondary to large bowel phenotypic changes after gastrointestinal surgery [7, 9, 10]. In addition, studies have shown that *C. difficile* is capable of colonizing the small intestine [11, 12]. After colonization, toxins may be released that result in mucosal damage and inflammation.

The clinical manifestations of *C. difficile* infection vary widely

in severity. Though the majority of patients are asymptomatic carriers, fulminant disease is known to occur. Patients with small bowel enteritis and colitis have similar presenting symptoms. Diarrhea and abdominal cramps are almost uniformly present. Unlike *C. difficile* colitis, in the majority of reported cases, small bowel enteritis has presented with systemic manifestations. In addition, *C. difficile* small bowel enteritis may be associated with a higher case-fatality rate than that reported with *C. difficile* colitis. As with any case review, these observations may be subject to reporting bias.

The treatment of choice for small bowel enteritis has not been established. Five of the 9 reported cases were treated with metronidazole and 7 were treated with vancomycin. Several patients received both of these antibiotics. As mentioned previously, the current patient received metronidazole and was the second reported to survive *C. difficile* enteritis after a total colectomy.

Small bowel enteritis with *C. difficile* is a rare entity. Presenting symptoms are similar to those of *C. difficile* colitis but may be more severe than those typically seen with the latter condition. A majority of the patients in our review had prior gastrointestinal manipulation, and several had inflammatory

bowel disease. This diagnosis should be entertained when patients with known risk factors for *C. difficile* infection present with diarrhea and have had prior colon surgery.

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