Gastroscopy-Related Peritonitis in Peritoneal Dialysis Patients

Peritonitis is associated with an increased risk of technique failure and mortality among peritoneal dialysis (PD) patients (1–3). Along with improved connectology and training methods, antibiotic prophylaxis given before high-risk procedures has probably contributed to an overall decline in peritonitis rates since the early 1990s. As recommended by the International Society of Peritoneal Dialysis (ISPD), most peritoneal dialysis units use prophylactic antibiotics for PD patients undergoing colonoscopy and dental procedures (4). In a retrospective

study by Yip *et al.*, PD patients undergoing a colonoscopy without any antibiotic prophylaxis had a 6.3% risk of developing peritonitis subsequent to the procedure; no episodes of peritonitis occurred in the group receiving antibiotic prophylaxis (5). Many case reports also highlight the added peritonitis risk for PD patients undergoing colonoscopy (6–8).

Although prophylaxis is widely accepted before colonoscopy, little is known about the gastroscopy-induced peritonitis risk in patients on PD. No recommendation has been made by the ISPD, and to our knowledge, only 2 cases have previously been reported in the literature (9,10). In this report, we describe another 2 gastroscopy-related cases and discuss further the implications of this complication.

CASE 1

Our first patient was a 28-year-old man with chronic obstructive uropathy on continuous ambulatory PD for 9 years. One month after starting PD, he developed an episode of *Citrobacter braakii* peritonitis and was treated with intraperitoneal tobramycin and oral ciprofloxacin. The patient's PD history was peritonitis-free for the subsequent 9 years, until an elective gastroscopy because of symptoms suggestive of gastroesophageal reflux. The gastroscopy showed high-grade esophagitis (Los Angeles class D), with esophageal ulcers. The following day, the patient reported abdominal pain, and the day after that, he presented to the hospital with cloudy effluent, nausea, and vomiting.

An effluent white blood cell (WBC) count showed 1850 cells/mm³, with 86% neutrophils. The patient was started on vancomycin and tobramycin. An effluent culture was positive for *Bacteroides fragilis*. Despite antibiotic therapy and the addition of metronidazole, the effluent culture stayed positive for more than a week. No visceral or intestinal perforations were seen on abdominal computed tomography imaging. The patient remained highly symptomatic and had a complicated hospitalization.

Peritoneal effluent cultures subsequently showed multiple bacteria, including *Klebsiella pneumoniae*, *Morganella morganii*, *B. fragilis*, *Prevotella* species, *Clostridium clostridioforme*, *Cit. koseri*, and *Enterococcus faecium*. The peritoneal catheter was removed, but the peritonitis persisted despite aggressive treatment. The patient died of ongoing complications 4 months after the gastroscopy.

CASE 2

Our second patient was a 73-year-old man with a 3-year history of continuous ambulatory PD for chronic

glomerulopathy. He had experienced only 1 previous episode of culture-negative peritonitis treated with cefazolin 2 years after PD initiation. The patient was admitted for uremic encephalopathy secondary to non-adherence to dialysis therapy. Extended blood work and cultures, including effluent cultures at admission, all came back negative.

Uremic symptoms improved with re-commencement of PD. However, 10 days after his admission, the patient developed upper gastrointestinal bleeding. He underwent a gastroscopy that revealed active bleeding from a large duodenal ulcer. Epinephrine was injected, and clips were placed. A second gastroscopy performed 2 days later observed no active bleeding. That day, the patient reported abdominal pain and cloudy effluent.

An effluent WBC count was elevated at 2930 cells/mm³, with 93% neutrophils, and an effluent culture was positive for *Escherichia coli*. The WBC count remained elevated for 6 days. The patient was treated empirically with tobramycin and cefazolin until receipt of the definitive culture results; the antibiotic course was completed with ciprofloxacin treatment for a total of 21 days.

The patient was discharged home a few days after his peritonitis without any further complications.

DISCUSSION

Our two cases of gastroscopy-related peritonitis occurred in patients who each had previously experienced only 1 peritonitis episode in PD durations of 9 and 4 years. Within 2 days of the gastroscopy, both presented with classical symptoms of bacterial peritonitis, an elevated WBC count, and a positive peritoneal effluent culture. The short delay between the procedure and the complication—together with the low previous peritonitis rate—suggests, but does not confirm, causality.

In the gastroscopy literature, cirrhotic patients with active bleeding are known to be at higher risk of infection (mostly bacteremia and spontaneous bacterial peritonitis). Antibiotic prophylaxis given in this group before gastroscopy has been associated with a lower risk of subsequent infection (11,12). Although gastroscopy is usually a low-risk intervention, PD patients could be vulnerable to the same peritonitis risk as cirrhotic patients because of the presence of fluid in the peritoneal cavity in both conditions.

Higher rates of infection have also been associated with specific endoscopic interventions, including treatment of esophageal varices, endoscopic retrograde cholangiopancreatography, and percutaneous endoscopic gastrostomy (13,14). Bacterial translocation with transient bacteremia and mucosal microperforation with bacterial migration

can both lead to peritonitis. Specific interventions aimed at controlling active bleeding could also increase the risk of peritonitis in dialysis patients. One of our patients underwent an endoscopic intervention with epinephrine injection and clip insertion during his first gastroscopy. An intervention was also performed for one of the two cases of gastroscopy-related peritonitis in the literature. As reported by Machuca *et al.* (9), a 69-year-old patient on automated PD underwent an emergency gastroscopy for occult gastrointestinal bleeding associated with syncope. Epinephrine injection and heat-probe coagulation were performed to control an actively bleeding duodenal ulcer, and a *Streptococcus viridans* peritonitis became clinically apparent on the subsequent day. On the other hand, no specific intervention was performed during the endoscopic procedure in our first patient. Another patient reported by Morimoto *et al.* (10) also underwent a simple gastroscopy without any intervention. This 49-year-old woman on PD had an episode of *Ent. faecalis* peritonitis 7 days after a gastroscopy. Her case differs from those of our two patients and the other reported case, because the woman was known to have repetitive peritonitis episodes related to gynecologic examinations. The 7-day peritonitis delay after that gastroscopy is also longer than the delay in the other cases.

Interestingly, considering our two cases and the two previously reported ones, gram-positive and gram-negative organisms have both been associated with upper endoscopy. Our first patient initially presented with *B. fragilis*, an obligatory anaerobic bacteria more specific to gut; the patient reported by Machuca *et al.* developed a *S. viridans* peritonitis, a bacterium frequently associated with mouth flora. If antibiotic prophylaxis were to be given to PD patients before gastroscopy, it should probably resemble the protocols used with colonoscopy as recommended by ISPD guidelines: ampicillin, plus a single dose of aminoglycoside, with or without metronidazole (4). Ampicillin would be effective prophylaxis for both oral and enteric bacteria.

CONCLUSIONS

Although no definitive conclusions can be drawn from these few cases of gastroscopy-related peritonitis, they highlight the need to reassess the infectious risk associated with gastroscopy in PD patients. Knowing the significant adverse outcomes associated with a peritonitis episode in these patients, antibiotic prophylaxis should be contemplated in PD patients undergoing upper endoscopy. It might also be prudent for the patient to be drained of dialysis fluid. The next generation of infection prevention and management guidelines from

bodies such as the ISPD should consider expanding their recommendations for antibiotic prophylaxis to include gastroscopy.

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DISCLOSURES

ACNF has no disclosures. JMB has been a consultant for Amgen and Baxter Healthcare, and is in the speakers' bureau for Amgen and DaVita Healthcare Partners.

Annie-Claire Nadeau-Fredette
Joanne M. Bargman*

Division of Nephrology
University Health Network
Toronto, Ontario, Canada

*email: joanne.bargman@uhn.ca

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