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Peritonitis following Endoscopy in a Patient on Peritoneal Dialysis with a Discussion of Current Recommendations on Antibiotic Prophylaxis

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Key Words

Ascites · Endoscopy · Peritonitis · Prophylactic antibiotics

Abstract

Patients on peritoneal dialysis (PD) are at increased risk for peritonitis. We report a case of a patient with end-stage renal disease on continuous ambulatory PD (CAPD) who developed peritonitis within 24 h of upper endoscopy with biopsy and colonoscopy with polypectomy. He had a previous history of peritonitis unrelated to invasive procedures and eventually was transitioned to hemodialysis because of his recurrent peritonitis. The International Society for Peritoneal Dialysis (ISPD) and newly revised American Society for Gastrointestinal Endoscopy (ASGE) guidelines recommend prophylactic antibiotics for CAPD patients undergoing endoscopic procedures. Other guidelines do not address this issue, and there has been limited evidence to support recommendations.

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Introduction

Peritonitis is a common complication in patients on continuous ambulatory peritoneal dialysis (CAPD). Rates of peritonitis range from 0.06 episodes per year up to 1.66 episodes per year, depending on the institution [1]. Various mechanisms may cause peritonitis in

these patients, including contamination from the skin, catheter-related infections, bacteremia, gynecologic sources, and bowel-source enteric organisms [1].

There are a variety of reasons that peritonitis as a complication of CAPD is clinically relevant. These include straightforward concerns such as increased morbidity, mortality, and healthcare costs. It is also important to consider less direct concerns such as the need to change dialysis modality from in-home CAPD to in-center hemodialysis (HD). In fact, the most common reason that patients change from CAPD to in-center dialysis is recurrent peritonitis [2]. This is important because there is evidence that patients on CAPD have outcomes that are possibly better than those of patients on in-center HD [3]. While there does not seem to be a significant difference in survival outcomes for these patients, there is a notable difference in patient satisfaction and quality of life [3]. In addition, the Medicare End Stage Renal Disease Program has multiple incentives in place to encourage the use of home dialysis methods over in-center HD [3]. Therefore, it is important to decrease the need to switch patients from home dialysis modalities, such as CAPD, to in-center HD. One way to do this would be to decrease the rate of peritonitis in patients on CAPD.

There is a notable correlation between invasive gastrointestinal procedures, such as endoscopy with and without polypectomy, and bowel-source peritonitis in patients on CAPD [1, 2]. These infections likely arise due to transmural migration of bacteria from the bowel following manipulation of the gastrointestinal tract [1]. This translocation of bacteria is thought to cause a systemic bacteremia and eventual seeding of the peritoneal fluid [2]. Patients on CAPD are more likely to develop peritonitis following these procedures due to a variety of factors, especially patients with comorbid diabetes and constipation [1]. Additionally, the glucose-containing dialysis solution itself likely decreases host defenses by diluting host immune responses and likely promotes bacterial growth [2].

The International Society for Peritoneal Dialysis (ISPD) guidelines, as well as the newly updated American Society for Gastrointestinal Endoscopy (ASGE) guidelines, encourage the use of prophylactic antibiotics prior to endoscopy, as will be discussed below [1, 4]. These recommendations are based mainly on 2 retrospective studies of peritonitis in patients on CAPD following invasive procedures [5, 6]. However, no controlled studies exist investigating this issue.

Below, we report a case of a patient with end-stage renal disease (ESRD) on CAPD who developed peritonitis following both upper and lower endoscopy with polypectomy. He did not receive prophylactic antibiotics. Informed consent was obtained for this case report. We additionally review 9 case reports, 2 retrospective studies, and the current guidelines regarding the recommendations for the use of prophylactic antibiotics in patients on CAPD undergoing invasive gastrointestinal procedures.

Case Presentation

A 50-year-old African-American male with a past medical history of ESRD secondary to hypertension on CAPD, *Enterococcus faecalis* peritonitis 4 months prior to presentation, peptic ulcer disease, and treatment-naïve chronic hepatitis C presented with diffuse abdominal pain 1 day after upper endoscopy (EGD) and colonoscopy with polypectomy. Approximately 1 week prior to presentation, the patient was seen in the outpatient gastroenterology clinic for intermittent left-sided abdominal pain. Because of his need for screening colonoscopy, the history of peptic ulcer disease, and abdominal pain, he was scheduled for an EGD and colonoscopy. He did not receive prophylactic antibiotics prior to the procedures. EGD was significant for clean-based duodenal ulcers. Biopsies were negative for *Helicobacter pylori*.

Colonoscopy was performed to the sigmoid colon but could not be completed because of poor preparation. However, it was significant for 3 polyps in the rectosigmoid, removed with cold biopsy forceps (hyperplastic).

The patient reported feeling well immediately following the procedure but developed diffuse abdominal pain that evening. The next morning, he presented to the emergency room complaining of continued diffuse abdominal pain and cloudy dialysate fluid. On examination, he was afebrile. Abdominal examination was soft, nondistended, diffusely tender to palpation, with voluntary guarding but no rebound. His peritoneal dialysis (PD) catheter was in place with no tenderness on manipulation. Peritoneal fluid analysis revealed 22,500 white blood cells with 84% segmented neutrophils. Gram stain revealed multiple polymorphonuclear cells with no organisms. He was given IV vancomycin and cefepime and was transitioned to cefepime via a PD catheter. Over the course of his hospitalization, the patient's abdominal pain improved. He was discharged on hospital day 3 on a course of cefepime and vancomycin via PD. Cultures of peritoneal fluid grew vancomycin-sensitive coagulase-negative *Staphylococcus*.

Discussion

This case highlights a patient on CAPD with a history of peritonitis who developed peritonitis within 24 h of EGD with biopsy and colonoscopy with polypectomy. The patient's history of 2 episodes of peritonitis within 6 months of each other led to the decision to transition this patient from CAPD to HD. Recurrent peritonitis is a common reason to change from CAPD to HD [2]. While there is no difference in overall survival when comparing dialysis modalities such as CAPD to HD, there is a difference in the overall patient satisfaction and quality of life [3].

Review of the literature identifies 9 cases of peritonitis following colonoscopy in patients on CAPD (table 1). Patient ages ranged from 51–73 years, and 67% were female (n = 6/9). Seventy-eight percent of the patients in these cases were colonoscopies indicated for either rectal bleeding or positive hemoccult samples. Two patients developed peritonitis despite prophylactic antibiotics. Cultured bacteria were consistent with suspected enteric pathogens. The majority of cases did not have a previous history of peritonitis.

Two retrospective studies have investigated the use of prophylactic antibiotics in patients on CAPD undergoing invasive procedures. While peritonitis following endoscopy in patients on CAPD is a relatively infrequent event, there is a notable difference in the incidence of peritonitis in patients following endoscopic procedures (6.3–6.6%) versus the general population (<0.1%) [5, 6]. One study, conducted in Hong Kong in 2007, found that 6.3% of the patients who underwent a colonoscopy, both with and without polypectomy, developed peritonitis without prophylactic antibiotics, whereas none of the patients who received prophylactic antibiotics developed peritonitis [5]. A more recent and expanded retrospective study found that prophylactic antibiotics significantly reduced peritonitis in patients on CAPD following invasive non-EGD procedures. Invasive non-EGD procedures were defined as colonoscopy, sigmoidoscopy, enteroscopy, cystoscopy, hysteroscopy, and hysteroscopy-assisted implantation or removal of intrauterine devices with biopsy, polypectomy or intrauterine device implantation [6].

The ISPD guidelines recommend drainage of peritoneal fluid and IV antibiotic prophylaxis with ampicillin, an aminoglycoside with or without metronidazole, prior to endoscopic procedures. The ASGE has recently released updated guidelines on antibiotic prophylaxis for GI endoscopy, which recommends the use of antibiotic prophylaxis for patients on CAPD

undergoing endoscopy of the lower GI tract [4]. They also suggest that the abdomen should be drained of fluid prior to any procedure involving the abdomen or pelvis.

It is important to note that neither the British Society of Gastroenterology (BSG) nor the European Society of Gastrointestinal Endoscopy (ESGE) address the issue of prophylactic antibiotics in patients on CAPD undergoing GI endoscopy [7, 8]. The variable recommendations for prophylactic antibiotics is likely due to the low grade of evidence for the use of prophylactic antibiotics as most data rely on retrospective small studies. Gastroenterologist and nephrologists may differ in their approach to endoscopy in patients on CAPD. As no controlled studies exist, this merits opportunities for further study of the role of antibiotics in PD patients undergoing endoscopy. Understanding patient factors that may play a role in who is at risk may help risk stratify this population and prevent unnecessary complications.

Disclosure Statement

The authors declare that there are no conflicts of interest to disclose.

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Table 1. Peritonitis following colonoscopy with and without polypectomy in patients on continuous ambulatory peritoneal dialysis

First author [ref.], year	Age/sex	Duration of CAPD	Indication for colonoscopy	Poly-pectomy	Time to infection, h	Cultured microorganism(s)	Prophylaxis given	Previous history of peritonitis noted
Peterson [9], 1987	69/M	-	F/U previously seen polyps	-	36	<i>Escherichia coli</i>	-	+
Verger [10], 1987	65/M	1 year	rectal bleeding	+	24	<i>E. coli</i>	-	-
Holley [11], 1987	69/F	-	positive hemocult	+	24	<i>E. coli</i>	-	-
Sprenger [12], 1987	54/F	1 year	positive hemocult	+	72	<i>Enterococcus</i>	+ ^a	-
Ray [13], 1990	65/F	-	rectal bleeding	+	24	<i>Nonfragilis bacteroides</i> (4 species)	+ ^b	-
Bac [14], 1994	51/F	4 years	fecal blood loss	+	24	<i>Peptostreptococcus asaccharolyticus</i> <i>Bacteroides disens</i> <i>B. ureolyticus</i>	-	-
Poortvliet [2], 2010 (a)	67/F	4 years	rectal bleeding	+	48	<i>E. coli</i>	-	+
Poortvliet [2], 2010 (b)	73/M	4 years	rectal bleeding	+	48	<i>E. coli</i> <i>Klebsiella oxytoca</i> <i>Enterococcaceae</i>	-	-
Lin [15], 2012	53/F	4 years	history of colonic polyps and elevated CEA	+	24	<i>E. coli</i> <i>K. pneumoniae</i> <i>E. faecalis</i>	-	-

F/U = Follow-up; CEA = carcinoembryonic antigen.

^a Intraperitoneal cephalothin; ^b intravenous vancomycin and gentamycin.