

[ ORIGINAL ARTICLE ]

## Oral Antibiotics are Effective for Preventing Colonoscopy-associated Peritonitis as a Preemptive Therapy in Patients on Peritoneal Dialysis

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### Abstract:

**Objective** In patients on peritoneal dialysis (PD), it was reported that colonoscopy, but not upper gastrointestinal endoscopy, could cause peritonitis as a complication. A guideline of the International Society for Peritoneal Dialysis recommends preemptive intravenous antibiotics administration of ampicillin and aminoglycoside with or without metronidazole, to prevent colonoscopy-associated peritonitis. In this study, we retrospectively evaluated the effects of preemptive antibiotics therapy by oral administration instead of intravenous administration.

**Methods** We investigated the incidence of colonoscopy-associated peritonitis in a single center. In 170 patients undergoing PD between January 2010 and December 2019, 50 colonoscopies were performed, including 49 with oral administration of amoxicillin and ciprofloxacin and/or metronidazole as preemptive therapy 1 hour before the colonoscopy procedure, and 1 without.

**Results** We observed no incidence of colonoscopy-associated peritonitis.

**Conclusion** Generally, oral administration of preemptive antibiotics is less painful and more convenient than intravenous administration, especially in outpatient procedures, such as a colonoscopy. Our results suggest that oral antibiotic administration might be effective for preventing colonoscopy-associated peritonitis in PD patients.

**Key words:** peritonitis, colonoscopy, peritoneal dialysis, prophylactic antibiotics administration

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### Introduction

In patients on peritoneal dialysis (PD), peritonitis as a complication is one of the main reasons for withdrawal from PD therapy in Japan and other countries (1-3). Although patient education is considered important for reducing the incidence of peritonitis (1, 4), some causes of peritonitis, such as appendicitis and gastrointestinal perforation, are difficult to circumvent. In addition, some medical interventions, such as extensive dental procedures (5, 6), colonoscopies (CS), and invasive gynecologic procedures (7, 8), can induce peritonitis in PD patients, so prophylactic administration of anti-

biotics is recommended, according to the 2016 International Society for Peritoneal Dialysis (ISPD) guideline (4).

The incidence of peritonitis after CS has been reported to be 6.3-6.6% in PD patients (7, 8) when prophylactic antibiotics were not administered. As a prophylactic antibiotic administration regimen, the intravenous administration of ampicillin and aminoglycoside with/without metronidazole before CS is recommended in the ISPD guideline (4). However, the process of intravenous administration is complicated, especially in the outpatient unit, because of the necessary preparation of the intravenous antibiotics, the difficulty of the insertion procedure for their administration, the required space, and the expense, which is generally more than

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that of oral administration. In addition, oral administration is not painful and does not require as much time as intravenous administration.

We herein report the effects of the oral administration of a combination of antibiotics on colonoscopy-associated peritonitis in PD patients at a single center.

## Materials and Methods

### Patients

In 170 patients on PD therapy in Nagoya University Hospital during the 10 years between January 2010 and December 2019, we retrospectively investigated the incidence of peritonitis after 50 CS procedures in 20 PD patients as a case series study. Thirty-five of these cases involved polypectomy, while the other 15 did not. In 20 patients, 11 had more than 2 CS procedures. The characteristics of the 20 PD patients are shown in Table 1. Five patients had a history of peritonitis.

The bowel preparation regimen involved 10 mL of sodium picosulfate and 1 bag of MOVIPREP® (EA Pharma, Tokyo Japan) in 2 L of tap water (half to one bag) being taken approximately 12 hours before CS after a low-residue diet according to the recommendation of the American Soci-

ety for Gastrointestinal Endoscopy (9). All CS procedures were performed with carbon dioxide insufflation to reduce patients' pain (10).

For all procedures, 1,000 mg of amoxicillin (AMPC), 400 mg of ciprofloxacin (CPFX), and/or 250 mg of metronidazole were administered together approximately 1 to 2 hours before starting each colonoscopy procedure, except for in 1 case (Table 2). Before the CS procedure, all patients had emptied their abdomens of peritoneal dialysate according to previous recommendations (11, 12). As a reference for this study, we checked the results of upper gastrointestinal endoscopy (UGE) examinations performed without antibiotics during the same observation period (128 procedures). In the present study, endoscopy-associated peritonitis was defined as that occurring within 24 hours after finishing endoscopy, according to a previous report (8), and peritonitis was diagnosed according to the 2016 ISPD guideline (4).

This study was performed with approval of the Ethics Committee for Human Research of the Faculty of Medicine at Nagoya University. All patients agreed to join the study.

## Results

### Oral prophylactic administration of antibiotics to prevent incidence of CS-associated peritonitis in patients on PD

In the present study, there were no episodes of peritonitis within 24 hours of CS performed with and without polypectomy (n=35 and 15, respectively; Table 3). Furthermore, no episodes of peritonitis were observed beyond two weeks after CS procedures. One of 50 procedures was performed without antibiotics administration because the patient forgot to inform the staff about the procedure. Fortunately, he did not develop peritonitis associated with CS performance.

As a reference during the same period, we experienced 128 UGE procedures. In all cases except for one, no peritonitis was observed, although no antibiotics were administered. After endoscopic submucosal dissection (ESD) during UGE, only one case had a cloudy peritoneal dialysate. Unfortunately, it was a Sunday, so we could not check the white cell fraction of the PD fluid because only emergency laboratory tests are performed outside of regular business hours. The next day, we observed an increased number of

**Table 1. Basic Characteristics of Peritoneal Dialysis (PD) Patients at the First Colonoscopy (CS).**

Total number of CS patients	20
Age (years) (mean±SD*)	67.3±10.4
Male (n) / Female (n)	17 / 3
DM** (n) / non DM (n)	5 / 15
PD history (months) (mean±SD)	38.3±39.0
Cause of ESRD*** [n (%)]	
Chronic glomerulonephritis	10 (50.0)
Diabetic nephropathy	5 (25.0)
Nephrosclerosis	3 (15.0)
Polycystic kidney disease	1 (5.0)
Unknown	1 (5.0)
Body mass index	23.3±3.7
Serum albumin level (g/dL) (mean±SD)	3.22±0.5
History of PD-associated peritonitis (n)	6****

\*standard deviation; \*\*diabetes; \*\*\*end-stage renal disease

\*\*\*\*6 episodes in 5 patients

**Table 2. Recipe of Prophylactic Oral Administration of Antibiotics for 50 Colonoscopy Procedures in 20 Patients on Peritoneal Dialysis.**

Prescription	n (%)
AMPC* 1,000 mg+CPFX** 400 mg+MNZ*** 250 or 500 mg	45 (90.0)
AMPC 1,000 mg+CPFX 400 mg	1 (2.0)
CAM**** 400 mg+CPFX 400 mg+MNZ 250 mg	2 (4.0)
CPFX 400 mg	1 (2.0)
No antibiotics	1 (2.0)

\*amoxicillin; \*\*ciprofloxacin hydrochloride; \*\*\*metronidazole; \*\*\*\*clarithromycin which was administered instead of AMPC because of penicillin allergy.

**Table 3. Incidences of Peritonitis after Colonoscopy (CS) and Upper Gastrointestinal Endoscopy (UGE).**

	n (%)
Total CS procedures	50
CS with polypectomy	35 (70.0)
CS without polypectomy	15 (30.0)
Peritonitis after CS	0 (0)
Total UGE procedures	128
Peritonitis after UGE	0 (0)

eosinophils in the PD fluid. Therefore, we diagnosed this patient with eosinophilic peritonitis.

## Discussion

In the present study, we did not observe any incidence of CS-associated peritonitis after oral prophylactic administration of antibiotics instead of intravenous administration before CS procedures. Although colonoscopic polypectomies were performed in 70.0% of CS procedures, no cases of peritonitis occurred, similar to a previous report (8). Oral administration is more convenient than intravenous administration in the hospital. Specifically, an intravenous drip infusion requires a bed or chair space for the patient. As in a previous report (8), we observed that most UGE patients did not develop peritonitis when procedures were performed without prophylactic antibiotics during the observation period in our institute.

In the American Society for Gastrointestinal Endoscopy (ASGE) guideline (12), antibiotic prophylaxis is recommended in patients for gastrointestinal endoscopy, but a Japanese guideline did not recommend prophylactic administration of antibiotics before CS (13). In PD patients, invasive interventional procedures (e.g. CS, hysteroscopy, cholecystectomy, and extensive dental procedures) may lead to intrinsic peritonitis when performed without prophylactic antibiotics, at a rate up to 25% (4, 8, 4-16). Therefore, the ISPD guideline suggested intravenous antibiotic prophylaxis be performed prior to CS as well as invasive gynecologic procedures, such as hysteroscopy (4). In the guideline, as an alternative administration route, intraperitoneal administration of the antibiotics is described instead of intravenous injection (11). However, the efficacy of oral prophylactic administration was not described. Our results suggested that oral administration could be an alternative and convenient administration route of prophylactic antibiotics prior to CS in PD patients. Our setting of oral administration was decided because the time to reach the peak plasma concentration of a drug after administration was between 1 and 2 hours, according to the drug information. Although the absorption of oral medication might be affected in cases of diarrhea, it was also reported that diarrhea did not affect the absorption of oral antibiotics in a previous report (17). Furthermore,

oral antibiotics were administered after diarrhea due to intestine lavage had ceased, so the pharmacokinetics should not have been affected in the present study.

This study was limited by the small sample size and the fact that our data were not obtained from a randomized control trial. In the future, an extended study will be required. We were also unable to analyze the pharmacokinetics of oral antibiotics directly in our patients.

In conclusion, the oral administration of antibiotics may replace the intravenous administration of antibiotics to prevent CS-associated peritonitis in PD patients.

**The authors state that they have no Conflict of Interest (COI).**

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