METHODS

Patients who underwent PD catheter insertion between April 2007 and March 2011 were divided into two groups according to whether they underwent the insertion procedure before or after the middle of 2009, when the practice of including a nephrologist on the operating team began. Patients for whom a nephrologist had been included on the operating team were designated the intervention group, and patients who had undergone insertion before that point were the control group. The prevalence of complications within 1 month postoperatively was then retrospectively compared between the groups.

Potential complications included catheter-related infections (exit-site infection, tunnel infection, peritonitis), catheter drainage dysfunction (omental wrapping, tip migration, obstruction), hemorrhage, ruptured sutures, leakage, and visceral perforation. In terms of the definition of catheter-related infection, the diagnosis was reached based on the criteria found in the International Society for Peritoneal Dialysis guidelines (3,4).

During the insertion procedure, surgeons focused on hemorrhage, suture rupture, and organ damage in particular. Nephrologists concentrated on matters related to catheter handling, such as contact time, number of contacts, catheter direction, and dialysate injection and drainage flow rate. Also, nephrologists shared with surgeons the information on intraoperative management put forward by the International Society for Peritoneal Dialysis guidelines (3,4) and tried to adhere to them—specifically, the guidelines on determining the ideal location for the cuff and the exit site, creating a downward-directed tunnel, fitting the tissue around the catheter snugly, creating a round exit site, and selecting a prophylactic intravenous antibiotic. The effect of vancomycin as a prophylactic intravenous antibiotic was reported in a previous study and the guideline (3). Therefore, in place of cephalosporin, a single dose of vancomycin was used in more patients, with consideration of the risk of hastening resistance in organisms.

Statistical analyses were performed using JMP (version 7: SAS Institute, Cary, NC, USA), and $p < 0.05$ was considered to be statistically significant. The study was approved by our institutional review board.

RESULTS

The study enrolled 50 patients, 23 in the intervention group and 27 in the control group. Table 1 shows patient demographics.

Impact of the Inclusion of a Nephrologist on the Surgical Team for Peritoneal Catheter Insertion

In Japan, peritoneal dialysis (PD) accounts for approximately 4% of all renal replacement therapy, and the proportion of patients on PD is on the decline (1). The PD catheter is removed 12 months or sooner after insertion in more than 10% of patients, and the most common reason for such removals is catheter-related infection (1). Prevention of such complications is therefore very important, and a recent guideline also emphasized the need for attention to detail in the reduction of complications (2).

In the present study, we investigated the effects on the occurrence of such complications of including a nephrologist engaged in postoperative dialysis management as part of the operating team.

TABLE 1
Patient Demographics

Variable	Patient group		p Value
	Intervention	Control	
Patients (n)	23	27	
Mean age (years)	55.8±13.8	53.8±19.9	0.7
Sex [n (%) men]	14 (61)	15 (56)	0.8
Hemoglobin (g/dL)	9.3±1.6	9.2±1.0	0.9
Albumin (g/dL)	3.3±0.4	3.4±0.5	0.6
Height (cm)	162.5±8.6	159.8±10.7	0.4
Weight (kg)	62.2±14.7	58.9±12.6	0.4
Body mass index	23.3±4.4	23.0±4.2	0.8
Cause of ESRD [n (%)]			
Diabetic nephropathy	10 (43)	7 (26)	0.2
Chronic glomerulonephritis	5 (22)	7 (26)	0.7
Nephrosclerosis	2 (9)	5 (19)	0.3
Other causes	4 (17)	4 (15)	0.8
Unknown	2 (9)	4 (15)	0.5
Catheter implantation [n (%)]			
Method			
Open surgery	21 (91)	26 (96)	0.5
Laparoscopy	2 (9)	1 (4)	0.5
Attempts			
First	21 (91)	25 (93)	0.9
Second	2 (9)	2 (7)	0.9
Prophylaxis with vancomycin	19 (83)	2 (7)	0.0

ESRD = end-stage renal disease.

In the intervention group, 1 case of catheter-related infection and 3 cases of catheter drainage dysfunction occurred. In the control group, 7 cases of catheter-related infection, 3 cases of catheter drainage dysfunction, and 1 case of intestinal damage occurred. No other complications were observed in either group. The difference between the groups in the occurrence of catheter-related infections was statistically significant by the Fisher exact test ($p = 0.042$). By contrast, other complications, such as catheter drainage dysfunction, were not observed to be statistically significance between the groups (Figure 1).

DISCUSSION

Many previous reports have discussed PD catheter insertion by a nephrologist. Increasing the number of interventional nephrologists results in the timely insertion of PD catheters, leading to enhanced PD penetration (5,6). It has also been reported that nephrologists can expand their PD scope by performing the insertion

Figure 1 — The difference in catheter-related infections between the groups was statistically significant ($p = 0.042$); however, the differences in catheter drainage dysfunction and other complications were not. N.S. = nonsignificant.

procedure, positively affecting PD utilization (7,8). On the other hand, some particular problems attend the PD catheter insertion procedure: visceral perforation, catheter migration, contraindication because of a prior history of abdominal surgery (8), and training programs that are inadequate (9). Difficulties have also been reported with having nephrologists become access providers (9).

In the present study, before nephrologists were included on the operating team, they had begun to acquire skills by participating in training (including a groundbreaking nationwide program). As a result, they obtained a more in-depth understanding of PD. Nephrologists also began performing the insertion procedure jointly with surgeons, with the objective of compensating for one another's weak points: surgical complications in the case of nephrologists, and complications during subsequent PD in the case of surgeons. Improved outcomes were the result.

Frequent communication between nephrologists and surgeons is required if the insertion procedure is to be performed in a timely fashion, and we therefore held regular joint conferences. To promote the widespread adoption of PD, it will be necessary to continue to amass cases and to provide better patient outcomes.

The present study had several limitations. First, it was retrospective, and the patients were not randomized. However, no major changes were made in the surgical method, the surgeons involved, or the devices used before and after the introduction of a nephrologist. Furthermore, all patients undergoing the catheter insertion procedure were included. No patients were excluded, and therefore, no obvious selection biases were present. Second, intravenous vancomycin

was significantly used for antibiotic prophylaxis in the intervention group. However, vancomycin was not administered to all patients in the intervention group, and it was also administered in the control group. Even if all patients in the intervention group had received vancomycin and none in the control group had received it, the estimated odds ratio for vancomycin compared with cephalosporin would be 7.70 in the present study, and that figure is higher than the previously reported ratio of 6.45 (3).

CONCLUSIONS

From the perspective of preventing complications after surgery, it is important to proactively include a nephrologist actually engaged in PD management as part of the operating team. Working in collaboration with a surgeon who can deal with intraoperative hemorrhage or unforeseen complications, a nephrologist can focus on preventing postoperative complications such as catheter-related infection, thereby improving overall patient care.

ACKNOWLEDGMENTS

The authors thank Dr. Kubota of Oji Hospital and the members of Aska Peritoneal Dialysis Educational Society.

DISCLOSURES

The authors have no financial conflicts of interest to declare in the conduct of this study.

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doi:10.3747/pdi.2011.00139