Long-Term Prognosis of Peritoneal Dialysis Patients with a Re-embedded Catheter

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Upon peritoneal dialysis (PD) discontinuation in frail patients, we have re-embedded the catheter and left it subcutaneously buried. However, we have not evaluated the long-term prognosis of those patients after the procedure or the complications associated with buried catheters. We therefore aimed to clarify the long-term prognosis of patients with a re-embedded catheter and to identify any associated complications.

The outcomes of 10 patients having a catheter that was re-embedded between February 2010 and May 2016 were assessed by interviewing the patients or their families (when possible), and by reviewing medical records.

Catheter re-embedding to reduce the surgical burden was elected by 7 patients, and 3 patients underwent re-embedding because they wanted to resume PD in the future. By the time of the interviews, 6 patients had already died of causes that were unrelated either to the buried catheter or infection. No abnormality was found in any buried catheter. A re-embedded catheter was later externalized to resume PD in 1 of the 4 patients who survived.

Catheter re-embedding is safe and allows for PD resumption at the terminal stage of dialysis.

Key words
Peritoneal dialysis, discontinuation, catheter re-embedding

Introduction

The rise in the aging population in Japan is remarkable, and the age of incident dialysis patients is also increasing (1). The benefits of peritoneal dialysis (PD) for elderly patients include fewer hospital visits, less blood pressure fluctuation, avoidance of general fatigue after hemodialysis (HD), and maintenance of a reasonable lifestyle, because the procedure is home-based. However, elderly patients with renal failure already have cardiovascular complications before starting dialysis, and those conditions often continue to worse during PD.

Self-management becomes difficult for such frail patients, and a switch from PD to HD is often necessary. In such cases, the PD catheter must be removed before transfer, because catheter management is impossible in most HD facilities. However, removal of the PD catheter in frail elderly patients is too invasive, and thus we have chosen to re-embed the PD catheter under local anesthesia, leaving the catheter subcutaneously buried when PD is discontinued (2). The re-embedding procedure is less invasive and less expensive, and neither spinal nor general anesthesia is required.

In the present study, we aimed to determine the long-term prognosis in 10 patients who underwent catheter re-embedding and the complications that can arise in such patients.

Methods

Double-cuffed swan-neck catheters or triple-cuffed straight catheters had been embedded by nephrologists in all 10 patients at the start of PD. At the time of the re-embedding surgery (between February 2010 and May 2016), which proceeded as previously described (2), no patient experienced exit-site or tunnel infection. All patients were discharged without perioperative complications.

The outcomes of the 10 patients were assessed by interviewing either the patients or their families (when possible), and by reviewing medical records at St. Marianna University School of Medicine Hospital and Kawasaki Tama Municipal Hospital. Demographic details, underlying cause of end-stage kidney disease, comorbidities, estimated glomerular

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filtration rate at initiation of PD, duration of PD, period from discontinuation of PD to catheter re-embedding, hospitalization period associated with catheter re-embedding, cause of PD discontinuation, reasons for catheter re-embedding, clinical outcome, cause of death, period from catheter re-embedding to death, and status of the buried catheter at the time of the investigation were collected from the interviews and medical records.

Results

Table I describes the 10 patients in whom PD catheters were re-embedded (mean age: 76 ± 12 years; 6 women; 6 patients with nephrosclerosis; mean PD duration: 34 ± 27 months; 9 patients with cardiovascular disease). Mean estimated glomerular filtration rate at the initiation of PD was 6.0 ± 1.7 mL/min/1.73 m^2. The mean period from PD discontinuation to catheter re-embedding was 3.8 ± 2.5 months (Table II). The median hospitalization period required for catheter re-embedding was 9 days. Difficulties with self-management led to PD discontinuation in 6 patients. Catheter re-embedding was selected by 7 patients to reduce the surgical burden, and 3 selected re-embedding because they hoped to resume PD in the future.

During follow-up, 6 of the patients died at a mean of 22 ± 11 months after catheter re-embedding. The causes of death in the 6 patients were not associated with their buried catheters (Table III), being colon cancer (n = 1), severe aortic stenosis (n = 1), sepsis (n = 2), cerebral infarction (n = 1), and rupture of an abdominal aortic aneurysm (n = 1). No bleeding or infection occurred after the surgeries, and symptoms of hernia and encapsulating peritoneal sclerosis (EPS) had not been observed at the time of the study. During the investigation, no abnormality was found in any buried catheter. Of the 4 surviving patients, 1 resumed PD using a catheter that had been re-embedded for 4

TABLE I Background of peritoneal dialysis patients with re-embedded catheters

Pt ID	*Age (years)*	*Sex*	*Underlying causes of ESKD*	*Comorbidities*	*eGFR (mL/min/1.73 m^2)*
1	87	Female	Nephrosclerosis	Cerebrovascular dementia, colon cancer	4.8
2	76	Female	Chronic glomerulonephritis	Angina pectoris, colon cancer	5.6
3	76	Male	Diabetic nephropathy	Cerebellopontine angle tumor	5.4
4	81	Female	Nephrosclerosis	Angina pectoris, paroxysmal atrial fibrillation	4.3
5	74	Male	Nephrosclerosis	Renal cancer, gastric cancer, old myocardial infarction, cerebral infarction	5.7
6	48	Female	Hypertensive emergency	Angina pectoris	6.7
7	70	Female	Diabetic nephropathy	Old cerebral infarction, dementia, aspiration pneumonia	3.6
8	78	Male	Nephrosclerosis	Cerebral infarction, thoracic aortic aneurysm, old myocardial infarction	9.7
9	93	Male	Nephrosclerosis	Brain tumor, colonic polyp, myelodysplastic syndrome	6.7
10	81	Female	Nephrosclerosis	Cerebral infarction, femoral trochanter fracture	7.0

Pt = patient; ESKD = end-stage kidney disease; eGFR = estimated glomerular filtration rate.

TABLE II State of peritoneal dialysis (PD) until catheter re-embedding

Pt ID	*Duration of PD (months)*	*Time from PD stop to re-embedding (months)*	*Hospitalization for re-embedding (days)*	*Causes of PD stop*	*Reasons for catheter re-embedding*
1	7	3	4	Self-management difficulties	Reduce surgical burden
2	5	5	4	Loss of RRF	Reduce surgical burden
3	62	7	10	Self-management difficulties	Reduce surgical burden
4	73	6	4	Peritonitis	Reduce surgical burden
5	10	5	18	Management of heart failure	Reduce surgical burden
6	4	7	5	Recovery of RRF	Wish to resume PD
7	49	1	162	Self-management difficulties	Wish to resume PD
8	60	2	8	Self-management difficulties	Reduce surgical burden
9	49	2	33	Self-management difficulties	Reduce surgical burden
10	23	0	95	Self-management difficulties	Wish to resume PD

Pt = patient; RRF = residual renal function.

TABLE III Clinical outcomes of peritoneal dialysis patients with a re-embedded catheter

Pt ID	*Clinical outcome*	*Cause of death*	*Time from catheter re-embedding to death (months)*	*Status of buried catheter at time of investigation*
1	Death	Hemorrhagic shock related to colon cancer	39	No abnormalities
2	Survival		—	No abnormalities
3	Survival		—	No abnormalities
4	Death	Aortic stenosis	31	No abnormalities
5	Death	Sepsis	22	No abnormalities
6	Survival		—	No abnormalities
7	Death	Brainstem infarction	16	No abnormalities
8	Death	Aortic aneurysm rupture	17	No abnormalities
9	Death	Sepsis	7	No abnormalities
10	Survival		—	No abnormalities

Pt = patient.

years. That patient was one of the 3 patients who had wanted to resume PD in the future.

Discussion

All but 1 of the 10 patients were more than 70 years of age, and all had ischemic heart disease and cerebral infarction. Renal function at the time of PD initiation was within the Japanese guidelines [estimated glomerular filtration rate: 6 mL/min/1.73 m^2 (3)], and their PD duration was about 34 months, which is in line with a previous large cohort study in Japan (4).

We waited about 3 – 4 months from PD discontinuation to catheter re-embedding to confirm the absence of subsequent ascites accumulation, which is considered a sign of EPS after PD (5). The patients with ascites accumulation were treated with peritoneal lavage at our institution. Hospitalization periods varied because long- and short-term inpatients were included in the study group. Many patients who underwent catheter re-embedding had developed difficulties with self-management because of the onset of cerebral infarction or a decline in cognitive function during PD. We also considered the desire of the family to reduce the surgical burden on the patient as a reason for choosing catheter re-embedding.

The buried catheters had not become infected in any of the 6 patients who had died by the time of the investigation. The sepsis identified in 2 patients was not associated with the catheter. In contrast, 1 patient resumed PD after externalization of a catheter that had been embedded for 4 years (6). Korzets *et al.* (7) reported that some complications (bleeding, local infection, retained cuff, peritoneal fistula, and pseudoaneurysm in the inferior epigastric artery) occur even with PD catheter removal. In addition, abdominal wall hernia has been reported as a delayed complication. However, the risk of such complications is considered to be extremely low because the re-embedding procedure is simple and requires no general anesthesia.

Currently, assisted PD for elderly end-stage kidney disease patients in Japan is gaining attention as the ideal renal replacement therapy. Béchade *et al.* (8) reported that PD might prove to be a feasible complementary alternative to in-center HD for elderly patients with end-stage kidney disease. We believe that catheter re-embedding is a good solution for elderly patients who switch from PD to HD, who wish to be taken care of at home in the future, and who are frail and thus at high risk for catheter removal. Oei and Fan (9) have suggested that end-of life advance care planning is a useful tool to help clinicians individualize care to the expectation and desires of elderly patients.

Certain concerns are associated with catheter re-embedding. Catheter infection and peritonitis could occur after the embedding procedure, the catheter could become obstructed (10), and the catheter might itself confer a risk of EPS (11). Infection and peritonitis during catheter burial did not occur in any of the 10 patients investigated here, and no buried catheter was associated with such complications. In addition, a catheter that had been buried for 4 years in one of our patients had not become blocked, and it was used to resume PD.

Conclusions

Catheter-related complications did not arise after catheters had been re-embedded for a long period in our study patients. More than half this group of patients died within a short time after surgery, but the deaths were related to poor overall health status and not to catheter re-embedding. Catheter re-embedding is less invasive and safer than catheter removal, and it allows for PD resumption in patients who wish to return to PD.

Disclosures

We understand that *Advances in Peritoneal Dialysis* requires disclosure of any conflicts of interest, and we declare that we have no conflicts to disclose.

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