Exit-Site Infection and Acute Peritonitis Due to Peritoneal Dialysis Catheter Rupture

Peritoneal dialysis (PD) catheter rupture is uncommon but has been reported as a complication associated with PD (1–4). It may present as an outflow failure, exit-site infection (ESI), and/or peritonitis (1). We herewith report a case of outflow failure of a PD catheter in a 36-year-old woman with ESI and acute *Staphylococcus aureus* peritonitis complicating automated peritoneal dialysis (APD).

CASE REPORT

The patient started with continuous ambulatory peritoneal dialysis (CAPD) in 2007 due to hypertension as a cause of end-stage renal disease (ESRD) after placement of a silicone PD catheter (Swan Neck Missouri PD catheter, Kendall, a Division of Tyco Healthcare group LP, Mansfield, USA) via a standard open surgical procedure. After 6 months, she changed to APD. Exit-site care was performed routinely with soap, saline, and a product for skin disinfection, occasionally with Mupirocin as well. She had an episode of acute peritonitis with *Difteroides* in 2010. On admission in December 2012, she reported 2 days of vomiting, abdominal pain and a fever (37.8°C). In the last 6 months before her admission, intermittent problems with negative ultrafiltration were noted, although the regime of PD had been changed several times. However, the patient's weight was stable. Two months before her admission, she had a hernioplasty. She reported falling on the stairs on her back a few weeks before her admission. On initial evaluation, she had a temperature of 37.2°C, the abdominal examination revealed generalized tenderness, the external part of the PD catheter appeared normal, with no breaks or kinks, but there were signs of ESI with a green discharge. Peritoneal fluid demonstrated 5,308 leukocytes/μL, with a predominance of polymorphonuclear cells. She was initially treated with Ceftazidime 1,800 mg daily and Cefazolin 1,400 mg daily intraperitoneally. Later, the Ceftazidime was discontinued when coagulase-negative *Staphylococcus aureus* grew in hemoculture and from the exit-site culture as well. She responded well, but the drainage was slow, the volumes were gradually decreasing to zero, and fluid leakage was noted. An abdominal X-ray confirmed a well-positioned PD catheter tip, but a disruption of the catheter was noted (Figure 1). Surgical removal revealed that the PD catheter was transected and split in 2 parts with the fracture site located 3 cm in front of the catheter cuff within the abdominal rectus musculature (Figure 2). The patient discontinued APD and hemodialysis was initiated.

DISCUSSION

Rupture of a peritoneal catheter is an infrequent complication, and, what is more, a secondary acute peritonitis as a consequence is even less common. Except for the case of Agarwal *et al.* (1), we found no other cases presenting acute peritonitis as a consequence of peritoneal catheter rupture.

Figure 1 — Abdominal X-ray showing a well-positioned catheter tip, but suggesting a disruption of the catheter.

Figure 2 — The surgical removal revealed that the PD catheter was transected and split in 2 parts. PD = peritoneal dialysis.

In contrast to our case, in the case of Agarwal *et al.* (1), no ESI was noted.

It has been suggested that various chemical and environmental stresses are responsible for damage to the catheter (1). Factors causing catheter fracture seem to be associated with the composition of the catheter (5–7), catheter aging (6,7), repeated exposure to Povidone-iodine (7) or Mupirocin ointment (1,3,4,7–9), and strong oxidants secondary to chronic exit-site inflammation (7). Most fractures occur within the tunnel or distal to the exit site (3,6,7). The connecting parts between the silicone rubber and the Dacron cuff may be another site susceptible to fracture (7,10). Internal breaks are relatively uncommon, but they can be caused by product defects, accidental needle-stick injury, the catheter becoming brittle with aging, and the intrinsic properties of polyurethane (1,7,8,10). Exit-site colonization and infection with gram-negative bacteria may also predispose to catheter rupture (1,5). Outflow failure

is attributed mostly to mechanical problems such as catheter migration, omental wrapping, constipation, and intraluminal obstruction by a fibrin or clot, and it usually occurs shortly after initiation of PD. However, fracture or rupture of the PD catheter is a very unusual case of drainage failure (8).

In our case, the cause of the catheter rupture is not clear. The last application of Mupirocin to the exit site was 3 years before the catheter rupture. It was possible that the catheter was subjected to mechanical trauma during hernioplasty performed 2 months prior. In the previously reported case by Agarwal *et al.*, the patient had a hernia operation 1.5 years before the catheter rupture and peritonitis (1). Dynamical stress from falling on the stairs a few weeks before admission was also a possible cause. Moreover, catheter aging could lead to rupture of the catheter.

In conclusion, spontaneous PD catheter rupture is a rare complication, which should be considered as a possible cause of ESI and acute peritonitis, especially when connected with outflow failure.

DISCLOSURES

The authors have no financial conflicts of interest to declare.

Maša Knehtl^{1*}
Robert Ekart²
Sebastjan Bevc¹
Matjaž Horvat³
Radovan Hojs¹

Clinic of Internal Medicine¹
Department of Nephrology and Department of Dialysis²
Surgery Clinic³
Department of Abdominal and General Surgery
University Medical Centre Maribor, Maribor, Slovenia

*email: masaknehtl@gmail.com

REFERENCES

1. Agarwal S, Gandhi M, Kashyap R, Liebman S. Spontaneous rupture of a silicone peritoneal catheter presenting outflow failure and peritonitis. *Perit Dial Int* 2011; 31(2):204–6.
2. Panuccio V, Enia G, Crucitti S, Pustorino M, Biondo A, Zoccali C. Another “epidemic” of spontaneous rupture of peritoneal catheters. *Nephron* 1998; 79:359.
3. Riu S, Ruiz C, Martinez-Vea A, Peralta C, Oliver J. Spontaneous rupture of polyurethane peritoneal catheter. A possible deleterious effect of Mupirocin ointment. *Nephrol Dial Transplant* 1998; 13:1870–1.
4. Khandelwal M, Bailey S, Izatt S, Chue M, Vas S, Bargman J, *et al.* Structural changes in silicon rubber peritoneal dialysis catheters in patients using Mupirocin at the exit site. *Int J Artif Organs* 2003; 26:913–17.
5. Rao S, Oreopoulos D. Unusual complications of a polyurethane PD catheter. *Perit Dial Int* 1997; 17:410–12.
6. Twardowski ZJ, Nichols WK. Peritoneal dialysis access and exit-site care including surgical aspects. In: Gokal R, Khanna R, Krediet R, Nolph K, eds. *Textbook of Peritoneal Dialysis*. 2nd ed. Boston, MA: Kluwer Academic Publishers; 2000:307–51.
7. Lee SW, Lee SW, Park GH, Kim SH, Choi YA, Lee CW, *et al.* Spontaneous

fracture of the intraperitoneal portion of a PD catheter. *Perit Dial Int* 2006; 26 (2):278–80.

8. Kim HR, Lee MJ, Song JE, Han JH, Yoo TH, Kang SW, *et al.* Drainage failure because of spontaneous fracture of the peritoneal dialysis catheter. *Perit Dial Int* 2013; 33(2):218–20.
9. Guiserix J. Spontaneous rupture of peritoneal catheters. *Nephron* 1997; 75:100.
10. Closkey GM, Zappacosta AR. CAPD drainage failure due to Tenckhoff catheter fracture: a case report. *Perit Dial Int* 1992; 12:266–7.

doi: 10.3747/pdi.2014.00025