SHORT REPORTS

Small-Bowel Erosion by a Functioning Peritoneal Dialysis Catheter

Continuous ambulatory peritoneal dialysis (CAPD) is an effective and widely used modality of renal replacement therapy. However, the modality is not devoid of complications. Bowel erosion by dormant as well as functioning peritoneal dialysis (PD) catheters late after their insertion has been reported in literature (1–4). In all those reports, erosion by the PD catheter was suspected based on symptoms of bowel erosion with or without catheter malfunction. Here, we report a patient on CAPD who developed erosion of the small bowel by a functioning PD catheter without manifesting any symptoms of bowel erosion.

CASE REPORT

A 44-year-old man was diagnosed with end-stage renal disease secondary to presumed chronic glomerulonephritis 6 months before admission. The patient underwent

twice-weekly hemodialysis for 3 months, after which he opted for CAPD because of difficulty in accessing a hemodialysis center. A double-cuffed straight Tenckhoff PD catheter was therefore inserted using the percutaneous Seldinger technique. Plain radiographs of abdomen and pelvis after catheter insertion confirmed that the tip of the catheter was located on the right side in the pelvis [Figure 1(A)]. Two weeks after catheter insertion, the patient was initiated on CAPD. The CAPD prescription of four 2-L exchanges of 1.5% dextrose solution daily achieved optimal solute clearance and ultrafiltration.

One month later, the patient developed culture-positive PD-associated peritonitis. The initial cell count in effluent was $3100 \times 10^6/L$ (predominantly neutrophils) and coagulase-negative *Staphylococcus* was isolated on an effluent sample. Based on the sensitivity report, the peritonitis was managed successfully with intraperitoneal vancomycin and cefepime.

Two months after that episode of peritonitis, the patient presented with complaints of slow dialysate inflow and absent outflow during CAPD. There was no

Figure 1 — Radiography of abdomen and pelvis (A) at the time of insertion shows the tip of the continuous ambulatory peritoneal dialysis catheter located in the pelvis on the right side, and (B) at the time of last admission shows the tip in the right hypochondrium, suggesting catheter migration.

history of abdominal pain, fever, loose stools, or abdominal distension during or immediately after dialysate inflow. On examination, vital signs were stable, and the abdomen was soft. There was no evidence of tunnel or exit-site infection. Abdominal examination showed free fluid, which was attributed to retained CAPD fluid from the preceding exchange.

Blood urea was 96 mg/dL, and serum creatinine was 6.0 mg/dL. Ascitic fluid cell count was $50 \times 10^6/L$, predominantly consisting of lymphocytes. Radiography of the abdomen and pelvis showed that the tip of the PD catheter was now lying in the right hypochondrium [Figure 1(B)]. Urgent ultrasonography of the abdomen revealed moderate ascites. In addition, the catheter tip could not be located.

Based on those findings, a diagnosis of PD catheter migration resulting in catheter malfunction was made. Computed tomography imaging of the abdomen and pelvis with PD catheterography was used to look for the cause of catheter malfunction and to exclude omental wrap of the catheter. Catheterography revealed opacification of small-bowel loops because of contrast exiting through the side holes of the PD catheter, without any spill of contrast through the catheter tip [Figure 2(A)]. Those findings were suggestive of erosion of the small bowel by the PD catheter, with complete occlusion of the catheter tip.

On multiplanar image reconstruction, the diluted contrast was observed to leak through the proximal side holes of the PD catheter into the small bowel, with no spillage into the peritoneum, suggestive of a well-sealed bowel erosion [Figure 2(B)]. On further imaging using

volume rendering (a computed tomography technique that provides a 3-dimensional surface view of the object of interest), it appeared that the PD catheter has eroded through both walls of the small bowel, with the tip lying in the peritoneal cavity (Figure 3).

The CAPD exchanges were stopped, and the patient was kept nil orally. After 2 sessions of hemodialysis, the patient underwent laparotomy under general anesthesia. At laparotomy, the ascites was drained, and the PD catheter was traced along its intra-abdominal course. The catheter was found to be eroding the proximal jejunum. The distal 10-cm segment of the PD catheter (including the tip) was lying inside the proximal jejunum. That finding was contrary to the computed tomography findings suggesting that the catheter had eroded through both bowel walls with its tip lying in the peritoneal cavity (Figure 4).

The catheter was removed from the bowel. A biopsy was taken from the edge of the defect in the jejunum, and then the defect was repaired by simple closure of the perforation.

DISCUSSION

Erosion of bowel by a PD catheter late after its insertion is a very rare complication. Most of the cases previously reported in the literature involve erosions of the large bowel by the PD catheter. In most cases, the patients presented with one or more of the following clinical manifestations: acute abdomen, feculent peritonitis, bleeding per rectum, or diarrhea at the time of CAPD inflow (1–3).

Figure 2 — (A) Axial computed tomography imaging after injection of dye through the catheter confirms opacification of small-bowel loops and no peritoneal spill of contrast from the catheter tip. (B) Curved multiplanar image reconstruction (which presents curved structures in a straight line) shows the relationship of the entire catheter length to the adjacent small-bowel loop (thick arrows) and a leak of contrast (thin arrow) through one of the proximal side holes of the catheter into the bowel lumen distally.

Figure 3 — Image generated by the volume rendering technique (which presents a 3-dimensional surface overview) demonstrates the relationship of the catheter with the bowel loops and the site of the leak (arrow) through one of the catheter side holes. No contrast spill from the distal side hole or tip is seen.

The risk factors predisposing to bowel erosion by the PD catheter are not well described. Brady *et al.* (1) reported 2 patients with colonic erosions by dormant PD catheters after renal transplantation. Those authors speculated that dormant catheters are more likely to erode the bowel because of persistent unlubricated or unbuffered contact between the bowel and the catheter. Finkle (4) reported a case of rectal erosion by a PD catheter in a patient with biopsy-proven amyloidosis of rectum. He proposed that bowel amyloidosis or other underlying bowel disorders might increase the propensity for bowel erosion by PD catheters. In our case, histopathologic examination of the biopsied fragment did not reveal any underlying bowel pathology, only nonspecific inflammation. Rotellar *et al.* (5) described a series of 8 patients who developed bowel erosion by PD catheter. They noted that advanced age, constipation, and the presence of diverticulosis of the large intestine were important risk factors. Notably, all erosions described in that series were into the colon. The diagnosis was delayed in most cases because of partial response to antibiotics. In our case, PD catheterography helped to reach an early diagnosis of bowel erosion. Grzegorzewska (6) and Shrestha *et al.* (7) also reported colonic erosion

Figure 4 — Intraoperative picture of the peritoneal catheter eroding the proximal jejunum.

by PD catheter. The patients in those reports were both more than 60 years of age.

Our case differs from all the other cases previously reported adult patients, in that the bowel erosion occurred into the small intestine rather than into the large intestine. In addition, our patient was younger and had no clinical manifestations of bowel erosion. Moreover, he had none of the risk factors mentioned in the earlier case reports. One explanation for the clinically silent erosion might be that the defect was well sealed by the catheter itself. The absence of diarrhea during CAPD dialysate inflow could be attributed to absorption of large volumes of the instilled dialysate by the small bowel. Thus, small-bowel erosion by a PD catheter can be clinically silent (presenting solely with catheter dysfunction), unlike large-bowel erosion, in which diarrhea during dialysate inflow is characteristic. Had catheterography not been carried out in our patient, the bowel erosion would have been missed. In all probability, blind removal of the PD catheter in this case would have resulted in severe peritonitis secondary to leakage of small-bowel contents into the peritoneum.

We propose that PD catheterography should be done in patients presenting with catheter malfunction, especially in the setting of catheter migration. This simple and inexpensive investigation might help to avert the serious complication of peritonitis after blind removal of a PD catheter in the presence of a clinically silent bowel erosion.

DISCLOSURES

The authors have no financial conflicts of interest to declare.

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