Single-Port Laparoscopy for Salvaging Outflow Failure from Omental Wrapping

Editor:

Peritoneal dialysis (PD) is used as renal replacement therapy in children with end-stage renal disease. Outflow failure is an important problem, and omental wrapping is a common cause of mechanical obstruction, requiring open surgery to correct (1,2). In many cases, the diagnosis of outflow failure may be difficult because of a lack of noninvasive methods. Multiple-port laparoscopy has been used to resolve the problem of catheter obstruction (3,4), including outflow failure from omental wrapping (3). Single-port laparoscopy has recently been used for placement of the PD catheter (5,6). However, little information is available about the usefulness of the single-port laparoscopic technique for salvaging outflow failure from omental wrapping. Here, we report a case of single-port laparoscopic-assisted salvage of outflow failure from omental wrapping, with partial omentectomy and intra-abdominal fixation of the PD catheter.

CASE REPORT

A 6-year-old boy was referred to our hospital on 1 July 2009. Physical examination revealed edema of the face and lower limbs. Blood pressure was 210/116 mmHg. Investigation revealed a serum creatinine of 5.14 mg/dL and a creatinine clearance of 3.9 mL/min/1.73 m². Chest radiography showed cardiac enlargement.

Under general anesthesia, a double-cuff curled Tenckhoff catheter was placed in the Douglas pouch using open surgery without omentectomy. A renal biopsy was simultaneously performed, revealing focal segmental glomerulosclerosis. Automated tidal PD was started 3 days after catheter placement. Inflow and outflow speeds were normal. The subsequent clinical course was uneventful for 1 year.

Because of a 1-month history of a malfunctioning catheter, this patient was admitted to our hospital on 5 October 2010. No evidence of peritonitis or leak was found. Abdominal radiography revealed no dislocation of the catheter tip, intestinal dilatation, or gas accumulation. One-way complete obstruction was found during saline infusion through the catheter, suggesting extraluminal obstruction.

Under general anesthesia, single-port laparoscopy was performed [Figure 1(A)]. A 2-cm supraumbilical incision was made, and a 12-mm balloon trocar was placed. After the abdomen was inflated with CO₂ at 10 cmH₂O, a

12F operative endoscope (miniature nephroscope: Karl Storz, Tuttlingen, Germany) was introduced into the peritoneal cavity. Under direct visualization, the catheter tip was found to be entirely wrapped with the greater omentum [Figure 1(B)].

After a failed attempt to strip the catheter from the omentum using a grasping forceps through the working channel, the catheter and the omentum were exteriorized together from the peritoneal cavity through the port site. The catheter was stripped from the adherent omentum manually, with dissection of the intraluminal omentum and partial omentectomy [Figure 1(C)]. The catheter and partially dissected omentum were pushed back into the peritoneal cavity, and a grasping forceps was used to direct the catheter tip to the Douglas pouch.

To prevent catheter dislocation, intra-abdominal fixation of the catheter was performed [Figure 1(A,D)]. A monofilament nylon thread (3-0) with a circle needle was passed through the anterior abdominal wall at the point between the bilateral umbilical ligaments at the middle of the umbilicus and pubic bone. A grasping forceps was used to pass the catheter through the nylon loop, and the threads were then tied, fixing the catheter to the anterior intra-abdominal wall. The trocar was removed, and the wound was closed. Total operation time was approximately 60 minutes. The following day, PD was re-started.

In the 14 months post-procedure, the catheter has worked properly.

DISCUSSION

Outflow failure occurs in 4% – 34.5% of PD patients (2,3,7,8). Using laparoscopic salvage, the incidence of outflow failure by omental wrapping ranged between 57% and 92% in some series (2). Multi-port laparoscopy has been used for adhesiolysis, omental treatment, or fixation of the catheter to the peritoneal wall to salvage malfunctioning catheters in adult and pediatric patients on PD (1–4,7,9). Our patient is the first reported case of single-port laparoscopy-assisted salvage of outflow failure from omental wrapping with partial omentectomy and intra-abdominal wall fixation of the catheter. This technique is minimally invasive, with smaller wounds, less scarring, and a lower complication rate than are seen with open procedures; it also results in better catheter function without fluid leakage and a short hospital stay (5,6). As in multi-port laparoscopy, the single-port technique permits direct visualization of the procedure, protecting against the serious complications of perforation of the viscera and

Figure 1 — (A) Schema of a single-port laparoscopy procedure for intra-abdominal fixation and salvaging outflow failure of a peritoneal dialysis catheter. Laparoscopic images revealed that (B) the catheter was entirely wrapped with the greater omentum (arrow). (C) After the catheter was manually stripped from the omentum, (D) it was fixed at anterior intra-abdominal wall (arrow).

peritoneal cavity, leading to better catheter positioning and permitting omental treatment and intra-abdominal catheter fixation (5,6).

Omental treatment—including omentectomy, omentopexy, or omental folding (1,2,8,10)—has been effective for salvage of catheter malfunction because of omental wrapping. As in our case, partial omentectomy has been successful, and the procedure can easily be performed extracorporeally by pulling the omentum through the site of the trocar (8).

Outflow failure occurs in 2% – 10% of patients with prophylactic omentectomy (10). Omentopexy may be superior to omentectomy when the omentum extends to the pelvis, resulting in better outcomes (1,10). Because omental wrapping may occur when the catheter

is moved into the upper abdominal cavity (9), omental treatment in combination with catheter fixation to the abdominal wall by laparoscopy may produce better outcomes (1,2,9). Catheter function can be immediately tested under direct visualization laparoscopically (7). Neither obesity nor previous surgery is a contraindication for the procedure (7). The single laparoscopy entry site is very small, resulting in a lower risk of hernia (6). Because of the low risk of leaks, PD can be started immediately (5,8).

Although single-port laparoscopy is underused, it is minimally invasive, safe, and useful for salvaging outflow failure in children on PD. Further studies in a large number of patients would be necessary to confirm the effectiveness of the technique.

DISCLOSURES

The authors have no financial conflicts of interest to declare.

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