been reported that an anchor technique onto the peritoneal wall using laparoscopy is useful to prevent dislocation (3). We present a new anchor technique in a small child who had frequent catheter-related complications.

CASE REPORT

The patient, a 16-month-old female, suffered end-stage kidney disease (ESKD) by nephronophthisis. Her height was 68.6 cm (-3.1 standard deviation [SD]) and she weighed 9.28 kg (-0.2 SD). The first open surgical implantation of a PD catheter (double-cuff, straight type) with partial omentectomy was performed in the left lateral abdomen. The entry and exit sites were in the paramedian and lateral position. On postoperative day 7, an inadequate in and out flow was found due to obstruction by intra-abdominal tissues. The next day, a 3-cm vertical incision was made at the linea alba, 2 cm below the umbilicus. The left fimbria was found to be wrapped around the catheter, occluding the catheter. Three months later, removal and re-insertion of the catheter (double-cuff, coiled type with bend) on the contralateral (right) side, including omentectomy, were performed due to inadequate drainage, without obstruction or dislocation. The catheter tunnel was configured on the upper abdomen and the exit was made on the middle abdomen to suit its bend. On postoperative day 13 after this re-insertion, the catheter tip was directed toward the upper abdomen, which led to a catheter malfunction catheter. Because the kink would not right itself, the decision was made to operate.

An incision was made using the median access site of the previous salvage operation. Omentum was wrapped on the end of the catheter, causing the retracted catheter to kink. For the purpose of preventing this dislocation, fixing the catheter onto the peritoneal wall as an additional treatment was performed using the anterior rectus fascia. Before approaching the peritoneal cavity, a flap of anterior rectus sheath was created in an inverted U-shape (Figure 1). The left anterior rectus fascia close to the linea alba was cut 2 cm vertically and resected

A New Anchor Technique on the Peritoneal Wall for Preventing Dislocation of Peritoneal Dialysis Catheters Using the Anterior Rectus Fascia in a Pediatric Peritoneal Dialysis Patient

Catheter obstruction and dislocation are known as major catheter-related complications for pediatric peritoneal dialysis (PD) patients (1,2). As a method of fixing the PD catheter, it has

Figure 1 — Site of flap creation using the left anterior rectus sheath. The flap was an inverted U-shape (2 × 1 cm).

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1 cm transversely as well as 2 cm in parallel with an internal longitudinal incision. The flap was adequately separated from the muscle. The flap was passed through underneath the catheter (Figure 2). It was rolled around it and secured with 3 absorbable 4-zero polyglactin knots to connect the tip and pedicle of the flap (Figure 3). When the flap was placed into the abdominal cavity (Figure 4), the peritoneum and anterior rectus sheath were ligated tightly, but the pedicle of flap was free from ligation to ensure the blood supply. Testing the catheter function using an injection of dialysate solution (15 mL/kg), no solution leakage was detected. Peritoneal lavage was started on the operative day and regular PD was introduced on postoperative day 3. Peritoneal dialysis has continued without any complications for over 1 year since final operation. The position of the catheter has also remained stable.

DISCUSSION

This new technique to anchor a PD catheter onto the peritoneal wall offers important clinical benefits. It is useful as a salvage method for small pediatric patients in open surgery. In addition, using the firm tissue of the anterior rectus fascia may prevent further dislocation and reduce the need for additional surgery.

In pediatric patients, 3 techniques for catheter insertion have been described, namely, (a) open surgery, (b) blind percutaneous insertion, and (c) laparoscopic insertion (4). The overall survival rate of PD catheters in laparoscopic surgery is similar to that of open surgery (3,5), while laparoscopy is advantageous regarding migration rate (5) and cost efficiency (6). It has been shown that the implantation of a securing suture in laparoscopic surgery offers the advantage of postponing catheter dislocation. Moreover, the advantage of laparoscopy is that it causes a smaller opening of the peritoneum and is thus less invasive. In the present case, however, the patient had a small space in the abdominal cavity and suffered preoperative overhydration due to under-dialysis, and there was the possibility that increasing intra-abdominal pressure during laparoscopic surgery would exacerbate the overhydration. Therefore, we performed each salvage operation as open surgeries instead of laparoscopic surgery.

Due to the recurrent problems with obstruction and dislocation of the catheter, we decided intraoperatively to fix the catheter in its position pointing into the lesser pelvis. However, there were 2 considerable issues in this case. First, the operative field was very small. It was difficult to reach to the deeper abdominal wall in order to secure the catheter in open surgery. Secondly, fixation by suture does not ensure avoidance of dislocation (3). Securing suture types (e.g., nylon monofilament) are generally tougher than the softer peritoneum. Therefore, for a child with a thin peritoneum, the suture could more easily break free, possibly leading to further dislocation, compared with an adult. As a result, we concluded that the anterior rectus fascia could be adapted as an alternative autologous securing material, as it is native, firm, unstretched tissue, which is less likely

Figure 2 — The flap went below the catheter and was wrapped. The asterisks mark the tip and pedicle of the flap, which were then connected.

Figure 3 — The U-shape rectus sheath flap can be seen here, fully wrapped around the PD catheter and sutured with 3 knots before placement into the peritoneal cavity.

Figure 4 — The position of the anchoring flap. The catheter was fixed on the abdominal wall distally.

to cause constriction of the catheter and is easy to access within the small operative field. This method should only be used for small children, because their rectus muscles are not fully developed, and thus it is easy for the flap to reach the abdominal cavity. However, there is a risk of herniation, and routine ultrasound screening for herniation is needed. In addition, there is no evidence of whether blood flow to the flap is sufficient. The answers to these questions require long-term observation.

Both prolonged catheter life and regular PD contribute to a better quality of life for children with ESKD, and it is therefore important to decrease complications. This new method is considered to be of merit for preventing dislocation and would be recommended as a feasible salvage technique for small pediatric patients if laparoscopic surgery is not selected. However, further studies are necessary for comparison with standard techniques and to observe the long-term outcome.

DISCLOSURES

The authors have no financial conflicts of interest to declare.

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