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Peritoneal Dialysis Catheter Placement and Management

Zhen Su

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1. Introduction

Peritoneal dialysis (PD) is an alternative to hemodialysis in patients with end-stage renal disease (ESRD). The main function of a peritoneal dialysis catheter is to permit consistent bidirectional flow of dialysate into intraabdominal peritoneal cavity without obstruction or undue discomfort [1]. Most catheters are flexible tubes with multiple ports in the intraabdominal segment which is ideally positioned freely in the intraabdominal pelvic area. The catheter's function depends upon its design, implantation site, and the configuration of the system used to perform dialysis exchanges, and also be directly related to skill of catheter placement doctors, catheter-related problems and infections are responsible for approximately 20% of implantation technique failure [2]. 12 contents of this chapter are types of catheters, considerations in catheter placement, exit site location, exit site size, antibiotic prophylaxis, implantation technique, postoperative catheter care, exit site care, complication, repositioning migrated peritoneal dialysis catheters, brief information for patients, recommendations.

1.1. Types of catheters

Many types of catheters are currently available for chronic peritoneal dialysis (Figure 1).

Peritoneal catheters have intraperitoneal and extraperitoneal segments. The extraperitoneal segment passes through a tunnel within the abdominal wall, exits through the skin, and has an external segment. Most catheters are flexible tubes with multiple ports in the distal intraperitoneal segment. The intraperitoneal portion of the catheter should be ideally placed between the visceral and parietal peritoneum near the pouch of Douglas. The catheter's midportion is normally implanted within the wall of the abdomen by one to two Dacron velour cuffs. With double-cuffed catheters, the inner cuff should be imbedded in the abdominal rectus muscle to prevent leaks; the superficial cuff in both double cuff and single cuff catheters should

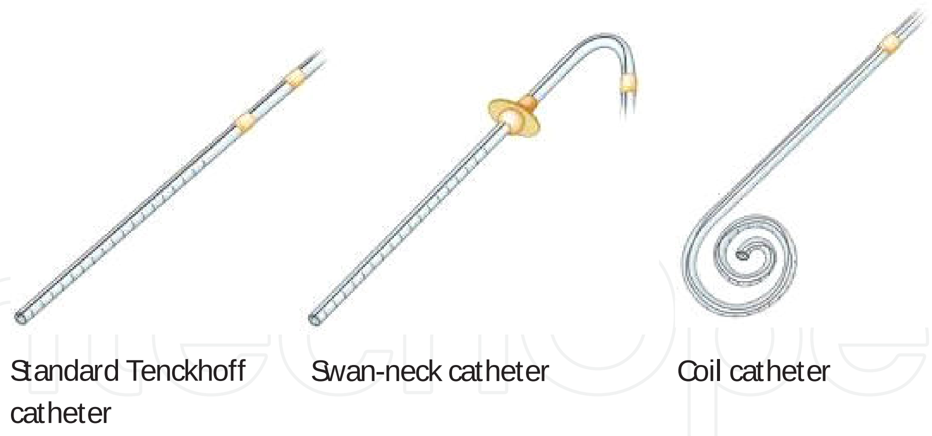

Figure 1. Intraperitoneal and extraperitoneal designs of currently available peritoneal catheters.

be placed subcutaneously approximately 2 cm from the catheter exit site on the abdominal wall to create a dead space in between the two cuffs, which is believed would prevent migration of infections coming from the exit site. Double cuff catheters have the advantages of fewer complications, a longer time to first peritonitis episode, and longer survival [3].More than 90% of the catheters used have two cuffs.

The double cuff straight Tenckhoff catheter, a silicone catheter with a straight intraabdominal portion is a most widely used catheter [4], followed by the swan-neck catheter [5]. The Tenckhoff and swan-neck catheters terminal segment is either straight or coiled. Catheters with a coiled intraperitoneal segment may minimize infusion and pressure pain. The straight double-cuff Tenckhoff catheter is about 40 cm long with an intraperitoneal segment about 15 cm long, an intramural segment about 5 to 7 cm long, and an external segment about 16 cm long. The open-ended intraperitoneal segment has multiple 0.5 mm side openings in the terminal 11 cm segment. Most Tenckhoff catheters have a barium-impregnated radiopaque stripe throughout the catheter length to assist in radiologic visualization. Overall catheter survival is approximately 88 percent at one year with removal rates of 15 percent per year [6].

The swan-neck catheter is a modified Tenckhoff catheter. The intraperitoneal segment of the swan-neck catheter is identical to that of the Tenckhoff catheter. The swan-neck catheter can be placed in a bend tunnel with both external and internal segments of the tunnel directed downwards. A long tunnel, downward-directed exit, and two intramural cuffs tend to reduce exit and tunnel infection rates. However, a study comparing swan-neck and straight Tenckhoff catheters have shown a similar risk for peritonitis and exit infection, but less cuff extrusion with the swan-neck design. The lower incidence of cuff extrusion enhances the survival of the swan-neck catheters [6]. The other catheters in use are the T-fluted catheter; the self-locating catheter; the Cruz catheter; the Toronto Western Hospital catheter; the Ash catheter; the column disc catheter; and the Gore-Tex peritoneal catheter [7].

Although all cause mortality may be lower with straight catheters, a review found no difference related to prevention of peritonitis with respect to straight versus coiled or single versus doubled cuffed catheters [8]. A randomized prospective study of 132 patients found no difference in dialysis adequacy measures between the coiled catheter group and straight catheter group [9]. A meta-analysis that compared swan neck catheters with a coiled versus a straight end showed no significant difference in overall catheter failure. However, late (>8 weeks) catheter tip migration was more common with the coiled end catheters [10].

Presternal catheters were designed to allow for an exit site in a presternal location. Patients with obesity, floppy abdominal skin folds, ostomies, or incontinence of urine or feces, children wearing diapers, are all indications to use an extended catheter system providing a remote exit site location to the upper abdomen or chest [11]. Exit site location of a presternal catheter should be at least 3 cm off the midline. A review showed a nonsignificant trend for improved survival and lower peritonitis rates was observed with presternal compared with abdominal catheters [12]. In a study of 200 patients, anthropometric analysis to help maximize the position of the catheter tip to a deep pelvic location and ideal exit site location found that the optimal catheter type may differ in men and women [13]. Swan neck catheters with a downwardly-directed external limb and exit site were better suited to females, while straight Tenckhoff catheters and a laterally-directed tunnel and exit site were better suited to males [14]. The gender differences primarily resulted from the location of the belt line combined with the desire to produce a downwardly-directed exit site. Thus, using a single, preferred catheter for all patients may not achieve ideal pelvic positioning of the catheter tip, it is not the optimal strategy.

Biofilm is an important factor in the development of PD catheter infections. It is no available catheter material resists biofilm formation now. Most available peritoneal catheters are made of either silicone rubber or polyurethane, there is little long-term experience with these catheters for PD.

Summary, it is no particular catheter is definitively better than the standard double cuff silicone Teckhoff catheter for the prevention of peritonitis [15].

2. Considerations in catheter placement

When inserting a peritoneal dialysis catheter, various factors (include the location of the exit site, use of prophylactic antibiotics, implantation technique, preoperative and postoperative care of the catheter, and temporal needs for dialysis [16]) require consideration.

3. Exit site location

The subcutaneous tract and exit site should face downward and laterally to avoid exit-site infection. Considering for patient comfort and accessibility to the catheter, therefore it is best to avoid exit sites over scars, belt lines, and skin folds. To determine the best location, it is often necessary to mark the desired location for the catheter's exit site with the patient in a sitting position and upright position, rather than when the patient is lying on the operation table awaiting catheter insertion. With the patient in the supine position, the position of the insertion site, is established by aligning the upper border of the symphysis pubis (a reliable landmark for the ideal position of the catheter tip in the true pelvis). Once the insertion site is determined, the appropriate catheter can be selected to produce a downwardly-directed tunnel and acceptable exit site location for the patient.

Most PD catheters are placed in a paramedian or lateral abdominal location rather than in the midline. A paramedian location also provides better structural support for and a strong seal around the catheter, thereby minimizing the risk of peritoneal leak. This location allows for positioning of the catheter's deep cuff in the rectus muscle, permitting better tissue ingrowth around the cuff due to the richer vascularization of muscle tissue.

We recommend that PD catheters be placed in a paramedian or lateral abdominal location rather than in the midline.

4. Exit site size

A prospective nonrandomized study found that the risks of first exit site and tunnel infections, catheter-related peritonitis, and catheter removal were associated with large exit site wounds [17]. Careful dissection and exit-site construction resulting in the smallest possible hole for the exiting catheter is therefore desirable.

Sutures should never be placed at the catheter exit site. Suture material may act as a nidus for bacterial growth and increase the risk of catheter-related infection. Fibroblast ingrowth of the Dacron cuff is sufficient to anchor the catheter, obviating the need for suture material at the exit site.

5. Antibiotic prophylaxis

A little data relating to the efficacy of an antibiotic just prior to peritoneal catheter placement may decrease the incidence of wound infection and peritonitis [18]. Four randomized prospective studies consisting of 335 patients found that the use of perioperative intravenous antibiotics, compared with no treatment, significantly reduced the risk of peritonitis within one month of surgery [19].

Vancomycin has a little renal toxicity, and a rise in the incidence of vancomycin resistant Enterococcus sp. Therefore, the routine use of vancomycin for prophylaxis prior to catheter insertion is not recommended. A first or second generation cephalosporin, such as a cephalosporin, should be the first choice [20].

We suggested that a single dose of a first or second generation cephalosporin should be given intravenously, vancomycin not to be routinely used.

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6. Implantation technique

Compared with an upwardly or horizontally-directed PD catheter tunnel, a downwardly-directed tunnel is preferred and recommended by International Guidelines since it may be associated with fewer catheter infections and fewer peritonitis episodes resulting from catheter or tunnel infections [21]. Catheters with a permanent bend (eg, Swan Neck catheter) naturally have a downwardly-directed tunnel because of the catheter's configuration (Figure 1).

For long-term use, PD catheters such as the Tenckhoff or Swan-neck catheters can be inserted into the abdominal cavity by surgeons [22], experienced nephrologist [23]or interventional radiologists [24]. There are several techniques of PD catheter insertion: 1) surgical placement, either by a standard dissection or by a modification, such as the buried technique or using a presternally-located catheter; 2) laparoscopic [25], [26]; 3) fluoroscopic insertion [27], [28]; and 4) blind (Seldinger) [29], At the bedside, using a trocar and guidewire technique (generally reserved for temporary acute PD).

1. Surgery: Surgical placement of catheters has the advantage of precise catheter placement with little risk of viscus perforation. Disadvantages are the longer time involved (including operating room scheduling), greater cost, and larger incision required.

Technical Procedure:

Pre-operatively, the surgeon will have marked the exit place of the catheter together with the patient (left or right), well above the belt.

The patient will be operated under general anaesthesia or conscious sedation. Antibiotic prophylaxis will be administered on the ward approximately 1 hour before incision. Desinfection will routinely be applied. The patient will be covered with sterile drapes. The patient is put in Trendelenburg position. Insertion site will be selected to be 9~13 cm above the upper border of the symphysis pubis, and 2 cm to the left or right and lateral to the midline.

A 3~5cm skin incision is made, dissection is performed layer by layer to expose the anterior rectus sheath. The rectus muscle fibers are bluntly separated until the posterior sheath, and the peritoneum is then incised to create a small opening. The surgeon ensures that the surrounding peritoneum is free of adhesions. The catheter is introduced and the tip is placed in the pouch of Douglas. The internal cuff is secured within the rectus muscle, and then an absorbable purse-string suture completed the closure at the peritoneum and posterior rectus sheath. Testing of inflow and outflow is done. The proximal end of the catheter is connected to a tunneled needle, and a subcutaneous tunnel to the preferred exit site is created with tunneled needle. The tunneled needle is desirable to help prevent tunnel infection. The external cuff is placed subcutaneously at approximately 2 cm from the exit point. No sutures is placed at the skin exit. Free drainage of PD fluid is tested.

The buried catheter technique differs from the standard surgical technique, in that the extraperitoneal portion of the catheter is buried in the abdominal subcutaneous tissue until the patient is ready for PD, usually 4 to 6 weeks after catheter placement [30]. At that time, the catheter is exteriorized. This method was developed to possibly reduce peritonitis and catheter infections by allowing complete sinus tract healing and fibroblast ingrowth into the cuff. Most hospitals continue to use the standard technique unless early infection rates are high. The principal disadvantages of the buried technique are the need for two procedures and the longer waiting time for catheter use. Few randomized prospective trials have some conflicting results: In two prospective randomized study, the buried technique, compared with the standard technique, was not associated with a reduced risk of peritonitis or exit-site infection [31]; Another study of 214 new catheters (59 implanted using the buried technique and 155 via the conventional method) also showed no difference in peritonitis rates [32]. A third study of 349 buried catheters found that prolonged catheter embedding (131 to 2041 days) prior to exteriorization and use may lower the risk of initial infection of the tract [33].

The peritoneal catheter implantation technique is the same as the surgical insertion, except that the PD catheter has a straight design instead of a swan neck. After the PD catheter is placed, then a second catheter is tunneled from the mid-abdomen up to the chest wall. The two catheters are connected by a titanium joint piece. The second catheter has two cuffs. The exit site is located lateral to the mid-sternal line.

2. laparoscopy: Peritoneoscopic catheter placement permits to use immediately. For an experienced doctor, it is a relatively simple and quick procedure. At one center, a significantly lower incidence of flow dysfunction was observed with such placement (particularly advanced laparoscopic techniques) compared with an open surgical procedure [34].

Technical Procedure:

Peritoneal catheters placed peritoneoscopically are implanted through the rectus muscle using the Y-TEC peritoneoscope system. Under local anesthesia, a 2 cm skin incision is made. The subcutaneous tissue is dissected up to the rectus muscle. A catheter guide is inserted into the abdomen, and the Y-TEC peritoneoscope is inserted into the catheter to assess initial entry to the peritoneal cavity. The scope is removed, and 500 mL of air is infused into the cavity. The scope is again replaced and advanced to the pelvic area. This area is inspected for adhesions and bowel loops. The scope is again removed, and the peritoneal catheter is introduced through the catheter with the help of a stainless steel stylet. The catheter is advanced to the pelvic area. The stylet is removed, and the inner cuff is buried into the musculature. The exit location is determined, and the catheter is tunneled to that location.

3. Fluoroscopy: Percutaneous fluoroscopy-guided placement provides accurate placement with little waiting time and a relatively small incision [35], but the incidence of late leakage appears to be increased.

Technical Procedure:

An ultrasound machine with a 5~12MHz transducer and a sterile cover is used to guide a 21 gauge needle into the peritoneum. Under ultrasound guidance the needle penetrates through the skin, the subcutaneous tissue, the outer fascia of rectus muscle, the muscle fibers, the inner fascia, and the parietal layer of peritoneum. 3~5 mL contrast is injected into the peritoneal cavity under fluoroscopy to assure appropriate location. A radiologic pattern of outer bowel delineation is indicative of a good placement. A wire is introduced through the needle. The needle is exchanged for a 6 French catheter sheath. A 2 cm incision is made on the skin, and the subcutaneous tissue is digitally dissected up to the rectus muscle. A series of dilators are passed over a stiff glide wire, and an 18-French, peel-away sheath is placed. A peritoneal dialysis catheter is introduced over the stiff glide wire into the peritoneal cavity. The inner cuff is pushed into the muscle before removing the peel-away sheath. Alternatively, the tunnel could be created before catheter insertion into the peritoneum. A tunnel is created with an exit site located lateral, and below the initial incision with the outer cuff buried in the subcutaneous tissue. A final fluoroscopic imaging is performed to verify placement of the peritoneal catheter. Inflow and outflow of the PD catheter is tested with 500 mL of normal saline.

4. Bedside catheter placement: The benefits of bedside catheter placement technique require a small incision, quick and inexpensive, and permits immediate use. The shortcomings of primarily technical is a blind procedure, thereby resulting in a greater risk of inadvertent organ and vessel perforation; leaks and poor catheter flow are also common.

The type of catheter placement generally outweigh the advantages in most patients; exceptions include some cases of acute renal failure, and some individuals unable to tolerate the anesthesia required for catheter placement in the operating room. This method is not used for chronic catheter placement.

Summary, as with the choice of catheter, the technique used by a PD program depends upon the preferences and expertise of the surgeon or nephrologist inserting the catheter. Each method of insertion has its benefits, but no technique has been shown to be preferable overall [36]. Individual experience will dictate the technique and operators placing PD catheters.

7. Postoperative catheter care

Postoperative catheter care is very important. Patients stayed supine for the first 24 hours after catheter insertion. Usually PD is started between 2 and 3 weeks after placement of the catheter, to allow for wound healing, and securing of the catheter cuff. Providing sufficient time for healing, helps to avoid leaks, which can increase the risk of infection. Newly placed catheters are usually flushed with Low-volume dialysate until the effluent is clear. Then the catheter is capped and a dressing applied. If fibrin or clots are evident in effluent dialysate, heparin may be added as 500 to 1000 units/L dialysate. As the heparin is not peritoneally absorbed, some may choose to "lock" the PD catheter with heparin during temporary cessation of PD in an attempt to avoid clotting of the PD catheter. Others may elect not to lock the PD catheter as the risk of catheter occlusion during non-use is probably low.

A 1000mL volume of dialysis solution is used for supine PD exchanges if immediate dialysis is needed. If PD is required less than 10 days following catheter placement, less than 1500 mL volume exchanges performed in the recumbent position only can be performed with little risk of a significant leak. However, a single center study showed that the catheter may be used immediately after placement without increasing the risk of infection, the leaks were minor, urgent initiation was associated with no greater risk of peritonitis or exit site infection at three months [37].

These optimal catheter care post-placement are that the catheter site be covered with nonocclusive dressing and remain undisturbed for 10 to 14 days. The catheter should be immobilized with a dressing. Infrequent dressing changes (such as once/week) are probably sufficient for the first one to two weeks after implantation.

8. Exit site care

Optimal care and cleaning of the exit site is unknown. There are few prospective, controlled trials comparing agents to clean PD catheter exit sites.

9. Complication

A major complication during placement of the PD catheter is bowel perforation. It is infrequent with all techniques except for blind placement, but once identified, it requires bowel rest, intravenous antibiotic therapy, and rarely surgical exploration [38]. PD leaks around the catheter less than 10% [39]. Prophylactic antibiotics are usually given, perioperative infection and bleeding are rare. Tip migration is a very common (up to 35%) late complication, which could cause problems with draining of the PD fluid. It can be fixed with either radiologic or surgical manipulation [40], or non-traumatic maneuver [41].

Multiple abdominal surgeries may be complicated by the presence of dense intra-abdominal adhesions, due in part to repeated peritonitis episodes. Hemodialysis may be required in the immediate post-operative period depending upon the patient's clinical status, degree of residual renal function, and ability to perform supine only, low volume PD exchanges. Resumption of peritoneal dialysis after a week delay is reasonable.

As with all patients, patients with autosomal dominant polycystic kidney disease (ADPKD) who progress to ESRD require either dialysis or renal transplantation. Because massively enlarged kidneys make it difficult for the ADPKD patients to accommodate large volumes of peritoneal dialysate fluid. In addition, there may be an increased risk of peritonitis secondary to cyst infections [42], patients with ADPKD and renal failure are therefore most commonly treated with hemodialysis or undergo renal transplantation, peritoneal dialysis is less commonly performed. However, a survival benefit among patients with ADPKD, compared to those without ADPKD, was observed with peritoneal dialysis; Limited evidence suggests that patients with ADPKD may have superior survival rates with peritoneal dialysis than with hemodialysis [43]. Some centers have also found that peritoneal dialysis is well tolerated and results in no specific difficulties in the patient with ADPKD who have reached ESRD [44].

10. Repositioning migrated peritoneal dialysis catheters

PD catheter migration refers to displacement of the PD catheter from the pelvis to the upper abdomen, often resulting in PD failure and catheter removal. The most common management technique for the migrated PD catheter at present is repositioning the catheter by laparoscopy [45], or surgically, which often causes more suffering and economic burden to the patient. We found an original non-traumatic maneuver for repositioning a migrated peritoneal dialysis catheter. Laxatives have a possible effect on the mobilization of misplaced catheters prior to maneuver.

Technical Procedure:

Our method includes dissociation, determination of the return route, and manual repositioning.

Dissociation: After the migration position is confirmed by abdominal x-ray, some of the dialysate is drained, with about 1000 mL retained in the abdomen. The patient lies, flexing the knees and relaxing the abdominal muscle. The operator stands on the right side of the patient, with the right hand feeling the site of the migrated catheter, which will cause a painful sensation in most patients. Feeling should be from a light force to a heavy force, and from the center to the periphery in clockwise and anticlockwise directions alternately for 20 times until the pain at the site of migration is significantly lessened. Again, using the pain point as the center, one hand presses the catheter and the other hand gives a gentle force in an upward radiating and right-to-left direction to dissociate the greater omentum, which might be wrapped around the catheter.

Determination of the Return Route: A return route is designed according the position of the catheter on the x-ray films. For patients with catheter migration to the right or left upper quadrant or the right lumbar region, the catheter is first moved toward the epigastrium and then repositioned downward. For patients with catheter migration to the epigastrium, repositioning is done directly downward. For patients with catheter migration to the left lumbar region, repositioning is done according to the size of the abdominal cavity: for patients with a big abdominal cavity, repositioning is implemented by pushing the catheter down to the left lower quadrant and then to the pelvic fossa; for patients with a small abdominal cavity, the catheter is first moved to the epigastrium and then downward to the pelvic fossa. For patients with catheter migration to the right or left iliac fossa, repositioning is implemented by moving the catheter directly to the pelvic fossa.

Manual Repositioning (Figure 2): For catheter migration to the right or left upper quadrant or the right lumbar region, the patient is asked to lie in a side position opposite to the migration, that is, a left-side position for right migration and vice versa.

Step 1: Pressing: The patient lies flat and the operator stands on the side of migration and uses both of his/her thumbs or the heel of the hand to press the intestine below the catheter tip, gently but vigorously shaking up and churning the abdominal contents, and using some directional pressure to facilitate gravity and the natural resiliency forces of the displaced

Figure 2. Steps in manual repositioning of a migrated peritoneal dialysis catheter.

catheter tubing to return it to the original pelvic position. This method is especially important for patients using coiled PD catheters.

Step 2: Palpating: The patient lies flat and the operator stands on the side opposite the migration, puts the left hand on the right hand, uses finger tips of both hands to feel and palpate the catheter with fluctuation of the patient's deep breathing, and at the same time pushes the catheter to the mid-axial line for 20 times.

Step 3: Vibrating: The operator stands behind the patient with the fingertips of both hands flexing naturally, vibrating the patient's abdominal wall at the site above the catheter at a rate of 180~200 times/minute, to a depth of 4~5 cm, for 3 minutes continuously.

Step 4: Wave Vibrating: The patient lies on his side and the operator stands behind the patient with the fingers of both hands holding the contralateral abdominal wall, vibrating the abdominal wall upwardly at a rate of 150 times/minute for 3 minutes.

Step 5: Rotating: The patient lies on his side and the operator extends the fingers of both hands widely, grasps both sides of the rectus abdominis, and rotates the abdominal wall in the direction opposite to migration at a rate of 100 times/minute for 2 minutes for the purpose of helping the intestine and the dialysate in the abdominal cavity move in a direction opposite to catheter migration and causing the catheter to move to the mid-axial line.

When the catheter is moved to the epigastrium through the above five steps, the patient is allowed to sit up and lean slightly backward, with the upper limbs resting on the arms of the chair, both knees flexing, the feet touching the ground, and the whole body relaxing naturally.

Step 6: Back-Pushing and Vibrating: The operator squats, with both hands moving forcefully downward as in Step 3.

Step 7: Swaying: The operator extends the fingers of both hands widely, grasps both sides of the rectus abdominis, and sways the abdominal wall left and right at a rate of 150 times/minute for 2 minutes.

Step 8: Compressing: The operator squats, overlaps both hands, places the heel of the hand on the anterior pubic symphysis, and then compresses the abdominal cavity in a superior–posterior direction at a rate of 100 times/minute for 2 minutes.

The above 8 steps are a set of actions and should be done completely for each repositioning, which lasts about 20 minutes. It is preferable to select the time point before replacing the dialysate for the sake of saving the dialysate.

For patients with catheter migration to the right or left iliac fossa or to the left lumbar region, and with a big abdominal cavity, steps 1, 2, 3, 5, 6, and 7 are enough, using the same frequency and duration as mentioned above. For patients with catheter migration to the epigastrium, steps 6~8 are sufficient but the duration should be doubled.

After completion of manual repositioning, the remaining 1000 mL dialysate is drained and replaced with fresh dialysate. During infusion of the dialysate, it is better to ask the patient to stand up and sit down 30~50 times, with both hands supporting the waist to facilitate catheter repositioning.

If the procedure has been successful and the amount and rate of dialysate flow has returned to the level before migration, the patient may have a sensation of perianal pressure by the end of drainage, which can be used as a clinical criterion for successful repositioning. If repositioning is successful on the first attempt, radiological examination is done the following day to confirm. If repositioning cannot be achieved on the first attempt, it can be repeated two to three times on the same day; and if repositioning cannot be achieved within a day, the procedure can be repeated on 3 consecutive days.

The present method is suitable for patients of all ages and body shapes, as long as their condition is stable. It is a safe, effective, economical, and painless maneuver to reposition the migrated PD catheter as an alternative to surgical intervention. We suggest that, once the diagnosis of catheter migration is confirmed, it is preferable to reposition the migrated catheter manually before endoscopic or surgical intervention

11. Brief information for patients

1. The catheter is placed on the left of the umbilicus. The patient may be given general or local anesthesia before the insertion procedure.
2. Although the catheter can be used right away, it is best to wait 10 to 14 days after placement before dialysis is performed, this method allows the catheter site to heal. In some hospital, a small volume of fluid can be exchanged during this time.
3. Care of the catheter and the skin around the catheter is important to keep the catheter functioning and also to minimize the risk of developing an infection. After the catheter is inserted, the insertion site is usually covered with a gauze dressing and tape to prevent the catheter from moving and keep the area clean. The dressing is usually changed at 7 to 10 days after placement. If a dressing change is needed before this time, it should be done using sterile techniques. The catheter should not be moved or handled excessively because this can increase the risk of infection. The area should be kept dry until it is well healed, usually for 10 to 14 days. This means that you should not take a shower or bath or go swimming during this time. You will be asked to limit lifting and vigorous exercise within three weeks.
4. Avoid constipation Straining to move the bowels can increase the risk of developing a hernia. Constipation, not moving the bowels regularly, can lead to catheter function problems (such as slow drain time, difficulty draining). To avoid constipation, your need a High-fiber diet, as well as a stool softener or laxative.

12. Recommendations

1. Many types of catheters are available for chronic peritoneal dialysis. The catheter used by a PD program primarily depends upon the preferences and experience of the clinician inserting the catheters, with some guidelines stating that no particular catheter is definitively better. However, we prefer double cuff catheters over single cuff catheters since double cuff catheters have the advantages of fewer complications, a longer time to first peritonitis episode, and longer survival.

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2. As with the choice of catheter, the technique used by a PD program depends upon the preferences and expertise of the surgeon or nephrologist inserting the catheter. Each method of insertion has its benefits and shortage, but no technique has been shown to be preferable overall.

3. We recommend that PD catheters be placed in a paramedian or lateral abdominal location rather than in the midline. A downwardly-directed tunnel is preferred and prophylactic antibiotics should be given at the time of catheter placement.

Author details

Zhen Su*

Division of Nephrology, The First Affiliated Hospital of Wenzhou Medical University, Wenzhou, Zhejiang, China

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