

THE USAGE OF GUIDEWIRE OR STYLET IN SUCCESSFUL PERITONEAL DIALYSIS CATHETER EXCHANGE WITHOUT FLUOROSCOPY OR PERITONEOSCOPE USE - THE SERDANG METHOD

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ABSTRACT

Mechanical malfunction of peritoneal dialysis (PD) catheters remains the most common non-infective complication of peritoneal dialysis. Failure in conservative measures often results in surgical correction, which is often invasive, time-consuming and may require the patient to temporarily switch to haemodialysis while waiting for post-operative

recovery and wound healing. This article describes two methods of PD catheter exchange that are minimally invasive, time- and cost-efficient; and most importantly, successful.

Keywords: PD catheter; malfunction; guidewire; stylet

INTRODUCTION

Peritoneal dialysis (PD) catheter is the single most important medical device for patients with end stage kidney disease (ESKD) who choose peritoneal dialysis for long-term renal replacement therapy. Peritoneal dialysis gives ESKD patients the freedom to carry on with their lives independently without causing much disruption. Catheter malposition is one of the most common causes of PD failure, occurring in up to 20% of all catheters (1). Conservative measures to overcome these issues include the usage of laxatives to promote bowel movement, change in body position, saline flushing, increase in physical activity as much as possible have been described, however, the success rate is only about 25 percent (2). If such non-invasive techniques fail, fluoroscopically guided manipulations such as using a rigid cannula, stiff metal rod, tip-deflecting wire, or Lunderquist guidewire may be

used to reposition the catheter (3-5).

Failure or unavailability of the methods described above inevitably leads to more invasive surgical revision; either a removal and reinsertion of a new PD catheter, or a laparoscopy-guided insertion. This article describes the exchange of PD catheters using either a guidewire or stylet without fluoroscopy or laparoscopy guidance, which is relatively less invasive, with good post-operative outcome.

FIRST CASE REPORT

A 47-year-old male with a body mass index (BMI) of 22.7 kg/m² was diagnosed with underlying ESKD secondary to autosomal dominant polycystic kidney disease (ADPKD) in September 2019. Due to his wish to continue working and to minimize disruption to his work, he opted for automated peritoneal dialysis (APD). A PD catheter was successfully placed via peritoneoscope. He completed APD training and continued to self-care with no major issues until six months later when he presented to the PD unit with poor outflow and negative ultrafiltration. A repeat abdominal x-ray (AXR) showed migrated PD catheter tip (figure 1). He was put on interim haemodialysis. Unfortunately, conservative measures failed, and he underwent PD

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Fig.1: Migrated PD catheter tip.

catheter exchange by using a 70-cm stylet (figure 2). After allowing time for post-op healing, he resumed APD 16 days post operation.

SECOND CASE REPORT

The second patient was a 69-year-old male (BMI 31.1 kg/m²) with underlying Type 2 Diabetes, severe ischaemic heart disease (IHD) with 3 vessel involvement based on coronary angiography findings and ESKD for 10 years, previously on haemodialysis. He was converted to APD due to recurrent intradialytic hypotension. He was admitted to our hospital under cardiology unit for acute coronary syndrome (ACS). He was referred to the nephrology team for dialysis support, however APD could not be started due to poor outflow. AXR showed migrated PD catheter. While he was being treated for ACS, he was dialysed via sustained low-efficiency dialysis (SLED). He later underwent PD catheter exchange using a 70-cm guidewire with no complications (figure 3). 2 weeks post operation, he recommenced APD.

THIRD CASE REPORT

A 44-year-old male with BMI of 32kg/m² on CAPD for 4 months presented to the PD unit complaining of leaking from his PD catheter, approximately 3 cm from the exit site. He denied the usage of any sharp objects while manipulating the catheter. On further inspection, the likely



Fig.2: PD catheter post exchange using stylet.



Fig.3: PD catheter post guidewire exchange.



Fig.4: PD catheter post guidewire exchange.

cause of the trauma was due to the pouch zipper used to store the catheter. He was given prophylactic antibiotics and catheter exchange was done under elective OT using a 70-cm guidewire. Figure 4 shows the catheter tip placement post catheter exchange. He had an early break-in period post operatively, resuming with low volume peritoneal dialysis 5 days post operation. He continued his usual CAPD regime after 14 days.

TECHNIQUE DESCRIPTION

All three patients selected for the guidewire/stylet PD catheter exchange procedure had their first catheters

inserted via peritoneoscopy, where the peritoneum cavity was visualized prior to insertion to ensure correct placement of the PD catheter. All of them also had used their PD catheters for more than three months before issues arose with their catheter outflow/catheter leak occurred. Patients with concurrent peritonitis were excluded from these exchange methods.

The initial stages of PD catheter exchange procedure were similar for both methods of exchange. The procedures were carried out under strict aseptic conditions in daycare operation theatre on an outpatient basis using sedation and local anaesthesia. Patients were given intravenous midazolam 1-3mg and intravenous fentanyl 20-30mcg (dose adjusted according to patient's sedation level and pain tolerance) prior to sterile preparation and draping of the patient in the operation theatre. Intravenous cefuroxime was administered in each case as antibiotic prophylaxis. Lignocaine 2% was given subcutaneously before incision was made.

During the operation, both the internal and external cuffs of the PD catheters were released. The old PD catheters were cut between the internal and external cuffs to leave a shorter catheter length before threading them through either the stylet or the guidewire. Good inflow and outflow were observed in each of the cases intra-operatively. The duration of each procedure ranged between 20 to 25 minutes for each case from the first incision to the closure of the main wound. There was not immediate complication observed in any of the cases such as bleeding/haematoma, pericatheter leakage or infection, and 3 months post PD catheter exchange all three patients still continued their APD/CAPD without any issues.

1. STYLET METHOD

In the first case, a 70-cm stylet (Figure 5) was inserted through the old PD catheter into the peritoneal cavity before the catheter was removed, leaving the end stylet still within the peritoneal cavity. A new 67-cm double-cuff



Fig.5: A 70 cm stylet used in the PD catheter exchange. For this purpose, the curved end of the stylet was straightened to ensure ease of threading the new PD catheter through into the peritoneal cavity.

PD catheter was then carefully threaded through the stylet (with the curved end straightened) and then placed into the peritoneal cavity (Figures 6a – 6c). The internal cuff of the catheter was then placed within the rectus sheath and the external cuff implanted within the subcutaneous tissue, at least 2 cm away from the new exit site.

2. GUIDE WIRE METHOD

For cases 2 and 3, a 70-cm guidewire was inserted through the old PD catheter before the old catheter was removed (Figure 7a). Subsequent steps were similar to PD catheter insertion via Seldinger method. A dilator and a pull-apart sheath as a single unit were advanced along the guidewire into the peritoneal cavity (Figure 7b). The new PD

catheter then was inserted through pull-apart sheath with the guidance of a stylet and placed into its proper position (Figure 7c). The internal cuff was placed just above the anterior rectus sheath and the external cuff implanted within the subcutaneous tissue in the normal fashion.

DISCUSSION

Peritoneal dialysis is a good option for ESKD patients who are still independent and able to self-care. However, the PD catheter itself remains the Achilles heel of the programme, as the catheter is liable to malfunction which necessitates its exchange or salvage. In the cases described above, two patients underwent PD catheter exchange as the result of catheter malfunction or migration, a common non-infectious complication of PD catheters. The final patient had an exchange due to leaking PD catheter caused by mechanical trauma to the catheter itself, and while the incidence of such cases is not reported, it is not an unheard of occurrence in many PD units, whether accidental or otherwise. The catheter exchanges were done without the use of general anaesthesia or fluoroscopy guidance with good outcome, which is a great advantage to this technique. The perioperative risk involved with the PD catheter exchange using the guidewire or stylet method is not higher compared to the conventional method of PD catheter insertion. The usage of these techniques negated the necessity of another puncture through the intraabdominal wall or creation of a new tract often necessary with new



Fig.6a: After releasing both the internal and external cuffs of the catheter, the PD catheter was cut between the internal and external cuff.



Fig.6b: The 70-cm stylet inserted through the old catheter into the peritoneal cavity and the old catheter removed



Fig.6c: Insertion of the new PD catheter



Fig.7a: Removal of the old PD catheter after insertion of guidewire.



Fig.7b: Placement of dilator and pull-apart sheath into the peritoneal cavity.



Fig.7c: Placement of the new PD catheter through the pull-apart sheath using stylet as guidance.

catheter insertion, making it less traumatic for the patient while saving operation time and cost. While the articles of other techniques of catheter exchanges (1, 3-5) did not mention the duration of the procedures done for comparison, the operation time of 20 to 25 minutes for the cases in this case report is a short duration of time in itself. However, comparing PD catheter exchange using stylet with guidewire, the guidewire method is relatively more costly as a new Seldinger PD catheter set is required, unlike the stylet method where only a new PD catheter is needed.

The third patient in this case report had early break-in time of the PD catheter by undergoing low-volume intermittent peritoneal dialysis without any leakage issues. This demonstrated that a faster initiating time of PD treatment is possible with the catheter exchange methods used.

CONCLUSION

PD catheter malfunction is a common occurrence in patients on peritoneal dialysis. First-line management includes conservative manoeuvres such as laxatives, saline flushing and change in body position. Failure to manage the issue conservatively leads to surgical management. PD catheter exchange using guidewire or stylet as described in this article have demonstrated two different techniques which are successful, minimally invasive, and less traumatic to the patient.

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