The Technique and Outcome of Peritoneal Dialysis Catheter Revision

Dolrudee Songtish MD*,
Prinya Akranurakkul MD*, Siribha Changsirikulchai MD**

** Department of Surgery, Faculty of Medicine, Srinakharinwirot University, Bangkok, Thailand*
*** Department of Medicine, Faculty of Medicine, Srinakharinwirot University, Bangkok, Thailand*

Objective: *Tenchkhoff catheter malposition is a significant cause of technical failure in patients with peritoneal dialysis (PD). Many surgical revised techniques have been reported including wire manipulation and laparoscopy. The objective of the present study was to report the outcome of surgical revised technique for catheter malposition in patients with PD.*
Material and Method: *The data of one hundred and twenty three patients with peritoneal dialysis at the HRH Princess Maha Chakri Sirindhorn Medical Center were reviewed. The Tenchkhoff catheters were revised in ten patients who had delayed outflow drainage and failed with nonsurgical treatment. The outcome of catheter placement and revision were reported.*
Results*: The longest catheter survival time in the authors' patient was 71 months. The Tenchkhoff catheters were revised successfully in ten patients. The positions of exit sites were not changed. The immediate postoperative complication was not found. The second revision of Tenchkhoff catheter was performed in three patients. Five patients died from other causes not related to the catheter malposition, one patient was referred to another hospital, and four patients had still undergone CAPD.*
Conclusion: *The authors catheter-revised technique is safe, simple, straightforward and no special instrument needed therefore it is suitable to be practiced in Thailand.*

Keywords: *Peritoneal dialysis, Tenchkhoff catheter, Revision, Insertion, Malposition*

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Continuous ambulatory peritoneal dialysis (CAPD) is a main renal replacement therapy for Thai patients with end stage renal disease (ESRD). After the National Health Security Office implemented the "PD First" policy, the number of CAPD patients has been increased nationwide. The success of Tenchkhoff catheter placement is a mandatory step for the successful of the PD program. The Tenchkhoff catheter malposition has been reported to account for an early technical failure in 17% of patients[1]. It is a cause of inadequate dialysis drainage. The causes of catheter malposition are catheter migration, catheter obstruction by fibrin and omental wrapping the catheter. Many surgical revised techniques have been reported including wire manipulation and laparoscopy to restore the catheter position. The authors reported our surgical technique for revision of catheter malposition.

Correspondence to:
Changsirikulchai S, Department of Medicine, Faculty of Medicine, Srinakharinwirot University, Rangsit Road, Onkharak, Nakhonnayok 26120, Thailand.
Phone: 037-395-085 ext. 11001, Fax: 037-395-085 ext. 11003
E-mail: siribha@swu.ac.th

Material and Method

The Tenchkhoff catheter was placed in one hundred and twenty three patients with ESRD in September 2004 to March 2011 at the HRH Princess Maha Chakri Sirindhorn Medical Center. The mean age of these patients was 60 years (21-91 years). The technique for Tenchkhoff catheter placement was performed by surgeons using minioperation under local anesthesia. Most of the operations were performed by the experienced surgeons. The surgical incision was either in paramedian or lower midline position. The preparations for catheter placement and revision were preoperative intravenous antibiotic prescription and emptying of bladder and rectum[2]. The catheter related complications and outcomes were evaluated. The position of catheter was checked by plain x-ray imaging (Fig. 1). Thirty-five patients developed delayed outflow drainage and they were initially managed by nonsurgical treatment. Ten patients needed catheter revisions because the nonsurgical treatment failed to correct delayed outflow drainage. Three patients needed the second catheter revision. PD-related infectious complications including tunnel infection, exit-

Fig. 1 The imaging of Tenchkhoff catheter malposition

Fig. 2 Demonstration of catheter removal from abdomen

site infection and peritonitis were also determined.

Technique of surgical revision

All procedures were performed under local anesthesia. A 2-cm separated incision was done either between previous scar and pubic symphysis or caudal to the previous scar with the length approximately around the length of surgeon index. The site of incision was aimed to reach the catheter by palpation and to facilitate the placement of the catheter tip into the pelvic cavity. After the abdominal cavity was entered, the authors used the finger to palpate the proximal part of intra-peritoneal portion of catheter which mostly lied near the previous scar (Fig. 2). The catheter was gently brought through the incision and then the omentum wrap was cautiously removed. This step would prevent iatrogenic bleeding. The catheter was flushed and irrigated by injection of normal saline through the catheter lumen, therefore, all debris and clot were removed from the catheter tip. The patency of catheter lumen was checked. The catheter was reintroduced into the pelvis by insertion of wire through the side hole of the catheter and its position was guided to the cul de sac (Fig. 3). The position of exit site was not changed. Routine flow testing was performed and the abdominal wall was closed layer by layer (Fig. 4 and 5). The operation time was approximately 30 minutes.

Results

The baseline data of one hundred and twenty three patients undergoing CAPD were presented in Table 1. All patients used the double cuff catheters which mostly were curled tip catheters. Delay of outflow drainage occurred in 35 patients, of whom 3 cases used the straight catheters and 32 subjects used the curled tip catheters. Ten patients needed catheter revision by surgery and three of them required the second surgical revision (Table 2). Four patients still performed CAPD. The longest survival time of catheter was 71 months. Five patients dropped out from the program due to cardiovascular disease and non-PD related infection. The bleeding complication which needed surgical correction did not occur. All patients could return to their usual activity after operation and discharged after they finished the PD training program.

Discussion

The authors reported the technique and

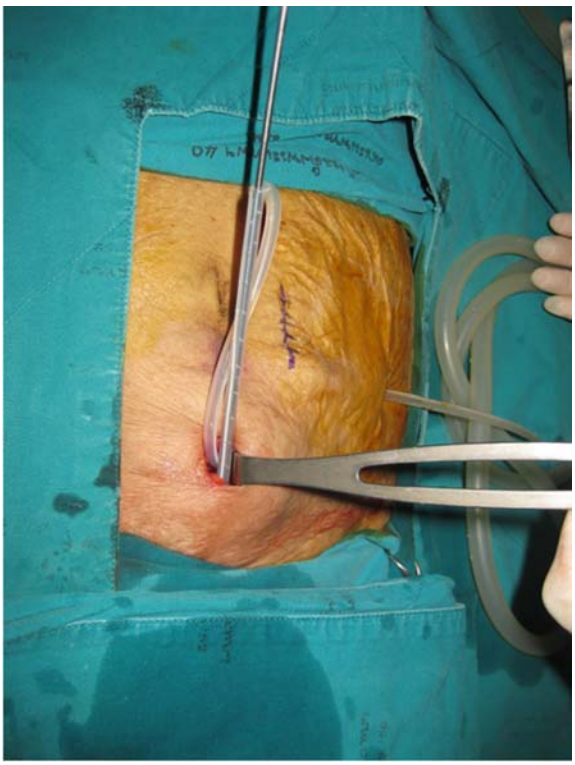

Fig. 3 Demonstration of catheter reinsertion into abdomen by using guide wire

Fig. 4 The imaging of Tenchkhoff catheter in pelvis

outcome of catheter revision performed by surgical method. The causes of PD failure which is related to catheter placement are leakage and outflow obstruction. There are many studies reported the incidence of leakage in the range of 0.9% to 8 %[3,4] and catheter outflow obstruction in the range of 8.8 to 20%[5-7]. The difference of incidence in these data depended on the technique of catheter placement and catheter type. There was no leakage found in our patients which might be from the two weeks of break- in period or we prescribed low volume dialysate in patients who required immediate dialysis. The delay of catheter outflow drainage occurred in 35 (28%) patients but most of them responded to nonsurgical treatment including correction of constipation and flushing the catheter with heparin. Only ten (8.1%) patients failed to those nonsurgical treatment required surgical revision. There are many previous studies reported several technique and outcome of catheter revision. Kumwenda et al[8] reported using a channel-cleaning brush to revise catheter malfunction under fluoroscopic guidance and eight from ten patients were successfully

Table 1. Baseline characteristic of patients with CAPD

	Straight tip catheter (n = 7)*	Curled tip catheter (n = 116)*
Sex		
Male	2 (28.6%)	51 (44%)
Female	5 (71.4%)	65 (56%)
Age (mean (SD))	71.8 (7.6)	60 (13.2)
Outflow obstruction		
Yes	3 (42.9%)	32 (27.6%)
No	4 (57.1%)	84 (72.4%)
Catheter revision		
Yes	2 (28.6%)	8 (6.9%)
No	5 (71.4%)	108 (93.1%)
Non-PD related infection		
Yes	2 (28.6%)	27 (23.3%)
No	5 (71.4%)	89
Catheter survival time (mean (SD)) months	24.8 (23.2)	17.5 (16.8)

* The type of Tenchkhoff catheter was not recorded in one patient

Fig. 5 A & B) The abdomens of patients with the successful catheter revisions

restored the catheter functions. Kawamoto et al[9] and Bryn et al[10] reported the technique of catheter revision by using the stiff wire to correct the catheter position. Although they reported the high success rate which were in the range of 50% to 76%, the catheter malposition could reoccur easily and there was a chance of intra-abdominal organ injury by pushing wire. Laparoscopic approach is another option for revision the catheter malfunction. There were many studies[11,12] reporting the technique and outcome of treatment by using laparoscopic method. The success rate of catheter revised by laparoscopy has been reported high due to direct visual, ability to fix the catheter tip to pelvic cavity and prevent omental wrap by omentectomy but the rate of complication such as bleeding or infection is high. In addition, the laparoscopy is a time consuming procedure and requires general anesthesia and experienced laparoscopic surgeon. These reasons may explain why the laparoscopic revision is not a common practice in nationwide. The authors presented the simple surgical technique to revise catheter malposition. Kim et al[13] also described the similar technique for revision of catheter malposition in six patients. There were some different points in their report and ours. The authors used wire but they used clamps or forceps to reinsert the catheter. The success rate of the first catheter revision in their report was higher than the authors as they could restore the catheter function in 5 (83%) patients. However, the longest catheter survival time in the authors' patient was higher than the earlier study (71 vs. 35 months, respectively). The authors' surgical revision technique for catheter malposition is safe, simple, straightforward, and no need for special instrument. It can be conducted in any hospitals in

Table 2. The outcome of catheter revision in ten patients

Patient	age	sex	Type of catheter	Catheter survival time (month)	outcome
1	56	F	Straight tip	71	alive
2	83	F	Straight tip	34	Death from non-PD related infection
3*	65	F	Curled tip	60	alive
4	65	F	Curled tip	4	Not known(refer)
5*	81	F	Straight tip	42	Death form non-PD related infection
6	69	F	Curled tip swan neck	14	Death from cardiovascular disease
7*	66	F	Curled tip swan neck	8	Death from cardiovascular disease
8	60	M	Curled tip swan neck	6	Death from cardiovascular disease
9	45	F	Curled tip	18	alive
10	69	M	Curled tip	3	alive

* Patients received the second revision of Tenchkhoff catheter

Thailand. Previous abdominal surgery may limit the use of this technique and, in such case, the laparoscopic placement may be the preferred choice.

Potential conflicts of interest

None.

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ผลการผ่าตัดแก้ไขการเปลี่ยนตำแหน่งของสายล้างไตทางช่องท้องที่มีผลให้น้ำยาล้างไตช่องท้องไม่ไหลออก

ดลฤดี สองทิศ, ปริญญา อัครานุรักษ์กุล, สิริภา ช้างศิริกุลชัย

วัตถุประสงค์: *การเปลี่ยนตำแหน่งของสายล้างไตทางช่องท้องเป็นปัญหาสำคัญที่ทำให้การล้างไต ทางช่องท้องในผู้ป่วยโรคไตวายเรื้อรังล้มเหลวจากการที่น้ำยาล้างไตทางช่องท้องไม่ไหลออกจากผู้ป่วย มีรายงานการแก้ไขภาวะการอุดกั้น และการเปลี่ยนตำแหน่งของสายล้างไตทางช่องท้องโดยการใช้ลวด และการผ่าตัดส่องกล้อง ผู้นิพนธ์และคณะ รายงานผลการผ่าตัดวางสายล้างไตทางช่องท้องเพื่อแก้ไขการเปลี่ยนตำแหน่งที่ทำให้เกิดการอุดตัน ของสาย*

วัสดุและวิธีการ: *ทบทวนเวชระเบียนผู้ป่วยโรคไตวายเรื้อรังที่ได้รับการรักษาโดยการวางสายล้างไตทางช่องท้องที่ศูนย์การแพทย์สมเด็จพระเทพรัตนราชสุดาฯ สยามบรมราชกุมารีจำนวน 123 คน ทบทวนผลการผ่าตัดแก้ไขเปลี่ยนตำแหน่งของสายล้างไตทางช่องท้องในผู้ป่วย 10 คนที่ไม่ตอบสนองต่อการรักษาด้วยวิธีประคับประคอง*

ผลการศึกษา: *การผ่าตัดแก้ไขการเปลี่ยนตำแหน่งของสายล้างไตทางช่องท้องในผู้ป่วย 10 ราย มีผลเป็นที่พอใจ ไม่พบภาวะแทรกซ้อนหลังผ่าตัด ไม่มีการเปลี่ยนตำแหน่งของช่องทางออกสายล้างช่องท้อง ผู้ป่วย 3 ราย ได้รับการผ่าตัดแก้ไข 2 ครั้ง ผู้ป่วย 5 คน เสียชีวิตจากภาวะแทรกซ้อนอื่นที่ไม่เกี่ยวข้องกับสาเหตุจากสายล้างไตทางช่องท้อง ผู้ป่วยหนึ่งรายไม่ได้รับการติดตามเนื่องจากไปรับการรักษาต่อที่โรงพยาบาลต้นสังกัด ผู้ป่วย 4 คน ใช้สายล้างไตทางช่องท้องถึงปัจจุบัน ระยะเวลาที่ติดตามที่นานที่สุดพบที่ 71 เดือน และสายล้างไตทางช่องท้องยังทำงานตามปกติ*

สรุป: *วิธีการผ่าตัดแก้ไขการเปลี่ยนตำแหน่งของสายล้างไตทางช่องท้องตามที่ผู้นิพนธ์และคณะได้รายงาน ปลอดภัย ทำได้ง่าย และไม่ต้องใช้อุปกรณ์พิเศษจึงเหมาะสมกับบริบทประเทศไทย*