Does Previous Abdominal Operation Affect Peritoneal Dialysis Complications and Outcomes?

Piyatida Chuengsaman MD*,
Apichat Panomrerngsak MD*, Kanda Sriudom BNS*

** CAPD Service and Training Center, Prommitr Branch, Banphaeo Hospital (Public Organization), Bangkok, Thailand*

Objective: *Peritoneal dialysis (PD) "First Policy" for end stage renal disease (ESRD) patients who are under universal healthcare coverage scheme, was implemented in Thailand since January 2008. Now there are about 10,000 PD patients all over the country and most of them are in low to medium socio-economic status. In the past, previous abdominal operation was considered as a contra-indication to PD. The purpose of the present study is to compare the complications and outcomes between patients with and without previous abdominal operation.*

Material and Method: *The present study was a retrospective review of all new PD cases for complications and outcome of the first PD catheter implantation. The method of catheter implantation is mini-laparotomy under local anesthesia by one surgeon. The bleeding, exit site/wound infection, catheter malposition/obstruction, and catheter/technique/patient survival rate were compared between two groups.*

Results: *In 730 ESRD patients who underwent catheter implantation, there were 106 patients with history of previous abdominal operation (14.5%). There were no significant differences between patients "with previous abdominal operation" and "without previous abdominal operation", for bleeding, exit site/wound infection, catheter malposition/obstruction, and catheter/technique/patient survival.*

Conclusion: *History of previous abdominal operation in ESRD patients is not a contra-indication to PD. The complications are low and the outcomes are excellent regardless of previous abdominal operation. Dedicated catheter implantation team might be the key of success.*

Keywords: *"PD First" policy, Peritoneal dialysis, Peritoneal dialysis catheter, Previous abdominal operation, Post-operative complication, Catheter malfunction*

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Peritoneal dialysis (PD) utilization in Thailand grows rapidly after launching the "PD First" policy in January 2008. Data from Thailand Renal Replacement Therapy Registry 2010 demonstrated that the percentage of PD utilization was increased from 4.7% in 2007 to 14.7% in 2009[1].

The initially crucial step in starting PD is PD catheter implantation. There are many approaches for catheter implantation. Open dissection through mini-laparotomy incision is most widely practiced in Thailand and the procedure is mostly operated by surgeon. Modified Seldinger technique is another method which is performed by some nephrologists. There are many studies which encourage nephrologists to implant the catheter by any approaches, but this issue is still a debatable issue[2-4]. Laparoscopy-assisted catheter implantation is practiced in limited indications such as in case of suspected extensive intra-peritoneal adhesion.

Another unestablished issue in this area is the effect of previous abdominal operation to immediate/peri-operative and longterm outcome of PD. A previous study demonstrated that approximately 70-90% of individual who once had any abdominal operation would get intra-peritoneal adhesion[5]. In the presence of adhesion, catheter implantation can be complicated by visceral injury, bleeding and catheter mal-position/obstruction. In addition, compartmentalization of peritoneal cavity by adhesion can reduce the availability of peritoneal free space which might lead to inadequate dialysis.

The purpose of the present study was to compare the immediate/peri-operative complications

Correspondence to:
Chuengsaman P, CAPD Service and Training Center, Prommitr Branch, Banphaeo Hospital (Public Organization), Bangkok 10110, Thailand.
Phone: 0-2259-0333 ext. 183, 411
E-mail: pjeungsmarn@yahoo.com

and outcomes between patients with and without previous abdominal operation.

Material and Method

All data in the present study were retrospectively reviewed since the opening of the PD center in February 2008. At the end of April 2011, there were 794 new PD patients. PD catheter implantation was performed by one surgeon using mini-laparotomy under local anesthesia.

Patient, technique and catheter survival probabilities were estimated using the method of Kaplan and Meier. Comparison of probability curves was performed with the log rank test. Patient survival was censored for transfer to hemodialysis, kidney transplantation, and renal recovery. Technique survival was censored for death, kidney transplantation and renal recovery. Catheter failure was defined as removal of the catheter for some mechanical and infectious complications. Catheter loss due to death, transplantation, and renal recovery were censored despite being counted as survived catheters since these catheters had no problems and were working when were removed.

Statistical analysis

Chi-square test was used to compare nominal data while t-test was utilized to compare continuous data. All results were considered significant when $p < 0.05$. For descriptive purposes, cumulative rate of mechanical complication was calculated in percentage of total patients in each group.

Results

From 794 patients, there were 730 patients who got the first catheter implantation by using mini-laparotomy technique under local anesthesia by one surgeon. There were 624 patients who had no history of previous abdominal operation while the remaining 106 patients (14.5%) underwent previous abdominal surgery. The types of previous abdominal operation were detailed in Table 1.

Table 1. Type of previous abdominal operation

Type of previous operation	Number of cases
Intra-abdominal	33
Intra-abdominal & pelvic cavity	3
Pelvic cavity	62
Data not available	8

The demographic data between patients with and without previous abdominal operation were analyzed. The significant different data were gender and poor clinical status at the time of starting dialysis. In the "with previous abdominal operation" group, the percentage of female was higher than in the "without previous abdominal operation" group. In the "with previous abdominal operation" group, the percentage of patients with poor clinical status was less than in the "without previous abdominal operation" group (Table 2).

No incidence of visceral organ injury was detected in both groups. As shown in Table 3, there were no significant differences in incidences of bleeding from exit site or incision wound within 4 days, acute exit site infection within 14 days, catheter mal-position at the first time of starting dialysis and within 30 days, and catheter obstruction at the first time of starting dialysis and within 30 days after catheter implantation between patients with and without previous abdominal operation (NS).

In the "previous abdominal operation" group, there were 3 patients who previously underwent small/large bowel operation. All of them got the catheter implantation successfully without any immediate complication.

The peritonitis rate of the "previous abdominal operation" group was 1 episode per 35 patient-months compared with 1 episode per 27 patient-months in the "without previous abdominal operation" group (NS). The exit site infection rates of both groups were the same, 1 episode per 28 patient-months (NS).

Kaplan-Meier analysis was performed to compare overall patient/technique/catheter survival time between patients with previous abdominal operation and without previous abdominal operation.

No significant differences in patient, technique, and catheter survival times were detected between both groups ($p = 0.94$, $p = 0.14$, and $p = 0.40$ respectively) (Fig. 1-3).

Discussion

The results in the present studies have demonstrated that ESRD patients with history of previous abdominal operation is not contra-indicated to PD. The immediate and peri-operative complications were comparable. The long-term outcome, in terms of patient/technique/catheter survival and infectious complications were similar and acceptable in both group.

The percentage of patients who had history

Table 2. Baseline characteristics in patients "with previous abdominal operation" and "without previous abdominal operation" groups

	Patients with previous abdominal operation (n = 106)	Patients without previous abdominal operation (n = 624)	p-value
Gender (male)	32 (30.2%)	320 (51.3%)	< 0.0001
Age(mean ± SD) (year)	57.42 ± 13.3	56.97 ± 25.1	0.86
Diabetes (%)	73 (68.8%)	423 (67.8%)	0.91
Previous mode of dialysis:			
HD more than 90 days	6 (5.7%)	55 (8.8%)	0.35
Poor clinical status* (%)	8 (7.5%)	111 (17.7%)	0.007

* Clinical status at presentation including alteration of consciousness or cachexia due to severe uremia

Table 3. Immediate/peri-operative complications in patients "with previous abdominal operation" group and "without previous abdominal operation" group

	Patients with previous abdominal operation (n = 106)	Patients without previous abdominal operation (n = 624)	p-value
Bleeding within 4 days	2 (1.9%)	15 (2.4%)	1.00
Exit site/wound infection within 14 days	0	13 (2.1%)	0.23
Malposition when first running dialysis	1 (0.9%)	3 (0.5%)	1.00
Malposition within 30 days postoperatively	4 (3.8%)	11 (1.8%)	0.25
Obstruction when first running dialysis	2 (1.9%)	4 (0.6%)	0.21
Obstruction within 30 days postoperatively	2 (1.9%)	9 (1.4%)	0.67

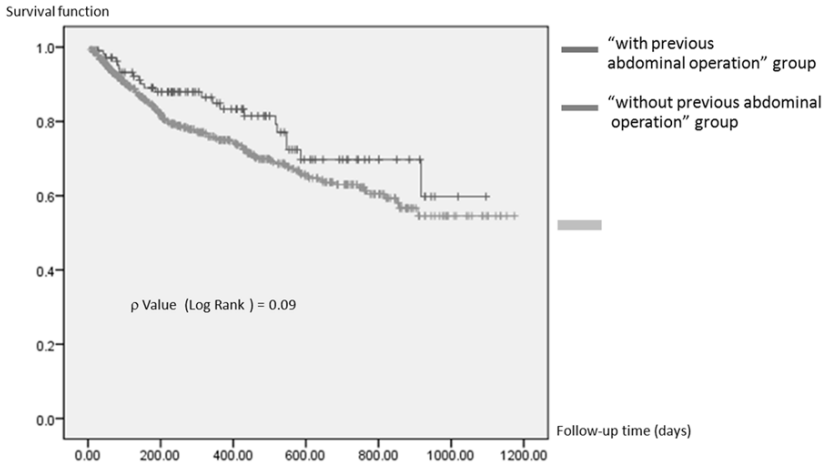

Fig. 1 Overall patient survival between patients "with previous abdominal operation" and "without previous abdominal operation" groups

of previous abdominal operation is 14.5 percent in the present study. Chen et al[6] had reported the percentage of patients with previous abdominal operation in their study of 14.8 percent. However, there were several publications which observed the higher percentage, ranged from 45.8 to 55.1 percent[7-9]. The lower incidence in the present study might be caused by selection bias. Many nephrologists/surgeons still perceive that previous abdominal operation is one of the crucial contra-indication to PD, as such, they will suggest

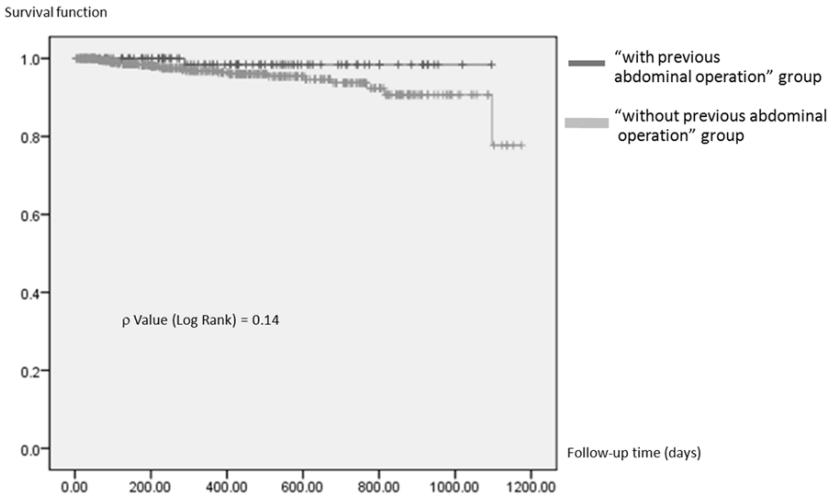

Fig. 2 Overall technique survival between patients "with previous abdominal operation" and "without previous abdominal operation" groups

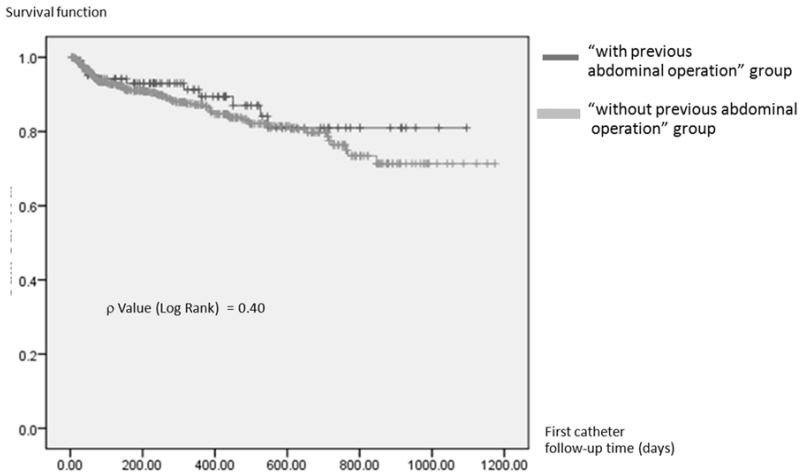

Fig. 3 Overall first catheter survival between patients "with previous abdominal operation" and "without previous abdominal operation" groups

hemodialysis as the first option for renal replacement therapy. The present study was conducted in the main PD referral center in Bangkok. All of the patients started PD in this center but they did not get the first counseling for their selection modality here. This might lead to a selection bias before the patients were referred to this center.

The overall incidence of immediate and perioperative complications in the present study were quite low when compared with previous publications. Regardless of the implantation approach used, the outcomes have been extremely variable relative to noninfectious procedure complications. The incidence rates of flow dysfunction and catheter displacement generally ranged from 2-31 percent of cases[10-12]. Tiong et al[13] reported that catheter mal-position/poor flow was 12 out of 164 patients (7.31 percent). When considered only the ones who needed re-implantation, the number was 6 from 164 patients (3.66 percent). Crabtree et al[9] conducted a study to compare patient outcome and complications between different surgical techniques including open laparotomy, basic laparoscopy, and advanced laparoscopy. In the open laparotomy arm, catheter flow obstruction occurred in 11 out of 63 patients (17.5 percent). However, the authors did not show the details of the timing of the complication.

Being the main referral PD center in Bangkok,

most of the patients in the center started PD in an elective setting. The catheter implantation is operated by only one surgeon and the implantation technique is open dissection through mini-laparotomy. This technique can make some benefits in decreasing risk of mechanical complications, especially catheter mal-position. Our technique can create a rectus tunneling and this can ensure that the catheter course in the rectus muscle will parallel to the posterior rectus sheath. This can reduce the risk of tip migration. Another factor that might contribute to this is that the patients are encouraged to perform early ambulation. Most of the operations require 1-day hospitalization. After that, break-in and training period are performed in outpatient clinic. This might facilitate bowel movement thus decreasing the chance of catheter dysfunction. All of these factors might contribute to the low rate of overall immediate/peri-operative complications. In the present study, there were no differences of early infectious and non-infectious complications between patients without previous abdominal operation. In contrast, Tiong et al[13] reported that 18 (41.9%) catheter insertions in patients with previous abdominal operation, including previous insertion, had higher early complications compared with 32 (26.4%) insertions in patients without previous abdominal operation ($p = 0.02$). However, Chen et al[6] reported that previous abdominal operation group seemed to get, slightly but not significantly, higher percentage of complications than the other group (16.7% vs. 12.5%). In the recent years, there are many publications which addressed about laparoscopic-assisted catheter implantation. Laparoscopy provides a relatively noninvasive method to fully investigate the peritoneal cavity. Additionally, it can allow proactive intervention for problem identified during the procedure that could complicate catheter function[9,14,15].

Although laparoscopic-assisted operation is widely practiced in Thailand, but it is still very limitedly used in PD catheter implantation. In this center, laparoscopic-assisted PD catheter implantation is indicated only in case of suspicious extensive peritoneal adhesion. In a recent study from Iran[16], all patients underwent laparoscopic implantation of PD catheter regardless of history of previous abdominal operation. The authors found that 26.9 percent of patients with history of previous abdominal operation got intra-peritoneal adhesion compared with 2.8 percent of patients without history of previous abdominal operation. This data support that history of previous abdominal operation does not lead to intra-peritoneal adhesion in all cases. Many studies recommend that laparoscopic-assisted catheter implantation should be performed in all cases or in cases of previous abdominal operation. There was a study which demonstrated the cost effectiveness of this approach compared with open dissection[17]. Whether this practice is suitable for Thai situation or not needs more evidence to support.

In conclusion, a history of previous abdominal operation in ESRD patient is not a contra-indication to PD. The immediate and peri-operative complications are low and there were no significant differences between patient with/without previous abdominal operation. Dedicated catheter implantation team would be the key of success.

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Potential conflicts of interest

None.

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ผลของประวัติการผ่าตัดช่องท้องต่อภาวะแทรกซ้อนและผลการรักษาด้วยวิธีการล้างไตทางช่องท้อง

ปิยะธิดา จึงสมาน, อภิชาติ พนมเริงศักดิ์, กาญฎา ศรีอุดม

วัตถุประสงค์: *ในระยะเวลา 3 ปี ตั้งแต่เริ่มประกาศใช้นโยบายการล้างไตทางช่องท้องเป็นลำดับแรก สำหรับผู้ป่วยโรคไตวายเรื้อรังระยะสุดท้ายภายใต้สิทธิหลักประกันสุขภาพถ้วนหน้า มีการขยายการให้บริการล้างไตทางช่องท้องในโรงพยาบาลภาครัฐเพิ่มขึ้นอย่างต่อเนื่อง ปัจจุบันมีผู้ป่วยรายใหม่ทั้งหมดประมาณ 10,000 ราย กระจายอยู่ทั่วทุกภาคของประเทศ ในอดีตจะถือว่าหากผู้ป่วยโรคไตวายเรื้อรังระยะสุดท้ายมีประวัติการผ่าตัดช่องท้องมาก่อนเป็นข้อห้ามสำหรับการล้างไตทางช่องท้อง วัตถุประสงค์ของการศึกษานี้คือเปรียบเทียบภาวะแทรกซ้อนหลังผ่าตัดวางสายล้างไตทางช่องท้องและผลลัพธ์ ของการรักษาระหว่างผู้ป่วยโรคไตวายเรื้อรังระยะสุดท้ายที่เคยได้รับและไม่เคยได้รับการผ่าตัดช่องท้อง*

วัสดุและวิธีการ: *การศึกษานี้เป็นการศึกษาย้อนหลังทบทวนข้อมูลการวางสายล้างไตทางช่องท้องสายแรกของผู้ป่วยทุกรายตั้งแต่เริ่มเปิดให้บริการในเดือนกุมภาพันธ์ พ.ศ. 2551 จนถึงเดือนเมษายน พ.ศ. 2554 เทคนิคการวางสายล้างไตทางช่องท้องเป็นเทคนิคเดียวกันทุกรายคือการผ่าตัดด้วยวิธีผ่าตัดขนาดเล็ก โดยศัลยแพทย์ท่านเดียว การศึกษานี้เปรียบเทียบภาวะเลือดออกและการติดเชื้อที่แผลผ่าตัดในระยะแรกหลังผ่าตัด นอกจากนี้มีการเปรียบเทียบอัตราการเกิดการผิดตำแหน่งและการอุดกั้นของสายล้างไตทางช่องท้อง รวมทั้งอัตราการรอดชีวิต อัตราการเปลี่ยนการรักษาเป็นการฟอกเลือดด้วยเครื่องไตเทียมและอัตราการอยู่รอดของสายล้างไตทางช่องท้องสายแรกระหว่างผู้ป่วยไตวายเรื้อรังระยะสุดท้ายที่เคยได้รับและไม่เคยได้รับการผ่าตัดช่องท้อง*

ผลการศึกษา: *จากการผ่าตัดวางสายล้างไตทางช่องท้องสายแรกในผู้ป่วย 730 ราย เป็นการผ่าตัดในผู้ป่วยที่มีประวัติผ่าตัดช่องท้องมาก่อน 106 ราย คิดเป็น (ร้อยละ 14.5) ผลการเปรียบเทียบภาวะเลือดออกและการติดเชื้อที่แผลผ่าตัดในระยะแรกหลังผ่าตัด อัตราการเกิดการผิดตำแหน่งและการอุดกั้นของสายล้างไตทางช่องท้อง รวมทั้งอัตราการรอดชีวิต อัตราการเปลี่ยนการรักษาเป็นการฟอกเลือดด้วยเครื่องไตเทียม และอัตราการอยู่รอดของสายล้างไตทางช่องท้องสายแรกระหว่างผู้ป่วยโรคไตวายเรื้อรังระยะสุดท้ายที่เคยได้รับ และไม่เคยได้รับการผ่าตัดช่องท้อง ไม่พบความแตกต่างอย่างมีนัยสำคัญทางสถิติ*

สรุป: *ประวัติการผ่าตัดช่องท้องในผู้ป่วยโรคไตวายเรื้อรังระยะสุดท้ายไม่เป็นข้อห้ามสำหรับการล้างไตทางช่องท้องหากดำเนินการโดยทีมผ่าตัดและทีมหลังผ่าตัดที่ทุ่มเท มีผลให้ภาวะแทรกซ้อนหลังผ่าตัดอยู่ในเกณฑ์ต่ำและไม่มีความแตกต่างระหว่างผู้ป่วยโรคไตวายเรื้อรังระยะสุดท้ายที่เคยได้รับและไม่เคยได้รับการผ่าตัดช่องท้อง*