Peritonitis in Peritoneal Dialysis Patients: Ramathibodi Hospital Experience

Suthida Topanthanont MSN*,
Amporn Sakulsaengprapha MD**

** Division of Nursing Service, Faculty of Medicine, Ramathibodi Hospital, Mahidol University, Bangkok, Thailand*
*** Renal Unit, Faculty of Medicine, Ramathibodi Hospital, Mahidol University, Bangkok, Thailand*

Objective: *This single center, retrospective cohort study was conducted to assess peritonitis rate during 2000 to 2010.*
Material and Method: *All 103 peritoneal dialysis (PD) patients during January 2000 to December 2010 were recruited in the present study.*
Results: *There were 112 episodes of peritonitis during 5,238 patient-month which was 1 episode of peritonitis in 46.77 patient-month or 0.257 episode per patient-year. Fifty-eight patients used the previous single bag dialysis solution (both safe lock and spike system). During 2003-2005, 35 (60%) patients who previously used the single bag system were retrained and changed to new double bags connecting system while the remainings were out of program before this system was available in the hospital. After the new double bags connecting systems and automated peritoneal dialysis (APD) were available, 71 and 7 new patients were commenced on double bags system and APD respectively. The authors found 66 peritonitis during 2,686 months in the group of patients who used single bag solution which was equall to 1 episode of peritonitis in 40.70 patient-months or 0.295 peritonitis per patient-year. In the double bags solution group, there were 45 episodes of peritonitis during 2,722 months which equalled 1 peritonitis in 60.49 patient-months or 0.198 peritonitis per patient-year, while the authors found 1 episode of peritonitis in 88 patient-month or 0.136 peritonitis per patient-year. In the present study, there were 38 (36.9%) diabetic patients. There were 35 and 77 episodes of peritonitis within 1,141 and 4,355 patient-months which means 1 episode of peritonitis every 32.60 and 56.56 months or 0.368 and 0.212 peritonitis per patient-year in diabetic and non diabetic patients respectively.*
Conclusion: *The authors confirmed that diabetes mellitus was the risk factor of peritonitis in the authors unit. With the new double bags connecting system and APD, peritonitis rate in the authors unit decreased significantly. Peritonitis rate in the authors unit was 0.257 episode per patient-year or 1 episode every 46.77 patient-months which achieved the goal standard.*

Keywords: *Peritoneal dialysis, Peritonitis rate, Single bag, Double bags*

J Med Assoc Thai 2011; 94 (Suppl. 4): S25-S29
Full text. e-Journal: *http://www.mat.or.th/journal*

Although peritoneal dialysis (PD) is an important modality of renal replacement therapy (RRT), peritonitis is the main complication of the treatment and the leading cause of technical failure. In this regard, continuous ambulatory peritoneal dialysis (CAPD) has not been a popular option and was accepted only as an alternative dialysis in many coutries. In Thailand, after the "CAPD First" policy was implemented in 2008, the number of PD patients were enormously increased. As in TRT report 2008, the number of prevalence PD patients escalated from 1,198 in 2007 to 2,760 in 2008[1]. With the recently inofficial report, there were more than 10,000 PD patients in 2011. The rapidly increasing in PD patients in the short period of time brought back the concerns of peritonitis from all the health personels and patients. Indeed, peritonitis rates vary from time to time and place to place, depending on many factors[2,3]. As in ISPD guidelines, each center's peritonitis rate should not be more than 1 episode every 18 months (0.67/year at risk). However, the peritonitis rates as low as 1 episode every 41-52 months (0.29-0.23/year) have been reported, the goal that all CAPD centers should strive to achieve. Monitoring the peritonitis rate in every center is the key to improve the outcome of PD patients[4].

PD was initiated in Ramathibodi Hospital as a kind of RRT for more than 30 years. Most of the patients were government officers and families. Before the year 2003, all the patients were commenced on the single bag connecting system (safe lock and spike system).

Correspondence to:
Sakulsaengprapha A, Renal Unit, Faculty of Medicine, Ramathibodi Hospital, Mahidol University, Bangkok 10400, Thailand.
Mobile: 08-1649-6776
E-mail: amporn_s@hotmail.com

The new peritoneal dialysis patients starting after the year 2003 were trained to use double bags connecting system. The patients with the single bag system were retrained and switched to the double bags system during 2003-2005. Automated peritoneal dialysis (APD) was recently initiated into Ramathibodi Hospital in 2009. This retrospective study reported the peritonitis rate at Ramathibodi Hospital between 2000 to 2010.

Material and Method

The incidence PD patients in Ramathibodi Hospital between January 2000 to December 2010 were included in the present study. There were 103 end stage renal disease (ESRD) patients who were commenced on PD. All the PD patients who started the treatment before 2003 will be started on CAPD with single bag or straight connecting system (both safe lock and spike system). After 2003 the double bags system was available in the hospital, all new patients underwent PD with this double bags system. During 2003-2005, the existent PD patients who previously used the single bag system were retrained and switched to double bags connecting system (both Andy-disc and twin bags system). Since 2008, APD was introduced and available in the hospital, the new PD patients had been educated and discussed with the physicians and PD nurses about the option of the treatment. The standard coiled Tenckhoff catheters were inserted in all patients by trocar method or mini-exploration. All the PD and exchange training were undertaken in the out patient clinic by the same PD nurses, PD exchanges usually started after 7-10 days of break-in period. The patients were followed-up till the end of the present study at the end of December 2010, kidney transplantation, hemodialysis, or death. Diagnosis of peritonitis was confirmed the by presence of white blood cells more than 100/µl with at least 50% of polymorphonuclear cells. The peritonitis rate was calculated as total patient-years divided by the total number of episodes of peritonitis and as months of peritoneal dialysis at risk, divided by number of episodes, and expressed as interval in months between episodes.

Results

From 2000 to 2010, 103 PD patients were followed-up. The total period of follow-up time was 5,238 patient-months with average follow-up time of 53.36 $\pm$ 40.43 patient-months. The average age of population was 56.19 $\pm$ 14.133 year. There were 38 (36.9%) diabetic PD patients. Female patients were slightly more than male patients (63 female vs. 40 male) (Table 1).

Table 1. Basic characteristics of PD patients in Ramathibodi Hospital

Numbers of patients	103
Male:Female	40:65
Diabetic:Non diabetic patients	38:65 (36.9%:63.1%)
Mean age (year)	56.19 $\pm$ 14.13
Mean follow-up time (months)	53.36 $\pm$ 40.43

The authors categorized the authors patients into 4 groups: 1) 24 patients used single bag solution only, 2) 35 patients started with single bag and then changed to double bags system (One patient in this group lost to follow-up after changed system), 3) 37 patients started with double bags and 4) 7 patients initiated with APD.

During the present study period of 5,238 patient-months, 112 episodes of peritonitis were diagnosed. The peritonitis rate was 1 episode in 46.77 patient-months or 0.257 episode per patient-year (Table 2).

When diabetic and non-diabetic PD patients were compared, there were 35 episodes of peritonitis during 1,141 patient-months at risk in diabetic patients, and 77 episodes of peritonitis during 4,355 patient-month at risk in non diabetic group. As such, the peritonitis rate in diabetic patients was 1 episode of peritonitis in 32.60 patient-months or 0.368 episode per patient-year. In non diabetic patients, peritonitis was 1 episode of peritonitis in 56.56 patient-months or 0.212 episode per patient-year, indicating that peritonitis rate in non diabetic group was 42.39% lower than the diabetic group (Table 3).

When different connecting systems were assessed, there were 66 episodes of peritonitis during 2,686 patient-months at risk in the group that use single bag system, 45 episodes of peritonitis during 2,722 patient-months in the double bags phase, 1 episode of peritonitis during 88 patient-month in APD group. Peritonitis rates were calculated and showed 1 episode of peritonitis in 40.70, 60.49, and 88 patient-months or equal 0.295, 0.198, and 0.136 episode per patient-year in single bag system, double bags system, and APD, respectively. Thus, the peritonitis rates were reduced by 32.72% and 53.75% in double bags system and APD when compared with the previous single bag system (Table 2).

The causative agents of peritonitis were detailed in Table 4. Gram positive cocci remained the most common pathogens and comprised 33.04%

Table 2. Peritonitis rate in different groups of connecting system

	Peritonitis Rate (Episodes/Patient-months Duration between peritonitis(months)/Episode per patient-year)		
	Single bag	Double bags system	APD
Single bag (n = 24)	27episodes/769 pt-mo 1 episode every 28.49 pt-mo 0.421 episode per pt-yr		
Single/Double bags (n = 35)	39 episodes/1,917 pt-mo 1 episode every 49.16 pt-mo 0.244 episode per pt-yr	16 episodes/1,505 pt-mo 1 episode every 94.06 pt-mo 0.128 episode per pt-yr	
Double bags (n = 37)		29 episodes/1,217 pt-mo 1 episode every 41.97 pt-mo 0.286 episode per pt-yr	
APD (n = 7)			1 episode/88 pt-mo 1 episode every 88 pt-mo 0.136 episode per pt-yr
Total	66 episode/2,866 pt-mo 1 episode every 40.70 pt-mo 0.295 episode per pt-yr	45 episode/2,722 pt-mo 1 episode every 60.49 pt-mo 0.198 episode per pt-yr	1 episode/88 pt-mo 1 episode every 88 pt-mo 0.198 episode per pt-yr

Abbreviation: pt = patient; APB = automated peritoneal dialysis; mo = month; yr = year

Table 3. Comparison of peritonitis rate between diabetic and non diabetic patients

	Diabetic Patients	Non diabetic Patients
Episodes/patient-months at risk	35/1,141	77/4,355
Duration between episodes (months)	32.60	56.56
Episode per patient-year	0.368	0.212

Table 4. Causative organisms for the peritonitis

	Episodes of peritonitis (percentage)		
	Total	Single bag	Double bags/APD
Stphylococcus aureus	6 (5.36%)	5 (7.58%)	1 (2.17%)
Staphylococcus coagulase negative	20 (17.86%)	12 (18.18%)	8 (17.40%)
Streptococcus spp.	11 (9.82%)	5 (7.58%)	6 (13.04%)
E. coli	7 (6.25%)	4 (6.06%)	3 (6.52%)
Klebsiella pneumoniae	2 (1.79%)	1 (1.51%)	1 (2.17%)
Pseudomonas spp.	3 (2.68%)	3 (4.55%)	0 (0%)
Mixed organism	8 (7.14%)	4 (6.06%)	4 (8.70%)
Others	19 (16.96%)	12 (18.18%)	7 (15.21%)
Yeast	3 (2.68%)	2 (3.03%)	1 (2.17%)
No growth	19 (16.96%)	7 (10.60%)	12 (26.10%)
Unknown (No result)	14 (12.50%)	11 (16.67%)	3 (6.52%)
Total	112 (100%)	66 (100%)	46 (100%)

(*Staphylococcus coagulase* negative 17.86%, *Staphylocoocus aureus* 5.36%, *Streptococcus spp*. 9.82%) *E.coli* was the most common gram negative bacilli which was identified (6.25%), while *Pseudomonas spp.* was found in 2.68%, and fungal (yeast) peritonitis was observed in 3 patients (2.68%).

Of note 16.96% of patients had culture negative peritonitis while 12.50% of patients reported to have peritonitis and treated in other hospital with unknown culture reports.

Duscussion

Despite being the main complication in PD patients, peritonitis usually is the treatable condition. However, the magnitude of the problems need to be emphasized especially in Thailand where "PD First" policy was recently announced[1]. The results in the present study showed that over all peritonitis rate in Ramathibodi hospital was 0.257 episode per patient-year or 1 episode of peritonitis every 46.77 patient-months which reached the goal reported and mentioned in ISPD guidelines 2010. Several factors such as race, body mass index, diabetes mellitus, hypoalbuminemia, connectology etc. had been reported as the factors that contributed to the PD outcomes, especially peritonitis[2-6]. However, some of these factors were not easy to control or correct. The authors emphasized that regular peritonitis rate monitoring is the key process for self evaluation and improvement. There are many other factors in Ramathibodi hospital that could contribute or improve the peritonitis rate or general PD outcomes. Most of the PD patients in the hospital (about 87%) were government officers and families and this group of patients usually had less limitation to access health care system. The PD program in Ramathibodi hospital was facilitated by the experienced nurses who worked with the renal patients for more than 25 years. The ratio of the PD patients to nurses is rarely over 50-60 patients per one nurse. PD educations including exchange technique, general aseptic technique, hand hygiene, exit site care, nutrition, and support from the family or care givers are the main factors to keep and maintain good outcomes in PD patients.

In conclusion, overall peritonitis rate in Ramathibodi hospital during 2000 to 2010 was 1 episode of peritonitid every 46.77 patient-months or 0.257 episode per patient-year which is comparable outcome in view of peritonitis to the other countries. The present study confirmed that diabetic patients had higher peritonitis rate. The new connecting systems (double bags and APD) definitely reduce the peritonitis rate.

Acknowledgement

The authors would like to thank Mrs. Kittima Chan-O and Mrs. Veena Siriwattanakorn for their devoted work and endless support to the authors PD program.

Potential conflicts of interest

None.

References

1. Praditpornsilapa K. Report of Thailand renal replaement therapy year 2008. Bangkok: The Nephrology Society of Thailand; 2008.
2. Whaley-Connell A, Pavey BS, Satalowich R, Prowant BF, Misra M, Twardowski ZJ, et al. Rates of continuous ambulatory peritoneal dialysis-associated peritonitis at the University of Missouri. Adv Perit Dial 2005; 21: 72-5.
3. Maiorca R, Cancarini G. Thirty years of progress in peritoneal dialysis. J Nephrol 1999; 12 (Suppl 2): S92-9.
4. Li PK, Szeto CC, Piraino B, Bernardini J, Figueiredo AE, Gupta A, et al. Peritoneal dialysis-related infections recommendations: 2010 update. Perit Dial Int 2010; 30: 393-423.
5. McDonald SP, Collins JF, Rumpsfeld M, Johnson DW. Obesity is a risk factor for peritonitis in the Australian and New Zealand peritoneal dialysis patient populations. Perit Dial Int 2004; 24: 340-6.
6. Chow KM, Szeto CC, Leung CB, Kwan BC, Law MC, Li PK. A risk analysis of continuous ambulatory peritoneal dialysis-related peritonitis. Perit Dial Int 2005; 25: 374-9.

เยื่อบุช่องท้องอักเสบในผู้ป่วยล้างไตทางช่องท้อง ประสบการณ์ของโรงพยาบาลรามาธิบดี

สุธิดา โตพันธนานนท์, อัมพร สกุลแสงประภา

วัตถุประสงค์: *ทำการศึกษาย้อนหลังเพื่อประเมินอัตราการติดเชื้อเยื่อบุช่องท้องของผู้ป่วยไตวายเรื้อรังระยะสุดท้ายที่รับการรักษาด้วยการล้างไตทางช่องท้อง ตั้งแต่ พ.ศ. 2543 ถึง พ.ศ. 2553*

วัสดุและวิธีการ: *ทำการศึกษาในผู้ป่วยไตวายเรื้อรังระยะสุดท้ายที่รับการรักษาด้วยการล้างไตทางช่องท้อง 103 ราย*

ผลการศึกษา: *พบมีการติดเชื้อเยื่อบุช่องท้อง 112 ครั้งในระหว่างเวลาการติดตาม 5,238 เดือน ซึ่งเท่ากับอัตราการติดเชื้อ 1 ครั้ง ในเวลาทุก 46.77 เดือนหรือ 0.257 ครั้งต่อปี มีผู้ป่วย 59 ราย ที่เริ่มรับการรักษาด้วยการใช้น้ำยาชนิดถุงเดี่ยว ในช่วงปี พ.ศ. 2546 ถึง พ.ศ. 2548 ผู้ป่วยจำนวน 35 ราย ที่เคยใช้ระบบถุงเดี่ยวและยังคงรับการรักษา ด้วยการล้างไตทางช่องท้องอยู่ได้รับการฝึกการเปลี่ยนถ่ายน้ำยาใหม่ในระบบสองถุงและเปลี่ยนไปใช้ระบบดังกล่าว ขณะที่ผู้ป่วยใหม่ทุกรายหลังปี พ.ศ. 2546 จะได้รับการรักษาด้วยน้ำยาระบบสองถุงรวมเป็นในระบบน้ำยาสองถุง 71 ราย และผู้ป่วย 7 ราย เริ่มต้นการรักษาด้วยระบบเครื่องเปลี่ยนน้ำยาอัตโนมัติ จากการศึกษาพบการติดเชื้อ เยื่อบุช่องท้อง 66 ครั้ง ในระยะเวลา 2,686 เดือน ที่ติดตามในช่วงที่ผู้ป่วยใช้น้ำยาถุงเดี่ยว ซึ่งเทียบเท่ากับการติดเชื้อ 1 ครั้งทุก 40.70 เดือน หรืออัตราติดเชื้อ 0.295 ครั้งต่อปี พบการติดเชื้อเยื่อบุช่องท้อง 66 ครั้ง ในระยะเวลา 2,686 เดือน ที่ติดตามในช่วงที่ผู้ป่วยใช้น้ำยาถุงเดี่ยว ซึ่งเทียบเท่ากับการติดเชื้อ 1 ครั้งทุก 40.70 เดือน หรืออัตราการติดเชื้อ 0.295 ครั้งต่อปี ในขณะที่พบการติดเชื้อเยื่อบุช่องท้อง 45 ครั้งในระยะเวลา 2,722 เดือน ที่ติดตามในช่วงที่ ผู้ป่วยใช้น้ำยาถุงคู่ ซึ่งเทียบเท่ากับการติดเชื้อ 1 ครั้งทุก 60.49 เดือนหรืออัตราการติดเชื้อ 0.198 ครั้งต่อปี และพบ การติดเชื้อเยื่อบุช่องท้อง 1 ครั้ง ในระยะเวลา 88 เดือน ที่ติดตามในช่วงที่ผู้ป่วยใช้ระบบการเปลี่ยนน้ำยาด้วยเครื่อง อัตโนมัติซึ่งเทียบเท่ากับการติดเชื้อ 1 ครั้งทุก 88 เดือนหรืออัตราการติดเชื้อ 0.136 ครั้งต่อปี นอกจากนี้ พบการติดเชื้อ เยื่อบุช่องท้อง 35 ครั้งในเวลา 1,141 เดือนในผู้ป่วยเบาหวาน ขณะที่มีการติดเชื้อ 77 ครั้งใน 4,355 เดือน ในกลุ่ม ไม่เป็นเบาหวาน ซึ่งเทียบเท่ากับอัตราการติดเชื้อ 1 ครั้งทุก 32.60 เดือนหรือ 0.368 ครั้งต่อปี ในกลุ่มผู้ป่วยเบาหวาน และ 1 ครั้งทุก 56.56 เดือนหรือ 0.212 ครั้งต่อปี ในกลุ่มผู้ป่วยไม่เป็นเบาหวาน*

สรุป: *การศึกษานี้ยืนยันว่าเบาหวานเป็นปัจจัยเสี่ยงต่ออัตราการติดเชื้อเยื่อบุช่องท้อง ด้วยเทคนิคน้ำยาระบบถุงคู่และการเปลี่ยนน้ำยาด้วยเครื่องอัตโนมัติเป็นปัจจัยเสริมให้สามารถลดอัตราการติดเชื้อเยื่อบุช่องท้อง อัตราการติดเชื้อเยื่อบุช่องท้องโดยรวมของโรงพยาบาลรามาธิบดีเทียบเท่ากับ 1 ครั้งทุก 46.77 เดือนหรือ 0.257 ครั้ง ต่อปี ซึ่งถือว่าอยู่ในเกณฑ์มาตรฐานสากล*