

ASIA-PACIFIC CHAPTER NEWSLETTER

INTERNATIONAL SOCIETY FOR PERITONEAL DIALYSIS (ISPD)

VOLUME 17, ISSUE 3, FALL 2019



Contents

Recent Activities and Coordinator's Message	1
APCM-ISPD 2019 a glance back	2
Incremental Peritoneal Dialysis is Beneficial for Preserving Residual Renal Function Compared to Full-dose PD	4
Upcoming Meetings	6
Dietary fiber and mortality risk in patients on peritoneal dialysis	6
News from ISPD	8
Research News	8
The Use of Peritoneal Dialysis for Acute Kidney Injury in Children	9
Technical News	11
ISPD EuroPD JOINT MEETING: 2-5 MAY 2020 – SEC, GLASGOW, SCOTLAND	12

Recent Activities and Coordinator's Message

Meetings and conference

The 9th Asia Pacific Chapter Meeting of the International Society of Peritoneal Dialysis (APCM-ISPD 2019) was held at the Nagoya Congress Center in Japan from September 5 to 7, 2019. The Organizing Committee was led by Professor Yasuhiko Ito, and the conference theme was "Peritoneal Dialysis: Recent Advances and Enhancing knowledge." The program consists of 6 lectures, 12 symposium sessions, one full-day educational session, and dedicated Japanese sessions. There were 449 abstracts and 1184 delegates from 25 countries.

The core group meeting

The ISPD APC core group meeting was held on 6 September 2019 during the Nagoya conference. In addition to Mr Miguel Gallardo as the ISPD Society Coordinator, 18 core group members attended. Major discussions and decisions are as follows:

Plans for the next semester

1. To confirm the host of the 10th APC conference.
2. To prepare a formal Terms of Reference and define other related regulations.
3. To prepare and published ISPD Asia Pacific Chapter Newsletter Fall 2019.



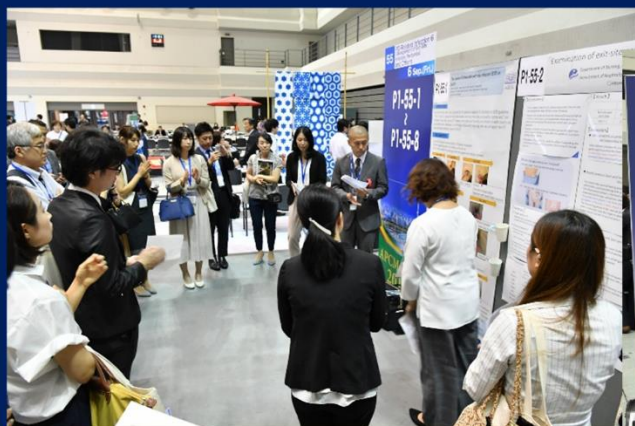
APCM-ISPDP 2019 a glance back

September 5 (Thursday) - 7 (Saturday)
Nagoya Congress Center, Nagoya, Japan

Total Number of Participants: 1184
25 Countries: Argentina, Australia, Bangladesh, Canada, Chile, China, France, Germany, Hong Kong, India, Indonesia, Japan, Korea, Malaysia, Myanmar, New Zealand, Panama, Philippines, Singapore, Sweden, Taiwan, Thailand, Uganda, UK, USA

Abstract Submissions: 449
Total Presentation: 546





Thank you for joining APCM-ISPDP 2019 at Nagoya!

Incremental Peritoneal Dialysis is Beneficial for Preserving Residual Renal Function Compared to Full-dose PD



Kook-Hwan Oh, M.D., Ph.D.

Department of Internal Medicine, Seoul National University College of Medicine, Seoul, Korea

Incremental PD is the practice of initiating PD exchanges less than four times a day in consideration of RRF, and increasing dialysis dose in a step-wise manner as the RRF decreases, by achieving a minimum weekly Kt/V target of 1.7 and not falling below the acceptable minimum. This gradual initiation of dialysis may make the process of dialysis less invasive and better tolerated hemodynamically, as well as allowing for a greater adaptation to patients [1, 2].

Continuous ambulatory peritoneal dialysis (CAPD) may be an ideal method for beginning an incremental dialysis strategy. Starting dialysis gradually, with 1 to 2 manual exchanges a day and graduating up to a maximal 4 exchanges a day (full-dose) if needed, could be an acceptable method to more gently transition into renal replacement therapy, and is better tolerated by patients in terms of lifestyle disruption.

We conducted a single-center, retrospective cohort study from in a relatively large number of patients on CAPD to compare the outcomes of incremental versus full-dose PD in terms of RRF preservation and other PD-related outcomes[3]. Data were extracted retrospectively from a cohort of incident PD patients who commenced PD between January 1, 2007 and December 31, 2015 in the PD Unit of Seoul National University Hospital (SNUH). Patients were excluded from the study if they met any of the following criteria: total duration of PD less than 6 months, initiation of PD at another hospital, urine volume of < 200 mL per day at the time of initiating PD, previous hemodialysis, patients treated with APD, less than 16 years of age, and incomplete study data. Patients who continued PD were followed until July 31, 2017 and were censored at the time of death or loss to follow-up.

Every 6 months, including the first month after dialysis, a total weekly Kt/V was calculated relating the values taken from the 24-hour collection of the urine and PD fluid to assess peritoneal and renal solute clearance, and RRF. Operationally, full-dose PD was defined as the initiation of PD with 3 or more exchanges per day for CAPD, 7 days a week, irrespective of RRF. Incremental PD was defined as one or two dwells per day on CAPD, 7 days a week, and a peritoneal Kt/V < 1.7 per week, but a total Kt/V ≥ 1.7 per week [4-6]. The comparison between incremental and full-dose PD approaches was based on an intention-to-treat analysis.

The primary outcome was time to anuria from initiation of dialysis, such that the urine volume reflected the RRF. Secondary outcomes were peritonitis, technique failure, and all-cause mortality. For analysis of time-to-technique failure, patients were censored at the time of death due to other causes, kidney transplantation, and follow-up loss. Death was determined using either hospital medical records or data from the National Database of Statistics Korea by using the Korean resident registration number. It was anticipated that the incremental and full-dose PD groups would differ substantially with respect to characteristics at the point of dialysis initiation, because the patient's RRF may influence the selection between the two methods. Therefore, inverse probability weight (IPW)-based propensity score matching was used as a tool for creating balance. We estimated Kaplan-Meier survival curves adjusted with the use of inverse probability weighting, and compared anuria-free survival between groups using the log-rank test. All tests were two-sided, and $P < 0.05$ was considered statistically significant.

A total of 347 incident PD patients, assessed were eligible for inclusion, started PD in the PD Unit of SNUH during the study period; 176 underwent incremental PD and 171 underwent conventional full-dose PD. Before adjustment using inverse probability weighting (IPW), patients in the incremental PD group were generally older, and a higher proportion were medium-risk patients by the Davies comorbidity index, compared with patients who initiated full-dose PD. Compared with patients initiating full-dose PD, the incremental PD group had a higher residual renal function, weekly renal Kt/V and urine volume, whereas had a lower peritoneal Kt/V and peritoneal CrCl, than the full-dose PD group. For the incremental PD group, as patients' RRF decreased, the delivered PD dose gradually increased over time. The median duration of incremental PD was 2.6 years. After IPW adjustment, the balance in baseline characteristics, especially the variables of renal solute clearances and urine volume between incremental and full-dose PD groups improved.

Fifty (28.4%) patients in the incremental PD group and 87 (50.9%) in the full-dose PD group developed anuria over time. The median follow-up duration of all patients was 5.9 years. Figure 1 shows the cumulative probability of remaining anuria-free in

two groups. Incremental PD was associated with significantly lower risks of anuria (hazard ratio [HR] 0.61, 95% confidence interval [CI] 0.43-0.88; $P = 0.007$) in univariable, time-dependent Cox proportional hazards model analyses with IPW-weighted for anuria (Figure 1). In multivariable analyses, the other independent predictors of developing anuria were younger age and history of kidney transplantation (Table 1). There was no significant association between initial urine volume and anuria. There were no differences in terms of peritonitis-free survival, technique failure, and all-cause mortality (Figure 2).

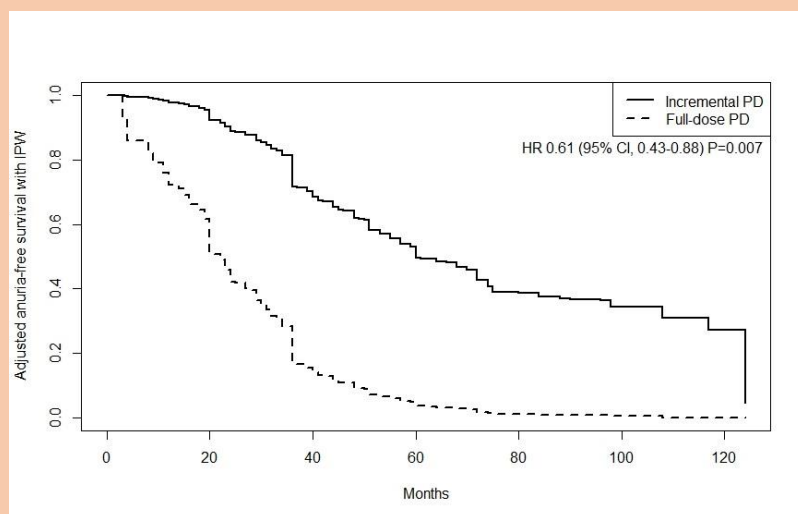


Figure 1. Inversed probability weighted, adjusted anuria-free survival using time-dependent Cox proportional hazards model.

Table 1. Results of multivariable, time-dependent Cox proportional hazards model analyses with IPW-weighted for anuria

Variable	HR (95% CI)	<i>P</i> value
Incremental PD	0.55 (0.34-0.89)	0.015
Age	0.97 (0.95-0.98)	<0.001
Kidney transplantation	7.45 (1.00-55.61)	0.05
Urine volume (per 100 mL)	0.97 (0.94-1.01)	0.162

Abbreviations: IPW, inverse probability weighting; HR, hazard ratio; CI, confidence interval; PD, peritoneal dialysis.

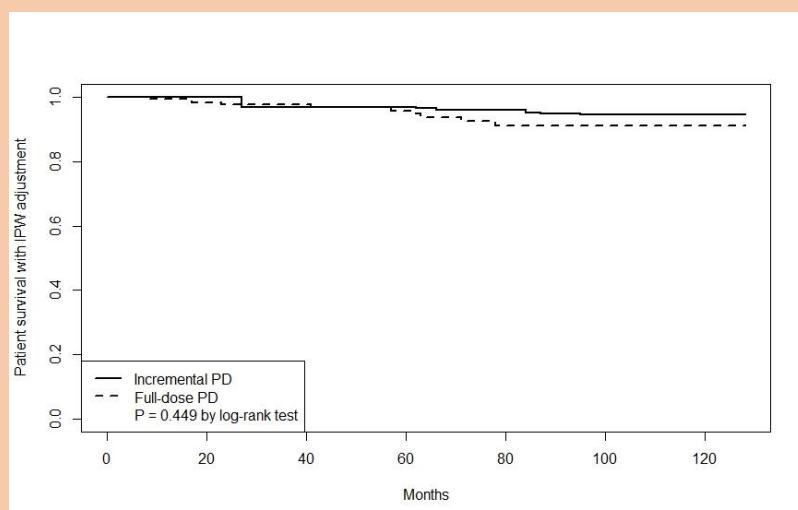


Figure 2. Kaplan-Meier survival estimates using inverse probability weighting (IPW).

The basic assumption of incremental dialysis is to reach the minimal target for adequate dialysis by summing renal function and dialysis dose. Early studies on incremental PD included only a small number of patients, and lacked control groups and any statistical comparison. However, incremental PD has become increasingly relevant with a world-wide trend to gradually initiate chronic dialysis at higher levels of renal function over the past 2 decades; in Italy, 29% of patients start PD with an incremental approach, and 51% of patients were on incremental PD at a single Canadian academic center [1, 7].

This study showed that incremental PD is beneficial for preserving RRF (as demonstrated by a longer anuria-free time) compared to conventional full-dose PD, with similar technique survival, peritonitis-free survival, and mortality. The results of the study give support to the preserving effect of incremental PD on the course of RRF. Moreover, incremental approach to the transitioning of patients from CKD to dialysis may make the patients more receptive to treatment, as it would provide a better quality of life without interfering with their daily activities.

References

1. Sandrini M, et al, Incremental peritoneal dialysis: a 10 year single-centre experience. *J Nephrol*, 2016. 29(6): p. 871-879.
2. Guest S, et al, Kinetic Modeling of Incremental Ambulatory Peritoneal Dialysis Exchanges. *Perit Dial Int* 2017; 37: 205-211.
3. Lee Y, et al, Incremental Peritoneal Dialysis May be Beneficial for Preserving Residual Renal Function Compared to Full-dose Peritoneal Dialysis. *Sci Rep* 2019; 9: 10105.
4. NKF-DOQI clinical practice guidelines for peritoneal dialysis adequacy. National Kidney Foundation. *Am J Kidney Dis* 1997; 30(3 Suppl 2): S67-136.
5. Blake PG, et al, Clinical Practice Guidelines and Recommendations on Peritoneal Dialysis Adequacy 2011. *Perit Dial Int* 2011; 31: 218-39.
6. Garofalo C, et al, Incremental dialysis in ESRD: systematic review and meta-analysis. *J Nephrol* 2019.
7. Ankawi GA, et al, The Use of Incremental Peritoneal Dialysis in a Large Contemporary Peritoneal Dialysis Program. *Can J Kidney Health Dis* 2016; 3: 2054358116679131.

Dietary fiber and mortality risk in patients on peritoneal dialysis



Xiao Xu, Ziqian Li, Jie Dong

Renal Division, Department of Medicine, Peking University First Hospital; Institute of Nephrology, Peking University; Key Laboratory of Renal Disease, Ministry of Health and Key Laboratory of Renal Disease, Ministry of Education; Beijing, China.

Correspondence to: Jie Dong,
E-mail: jie.dong@bjmu.edu.cn

Dietary fiber is related to the decreased risk for various chronic diseases and associated with all-cause and cardiovascular disease (CVD) mortality in the general population. The predictive role of dietary fiber in mortality has also been reported in chronic kidney disease (CKD) patients, from the ULSAM (1) and NHANES III cohorts (2). However, relevant data about the association between dietary fiber and mortality of dialysis patients is limited. We recently performed a single-center prospective cohort study with data retrospectively analyzed, to investigate the prognostic value of dietary fiber in the mortality among peritoneal dialysis (PD) patients(3). This study enrolled incident PD patients between October 2002 and August 2014. All patients were followed until death, transfer to hemodialysis, renal transplantation or until being censored in June 2018. Biochemical, dietary, and nutrition data were examined at baseline and thereafter at regular intervals to calculate the average values throughout the study. Baseline fiber intake and time-averaged fiber intake was categorized by tertile based on the distribution among the study population. The outcomes were defined as all-cause and cardiovascular death.

We followed 881 incident PD patients (434 men, 447 women), mean age of 57.7±14.8 years for 45.0 (21.5, 74.0) months; 42.1% had diabetes mellitus, and CVD was present in 42.6%. The baseline fiber intake was 8.2±3.4g/day in our cohort. Participants with higher fiber intake were more likely to be younger and prone to be male. They were likely to eat more food enriched with dietary nutrients, including protein, carbohydrates, and fat, and thus have better nutritional status reflected by serum albumin

Upcoming Meetings

ISN World Congress of Nephrology 2020

26-29 March 2020

Abu Dhabi, United Arab Emirates

Early bird registration deadline: December 16, 2019

Website: <https://www.wcn2020.org/>

ISPD / EuroPD Joint Congress

2-5 May 2020

Scottish Event Campus (SEC), Glasgow, Scotland

Early bird registration deadline: January 31, 2020

Website: <http://ispd-europd2020.com/>

18th Asian Pacific Congress of Nephrology

19-21 June 2020

Hong Kong Convention & Exhibition Centre, Hong Kong.

Abstract submission deadline: December 15, 2019

Website: <http://www.apcn2020.hk>

(34.6 ± 4.5 g/L vs 35.3 ± 4.6 g/L vs 36.2 ± 4.6 g/L in the low/ middle/ high fiber intake group) and hemoglobin (100.6 ± 15.4 g/L vs 101.7 ± 15.8 g/L vs 106.0 ± 15.3 g/L in the low/ middle/ high fiber intake group). They tended to have less inflammation defined as a lower level of C-reactive protein (CRP) at baseline and afterwards. Both baseline and time-averaged fiber intake exert protective effects against all-cause mortality by univariate analysis, with HR [0.82 (0.78, 0.85), $P < 0.001$] and HR [0.87 (0.84, 0.90), $P < 0.001$]. Despite that this benefit was weakened after multivariate adjustment for the whole cohort, an independent association between fiber intake and all-cause mortality was still found among non-diabetic patients on PD, in which each 1g/day of increase in time-averaged fiber intake correlated to 13% of reduction in all-cause mortality HR [0.87 (0.76, 0.98), $P = 0.022$]. No obvious associations between dietary fiber intake and CVD mortality were found by multivariate analysis.

The inverse association between dietary fiber intake and all-cause mortality might be explained by some clinical clues. Serum albumin, as a general nutritional index, is significantly predictive of patient outcomes in the dialysis population. An increase of approximately 2 g/L in serum albumin in the high tertile might have a substantial contribution to the benefits of dietary fiber intake on mortality, as shown in our data. In addition, serum CRP levels decreased along with the increased dietary fiber across the tertiles during the whole period. Similarly, the NHANES III study reported that the odds of elevated serum CRP levels decreased by 38% in subjects with CKD for each 10-g/day increase in total fiber intake(2). The ULSAM cohort study showed that the odds of having CRP > 3 mg/L were lower in the quartiles that ate more fiber (1). The causes underlying the relationship between dietary fiber and inflammation have been explored recently. Fiber has positive effects on altering gut bacterial metabolism, decreasing some toxins that trigger systemic inflammation, increasing the anti-inflammatory protein adiponectin, and improving lipid metabolism. Therefore, fiber may provide a number of health benefits to the outcomes of patients.

The amounts of time-averaged dietary fiber intake were markedly low in PD patients, i.e., 4.6 g, 6.8 g and 10.1 g in the three tertiles, respectively, relatively lower than 10.2 to 12.4 g/d of fiber in hemodialysis patients (4, 5), and 19.8 g/d of fiber in non-dialyzed patients with CKD (6). All above fiber intake levels among CKD patients are lower than the target for healthy individuals (25-30g/d for women and 30-38g/d for men)(7-9). Indeed, patients in the late stage of CKD were requested to decrease dietary potassium, phosphate, and fluid intake with the loss of renal function. Their dietary pattern may lead to a simultaneous reduction of dietary fiber due to the restriction on vegetables, fruit, and nuts. Unfortunately, current guidelines provide inconsistent references for dietary fiber intake for CKD patients. The KDIGO Clinical Practice Guidelines, ESPEN guidelines, and KHA-CARI guidelines emphasize the inclusion of fiber-rich foods in the diet or a balanced diet, rich in fruit and vegetables, but do not recommend an exact amount for fiber. The KDOQI Guidelines on dyslipidemia recommend 20–30 g/day of fiber (10). In view of limited data in the field, it is necessary to call for robust evidence for the target of dietary fiber in non-dialyzed and dialyzed CKD populations.

In conclusion, higher dietary fiber intake appeared to have a protective effect on all-cause mortality, which suggests that PD patients should be encouraged to eat a diet rich in fiber in view of the serious lack at present. Following the observation that PD patients with higher fiber intake concomitantly have better nutrition status and lower inflammation, more potential mechanisms for the benefits of dietary fiber in traditional and non-traditional risk factors need to be explored.

References

1. Xu H, Huang X, Riserus U, Krishnamurthy VM, Cederholm T, Arnlov J, et al. Dietary fiber, kidney function, inflammation, and mortality risk. *Clinical journal of the American Society of Nephrology : CJASN*. 2014;9(12):2104-10.
2. Krishnamurthy VM, Wei G, Baird BC, Murtaugh M, Chonchol MB, Raphael KL, et al. High dietary fiber intake is associated with decreased inflammation and all-cause mortality in patients with chronic kidney disease. *Kidney Int* 2012;81:300-6.
3. Xu X, Li Z, Chen Y, Liu X, Dong J. Dietary fiber and mortality risk in patients on peritoneal dialysis. *Br J Nutri* 2019;1-19.
4. Kalantar-Zadeh K, Kopple JD, Deepak S, Block D, Block G. Food intake characteristics of hemodialysis patients as obtained by food frequency questionnaire. *Journal of renal nutrition* 2002;12(1):17-31.
5. Khoeiry G, Waked A, Goldman M, El-Charabaty E, Dunne E, Smith M, et al. Dietary intake in hemodialysis patients does not reflect a heart healthy diet. *Journal of renal nutrition*. 2011;21(6):438-47.
6. Fassett RG, Robertson IK, Geraghty DP, Ball MJ, Coombes JS. Dietary Intake of Patients With Chronic Kidney Disease Entering the LORD Trial: Adjusting for Underreporting. *Journal of Renal Nutrition*. 2007;17(4):235-42.
7. USDA and U.S. Department of Health and Human Services. *Dietary Guidelines for Americans*, 2010. 7th ed. Washington, DC: U.S. Government Printing Office. 2010.
8. Canada's Food Guide. Ottawa: Health Canada; 2007.
9. United Kingdom Eatwell Plate, Food Standards Agency: Available from: <https://www.gov.uk/government/publications/the-eatwell-guide>.; 2007 [last accessed October 15, 2019].
10. KDOQI Clinical Practice Guidelines and Clinical Practice Recommendations for Diabetes and Chronic Kidney Disease. *Am J Kidney Dis* 2007;49(2 Suppl 2):S12-154.

Research News

Intraperitoneal Cefepime Monotherapy Versus Combination Therapy of Cefazolin Plus Ceftazidime for Empirical Treatment of CAPD-Associated Peritonitis: A Multicenter, Open-Label, Noninferiority, Randomized, Controlled Trial

Thidarat Kitrunghphaiboon, Pongpratch Puapatanakul, Piyatida Chuengsamarn, Krittaya Tiskajornsiri, Guttiga Halue, Monchai Siribamrungwong, Saraporn Matayart, Kamonrat Chongthanakorn, Ussanee Poonvivatchaikarn, Chanchana Boonyakrai, Wanida Somboonsilp, Pisut Katavetin, Karkiat Praditpornsilpa, Somchai Eiam-Ong, David W. Johnson, Talerngsak Kanjanabuch

Center of Excellence in Kidney Metabolic Disorders and Division of Nephrology, Faculty of Medicine, Chulalongkorn University, BKK THAILAND



Correspond to:
Professor Talerngsak Kanjanabuch, M.D.
Email: golfnephro@hotmail.com

Peritoneal dialysis (PD)-related peritonitis remains the leading cause of technique failure and patient death, accounting for up to 8.6% of patients.(2) Peritonitis was established as an important outcome to patients in the Standardised Outcomes in Nephrology (SONG) PD initiative.(3) International Society for PD (ISPD) guidelines 2016 recommend treating peritonitis empirically with combination antibiotic regimens that cover both Gram-positive organisms (including *Staphylococcus aureus*) and Gram-negative organisms (including pseudomonal species).(4) In steads of using combination therapy, intraperitoneal (IP) cefepime monotherapy for peritonitis may provide an advantage in lowering staff burden, shortening time-consuming antibiotic preparation, and reducing bag contamination risk. This study sought to evaluate whether cefepime monotherapy is non-inferior to combination regimens.

A multicenter, open-label, non-inferiority, randomized, controlled trial was conducted in adult incident peritoneal dialysis (PD) patients with CAPD-associated peritonitis across 8 PD centers in Thailand. A total of 144 eligible participants were randomly assigned 1:1 to receive either IP monotherapy of cefepime, 1 g/d, or IP combination of cefazolin and ceftazidime, 1 g/d, both given as continuous dosing. The loading and maintenance doses were adjusted for residual urine volumes > 100 mL/day by 25% increasing. The primary endpoint was the resolution of peritonitis at day 10 (primary treatment response). Secondary outcomes were an initial response (day 5), complete cure (relapse/recurrence-free response 28 days after treatment completion), relapsing/recurrent peritonitis, and death from any cause. Non-inferiority would be confirmed for the primary outcome if the lower margin of the 1-sided 95% CI was not less than 10%.(1)

There were 70 and 74 participants in the monotherapy and combination-therapy groups, respectively. The primary response was 82.6% in the monotherapy group and 81.1% in the combination-therapy group (treatment difference, 1.5%; 90% CI, -9.1% to 12.1%; P=0.04). There was no significant difference in the monotherapy group compared with the combination-therapy group in terms of initial response rate (65.7% vs 60.8%; treatment difference, 4.9%; 95% CI, -10.8% to 20.6%; P=0.5) and complete cure rate (80.0% vs 80.6%; treatment difference, -0.6%; 95% CI, -13.9% to 12.8%; P=0.7). Relapsing and recurrent peritonitis occurred in 4.6% and 4.6% of the monotherapy group and 4.2% and 5.6% of the combination-therapy group (P=0.9 and P=0.8, respectively).(1)

News from ISPD

Join the ISPD !

Membership benefits of the International Society for Peritoneal Dialysis include:

- print and/or online subscription to Peritoneal Dialysis International
- Receipt of PD News
- Online access to ISPD Guidelines
- Special registration fees at ISPD Congress, Chapter Meetings and the Annual Dialysis Conference
- Application for ISPD Scholarships and Grants

Please join the ISPD membership at www.ispd.org. There is a category of membership for developing countries (institutional membership) allowing 10 member from same institute to pay at one member cost.

Asia-Pacific Chapter Scholarship

This is a scholarship to support up to 3 months training in clinical PD for doctors and nurses from Asia-Pacific region. Deadline for application for each round: twice a year at 30 June or 31 December. **The next deadline is 31 December 2019.** Details and application procedures can be found under the Regional Chapters – Asia-Pacific Chapter, at the ISPD website.

Cefepime is a semi-synthetic, broad-spectrum antibiotic with linear pharmacokinetics over the range 250 mg to 2 g. Single IP dose of cefepime at 15 mg/kg over a 6-hour dwell provided a 24-hour minimum inhibitory concentration (MIC) of $> 8.0 \mu\text{g/mL}$, as required for susceptible staphylococcal and pseudomonal species (PDI).⁽⁵⁾ Cefepime remains stable in various PD solutions, including low-glucose degradation-product and icodextrin solutions. Similar to ceftazidime, cefepime excretes mainly via renal; therefore, the usage at the high dose in ESKD should be aware of neurotoxicity, including encephalopathy, seizures, myoclonus, and loss of consciousness.⁽⁶⁾

This study has some limitations. First, one-fifth of the participants required step-up antibiotics; thus, treatment outcomes did not solely depend on the assigned intervention. Other limitations included an open-label design, which introduced the possibilities of observer and performance biases. The results of this study may not generalize to PD patient populations outside Thailand and Asia or patients treated with automated PD.⁽¹⁾ As always, empirical treatment should be decided in the context of local pattern of infection.

In conclusion, IP cefepime monotherapy was noninferior to conventional combination therapy for resolution of CAPD-associated peritonitis at day 10 and maybe a reasonable alternative first-line treatment.

References

1. Kitrunghpaiboon T, Puapatanakul P, Chuengsamarn P, et al. Intraperitoneal cefepime monotherapy versus combination therapy of cefazolin plus ceftazidime for empirical treatment of CAPD-associated peritonitis: A multicenter, open-label, non-inferiority, randomized controlled trial. *Am J Kidney Dis* 2019 (in press)
2. Mehrotra R, Devuyst O, Davies SJ, Johnson DW. The current state of peritoneal dialysis. *J Am Soc Nephrol*. 2016;27(11):3238-52.
3. Manera KE, Johnson DW, Craig JC, et al. Patient and caregiver priorities for outcomes in peritoneal dialysis: multinational nominal group technique study. *Clin J Am Soc Nephrol*. 2019;14(1):74-83.
4. Li PK, Szeto CC, Piraino B, et al. ISPD peritonitis recommendations: 2016 update on prevention and treatment. *Perit Dial Int*. 2016;36(5):481-508.
5. Elwell RJ, Frye RF, Bailie GR. Pharmacokinetics of intraperitoneal cefepime in automated peritoneal dialysis. *Perit Dial Int*. 2005;25(4):380-6.
6. Al Sahlawi M, Liew A, Perl J. Cefepime as Empirical Peritoneal Dialysis-Associated Peritoneal Treatment: Something to Dwell On?. *Am J Kidney Dis* 2019. [Epub ahead of print]

The Use of Peritoneal Dialysis for Acute Kidney Injury in Children



Wanhong Lu, Huixian Li, Jiping Sun

Department of Nephrology, Kidney Hospital, First affiliated Hospital of Xi'an Jiaotong University, Xi'an, Shaanxi Province, China

Correspondence to: Dr. Wanhong Lu

E-mail: luwanhong@mail.xjtu.edu.cn

Acute kidney injury (AKI) is a critical condition in children, and has long been identified as an important risk factor for morbidity and mortality in children both in and outside the ICUs. Renal replacement therapy (RRT) is frequently used in managing the complications of AKI [1]. The number of children with AKI requiring dialysis is increasing in recent years [2, 3]. In the last two decades, RRT options for AKI have expanded from peritoneal dialysis (PD) and intermittent hemodialysis (HD) to continuous renal replacement therapy (CRRT) and hybrid approaches [4]. Currently, there is no consensus with regards to the optimal dialysis strategy in pediatric AKI. Usually, the decision is made according to patient characteristics, goals of dialysis, local expertise and equipment availability [5].

Historically, PD has been the primary RRT modality employed in pediatric care for the treatment of AKI, considering its advantages in safety, efficacy, no need for systemic anticoagulation, easy equipment and less expenses. In the past decades, the use of PD for AKI, however, has declined considerably in favor of other types of extracorporeal (EC) therapies [6]. In fact, there is no evidence to suggest significant differences in mortality between PD and EC dialytic modalities in AKI. In one study in which the 3 modalities (PD, IHD, and CRRT) were compared in children, it was concluded that the underlying clinical diagnosis,

hemodynamic stability and the use of pressor agents were the key predictors of mortality rather than the type of RRT [7, 4]. Recently, there has been a renewed interest in PD to manage AKI patients, even in developed countries [7].

Due to its advantage, peritoneal dialysis used to be one of primary RRT modalities in pediatric AKI in China. To evaluate the efficacy and safety of PD treatment in small children in local area of Xi'an city in North-west China, we retrospectively analyzed the PD-treated pediatric patients with AKI in our center for the past ten consecutive years [8]. Twenty-four small children were diagnosed as AKI and accepted peritoneal dialysis, with the mean age of 22.4 ± 18.7 months, ranging from 3 months to 5 years old. As to the causes, drug-induced AKI was the most common seen one, followed by glomerulonephritis. Other causes involved obstructive nephropathy, post cardiac surgery, hemolytic uremic syndrome, poisoning and acute tubular necrosis due to dehydration. Twenty cases survived, of whom eighteen achieved total renal recovery, and two suffered persistent oliguria and required maintenance of PD. Four cases died, of whom two were due to sepsis-related multiple organ failure, another two died of acute left heart failure and cardiac arrest. The overall mortality in our study was 16.7%, which was lower than that in previous studies [9, 10]. This may be related to the differences in AKI etiology and low proportion of critically ill patients. We further divided the patients by clinical outcomes into survivors who got total renal recovery and nonsurvivors who either died or needed maintenance of PD. It turned out that serum albumin level in nonsurvivors was significantly lower than that in survivors, which indicated serum albumin to be an independent predictor of mortality, and what's more, it was associated with the poor prognosis of pediatric AKI. There are no other PD-related complications except for one case of omentum wrap, which was also resolved after immediate reoperation. This study showed PD could significantly reduce the toxins as well as improve hypervolemia and correct electrolyte disturbances without many complications, which gives more evidence of the safety and efficacy of PD treatment in pediatric AKI.

Many studies have proved that acute PD remained the modality of choice in newborns including babies weighing < 1000 g [11], and infants who develop AKI [12], especially those following surgery for congenital heart disease [2,13]. Furthermore, acute PD has generally been considered the preferred therapy if there is isolated kidney failure in small children, including glomerular diseases, acute tubular necrosis due to ischemia and/or drugs and hemolytic uremic syndrome [5]. The physiological and less proinflammatory nature of PD makes it feasible also in hemodynamically unstable patients. Although fluid removal is unpredictable, using the appropriate catheter and technique, adequate solute clearances, ultrafiltration and metabolic control can be achieved even in critically ill infants and children [4]. As to the optimal timing for RRT initiation in pediatric AKI, it is still not determined, however many studies suggest that outcomes in children with AKI are superior with early institution of RRT. In a retrospective cohort of 146 neonates and infants who received PD for the treatment of AKI following cardiac surgery showed that initiation of PD on the first day following surgery was associated with a significant decrease in mortality compared with delayed dialysis [13]. In recent years, Seldinger or modified Seldinger approaches are more often implemented in PD access practice not only in adults but also in children. A study from China has shown a modified Seldinger technique system was successfully applied in PD treated AKI in neonates, and what more the costs was less expensive than conventional systems involving open insertion of Tenckhoff catheters [14].

In general, peritoneal dialysis is still a highly recommended and remains to be the most common used RRT modality in pediatric AKI [2]. There is a need for multicentric randomized controlled trials to evaluate the impact of modality of RRT in the outcome of children with AKI and also to identify the group of children who would benefit the most from PD [4].

Reference

1. James Chan (2002) Acute kidney failure: a pediatric experience over 20 years. *Arch Pediatr Adolesc Med* 156(9): 893–900.
2. Isabella Guzzo, et al (2019) Acute dialysis in children: results of a European survey. *Journal of Nephrology* 32:445–451
3. Rahul Chanchlani, et al (2019) Secular Trends in Incidence, Modality and Mortality with Dialysis Receiving AKI in Children in Ontario. *CJASN* 14 (9) 1288-1296
4. Lara de Galasso, Stefano Picca, Isabella Guzzo. (2019) Dialysis modalities for the management of pediatric acute kidney injury. *Pediatric Nephrology*. Published online 18 March. DOI: 10.1007/s00467-019-04213-x
5. Walters S, et al (2009) Dialysis and pediatric acute kidney injury: choice of renal support modality. *Pediatr Nephrol* 24:37–48
6. Ponce D, et al (2017) Peritoneal dialysis treatment modality option in acute kidney injury. *Blood Purif* 43:173–178
7. Cullis B, Abdelraheem M, Abraham G, et al (2014) Peritoneal dialysis for acute kidney injury. *Perit Dial Int* 34:494–517
8. Wanhong Lu, et al (2019) Peritoneal Dialysis Treatment in Small Children with Acute Kidney Injury Experience in Northwest China. *Blood Purif* Published online July 29. DOI: 10.1159/000502079
9. Gong WK, Tan TH, Foong PP, Murugasu B, Yap HK (2001) Eighteen years experience in pediatric acute dialysis: analysis of predictors of outcome. *Pediatr Nephrol*. 16(3): 2125.
10. Ademola AD, Asinobi AO, Ogunkunle OO, et al (2012) Peritoneal dialysis in childhood acute kidney injury: experience in southwest Nigeria. *Perit Dial Int* 32(3): 267–72.

11. Stojanović VD, et al (2017) Peritoneal dialysis in very low birth weight neonates. *Perit Dial Int* 37:389–396
12. Anil Vasudevan, Kishore Phadke, Hui-Kim Yap (2017) Peritoneal dialysis for the management of pediatric patients with acute kidney injury. *Pediatr Nephrol* 32:1145–1156
13. Bojan M, et al (2012) Early initiation of peritoneal dialysis in neonates and infants with acute kidney injury following cardiac surgery is associated with a significant decrease in mortality. *Kidney Int* 82:474–481
14. Qiaoling Zhou, et al (2018) Acute peritoneal dialysis system for neonates with acute kidney injury requiring renal replacement therapy: a case series. *Perit Dial Int* 38:S45 – S52

Technical News

Innovation from Peritoneal Dialysis Waste

Naowanit Nata, M.D.¹ and Professor Talerngsak Kanjanabuch, M.D.², on behalf of the PD steering committee, Nephrology Society of Thailand

¹Phramongkutklao Hospital and College of Medicine, BKK Thailand

²Center of Excellence in Kidney Metabolic Disorders, Chulalongkorn University, BKK Thailand

Do you know what happens to the discarded peritoneal dialysis (PD) bag after use? As it considers as "infectious waste", it is either dispatched to the landfill or incarceration, which both pollute our planet. Since the launch of "PD First Policy" in Thailand dated back to 2007, the number of PD population is soaring in the recent decade and, of course, leaving an enormous amount of PD waste in Thailand. Assuming that all PD patients dialyzed 4 exchanges daily equals 365 x 4 exchanges/year and PD waste weighs 0.14 kg per exchange. Simple mathematics can then calculate the generated annual weight of PD waste = 0.14 kg x 4 x 365 exchanges/year x 26,450 PD patients = 5,406,380 kg = 5,406 tons/year of PD waste in Thailand alone. An alternative way to handle the PD waste but environment-friendly from patients without blood-borne infection (HBV, HCV, or HIV) is recycling the PD bag since it is made of medical-grade plastic material. After disposing of the spent dialysate in the toilet, the empty bags are soaked in the bath of household bleach for 10-15 minutes. The disinfected PD bag is then sun-dried and returned to the PD unit.

The PD bags are then cut into square pieces which are sewn together and re-invented as new innovative products, including fashion bag, apron, raincoat, suit covers, air mattress, sportswear, air pillows, cushions for arm resting during venipuncture, and artificial flowers (below picture). The PD bags are designed to make them attractive and increase their commercial value. These innovative products from the PD bags are not only spurring interest of people within the country but also from overseas. Income from the sale of the products goes to a fund to financially support disadvantage PD patients and their family.



Photo credits:

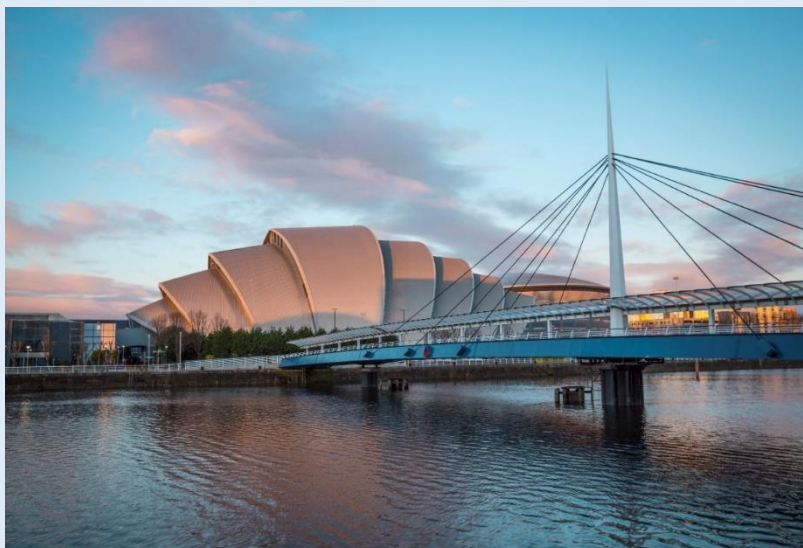
www.facebook.com/Kiddeeproject.Thailand,
Souvenir collection from tcdconnect.com, PD
bag air mattress from Friends of Kidney-Failure
Patients Club and MGR online, and Ms.Nisa
Thongbor, Sunpasitthiprasong Hospital, Ubon
Ratchathani, Thailand



SAVE THE DATE

ISPD EuroPD JOINT MEETING: 2-5 MAY 2020 – SEC, GLASGOW, SCOTLAND

ISPD and EuroPD will be jointly hosting the 2020 Congress in Glasgow, Scotland, from 2-5 May. This will be the largest gathering of PD experts in Europe. It is expected to attract over 2,000 delegates from around the world.

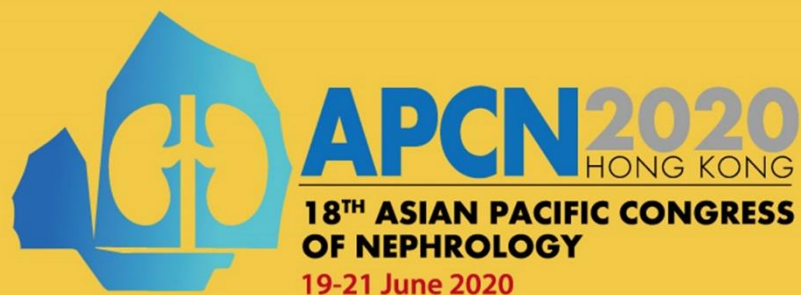


© VisitScotland | Kenny Lam, all rights reserved

The programme will aim to strengthen participants' knowledge of PD and Home Haemodialysis on a national, regional and international scale through a multidisciplinary programme. Outline topics include:

- Patient engagement
- Patient-centred care
- Hands-on catheter insertion masterclasses
- Global PD care
- Standardising care and outcomes
- Basic science

We hope you can join us and take this opportunity to share best practice and develop future collaborative partnerships for many years to come. Want to know more? Visit www.ispd-europd2020.com
info@ispd-europd2020.com Tel: +44 (0)131 336 4203



Combating CKD in the Asia Pacific: Local Strategies for a Global Problem



Organisers:



APCN2020.hk