

In-Centre Intermittent Peritoneal Dialysis: A Viable Interim Option to an Eventual Definitive Renal Replacement Therapy?

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SUMMARY

In-centre intermittent peritoneal dialysis (IPD), a decade-old modality commonly associated with acute (stab) PD, continues to play an undeniably important role of providing “temporary” renal replacement therapy (RRT) in Malaysia. In our center, IPD is commenced after insertion of Tenckhoff catheter by interventional nephrologists as an interim option until a definitive RRT is established. This study aims to describe our experience and evaluate the viability of this modality as a bridging therapy.

We retrospectively analyzed 39 IPD patients from January 2007 to December 2009; looking at demographics, cause of end-stage renal disease, duration on the program, length of hospitalization, PD-related infection profile, biochemical parameters and clinical outcomes.

We accumulated a total experience of 169 patient-months, the average age of patients was 54.6 ± 11.6 years, 84.6% of them diabetics. The median duration of a patient in the program was 88 days with accumulated in-hospital stay of 45 days. Eventually 48.7% of the patients secured placement for long-term haemodialysis while 20.5% were converted to CAPD. The mortality rate was 7.7% while the peritonitis rate was at 1 per 18.8 patient months.

Our study shows that IPD is a viable interim option with a low infection rate and good clinical outcome.

KEY WORDS:

Peritoneal dialysis; end-stage renal disease; peritonitis; Tenckhoff catheter

INTRODUCTION

Peritoneal dialysis (PD) has been recognized as a form of treatment for renal failure as early as 1923; and together with haemodialysis, continues to be commonly employed as chronic renal replacement therapy¹. It can be performed either as continuous ambulatory peritoneal dialysis (CAPD), automated peritoneal dialysis (APD) or intermittent peritoneal dialysis (IPD)². In Malaysia, IPD has been widely used since 1960, following insertion of temporary stiff catheter, which was a method known as acute stab PD in those early days. CAPD was not available in our country until 1983 when first introduced in a university hospital and a year later in a Ministry of Health hospital^{3,4}.

In Malaysia, in-centre IPD continues to play an undeniably important role of providing “temporary” renal replacement therapy (RRT) in both the acute and chronic setting. It serves as an interim option for a multitude of reasons, that include those awaiting financial aid for definitive long term RRT, elderly dialysis patients with significant co-morbidities, inability to commence on haemodialysis and unavailable assistance for CAPD^{4,5}. Over the years, in-centre IPD program has evolved from manually performed by the nursing staff to using of automated cyclers akin to home-based APD.

Unfortunately, IPD program that comprises of acute stab PD is still widely practiced. This is particularly true for the unplanned admissions for complications associated with uraemia. The manner of which temporary catheters were inserted has been produced an unfavourable perception towards the PD program as a whole. Our centre is unique in the sense that we provide insertion of a permanent Tenckhoff catheter for our IPD program. The catheters are all inserted by nephrologists through a peritoneoscopic method⁶.

Until today, there is a scarcity of local data on selection of patients, complications, peritonitis, survival on IPD and renal registries do not even list IPD as a distinct modality⁷.

This study aims to describe the experience and the results of our IPD program as a viable interim option to an eventual definitive RRT.

MATERIALS AND METHODS

1. Setup of IPD program and IPD prescription

The in-centre IPD program was introduced in 2007 in Serdang Hospital. It was set up within our dedicated Nephrology ward and staffed with trained nurses in PD. It was equipped with 5 to 6 automated PD cyclers (Baxter® HomeChoice cycler), according to the existing needs. Each patient underwent continuous sessions comprising of 40 – 60 L dialysate volumes per session utilizing mainly PD dialysate of 1.5% glucose or occasionally in combination with 4.25% glucose solutions (Peritonil H1, Ain Medicare, Malaysia), depending on patient’s pre-IPD weight and clinical judgment of attending nephrologists. Fill volume was set at 1000ml/ dwell with dwell duration of 40 minutes. Patients would receive an in-hospital stay of 3 days and readmit once weekly for their subsequent IPD sessions.

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2. PD catheters insertion

All Tenckhoff catheters were inserted by nephrologists in our hospital using a peritoneoscopic method. The procedure was performed in a daycare operating theaters under local anaesthesia and monitored conscious sedation. The insertion was carried out using Y-Tec® peritoneoscope (Medigroup, Naperville, IL, USA) with the use of VP210STD disposable pack (Medigroup). All catheters used were double cuffed coiled Tenckhoff catheters of either 57 or 62cm length depending on the patient’s body habitus. The patient would usually be allowed home on the same day or the next morning if there were no post-operative complication. Catheter break-in for initiation of treatment was 2 weeks after insertion of catheter, or in some circumstances immediately after catheter insertion with a low dialysate volume of 500ml/dwell.

3. Selection of patients

We identified patients whom received IPD for more than 2 weeks between 1st January 2007 and 31st December 2009 by retrospective search of our hospital computerized information system and in-patient records.

4. Data collection

Clinical data were obtained for patient demographics, duration on IPD program and total accumulated hospitalization days, peritonitis rate, outcome of the program and the cause of death.

Laboratory values for haemoglobin (Hb), corrected serum calcium, phosphate and albumin were obtained from our computer database for two time-points; which were at the initiation and termination of IPD program.

5. Statistics

Statistical analysis was performed using the SPSS version 16 (SPSS Inc., Chicago, Illinois, USA). Descriptive statistics were used to define mean values, standard deviations (SD) and percent prevalence. Paired t-testing was used to compare laboratory data at initiation of IPD and after termination from the program. Sub-analysis was performed for 2 groups of patient comparing those on IPD program for less than 3 months and those 3 months or more for the differences in mean serum albumin. p-values <0.05 were considered statistically significant.

RESULTS

In this study, we identified 39 patients that received IPD treatment between 1st January 2007 and 31st December 2009 for more than 2 weeks. The total accumulated experience was 169 patient-months.

The baseline characteristics of the patients are illustrated in Table I. The mean age was 54.6 ± 11.6 years and the majority of them were diabetics. The median duration a patient was in the program was 88 days with total accumulated in-hospital stay of 45 days (interquartile range 24 to 62.5).

Regarding the biochemical parameters, there appears to be statistically significant differences in corrected serum calcium, phosphate and albumin level (Table II) at the point of initiation and at termination of IPD program. These patients received a median dosage of 3g daily (range 1 to 6g) of calcium carbonate in divided dosages as phosphate binders and 0.25 to 0.5mcg of alfacalcidol on alternate day dosing. The calcium concentration in the dialysate is 1.85mEq/L.

Further analysis showed that the mean serum albumin decline at the termination of IPD program was only statistically significant for those remaining in the program for 3 months or more (Table III).

We did not provide erythropoiesis-stimulating agents in this program and blood transfusion would be given for patient who were symptomatic for low Hb or when their Hb level was less than 8g/dL. The median blood transfusion received throughout the entire IPD program was 3 pints packed cells (interquartile range 1 to 4.5).

In analyzing the clinical outcome variables, the majority of patients (62.9%) successfully secured definitive RRT treatment; either chronic haemodialysis (HD) or CAPD (Table IV). Two patients were terminated early from the program following peritonitis that required the removal of the Tenckhoff catheters and they were subsequently supported on haemodialysis treatment. There was a total of 5 treatment episodes for exit site infection and 9 treatment episodes for peritonitis. Overall the peritonitis rate of our IPD program was 1 in 18.8 patient-months. The mortality rate was at 7.7% (3 patients). The causes of death were that one patient passed away suddenly at home, one due to cerebrovascular accident and one from septicaemia following tunnel tract infection.

Finally, at the end of this study, there were still seven patients remained in this program.

Table I: Baseline characteristics of patients

| | |
|----------------------------------|-------------|
| Number of patients | 39 |
| Age (Mean ± SD, years) | 54.6 ± 11.6 |
| Gender | |
| Male | 18 (46.2%) |
| Female | 21 (53.8%) |
| Cause of end stage renal disease | |
| Diabetes | 33 (84.6 %) |
| Others | 6 (15.4 %) |

Table II: Biochemical parameters at the initiation and termination of IPD

| Biochemical parameters | At initiation (Mean ± SD) | At termination (Mean ± SD) | P value |
|----------------------------------|------------------------------|-------------------------------|---------|
| Haemoglobin (g/dL) | 9.2 ± 1.5 | 9.9 ± 1.6 | 0.073 |
| Corrected serum calcium (mmol/L) | 1.97 ± 0.30 | 2.10 ± 0.25 | 0.046 |
| Serum phosphate (mmol/L) | 1.92 ± 0.75 | 1.56 ± 0.64 | 0.042 |
| Serum albumin (g/L) | 36.9 ± 6.7 | 33.6 ± 6.3 | 0.010 |

Table III: Comparison of mean serum albumin (g/L) between those in IPD program for less than 3 months and 3 months or longer

| | At initiation (Mean \pm SD) | At termination (Mean \pm SD) | P value |
|----------------------------|----------------------------------|-----------------------------------|---------|
| IPD < 3 months (n=20) | 34.9 \pm 4.5 | 29.8 \pm 11.5 | 0.161 |
| IPD \geq 3 months (n=19) | 38.9 \pm 8.1 | 33.6 \pm 6.8 | 0.018 |

Table IV: Clinical outcomes of IPD program

| | |
|-------------------------------------|--------|
| Converted to chronic haemodialysis | 48.7 % |
| Converted to CAPD | 20.5 % |
| Terminated early due to peritonitis | 5.1 % |
| Passed away while in the program | 7.7% |
| Still remain in the program | 18.0% |

DISCUSSION

Providing renal replacement therapy in an ageing and ever-expanding population is often a challenging task besides posing an increasing burden to the healthcare system of any country. In Malaysia, the number of dialysis patients had tripled from 6,689 in the year 2000 to 21,159 in 2009. This happened over the period of only 10 years in the background of incident kidney transplantation rate of 4 per million populations⁷. This means that not every new ESRD patient would have immediate access to long term RRT. Hence, a viable interim option is important as a bridging therapy until a definitive RRT is established.

In our centre, both our PD and HD program began almost concurrently in 2006. Our unit has always been promoting PD as the preferred first mode of RRT supported successfully by our interventional nephrology peritoneal dialysis access program (6). It has been shown in other centres as well, that a nephrologist-initiated catheter insertion program is important in improving PD utilization rate^{8,9}. Abolishing the traditional practice of acute stab PD to improve patients' perception and acceptance towards PD program led to the establishment of the Tenckhoff-IPD program in our unit.

IPD treatment has always raised the concern of low solutes clearance¹⁰ and its ability to reach the recommended weekly Kt/V of 1.7 for long term PD patients¹¹. This concern is valid if IPD program is intended for as a definite RRT option for certain cohort of patients; as being practiced in some centre. In our program, despite serving as an interim bridging therapy, it has shown modest but statistically significant improvement in the control of serum phosphate and calcium level. In this program, patients with anaemia are supported with blood transfusions, as they would not be able to receive erythropoiesis-stimulating agents in the absence of budget allocation and reimbursement.

Amongst dialysis patients, albumin levels are known to be lower than the general population and it has been shown to be a powerful predictor of mortality in numerous studies¹². It also serves as an important surrogate marker of nutrition and morbidity in peritoneal dialysis patients¹³. In our study, the albumin level showed a statistically significant drop at the termination of IPD program. Further analysis showed that it is partially influence by the duration of our patients remained

in the program. We could not conclude whether there is a correlation with dialysis adequacy of this modality, as we did not measure the solute clearance for this cohort of patients. However, this observation provides important information into the possible need of adjusting the dialysis prescription and the need for greater emphasis in nutritional intervention should the patients required to remain longer in the program.

Our IPD program has established itself as a viable interim option, as two-third of the patients eventually secured a permanent modality for their RRT needs with half of them requiring them more than 3 months. It also has a low morality rate as opposed to other IPD program that has been adopted as long-term RRT solution^{5,14}. Furthermore, our program has managed to achieve low exit site infection rate and respectable peritonitis rate achieving the recommended rate of no more than 1 episode in every 18 months by International Society for Peritoneal Dialysis (ISPD) for a PD program¹⁵. This had alleviated the concerns of probable higher PD catheter related infection and peritonitis amongst IPD patients as unlike CAPD patients they were not trained to care or perform dressing for the catheter exit site.

CONCLUSION

Our study has shown that the Tenckhoff-IPD program is a viable interim option as majority of our patient had eventual permanent renal replacement therapy option. This bridging therapy contributes an undeniably important role especially in a resource limited setting. We do not foresee IPD to be a definitive RRT solution but its low infection rate and encouraging survival outcome could at least allow severely disabled or elderly ESRD patients with poor social support to receive a trial of IPD. It may also expand the role of IPD within the scope of end-of-life care in nephrology. However, future prospective studies are needed to provide a better insight into the moderate to long-term dialysis adequacy, quality of life and cost-effectiveness of IPD program.

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REFERENCES

1. J. E. Romao Junior, R. M. Fortes, M. A. Fadil, *et al.* Peritonitis in intermittent peritoneal dialysis: microbiological aspects and the antibiogram. *Rev Hosp Clin Fac Med Sao Paulo* 1989; 44: 100-3.
2. Heimburger O, Blake PG. Apparatus for Peritoneal Dialysis. In: Daugirdas JT, Blake PG, Ing TS (eds). *Handbook of dialysis*, 4th Edition. Philadelphia: Williams & Wilkins, 2007: 339-55.
3. Morad Z, Lee DG, Lim YN, Tan PC. Peritoneal dialysis in Malaysia. *Perit Dial Int* 2005; 25: 426-31.

4. Zainal D, Loo CS. The status of intermittent peritoneal dialysis in Hospital University Science Malaysia. *Singapore Med J* 1995; 36: 379-82.
5. Fourtounas C, Hardalias A, Dousdampanis P, Savidaki E, Vlachojannis JG. Intermittent peritoneal dialysis (IPD): an old but still effective modality for severely disabled ESRD patients. *Nephrol Dial Transplant* 2009; 24: 3215-8.
6. Goh BL, Ganeshadeva YM, Chew SE, Dalimi MS. Does peritoneal dialysis catheter insertion by interventional nephrologists enhance peritoneal dialysis penetration? *Semin Dial* 2008; 21: 561-6.
7. Malaysian National Renal Registry Report, 2009.
8. Asif A, Byers P, Gadalean F, Roth D. Peritoneal dialysis underutilization: the impact of an interventional nephrology peritoneal dialysis access program. *Semin Dial* 2003; 16: 266-71.
9. Asif A, Pflederer TA, Vieira CF, Diego J, Roth D, Agarwal A. Does catheter insertion by nephrologists improve peritoneal dialysis utilization? A multicenter analysis. *Semin Dial* 2005; 18: 157-60.
10. Dreyer G, Fan SL. Is intermittent peritoneal dialysis still a valid treatment option? *Perit Dial Int* 2008; 28: 484-6.
11. Peritoneal Dialysis Adequacy Work Group. Clinical practice guidelines for peritoneal dialysis adequacy. *Am J Kidney Dis* 2006;48 Suppl 1: S98-129.
12. Kaysen GA. Serum albumin concentration in dialysis patients: Why does it remain resistant to therapy? *Kidney Int* 2003; 64: S92-98.
13. Spiegel DM, Anderson M, Campbell U, *et al.* Serum albumin: a marker for morbidity in peritoneal dialysis patients. *Am J Kidney Dis* 1993; 21: 26-30.
14. Woywodt A, Meier M, Kaiser D, Schneider G, Haller H, Hiss M. In-center intermittent peritoneal dialysis: retrospective ten-year single-center experience with thirty consecutive patients. *Perit Dial Int* 2008; 28: 518-26.
15. Piraino B, Bailie GR, Bernardini J, *et al.* Peritoneal dialysis-related infections recommendations: 2005 update. *Perit Dial Int* 2005; 25: 107-31.