Intermittent peritoneal dialysis (IPD): an old but still effective modality for severely disabled ESRD patients

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Abstract

Background. Hospital-based intermittent peritoneal dialysis (IPD) is an old PD modality applied for as long as 40 h per week using high volumes of PD fluid, but it has almost been abandoned due to its low solute clearances. However, IPD might be the only option for elderly dialysis patients with significant comorbidities, unable to undergo haemodialysis (HD) or PD at home without any assistance, for various reasons.

Methods. We describe our experience with 25 patients aged 71.2 ± 7.5 years with a previous history of HD for 55.4 ± 54 months, dialysed with IPD for more than 3 months. IPD was performed three times weekly for 8–10 h.

Results. Mean values for haematocrit, serum urea, creatinine, sodium, potassium and calcium were comparable with other ESRD populations, whereas there were significantly lower values for albumin (3.2 ± 0.3 mg/dL) and significantly higher values for phosphorus (7.1 ± 1.7 mg/dL) despite the use of phosphate binders. The patients survived for a mean of 16.8 ± 11.5 (3–43) months despite very low solute clearances, as expressed by Kt/V urea (1 ± 0.26) and weekly creatinine clearance (27.2 ± 7.6 L/week). However, by using 22.9 ± 4.5 L of various combinations of isotonic and hypertonic PD fluids, the mean ultrafiltrate was 1854 ± 326 mL per session. There were only two cases of peritonitis, unrelated to IPD per se.

Conclusions. Considering the underlying comorbidities, IPD remains a valuable and effective option with acceptable survival rates, for a special population of ESRD patients not able for various reasons to undergo HD, neither PD at home.

Keywords: peritoneal dialysis; peritoneal dialysis adequacy; peritoneal dialysis modalities; peritoneal dialysis outcomes; ultrafiltration

Introduction

Hospital-based intermittent chronic peritoneal dialysis (IPD) is the oldest PD modality, applied for as long as 40 h per week, using high volumes of PD fluids [1]. By using the ancient cyclers in the early 1980s, patients were undergoing IPD in cycles lasting for 1 or more hours, for as long as 24 h once a week, 12 h two or more times per week, or even shorter treatments lasting 6–8 h performed as many as five times per week [2]. However, with the advent and improvements of continuous ambulatory (CAPD) and automated peritoneal dialysis (APD), the method has been criticized for its long duration and low adequacy regarding solute clearances and has almost been abandoned in western countries [3].

Nevertheless, the dialysis population is ageing and carries a significant burden of comorbidities [4,5]. The number and extent of comorbid illnesses in the average patient initiating dialysis have increased over the past two decades highlighting the need for more attention not only for prognostic reasons, but mainly for the day-to-day care of these patients [6,7]. There are not few haemodialysis (HD) patients with vascular access exhaustion, unable to undergo PD by themselves and without any partners to assist them at home. The recently introduced concept of assisted PD, where patients can be assisted in performing their PD exchanges at home by private nurses, is a real solution for
these patients, provided that the local health systems are re-
imbursing this modality [5–8–12]. Unfortunately, at present in 
Greece and many other European countries except 
Denmark, France, Belgium and one region in Spain, assis-
ted PD is not reimbursed [12] and IPD might be the only 
option for this special population of patients with end-stage 
renal disease (ESRD).

The aim of the present study was to describe the experi-
ence and the results of our daytime three times weekly IPD 
programme since its introduction in 1995.

Subjects and methods

The in-hospital IPD modality was introduced since the start of our PD 
programme in 1995. A special ward next to the PD unit was used and 
was equipped with 3–4 automated PD (APD) cyclers, according to the 
existing needs. The IPD programme was scheduled for 3 days per week 
(Monday–Wednesday–Friday) from 08.00 a.m. until 16.00–18.00 p.m. The 
existing PD unit staff was taking care of the patients during their daily shift 
(07.00 a.m. until 15.00 p.m.) and another PD nurse was assigned for a 
second shift (12.00 until 20.00 p.m.) to take care of the patients until the end 
of the PD session. During the rest days of the week, the ward has been 
used for other reasons, such as performing peritoneal equilibration tests 
(PET), or training new patients for CAPD or APD at home.

A total of 30 patients were dialysed by IPD in our unit during the 
last 12 years (1995–2007). However, for five of them, IPD was used only 
as a temporary bridge for adequate training, as they underwent IPD for 
less than 3 months and then were dialysed at home by APD, by them-
selves (two patients) or by their spouses (three patients), and were ex-
cluded from further analysis. So, our data included 25 patients (12 males, 
scored at the start of IPD, using the definitions by Charson 
et al [12]. The IPD prescription is shown in Table 1. As there were no adequacy 
targets set, we used various combinations of isotonic (1.36%) and hyper-
tonic (3.86%) glucose solutions, in order to achieve an ultrafiltration (UF) 
volume of more than 1500 mL per IPD session.

PD adequacy was measured by Kt/V urea and creatinine clearance 
according to standard protocols every 6 months. Peritoneal equilibration 
test (PET), by using 2.27% dextrose dialysate (standard PET), was per-
formed for each patient 4–6 weeks after IPD initiation. Mean laboratory 
data values were calculated from monthly recordings for each patient.

Comorbidity was assessed by Charlson’s comorbidity index (CCI), 
scored at the start of IPD, using the definitions by Charson et al. [13].

Statistical analysis

All values are expressed as mean ± SD. Linear regression analysis 
was used as appropriate. P-values <0.05 were considered statistically 
significant.

Table 1. Intermittent peritoneal dialysis (IPD) prescription

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
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<tr>
<td>APD with PD cyclers</td>
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<td>Three times per week (M–W–F)</td>
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<td>8–10 h per session</td>
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<td>Dwell volume: 22.9 ± 4.5 L (20–30)</td>
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<tr>
<td>PD solutions: glucose 1.36% and 3.86%</td>
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<td>Glucose 3.86%: 10.9 ± 2.9 L per session</td>
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Discussion

Many medical and non-medical factors are involved in the 
phenomenon of PD underutilization in Europe [14] and the 
USA [15]. Older age has been traditionally associated with more medical and non-modifiable conditions, physical dis-
abilities and psychosocial issues that are absolute or relative contraindications for choosing PD [5,6,16]. So, at present, 
most elderly patients with ESRD are enrolled in in-centre 
HD programmes [14,15]. Nevertheless, there are not few elderly prevalent HD patients who may present intolerance 
To HD or failure of any possible vascular access. For these 
patients, switching to PD becomes the only option. Most of 
them, having a rather long HD vintage, carry significant co-
morbidities and are not able to undergo PD at home alone.
In addition, prevalent PD patients may become incapable to continue PD at home for various reasons (e.g. stroke, dementia) and are also not suitable for HD.

The concept of assisted PD by private nurses at home is not new [17], but has recently been re-introduced in many centres in Europe [8–10] and Canada [11]. Unfortunately, at present in Greece and many other European countries assisted PD is not reimbursed [12] and in-hospital PD might be the only option for this special ESRD population.

In the present study, we retrospectively analysed the results of our IPD programme that was established in 1995. By using PD cyclers for 8–10 h three times per week, we have offered therapy in 25 severely disabled ESRD patients.

Being aware of the short life expectancy of these frail patients, we used rather liberally a significant amount of hypertonic solutions in order to achieve an acceptable amount of UF and to avoid symptomatic volume overload. The average UF per IPD session was a bit lower than that suggested by the European Best Practice Guidelines for PD (1 L/day) [18], but higher than that of the EAPOS study in anuric APD patients [19]. The achieved mean Kt/V and creatinine clearance were extremely low compared with the proposed targets for adequate PD dosing [20], providing evidence that this modality is really inferior to other PD modalities regarding solute clearances, especially for the anuric patients. However, the acceptable survival rates of these patients provide indirect evidence that efficient fluid removal may be more important than increased solute clearance for ESRD patients [19,21]. Woywodt et al. from Germany have also reported their results with in-center IPD studying 30 patients for 439 months from 1997 to 2007 [3]. Their patients had a CCI of 6 and were dialysed for 2–4 times per week with 10–25 L of PD fluids with a mean UF of 853 mL per session (range 100–2800 mL). They reported a low peritonitis rate and a mean survival of 26.6 months, but many patients presented significant residual renal function.

Our IPD patient survival might look low, but we must also consider the special characteristics of our population such as the advanced age, the long history of HD before initiation of IPD and finally their significant comorbidities.

Fried et al. found that comorbidity assessment by CCI was a strong predictor of patient survival in a prospective study of 268 incident PD patients [22]. In the same study, the mean CCI score was 5.4 ± 2.2, whereas the mortality rate was 0 for patients with a CCI of 2 or 3 and increased to ~50/100 patient/years for CCI scores 8 or greater [22]. In our IPD patients, the mean CCI score was very high (9.8 ± 2.08) indicating a severely disable population due to various other reasons except ESRD.

Our results should not be compared with any other conventional PD programme, but rather with those of the recently introduced assisted PD programmes. Povlsen and Ivarsen from Denmark reported their 4-year experience with assisted APD in incident patients [8]. Peritonitis rates were low, but 20% of the patients were converted permanently to HD due to PD technique failure. Lobbedez et al. from France have reported their experience with 36 patients with a mean CCI score of 7 ± 2.5, undergoing mainly assisted CAPD at home [9]. The authors reported rather high peritonitis rates and a technique survival of 58% in the first year [9]. In our cohort, PD patients presented higher comor-bidity scores and rather equal survival rates. Stroke was the leading cause of death and this can be attributed to the increased age and the high incidence of hypertension (100%) of our IPD patients, possibly due to inadequate sodium removal, by the sodium sieving effect during the short dwell times applied with our high volume PD prescription [23].

In addition, our peritonitis rates (two cases for 420 patient/months) are far better than in any other assisted PD programme. This may be due to the nature of the persons assisting for the PD exchanges (qualified PD nurses) and the low peritonitis rates of our PD program [24].

Regarding the cost-effectiveness of our programme, we took advantage of having a small ward in the PD unit that was also used for the rest of the week for other PD-related activities (PD training, PET performance, etc.). The PD solutions used per week for each patient were rather equal to one 8–10 L APD schedule done every night at home, and the nursing fees for an extra shift of 3 days per week were lower than hiring special visiting nurses for daily APD at home and only for a few patients each time.

Nevertheless, we have to admit that undergoing IPD for 8–10 h in the hospital, plus the time needed for transportation to and from the PD unit especially for so severely disabled and elderly patients, is not the most appropriate maintenance therapy in terms of satisfaction and quality of life. The long duration of the modality of 3 days per week in a hospital environment might sound unacceptable, as it is a severe obstacle for rehabilitation and social activities.

However, for elderly people who live alone at home, resting on the bed or a wheelchair all day long, this might also look like an oasis for socialization with other patients or the nursing and medical staff. Unfortunately, we have neither data regarding quality of life parameters in our IPD patients, nor a coexisting assisted at-home PD programme in order to compare these issues and have a definite input of how these patients experience this kind of therapy and how much they are really satisfied with it.

Considering all the above-mentioned social and financial issues, as well as the medical barriers of this special population of desperate and frail ESRD patients, who are not able for various reasons to undergo HD, neither PD at home, IPD targeting at high UF volumes, remains a valuable and effective option with acceptable survival rates.

Conflict of interest statement. None declared.

References


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