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Original article

Is peritoneal dialysis a therapeutic option for polycystic kidney disease? 15 years' experience in a single center

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ABSTRACT

Background. – Peritoneal dialysis (PD) is often avoided for patients with polycystic kidney disease (PKD) because of increased risk of complications and technique failure due to limited intra-abdominal space. In this study, we have aimed to determine clinical outcomes, patient and technique survivals in patients with PKD performing PD and to define whether PD is appropriate for these patients.
Methods. – Totally 99 patients: 33 with PKD and 66 with diseases other than PKD were included in this retrospective study. All patients started PD between 2001 and 2015 years and have been matched by time of PD therapy initiation. Socio-demographic characteristics, clinical data and complications during the specified period were evaluated. The factors associated with mortality and patient and technique survival were investigated for all patients.
Results. – The two groups were similar in terms of demographic, baseline and last visit clinical and laboratory parameters, additional systemic diseases, with the exception of higher pretreatment and last visit serum albumin levels in PKD patients ($P = 0.03$ and 0.01 respectively) and younger age of non-PKD patients ($P = 0.002$). Incidence of peritonitis and catheter exit-site/tunnel infections were similar among the two groups ($P = 0.26$ and 0.12 respectively). The two groups were similar in terms of leak and hernia developments ($P = 0.07$ and 0.57, respectively). By the end of the study period; in PKD group, 10 patients had been transferred to HD and had kidney transplantation and only 6 patients had died. In non-PKD group, 19 patients had been transferred to HD, 11 patients had kidney transplantation and 23 patients had died. Mortality was lower in PKD group (log rank = 0.034). The two groups were similar regarding death and HD transfer reasons ($P = 0.35$ and 0.36 respectively). The technique survival rates were similar among the two groups (log rank = 0.37).
Conclusions. – Peritoneal dialysis may be a suitable renal replacement therapy option for PKD patients. PKD is not an additional risk factor in patients treated by PD. Mortality is similar with non-diabetic PD patients. Peritoneal dialysis in PKD patients is associated with a similar overall rate of technique survival, incidences of hernia, leak and infectious complications as in non-PKD patients.

1. Introduction

Autosomal dominant polycystic kidney disease (PKD) is the most common hereditary kidney disease [1]. It is the fourth leading cause of end-stage renal disease (ESRD) according to US Renal Data System (USRDS) just after diabetes, hypertension, and glomerulonephritis [2].

The choice of modality for renal replacement therapy in patients with PKD varies, often based on patients' choice, physician-related factors, and dialysis centers' distance to the patient. The choice of initiating peritoneal dialysis (PD) has traditionally raised concerns in patients with PKD and is not preferred in many peritoneal dialysis units [3]. Abdominal wall hernias or leaks are more prevalent as extrarenal manifestations of PKD and would be expected to complicate the administration of PD [4]. There has also been concerns for higher rates of colonic diverticulosis and diverticulitis in patients with PKD, which could lead to increased rates of peritonitis [5]. Finally, peritoneal dialysis

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is often avoided for patients with PKD because of the possible limited intraperitoneal space to accommodate the dialysis fluid due to enlarged kidneys and liver [3]. This has raised concerns as to whether peritoneal dialysis is a good treatment modality in PKD patients, based on clinical experience and evidence from small scale observational studies, however new opinions have been formed and policy changed [6,7]. It has recently even been suggested that PD may be associated with a better prognosis in PKD than in patients with other etiologies [8].

In this study we aimed to determine clinical outcomes, patient and technique survival rates in patients with PKD undergoing PD and to define whether PD is appropriate for this group of patients.

2. Material and method

The records of patients with ESRD in Sisli Hamidiye Etfal Research and Educational Hospital Peritoneal Dialysis Unit between January 2001 and March 2015, for whom PD therapy was started, were evaluated retrospectively. We reviewed all incident PD patients in our unit who had a diagnosis of PKD (PKD group). For each patient with PKD, 2 new PD patients were selected as control group (non-PKD group). Patients in non-PKD group were started on dialysis therapy immediately before and after the patient with PKD. Their cause of ESRD was unknown and all have had bilateral small kidneys.

Age, gender, socio-demographic characteristics such as (the availability of someone) presence of someone to administer PD (e.g., by themselves or assisted PD [their children or other persons like health caregivers]), nature of the decision for PD (patient's own preference or compulsory choice) were investigated in-depth from patients' records. Presence and, if present, duration of hemodialysis (HD) history before PD therapy, were noted.

Clinical data, including blood pressures, daily urine volumes, daily mean ultrafiltration (UF) amount and co-morbid conditions, such as hypertension, cardiovascular disease (CVD), cerebrovascular events, malignancy, etc. were recorded. Laboratory data, including serum creatinine, calcium, phosphorus, albumin, intact parathyroid hormone (iPTH), hemoglobin, and ferritin were recorded at the beginning of PD treatment and at the last visit.

In our unit, all patients starting CAPD perform 4 changes a day, low calcium, 2–2,5 L/change solution. Patients were transferred from CAPD to APD or started directly with APD and performed 4–5 changes every 12 hours at night, 2 L/change and 2 L for last filling. Responsible nephrologist can change number of changes and/or volumes if clinic need occurs.

Data related to extrarenal complications of PKD were collected, including the history of nephrectomy, hernia, dialysate leaks, bowel perforation, diverticular disease, and intracranial hemorrhage.

Infectious complications such as peritonitis, exit-site/tunnel infections were recorded and their incidences were calculated. Diagnosis of peritonitis and exit-site/tunnel infections were made according to ISPD guidelines. The factors associated with mortality and patient and technique survival were investigated for all patients. Technique failure was defined as transfer to HD due to peritonitis, ultrafiltration failure, inadequate dialysis, exit-site and/or tunnel infection and mechanical problems.

Data were compared in two groups: PKD group and total PD patient group (non-PKD). Diabetes is a significant co-morbid disease and has a strong impact in patient and technique survival. Therefore in non-PKD group, patients with diabetes were excluded and sub-group analysis was done.

Scientific Package for Social Science (version 15.0; SPSS Inc., Chicago, IL, USA) was used for statistical analyses. We used Chi^2 test for non-parametric variables, independent-samples *t* test for analyzing clinical and biochemical parameters. The Kaplan-Meier method was used for calculation of patient survival rates and technique survival rates.

We also analyzed the risk factors in two groups and calculated their relative ratios (RR) for patient mortality and PD technique failure using backward logistic regression of the Cox proportional hazard method. Differences were considered statistically significant for *P* values less than 0.05.

3. Results

Records of 388 patients with ESRD receiving PD therapy in our PD unit between January 2001 and March 2015 were evaluated retrospectively. Thirty-three patients with PKD (PKD group) and 66 patients with diseases other than PKD (non-PKD group) that started PD at the same time were evaluated. In PKD group, 13 of 33 patients were female, the mean age at onset of PD was 35.4 ± 13.1 years and mean duration of PD was 53.7 ± 41.7 months. In-non-PKD group, 35 of 66 patients were female, the mean age at onset of PD was 46 ± 16.8 years and mean duration of PD was 39.4 ± 34.2 months. Patients in non-PKD group were older than those in PKD group ($P = 0.002$). Baseline demographic data of the two groups are shown in Table 1. In sub-group analysis with the remaining 47 patients; after patients with diabetes were excluded in non-PKD group; age, sex and following time were resembling between the two groups ($P = 0.13$, 0.11 and 0.22 respectively).

While 7 patients (21.2%) in PKD group made a compulsory choice to begin PD due to vascular problems and/or social reasons, 17 patients (25.7%) began PD compulsorily in non-PKD group ($P = 0.59$). Twelve patients performed assisted PD in non-PKD group whereas, only 1 patient performed assisted PD in PKD group ($P = 0.033$). Six patients performed assisted PD in control group for subgroup analysis. There is no statistically significant difference ($P = 0,23$).

In PKD group, 7 patients started treatment with APD, 26 patients started with CAPD. Seven patients in treatment of CAPD were transferred to APD. In non-PKD group, 19 patient started treatment with APD, 47 patients started with CAPD and 12 patients in CAPD treatment tranferred to APD. Treatment modality is similar in both two groups ($P = 0,36$).

Baseline and last visit laboratory parameters of two groups are shown in Table 2. There was no statistically significant difference between the two treatment groups regarding demographic, baseline and last visit clinical and laboratory parameters, with the exception of higher pretreatment and last visit serum albumin levels in the PKD group ($P = 0.03$ and 0.01 respectively) and younger age of patients in non-PKD group ($P = 0.002$). Only last visit serum albumin level is statistically significant in two groups when diabetic patients were excluded.

Etiologies of ESRD were chronic glomerulonephritis (33.3%), diabetic nephropathy (28.8%), hypertensive nephropathy (12.1%) and unknown causes (25.8%) in non-PKD group. Co-morbid diseases were hypertension ($n = 3$), coronary artery disease ($n = 2$) and cerebrovascular accidents ($n = 1$) in PKD group and 27 patients had no additional systemic disease. In non-PKD group, forty-five patients had no additional systemic diseases. Co-morbid diseases were hypertension ($n = 4$), coronary artery disease ($n = 5$), and cerebrovascular accidents ($n = 3$) in this group. The two groups were similar in terms of additional systemic diseases except for diabetes ($P = 0.66$).

Incidence of peritonitis and catheter exit-site/tunnel infections were similar among the two groups ($P = 0.26$ and 0.12 respectively). In PKD group, 17 patients developed 41 peritonitis episodes and the isolated organisms were Gram-positive in 22 (53.6%) episodes (13 episodes of methicillin-sensitive *Staphylococcus*