

Clinical Outcomes of Peritoneal Dialysis Patients at a Secondary State Hospital Nephrology Clinic

İkinci Basamak Devlet Hastanesi Nefroloji Kliniği Periton Diyaliz Hastalarının Klinik Sonuçları

ABSTRACT

OBJECTIVE: We present our experience with demographics, clinical and biochemical outcomes, and factors affecting mortality in ESRD patients treated with peritoneal dialysis (PD) during a 12-year period (1997–2009) at secondary state hospital's nephrology clinic.

MATERIAL and METHODS: After excluding patients younger than age 15 at the initiation of PD, those who had follow-ups at less than three months, outcomes were analyzed for 313 patients. The demographic, clinical, and biochemical data were collected from the patients' medical records.

RESULTS: The mean age at the start of PD was 51.9 ± 17.6 years and the mean PD duration was 27.5 ± 27.1 months (median: 20, range: 3–166). Hypertension was the most common cause of ESRD (36.1%), followed by diabetes mellitus (31.3%). Among these 313 patients, 58 (18.5%) died. Patients' survival rates were 93.3%, 85%, and 72.4%, at one, three, and five years, respectively. A higher educational level ($p=0.045$), lower age ($p=0.002$), higher baseline creatinine ($p=0.045$), and higher baseline albumin level ($p=0.003$) were found to affect patients' survival. Technique survival rates were 89.1%, 84%, and 74.1% at one, three and five years, respectively. Technique failure was associated with peritonitis rate ($p=0.03$).

CONCLUSION: Our results suggest that patients' and technique survival rates and the factors affecting mortality in our patients at a secondary state hospital's nephrology clinic were similar to those at a tertiary care university hospital's nephrology clinic in Turkey.

KEY WORDS: Peritoneal dialysis, Outcome, Survey, Peritonitis

ÖZ

AMAÇ: İkinci basamak tedavi kurumu olarak kliniğimizde 12 yıl boyunca (1997–2009) periton diyaliz tedavisi uygulanan son dönem böbrek yetmezlikli hastaların demografik, klinik ve biyokimyasal özellikleri ve mortaliteyi etkileyen faktörlerini sunmaktayız.

GEREÇ ve YÖNTEMLER: Periton diyalizine başlama yaşı 15'in altında olan ve üç aydan daha kısa süre izlenen hastaların çıkarılmasından sonra toplam 313 hastanın sonuçları değerlendirildi. Hastaların demografik, klinik ve biyokimyasal özellikleri tıbbi hasta dosyalarından kaydedildi.

SONUÇ: Ortalama periton diyalizine başlama yaşı $51,9 \pm 17,6$, periton diyaliz süresi $27,5 \pm 27,1$ ay idi (ortanca: 20, aralık: 3–166). Son dönem böbrek yetmezliğinin en sık nedeni hipertansiyon (%36,1) ve bunu izleyen diyabetes mellitus (%31,3) idi. 313 hastanın 58'i öldü (%18,5). Hasta sağ kalım oranı birinci, üçüncü ve beşinci yılda sırayla %93,3, %85 ve %72,4 olarak bulundu. Yüksek eğitim düzeyi ($p=0,045$), genç yaş ($p=0,002$), yüksek bazal kreatinin düzeyi ($p=0,045$), ve yüksek bazal serum albumin düzeyi ($p=0,003$) hasta sağ kalımını etkileyen faktörler olarak saptandı. Teknik sağ kalım oranları birinci, üçüncü ve beşinci yılda sırayla %89,1, %84 ve %74,1 olarak bulundu. Teknik yetersizlik peritonit hızıyla ilişkili saptandı ($p=0,03$).

TARTIŞMA: Bizim sonuçlarımız ikinci basamak sağlık kuruluşu nefroloji kliniği olarak hasta ve teknik sağ kalım oranları ve hasta mortalitesini etkileyen faktörlerin Türkiye'deki üçüncü basamak üniversite hastanelerinin sonuçlarına benzediğini göstermektedir.

ANAHTAR SÖZCÜKLER: Periton diyalizi, Sonuç, Sağ kalım, Peritonit

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INTRODUCTION

Continuous ambulatory peritoneal dialysis (CAPD) is an established treatment modality in patients with end-stage renal disease (ESRD), and approximately 150,000 patients are being maintained on CAPD worldwide (1). The home-based nature of this modality gives it an advantage over hemodialysis (HD). However, the decline of CAPD compared with HD has become evident, even though many reports indicate that survival rates for PD are better than those undergoing HD during the first two to three years after dialysis initiation (2,3).

There have been many reports on the outcomes of PD from Turkey since 1981 (4-11). The first study from Turkey on these outcomes was reported in 2001 (12). Recently, Sipahioglu et al.(10) from Erciyes University's tertiary care reported their experiences about the outcomes of PD in Turkey. In the present study, we investigated patient and technique survival rates and factors affecting mortality in end-stage renal disease patients treated with PD during a 12-year period (1997–2009) at our secondary state hospital's nephrology clinic.

MATERIAL and METHODS

During 1997–2009, we initiated PD for a total of 386 patients at our Public Hospital's Nephrology Clinic. After excluding patients younger than age 15 at the initiation of PD, those who had follow-ups at less than three months, those who had recovered renal function, and those who had missing data, we analyzed the data for 313 patients. The demographic, clinical, and biochemical data were collected from their medical records. Demographic and clinical data included age at the start of PD, gender, cause of ESRD, prior renal replacement history, comorbid disease. Hemoglobin level, white blood cell count, serum albumin, creatinine, blood urea nitrogen, calcium, phosphorus, parathormone, total cholesterol, triglyceride levels were collected at 6-month intervals.

Clinical outcomes were mortality and technique failure, and the latter was defined as a transfer to HD due to peritonitis, inadequate dialysis, ultra filtration failure, exit site and/or tunnel infection, and mechanical problems.

Statistical analysis was performed using SPSS version 10.0. Mortality and technique failure risks were analyzed with a logistic regression analysis. Differences in various clinical parameters between different groups were analyzed using the chi-square test and the Mann-Whitney U test. Differences were considered statistically significant for p values less than 0.05.

RESULTS

This study included 313 patients in our PD unit. A total of 194 (62%) patients were male. The mean age at the start of PD was 51.9 ± 17.6 years and the mean peritoneal dialysis duration was 27.5 ± 27.1 months (median: 20, range: 3–166). Hypertension was the most common cause of end-stage renal disease (36.1%),

followed by diabetes mellitus (31.3%) (Table I). Biochemical results are shown in Table II.

Among these 313 patients, 58 (18.5%) died. The mean follow-up duration of patients who died was 37.9 ± 26.5 months (median: 32). Patient survival rates were 93.3%, 85%, and 72.4%, at one, three, and five years, respectively. Most deaths (35.5%) were the result of cardiovascular disease. A higher education level ($p=0.045$), lower age ($p=0.002$), higher baseline creatinine ($p=0.045$), and higher baseline albumin ($p=0.003$) were found to affect patients' survival (R square:0.68, $p:0.035$).

Technique survival rates were 89.1%, 84%, and 74.1% at one, three and five years, respectively. The causes of technique failure were peritonitis (55.2%), mechanical malfunction (20.5%), and ultra filtration failure or inadequate dialysis (24.3%). Technique failure was associated with the peritonitis rate (0.31 episode/patient year) ($p=0.03$). Diabetes mellitus did not affect patient survival or technique failure ($p>0.05$).

Table I: Causes of end-stage renal disease.

	Number	%
Hypertension	113	36.1
Diabetes mellitus	98	31.3
Glomerulonephritis	18	5.8
Polycystic kidney disease	6	1.9
Others	10	3.2
Unknown	68	21.7
Total	313	100

DISCUSSION

Continuous ambulatory peritoneal dialysis (CAPD) is an established treatment modality in patients with end-stage renal disease (ESRD), and approximately 150,000 patients are being maintained on CAPD worldwide (1). The home-based nature of this modality gives it an advantage over HD. A recent comprehensive review revealed that overall patient survival is similar for PD and HD, but that important differences do exist within select subgroups of patients, particularly those subgroups defined by age and the presence or absence of a comorbid disease (3).

PD has been performed in Turkey since 1981. According to registry data of the Turkish Society of Nephrology for 2007, there were 6,370 PD patients in Turkey (13). The first study that evaluated the status of PD in Turkey was reported in 2001 by Utas et al (12). That study was a retrospective multicenter study from 12 centers and included 334 patients. Utas et al.(12)

Table II: Biochemical parameters in the study population.

	Baseline	6 months	first year	Final
Hemoglobin (g/dL)	10.2 ± 1.8	11.2 ± 2.0	11.0 ± 2.3	10.9 ± 2.1
Creatinine (mg/dL)	6.7 ± 3.7	7.3 ± 3.4	8.2 ± 3.8	7.9 ± 3.9
Blood urea nitrogen (mg/dL)	67.8 ± 32.6	48.2 ± 20.7	51.3 ± 20.0	49.0 ± 23.4
Calcium (mg/dL)	9.3 ± 1.2	9.4 ± 1.0	9.2 ± 1.3	9.0 ± 1.1
Phosphate (mg/dL)	5.0 ± 1.6	4.8 ± 1.4	4.8 ± 1.6	4.5 ± 1.9
Parathormone (pg/ml)	202 (36-543)	161 (30-621)	163(29-498)	145 (44-532)
Ferritin (ng/mL)	246 (50-443)	248(56-331)	229(83-669)	276(45-497)
Triglyceride (mg/dL)	144.1 ± 88.3	155.4 ± 90.9	158.6 ± 84.8	156.1 ± 85.1
Total Cholesterol (mg/dL)	175.5 ± 49.3	193.6 ± 50.9	190.1 ± 46.0	189.3 ± 50.0
Albumin (g/dL)	4.0 ± 0.7	3.9 ± 0.8	3.9 ± 0.7	3.8 ± 0.7
Glucose (mg/dL)	128.7 ± 83.8	120.2 ± 69.1	121.0 ± 60.4	128.6 ± 77.1
Body weight (kg)	63.3 ± 14.8	66.3 ± 15.7	67.1 ± 16.1	67.3 ± 15.1

Parathormone and ferritin values were given as median, minimum-maximum, other parameters were given as mean ± standard deviation.

reported three- and five-year patient survivals as 84.5% and 68.8%, respectively. Recently, Sipahioglu et al. (10) from Erciyes University's tertiary care unit reported their experiences about the outcomes for PD patients in Turkey. Sipahioglu et al. (10) found one- and five-year patients' survival rates were 96.9% and 68.8% respectively. Our results are similar to those reported by Utas et al.(12) and Sipahioglu et al.(10). Our one, three- and five-year patient survival rates were 93.3%, 85%, and 72.4%, respectively. Different survival rates have been reported from different countries and from different regions (5-8,11). The reasons for the differences in survival rates may be multifactorial. Some evidence suggests that the differences are due in part to general differences in total and cardiovascular mortality among the general population of various countries (14,15). Demographic characteristics of the patients (age, comorbid disease, and genetic and regional factors) and transplantation rates differed in these study populations. In addition, the time period that the data was collected is important because PD experience increases with time; hence, evaluations with the current data may provide more positive results.

The clinical outcomes of PD patients are affected by many factors, including age; the presence of comorbid disease such as diabetes mellitus and cardiovascular disease; nutritional status; serum albumin level; and membrane transport property (16-21). Education levels, age, creatinine, and albumin were found to affect patients' survival rates in our study. In other outcome studies reported from Turkey, age, serum albumin, creatinine

level, total Kt/V urea, D/P creatinine, peritonitis rate, previous HD history, comorbidity, hypertension, and renal residual function were shown to affect mortality (10,12,22).

Cardiovascular disease is prevalent in patients with ESRD and is the most frequent cause of death for these patients (23). In our study, most deaths were the result of cardiovascular disease. In addition to a high prevalence of traditional cardiovascular disease risk factors, the reasons for the high prevalence of cardiovascular disease in these patients were kidney disease-related risk factors (uremic toxins, vascular calcification, endothelial dysfunction, volume excess, etc.). Chronic renal disease alone is currently considered a coronary heart disease risk equivalent (24).

In dialysis patients, the serum creatinine level is proportional to skeletal muscle mass and dietary protein intake (25). The serum creatinine level is valid and a clinically useful marker of protein-energy nutritional status in maintenance dialysis patients. The serum creatinine level reflecting the nutritional status is inversely related to mortality in patients with PD (26-31). In our study, patients with higher creatinine levels at the beginning of treatment and during the follow-up period had higher survival rates similar to the results of Sipahioglu et al.'s (10) and Ates et al.'s (22) studies from Turkey.

Serum albumin levels were found to affect patients' survival rates in our study. In dialysis patients, a 1-g/dl decrease in serum albumin was associated with an increased mortality risk of

38% in PD patients. These mortality risks have been partially explained by the inflammatory pathway and as a consequence of malnutrition (32).

Peritonitis is a major complication of PD. Not only is peritonitis the leading cause of technique failure, but it also contributes to mortality (33-36). Although the incidence of peritonitis varies from center to center, during the past decade approximately 0.5 episode/patient year were routinely observed (37,38). In some centers, an incidence of 0.2 episode/patient year has been achieved, in large part due to exceptional patient education, as well as new connector and catheter technologies (39). Peritonitis resulted in death in 3% of the episodes in Sipahioglu et al.'s study (10) from Turkey, which is similar to the percentage reported in other studies (1%-6%). They reported a 55.8% rate of technique failure due to peritonitis (10). In our study, peritonitis was detected at a rate of 0.31 episodes/patient year. Peritonitis was the cause in 55.2% of our technique failures. Peritonitis continues to be the most devastating complication of PD treatment and the leading cause of technique failures in our patients with PD.

There are potential limitations of our study. First of all, the results of this study were indirectly (not directly) compared to the results of a tertiary care university hospital's nephrology clinic. Secondly, it was a retrospective study and had a heterogeneous study population for demographic (age at the start of PD, duration of PD, etc.), clinical (causes of ESRD, etc.) and laboratory parameters. Further prospective studies are therefore required to clarify this issue.

In conclusion, our results suggest that patients' and technique survival rates, and the factors affecting mortality in our patients at our secondary state hospital nephrology clinic, are similar those at a tertiary university hospital's nephrology clinic in Turkey.

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