The Evaluation of the Causes of Discontinuation in Patients Undergoing Continuous Ambulatory Peritoneal Dialysis

Sürekli Ayaktan Periton Diyaliz Programındaki Hastalarda Tedaviyi Sonlandırma Nedenlerinin Değerlendirilmesi

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ABSTRACT Objective: Peritoneal dialysis is one of the renal replacement therapy modalities in patients with end-stage renal disease. Treatment should be discontinued due to various reasons. To elucidate these reasons and prevent them is very important in maintaining peritoneal dialysis. In the present study, reasons those lead to discontinuation of treatment were evaluated in patients who underwent peritoneal dialysis and have been followed in our Nephrology Department. **Material and Methods:** Data from 313 patients (194 male and 119 female) who underwent peritoneal dialysis in the last 12 years (1997-2009) were reviewed retrospectively. Among these, patients who discontinued peritoneal dialysis were assessed. Data analyzed by using descriptive statistic tests. **Results:** The mean age for dialysis onset was 51.9 ± 17.6 years and the mean dialysis duration was 27.5 ± 27.1 months (median 20 months; range: 3-166 months). During follow-up period, 212 patients (67.7%) ceased peritoneal dialysis. Reasons of discontinuation were as follows: death in 58 patients (27.4%), peritonitis in 36 patients (17.0%), transfer to another facility (8.0%), inadequate dialysis in 16 patients (7.5%), improvement in renal failure in 16 patients (7.5%), transplantation in 14 patients (6.6%), patient incompliance in 12 patients (5.7%), unwillingness of the patient for peritoneal dialysis in 8 patients (3.8%), hypervolemia in 5 patients (2.4%), leakage in 9 patients (4.2%), hernia in 4 patients (1.9%) and other technical factors in 17 patients (8.0%). There were not any relationship between the reasons of discontinuation and causes of end-stage renal disease, prior renal replacement history, comorbid disease, hemoglobin level, white blood cell count, and levels of serum albumin, calcium, phosphorus, parathormone, total cholesterol and triglyceride ($p > 0.05$). **Conclusion:** Our results indicated that peritonitis was the most important reason for being unable to maintain long term peritoneal dialysis and discontinuation of this treatment modality. Consequently, decreasing the incidence of peritonitis should be considered as an important factor in maintaining treatment.

Key Words: Peritoneal dialysis, continuous ambulatory; peritonitis; kidney failure, chronic

ÖZET Amaç: Periton diyalizi son dönem böbrek hastalığı olan hastalarda renal replasman tedavi seçeneklerinden birisidir. Çeşitli nedenlerden dolayı tedaviye ara verilmemelidir. Bu nedenleri belirlemek ve önlemek periton diyalizinin sürdürülmesinde çok önemlidir. Bu çalışmamızda Nefroloji kliniğimizde periton diyalizi programına alınarak izlenen hastaların tedaviye ara verme nedenleri değerlendirildi. **Gereç ve Yöntemler**: Son 12 yılda (1997-2009) periton diyalizine alınan 313 olgu (194 erkek ve 119 kadın) retrospektif olarak değerlendirildi. Bunlar arasında periton diyaliz tedavisinden çıkanlar değerlendirildi. Veriler deskriptif istatistik testler kullanılarak analiz edildi. **Bulgular:** Ortalama diyalize başlama yaşı 51.9 ± 17.6 ve ortalama diyaliz süresi 27.5 ± 27.1 aydı (ortanca 20 ay; aralık 3-166 ay) izleme süresince 212 hasta (%67.7) periton diyalizini bırakmıştı. Periton diyalizine devam etmeme nedenleri şöyleydi; 58 olguda ölüm (%27.4), 36 olguda peritonit (%17), bir başka tedavi kurumuna nakil (%8), 16 olguda yetersiz diyaliz (%7.5), 16 olguda böbrek yetmezliği düzeyinde düzelme (%7.5), 14 olguda transplantasyon (%6.6), 12 olguda hasta uyumsuzluğu (%5.7), 8 olguda hastanın periton diyalizini istememesi (%3.8), 5 hastada hipervolemi (%2.4), 9 hastada sızıntı (%4.2), 4 hastada herni (%1.9) ve 17 hastada diğer teknik sorunlar (%8). Tedaviyi kesme nedenleri ile son dönem böbrek yetmezliği nedenleri, önceki renal replasman tedavi seçeneği, komorbid hastalık, hemoglobin, beyaz küre sayısı, serum albumin, kalsiyum, fosfor, parathormon, total kolesterol ve trigliserid düzeyleri arasında ilişki bulunamamıştı ($p > 0.05$). **Sonuç:** Sonuçlarımız peritonitin uzun süreli olarak periton diyalizini sürdürememe ve bu tedavi seçeneğinin sonlandırılmasında en önemli neden olduğunu gösterdi. Sonuç olarak bu tedavi şeklini sürdürebilmede peritonit sıklığını azaltmak önemli bir etken olarak düşünülmelidir.

Anahtar Kelimeler: Periton diyalizi, sürekli ayaktan; peritonit; böbrek yetmezliği, kronik

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After continuous ambulatory peritoneal dialysis (CAPD) was first introduced by Popovich et al. as an alternative treatment modality in patients with end-stage renal disease in 1976, it has been a popular renal replacement therapy both in the world and in our country.[1] Peritoneal dialysis (PD) is preferred because it offers better blood pressure control and fluid-electrolyte balance it is, safer to use in cardiovascular instability, provides independency from hospital-healthcare facility, does not need special equipments, performed without painful needle insertion, improves quality of life, reduces erythropoietin need and has a low cost. PD is a renal replacement therapy used by more than 100000 patients.

Despite advances in technology, increase in the number of patients who undergo PD leads an increase in complication rate and number of patient who has to discontinue the treatment due to various reasons. Although peritonitis rate decreased in this patient group, it is still the most important reason for discontinuation of therapy.[2-4] Other reasons include decrease in peritoneum functions, inadequate dialysis, mechanical complications (peritoneal leakage syndrome, catheter issues, and inadequate dialysis) and loss of ultra-filtration. It has been reported that technical survival rate for CAPD was 30-50% in the fifth year.[5]

In the present study, we investigated the reasons of discontinuation of peritoneal dialysis in PD patients who have been followed in our Nephrology Department.

MATERIAL AND METHODS

Three hundres thirteen of 386 patients with available medical records and have been followed up to 12 years in Antalya Education and Training Hospital between 1997 and 2009 were included in this study. Data from patients were reviewed retrospectively from hospital records. There were 194 male (62%) and 119 female (38%) patients. Peritoneal catheter placement was achieved by percutaneous technique in 220 (70.3%) patients and by surgical technique in 93 (29.7%) patients. Patients who started to receive PD before 15 years of age and who had PD duration shorter than three months were excluded from the study. The demographic, clinical, and biochemical data included age at the start of PD, gender, cause of (ESRD), prior renal replacement history and comorbid disease. Hemoglobin level, white blood cell count, levels of serum albumin, creatinine, blood urea nitrogen, calcium, phosphorus, parathormone, total cholesterol and triglyceride were collected from their medical records.

Clinical outcomes were mortality and technique failure, and the latter was defined as a transfer to hemodialysis (HD) due to peritonitis, inadequate dialysis, ultrafiltration failure, exit-site and/or tunnel infection, and mechanical problems. Reasons of discontinuation, demographic and clinical information were assessed in patients who discontinued peritoneal dialysis for any reason (death, peritonitis, transfer to another facility, inadequate dialysis, improvement in renal failure, transplantation, patients incompliance, unwillingness of patients hypervole-mia, leakage, hernia etc.). Peritonitis was defined as the presence of cloudy peritoneal dialysis effluent with more than 100 white blood cells/mm^3 and more than 50% polymorphonuclear cells, in accordance with the International Society for Peritoneal Dialysis (ISPD) guidelines.

Statistical analyses were performed by using SPSS software version 10.0. Statistical assessments were done by descriptive analysis. Discontinuation risk factors were analyzed with a logistic regression analysis. Differences in various clinical parameters between continued and discontinued groups were analyzed using the Chi-square test and Mann Whitney U test. Differences were considered statistically significant for p values less than 0.05.

RESULTS

The mean age at dialysis onset was 51.9 ± 17.6 years and the mean dialysis duration was 27.5 ± 27.1 months (median 20 months; range: 3-166 months).

In PD patients, most common causes of ESRD were found as hypertension and diabetes mellitus (36.1% and 31.3%, respectively) (Table 1).

TABLE 1: 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
Other	10	3.2
Unknown	68	21.7
Total	313	100

During follow-up period, 212 patients ceased peritoneal dialysis. Technical survival rate was found as 89.1%, 84.0% and 74.1% in the first, third and in fifth years, respectively.

Among others, peritonitis was the most important reason of discontinuation of peritoneal dialysis (Table 2). It was found that peritonitis rate was 0.31 episode/patient years. The frequency of *Staphylococcus aureus* was 11.2% and coagulase (-) staphilococcus was 6.8%. No relationship was found between catheter placement method and technical failure, peritonitis, leakage or revision requirement ($p > 0.05$).

A higher educational level ($p= 0.045$), lower age ($p= 0.002$), and higher baseline creatinine level ($p= 0.045$) were found to affect patient's survival. There were not any relationships between the reasons of discontinuation and causes of ESRD, prior renal replacement history, comorbid disease, hemoglobin level, white blood cell count, and levels of serum albumin, calcium, phosphorus, parathormone, total cholesterol and triglyceride ($p > 0.05$).

TABLE 2: Reasons of discontinuation in patients undergoing continuous ambulatory peritoneal dialysis

	Number	%
Death	58	27.4
Peritonitis	36	17
Transfer to another facility	17	8
Inadequate dialysis	16	7.5
Improvement in renal failure	16	7.5
Transplantation	14	6.6
Patient incompliance	12	5.7
Unwillingness of patient	8	3.8
Hypervolemia	5	2.4
Leakage	9	4.2
Hernia	4	1.9
Other technical causes	17	8
Total	212	100

DISCUSSION

PD practice is increasing in Turkey parallel to the world's practice due to advantages against hemodialysis. According to 2007 registries of Turkish Society of Nephrology (TNS), there were 6370 patients undergoing peritoneal dialysis in Turkey.[6]

Peritonitis, decrease in peritoneal functions, inadequate dialysis, transplantation and catheter issues should be mentioned among the reasons of discontinuation of PD. In a study with 20 years experience, it was reported that discontinuation reasons were peritonitis in 1/3, death in other 1/3 and transplantation in remaining 1/3 of the patients.[7] Death and peritonitis were seen as the most important reason of discontinuation. Although Antalya is the region with highest transplantation rate in Turkey, number of discontinuation due to transplantation is still low. However, increasing transplantation numbers in the last few years should have a potential to alter the transplantation rate among discontinuation reasons. Concerning the whole country, it appears that transplantation numbers are low. National policies have to be developed in order to increase organ transplantation.

In a study with patients who converted treatment modality from CAPD to HD, it was reported that discontinuation reasons were loss of ultra-filtration in 42% and peritonitis in %19 of the patients.[8] In addition, Dervisoglu et al.[9] reported that the reasons of discontinuation from CAPD were persistent peritonitis in 41.8% and loss of ultra-filtration in 12% of the patients.

Peritonitis is a major complication of PD. Peritonitis is the most important reason that leads both high mortality rates and technical failure.[2-4] Although the incidence of peritonitis varies from center to center, during the past decade, approximately 0.5 episode/patient year were routinely observed. In some centers, an incidence of 0.2 episode/patient year has been achieved, largely due to exceptional patient education, as well as new connector and

catheter technologies. Sipahioglu et al.[10] was reported that 55.8% of technical failure and 3% of mortality were associated with peritonitis. In our study, peritonitis rate was 0.31 episode/patient years and the rate of technical failure due to peritonitis was 55.2%. Peritonitis continues to be the most devastating complication of PD treatment and the leading cause of technique failure in our patients using PD. we estimate that gram (+) microorganisms are the most common etiological factors of peritonitis in PD patients. Furthermore, no relationship was found between catheter placement method and technical failure, peritonitis, leakage or revision requirement.

Impaired solid and glucose transport due to long term exposure to solutions, loss of ultra-filtration and inadequate dialysis should mandate the cessation of peritoneal dialysis. In our group, 7.5% of patients discontinue CAPD due to inadequate dialysis and other %2.4 due to hypervolemia.

In CAPD patients, mechanical complications such as peritoneal leakage syndrome, herniation and catheter malposition should lead to cessation of CAPD.[11,12] In our patient group, leakage was seen in 4.2%, hernia was seen in 1.9% and other mechanical reasons were seen in 8.0% of the patients.

Patients' compliance-education and appropriate environmental conditions are important to maintain long term and healthy peritoneal dialysis. In our study, peritoneal dialysis cannot be maintained due to patients' incompliance in 5.7% of the patients.

Our results indicated that peritonitis was the most important reason for being unable to maintain long term PD and discontinuation of this treatment modality. Consequently, decreasing the incidence of peritonitis should be considered as an important factor in maintaining treatment.

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