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Chronic peritoneal dialysis in the tenth decade of life

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Abstract. In this retrospective study we present our experience with chronic peritoneal dialysis in nine patients with ESRD in their 10th decade of life (≥90 years) at the Toronto Western Hospital. A family member or a private nurse assisted all patients in dialysis procedure. The co-morbid illnesses, survival, hospitalizations and complications related or unrelated to peritoneal dialysis were reviewed. Four patients started dialysis before and five after their 90th birthday, their mean age was 90.61 ± 4.04 years. All patients had three or more co-morbid illnesses at the start of dialysis. Total duration of PD treatment was 210 patient months with a median duration of 25 months (range 4–68 months). Of the nine patients, four died after a mean follow up of 38.5 months on dialysis. Of the remaining five, one was transferred to hemodialysis after remaining for 10 months on peritoneal dialysis and the other four are continuing on PD for a mean duration of 9.25 months. Peritonitis (1/13.4 patient months) and exit site infection (1/100.5 patient months) responded to treatment. Hospitalization rate was one admission per 2.5 patient years. Most often, the cause of hospitalization was unrelated to PD, e.g., cardiovascular events, pneumonia and peripheral vascular disease etc. Patient survival at 1, 3 and 5 years was 88%, 58% and 24% respectively. The technique survival was 69%, 47% and 23% at 1, 3 and 5 years respectively. We conclude that continuous peritoneal dialysis is a safe and suitable treatment even in nonagenarians (≥90 years) ESRD patients.

Key words: End stage renal failure (ESRD), Geriatric nephrology, Nonagenarians, Peritoneal dialysis

Introduction

The demand for renal replacement therapy in elderly population is increasing worldwide as a result of increasing longevity and hence age related increase in the incidence of end stage renal failure [1, 2] and the liberalization of acceptance criteria for dialysis [3]. In 1997, according to the United States Renal Data Systems (USRDS), 44.5% of the ESRD patients and 50.6% of the incident patients were over 65 years of age [4]. Similarly, the Canadian Organ Replacement Register (CORR) reported that the most rapidly growing age group is that of patients 75 years and above. In addition, in 2000, 60% of patients were older than 65 years [5]. As a result nephrologists now are confronted with an elderly population who have special needs that differ from those of younger patients.

Continuous peritoneal dialysis (CPD) is an established treatment for elderly patients with ESRD, whose body systems are in physiological decline and who have many co-morbid conditions [6]. Seventy eight percent of patients older than 65 years have at least one additional chronic illness and 30% have three or more illnesses [2].

Although there are a few reports on peritoneal dialysis in 7th, 8th and 9th decades of life [5–8], there is no literature regarding chronic PD in patients in the 10th decade of life (≥90 years). In this paper we review our center's experience in terms of patient survival, technique survival, complications

and quality of life in patients who are receiving PD at the age of 90 years and above.

Patients and methods

Retrospectively, we have reviewed the records of nine patients receiving peritoneal dialysis at the age of 90 years and above between January 1992 and 30th September 2003 at the Toronto Western Hospital (TWH). Only patients who remained stable on dialysis for more than 3 months were included. Peritoneal dialysis was chosen as the form of dialysis by the patient and family. These patients were followed up until the time of death, withdrawal from dialysis or a switch of modality or until 30th September 2003. At the start of dialysis, any co-morbid illness (e.g. diabetes mellitus, ischemic heart disease, peripheral vascular disease, hypertension, obstructive airway disease, malignancy, etc.) was identified and recorded.

All patients were treated at home either with continuous ambulatory peritoneal dialysis or automated peritoneal dialysis using a cycler. Family members or a home-care nurse were responsible for bag selection and exchanges. A visiting nurse gave erythropoietin injections, measured blood pressure, weight, blood glucose, if the patient was diabetic, and monitored the exit site. There was close communication among family members, home-care nurses and the center staff. Dialysis prescription was based mainly on clinical and biochemical data based on DOQI guidelines. Patients were seen at the peritoneal dialysis clinic every 4–6 weeks for clinical assessment and biochemical investigations. During their follow up, all patients were observed closely for the development of new co-morbid diseases and any PD-related complications.

Peritonitis was diagnosed by the presence of at least two of the following parameters i.e. abdominal pain, cloudy effluent with more than 100 WBC/mm^3 with >50% of neutrophils and positive dialysate culture. Exit-site infection was diagnosed by the presence of serous or purulent discharge accompanied by positive culture. Peritonitis rate and exit-site infection rate were expressed as one episode per patient months. Hospitalization rate was expressed as admissions per patient years or as the number of hospital days per patient year. Values were expressed as mean ± standard deviation and median values where applicable.

Results

Table 1 shows the patient demographics. There were 9 patients. Five patients were older than 90 years of age when they started dialysis and four patients who started dialysis when they were younger than the age of 90 years continued their dialysis past their 90th birthday. Their mean age was 90.61 ± 4.04 years (range 84–95 years). Five were male. The most common cause of renal failure was hypertensive nephrosclerosis (4 patients) and diabetic nephropathy (2 patients). Six were on automated peritoneal dialysis and three were on continuous ambulatory peritoneal dialysis. No patient was able to perform dialysis by him/herself without help. Dialysis was done by a family member in eight cases and by a private nurse in one.

Laboratory data

Table 2 shows the laboratory data at the beginning of treatment and at the last clinic visit in all patients. Except for the serum urea concentration, which was lower at the last visit, the other values did not change significantly. Renal creatinine clearance, measured in seven out of nine patients at the start of dialysis, ranged between 3 and 8.1 ml/min.

Peritonitis and exit-site infection

Seven patients developed 15 episodes of peritonitis over 201 patient months of peritoneal dialysis – an overall incidence of one-episode/13.4 patient

Table 1. Patient demographics

No. of patients	9
M:F	5:4
Mean age	91.2
Total follow up (patient months)	210
Etiology of ESRD	
Hypertension	4
Diabetes mellitus	2
Chronic glomerulonephritis	1
Unknown	2

Table 2. Laboratory data at the first and the last clinic visits

	Initial	Last	*P*
Creatinine (μmol)	533.7 ± 227.9	533.5 ± 237.13	ns
BUN (mmol/l)	27.22 ± 6.98	18.13 ± 9.40	$P = 0.0506$
Total protein (g/l)	66.33 ± 8.91	61.77 ± 14.87	ns
Albumin (g/l)	34.22 ± 3.83	29.55 ± 8.57	ns
Hemoglobin (g/l)	95 ± 11.5	110.33 ± 17.81	ns
Iron (μmol/l)	11.66 ± 4.06	11.88 ± 62	ns
Ferritin (μg/l)	230.55 ± 226.65	372.33 ± 329.7	ns
Total calcium (mmol/l)	2.21 ± 0.3	2.24 ± 0.25	ns
Phosphorous (mmol/l)	1.50 ± 0.34	1.04 ± 0.34	ns
Alk. phosphatase (IU)	81.77 ± 31.01	117.33 ± 68.02	ns
PTH (pmol/l)	17.92 ± 9.86	40 ± 19.72	ns
Cholesterol (mmol/l)	4.57 ± 1.15	4.36 ± 0.99	ns
Triglycerides (mmol/l)	1.27 ± 0.46	1.27 ± 0.51	ns

months. One patient had six episodes of peritonitis over a 4-year period, four due to Gram negative and two due to Gram-positive organisms. Three patients had two episodes of peritonitis. Of the 15 episodes of peritonitis, 10 were due to Gram positive and five due to Gram-negative organisms. The most frequent organism was coagulase negative Staphylococcus. Two out of the seven patients died during the episode of peritonitis. A third patient, who developed severe peritonitis, required removal of PD catheter and a change over to hemodialysis. After 1 year, he reverted back to peritoneal dialysis due to personal preference. He did well for an additional 30 months on APD with a cycler. For the actuarial survival this patient was considered as continuing on CPD all the time (Figure 1). Interestingly, we encountered only two episodes of exit-site infection during 201 patient months of peritoneal dialysis – an overall incidence of one episode per 100.5 patient months. One of these had leakage at the exit-site and infection at the initiation of peritoneal dialysis with pseudomonas aerugenosa. This patient required 3 weeks of hospitalization for treatment of leakage and recovered completely. The other patient with exit-site infection was treated as outpatient. None of our patients had catheter related complications.

Hospitalizations

Five patients required seven admissions during a follow-up of 210 patient months i.e. one admission/2.5 patient-year (one admission per 30 patients month). They spent total of 204 days in the

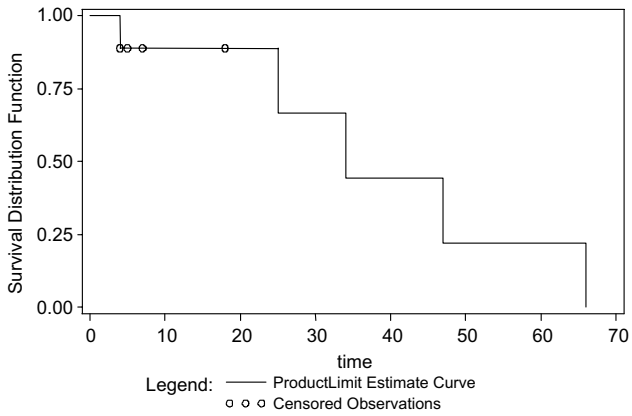

Figure 1.

hospital. Average hospital stay is 22.6 days (i.e. 204 days/9 patients under study). Specifically, they spent 21 days for exit-site leakage and infection, 54 days for peritonitis with mixed organisms, 30 days for persistent peritonitis requiring catheter removal, 61 days for prolonged diarrhea due to clostridium difficile with left malleolar fracture, 21 days for cardiovascular event due to congestive heart failure (CHF) and atrial fibrillation, 13 days for one admission due to pneumonia and, 14 days one patient due to peripheral vascular disease requiring amputation.

Nutrition/malnutrition

On clinical and biochemical evidence, malnutrition was present in four patients at the initiation of PD. Two of them had a bleeding peptic ulcer requiring repeated blood transfusions which probably contributed to malnutrition. Table 3 shows other co-morbid conditions present in these 9 patients.

Quality of life

All patients were mentally alert and had good social interaction. During the follow up, the most frequent complaints were of poor appetite and easy fatigability; patients spent most of their time in bed or in a wheelchair. All had control of bladder and bowels. However, all of them required partial or total assistance in the conduct of peritoneal dialysis and for their activities of daily living (ADL).

Survival

The median duration of peritoneal dialysis was 25 months (range 4–68 months). Four patients expired after an average survival of 38.5 months on peritoneal dialysis. Of these four patients, two died with septicemia following an episode of peritonitis and two due to a cardiovascular cause. Four are still on the CAPD program after 6–18 months (mean duration 9.25 months) of follow up.

Figure 1 shows the actuarial survival of these nine patients. The survival at the end the 1st, 3rd and 5th years was 88%, 58% and 24% respectively. The technique survival in these nine patients was 69%, 47% and 23% at 1, 3 and 5 years respectively.

Table 3. Co-morbidity

Type of co-morbid disease	No. of patients
Diabetes mellitus	2
Hypertension	4
Coronary artery disease	5
Peripheral vascular disease	2
Chronic airway disease	1
Cerebrovascular disease	2
Malignancy	1

Discussion

Our data shows that, even at the tenth decade of life, patients can be successfully treated with CPD. With the exception of Canada, UK and the Scandinavian countries, there are few reports on elderly patients on PD [6]. In agreement with the published data, we found that the leading cause of renal failure in elderly was hypertension and diabetes. As in other series [2, 5], majority of patients had three or more co-morbid conditions; hypertensive heart disease, coronary artery disease, peripheral vascular disease and malnutrition were the most common co-morbid illnesses [7, 9]. Malnutrition has been reported to be commoner than in the younger PD population and is correlated with patient survival [10]. Four of nine patients showed clinical and biochemical evidence of malnutrition.

Our overall peritonitis rate of one episode/13.4 patient months is lower than that reported by others [5, 8, 11]. The most common organism was coagulase negative staphylococcus probably due to touch contamination by the individual assisting in dialysis. Exit-site infection was less common probably because of less physical activity [12, 13]. The hospitalization rate is reported to be higher in the elderly than in younger patients [7]. Our average hospital stay was 22.6 patient days, which is slightly higher than reported by others [14–16]; this is explainable because our patients had more co-morbid conditions at the start of dialysis. Later in the course of PD they had developed even more co-morbid conditions. Survival in our nine patients is better than in patients reported in two other series [17, 18]. According to Isabelle et al., the survival rates after 1 and 3 years on dialysis of patients over 75 years of age was 80% and 45% respectively [17]. After 1 and 5 years on dialysis for

patients over 75 years, Munshi et al. reported survival rates of 53.5% and 2.4%, respectively [18]. Comparisons of similar aged patients on haemodialysis was not possible, however there are studies which have shown that clinical outcome and QOL are similar in elderly people on PD and HD [19].

Quality of life is difficult to assess in retrospective studies. Most of our patients were confined to bed or wheelchair and required help from a family member for the performance of dialysis and for their activities of daily living at home.

Conclusion

Chronic peritoneal dialysis is a feasible option of renal replacement therapy in selected patients in the tenth decade of life with good patient and technique survival. They required more hospitalization due to their increase co-morbid illnesses and malnutrition.

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