

Renal replacement therapy in elderly patients*

P. Fauchald¹, D. Albrechtsen², T. Leivestad³, K.J. Berg¹, T. Talseth¹, and A. Flatmark²

¹ Medical Department B, ² Surgical Department B, and ³ Institute of Transplantation Immunology, The National Hospital, University of Oslo, N-0027 Oslo 1, Norway

Abstract. The results of renal replacement therapy (RRT) in elderly patients in Norway were evaluated. During the 5-year period between 1981 and 1985, 368 patients at least 60 years of age (mean, 66.7 years) at the start of RRT were included and followed until 15 February 1987. Transplantation was planned for 249 patients; of these 127 were not grafted. The actuarial survival in this group was 64%, 44%, and 7% at 6, 12, and 48 months, respectively. Survival in 122 grafted patients was 93%, 87%, and 62%, respectively, and the corresponding graft survival was 70%, 67%, and 48%. The remaining 119 patients were allocated to long-term dialysis, with a survival of 63%, 48%, and 13%, respectively. Our results describe the outcome of a treatment program available to the entire elderly population accepted for RRT. In two-thirds of the patients transplantation was planned, and one-third of all patients were actually grafted, with good patient and graft survival. The results suggest that transplantation is the treatment of choice for most elderly patients.

Key words: Elderly patients - Renal transplantation - Renal replacement therapy.

The mean age of patients starting renal replacement therapy (RRT) is increasing in most centers [6, 7]. In the EDTA registry [7], the proportion of new patients over 55 years of age increased from 22% in 1975 to 44% in 1983. The majority of elderly patients are treated with long-term dialysis, and advanced age has been considered to be a contraindication for renal transplantation [1, 7].

Most studies of renal transplantation in elderly patients have described patients over 50-55 years of age at the start of RRT [3, 8, 10]. This seems a rather low age limit, as the median age at the start of RRT in many countries, including Norway, is well above 50 years. Recent reports have indicated improved results in older transplant recipients [3, 8, 10]. However, the proportion of the uremic population on RRT selected for transplantation and the proportion of these patients who are actually grafted are not given in these reports. It is therefore difficult to evaluate the relative importance of the alternative treatment modalities within a defined population.

The present study was undertaken to evaluate the mode and results of RRT in patients over 60 years of age at the start of treatment in a defined population served by a national health service.

Material and methods

During the 5-year period from 1981 to 1985, 368 patients at least 60 years of age were accepted for RRT in Norway. This number represents 39% of all patients accepted during that period and corresponds to 18 new patients/million inhabitants per year (Norway's population = 4.1 million). The mean age at the start of treatment was 66.7 years (range, 60-83 years), and 98 patients were ≥ 70 years old. The female/male ratio was 31%/69%. The distribution of renal diseases is given in Table 1; the diagnosis was based on histological examination in only 21% of the patients with a diagnosis of chronic glomerulonephritis.

No exclusions were made, and patients were included even if they died during the first days of dialysis. They were followed up until 15 February 1987, and none were lost to follow-up. Cooperation of the 16 regional dialysis centers in the national transplantation program made the study possible.

Hemodialysis was the initial treatment in 335 patients, 21 were started on CAPD, and 12 were predialytically grafted. Due to cardio/cerebrovascular or malignant disease and/or patients' preference, 119 patients (32.3%) were allocated to long-term dialysis (group 1). Transplantation was planned for the remaining 249 patients (67.7%); of these, 127 were not grafted, either because they died while waiting for a graft or because they were still on the waiting list at follow-up (group 2). Transplantation was carried out in 122 patients (group 3). The mean age at the start of treatment in the three groups is given in Table 2.

* Part of the data in this paper has previously been published in *Transplantation Proceedings* 20: 367-369, 1988

Offprint requests to: P. Fauchald

Table 1. Distribution of the kidney disease leading to renal failure

	Patients (n)	(%)
Glomerulonephritis	144	(39.1)
Pyelonephritis/interstitial nephritis	51	(13.9)
Polycystic disease	37	(10.1)
Nephrosclerosis	34	(9.2)
Renal amyloidosis	18	(4.9)
Myelomatosis	16	(4.3)
Systemic disease (e.g. SLE, polyarteritis)	16	(4.3)
Diabetic nephropathy	12	(3.3)
Renal tuberculosis	6	(1.6)
Kidney tumor	5	(1.4)
Other causes	9	(2.5)
Chronic renal failure, etiology uncertain	20	(5.4)

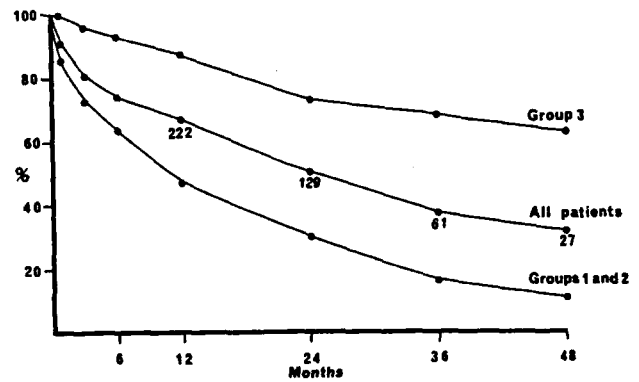
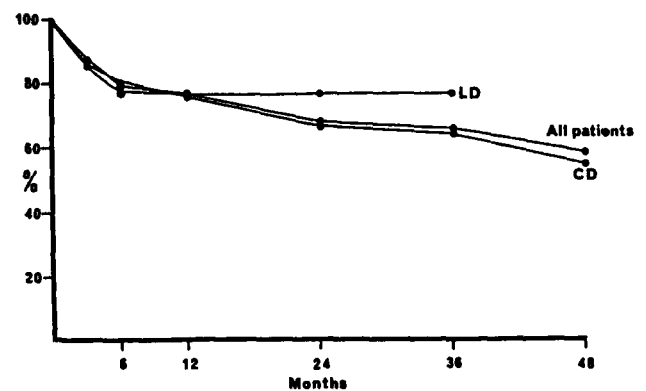
Table 2. Age at start of treatment and actuarial patient survival. Number of patients at risk in parentheses

Treatment group	Mean age at start of RRT, years (range)	Actuarial survival (%) from start of RRT, months				
		3	6	12	24	48
Group 1, long-term dialysis	70.3 (60-83)	74	63	48 (58)	29 (29)	13 (2)
Group 2, transplant planned	65.9 (60-80)	72	64	44 (57)	30 (27)	7 (1)
Group 3, transplant carried out	65.9 (60-83)	96	93	87 (78)	73 (44)	62 (15)

Table 3. Number of deaths in the three groups and causes of death (in %)

	Group 1, long-term dialysis (n=119)	Group 2, transplant planned (n=127)	Group 3, transplant carried out (n=122)
Deaths	93	103	41
Cerebro/cardio-vascular disease	44	58	44
Infections	18	10	34
Malignant disease	16	7	8
Therapy stopped	8	5	2
Dementia/cachexia	7	7	5
Other causes	7	13	7

Cadaveric donor grafts (CD) were used in 96 patients, whereas 26 received living donor grafts (LD) (10 from HLA-identical siblings, 11 from 1-haplotype-mismatched siblings, and 5 from 2-haplotype-mismatched living donors). The mean time on dialysis before transplantation was 10.5 months (range, 0-39 months). The mean age at the start of RRT was 66.7 years in the recipients of LD grafts and 65.7 years in the recipients of CD grafts. Re-

**Fig. 1.** Actuarial patient survival from the start of treatment for all patients, those treated only by dialysis (groups 1 and 2), and grafted patients (group 3)**Fig. 2.** Actuarial patient survival from grafting for all patients (n=122), recipients of living donor grafts (LD) (n=26), and recipients of cadaveric donor grafts (CD) (n=96)

transplantation was carried out in six patients, who received CD grafts. The 128 grafts in elderly patients represented 19% of all grafts done in Norway during that period (11% of LD grafts and 24% of CD grafts).

Transplant patients received prednisolone and azathioprine until 1982. As of January 1983, low-dose prednisolone and cyclosporin were used in all patients. Actuarial patient and graft survival calculations were done using the Kaplan-Meier method.

Results

Patient survival

The actuarial patient survival for all patients, those treated with dialysis only (groups 1 and 2), and grafted patients (group 3) is shown in Fig. 1. In Table 2, survival data for the three groups are given separately, the results in groups 1 and 2 being nearly identical. Circulatory system disease and infections accounted for the majority of deaths in all groups (Table 3). The results were independent of the graft source (Fig. 2) as well as the basic immuno-

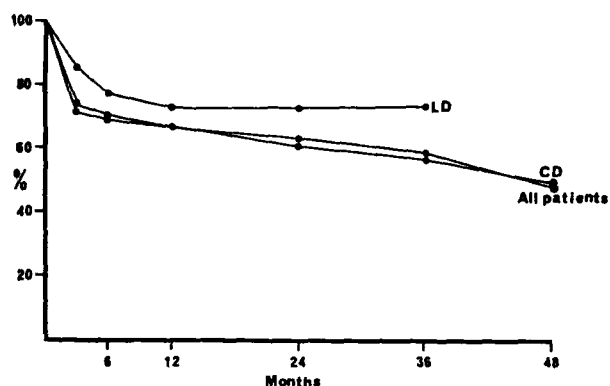


Fig. 3. Actuarial graft survival for first grafts ($n=122$), living donor grafts (LD) ($n=26$), and cadaveric donor grafts (CD) ($n=96$)

Table 4. Actuarial patient and graft survival (in %) in azathioprine- and cyclosporin-treated recipients of first cadaveric donor grafts. Aza, Azathioprine; CyA, cyclosporin; PS, patient survival, GS, graft survival

	Aza ($n=20$)		CyA ($n=76$)	
	PS	GS	PS	GS
3 months	90	70	82	72
6 months	80	65	79	71
12 months	70	60	79	69
24 months	61	55	68	63
48 months	51	40	55	50

Table 5. Causes of graft failure in first transplants and retransplants

First transplants ($n=122$)	
Died with functioning graft	20
Rejection	20
Local infection/bleeding	5
Nonfunctioning graft	1
Recurrent nephritis	1
Retransplants ($n=6$)	
Rejection	3

suppression regime (Table 4). Patient survival for the six regrafted patients was 83% at 12 months.

Graft survival

Actuarial graft survival comparing recipients of CD and LD grafts (first grafts) is shown in Fig. 3, illustrating only small differences between the groups. Graft survival at 12 months for the six regrafted patients was 67%. The results in first CD grafts were independent of the basic immunosuppression used (Table 4). Death with a functioning graft and rejection were the most frequent causes of graft failure (Table 5).

Discussion

The survival of these elderly patients (67%, 50%, and 31% at 1, 2, and 4 years, respectively) is fairly similar to that reported as the overall result in treatment programs based mainly on dialysis [4, 6]. Patient survival is, of course, heavily dependent on the selection criteria for acceptance into RRT programs. In this study involving patients at least 60 years of age, approximately 18/million inhabitants per year were accepted for RRT, which is a relatively high number compared with those in other European countries [13]. We think that this incidence fairly well reflects the actual requirement for RRT in our elderly population. All dialysis centers in Norway cooperate in a national RRT program with reasonably liberal indications for the acceptance of elderly patients. The high mortality in groups 1 and 2 during the first months of dialysis may reflect that liberal criteria were used. RRT is freely available, regardless of socioeconomic status, and during this 5-year period there were no capacity problems. We therefore conclude that our results are representative of a treatment program offered to the entire uremic population accepted for RRT according to liberal selection criteria.

The proportion of patients with glomerulonephritis as the primary renal disease was high compared with other series [8] but of the same magnitude as that reported by Sommer et al. [10]. Due to the low frequency of histological examinations, the distinction between glomerulonephritis and renal vascular disease (nephrosclerosis) was difficult. The RRT program in Norway is based on an active transplantation policy, resulting in a high transplantation rate and a low number of patients on dialysis [7]. This was also the case for our elderly patients, in two-thirds of whom transplantation was planned. Whereas patients 60 years of age or older represented 39% of all new patients in this period, the total of 128 transplantations in this elderly group constituted 19% of all transplants carried out in the same period. This reflects that, in spite of an active attitude toward transplantation in the elderly, a greater proportion of elderly patients were allocated to long-term dialysis compared with patients under the age of 60. Approximately one-third of all elderly patients were grafted, and only one-half of the patients for whom transplants were planned were grafted, mainly due to high mortality during the waiting time (group 2). This may be an argument for earlier preparation of the patients for transplants, aiming at a higher rate of predialytic transplantation.

The results of dialysis and transplantation can-

not be compared in this study. The selection of high-risk patients to group 1 resulted in a high mortality for long-term dialysis. Moreover, survival on dialysis was a selection criterion for the transplant patients. However, even beyond the 1st year, transplant patients had better survival than group 2 patients.

Although liberal acceptance criteria for transplantation were applied, both patient and graft survival were satisfactory, as also were those previously reported in smaller series of elderly patients [8, 11]. Compared with previous reports [3, 8], we found only small differences in patient and graft survival between the azathioprine- and cyclosporin-treated recipients, but the azathioprine-treated group was small and the groups were not randomized. Nonfatal steroid-related complications were not recorded; in this respect, the greatest differences can be expected between the low-dose prednisolone/cyclosporin and the higher-dose prednisolone/azathioprine groups.

As previously reported by other centers [6, 8], cardio/cerebrovascular disease is the most prevalent cause of death. As expected, infections were most frequent in the transplant patients. Only 2%–8% of all deaths were due to the discontinuation of therapy, most frequent in group 1 (long-term dialysis). Kjellstrand et al. [6] have reported that in patients over 70, 38% of all deaths were due to the discontinuation of dialysis. We cannot explain this difference, but varying socioeconomic conditions might have played a role. A high proportion of graft losses (46%) were due to the death of patients with functioning grafts, which might be anticipated in this age group.

The question as to whether or not we can afford to offer RRT to aged uremic patients is often discussed [2, 13]. The results of RRT in elderly patients with respect to survival, morbidity, and quality of life [5, 8, 10, 12] are encouraging and do not support their being denied treatment. Due to difficulties in selecting low-risk patients [12], liberal acceptance criteria must be applied. Transplantation is by far the least costly treatment alternative [9, 13]; the more a national program incorporates transplantation, the more cost-effective it will become. In Norway, an active program for organ procurement combined with the use of living related donors has resulted in a high transplantation rate (approximately 45/million inhabitants per year), a decline in the number of patients on the waiting list for transplantation, and stabilization of the number of patients on dialysis at a low level (approximately

60/million inhabitants). Without this situation, it could have been difficult or impossible for health and economic reasons to apply liberal acceptance criteria for elderly patients on RRT.

In this study we did not assess patients' quality of life, but other studies [8] have confirmed the clinical impression of a superior quality of life for successfully transplanted patients compared with those on long-term dialysis, an additional argument suggesting that early transplantation is the treatment of choice for most elderly patients requiring RRT.

Acknowledgements. We are grateful to the nephrologists at the regional dialysis centers in Norway for conveying information on the nongrafted patients.

References

1. Cardella CJ (1986) Renal transplantation in the elderly: the Canadian experience. In: Oreopoulos DG (ed) *Geriatric nephrology*. Nijhoff, Dordrecht, pp 169–173
2. Friedman EA (1986) Uremia in the aged: can we afford to treat everyone? In: Oreopoulos DG (ed) *Geriatric nephrology*. Nijhoff, Dordrecht, pp 221–226
3. Fryd DS, Kruse L, Seifeldin R, Canafax DM, Sutherland DER, Simmons RL, Najarian JS (1987) Improving results of renal transplantation with multidrug therapy in patients over 50 years of age. *Clin Transplant* 1: 75–80
4. Held PJ, Pauly MV, Diamond L (1987) Survival analysis of patients undergoing dialysis. *JAMA* 257: 645–650
5. Huseby DG, Westlie L, Styrvoky TJ, Kjellstrand CM (1987) Psychological, social, and somatic prognostic indicators in old patients undergoing long-term dialysis. *Ann Intern Med* 147: 1921–1924
6. Kjellstrand CM, Koppy K, Umen A, Nestrud S, Westlie L (1986) Hemodialysis of the elderly. In: Oreopoulos DG (ed) *Geriatric nephrology*. Nijhoff, Dordrecht, pp 135–145
7. Kramer P, Broyer M, Brunner FP, Brynger H, Challah S, Oules R, Rizzoni G, Selwood NH, Wing AJ, Balas EA (1984) Combined report on regular dialysis and transplantation in Europe XIV, 1983. *Proc Eur Dial Transplant Assoc Eur Ren Assoc* 21: 5–65
8. Øst L, Lundgren G, Groth CG (1985) Renal transplantation in the older patient. *Prog Transplant* 2: 1–15
9. Søgaard J (1984) Cost-effectiveness af ny immunosuppressive behandling med cyclosporin A. Thesis, University of Odense, Odense
10. Sommer BG, Mandelbaum DM, Henry ML, Ferguson RM (1986) Renal transplantation in the middle-aged and elderly uremic patient. In: Oreopoulos DG (ed) *Geriatric nephrology*. Nijhoff, Dordrecht, pp 157–168
11. Taube DH, Winder EA, Ogg CS, Bewick M, Cameron JS, Rudge CJ, Williams DG (1983) Successful treatment of middle aged and elderly patients with end stage renal disease. *Br Med J* 286: 2018–2020
12. Westlie L, Umen A, Nestrud S, Kjellstrand CM (1984) Mortality, morbidity, and life satisfaction in the very old dialysis patient. *Trans Am Soc Artif Organs* 30: 21–30
13. Wing AJ (1986) Can we afford to treat everybody? The UK view. In: Oreopoulos DG (ed) *Geriatric nephrology*. Nijhoff, Dordrecht, pp 227–239