COMPLICATIONS POST RENAL TRANSPLANTATION IN CHILDREN ON CONTINUOUS AMBULATORY PERITONEAL DIALYSIS/CONTINUOUS CYCLING PERITONEAL DIALYSIS: A COMPARISON TO HAEMODIALYSIS

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Summary

We evaluated in a retrospective study the risk of renal transplantation in 44 continuous ambulatory peritoneal dialysis/continuous cycling peritoneal dialysis patients who received 48 transplants (32 cadaveric, 16 live-related) and compared the outcome to 41 haemodialysis patients in whom 49 transplants (39 cadaveric, 10 live-related) were performed. Post-transplant complications were minimal in the continuous ambulatory peritoneal dialysis/continuous cycling peritoneal dialysis patients indicating the suitability of this dialysis modality before transplantation. One and two year graft survival rates were 46/40 per cent in the haemodialysis patients and 65/55 per cent in the peritoneal dialysis patients.

Introduction

Successful renal transplantation is considered the optimal therapeutic modality for paediatric patients with end-stage renal disease because of the potential for maximum rehabilitation. In children there is increasing use of continuous ambulatory peritoneal dialysis and continuous cycling peritoneal dialysis as a primary dialytic therapy. However, the question has been raised as to the suitability of patients undergoing peritoneal dialysis for renal transplantation because of the potential for increased infection secondary to the presence of the peritoneal access catheter. This report describes our experience with renal transplantation in 44 patients undergoing continuous ambulatory peritoneal dialysis/continuous cycling peritoneal dialysis and compares the results with a concurrent group of 41 patients who were transplanted following treatment with haemodialysis.

Patients and methods

Between September 1980 and January 1985, 85 patients with end-stage renal disease received a cadaver or live-related donor renal allograft in the UCLA Center
for the Health Sciences following treatment with either haemodialysis or continuous ambulatory peritoneal dialysis/continuous cycling peritoneal dialysis. Patients who were treated with haemodialysis were dialysed for four hours three times weekly. Peritoneal dialysis in the continuous ambulatory peritoneal dialysis and continuous cycling peritoneal dialysis patients was performed as described previously [1].

The mean age of the 44 recipients (27 males/17 females) who underwent continuous ambulatory peritoneal dialysis and/or continuous cycling peritoneal dialysis was 12.0±5.7 years (range 2.3–21.5 years) compared to 16.0±5 years (range 3.9–24 years) in the 41 patients (20 males/21 females) on haemodialysis. The total duration of dialysis was 756 months (peritoneal dialysis group) and 761 months (haemodialysis group).

Prior to surgery, peritoneal dialysis patients had their dialysis fluid drained and a sample for cell count, Gram stain and culture was obtained. The catheter was kept in place and a spike guard was applied to the transfer set. All cadaver donor recipients received one loading dose of gentamicin (1.5mg/kg) IV and Oxacillin 250/500mg IV four times a day for two days. In case of post-transplant fever, peritoneal fluid and, if necessary, exit-site cultures were obtained.

If post-transplant dialysis was necessary, the dialysate volume was reduced and the dwell time decreased, in order to prevent a dialysate leak at the surgical site. Peritonitis was defined and treated as described by Fine et al [2]. Exit-site infection was defined by the presence of erythema and exudate; a tunnel infection was present when tenderness and swelling of the subcutaneous catheter occurred.

The surgical technique and post-transplant immunosuppression was comparable in both peritoneal dialysis and haemodialysis patients. In the majority of the transplants in each group (42 peritoneal dialysis, 41 haemodialysis) prednisone and azathioprine were used. Following the availability of Cyclosporin A in 1984, we used it mainly in high risk patients (i.e. multiple transplants, >50 per cent of cytotoxic antibody level, rejection of previous graft within one year). Six (12%) of the peritoneal dialysis transplants and eight (16%) of the haemodialysis transplants received Cyclosporin A. Further details regarding the immunosuppressive regimen are reported elsewhere [3].

The allograft was placed either retroperitoneally or intraperitoneally.

All patients received blood transfusions prior to transplantation. Transplant loss was defined as return to permanent dialysis or patient death. The Student’s 't' test or the two by two chi-square test was used to analyse the differences between continuous ambulatory peritoneal dialysis and haemodialysis recipients. Graft outcome was evaluated using life table analysis and difference in graft survival between the two groups of patients was analysed using the Mantel-Cox and Wilcoxon tests.

Results

Complications in patients on continuous ambulatory peritoneal dialysis/continuous cycling peritoneal dialysis

In 25 patients (57%) post-transplant dialysis was required because of oligoanuria resulting from acute tubular necrosis or acute rejection. The duration of dialysis
ranged from two to 63 days for a total of 411 days (mean 16.4±16.2 days) which is equivalent to 13.7 patient months. Five recipients developed peritonitis. The two patients who developed peritonitis while being dialysed had their episodes seven and 19 days post-transplant. The remaining three patients, who were off dialysis, had their episodes 65, 70 and 215 days (mean 117±85 days) after transplantation. The predominant organism was Staphylococcus Aureus (4 of 5 episodes). In the two patients undergoing dialysis at the time of peritonitis, intraperitoneal antibiotics were curative, whereas in three patients who were off dialysis, one dose intraperitoneal and a full 10 day course of IV antibiotics was necessary.

Exit-site infections occurred in nine patients (20%). In three patients, antibiotic treatment led to improvement, whereas in six progression to tunnel infection necessitated catheter removal.

Ascites developed in 12 recipients (27%) with a mean age of 12.1±4.4 years (range 5.4–21.5 years). The time interval from transplantation to the occurrence of ascites was 19.0±12 days (range 8–50 days) and the drainage volume was 100–500ml.

Thirty-two patients (73%) had their catheters removed when either kidney function was stable, in the presence of a tunnel infection and/or peritonitis episode 17.0±14.2 weeks (range 1 to 69 weeks) post-transplant. Of the remaining 12 patients, nine rejected their kidney and resumed peritoneal dialysis, one patient died and two still have their catheters in place because of the short follow-up period.

Allograft number and patient survival.

Both groups were comparable with regard to the number of transplants (48 peritoneal dialysis, 49 haemodialysis). There was no significant difference between peritoneal dialysis and haemodialysis groups regarding cadaver or live-related transplants (chi-square = 1.45). Similarly with regard to the number of first or multiple transplants, no significant difference was found in the two groups (chi-square = 0.1).

One peritoneal dialysis patient died of gastrointestinal haemorrhage, as well as one haemodialysis patient who died of severe herpes infection.

Blood transfusions

Accurate data were available in only 42 of the peritoneal dialysis and 33 of the haemodialysis recipients as some of them had been followed previously in other centres. The mean number of transfusions was 16±22 (range 1–126) in the peritoneal dialysis group and 18±26 (range 4–143) in the haemodialysis group.

Histocompatibility

There was no statistically significant difference in the HLA, A, B or DR match grade or HLA A, B or DR mismatch grade in the continuous ambulatory peritoneal dialysis versus haemodialysis recipients. Lymphocytotoxic antibody titres were also not significantly different in first transplants and multiple transplants.
Thirty-one (65%) of the 48 allografts in the peritoneal dialysis recipients are currently functioning 2.5–49 months (mean 19.9±13.0) post-transplant, whereas 20 (41%) of the 49 allografts in the haemodialysis recipients are functioning one to 51.5 months post-transplant (mean 24.1±16.3). The mean serum creatinine values are 1.7±1.3mg/100ml (range 0.5–6.6mg/100ml) in the peritoneal dialysis group, as compared to 2.1±1.9mg/100ml (range 0.4–7.2mg/100ml) in the haemodialysis group. The actuarial one year graft survival rate for the peritoneal dialysis and haemodialysis patients was 65 per cent and 46 per cent, respectively and the two year survival rate was 55 per cent and 40 per cent, respectively. The cumulative allograft survival rate in the patients who had undergone continuous ambulatory peritoneal dialysis/continuous cycling peritoneal dialysis was significantly better (p<0.032) when the Mantel-Cox test was used. By analysing the data with the Wilcoxon-test, no significant difference in the survival rate could be found.

Discussion

There are few reports in the literature detailing the outcome of renal transplantation in patients who have undergone continuous ambulatory peritoneal dialysis/continuous cycling peritoneal dialysis. Most of the reported experience with transplantations in adult patients [4–7] and only two reports from one centre describe experience in children [8,9].

The initial concerns that renal transplantation in continuous ambulatory peritoneal dialysis or continuous cycling peritoneal dialysis patients would be associated with more frequent or severe infections could not be substantiated by our data.

Post-transplant dialysis was necessary in 25 (57%) of the peritoneal dialysis patients and 29 (71%) of the haemodialysis patients because of acute tubular necrosis or acute rejection. Five peritoneal dialysis patients (11%) developed peritonitis and antibiotic treatment with subsequent catheter removal was curative in all cases. Exit-site and tunnel infections occurred in nine patients (20%) and were similarly managed successfully. No patient was endangered and no graft was lost secondary to an infectious complication. The concern that subclinical bacterial contamination might proceed to a severe infection [6] could not be substantiated. The results with regard to peritonitis (1 episode every 37.8 months of exposure) can be compared to other reports in the literature [7] where the peritonitis rate was one every 22 patient months following transplantation. Ascites was seen quite frequently (12 patients/27%) in our paediatric peritoneal dialysis patients. Drainage through the in-dwelling dialysis catheter on one or several occasions was curative in all instances. Ascites in the post-transplant period is a benign process; however, the mechanism and the factors causing the occurrence are unclear.

Dialysis catheters were left in place and were used as access to the peritoneal cavity if dialysis, drainage of ascites or culturing because of post-operative fever made it necessary. Our experience indicates that the catheter does not need to
to be removed at the time of transplantation, as is the policy in some other centres [5,8].

Multiple factors influence cadaveric renal allograft survival rates; however, pre-transplant blood transfusions, histocompatibility for HLA A and B and/or DR antigens, efficacy of the immunosuppressive regimen and individual immunological responsiveness are probably the most important. There was no significant difference in either group with respect to these parameters.

The improved, but not significantly different allograft survival rate in the peritoneal dialysis recipients was apparent and is difficult to explain. An allograft enhancing effect of peritoneal dialysis may be suggested by our results, although data from another group revealed opposite findings [10]. The authors compared graft survival rates of 79 haemodialysis and 37 peritoneal dialysis patients who received cadaveric grafts and found a significantly decreased one year graft survival rate in the peritoneal dialysis group (35.5%) when compared to the haemodialysis group (63.5%). Studies of T cell subsets indicated that the difference might be attributable to an increased OKT4/OKT8, helper/suppressor, ratio in continuous ambulatory peritoneal dialysis patients.

Based on our findings, renal transplantation can be safely performed in paediatric continuous ambulatory peritoneal dialysis and continuous cycling peritoneal patients. They are not more prone to infectious complications and graft and patient survival rates are similar or even better when compared to patients previously maintained on haemodialysis. Further immunological investigations of peritoneal dialysis patients are necessary to determine how immune function is altered with this dialysis modality and whether these changes influence the ultimate outcome in renal transplantation.

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References
