

Adult pre-emptive kidney transplantation: a paired kidney analysis

doi:10.1111/j.1432-2277.2011.01249.x

We would like to present our experience in pre-emptive kidney transplantation, which was introduced in our center at the end of 2003. Currently, pre-emptive procedures from deceased donors constitute 10% of all transplantations. The present study compares the outcomes of these pre-emptively transplanted patients (PET) who had their kidney donor pairs transplanted after variable duration of dialysis (PTD) – 40 patients. The benefits for individual patients and for the health care system are discussed.

The PET group consisted of 40 (25 male, 15 female) end stage renal disease (ESRD) patients aged 18–68 (mean 40.8 ± 13.4) years. Pre-emptive recipients were under the care of nephrologists for 7.74 years (range: 0.2–18 years). According to many authors, early referral to specialists allows optimal medical care of patients suffering from ESRD [1–3] and preparation for renal replacement therapy (RRT). Specific educational programs that help with the process are also important for increasing patients' compliance after transplantation [4].

The PTD group consisted of 40 (27 male, 13 female) patients aged 19–72 (mean 45.5 ± 13.3) years. PTD recipients were dialyzed for 3.2 ± 3.2 years (range: 3.5–180 months). The modalities of RRT before transplantation were hemodialysis (75%) and peritoneal dialysis (25%).

The PET and PTD groups did not differ in respect of underlying renal diseases. With regard to the Carlson co-morbidity index [5] we observed that the PTD recipients suffered from more co-morbidities (2.9 vs. 2.4) than PET patients, although this difference was not statistically significant (*U* test, $P > 0.05$).

It has been reported that pre-emptive transplantation improved patient and graft survival as compared to transplantation in previously dialyzed patients [6,7]. In our center, PET was associated with excellent 1-year patient and graft survival (100% and 95%, respectively). Patient and graft 1-year survival in the dialyzed pairs was 97.5% and 92.5%, respectively. The estimated graft function [4-point MDRD (Modification of Diet in Renal Disease)] 1 year after transplantation was similar in both groups [estimated glomerular filtration rate (eGFR) 52.8 vs. 56.5 ml/min]. During a 5-year follow-up (5–68 months)

one patient died in PTD group (sepsis), and three patients in PET group (lung cancer, pulmonary embolization, and ileus). Four patients from each group lost their grafts. In one case in the PET group and in two cases in the PTD group, noncompliance to medication was suspected.

The occurrence of acute rejection (AR) episodes in PET and PTD did not differ significantly and was only slightly lower in the PET group (30% vs. 35%). This might have been related to the fact that, in the PTD group, there were some patients who were transplanted once in the past ($n = 5$), and thus the mean panel reactive antibody (PRA) was slightly higher in this group (3.2% vs. 0% in PET). The PET and PTD groups did not differ from each other with respect to the mean number of mismatches (3.2 vs. 2.9), PRA titers, types of immunosuppressive protocols and total ischemic time (10.0 vs. 10.9 h).

Four (10%) PET patients and 14 (35%) PTD patients experienced delayed graft function (DGF) (*U* test, $P < 0.05$). DGF was defined as the need for hemodialysis during the first week after transplantation. PTD patients required twelve times more hemodialysis sessions than PET patients. Frequency as well as duration of hospitalization during the first year after transplantation did not differ significantly, although PTD patients were hospitalized more frequently and received longer (mean about 6 days) hospitalization during the post-transplant period than PET. Pre-emptive transplantation as a method of RRT may also have an additional advantage such as cost effectiveness. Direct costs from transplantation are lesser than dialysis [8]. This was further demonstrated in our study as both the cost of dialyzing 40 patients for 38 months before transplantation and significantly more erythropoiesis stimulating agent (ESA) during the months preceding transplantation, also 12 times more hemodialysis sessions and longer hospitalizations after transplantation. Therefore, pre-emptive transplantation reduces both the direct and indirect cost of RRT.

Potential advantage of pre-emptive transplantation may be in allowing at least some individuals to continue to

work and study [9]. As those working or in school are generally productive citizens, it can be said that pre-emptive transplantation also indirectly reduces the costs to society. Our single-center experience confirmed this: 63% of PET patients (all students and working adults) and only 19% of PTD patients continued their education and work after transplantation (Fisher test, $P < 0.05$). In this way pre-emptive transplantation allows some ESRD patients to feel as a rightful member of the society.

The most common complications after kidney transplantation were urinary tract infections and cytomegalovirus (CMV) infections. CMV infections occurred more often in PET patients. More PET patients were CMV IgG titer-negative before transplantation. Among the surgical complications, the most common were hematomas, lymphoceles, urinary fistulas and ureter obstructions. The number of surgical interventions was slightly higher in the PTD group. Post-transplant diabetes mellitus or impaired-fasting glucose occurred in 10% of patients from the PET and PTD group.

The PET patients moved from the 5 chronic kidney disease (CKD) stage to the 2–3 CKD stage without dialysis. A widely known fact is that mortality is lower in transplanted patients than those on dialysis. Thus, pre-emptive transplantation may decrease the mortality rate by avoiding dialysis. The longer the time spent on dialysis is, the worse the outcome is, as far as both the patients and the grafts survivals are concerned [6].

The main disadvantage of pre-emptive transplantation is the diversion of a scarce resource from patients who have been on dialysis for a long time to patients who have not been through the experience at all. In our system, each dialyzed patient is assessed on a yearly basis as a potential candidate for transplantation and by the same method gets the chance to be referred to transplant wait list. In addition, a dialyzed candidate for transplantation obtains additional points for each year spent on dialysis. Therefore, facilitating transplantation in already dialyzed patients and simultaneously allowing pre-emptive transplantation, we create a policy that is beneficial for the individual patient and provide constant influx of new pre-emptively referred candidates to transplant wait list. The policy increases the ability to effectively manage the waiting list [10].

In our center, many patients prefer pre-emptive transplantation as the first method of RRT. They are highly motivated and cooperative during the preparation for

transplantation. Around 90% of them received transplants before dialysis became unavoidable.

In summary, pre-emptively transplanted patients derive major benefits from transplantation in the form of better quality of life and society benefits from this procedure which reduces both directly and indirectly, the costs of RRT.

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