Incidence and Risk Factors of Delayed Graft Function and its Impact on Long-Term Graft Survival in Living Kidney Transplantation in Shiraz

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Abstract

Background: Delayed graft function (DGF) remains as an important complication in renal transplantation with obvious short-term and possible long-term disadvantages.

Objective: To determine the influence of recipient and donor factors on the development of delayed graft function and their impact on the long-term graft survival.

Methods: A total of 237 living kidney recipients were reviewed with regards to recipients and donors factors. Delayed graft function was defined as a need for dialysis during the first week after transplantation or failure of serum creatinine to decrease below pretransplant levels within one week regardless of urine output. Effect of patients' factors on the development of delayed graft function and its effect on 1 and 5 years graft survival were studied.

Results: Thirty-six out of 237 patients experienced delayed graft function (15.2%). Incidence of delayed graft function was 10.6% in recipients of living related donors compared to 24.4% in living unrelated donors (p=0.002). One and 5 years graft survival were 85.5% and 69.5% in patients with immediate graft function and 81.0% and 57.9% in patients with delayed graft function respectively.

Conclusion: The only risk factor for delayed graft function in recipients of living kidney transplant as shown by this study was living unrelated kidney donation. Delayed graft function seems to have no deleterious effect on 1 and 5 years graft survival.

Key words: Delayed graft function, living related kidney transplantation, living unrelated kidney transplantation.

Introduction

Delayed graft function (DGF) is an important complication of renal transplantation. Its incidence is between 25-45% in most studies dealing with cadaver donors but rates as high as 80% has also been reported. DGF may reflect sub-optimal donor management, technical problems for organ procurement and preservation or recipients' immunological and anatomical factors. Numerous studies have been performed in recipients of cadaver renal allografts in term of delayed graft function. Main risk factors for DGF as shown by these studies are prolonged cold ischemia time, advanced donor age, number of previous transplants, absence of intra-operative diuresis, and poor quality reperfusion.

Patients and Methods

A total of 237 kidney recipients who had received a kidney transplant between 1988 and 1994 were studied retrospectively. We obtained data required for our study from patient’s medical charts containing information about recipients (i.e. age, sex, duration of disease, and duration of pre-transplant dialysis) and for donors (i.e. age, sex, latest serum creatinine, and relationship with the recipient). Delayed graft function was defined as a need for dialysis during the first week after transplantation or failure of serum creatinine to decrease below pre-transplant levels within one week of transplantation, regardless of urine output. Grafts with primary nonfunction were also included with exclusion of those with technical failure. Graft failure was defined as return to dialysis, serum creatinine more than 5 mg/dl or death from any cause.

Effect of recipients and donors’ factors on DGF and the effect of DGF on graft survival after 1 and 5 years were studied. Categoric variables were analyzed using chi-square test, for continuous variables, t-test was applied. Results were considered to be statistically significant with p<0.05.

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Results
The recipient group included 176 (74.3%) males and 61 (25.7%) females with a mean age of 33.47 years. Mean duration of disease was 35.32 months, with a mean pre-transplant period of 13.13 months. The donor group included 139 (58.6%) males and 98 (41.4%) females with a mean age of 34.34 years. Mean serum creatinine before donation was 1.00mg/dl. Thirty-six (15.2%) patients experience DGF. Groups with immediate and delayed graft functions were compared for donor and recipient factors (Table 1, 2).
Total of 152 recipients had one-year follow-up, with overall graft survival rate of 84.9%. One year graft survival rate was 85.5% for patients with immediate graft function versus 81.0% for those with delayed graft function (p=0.395). In this study 137 patients had 5 years follow-up with overall graft survival rate of 67.9%. Patients with delayed graft function had a graft survival rate of 57.9% versus 69.5% for those with immediate graft function (p=0.135), (Fig. 1).

Discussion
DGF has obvious short term disadvantages such as more difficult diagnosis and management of early post complications, increased morbidity, more prolonged admission time, higher economic costs, and more use of invasive diagnostic procedures.1, 14 Long term of DGF on graft survival remains a matter of debate. Some studies showed that DGF definitely has a negative impact on graft survival11,12,13,16,18, while others have found no prognostic significance for DGF.2,3,5,7,8,10,15,19 Despite several studies performed on recipients of cadaver donors, studies involving recipients of living donors a few and limited. In fact there are only two main studies about DGF in recipients of living grafts in the literature.11,18 In our study the incidence of DGF was 15.2%; it is somewhat higher compared with other studies involving living graft recipients.
Cold ischemia time is significantly shorter in living donor transplantation compared with cadaver transplant and also pre-transplant donor management is far better in living donors, so some of the best known and most significant risk factors of DGF are absent in recipients of living grafts. Interestingly, DGF also happens in living kidney recipients, even in rates as high as 15% as shown by this study.

Table 1: Effect of recipient factors on DGF

<table>
<thead>
<tr>
<th>No of transplants</th>
<th>No DGF</th>
<th>DGF</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>75.6%</td>
<td>66.7%</td>
<td>0.257</td>
</tr>
<tr>
<td>Female</td>
<td>24.4%</td>
<td>33.3%</td>
<td></td>
</tr>
<tr>
<td>Recipient age (years)</td>
<td>33.53±0.7*</td>
<td>33.11±1.8</td>
<td>0.820</td>
</tr>
<tr>
<td>Duration of disease (months)</td>
<td>3.46±2.6</td>
<td>29.00±4.8</td>
<td>0.254</td>
</tr>
<tr>
<td>Duration of dialysis (months)</td>
<td>13.32±1.4</td>
<td>12.12±1.9</td>
<td>0.691</td>
</tr>
</tbody>
</table>

Figure 1: Graft survival rate 1 and 5 years after transplantation in patients with and without DGF

Table 2: Relation of donor factors with DGF

<table>
<thead>
<tr>
<th>No of transplants</th>
<th>No DGF</th>
<th>DGF</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age of donor</td>
<td>34.35±0.08*</td>
<td>34.29±1.8</td>
<td>0.979</td>
</tr>
<tr>
<td>Donor's sex</td>
<td>Male</td>
<td>57.7%</td>
<td>63.9%</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>42.3%</td>
<td>36.1%</td>
</tr>
<tr>
<td>Donor's serum creatinine</td>
<td>1.05±0.02</td>
<td>1.09±0.03</td>
<td>0.561</td>
</tr>
<tr>
<td>Donor status</td>
<td>Living related</td>
<td>131(65.8%)</td>
<td>14(38.9%)</td>
</tr>
<tr>
<td></td>
<td>Living un-related</td>
<td>68(34.2%)</td>
<td>22(61.1%)</td>
</tr>
</tbody>
</table>

*Mean±SE
This study reveals that other factors may affect the development of DGF. These factors may be mainly of immunological origin. Among donor and recipient factors included in this study, only donor status, related or unrelated had significant predictive value for DGF. There is no study comparing the effect of donor-recipient relationship and occurrence of DGF. We have shown that there is a significant increase in DGF in recipients of living unrelated donors compared with recipients of living related donors, 24.4% vs. 10.6%. One acceptable explanation for this result is the role of immunological mechanisms in the development of DGF. Ischemic acute tubular necrosis is not the only cause of DGF and intercurrent undiagnosed rejection may also play a role in delayed graft function, so the increase in DGF in recipients of living unrelated donors may be due to the increases in undiagnosed acute rejection in this group, which may be due to frequent antigen mismatch between donor and recipient. Further controlled studies must be performed to prove this hypothesis.

Conclusion
This study showed that delayed graft function is an important clinical problem in recipients of living donors. Among donors' and recipients' factors that were included in this study none had predictive value for development of delayed graft function except for donor-recipient relationship. In terms of long-term effects, no detrimental effect of delayed graft function was shown both at 1 and 5 years post-transplantation.

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References