Long term functional graft survival results of the 3rd stage single centre living and cadaveric donor transplants

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Abstract

\textbf{Aim:} Kidney transplantation is the most optimal end stage renal disease (ESRD) treatment. It is more advantageous treatment regard to both its effect on the patient’s life quality or mortality. The number of patients who underwent or followed after renal transplant is constantly increasing while their survival becomes a topic more frequently. Different centers therefore report different survival rates in the post-transplantation process. In this study, the transplantation progress and the functional graft survival rates of the patients who have received renal transplants and are followed in our center and the factors which influence the survival rates are explored.

\textbf{Materials and Methods:} The patients over 18 years old who applied to Inonu University Turgut Ozal Medical Center Nephrology Department Policlinics who received transplants retrospectively analyzed.

\textbf{Results:} While the median for the functional graft period of the patients were 60 months, the longest was found to be 240 months. The grafts of our 77\% patients are functional, while 3.7\% are exitus with functional graft due to various reasons. 5.3\% of the patients received HD again, 3\% started PD and 1.3\% underwent retransplantation.

\textbf{Conclusion:} While the number of transplants are increasing day by day in Turkey, studies on the long term functional graft survival results and the patients’ pre- and post-transplant characteristics are limited and there is not much literature data related to Turkey. We aimed to contribute to the literature with our data. Also, the duration of ESRD increases, the lower is the functional graft time significantly. The preferred ESRD treatment should, therefore, be renal transplantation. Renal transplants could be preferred in suitable patients or donors of advanced age, and transplant age spectrum could be extended.
rates are explored.

Materials and Methods
Patients who received renal transplants in Turgut Ozal Medical Center were included in the study. The patients over 18 years old who applied to Inonu University Turgut Ozal Medical Center Nephrology Department Policlinics from 01 January 2007 to 01 November 2020, followed with a functional graft for at least 3 months were included in the study. Disease activities and histories are available in follow-up files. In the Nephrology Clinics of our Center, renal transplants are performed since January 2007, while so far 326 patients received renal transplants. Furthermore, approximately 600 patients who received transplants in abroad or Turkey are followed. In the study, such sociodemographic features as age or sex as well as graft type, pre-transplantation dialysis and ESRD etiologies and periods, functional graft periods were examined. For the purposes of performing the study, ethical board approval was received from Inonu University Non-Invasive Clinical Research Board (Approval Number: 2020/900).

Statistical analysis
While evaluating the findings obtained in the study, the software (IBM SPSS Statistics (Version 22)) was used for statistical analyses. For the purposes of compliance of continuous variables to normal distribution, Kolmogorov – Smirnov test was employed while the functional graft period and ESRD period was found to be non-compliant to normal distribution (p<0.05). The categorical data was expressed as n (number) and % (percent). While considering the data in the study, median (min-max) was used in the variables not compliant with the normal distribution. Fisher Exact and Pearson chi-square test, observed frequencies, were used for statistical analyses while the significance level was accepted as p<0.05.

ESRD period, functional graft function and post-transplantation minimum creatinine values were not found normal distribution (p<0.05). So we used Spearmen Correlation to analyzed. This analysis was used to determine the relationship of continuous variables. Also, during the follow-up period, the number and percentage of deaths or survival in the respective year are presented as graphic.

Results
There is 300 patients included in the study, of these patients 65% are male. The average ages of the patients is $31.7 \pm 13.2$ (10-70), 95.4% are below 60 years and 4.6% are older than 60 years (Figure 1). 79.7% of the patients received kidney from alive donor.

The ESRD median period of the patients in the study group is 48 months. Considering their ESRD etiologies, chronic renal deficiency with an unknown cause ranked first with 34.3%, the glomerulonephritis ranked second with 17%, and reflux nephropathy ranked third with 11%. These causes are followed by hypertensive patients with 10% and diabetics with 8.7%. While the patients were followed mostly for hemodialysis (HD) with 42.7%, the rate of preemptive patients was 34%, the rate of peritoneal dialysis (PD) receiving patient was 13% and the rate of the patients receiving both HD and PD was 10.3% (Table 1).
Table 1. Various characteristics of the renal transplant patients included in the study.

<table>
<thead>
<tr>
<th>N</th>
<th>%</th>
</tr>
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<tbody>
<tr>
<td><strong>Chronic Renal Deficiency caused by</strong></td>
<td></td>
</tr>
<tr>
<td>Diabetes</td>
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<tr>
<td>Hypertension</td>
<td>30</td>
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<td>Glomerulonephritis</td>
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<td>Renal Calculus</td>
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<tr>
<td>Hereditary Nephritis</td>
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<tr>
<td>Other</td>
<td>11</td>
</tr>
<tr>
<td>Unknown</td>
<td>103</td>
</tr>
</tbody>
</table>

**Chronic Renal Deficiency Period (Min-Med-Max) (months)** 1-48-360

**Pre-Transplantation**

Preemptive | 102 | 34.0 |

**Hemodialysis** | 128 | 42.7 |

Peritoneal Dialysis | 31 | 13.0 |

Hemodialysis + Peritoneal Dialysis | 39 | 10.3 |

**Graft Type**

Cadaveric | 53 | 17.7 |

Alive relative | 219 | 73.0 |

Alive non-relative | 20 | 6.7 |

Unknown | 8 | 2.7 |

**Functional Graft Period (Min-Med-Max) (month)** 3-60-240

**Functional Status of the Graft**

Functional | 232 | 77.3 |

Non-Functional | 36 | 12.0 |

Unknown | 32 | 10.7 |

**Patient’s Condition**

Retransplantation | 4 | 1.3 |

Hemodialysis | 16 | 5.3 |

Peritoneal dialysis | 9 | 3.0 |

Living with functional graft | 225 | 75.0 |

Exitus with functional graft | 11 | 3.7 |

Unknown | 35 | 11.7 |

**Patient’s Final Status**

Living | 261 | 87.0 |

Exitus | 15 | 5.0 |

Unknown | 24 | 8.0 |

Discussion

Renal transplants have been performed worldwide since 1954 and in Turkey since 1975 [1,4]. According to 2018 data, 3871 renal transplants took place in Turkey [1]. With regard to transplants in Turkey, contrary to the global data, 78% of all transplants were from living donors and 22% were from cadavers [1]. In our hospitals, 70% of the transplants were from living donors, revealing outcomes correlated with those of other Turkish transplant centers.

In an extended study performed in Turkey, it was found that individual knowledge levels were low, and people mostly did not consider donating their organs. However, when their relatives require transplants, they donate their organs [9]. Being uninformed about how other patients can be treated through organ donation and transplantation after brain death could be the reason for the small proportion of transplants from cadavers in Turkey.

The rate of transplants in patients over the age of 65 years was determined to be 3.9% in Turkey [1]. The median age of the patients included in our study was 36 years, and the proportion of patients aged >60 years who received transplants was 4.6%. According to the literature, the average age of transplant recipients in Europe was 36 in 1990, which rose to 53 in 2013. In the last 15 years, transplants in patients >65 years have increased and studies on advanced-age transplants are increasing [10]. Advanced-age kidney transplants are becoming more common because survival and quality of life are better with transplant than dialysis, donor acceptance criteria have been
expanded, and more kidneys from older donors are being used [11].

In our study, the proportion of transplant patients over 60 years of age was approximately 5%, and their five-year functional graft survival rate was 71.4%. These data are above the national average in Turkey. In a randomized controlled study performed by Nikodimopouloua et al., in recipient transplants from individuals 65 years or older, five-year survival was reported to be 50%, and it was significantly lower compared to the control group (<65 years) [12]. In our study, graft survival rates in this age group may have been higher due to the lower age group and younger donor ages.

In the renal transplants taking place in our center, antithymocyte globulin (ATG) is administered from 5 to 7 days as induction therapy. In the maintenance phase, a combination of oral prednisone, mycophenolate mofetil, and tacrolimus is administered unless there are contraindications. Patient survival depends on the source of the transplant and the patient’s age, comorbidities, race, sex, and immunosuppressant dosage [13, 14]. In the literature, there are insufficient data on the long-term survival results of renal transplantation in Turkey.

The median functional graft time followed up in our center was 60 months. With regard to functional graft survival rates, grafts from living donors have higher survival rates than those from cadavers. These rates decrease as the time after transplantation increases; this decrease accelerates, especially after the 10th year. For the first year, the functional graft survival rate in transplants from living donors was 96%, and 95% in cadaveric transplants. The functional graft rates decreased to 62% in grafts received from living donors and 55% in cadaveric grafts in the 20th year.

Different survival rates have been reported by different centers. For example, in a comprehensive study carried out in Ireland on 500 patients with regard to 45-year graft complications, functional graft survival rates dropped to 79% (6) in the 10th year. In another study, 20-year graft survival was found to be about 50% [7].

In Turkey, according to dialysis and transplantation data in 2018, first-year survival rates were reported to be 94% in the case of living donors. Another single-center study in Turkey of 286 patients between 1993 and 2014 indicated that the graft survival rate in the 5th year was 85%, which became 71% in the 10th year and 33% in the 20th year [8]. Our survival rates have been found to be higher than in similar centers in Turkey. This could be associated with immunosuppressive treatments, more predictable post-transplant complications, and increasing experience of the centers in Turkey.

Finally, as specified in our study, as the duration of ESRD increases, the lower is the functional graft time significantly. The preferred ESRD treatment should, therefore, be renal transplantation. Renal transplants could be preferred in suitable patients or donors of advanced age, and transplant age spectrum could be extended.

While the number of transplants is increasing day by day in Turkey, studies on the long-term functional graft survival results and the patients’ pre- and post-transplant characteristics are limited and there is not much literature data related to Turkey. We aimed to contribute to the literature with our data.

Ethical approval

Ethical board approval was received from Inonu University Non-Invasive Clinical Research Board (Approval Number: 2020/900).

References