INTRODUCTION

Renal replacement therapy (dialysis & transplantation) for patients with end-stage renal disease (ESRD) is on the rise globally and the same epidemiologic trend is also being observed in Iran. Three methods used for treatment of patients with ESRD are hemodialysis, peritoneal dialysis and renal transplantation. Renal transplantation is the best option for treatment of the end-stage renal diseases and has more advantages than dialysis. By renal drafting, patients with ESRD experience more survival rate and better quality of life in all ages. In the previous studies of our center, survival rate in deceased donor, living donor and diabetics patients were reported and...
the objective of this study was to determine the
ten-year survival rate of renal transplantation and
its contributing factors in patients aged 18 years
and younger who were transplanted from March
1999 to March 2009 in Shiraz Namazi Hospital
Transplantation Center, southern Iran.

METHODOLOGY

This study is a retrospective cohort which aimed
to investigate the ten-year graft survival rate of
renal transplantation and its contributing factors
in patients (164 cases) aged 18 years and younger
(which made up 12% of all patients) who were
transplanted from March 1999 to March 2009 in
Shiraz Namazi Hospital Transplantation Center,
southern Iran.

In this study the precise time of transplantation
was considered as “initial event” and the time of
irreversible rejection of transplantation in which
patient needs dialysis was considered as the “end
point event”. To determine the survival rate, Ka-
plan-Meier method and to compare survival curves,
log rank test and for determining Hazard Ratio and
also modeling of survival affecting variables, Cox
Regression Models were used. The variables inves-
tigated in this study are the age of the donor, gen-
der of the donor and recipient, blood type and Rh
of the donor and recipient, the marital status of the
donor, donor source, immunosuppressive drugs
regimen, cause of ESRD, time to diuresis, vascular
complications, cold ischemic time, the duration of
dialysis before the operation and the duration of
hospitalization after the operation.

The Required data was collected from patients’
files at Namazi Hospital. To determine the graft
survival status, available files at the nephrologists’
offices, the Center for Special Diseases, and the
Association for Supporting of Renal Patients and
in some cases, available telephone numbers in pa-
tients’ files were used. SPSS software version 11.5
was utilized to analyze the data and a p-value of less
than 0.05 was considered significant.

RESULTS

From 164 patients with transplantation, 160
patients were followed successfully and among
these patients, there were 25 cases (15.6 percent)
with transplantation rejection. The numbers and
percentages shown in the tables are based on the
total number of transplanted patients (164 cases)
and calculated survival rates are based on followed
cases (160 cases). As seen in Table-I, 55.5% of
recipients were men, and they comprised 62.8% of
donors. The mean age of recipients and donors were
14.00±3.16 years and 25.78±13.08, respectively. The
mean values for duration of hospitalization after the
operation and cold ischemia time were 12.76±5.32
and 54.36±63.15, respectively. “O” was the most
frequent blood type among recipients and donors
with 45.7 and 54 percent of cases, respectively.

In 85.6% of cases, donor and recipient had the
same blood group, while the rest had compatible
blood groups. Considering marital status, 55.1%
of donors were married. The highest number of
transplants belonged to deceased donors (51.2%)
and the rest belonged to living-related (34.1%)
and living-unrelated (14.6%) donors. The protocol
for immunosuppressive therapy in patients
comprised three groups of drugs (Table-II). In the first group, cyclosporine, Imuran, IV
methyl Prednisolone and oral Prednisolone were
prescribed. The second group drugs were si milar
to the first group with Cellcept replacing Imuran.
The third group included all the first group drugs
plus Cellcept. The most frequently consumed
drugs belonged to the first group with 80 cases
(51%). Duration of hospitalization after operation
was between 7 to 14 days in the 63.5% of cases.
The 1, 3, 5, 7, and10-year graft survival rates for
renal transplantation were 96.8, 88.8, 82.8, 78.1, 78.1
percents, respectively (Fig.1).

The 1, 3, 5, 7, and 10-year graft survival rates based
on different variables, calculated with Kaplan-Meier
method, are shown in Tables I and II. To investigate
the existence of significant differences in survival
rates among different classes of these variables, log-

![Survival Function](image-url)

Fig.1: Ten-year graft survival rate in
pediatric renal transplantation.
rank test p-values are inserted in these tables. Only, duration of hospitalization showed a significant relationship with graft survival. The survival rate of patients who were hospitalized for 7 to 14 days after the operation was higher than others. There were no significant differences between survival rates for other investigated variables.

Although the graft survival rate in patients who had been transplanted from deceased-donor was less than the other two groups, but the difference was not significant (P = 0.16), and even after integrating the living-related and living-unrelated donor groups and comparing that with the deceased-donor group, there was no significant difference between their graft survival rates (P = 0.059). Those variables with a P value of less than 0.2 in univariate log-rank test were inserted into Cox model, but as shown in Table-III, only duration of hospitalization after operation had a relationship with survival rate. Hazard ratio in patients who had a history of being hospitalized between 7 to 14 days was 0.212 (CI = 0.053-0.854, P = 0.029).

**DISCUSSION**

Our study showed that 1, 3, 5, 7, and 10-year survival rates for renal transplantation were 96.8, 88.8, 82.8, 78.1, 78.1 percent respectively. Similarly, Sumboonnanonda et al reported a graft survival of 98% and 84% at 1 and 5 years. In another study from 1986 to 1998, however, 1, 3, and 5 year graft survival
rates were 93%, 75% and 63%, respectively. The rates in our study are higher compared to these which might be due to improvement of techniques and immunosuppressive therapy.

We found that survival was significantly related to hospital stay after the operation. Survival rates of patients who were hospitalized for 7 to 14 days after operation were higher than others. In this study, there were no significant differences between survival rates in transplantsations with deceased-donor (cadaveric), living-related donor and living-unrelated donor. Similarly, Abbud-Filho and colleagues found that graft survival did not differ significantly by donor type.

Another study showed that among live donor kidney transplant recipients, donor-recipient relationship (related vs. unrelated) had no significant effect on graft survival. We combined

<table>
<thead>
<tr>
<th>Variables</th>
<th>N (%)</th>
<th>Survival Rates (%)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1yr</td>
<td>3yr</td>
</tr>
<tr>
<td>Immunosuppressive regimen *</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G1</td>
<td>80(51)</td>
<td>97.44</td>
<td>92.1</td>
</tr>
<tr>
<td>G2</td>
<td>76(48.4)</td>
<td>97.2</td>
<td>86.8</td>
</tr>
<tr>
<td>G3</td>
<td>1(0.6)</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Time to diuresis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Immediate</td>
<td>120(91.5)</td>
<td>97.6</td>
<td>91.2</td>
</tr>
<tr>
<td>Delayed</td>
<td>12(8.5)</td>
<td>90.9</td>
<td>72.7</td>
</tr>
<tr>
<td>Artery</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Simple</td>
<td>19(83.8)</td>
<td>96.5</td>
<td>90.6</td>
</tr>
<tr>
<td>Double</td>
<td>20(14.1)</td>
<td>100</td>
<td>88.5</td>
</tr>
<tr>
<td>Arterial anastomosis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Int.iliac</td>
<td>125(88)</td>
<td>96.7</td>
<td>90</td>
</tr>
<tr>
<td>Ext.iliac</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Both</td>
<td>17(12)</td>
<td>100</td>
<td>87.1</td>
</tr>
<tr>
<td>Cold ischemic time</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;2 hr</td>
<td>23(92)</td>
<td>100</td>
<td>94.1</td>
</tr>
<tr>
<td>≥2hr</td>
<td>4(8)</td>
<td>100</td>
<td>-</td>
</tr>
<tr>
<td>Admission time</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;1week</td>
<td>22(13.8)</td>
<td>95</td>
<td>-</td>
</tr>
<tr>
<td>1-2 weeks</td>
<td>101(63.5)</td>
<td>100</td>
<td>89.2</td>
</tr>
<tr>
<td>2-3 weeks</td>
<td>25(15.7)</td>
<td>92</td>
<td>79.45</td>
</tr>
<tr>
<td>&gt;3 week</td>
<td>11(6.9)</td>
<td>90</td>
<td>65.63</td>
</tr>
</tbody>
</table>

*G1: (Cyclosporine, Imuran, IV methyl Prednisolone and oral Prednisolone).
G2: (Cyclosporine, Cellcept, IV methyl Prednisolone and oral Prednisolone).
G3: (Cyclosporine, Imuran, Cellcept, IV-methyl Prednisolone and oral Prednisolone).
the living-related and unrelated donor groups and compared it with the deceased-donor group and found that there was no significant difference between their graft survival rates. This finding is confirmed by the 2001 annual report of North American Pediatric Renal Transplant Cooperative Study which noted that 1-year allograft survival rate did not differ between cadaver-donor and living-donor recipients. On the other hand, allograft survival rate was higher in living-donor recipients compared with deceased-donor recipients at all times after renal transplantation.

When transplant cases with donor and recipient of the same blood groups were compared to those with compatible blood groups, we found no significant difference between their survival rates. This finding is similar to those of El-Husseini and colleagues who investigated graft survival rate in pediatric living-donor renal transplantations. Park and colleagues, however, noted that survival rate was significantly higher in grafts where donors and recipients had identical blood groups.

Studies have shown that cold ischemia time does not influence graft survival in pediatric renal transplantations, a matter which is in line with our findings. However, it should be noted that the number of patients for whom cold ischemia time was documented was small in our study.

This study showed the time to diuresis after the operation. Donor source, blood group, gender, cold ischemia time, immunosuppressive drugs regimen, time to diuresis, and cause of ESRD might translate into lower long-term graft survival. In Cox model, length of post-transplant hospitalization (LOH) has a significant relationship with graft survival rate. As shown in results, hazard ratio in patients who had a history of being hospitalized between 7 to 14 days was 0.212, much higher than the group with over 3 weeks LOH. This result is similar to Abiodun Omoloja and et al study. Duration of hospitalization is related to various factors such as creatinine level, urine output, acute rejection, hemoglobin, proteinuria, anemia and some other factors. Longer hospital stays in our center usually is due to a problem with the renal grafts such as delayed function from any cause (e.g., acute tubular necrosis or severe humeral rejections that need additional treatment modalities such as plasmapheresis or antithymocyte globulin). Our routine is to discharge the patients when their serum creatinine level is lower than 2 mg/dL and urine output is around 1 mL/ kg/min (7–10 days after the operation). In other words, LOH lower than 1 week or greater than 2 weeks naturally correlate with a problem in the kidney function that might translate into lower long-term graft survival.

CONCLUSION

The 10-year graft survival rate for pediatric renal transplantation was 78.1% in this study. Graft survival was significantly related to hospital stay after the operation. Donor source, blood group, gender, cold ischemia time, immunosuppressive drugs regimen, time to diuresis, and cause of ESRD did not influence graft survival rate.

REFERENCE

Graft survival rate in pediatric renal transplantation


Authors Contribution:
AA, AR, JH and HS conceived, designed and did statistical analysis & editing of manuscript. AA and EK did data collection and manuscript writing. DM and EK did review and final approval of manuscript.