

Characteristics and early clinical outcomes of patients undergoing living-related kidney transplantation

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ABSTRACT

Aim. This study aimed to access early outcomes of living-related kidney transplantation. **Methods.** The results of treatment of 159 patients (135 males and 24 females) with chronic renal disease during 2010-2018, have been investigated. Two new and traditional methods have been studied. New optimized method was performed for the main group (n=98) observed since February 2018, while the comparison group (n=61) from 2010 to February 2018 was operated in the traditional way. The characteristics of the patients were compared using the Wilcoxon rank-sum test or the Fisher's exact test as appropriate. All tests were two-sided, and P<0.05 was considered statistically significant. Analyses were performed using the R statistical package. **Results.** In 149 (93.7%) cases, the functional activity of the kidney transplants was assessed as a primary functioning graft with 95 (96.9%) cases in the main group and 54 (88.5%) in comparison group (P=0.048). Delayed graft function was detected in 2 (2.0%) recipients of the main group and in 5 (8.2%) cases of the comparison group. In the postoperative period, a significant decrease in creatinine level was observed in the main group of recipients and on the 1st day it was 221.0±58.7 μmol/L, whereas in the comparison group the index was 569.3±84.6 μmol/L (P<0.001). 3-4 days after surgery, the level of blood creatinine in the main group was significantly (P<0.01) lower than the comparison group (149.6±25.6 vs. 343.6±69.4 μmol/L). On the first day after surgery, there was also a significant decrease (P<0.05) in urea level of the main group (11.4±1.61 mmol/L) in comparison with the comparative group (15.4±0.84 mmol/L). At the time of hospital discharge of recipients, the level of urea was within normal limits and equal to 8.3±0.80 mmol/L and 9.0±0.95 mmol/L in the main and comparison groups, respectively (P>0.05). Hemodialysis was required in 3 (3.1%) recipients from the main group and 3 (4.9%) from the comparison group. The need for corticosteroid therapy was observed in 2 (2.0%) cases of the main group and in 3 (4.9%) cases from the comparison group. **Conclusion.** The effectiveness of improved approaches to patient management and surgical tactics of related kidney transplantation has been proved, taking into account the verification of the graft functional activity on the main clinical and biochemical data of the terminal stage of chronic renal failure regression.

Original Article

PII: S225199391900015-9

Rec. 06 June 2019
Rev. 15 July 2019
Pub. 25 July 2019

Keywords

Kidney Transplantation,
Living-Related Renal
Transplant Recipients,
Early Clinical Outcomes

INTRODUCTION

Kidney transplantation is the treatment of choice for chronic kidney disease. The risk of death for kidney transplant recipients (KTRs) is less than half of that for dialysis patient. Any differences in patient survival attributable to different immunosuppressive medication regimens are substantially smaller than the survival difference between dialysis and transplantation. Specifically, marginally inferior immunosuppressive medication regimens will result in substantially better patient outcomes than dialysis. Thus, it is better to perform kidney transplantation even with an inferior immunosuppressive regimen, than to avoid transplantation altogether [1].

According to the world medical statistics, organ transplantation of living donors has a lower incidence of graft rejection, as well as more satisfactory patient survival rates [2, 3, 4]. Currently, there is an improvement in kidney transplantation results, in connection with which more and more patients with end-stage renal disease prefer kidney transplantation to permanent program dialysis [5, 6].

Every year around the world, the number of living kidney donors increases. It is also likely that laparoscopic donor nephrectomy, which has a shorter duration of disability and fewer days of hospitalization, will further increase the number of living donors [7, 8].

In the conditions of the national health care system, kidney transplantation, as a radical form of treatment of chronic renal insufficiency, is at the stage of active development. In this connection, the aim of study was assessment early outcomes of living-related kidney transplantation.

MATERIAL AND METHODS

The results of treatment of 159 patients (135 males and 24 females) with chronic renal disease, which were observed from 2010 to 2018 in the department of vascular surgery and kidney transplantation of "RSSPMCS named after academician V. Vakhidov" were used as the main material. In the course of the research, modern principles of diagnosis and treatment were used, and complaints, objective examination data, laboratory and instrumental studies, immediate and long-term results of related kidney transplantation were also analyzed. The main group consisted of 98 cases observed since February 2018, in which kidney transplantation was performed according to a new optimized method, the comparison group included 61 cases from January 2010 to February 2018 operated in the traditional way. Among the recipients of both groups, patients aged from 20 to 44 years prevailed. In the majority of cases, surgeries were performed for male recipients - 135 (84.9%) cases. The main cause (95.6%) of renal failure was chronic glomerulonephritis, chronic pyelonephritis was detected in 1 (0.6%) case, 1 recipient (0.6%) suffered from type I diabetes, in 2 (1.2%) of the cases had urolithiasis, in 1 (0.6%) of the patient - chronic renal disease of unknown etiology, and in 1 (0.6%) of the cases polycystic kidney disease was detected.

Statistical analyze

The characteristics of the patients were compared using the Wilcoxon rank-sum test or the Fisher's exact test as appropriate. All tests were two-sided, and $P < 0.05$ was considered statistically significant. Analyses were performed using the R statistical package.

Ethical approval

The review board and ethics committee of RSCS named after acad. V.Vakhidov approved the study protocol and informed consents were taken from all the participants.

RESULTS AND DISCUSSION

Despite modern advances in immunosuppression and immunological selection, the results of a living-related kidney transplantation are better than the results of a cadaveric kidney transplant both in the early periods after surgery and in the long-term period [9, 10]. Literature data allow us to conclude that organ transplantation from a living-related donor is acceptable from a clinical and ethical perspective and turns out to be the most effective method of treating patients. In most cases, family members of the patient are living donors, but recently there has been an increase in the number of donors who have no genetic relationship with the patient (friends, relatives) [6, 8].

In our study by analyzing the results of living-related kidney transplantation from the early postoperative period, it was revealed that during the study period from 2010 to February 2018 (comparison group) a relatively high frequency of complications was recorded.

Table 1. Complications of immediate post-operative period

Type of complication	Main group		Comparison group		All	
	Abs.	%	Abs.	%	Abs.	%
Subcutaneous hematoma	1	1,0%	1	1,6%	2	1,3%
Subcutaneous seroma	0	0,0%	2	3,3%	2	1,3%
Lymphorrhoea	2	2,0%	2	3,3%	4	2,5%
Hematoma in the graft bed	3	3,1%	5	8,2%	8	5,0%
Wound suppuration	1	1,0%	1	1,6%	2	1,3%
Deep wound infection	0	0,0%	1	1,6%	1	0,6%
Failure of ureterocystanastomosis	0	0,0%	1	1,6%	1	0,6%
Bronchopulmonary complications	4	4,1%	4	6,6%	8	5,0%
Acute cardiovascular failure with a functioning transplant	2	2,0%	3	4,9%	5	3,1%

Table 1 reflects the complications observed in the early post-op period in the group of renal transplant recipients. Thus, a hematoma in the transplant bed developed in 3 (3.1%) patients of the main group and in 5 (8.2%) cases of the comparison group, making 5.0% of the total number of kidney transplant surgeries. Also, among the significant complications, bronchopulmonary complications can be identified with the development of acute respiratory failure, which were recorded in 8 (5.0%) cases, in 4 (4.1%) cases among recipients of the main group and in 4 (6,6 %) - comparison group. In the main group of recipients 2 (2.0%) cases of acute cardiovascular insufficiency were noted, in the comparison group it was 3 (4.9%) cases.

In 149 (93.7%) cases, the functional activity of the kidney transplants was assessed as a primary functioning graft (Table 2), with 95 (96.9%) cases in the main group versus the comparison group (54 (88.5%); $p=0.048$). Delayed graft function was detected in 2 (2.0%) recipients of the main group and in 5 (8.2%) cases of the comparison group.

Table 2. Graft functional activity

Items	Main group		Comparison group		All	
	Abs.	%	Abs.	%	Abs.	%
Primary functioning graft	95	96,9%	54	88,5%	149	93,7%
	χ^2 test =3,916; Df=1; $p=0,048$				-	-
Delayed graft function	2	2,0%	5	8,2%	7	4,4%
Acute Graft Rejection	1	1,0%	2	3,3%	3	1,9%
Total	98	100,0%	61	100,0%	159	100,0%

Acute graft rejection was observed after 3 (1.9%) surgeries, while 2 (3.3%) cases were in recipients of the comparison group. In order to assess the kidney transplant function, we studied the dynamics of creatinine ($\mu\text{mol/L}$) and urea indices in recipients.

Figure 1 showed that the differences in baseline creatinine values in the studied groups were not statistically significant ($P>0.05$) and amounted to 883.2 ± 24.6 and 923.4 ± 36.0 $\mu\text{mol/L}$ in the main and comparison groups, respectively. In the postoperative period, a significant decrease in creatinine level was observed in the main group of recipients and on the 1st day it was 221.0 ± 58.7 $\mu\text{mol/L}$, whereas in the comparison group the index was 569.3 ± 84.6 $\mu\text{mol/L}$ ($P<0.001$). 3-4 days after surgery, the level of blood creatinine in the main group was 149.6 ± 25.6 $\mu\text{mol/L}$, significantly lower than the comparison group (343.6 ± 69.4 ; $P<0.01$).

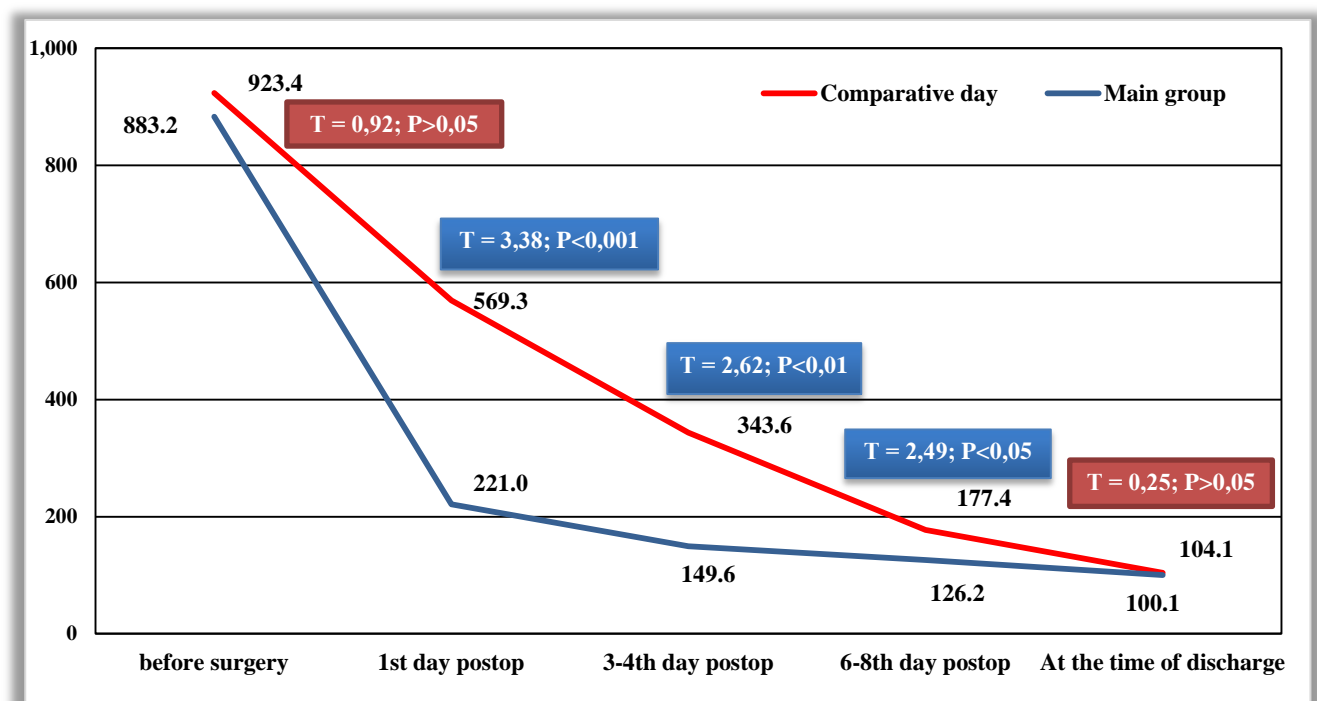


Figure 1. Dynamics of creatinine ($\mu\text{mol/L}$) after a related kidney transplant

It was also of interest to analyze the dynamics of urea indicators after living-related kidney transplantation, which is shown in figure 2. Thus, it can be noted that the differences in baseline values in the studied groups were not statistically significant ($P>0.05$) and amounted to 24.8 ± 0.87 and 26.0 ± 1.13 $\mu\text{mol/L}$ in the main and comparison groups, respectively. From the presented dynamics, it can be seen that on the first day after surgery there was a decrease in urea levels to 11.4 ± 1.61 mmol/L for the main group and to 15.4 ± 0.84 mmol/L for the comparison group ($P<0.05$). At the time of discharge of recipients from the hospital, the level of urea was within normal limits and equal to 8.3 ± 0.80 mmol/L and 9.0 ± 0.95 mmol/L in the main and comparison groups, respectively ($P>0.05$).

Glomerular Filtration Rate (GFR), as one of the main indicator of kidney transplant function, was also evaluated by in the dynamics of the postoperative period. A graphical representation of the dynamics of changes in the GFR calculated using the Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI) formula is shown in Figure 3.

In the main group significantly better GFR values were observed already on the 1st day after surgery relative to the comparison group and averaged 67.5 ± 2.97 ml/min ($P<0.01$). At the time of discharge, the GFR was equal to 95.4 ± 2.63 and 88.9 ± 3.94 ml/min in the main and comparison groups, respectively ($P>0.05$).

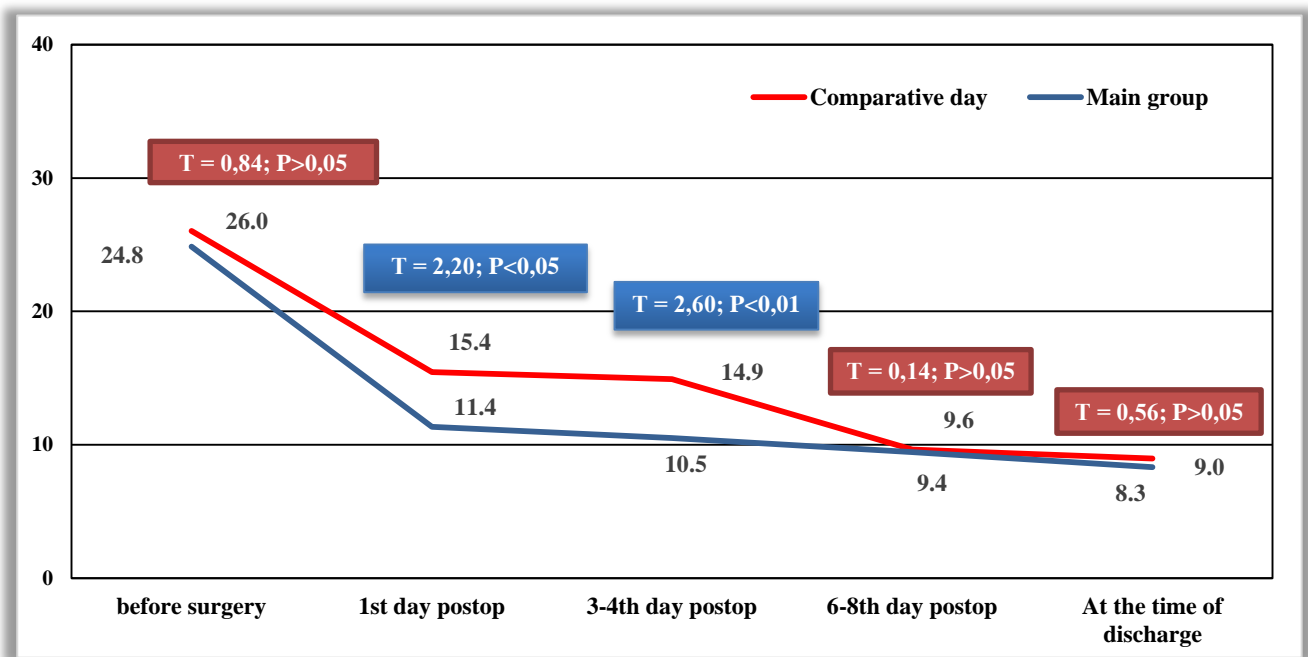


Figure 2. Dynamics of urea (mmol/L) after living-related renal transplantation

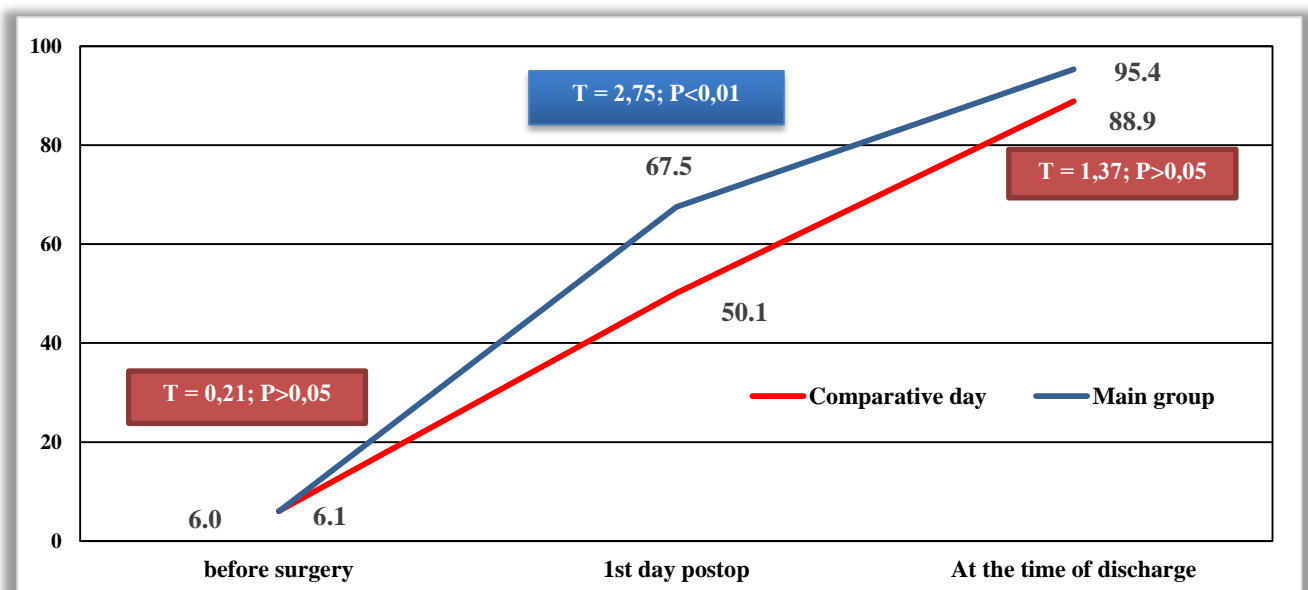


Figure 3. Dynamics of GFR (CKD-EPI) (ml / min) after related renal transplantation

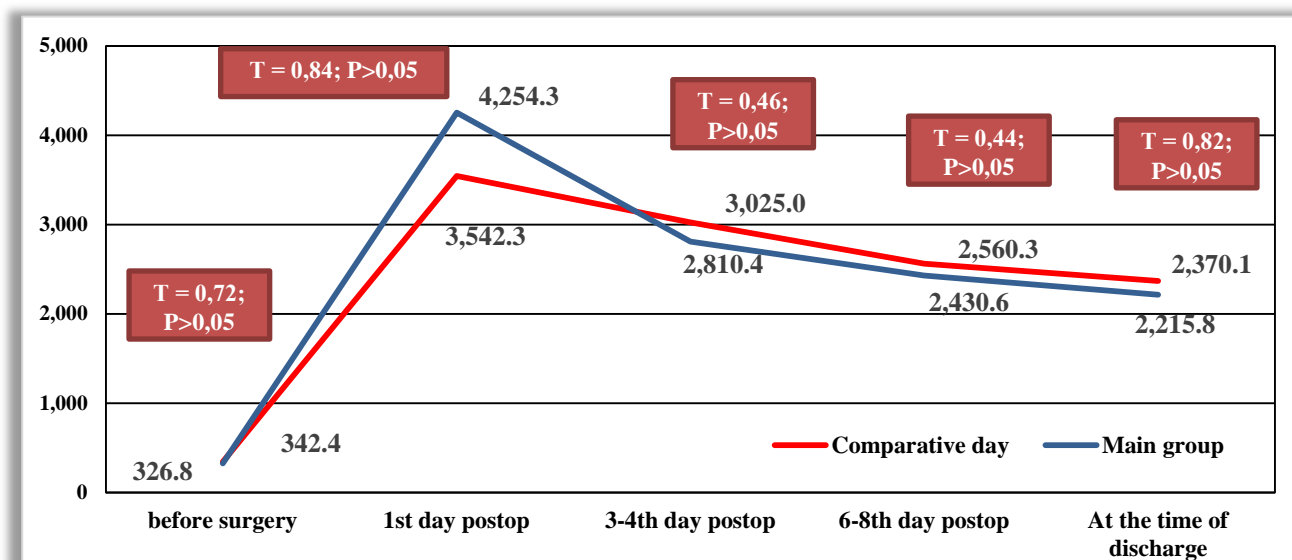


Figure 4. Dynamics of daily diuresis (ml)

When analyzing the indices of daily diuresis in the studied groups of recipients, positive dynamics was revealed in the main and comparison groups without significant difference. So, on the 1st day after surgery, the daily output increased from 326.8 ± 16.3 ml to 4254.4 ± 318.9 ml in the main group and from 342.4 ± 14.2 ml to 3542.3 ± 567.4 ml in the comparison group ($P > 0.05$). By the time of the discharge of the recipients, the daily diuresis was 2215.8 ± 129.5 ml and 2370.1 ± 136.1 ml in the main and comparison groups, respectively (Figure 4).

Data of times of creatinine normalization in the studied groups are reflected in table 3. Thus, in 137 (86.2%) of the total number of patients, creatinine normalization lasted up to 5 days in the postoperative period, 88 (89.8%) and 49 (80.3%) recipients from the main and comparison groups, respectively. On days 6-7 after surgery, normal creatinine values were 2 (2.0%) recipients from the main group and 2 (3.3%) from the comparison group. In 4 (2.5%) cases out of the total number studied, it took 10 or more days to normalize creatinine.

Hemodialysis was required in 3 (3.1%) recipients from the main group and 3 (4.9%) from the comparison group. The need for corticosteroid therapy was observed in 2 (2.0%) cases of the main group and in 3 (4.9%) cases from the comparison group (Table 3).

Table 3. The timing of the normalization of creatinine

Items	Main group		Comparison group		All	
	Abs.	%	Abs.	%	Abs.	%
Up to 5 days	88	89,8%	49	80,3%	137	86,2%
6-7 days	2	2,0%	2	3,3%	4	2,5%
8-9 days	1	1,0%	2	3,3%	3	1,9%
10 or more days	2	2,0%	2	3,3%	4	2,5%
Hemodialysis was required	3	3,1%	3	4,9%	6	3,8%
It took a pulsotherapy	2	2,0%	3	4,9%	5	3,1%

CONCLUSION

The development of a national school of living-related kidney transplantation made it possible to achieve an earlier normalization of the main clinical and biochemical parameters ($P < 0.05-0.001$) and thereby improve the early postoperative indicators of normal functional activity of the graft at the time of discharge from 90.2% (in the comparison group) to 94.9% (in the main group).

DECLARATIONS

Acknowledgements

This work was supported by Republican specialized scientific-practical medical center of surgery named after academician V.Vakhidov, Tashkent, Uzbekistan

Authors' contributions

All authors contributed equally to this work.

Competing interests

The authors declare that they have no competing interests.

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