

Demographic characteristics of Turkish kidney donors and the impact of donor-recipient relationship on postoperative outcomes: A single-center experience

Türk böbrek donörlerinin demografik özellikleri ve alıcı ile verici akrabalık ilişkisinin postoperatif parametrelere etkisi: Tek merkez deneyimi

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Özet

Amaç: Son Dönem Böbrek Yetmezliği (SDBY) hastalarına uygulanabilecek en etkili tedavi yöntemi böbrek transplantasyonudur (KTx). Canlı vericiden yapılan böbrek nakilleri, tamamen sağlıklı bir insanın ameliyata dahil edilmesi nedeniyle özellikli bir cerrahidir. Biz de bu retrospektif çalışmada, donör nefrektomi (DNx) yapılan Türk donörlerde, verici ile akrabalık derecesinin postoperatif sonuçlara etkisini araştırmayı amaçladık.

Gereç ve Yöntemler: Çalışmaya sol DNx yapılan toplam 297 hasta dahil edildi. Çalışmaya dahil edilen hastalar verici ile akrabalık derecelerine göre 6 ayrı gruba ayrılarak istatistiksel değerlendirmeye tabi tutuldu : böbrek vericisi anneler olan 69 DNx vakası grup-1'e, babalar olan 29 vaka grup-2'ye, eşlerden yapılan 70 donör nefrektomi vakası grup-3'e, kardeşlerden yapılan 68 vaka grup-4'e, çocuklardan yapılan 31 vaka grup-5'e ve 2. derece ve daha uzak akrabalarından yapılan 30 DNx vakası grup-6'ya dahil edildi. Hastalara ait yaş, cinsiyet, eğitim seviyesi, operasyon süresi (ST), postoperatif 1. gün Vizüel Analog Skala (VAS) ağrı skoru, hastanede yatış süresi ve Quality of Life (QoL) verileri retrospektif incelenerek kaydedildi.

Bulgular: Donörlerin akrabalık derecesine göre dağılımına bakıldığında, donör nefrektomi operasyonunun en sık eşlere (%23.57), annelere (%23.23) ve kardeşlere (%22.9) uygulandığı görülmektedir. Donörlerin %59.26'sının kadın olduğu ve çoğunluğunun (%67.68) orta öğrenim ve üzeri bir eğitim seviyesine sahip olduğu saptanmıştır. Gruplar arasında VAS skorları, hastanede kalış sü-

Abstract

Objective: Kidney transplantation (KTx) is the most effective treatment option for patients with end-stage renal disease (ESRD). Live donor kidney transplantation is unique as it involves healthy individuals who undergo a major surgery. This retrospective study seeks to investigate the effect of donor-recipient relationship on postoperative outcomes in Turkish donors undergoing laparoscopic donor nephrectomy (DNx).

Material and Methods: The study was conducted with a total of 297 patients who underwent left DNx. The patients included in the study were divided into six different groups based on the degree of relationship with the recipients: Sixty-nine cases of DNx involved mothers as kidney donors classified into group-1, 29 cases involving fathers into group-2, 70 cases involving spouses into group-3, 68 cases involving siblings into group-4, 31 cases involving children into group-5, and 30 cases involving second-degree and more distant relatives into group-6. Patients' data including age, sex, education level, duration of surgery (ST), Visual Analog Scale (VAS) pain score at postoperative day 1, length of hospital stay (HS), and Quality of Life (QoL) were retrospectively analyzed and recorded.

Results: The groups had significant differences in terms of VAS scores, HS, and QoL-MS. Posthoc analysis was performed to find out which groups had significant differences. Results showed that group-1 had significantly lower VAS scores than group-2, group-3, and group-6. HS was significantly long in group-3 and group-6. QoL-MS

The study was approved by Ethics Committee of University of Health and Sciences Bakırköy Dr.Sadi Konuk Training and Research Hospital (Approval No: 2023-01-35, Date: 2022/11/04). All research was performed in accordance with relevant guidelines/regulations, and informed consent was obtained from all participants.

resi ve QoL-Mental Skor açısından anlamlı farklılık izlenmiştir.

Sonuç: Canlı böbrek donörlerinin alıcı ile akrabalık dereceleri, postoperatif erken dönemde psikolojik sağlıkları üzerinde etkili olmakta ve muhtemelen bu yolla da VAS skorlarını ve hastanede kalış sürelerini etkilemektedir. Böbrek donasyon sürecinden en az etkilenen vericilerin anneler olduğu söylenebilir.

Anahtar Kelimeler: böbrek; transplantasyon; canlı böbrek donörü; alıcı-verici akrabalık derecesi

was significantly lower in group-2 and group-6 than the other groups.

Conclusion: The degree of relationship of living kidney donors to recipients influences their psychological health in the early postoperative period and probably affects VAS scores and length of hospital stay. It can be argued that mothers are the group of donors least affected by the kidney donation process.

Keywords: kidney; transplantation; live donor; donor-recipient relationship

INTRODUCTION

Kidney transplantation (KTx) is the most effective treatment option for patients with end-stage renal disease (ESRD). KTx relieves ESRD patients of both the psychological and socioeconomic burden of dialysis. However, living-donor kidney transplant surgery involves not only recipients but also donors as a group of patients. Patients undergoing donor nephrectomy have two healthy kidneys, usually have no major health problems and do not benefit functionally from the surgery they choose to undergo. In most cases, these patients volunteer to donate their organ for a close family member.

Experiences with patients undergoing nephrectomy show that patients undergoing donor nephrectomy (DNx) may have a different postoperative psychological state compared to patients undergoing nephrectomy for a disease (nonfunctioning kidney, tumor, etc.). These differences cause patients to perceive usual postoperative processes differently and feel anxiety, have more need for analgesics and longer hospital stays. Some studies have shown the impact of surgery on patients' psychological state as well as the effect of patients' emotional state on surgery and postoperative outcomes (1,2).

In 2020, 2,494 kidney transplants were performed in 78 centers in Turkey, making this the second most common transplantation after bone marrow transplant (3). More than 80% of kidney transplants in Turkey are performed using organs from living donors, and this means that it is crucial to investigate how living donors perceive the transplantation process and how their degree of relationship with the recipient affects this perception.

This retrospective study sought to investigate the effect of donor-recipient relationship on postoperative outcomes in Turkish donors undergoing DNx.

MATERIAL AND METHODS

This study was conducted in accordance with the principles of the Declaration of Helsinki and was approved by the local ethics committee (İstanbul Gelişim University, 2023-01-35). It involved a retrospective evaluation of patients' data.

The data of 353 patients who underwent DNx between January 2016 and December 2021 in our center was reviewed retrospectively. Patients were excluded if they were unrelated to the recipient, underwent DNx for paired transplantation, were foreign nationals, did not have sufficient data for statistical analysis, failed to present for regular follow-up examinations, or if their data were not readily available. Thus, the study was conducted with a total of 297 patients who underwent left DNx. The patients included in the study were divided into six different groups based on the degree of relationship with the recipients and statistically evaluated. Sixty-nine cases of DNx involved mothers as kidney donors classified into group-1, 29 cases involving fathers into group-2, 70 cases involving spouses into group-3, 68 cases involving siblings into group-4, 31 cases involving children into group-5, and 30 cases involving second-degree and more distant relatives into group-6.

Patients' data including age, sex, education level, duration of surgery (ST), Visual Analog Scale (VAS) pain score at postoperative day 1, length of hospital stay (HS), and Quality of Life (QoL) were retrospectively analyzed and recorded. ST was defined as the time from establishing pneumoperitoneum to extraction of graft. QoL scores were evaluated using "the medical outcomes study short form-12 (SF-12)," which was routinely administered for patients who presented for follow-up at week one. Patients' physical (QoL-PS) and mental (QoL-MS) scores were evaluated separately (4,5).

Surgical technique : In our center, all donor nephrectomies were performed by a single surgeon with the full laparoscopic donor nephrectomy technique. Before nephrectomy, a 7-8 cm Pfannenstiel incision was prepared for graft extraction while the patient was in the supine position. The patient was then placed in lateral decubitus position for laparoscopic nephrectomy. LDN were performed through three subcostal 5mm laparoscopy ports. After completion of donor nephrectomy, a 12 mm port was inserted through the opening at the end of the previously prepared Pfannenstiel incision, and the renal arteries and vein were severed separately with laparoscopic vascular staplers advanced through the 12mm port. The Pfannenstiel incision was opened completely including the peritoneum and the graft was extracted. The extraction incision was sutured subcuticularly after the layers were properly closed. The port entrance holes were also sutured subcuticularly.

Statistical Analysis

Statistical analyses were performed using the software SPSS version 25.0. Variables were analyzed for normality of distribution using histogram plots and the Kolmogorov–Smirnov test. Descriptive analyses were presented using mean, standard deviation, median and IQR values. Non-normally distributed (nonparametric)

variables were analyzed using the Kruskal–Wallis Test for comparisons of more than two groups, and using the Mann–Whitney U Test for comparisons between two groups. Statistical significance was set at $p < 0.05$.

RESULTS

Table-1 shows the demographic characteristics of the patients. Distribution of donors by degree of relationship shows that donor nephrectomy was most commonly performed on spouses (23.57%), mothers (23.23%), and siblings (22.9%). 59.26% of the donors were female and the majority (67.68%) had secondary education and above.

Table-2 presents the distribution of demographic characteristic by groups. Since the groups were composed of participants with different degrees of relationship, demographic characteristics were not statistically analyzed for comparison purposes.

Table-3 presents data relating to DNx surgery. The groups had significant differences in terms of VAS scores, HS, and QoL-MS. Posthoc analysis was performed to find out which groups had significant differences. Results showed that group-1 had significantly lower VAS scores than group-2, group-3, and group-6 (Figure-1). HS was significantly long in group-3 and group-6 (Figure-2). QoL-MS was significantly lower in group-2 and group-6 than the other groups (Figure-3).

Table 1. Patients' demographic data.

		n	%
Groups	Group-1	69	(23,2)
	Group-2	29	(9,7)
	Group-3	70	(23,5)
	Group-4	68	(22,9)
	Group-5	31	(10,4)
	Group-6	30	(10,1)
Sex	Male	121	(40,7)
	Female	176	(59,2)
Education	No	36	(12,1)
	Primary	60	(20,2)
	Secondary	155	(52,1)
	High school	46	(15,4)
Age	Mean±SD	48,4±12,8	
	Median (IQR)	48 (38-59)	

SD: Standard deviation, IQR: Interquartile Range

Table-2. Demographic data by groups.

	n	Group-1		Group-2		Group-3		Group-4		Group-5		Group-6	
		%	n	%	n	%	n	%	n	%	n	%	
Sex	Male			29	(100,0)	25	(35,7)	40	(58,8)	10	(32,2)	17	(56,6)
	Female	69	(100,0)			45	(64,2)	28	(41,1)	21	(67,7)	13	(43,3)
Edu.	No	15	(21,7)	5	(17,2)	7	(10,0)	4	(5,8)			5	(16,6)
	Primary	27	(39,1)	5	(17,2)	14	(20,0)	8	(11,7)	2	(6,4)	4	(13,3)
	Secondary	21	(30,4)	15	(51,7)	38	(54,2)	45	(66,1)	20	(64,5)	16	(53,3)
	High school	6	(8,7)	4	(13,7)	11	(15,7)	11	(16,1)	9	(29,0)	5	(16,6)
Age	Mean±SD	58,2±9,5		54,6±10,2		49,3±11,2		42,5±10,9		34,4±8,2		46,1±11,7	
	Median (IQR)	60 (51-64)		55 (48-60)		50 (39-57)		40 (35,5-47,5)		35 (28-40)		43,5 (35-56)	

SD: Standard deviation, Edu:Education, IQR: Interquartile Range

Table 3. Data relating to the surgery

		Group-1	Group-2	Group-3	Group-4	Group-5	Group-6	p
		ST	Mean±SD	42,2±5,7	41,6±4,9	42,2±5,1	42,2±5	
	Median (IQR)	42 (38-46)	42 (38-44)	42 (38-46)	42 (38-45,5)	44 (40-46)	44 (40-45)	
VAS	Mean±SD	3±1,4	5,1±1,6	3,8±1,3	3,5±1,5	3,5±1,3	4,8±1,9	<0,001
	Median (IQR)	3 (2-4)	5 (4-6)	4 (3-5)	3 (2-5)	4 (3-4)	5,5 (3-6)	
HS	Mean±SD	1,3±0,5	1,4±0,6	1,7±0,9	1,2±0,5	1,3±0,5	1,7±0,7	<0,001
	Median (IQR)	1 (1-2)	1 (1-2)	1 (1-2)	1 (1-1)	1 (1-2)	2 (1-2)	
QoL-PS	Mean±SD	51,5±7,9	51,4±8,8	48,6±9,8	48±10,8	48,9±10,6	49,3±10,1	0,708
	Median (IQR)	55,9 (46,1-56,4)	55,9 (54,8-56,4)	54,8 (43,5-56,4)	54,8 (43,5-56,4)	54,8 (43,5-56,4)	55,9 (36,8-56,4)	
QoL-MS	Mean±SD	56±9,4	43,6±15,3	51,2±13,6	53±12,6	54±11,8	41,2±13,8	<0,001
	Median (IQR)	58,9 (55,9-59,8)	37,9 (33,2-59,8)	57,9 (46,1-59,8)	58,4 (51,1-60,8)	58,9 (55,9-60,8)	37,9 (33,2-55,9)	

SD: Standard deviation, IQR: Interquartile Range, ST: Surgery time, VAS: Visual analog scale,

HS: Length of hospital stay, QoL-PS: Quality of life-physical score, QoL-MS: Quality of life-mental score

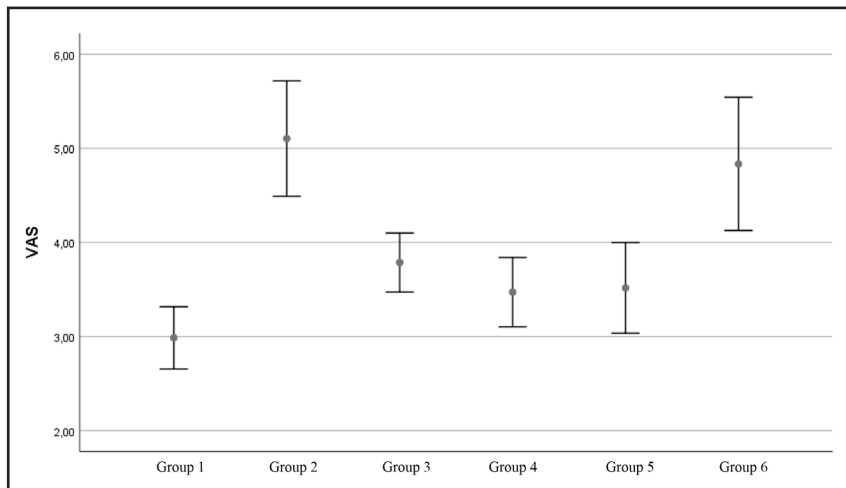


Figure 1. Visual Analog Scale (VAS) scores by groups

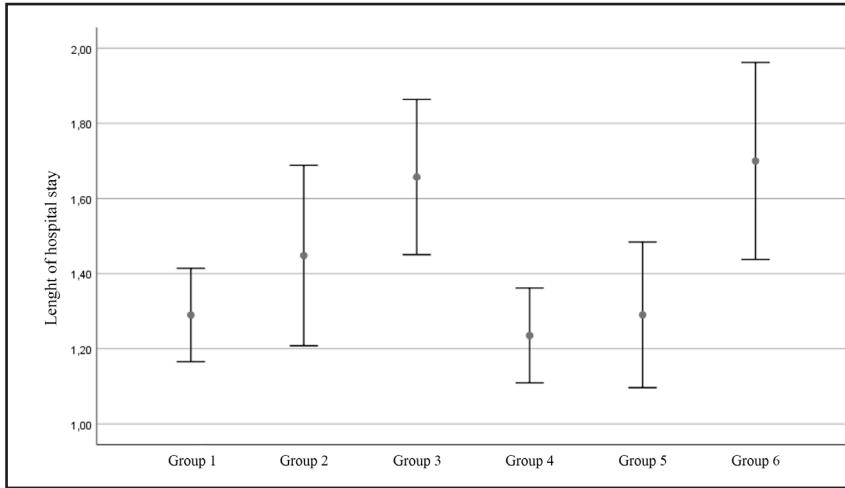


Figure 2. Length of hospital stay by groups.

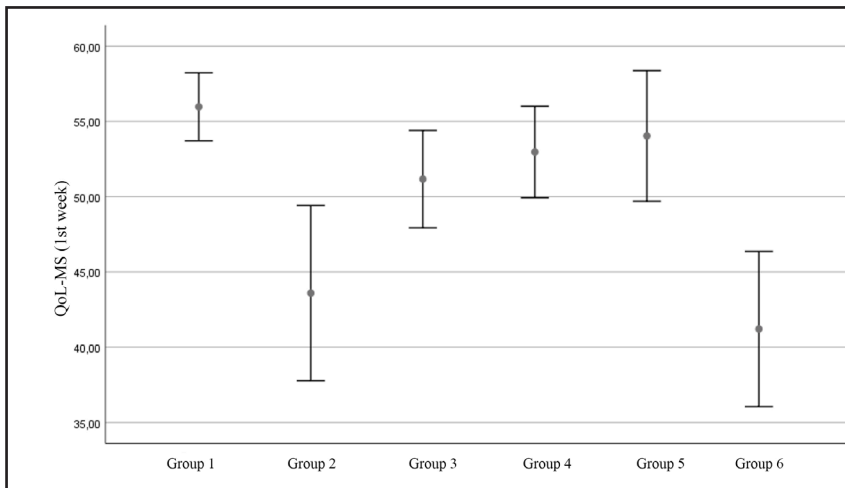


Figure 3. Quality of Life-Mental Scores (QoL-MS) by groups

DISCUSSION

Distribution of the living kidney donors based on relation to recipients in this study shows that spouses ranked first as donors with 23.57%, followed by mothers (23.23%) and siblings (22.90%). These data are in sharp contrast with previous studies. Messersmith et al. reported that most donors were siblings (41%), followed by parents (18%), while spouses ranked fourth with 8.9% (6). Similarly, Frade et al. also reported that most donors were siblings with 62.5%, followed by parents with 34.4% (7). The differences in the distribution of donors' biological relationship to recipients in previous studies may be due to various factors such as sociocultural characteristics, concept

of family, education level, or income status, which vary across societies. As for education level, most kidney donors in our study were high school graduates (secondary education) with 52.1%. It is extremely difficult to make comparisons on this parameter as countries have vastly different levels of education and national education systems. For example, a US-based study reported that more than 97% of kidney donors had a high school diploma or higher (6).

KTx contributes to the physical and psychosocial capacity of the patient with ESRD in the postoperative period and thus improves the QoL and life expectancy (8,9). Due to the low rate of cadaveric kidney transplantation in Turkey, living organ donation is

mostly used in kidney transplantation. This requires paying attention to the problems experienced by both kidney donors and recipients in the postoperative period. When postoperative care and monitoring focuses solely on assessing organic changes due to the surgery, it may lead to a disregard of the psychosocial changes that the organ donor may experience during and after the donation process. Understanding whether the degree of relationship with the recipient might affect potential negative outcomes is crucial, and can help prepare donors for the donation process in the preoperative period. Rodrigue et al. investigated this subject and showed that patients who were concerned about their future kidney health before donation remained concerned after donation as well (10).

A large number of studies have been conducted on the mood changes and QoL of living kidney donors in the postoperative period. The dominant view in most studies is that donors experience no adverse physical effects. However, studies have reported different results in terms of the psychosocial effects associated with the donation process (7,11,12,12,13,14,15,16). We believe that studies should focus not only on the psychosocial problems that kidney donors may experience during the rest of their lives, but also on the association of these problems with donor–recipient relationship. Our study found no difference between the groups in terms of QoL-PS, which is in line with the literature; whereas, QoL-MS was significantly lower in group-2 and group-6. Although limitations in our data prevent any comparisons with preoperative values, the low QoL-MS in group-2 may be explained by fathers' concern of incompetence related to their status in the family and society. On the other hand, donors in group-6, unlike other groups, did not have a homogeneous degree of relationship to recipients, and this makes it difficult to comment on the association of donor–recipient relationship with low QoL-MS scores in group-6. However, one possible explanation is that a more distant degree of donor–recipient relationship may be causing donors to have a decreased sense of psychological comfort associated with donating a kidney.

Another issue worth mentioning is the sex distribution of kidney donors. In our series, the

majority of kidney donors were women (59.26% vs. 40.74%), which is consistent with previous studies. An article investigating this subject put forward a number of reasons why living kidney donors are predominantly women. These reasons include in particular psychosocial and economic factors (17). Overall, it is known that mothers outnumber fathers, wives outnumber husbands, and daughters outnumber sons as living kidney donors (18). Our study found similar results. Our observations led us to think that this is due to the socioeconomic status of men in Turkish society. Men have the primary role in providing for the family, especially in terms of livelihood in Turkish society, and this may be the main reason why men are reluctant to become kidney donors. Some studies have revealed that kidney donation led to a financial loss and this loss was more prominent in donors with low household income (19, 20). Musol et al. evaluated the role of gender in living kidney donation and reported that women related to recipients considered kidney donation as a natural process and donated organs with an optimistic attitude and disregard for their own health. The same study emphasized that wives considered kidney donation as a way to avoid assuming the role of caregiver for their husbands and to protect their children (21).

VAS scores at postoperative day one in our study were significantly lower in group-1. The highest VAS score was in group-2. QoL-MS comparison between groups showed that group-1 also has the highest QoL-MS score. These data suggest that mothers are less affected by the kidney donation process in psychological terms. Lower VAS scores without any difference in QoL-PS scores may be explained by better psychological motivation of the mothers. Our clinical observations suggest that mothers donate kidneys with a more altruistic approach.

Finally, the length of hospital stay was significantly long in group-3 and group-6. We often observe that spouses donating a kidney are reluctant to be discharged for concerns over own care while their spouses are hospitalized or in order to spend more time with their spouses. This is likely to be reflected in the statistical analysis. On the other hand, the group composed of

distant relatives had long hospital stays, combined with high VAS scores and low QoL-MS values, which can be attributed to the concerns of these patients over their overall health.

In general, it can be said that the lowest VAS score after donor nephrectomy is observed in mothers, the shortest hospital stay in siblings, and the lowest QoL-MS score in fathers and distant relatives. The main limitation of this study is its retrospective design. Being a single-center study and focusing on early postoperative parameters can be counted as other limitations.

CONCLUSION

The degree of relationship of living kidney donors to recipients influences their psychological health in the early postoperative period and probably affects VAS scores and length of hospital stay. It can be argued that mothers are the group of donors least affected by the kidney donation process. In the preoperative period, donors should be evaluated for these aspects and, if necessary, referred to psychological support, which may help prevent potential negative outcomes in the postoperative period.

Conflict of Interest

The authors declare to have no conflicts of interest.

Financial Disclosure

The authors declared that this study has received no financial support.

Informed Consent

Informed consent was obtained from all individual participants included in the study.

Ethical Approval

The study was approved by University of Health and Sciences Bakırköy Dr.Sadi Konuk Training and Research Hospital Clinical Research Ethics Committee (Approval Number: 2023-01-35, Date: 2022/11/04) and written informed consent was received from all participants. The study protocol conformed to the ethical guidelines of the Helsinki Declaration.

Author Contributions

Conception and design; Açıköz O, Altinel M, Data acquisition; Açıköz O, Altinel M, Data analysis and interpretation; Altinel M, Drafting the manuscript; Açıköz O, Critical revision of the manuscript for scientific and factual content; Açıköz O, Statistical analysis; Açıköz O, Altinel M, Supervision; Açıköz O, Altinel M.

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