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CONNECTION OF EARLY COMPLICATIONS AFTER KIDNEY TRANSPLANTATION WITH THE GENDER OF THE RECIPIENT AND THE DONOR

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Abstract. *The frequency of vascular complications after kidney transplantation is low, but if they happen they present a great danger to the outcome of the transplantation. Renal artery thrombosis or renal vein thrombosis, as well as different types of hemorrhages can significantly jeopardize the outcome of the transplantation including the loss of the graft or mortality of the recipient. The aim of this research was to determine the connection between the frequency of early vascular complications and the gender of the recipient and the donor. The research was performed on the sample of 43 patients who underwent a kidney transplantation at the Clinic of Vascular Surgery, Clinical Centre in Niš within the period from 2009 to 2012. The difference in the representation of vascular complication between genders of the recipients (p=1) and the donors (p = 0.61) was not statistically significant. According to the results of this study, it can be concluded that the gender of the recipient and the donor is not connected to the frequency of the early vascular complications after a kidney transplantation*.

Key words: *Early vascular complications, gender, kidney transplantation*

Introduction

The frequency of vascular complications after kidney transplantation is low but if they happen they present a great danger to the outcome of the transplantation [1]. Renal artery thrombosis or renal vein thrombosis, as well as different types of hemorrhages can significantly jeopardize the outcome of the transplantation including the loss of the graft or lethality of the recipient [2]. Besides the perfection of the surgical technique, numerous vascular complications occur due to technical mistakes [3, 4].

One must also have in mind that the following illnesses of recipients in kidney transplantation are connected with some technical circumstances. Factors of comorbidity include hyper and hypocoagulable conditions, circulation paths, endothelial damage and immunosuppression [5]. The studies show that renal vein thrombosis occurs in the direct post-transplant period, usually during the first 10 days, with the presented frequency of 0.5% to 6% [6].

There are no literature data which show the connection of the gender of the recipient and the donor with early vascular complication after a kidney transplant. Starting from the assumption that the patients with a transplanted kidney stand for a high risk for developing early vascular complications, the aim of this research is to determine a connection of the frequency of early vascular complication in relation to the gender of the recipients and the donors.

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Patients and Methods

In the clinical prospective study, all patients who underwent a kidney transplantation at the Clinic of Vascular Surgery of the Clinical Centre of Niš were analysed during the period from 2009 to 2012.

The test group of patients

Patients were divided into two groups according to the type of donor:

Group A – patients who have undergone a kidney transplantation from a live related donor,
Group B – patients who have undergone a kidney transplantation from a cadaver.

Patients are divided in relation to the gender.

Early vascular complications were monitored (< 30 days after the transplantation): renal artery thrombosis; renal vein thrombosis and hemorrhage.

All the necessary data about previously mentioned test groups and vascular complications are obtained by the insight into the medical documentation of the patients (anamnesis, diagnostic procedures, surgical results, medical records and histopathological results).

Diagnostic protocol of the patients

The evaluation of live related donors was conducted on the basis of the standard diagnostic protocol of the Transplantation Center. According to the protocol, the following is necessary: complete CBC, erythrocyte sedimentation rate, basic biochemical analysis of blood,

coagulation status, haematological examination, urine sedimentation rate, urine culture, bacteriological examination, virological examination, mycological analysis, radiological examination—native ray of lungs and heart, native ray of urinary tract, intravenous pyelogram, renal arteriography, isotopic tests, blood and tissue typing, cardiorespiratory evaluation.

In all cadaveric donors, before donor nephrectomy, the following conditions had to be met: 1) period of hypotension is not longer that 30 minutes, 2) hourly diuresis is not larger than 30ml, 3) period from intubation and catheterization is not longer than 24 hours, 4) serum values of the urea and creatinin are normal.

All potential recipients were at the chronic program of hemodialysis. Evaluation and preparation for transplantations were conducted in accordance with the standard diagnostic protocol of the Center for Transplantation.

Surgical technique

The unique surgical technique for all cadaveric donors meant transperitoneal en bloc binephrectomy. Kidney preservation after donor nephrectomy was conducted by cold continuous perfusion of some of the standard perfusion solution (*Collins*, *Euro-Collins*, *Wisconsin*). Preservation of kidneys obtained from live donors was conducted *ex situ*, while preservation of kidneys obtained from cadavers was performed *in situ*. For revascularization of the graft the standard arterial anastomosis was represented by end-to-terminal anastomosis of the internal iliac with the renal artery of the graft. Termino-lateral anastomosis of the renal with the external iliac vein stood for the standard vein anastomosis. For reconstruction of the urinary tract, extraversical ureterocystoneostomy *Lich-Gregoir* was applied as a standard. In some cases where it was not possible to do an implementation of the graft by applying the aforementioned standard surgical procedures, some reconstructive urological and vascular surgical techniques were applied. According to the protocol of immunosuppressive therapy for all recipients, triple therapy which consists of cyclosporine, azathioprine and prednisone was applied. Recently, instead of azathioprine MMF has been used. During postoperative course, all patients were under constant surgical and nephrological control. By continuous monitoring of the subjective status of the patients, laboratory and clinical results, as well as by applying noninvasive and invasive extra diagnostic methods, an early diagnostics of early vascular and urological complications was conducted. For timely and adequate care of vascular and urological complications, adequate therapeutic procedures were applied.

Monitoring of the patients

Monitoring was available for all patients. The protocol of postoperative monitoring included everyday monitoring of the vital parameters, basic biochemical analysis and CBC, coagulation screening, general examination of urine, echo Doppler sonography of the allograft during the first 15 days of the postoperative period. In cases where there was a suspicion of graft rejection, a percutaneous biopsy of the graft was performed.

Monitoring was consultative with the participation of a nephrologist, urologist and vascular surgeon.

Statistical analysis

The data were analyzed by using commercial statistical The data were analyzed by using commercial statistical programs (SPSS® for Windows, v. 9.0, Chicago, USA). For comparing nonparametric data chi-square test and Fisher's exact test were used depending on the number and characteristics of features. Student's t test was used to compare parametric data if there was a normality distribution, or Mann-Whitney U test if there was no normal distribution of data. The results were presented in values ±/SD. Value $p \leq 0.05$ is considered to be statistically significant.

Results

The research was conducted on the sample of 43 patients who underwent a kidney transplant at the Clinic of Vascular Surgery of the Clinical Center in Niš during the period from 2009 to 2012. The gender structure of the recipients and donors is shown in Table 1.

Table 1. Gender structure of the recipients and donors

Parameter	Group A		Group B		Total	
	number	%	number	%	number	%
Recipients						
Male	20	55.56	3	42.86	23	55.56
Female	16	44.44	4	57.14	20	44.44
Donors						
Male	19	52.78	4	57.14	23	55.56
Female	17	47.22	3	42.86	20	44.44

NS for all parameters

The gender distribution of recipients and donors in the study group was uniform. Out of the total number of transplants, 23 transplants (53.5%) were performed on male recipients and donors and 20 transplants (46.5%) on female recipients and donors. There was no statistically significant difference between the genders in the studied groups. The age structure of the recipients is shown in Table 2.

Table 2. Age (years) structure of the recipients

Parameter	number	%	Min	Max	$\overline{X}$	SD
Group A	36	83.72	19	57	39.31	9.33
Group B	7	16.28	24	66	44.43	17.09
Total	43	100.0	19	66	40.14	10.86

p = 0.467

In relation to the total number of patients, the average age of recipients was 40.14 years, with a standard deviation of 10.86 years. The youngest recipient was 19 years old, while the oldest was 66 years. Although the average age of recipients in group B was 5.12 years higher compared to the group A, statistically significant difference between the surveyed groups was not found (p=0.467). The vascular complications in relation to the type of donors are shown in Table 3.

Table 3. Vascular complications in relation to the type of donors

Parameter	Group A		Group B		Total	
	N	%	N	%	N	%
Yes	3	8.33	1	14.29	4	9.30
No	33	91.67	6	85.71	39	90.70
Total	36	100.0	7	100.0	43	100.0

p=0.523

A total of 7 (9.3%) patients had vascular complications. There was no statistically significant relationship between groups A and B (p =0.523) for the development of early vascular complications after surgery.

The share of vascular complications in relation to the gender of the recipients is shown in Figure 1.

Observed in relation to the gender of the recipients, vascular complications occurred in 2 (8.7%) cases in males and in 2 (10%) cases in females. The difference in the representation of vascular complications between the genders was not significant (p=1).

The share of vascular complications in relation to the gender of the donors is shown in Figure 2.

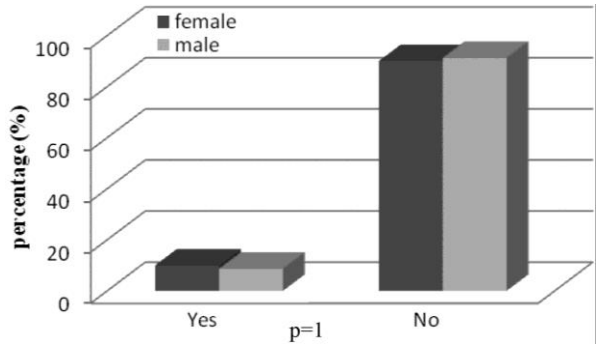

Fig. 1. Gender structure of the recipients

Observed in relation to the gender, vascular complications occurred in 3 (13.04%) cases in males and in 1 (5%) case in females. The difference in representation of vascular complications in relation to the gender of the donor is not statistically important (p = 0.61).

From total number of 43 donors, 23 (53.5 %) of them were male, while 20 (46.5 %) of them were female in which case there was no statistically significant difference between the genders.

The share of vascular complication in relation to the gender of the recipients is shown in the Figure 3.

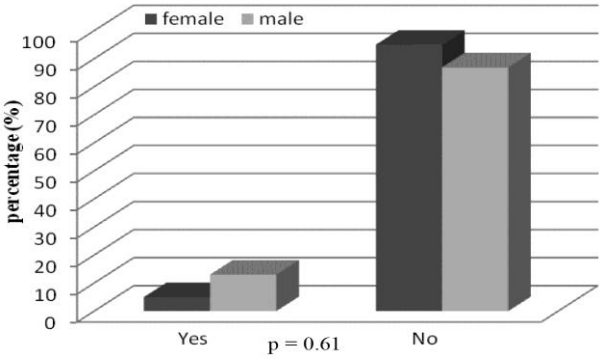

Fig. 2. Gender structure of the donors

Discussion

There are very few literature data concerning the vascular complications of kidney transplant, depending on the type of donor. Basically, all described complications are related to all of the transplanted patients, regardless of the type of donor [7]. Therefore, it is useful to consider these complications of kidney transplants from living donors and from cadavers, given the conceptual and technical differences between these two types of transplants, as well as the impact of these complications on the outcome of the procedure. The importance of the origin of the graft for certain vascular complications and the outcome of the transplant can be established by defining these complications in relation to the type of donor, as well as in relation to the applied surgical technique of implantation [8].

The benefits of transplantation from living donors include: biologically and physiologically adequate kidney, rapid social rehabilitation and reducing the number of recipients who would be waiting for cadaveric organ [9]. In our research 7 (9.3%) patients had vascular complications. Results of the research indicate the absence of statistically significant disparities between living donor and cadaveric (p =0.523) as a factor in the emergence of early vascular complications.

The average age of recipients of cadaveric group was higher by 5.12 years compared to group A. The results show that no statistically significant difference between groups of living donors and cadavers (p=0.467). Previously conducted research has shown that early transplanted vascular complications occur more frequently in kidney recipients aged 40 years and donors older than 60 years [10].

Literature data on the connection between the age of the recipient and the donor with the length of survival of the graft are different. Graft survival was longer in recipients younger than 17 years and it decreases exponentially with the age of the patient, so that the shortest was in recipients older than 60 years [11]. Research by Alexander et al. [12] showed that there was no difference in the survival of the graft donor of 56–65 years in relation to donors older than 65 years of age. At the same time donors older than 56 years had a graft survival of 10–14% less than the donor of age group16–45 years. These data indicate that donors older than 55 years had decreased renal function and detailed investigations in the selection of donors of this age has to be done [13].

There are numerous attempts to examine the influence of the gender on the outcome of the transplantation. In our examined series, male recipients were present with 53.5% and they were more numerous than female recipients who were present with 46.5%. Literature states that live donors are younger and more often female, while cadaveric donors are older and more often male [14]. In our series, live female donors were present with 53%, whereas live male donors are present with 47%. The study conducted in China shows that males and younger persons are the most common recipients, while females and middle-aged persons are the most common donors. The most common combination of live donor was mother donor son recipient [14].

In relation to the gender, vascular complications occurred in 8.7% of the cases in males and in 10% in females; there was no statistically important difference between genders (p=1). Considering the gender of the donor, vascular complications occurred in 13.04% of the cases in males and in 5% in females. The difference in representation of vascular complications in relation to the gender of the donors was also statistically insignificant (p = 0.61).

Some researches showed that there are no differences in the survival of the graft depending on the donors' gender despite the increased frequency of preformed lymphocytotoxic antibodies in female recipients [15]. Later analysis showed that the donor's gender does not affect the early postoperative outcome, but the survival of male recipients who have had the graft implanted from a female donor is shorter [16].

It is interesting that when parents are recipients of the graft from their children, there is a considerably better survival of the graft in mothers than in fathers. Some studies also showed that the survival of the graft from a male donor is longer that from a female donor [11]. The stated difference in survival increases if the donor is older than 30 years old and if cyclosporine is used in therapy. One of the possible explanations is that the nephron mass of the graft from a female donor is smaller [15].

Abou-Jaoude et al. [17] have analysed annual functionality of the graft and survival in gender combinations between donors and recipients; thus recipients and donors were divided into 4 groups: male donor- male recipient, male donor-female recipient, female donor-male recipient and female donor-female recipient. The best function of the graft was obtained in the group male donor-female recipient, while the rate of annual survival was the same in all groups [17]. On the other hand, the study by Kolonko et al. [18] showed that the combination female donor-male recipient shows a great possibility of losing the graft in 5 years. The study by McGee et al. [19] showed that in the combination of male donor-female recipient, the body mass index influences the graft survival time. Larger body mass index from male donor in relation to female recipient represents a favorable relationship [19]. Influence of metabolic parameters on the survival of the graft is more expressed in male recipients in relation to female recipients [20].

By the analysis of functional transplanted kidneys five years after surgeries Tent et al. [21] showed that there is no crucial difference between male and female donors. Transplanted kidneys adapted completely to the functional needs of the recipients regardless of their body mass index and gender [21].

It is necessary to remark that this is the first research which deals with interconnections of recipients and donors' gender with the frequency of early vascular complications. Further researches should be directed at examining the types of early vascular complications with the mentioned factors, as well as the interconnections of gender and systemic factors with the type of vascular complications.

Conclusion

The gender of the recipient is not connected with the frequency of early vascular complications after kidney transplantation.

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