

CARDIOVASCULAR AND RENAL OUTCOME OF LIVING KIDNEY DONORS ON A LONG TERM – A RETROSPECTIVE STUDY.

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ABSTRACT

Background :

Removal of one or more kidneys may result in reduced renal parenchyma and GFR. Hence it is essential to gain proper knowledge of clinical symptoms before donating the kidney. The main aim of this study is to analyze the long term renal and cardiovascular outcomes in living kidney donors.

Materials and methods:

It was a retrospective, observational study in a single center. A total of 62 living kidney donors from Darbhanga Medical College and Hospital in Laheriasarai, Bihar, from September 2022 to August 2023 were selected for this study. Their initial data (visit 0) during the time of the study to their last nephrological data (visit 1) were obtained and compared.

Results:

There was a huge drop in glomerular filtration rate which was about 28mL/min in a phase of 82±60 months. One donor underwent chronic kidney failure according to his last nephrological checkup (visit 1). There was no association between the age group and reduced glomerular filtration rate.

Conclusion:

The decrease in glomerular filtration rate as a consequence of kidney donation may cause an adverse reaction in renal and cardiovascular outcome.

Recommendation:

The age of the donor does not signify the occurring consequences and so older and healthy donor individuals are also recommended.

Keywords: Kidney donors, Nephrectomy, GFR, Cardiovascular outcome

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INTRODUCTION

Transplantation of kidney from a living donor is the alternative option for end-stage renal disease (ESRD) [1]. Kidney transplant from a living donor is considered as a quality graft and also it increases the patient rate of life rather than a kidney transplanted from a dead donor [1, 2]. Transplantation from a living donor demands a healthy person with zero gain for them and needs to be available for a volunteer surgery. However, chances of death during the process of surgery are rare and is about 0.04% of the donors and these transplantation risks are well managed and observed [2, 3]. For the living donors, kidney transplantation may result in reduced renal parenchyma and Glomerular filtration rate which in turn causes low kidney function [4].

Subsequently in few donors, association of high levels of proteinuria and increased blood pressure can also be observed after transplantation [5]. All these consequences are interlinked with high chances of cardiovascular outcomes in the donor [6]. Although many researches show that the chances of these consequences to occur in

the donors is as same as that of the whole population and so this does not make any significance with living donors [7, 8]. No confirmation of decreased survival rates in living kidney donors has been proved [9]. The main aim of this study is to analyze the long term renal and cardiovascular outcomes in living kidney donors.

MATERIALS AND METHODS

Study setting:

It was a retrospective, observational study in a single center. A total of 62 living kidney donors from Darbhanga Medical College and Hospital in Laheriasarai, Bihar, from December 2023 to September 2022 were selected for this study.

Participants

Those who gave their consent for the study were included, and those who refused to give the consent were excluded from the study.

Study population

Totally 62 living donors in which 45 (73%) were females and 17 (27%) were males. The mean age of the donors during the transplantation was 55 years for females and 53 years for males. Nearly 46% of the donors were between 50-60 years of age, 21% of donors were between 61-70 years of age, 21% of the donors were between 41 and 50 years of age, 7% of the donors were between 30-40 years of age, 2% of the donors were between 71 and 80 years of age, and 0.7% of the donors were between 20-30 years of age.

It is fascinating to observe the association of the donors and recipients: nearly 43% of the transplants were between mother and son or mother and daughter, 15% of the transplants were between husband and wife and 12% of the transplants were between siblings.

Data collection

After an overnight fasting blood and urine samples were collected from the donors for observation. The components like Urea, GFR, and creatinine are all analysed with respect to the CKD EPI formula and also blood sugar levels in fasting, 24 hours proteinuria, cholesterol, phosphorus and calcium were tested and calculated with respect to the laboratory procedures.

All these components were collected at the period of observation from the donors from visit 0 and visit 1 and both the results were compared. Analysis of vitamin D and parathyroid hormone were done during their final visit. ECG of the donors from visit 0 and visit 1 were also compared. This whole procedure also included the analysis of BMI and thorough medical conditions of the donors from visit 0 and visit 1.

The initial clinical data (visit 0) of the selected donors during the time of the study to their last nephrological data (visit 1) were obtained and compared.

Statistical analysis

The Shapiro-Wilk test of normality was used for the study of variables, the variables were denoted as mean and SD for Gaussian distribution variables and for non-Gaussian distribution they are denoted as median and range. Categorical variables are denoted as numerical and percentage. Based on the variables the analysis was done by parametric and non-parametric tests.

Ethical considerations

All the procedures with the living donors conducted in this study were of standard guidelines of the national research committee and with the 1964 Helsinki declaration. Since this was a retrospective study, informed consent from the donors is not needed.

RESULTS

According to the analysis of values the age of the donors were segregated in four equal groups of population. The age of the donors at visit 0 (at the time of the study) and visit 1 (at the last check up) are compared. The percentage of donors who were not regular the checkups were observed to increase over the period from the initial transplantation. The main characteristic of the donor was healthy and consent.

In this study among the 62 donors, about 15 donors were not available for regular follow ups which led to the analysed donor population as 47 individuals at visit 1. The comparison of scientific study of measurements and clinical data from visit 0 and visit 1 are listed in Table 1.

Table 1: Comparison of the principal anthropometric and biochemical data between visit 0 and visit 1

Variables	Visit 0	Visit 1
Age in years	53	60
BMI in kg/m ²	24.3	24.8
Creatinine in mg/dL	0.60	0.85
Urea in mg/dL	32	41
Proteinuria in mg/24 h	56	127
GFR in mL/min	97	67
Glycemia in mg/dL	90	85
Triglycerides in mg/dL	83	101

The average value of body mass index of the donors in visit 0 was 24.3 kg/m² and the average value of body mass index of the donors in visit 1 was 24.8 kg/m² and hence the value of p=0.19. The observation of donors with respect to body mass index it was known that before the period of transplantation there was one underweight individual, 19 individuals were of normal weight and 4 individuals with first class of obesity. And at visit 1 follow up the parameters altered as one underweight, 16 normal weight and 6 with first class of obesity and one with second class of obesity.

The average value of glomerular filtration rate of the donors at visit 0 was 97 mL/min and the average value of glomerular filtration rate of the donors at visit 1 was 67 mL/min and hence the value of p=0.02, so the overall fall of glomerular filtration rate was found to be 30 mL/min. A significant increase in the level of 24 hours proteinuria of the donors between the visit 0 and visit 1 was noticed. It was observed to be 56 mg/24 h during the visit 0 and the value was about 127 mg/24 h during the visit 1.

The average value of blood glucose in fasting of the donors during visit 0 was 90 mg/dL and the average value of blood glucose in fasting of the donors during visit 1 was

85 mg/dL and hence the value of $p=0.08$. The value of triglycerides of the donors during visit 0 was 83 mg/dL and the value of triglycerides of the donors during visit 1 was 101 mg/dL and hence the value of $p=0.4$. However these values have no medical significance.

The values of calcium and phosphorus in blood of the donors during visit 0 and visit 1 have no statistical and clinical significance. The principal levels of vitamin D during visit 1 were 24 ng/ml and the level of parathyroid hormone during visit 1 was 34.5 pg/ml. These observations show a good and improved metabolism.

DISCUSSION

The consciousness of interlink between decreased renal activity and high risk of cardiovascular failure creates surveillance in living kidney donors [10, 11]. It is in the hands of medical professionals to assess and report the consequences of donation to the patients and so the donors experience a phase of pre screening tests to confirm and predict the future risks [12].

The significant decrease in glomerular filtration rate in the donors following nephrectomy may be associated with a high level of proteinuria and blood pressure. To predict the exact values of glomerular filtration rate, methods like eGFRcys / mGFR can be used [13, 14]. In our study, an overall reduction of glomerular filtration rate was 30 ml/min observed in the average period of 80.5 months. And it is not possible to compare this obtained data with the general population.

The examined laboratory components denote that the donors have a good and improved metabolism with no respect to their age. However there is a decrease in glomerular filtration rate but they do not have any relationship with alterations in the levels of blood calcium and phosphorus nor with the association of high levels of PTH or a reduced levels of vitamin D. This observation shows that the living donors are not always at the risk of chronic renal disorders. Besides all these analysis and parameters, it is important to lead a healthy life with proper diet in order to prevent all the post transplant consequences and also attending the regular follow ups after the donation is equally essential [15].

Age of the donors does not have any association with the post surgery consequences and hence all age groups of donors, especially old and healthy individuals willing to donate a kidney on their own must be appreciated [16, 17]. Individual attention for every donor on pre screening before the donation is made in order to prevent any clinical errors.

CONCLUSION

Transplantation of kidney from living individuals is the best and reliable choice for ESRD (end-stage renal disease). Kidney transplant from a living donor is considered as a quality graft and also it increases the patient rate of life rather than a kidney transplanted from a dead donor. Also the donor must go through a series of complete medical checkups post donation in order to increase his quality of life.

In this study confirmation has been made that age is not associated with the reduced levels of GFR of the donors

or causes high risk of cardiovascular diseases and so living donors with increased age with good health status must not be excluded from the donation.

LIMITATIONS

The main disadvantage of the study was that there was no control group for the donors.

GENERALIZABILITY

Since a very small number of participants were included the findings of this study cannot be generalized for a bigger population.

RECOMMENDATION

The age of the donor does not signify the occurring consequences and so older and healthy donor individuals are also recommended.

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LIST OF ABBREVIATIONS

1. GFR- glomerular filtration rate
2. ESRD- end stage renal disease
3. BMI- body mass index

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CONFLICT OF INTRESTS:

The authors declare no conflict of interests.

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