http://pmjournal.ir Original Article
Spring 2019, Volume 4, Issue 13 (23-25)

Impact of diseased Donors' Serum Creatinine Level on Outcome of transplanted Kidneys: The Use of Personalized Medicine for Patient Selection

Meysam Mojtabaee [1], Fariba Ghorbani [1], Farahnaz Sadegh Beygi [1,*]

[1] Organ Procurement Unit (OPU), Lung Transplantation Research Center (LTRC), National Research Institute of Tuberculosis and Lung Diseases (NRITLD), Shahid Beheshti University of Medical Sciences (SBMU), Tehran, Iran

**Corresponding author: Farahnaz Sadegh Beigee, MD, Assistant Professor of Thoracic Surgery, Organ Procurement Unit (OPU), Lung Transplantation Research Center (LTRC), National Research Institute of Tuberculosis and Lung Diseases (NRITLD), Darabad, Niavaran, Tehran, Iran. Tel: +982127122103; E-mail: Beigeef@hotmail.com*

DOI: 10.21859/pmj04017

Submitted: 2019/01/12
Accepted: 2019/02/06

Keywords:
Serum Creatinine Level
Brain Death
Transplantation
Kidney

Abstract

Introduction: One of the possibilities is the utilize of personalized medicine, a method based on quantifiable and theoretical agents that assign the worldwide immunological hazard of refusal for each patient. Kidney transplantation is the best treatment for end-stage renal disease patients. Although the shortage of kidneys for transplantation has been addressed by expanding the criteria, transplantation teams in Iran don't have great tendency to implant marginal organs from brain death donors specially the ones with high creatinine before harvesting. The aim of this study was to evaluate the impact of brain dead donor serum creatinine (Cr) level on outcome of transplanted kidneys.

Methods: In this retrospective study, the records of 46 brain-dead donors of Masih Daneshvari organ procurement unit of Tehran, Iran were assessed. The medical file of donated 58 recipients was available. Donor demographic data (age, sex), brain death cause and the Cr level after transferring to OPU ICU were recorded. The Cr level was categorized based on ≥1.4 mg/dl with origin of prerenal azotemia or lower. The urine output of transplanted patients in the first 24 hours post-transplant, serum Cr level at discharge from hospital and dialysis during first month after transplantation were compared between two groups.

Results: The mean age of donors was 37yr and 25 (54%) were male. The cause of brain death in 16 (35%) was trauma. The donors' creatinine level at the admission to the ICU was 1.4mg/dl or higher in 20 (35%). The first 24 hours urine output did not significantly differ between donors' creatinine level lower than 1.4mg/dl or higher (5500 ± 2678ml and 4068 ± 3399ml, respectively, P=0.083). Similarly the recipient discharge serum Cr level did not significantly differ between two groups (1.69 ± 0.97 and 1.74 ± 1.34 mg/dl, respectively, P=0.887). Overall 8 recipients (14%) needed dialysis during first month after transplantation and there was no significant difference between groups (11% and 20%, respectively, P = 0.320).

Conclusions: Findings of this preliminary study showed that the outcome of transplanted kidneys from brain-dead donors with Cr level >=1.4mg/dl is similar to other patients. So, higher creatinine level is not a good excuse for rejecting the kidneys for transplantation. Because of various confounding factors in the assessment of transplanted kidney outcome, the future studies with larger sample size and longer follow-up period is recommended.

INTRODUCTION

Kidney transplantation is the best accepted treatment for end-stage renal disease patients [1]. The average staying time in kidney transplantation waiting list in Iran is different in different transplantation centers and different regions but is definitely less than many countries due to high usage of kidneys from living donors 4 years in Germany and 5 years in Italy [1-4]. This long waiting time is leading many transplantation teams worldwide to use marginal kidneys. But transplantation teams in Iran don't have great tendency to implant marginal kidneys from brain dead donors and prefer to use the living donor kidneys instead [2]. Therefore, the aim of this study was to evaluate the impact of brain dead donor prerenal azotemia defined by serum creatinine (Cr) level on outcome of transplanted kidneys.

METHODS

In this retrospective study, the records of 46 brain-dead donors of Masih Daneshvari organ procurement unit of Tehran, Iran were assessed. Donor demographic data (age, sex), brain death cause and the Cr level after transferring to OPU ICU were recorded. Patients were divided to two groups according to brain dead serum creatinine level of ≥ 1.4 with the origin of prerenal azotemia or < 1.4 mg/dl .The urine output of transplanted patients in the first 24 hours post-transplant, serum Cr level at discharge from hospital and dialysis during first month after transplantation and the time interval between transplantation and discharge were compared between two groups.

Definitions

According to the OPTN definition an expanded criteria or marginal donor was defined as a donor older than 60 years or older than 50 years with at least a couple of the following three criteria: creatinine > 1.5 mg/dl, history of hypertension and /or CVA as the cause of death. Because of lower staying time in waiting list in our country we defined marginal donors with prerenal azotemia and creatinine level > 1.4

Statistical Analysis

On collected data, descriptive analysis with consideration to central and deviational factors was done by SPSS 16, then further analysis of qualitative and quantitative variables were done by T-test, chi square and Leven's Tests.

RESULTS

The mean and SD of donors age was 37yr (37±29) and 25 (54%) patients were male. The cause of brain death in 16 (35%) was trauma and in 42 (65%) were other causes (cerebral artery aneurysm, anoxia, hypertension crisis, drug toxicity and other causes). The first 24 hours urine output did not significantly differ between donors' creatinine level lower than 1.4mg/dl or higher (5500 ± 2678ml and 4068 ± 3399ml, respectively, P=0.083). Similarly the recipient discharge serum Cr level did not significantly differ between two groups (1.69 ± 0.97 and 1.74 ± 1.34 mg/dl, respectively, P=0.887). Overall 8 recipients (14%) needed dialysis during first month after transplantation and there was no significant difference between groups (11% and 20%, respectively, P=0.320) (Table 1).

Table 1: OPTN Criteria Defining Expanded Criteria Donor (7)

Donor condition	Donor age catagories (years)				
	<10	10-39	40-49	50-59	≥60
CVA+HTN+Creat>1.5				×	×
CVA+HTN				×	×
CVA+Creat>1.5				×	×
HTN+Creat>1.5				×	×
CVA					×
HTN					×
Creatinine>1.5					×
None of the above					×

Source: OPEN

CVA= cerebrovascular accident was cause of death

HTN= history of hypertension

Creat > 1.5 = creatinine > 1.5 mg/dL

DISCUSSION

The use of the tools of personalized medicine could play a role in the assessment of patients for renal transplant by quantifying the different risk factors specific to these patients [5]. Findings of this preliminary study showed that the outcome of transplanted kidneys from brain-dead donors with Cr level >=1.4mg/dl caused by prerenal azotemia is similar to other patients. There are approximately 18,500 ESRD patients in Iran which is expected to get twice by 10 years. And 2000-3000 kidneys are implanted each year (2242 in 2011) mostly from living donors and 26-33 % from brain dead donors. In the last couple of years organ donation from deceased donors has been improving due to improved social awareness resulting in decrease of organ usage from

living donors. The average staying time in waiting list is 4 months to 1 year in different parts of the country in comparison to longer period in many countries such as 4 years in Germany [1] and 5 years in Italy [2]. Because of this facts transplant teams in Iran are not so interested in using marginal kidneys despite the reports suggesting acceptable results from using them in comparison to dialysis costs and risks and lower life expectancy [6-9]. However the definition of marginal kidneys has been differently stated and acceptable criteria for defining these kidneys has been controversial. In many countries creatinine level greater than 2.5 mg/dl [2] or greater than 3 mg/dl [10] is considered as the criteria of marginal donor and many other donor factors such as high age, history of diabetes and hypertension, long cold ischemia time, use of high dose inotropic drugs or renal vascular lesions and surgical diseases [4]) are considered for a donor to be labeled marginal .but our main point in our study is that these so called criteria are regarding to small donor pool and major kidney shortage in these countries. In Iranian organ procurement units (OPUs) some potential donors with above criteria are rejected to be a kidney donor .In this study we showed comparable short term results of transplanting the kidneys of brain dead donors who have had higher or lower than 1.4 mg/dl creatinine level.

CONCLUSIONS

Findings of this preliminary study showed that the outcome of transplanted kidneys from brain-dead donors with Cr level >=1.4 mg/dl caused by prerenal azotemia is similar to other patients with lower creatinine. So, transplantation teams in Iran could rely on marginal kidneys. Because of various confounding factors in the assessment of transplanted kidney outcome, the future studies with larger sample size and longer follow-up period is recommended.

Conflict of Interest

None.

REFERENCES

1. Heuer M, Zeiger A, Kaiser GM, Mathe Z, Goldenberg A, Sauerland S, et al. Use of marginal organs in kidney transplantation for marginal recipients: too close to the margins of safety? Eur J Med Res. 2010;15(1):31-4. pmid: 20159669
2. Veroux P, Puliatti C, Veroux M, Cappello D, Macarone M, Puliatti D, et al. Kidney transplantation from marginal donors. Transplant Proc. 2004;36(3):497-8. doi: 10.1016/j.transproceed.2004.02.012 pmid: 15110570
3. Major RW. Paying kidney donors: time to follow Iran? Mcgill J Med. 2008;11(1):67-9. pmid: 18523518
4. Hu XP, Yin H, Zhang XD. Evaluation and treatment of marginal grafts with surgical diseases in kidney transplantation. Chin Med J (Engl). 2012;125(3):461-4. pmid: 22490403
5. Dion-Labrie M, Fortin MC, Hebert MJ, Doucet H. The use of personalized medicine for patient selection for renal transplantation: physicians' views on the clinical and ethical implications. BMC Med Ethics. 2010;11:5. doi: 10.1186/1472-6939-11-5 pmid: 20380726
6. Gambino G, Gioviale MC, Maione C, Di Bona A, Buffa D, Virzi C, et al. Use of marginal donors in kidney transplantation: our experience. Transplant Proc. 2006;38(4):999-1000. doi: 10.1016/j.transproceed.2006.02.148 pmid: 16757243
7. Friedersdorff F, Roller C, Klein G, Werthemann P, Cash H, Budde K, et al. Outcome of expanded criteria donor kidneys that were transplanted at other Eurotransplant centers after being rejected by our institution. World J Urol. 2013;31(4):947-52. doi: 10.1007/s00345-012-0929-7 pmid: 22903774
8. Maciel R, Deboni L, Guterres J, Vieira JA, da Luz Filho HA, Rost CA. Renal transplant with marginal donor kidneys. Transplant Proc. 2003;35(3):1071. doi: 10.1016/s0041-1345(03)00311-7 pmid: 12947861
9. Kim YH, Jung JH, Song KB, Chung YS, Park JB, Cho YM, et al. Adult dual kidney transplantations obtained from marginal donors: two case reports. Transplant Proc. 2012;44(1):57-9. doi: 10.1016/j.transproceed.2011.11.062 pmid: 22310578
10. Chen CH, Hsu KH, Yang CR, Cheng CH, Wu MJ, Lian JD. The impact of donor serum creatinine level on long-term outcome of renal allografts. Transplant Proc. 2000;32(7):1595-6. doi: 10.1016/s0041-1345(00)01566-9 pmid: 11119852