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ORIGINAL ARTICLE

Impact of obesity on urologic complications among unrelated living donor kidney transplants

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Abstract

Purpose Although obesity has been associated with improved survival on dialysis, its effects on renal transplantation outcomes remain unclear. Herein we aimed to evaluate the effect of obesity on posttransplantation complications.

Patients and methods A retrospective analysis of consecutive renal transplant recipients from an unrelated living donors was undertaken from 2006 to 2008.

Results We included 180 patients, 34 (18%) were obese (body mass index >30 kg/m²) and 146 were lean. Obese patients were more likely to develop renal artery stenosis (17.6% vs 2.8%, $p < 0.001$), hematoma (47.9% vs 17.6%, $p = 0.009$), wound complications (64.7% vs 9.6%, $P < 0.001$) and renal vein thrombosis (2% vs 0%, $p < 0.001$). Urologic complications consisting ureteral, ureteropelvic and ureterovesicular junction stenosis, wound bleeding, urinary leakage and renal artery thrombosis and also hospitalization time were found similar between the two groups. 2 year patients and graft survival were not statistically different.

Conclusions Renal transplantation could be performed with reasonable urologic complications in obese patients

Keywords Obesity · Urologic complications · Renal transplantation

Introduction

The prevalence of obesity in patients with end-stage renal disease (ESRD) is increasing rapidly [1, 2]. In 2003, 60% of the renal transplant candidates in the United States were either obese or overweight [3]. Kidney transplantation, in contradistinction to dialysis, improves the quality of life and adds years of life to patients with end-stage renal disease (ESRD) [4–6]. Although obesity has been associated with improved survival on dialysis in comparison to nonobese patients, but its effects on renal transplant outcomes remain unclear. Urinary complications are common following renal transplantation. Some authors report that the outcomes for obese kidney transplant recipients are inferior to those of non-obese recipients [7–13] whereas others report no difference in outcomes [14–17]. This may be related in part to selection of the study populations, but most reports do not differentiate between obese patients (BMI between 25 and 30 kg/m²) and morbidly obese patients (BMI > 35 kg/m²). The World Health Organization (WHO) classification of obesity is determined by the body mass index (BMI), which is defined as weight in kilograms (kg) divided by height in meters squared (m²). Using this calculation, a BMI of 18.5–24.9 kg/m² represents normal weight, a BMI of 25–29.9 kg/m² represents overweight, and a BMI greater than 30 kg/m² represents obesity. Obesity affects at least 20% of the adult population in developed

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countries and its incidence is continuing to increase [18]. The aim of this study is to evaluate the impact of recipients obesity on urologic complications in unrelated living donor kidney transplants.

Patients and methods

An analytic file was created from the United Network for Organ Sharing (UNOS) Standard Transplant and Research (STAR) files based on OPTN data as of July 16, 2004. We identified all patients over 15 years old who underwent open nephrectomy unrelated living donor kidney transplantation from April 2006 to January 2008. Exclusion criteria included multiorgan transplantation or a history of prior renal transplantation and age <15 years old, leaving a total of 180 persons classified as non-obese (lean) or obese. End to-end arterial anastomosis was performed between renal transplanted artery and the internal iliac artery. The renal vein was anastomosed to external iliac vein with an End-to-side anastomosis. The ureters were anastomosed by using anterior Lich technique and stenting was carried out in all ureters which were removed after two weeks. A triple immunosuppressive protocol therapy including Cyclosporine, Mycophenolate Mefetil, and Prednisolone was administered for all recipients.

The patients were followed for two years. In the database information was stored about recipient age and sex, donor age and sex, vascular complications, lymphocele, haemorrhage, urinary leakage and ureteral stenosis, wound complications (infections and dehiscences), delayed graft function (DGF); (defined as the need for dialysis in the first week after renal transplantation) and BMI at the time of transplantation.

Statistical analysis

Data were shown as means \pm SD. Graft survival was evaluated by the Kaplan–Meier method. Univariate comparison

between Kaplan–Meier curves of the two groups was evaluated by Breslow statistics and log rank analysis. The statistical significance of differences between proportions was determined by chi-square analysis with Yates correction. Significance was defined as $p < 0.05$.

Results

During 2-year period between April 2006 and January 2008, among 180 patients underwent transplantation in this historical cohort, 34 (18%) were obese (body mass index [BMI] > 30 kg/m²) and 146 (82%) were non-obese (body mass index [BMI] < 30 kg/m²). The mean BMI in the lean and obese recipients were 26.4 kg/m² (range 18.2–29.4) and 32.7 kg/m² (30.3–34.8), respectively. There were 70 women (39%) and 110 men (61%) underwent renal transplantation. Mean age of recipients and donors were 39.8 \pm 14.9 (ranged 15 to 77) and 29.3 \pm 6.2 years old (ranged 21 to 34), respectively. All of our living kidney donors were HLA-mismatched unrelated donors. Patients' demographic characteristics are shown in Table 1. Older recipients were related to experience more risk for renal artery stenosis and hematoma ($p = 0.002$ and 0.03 respectively). Obese patients were more likely to experience renal artery stenosis (RAS) (17.6% vs 2.8%, $P < 0.001$). Logistic regression model showed a significant difference for the evaluation of BMI as a risk factor for hematoma (17.6% vs 48%, $p = 0.009$) and wound complications (64.7% vs 9.6%, $p < 0.001$) also there were a significant difference of renal vein thrombosis (RVT) between obese (2%) and non-obese group in which none of the patients had renal vein thrombosis ($p < 0.05$). As demonstrated in Table 2 there were no significant differences between the two groups with respect to DGF, ureteropelvic obstruction, UVJ obstruction, wound bleeding and urinary leakage, renal artery thrombosis and hospitalization time ($p = \text{No significant}$). During 2-year follow up no deaths had been observed in recipients. Graft survival rate in the obese patients was not significantly lower than that in lean kidney recipients (94.1% vs 96.7%; $P = .42$)

Table 1 Baseline characteristics of overweight (body mass index >30kg/m² at the time of transplantation) and non-overweight renal transplant recipients

BMI		
Demographic factors	[BMI] > 30 kg/m ²	[BMI] < 30 kg/m ²
Total	34 (18%)	146 (82%)
Sex (%)		
Male	17 (50%)	93 (63.7%)
Female	17 (50%)	53 (36.7%)
Age \pm SD (yr) (age range)	45.2 \pm 5.4 (40.2–50.2)	38.6 \pm 4 (38.2–41)
Hypertention	8 (23.5%)	30 (20.5%)

Table 2 Univariate analysis of recipient BMI and post-operative graft outcome

	[BMI]> 30 kg/m ²	[BMI]< 30 kg/m ²
Renal artery stenosis (%)	17.6%	2.8%*
Hematoma (%)	48%	17.6%**
Wound complications (%)	64.7%	9.6%*
Renal vein thrombosis	2%	0%***
Wound bleeding	0%	0%
UVJ obstruction	0%	0%
urinary leakage	2.9%	0.7%
renal artery thrombosis	2.9%	0%
Ureteropelvic obstruction	3(8.8%)	11(7.5%)
DGF	3(8.8%)	10(6.8%)
2-year patients survival	100%	100%
2-year Graft survival	94.1%	96.7%
Hospitalization time (day)	18.2 ± 3.6 (14–23)	15.1 ± 2.3(12–19)

UVJ, Ureterovesical Junction

*p< 0.001 vs. overweight

**p= 0.009 vs. overweight

***p< 0.05 vs. overweight

Discussion

During last two decades the prevalence of obese patients undergoing renal transplantation has more than doubled, while about 60% of patients currently on the waiting list for a transplant are obese [3].

The impact of recipient obesity on patient and graft survival is controversial; Some reports described BMI as a putative independent risk factor for patient mortality and graft failure independent of patient death after renal transplantation [19]. Some investigators have demonstrated no association between obesity and adverse graft survival, despite the increased risk among obese recipients for wound infections and DGF [12–16].

We observed a significant association between body mass index and the surgical renal transplant outcomes, especially vascular complications, such as renal artery stenosis, renal vein thrombosis and hematoma in the current analysis involving 180 adult Iranian patients followed at a single center study. Apart from mentioned surgical complications which were related to vascular complications, obesity was not associated with short or long term post transplant urologic complications such as ureter obstruction, ureteropelvic obstruction, UVJ obstruction, bleeding and leakage, renal artery thrombosis or increase in hospitalization time as like as D. Singh et al, detected no association between obesity with major short or long term posttransplant complications but obese patients were more likely to remain in hospital after transplantation [20]. Our findings showed obese recipients were prone to experience wound complications (infection and dehiscence) which were similar to Johnson et al. [21] who have reported increase in wound complications. In their retrospective study hospitalization time were also similar between the

two groups which were in concordance with our results. Kasiske and colleagues reported age, African-American race, Hispanic ethnicity, male donor, increasing human leukocyte antigen (HLA) mismatches, HCV infection, BMI greater than 30 kg/m², and tacrolimus as the initial maintenance immunosuppressive drug could be proposed as risk factors for post transplant diabetes mellitus (PTDM) after transplantation [22]. Immunosuppressive drugs have an important role in the development of PTDM. The authors recommended a less diabetogenic immunosuppressive protocol, especially for older recipients [23].

Recently an experience in our center by Savaj et al, have described an Overall of 19.2% recipients developed PTDM during 24 posttransplant months [23]. In the mentioned study recipient's weight and gender, the donor's age and gender were not the risk factors of PTDM in our previous study. The 5-year patient and graft survival rates were not significantly different between the kidney recipients with and without PTDM [23].

Obesity itself is a risk factor for cardiovascular disease in the general population and it would be possible that pretransplant obesity might result in reduced patient survival by association with cardiovascular death. The effect of pretransplant obesity on patient survival is conflicting. studies have shown a significant difference in patient survival but on the other hand some studies have shown no difference [24, 25].

Herein we did not detect significant differences in either patient and graft survival rates or DGF in obese and non obese recipients. Similarly, Merion et al. [15] described greater incidence of wound infections in obese populations while other parameters including the patients and graft survival rates were the same. Similar findings were also observed by Drafts et al. [16]. On the other hand some have

revealed association between obesity and posttransplant complications containing, graft survival [19], urological complication and DGF [26]. This disparity might be caused by improvement in patient management and transplant outcomes over the time. Herein we did not sub analyze recipients with morbid obesity (BMI > 35 kg/m²) and we did not investigate the incidence of PTDM or cardiovascular complications and comorbidities which could be limitations of our study. According to Marks et al kidney transplantation can be performed for morbidly obese patients safely with patient and graft survival time similar to nonobese recipients, at least for the first 3 post-transplant years [25]. Although higher BMI is associated with a survival advantage on dialysis, it is revealed that kidney transplantation provides obese patients a survival advantage over dialysis as reported by Glanton et al. [6] and Marks et al. [27].

Conclusions

Obesity is not considered as contra-indication for renal transplantation and renal transplantation could be performed with reasonable urologic complications in obese patients with acceptable transplantation complications and graft survival in comparison with non obese patients.

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