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Graft and Patient Outcomes of Kidney Transplant Tourism: A Single-Center Experience

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Abstract

Background The supply-demand mismatch between organ donor and patient waiting for transplant has led to the growth of transplant tourism. This type of transplant is considered unethical and illegal, as it is usually performed in poor environments and carries a higher risk of infectious, vascular, and immunological complications.

Methods In this single-centered retrospective cohort study, we compared patients who underwent transplant tourism to patients who were transplanted locally and followed up in our hospital from January 2015 to December 2018.

Result A total of 254 local transplants and 60 patients from the transplant tourism group were included. Transplant tourism recipients were younger otherwise both groups were similar in gender, body mass index, diabetes, and hypertension. Recipients in the transplant tourism group had a significantly higher rate of delayed graft function (18.3% vs. 6.3%, p 0.005), acute rejection (40% vs. 7.9%, $p < 0.001$), and higher posttransplant infection in general. With more urological complications and higher graft failure at 3-years' follow-up (11.7% vs. 0.8%, $p < 0.001$).

Conclusion Transplant tourism is associated with a higher risk of infection and poor graft outcomes. Extra efforts are required to cut down transplant tourism by educating patients about its clinical risk and ethical considerations. In addition, measures to increase the number of deceased donor pool to provide a better alternative options for patients are essential.

Keywords
- kidney transplantation
- transplant tourism
- commercial transplant
- posttransplant complications
- graft survival

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Background

Renal transplantation is the treatment of choice for patients with end-stage renal disease (ESRD). It is associated with better quality of life and patient survival when compared with other renal replacement modalities, such as hemodialysis and peritoneal dialysis[1–3] The major factor limiting transplantation is the expanding supply-demand mismatch between organs available for transplantation and patients on need which leads to the prolonged waiting time for kidney transplantation.[4] In Saudi Arabia, the prevalence of ESRD treated by dialysis is estimated to be 604 cases/per million people . Currently, there are more than 20,000 patients on dialysis and around 6,000 Saudi patients awaiting kidney transplantation. While the number of patients starting dialysis is increasing, the number of deceased donors per year remained relatively steady, it is around 110 to 140 cases per year over the last few years.[5,6] Consequently, the organ shortage has led to the growth of transplant tourism in which donors are financially compensated.[7–9] This type of transplant has been defined according to the Declaration of Istanbul as "a policy or practice in which an organ is treated as a commodity, including by being bought or sold or used for material gain."[10] The World Health Organization has estimated that 5 to 10% of organ transplants performed annually take place in the context of transplant tourism.[8] Due to its illegal nature, it is usually performed in poor environments, lacking infection control practices, and prior immunological screening. Therefore, this kind of procedure carries a higher risk of infectious, vascular, and immunological complications.[11–14]

In this retrospective study, we describe the characteristics and posttransplantation outcomes of patients who sought a transplant abroad and then returned to be followed at King AbdulAziz Medical City (KAMC), Riyadh, Saudi Arabia. Our objective is to increase awareness regarding the risks and challenges of transplant tourism and to compare the rate of posttransplant medical and surgical complications between tourist and local transplant groups.

Materials and Methods

A single-centered retrospective cohort study comparing patients who underwent commercial transplant (transplant tourism group) to patients who underwent kidney transplant in our hospital (local transplant group). We included all the patients who underwent renal transplants and followed up in KAMC for at least 1-year posttransplant between January 2015 and December 2018. We excluded patients younger than 14 years old as they are being followed with pediatric nephrologist in our hospital, patient who present in another local hospital first before following with us, and patients who did not complete 1-year follow-up in our hospital. Data were collected from patients' electronic medical records (BESTcare). Extracted data include patients' demographics, country and date of transplantation, induction and immunosuppression therapy received, and posttransplant medical and surgical complications such as graft rejection, infections including viral, wound dehiscence, urine leak, lymphocele, and hematomas. Graft function was assessed by reviewing serial serum creatinine levels over first year posttransplantation.

Statistical Analysis

All data were analyzed using IBM SPSS statistics software (version 24.0) (SPSS Inc.; Chicago, Illinois, United States). Continuous variables were reported as mean ± standard deviation. Comparison between groups was assessed by unpaired *t*-test or Mann–Whitney test. Categorical variables were presented as numbers and percentages and analyzed using the chi-square or Fisher's exact tests as appropriate. All reported *p*-values are two-sided, and *p*-value less than 0.05 was considered statistically significant.

Results

A total of 314 kidney recipients were included in this study, 254 patients had kidney transplant at our center and 60 patients received kidney transplant abroad. Baseline characteristics of transplant recipients are shown in ►Table 1. Transplant tourists were younger aged than local recipients. There was no significant difference at other variables such as gender, body mass index (BMI), diabetes, hypertension, history of coronary artery disease, and smoking. There was no difference in the cause of kidney failure and duration of dialysis between the two groups. Almost all transplant tourism recipients received kidney from living donors (98.2%) whereas the living donors were 76.1% in the local group. More than half of the transplant tourism group lack the induction information. Surgical details, donor data, and discharge summaries were available for only a minority of transplant tourism group.

Graft outcomes are shown in ►Table 2. Recipients in the transplant tourism group had a significantly higher rate of delayed graft function (DGF) (18.3% vs. 6.3%, $p = 0.005$). The acute rejection rate was significantly higher within the first year in the transplant tourism group compared with the local group (40% vs. 7.9%, $p < 0.001$). Serum creatinine at 1 week, 1, 6, and 12 months were significantly lower in the local group ($p < 0.001$). The short-term outcomes, 1 year graft, and patient survival were similar between the two groups. However, the long-term graft survival, at 3-year follow-up, was significantly lower among the transplant tourism group.

Posttransplant complications are outlined in ►Table 3. Generally, most posttransplant complications were higher in the transplant tourism. Compared with the local recipients, transplant tourism recipients had statistically significant higher rates of surgical wound infection (16.7% vs. 2.0%, $p < 0.001$) and wound dehiscence ($p = 0.023$). Urinary tract infection incidence was also significantly higher in the transplant tourism group (56.7% vs. 31.1, $p < 0.001$). Cytomegalovirus (CMV) viremia was the highest finding among complications with 38 patients (63.30%) and 139 patients (54.70%) in the transplant tourism and local groups, respectively. BK viremia was numerically higher among transplant tourism recipients as well (26.7% vs. 16.10%, $p = 0.064$). There was a tendency to see more urological complications among

Table 1 Baseline characteristics

Characteristic	Total	Tourism	Local	*p*-Value
N	314	60	254	
Age	45.2 ± 15.0	40.6 ± 12.4	46.3 ± 15.3	0.003
Gender				
Female	129	20	109	0.192
	41.10%	33.30%	42.90%	
Male	185	40	145	
	58.90%	66.70%	57.10%	
BMI	27.2 ± 5.3	27.5 ± 5.1	27.2 ± 5.4	0.694
Smoking				
Never	269	47	222	0.182
	85.70%	78.30%	87.40%	
Smoker	38	11	27	
	12.10%	18.30%	10.60%	
Ex-smoker	7	2	5	
	2.20%	3.30%	2.00%	
DM	81	9	72	0.034
	25.90%	15.00%	28.50%	
HTN	247	45	202	0.484
	78.70%	75.00%	79.50%	
CAD	33	4	29	0.354
	10.50%	6.70%	11.40%	
Cause of KF				
Unknown	111	25	86	0.292
	35.40%	41.70%	33.90%	
GN	61	12	49	
	19.40%	20.00%	19.30%	
DM	73	10	63	
	23.20%	16.70%	24.80%	
HTN	43	5	38	
	13.70%	8.30%	15.00%	
Urological	19	6	13	
	6.10%	10.00%	5.10%	
Cystic	7	2	5	
	2.20%	3.30%	2.00%	
Duration of HD	2.2 ± 2.2	2.1 ± 1.7	2.3 ± 2.3	0.639
Graft type				
Living	246	55	191	< 0.001
	80.10%	98.20%	76.10%	
Deceased	61	1	60	
	19.90%	1.80%	23.90%	
Previous Tx	14	1	13	0.321
	4.50%	1.70%	5.10%	
Surgical details	253	3	250	< 0.001

Table 1 (*Continued*)

Characteristic	Total	Tourism	Local	*p*-Value
	80.80%	5.00%	98.80%	
Donor data	254	1	253	< 0.001
	81.20%	1.70%	100.00%	
Discharge summary	266	13	253	< 0.001
	85.30%	22.00%	100.00%	
Induction				
ATG	149	15	134	< 0.001
	48.10%	25.00%	53.60%	
Basilixmab	127	11	116	
	41.00%	18.30%	46.40%	
Unknown	34	34	0	
	11.00%	56.70%	0.00%	
Maintenance therapy				
Prednisolone	100%	100%	100%	
Mycophenolate	309	55	254	< 0.001
	98.40%	91.70%	100.00%	
Tacrolimus	309	55	254	0.006
	99.00%	94.80%	100.00%	
Cyclosporine	8	5	3	0.007
	2.60%	8.60%	1.20%	

Abbreviations: ATG, anti-thymocyte globulin; BMI, body mass index; CAD, coronary artery disease; DM, diabetes mellitus; GN, glomerulonephritis; HD, hemodialysis; HTN, hypertension; KF, kidney failure.

tourists; however, it did not reach statistical significance. One patient in the transplant tourism group required nephrectomy for fungal infection.

Discussion

Transplant tourism has been condemned by the international community because it presents a considerable risk for the donors and recipients outcome in addition to utilizing organ for buying, selling, and/or trafficking which make transplant tourism one of the most lucrative illegal practices worldwide.[15] The number of this illegal transplant is still increasing despite the measures taken by many countries to stop such practice since the Declaration of Istanbul.[16] This is because of the steadily expanding shortage for organs required to meet the demands.[17] Transplant tourism is associated with poor clinical outcome for both recipients and donors in additions to major ethical concerns.[18–20]

In our study, both local recipients and transplant tourist were similar in most of the demographic cofounding variables such as BMI, diabetes, hypertension, history of coronary artery disease, smoking, and the cause of kidney disease. Although the patients in the transplant tourism group tended to be younger and received organs from living donor, their outcomes were worse than the local group. Such findings may reflect the increased morbidities from transplant tourism that counterbalanced the advantage of being young recipients of living organ donation. Many previous retrospective studies have addressed the clinical and surgical outcomes of transplant tourism; however, the results are contradicting.[21–23] AlBugami et al compared 86 renal transplant tourists to 365 matched cohort of local renal transplant recipients and showed worse outcome of transplant tourism as compared with the local recipients. In this study, 1-year graft and patient survivals were significantly lower among tourists compared with locals (87.2% vs. 98.0%, $p < 0.001$ and 90.7% vs. 98.0%, $p < 0.001$, respectively). Tourists had a significantly higher rate of acute cellular rejection (19.8% vs. 7.1%, $p < 0.001$), and they sustained significantly higher rates of serious viral, bacterial, and fungal infections compared with the locals.[9] In another study from Saudi Arabia, Alghamdi et al reported a higher rate of acute rejection in transplant tourists in the first year compared with local transplantation (27.9% vs. 9.9, $p > 0.005$), higher mean creatinine at 6 months and 1 year (120 vs. 101 umol/L, $p > 0.0007$, 113 vs. 98 umol/L, $p > 0.008$). There was no statistical difference in graft or patient survival in 1 or 2 years after transplantation. Morad and Lim reported the outcome of 515 patients transplanted tourist and found that patient and graft survival were more than 90%.[23] Gill et al in University of California, Los Angeles showed that patient and graft survival were not statistically different; however,

Table 2 Graft and patient outcomes

Characteristic *(N)*	Total	Tourism	Local	*p*-Value
DGF	27	11	16	0.005
	8.60%	18.30%	6.30%	
1st year rejection	44	24	20	< 0.001
	14.00%	40.00%	7.90%	
Creatinine				
1 wk	136.9 + 118.1	198.0 ± 149.4	122.4 ± 104.7	< 0.001
1 mo	107.1 ± 44.5	134.9 ± 56.6	100.5 ± 38.5	< 0.001
6 mo	102.1 ± 41.5	131.9 ± 59.9	95.0 ± 32.1	< 0.001
12 mo	99.6 ± 53.3	131.9 ± 90.1	91.9 ± 36.2	0.001
Graft failure				
During 1st year	3	2	1	0.096
	1.00%	3.30%	0.40%	
Three years	9	7	2	< 0.001
	2.90%	11.70%	0.80%	
Mortality				
During 1st year	0	0	0	
	0%	0%	0%	
Three years	1	1	0	0.193
	0.30%	1.70%	0.00%	

Abbreviation: DGF, delayed graft function.

Table 3 Posttransplant complications

Characteristic *(N)*	Total	Tourism	Local	*p*-Value
Wound infection	15	10	5	< 0.001
	4.80%	16.70%	2.00%	
Wound dehiscence	4	3	1	0.023
	1.30%	5.00%	0.40%	
Collection	34	5	29	0.645
	10.80%	8.30%	11.40%	
Vascular complication	4	1	3	1
	1.30%	1.70%	1.20%	
Urinary leak	6	2	4	0.6
	1.90%	3.30%	1.60%	
UTI	113	34	79	< 0.001
	36.00%	56.70%	31.10%	
NODAT	15	1	14	0.319
	4.80%	1.70%	5.50%	
Hepatitis	4	2	2	0.167
	1.30%	3.30%	0.80%	
Bacteremia	12	3	9	0.706
	3.80%	5.00%	3.50%	
Fungal	0	0	0	

Table 3 (*Continued*)

Characteristic *(N)*	Total	Tourism	Local	*p*-Value
	0%	0%	0%	
CMV viremia	177	38	139	0.249
	56.40%	63.30%	54.70%	
BK viremia	57	16	41	0.064
	18.20%	26.70%	16.10%	
Nephrectomy	1	1	0	0.191
	0.30%	1.70%	0.00%	

Abbreviations: CMV, cytomegalovirus; NODAT, new-onset diabetes after transplantation; UTI, urinary tract infection.

there was a higher complication rate in the transplant tourist group.[24] In our study, we found transplant tourist had a significantly higher rate of DGF defined by requirement of dialysis in first week posttransplant (18.3% vs. 6.3%, $p = 0.005$) and significantly higher rate of acute rejection within the first year (40% vs. 7.9%, $p < 0.001$). Higher serum creatinine at 1 week, 1, 6, and 12 months were significantly lower in the local group ($p < 0.001$). The overall 1-year graft and patient survivals are almost similar in both group but at 3-year follow-up there was more graft failure in the transplant tourism group (11.7% vs. 0.8%, $p < 0.001$). The higher rate of DGF in tourist group despite having transplant mainly from living donor may result from poor surgical technique, prolonged cold ischemia time, or due to the higher rate of acute rejection which mainly results from poor matching and inadequate human leukocyte antigen testing in tourist group, lack of induction therapy in large number of returning patients, and using an unappropriated maintenance regimen. Most of transplant tourism recipients present early to our hospital and rejection treated in early stages resulting in similar 1-year graft survival between the two groups.

In our study, transplant tourist has statistically higher rates of infections such as surgical wound infection, urinary tract infection, CMV, and BK viremia. This is in line with the findings of previous studies which show higher rate of infections in transplant tourist.[8,9,25,26] The higher rates of infections among transplant tourism recipients may be related to inadequate pre- and posttransplant hygiene, poor sanitation in the operation room, lack of antimicrobial prophylaxis, and unclear process of the kidney donor evaluation to prevent donor-derived infections. BK viremia may result from the intensive immunosuppressive therapy given to treat acute rejection after presentation to our hospital. Beside infectious complication we found higher rate of urological complications such as urine leak. The increased surgical complications may have resulted from poor surgical technique and early removal of Foley catheter in the second or third postoperative day without educating the patient about proper bladder emptying.

Most of the transplant tourist present to our hospital with poor documentation. There is no surgical report, no donor tissue typing, no crossmatch result, and no donor-related data such as donor age, kidney function profile, and donor serology status. In addition, most of the time there are no information about induction and maintenance therapy. Absence of this crucial data makes the posttransplant management of such patients very challenging.

The ethical issues are far more complicated and beyond the scope of this study but extra efforts should be done to reduce transplant tourism such as expanding donor pool to reduce the organ shortage and achieve national self-sufficiency in transplant organs. Educating patient about the risks of transplant tourism at short and long term is essential.

Our study has many limitations, it is a retrospective observational study with a small number of transplant tourist and short follow-up period. Furthermore, we have no data about transplant tourism patients who died abroad or lost their graft immediately and never presented to our center. However, our study adds to the existing literature signaling to the increased risk of morbidity, and possibly the mortality, resulting from transplant tourism.

In conclusion, transplant tourism is associated with a worse posttransplantation course with a higher rate of acute rejection, poor graft survival, and increased severity of infectious complications after transplantation. Transplant tourism is a risky option for patients who are awaiting kidney transplantation, and a lot of effort should be done to stop this type of transplantation by educating patients about its clinical risks and ethical consideration. In addition, implementing strategies to expand the deceased donor pool is essential to reduce waiting time for transplantations.

Ethical Approval

This study was approved by King Abdullah International Medical Research Center ethical committee with memo ref. no. IRBC/1751/20.

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None.

Conflict of Interest

None declared.

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