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Research Article

Single-Center Experience in Kidney Transplantation: A Retrospective Cohort Study

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ABSTRACT

Objective: Renal transplantation has become the optimal treatment for patients with End-Stage Renal Disease (ESRD). Renal transplant recipients had a greater survival rate, better quality of life and reduced costs when compared to long-term dialysis in ESRD patients. Owing to these results, the demand for renal transplantation has increased over time. In this study, we aimed to share our experience in kidney transplantation by presenting the data of kidney transplants performed in Al-Assad University Hospital, Damascus, kidney transplantation unit from January, 2020 to September, 2021.

Material and methods: Retrospective data was collected from archives of registries, Al-Assad University Hospital during the period from January, 2020 until late October, 2021. The demographic data were collected in addition to their follow up during hospitalization and up to one year post transplantation.

Results: Renal transplantation was performed to 101 patients among whom 14 patients dropped out of follow-up because they traveled abroad. So, our study included 87 patients from the total number of kidney transplant, 62 (71.2%) male and 25 (28.7%) female. All of the transplanted kidneys were from living donors. The donor-recipient degree of propinquity; 42 (48.2%) transplants were received from related donors and 45 (51.8%) were non-related. Patients and graft survival after 1 year was 97.7% and 93.1% respectively. 71 (81%) patients were complication-free, lymphocele was found in three (3%) patients, infections (pneumonia, urinary tract infection) during hospitalization were noted in nine (10%) patients and six (6%) patients had complications leading to graft failure (two patients were rejected, one patient had recurrent disease, two patients had renal vein thrombosis, one patient had graft infarction due to surgical complications and one patient had acute tubular necrosis). There was no statistically significant relationship between the graft survival and the length of dialysis duration pre-transplantation (p=0.851), preemptive transplant (p=0.084) and type of induction therapy (p=0.318).

Conclusion: Our experience showed that our renal transplant program has an acceptable outcome comparable to international outcome and can be successfully introduced in resource-constrained centers in developing countries.

Keywords: Graft survival, Chronic kidney disease, Glomerular filtration rate, End-stage renal disease, Kidney transplantation

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INTRODUCTION

Chronic Kidney Disease (CKD), which is defined as a reduced Glomerular Filtration Rate (GFR) (<60 ml/min/1.73 m^2 for ≥ 3 months) and/or increased urinary albumin excretion (≥ 30 mg/24 hours), is classified into 5 stages, based on the estimated GFR (eGFR). Stages 1-3 are considered as the early stages of CKD which are nearly always asymptomatic while stages 4 and 5 are classified as ESRD and are characterized by multiple complications (Eknoyan G, *et al.*, 2013).

Treatment of End-Stage Renal Disease (ESRD) imposes heavy financial burden, especially in countries with limited resources. Kidney Transplantation (KT) is the most cost-effective option among renal replacement therapy modalities and has lengthened the patient's survival and improved their quality of life (Simforoosh N, *et al.*, 2017; Babloyan S, *et al.*, 2021). Despite an initial higher risk of death, long-term survival for patients who undergo transplantation are significantly better compared with patients who are listed but remain on dialysis. A successful transplant triples the life expectancy of a listed renal failure patient (Schnuelle P, *et al.*, 1998).

In low- to middle-income countries, the majority of patients present to hospital at late stages of CKD (ESRD), when dialysis is required, adding to treatment costs (Parameswaran S, *et al.*, 2011). Since 1980, kidney transplantation in Syria has been developed to include living-related and unrelated donors. Syria has a long-standing transplant history. The 1st successful kidney transplant in Syria was performed at Harasta Hospital in Damascus in 1979. By 2019, 5407 kidney transplants had been performed (Saeed B, 2020; Saeed B, *et al.*, 2007; Saeed B, 2011). The purpose of this study is to review the protocol of kidney transplantation, donors and recipient candidates, their demographic data, etiologies of ESRD, short term outcomes of kidney transplantation in Al-Assad University Hospital, Damascus, single kidney transplantation center between 2020 and late 2021s.

MATERIALS AND METHODS

Protocol of kidney transplantation

Renal donor and recipient candidates were examined and informed about all risks and possible outcomes of the operation and preoperative consultations were obtained to ensure that the patient is suitable for a kidney transplant. Immunologic donor-recipient matching was determined by blood group, Human Leukocyte Antigen (HLA) typing, lymphocyte cross-match and Panel Reactive Antibodies (PRA). Immunologically suitable donors were evaluated by measuring renal functions, serum creatinine levels, 24 hour urine creatinine clearance and urine protein measurement (≤ 150 mg/day). Ultrasonography (USG) and Computed Tomography Angiography (CTA) were performed to investigate possible renal pathologies in donors radiologically, and to reveal vascular and ureter anatomy. Hepatitis B, C, Human Immunodeficiency Virus (HIV) and *Cytomegalovirus* (CMV) serological tests were administered to all of the renal donor and recipient candidates. The recipients were evaluated the suitability of the iliac artery and vein using preoperative Doppler Ultrasound Sonography (USG). A detailed systemic examination was performed and treatment of accompanying comorbidities and an anaesthesia plan was made accordingly.

Then, the profiles of the donor and recipient were reviewed by the responsible medical committee in our hospital and after they were given permission for the transplant; we suggested an approximate date on the waiting list for a kidney transplant. The recipients were induced with preoperative polyclonal (anti-thymocyte globulin-ATG), methylprednisolone, basiliximab or a combination according to immunological risk. For sensitized patients, we relied on a minimum of three sessions of plasma exchange along with rituximab -/+ Intravenous Immunoglobulin (IVIG) according to the clinical response and the availability of resources.

Nephrectomies in live donors were performed by open surgical methods. Left nephrectomy was performed in all patients who did not have vascular anomaly or a condition that specifically required the choice of the other kidney according to the expert opinion of the surgery team. Immediately after surgery, recipients were admitted to the kidney transplant unit with close monitoring of vital signs, urine output, volume status, drains output and laboratory tests. Drains were withdrawn on the 3rd-5th postoperative days and the urinary catheters on the 5th postoperative day.

Immunosuppressive treatment of patients who did not develop complications was regulated and they were discharged from the hospital on postoperative 8th day. Tacrolimus, Mycophenolate Mofetil (MMF) and steroid regimens were used as immunosuppressive therapy in patients. Prednisone was tapered during the 1st month post-transplant to 5 mg/day. For infection prophylaxis, trimethoprim/sulfamethoxazole and nystatin were administered for 3 months. Valganciclovir was used as prophylaxis only in high-risk patients for CMV disease.

Statistical analysis

Statistical Package for the Social Sciences (SPSS) was used for data analysis. All statistical tests were two-sided where $p<0.05$ was considered to be statistically significant.

RESULTS AND DISCUSSION

Transplantation demographics

Gender and age: We relied on the data of 87 recipients who underwent Kidney Transplantation (KT) between 2020 and 2021 using an independent two-sample t-test to indicate the difference between the average data of the sample members on the total degree of kidney transplantation in Al-Assad University Hospital (single center) according to the gender and age variables.

Recipients' characteristics included 62 (71.2%) of male recipients of the total number while 25 (28.7%) were female. Mean recipient age was 34.235 years. Number of living related donors included 42 (48%) and non-related were 45 (52%) (*Table 1*). To reveal the statistical significance of the differences between the responses of the sample members according to age, a one-way Analysis of Variance (ANOVA) was performed.

Value of "F" was found to be 0.792 while p-value was 0.456>0.05. Therefore, there were no differences between the sample members who underwent a kidney transplant during (2020-2021) at Al-Assad University Hospital (single center) according to the age variable (*Figure 1 and Figure 2*).

Etiology of ESRD

Primary kidney disease in 36 (41%) patients remained unknown, where 12 (14%) patients had hypertensive nephropathy, 10 (12%) patients had congenital urinary tract anomaly, 9 (10%) patients had biopsy-proven glomerulonephritis, 7 (8%) patients had diabetic nephropathy, 5 (6%) patients had polycystic kidney disease, 3 (3%) had analgesic nephropathy, 5 (6%) patients had others (cystinosis, post-partum renal cortical necrosis, Familial Mediterranean Fever (FMF), renal tubular acidosis and amyloidosis) (*Figure 3*).

Table 1: Difference between the average data of sample members on the total degree of kidney transplantation in Al-Assad University Hospital (single center) according to the gender variable

Sample	Number	Mean	Standard deviation	t	Degree of freedom	p	Significance level
Male	62	1.14	0.355	1.391	85	0.168	Non-significant
Female	25	1.04	0.2				

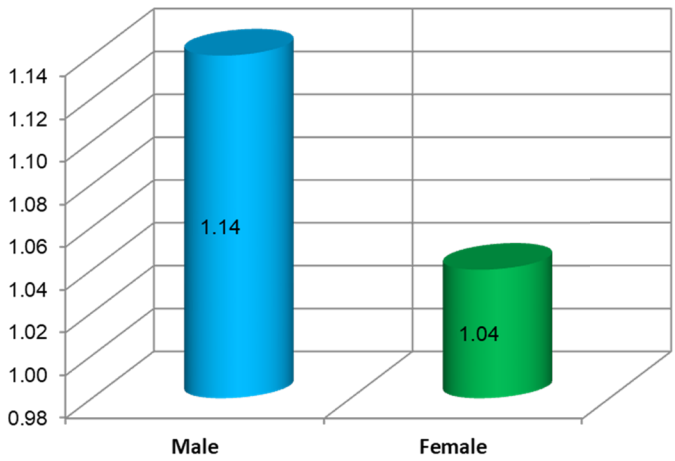

Figure 1: Graphical representation of the difference between the mean data of the sample members who underwent a kidney transplant during 2020-2021 at Al-Assad University Hospital (single center) according to gender variable
Note: (■): Male and (■): Female

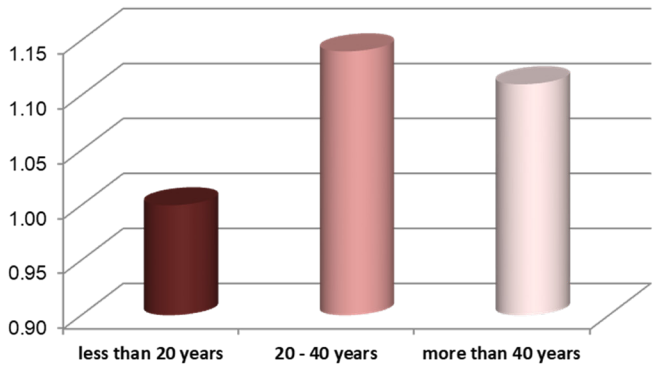

Figure 2: Graphical representation of the difference between the data averages of the sample members who underwent a kidney transplant during (2020-2021) at Al-Assad University Hospital (single center) according to the age variable
Note: (■): Less than 20 years; (■): 20-40 years and (■): More than 40 years

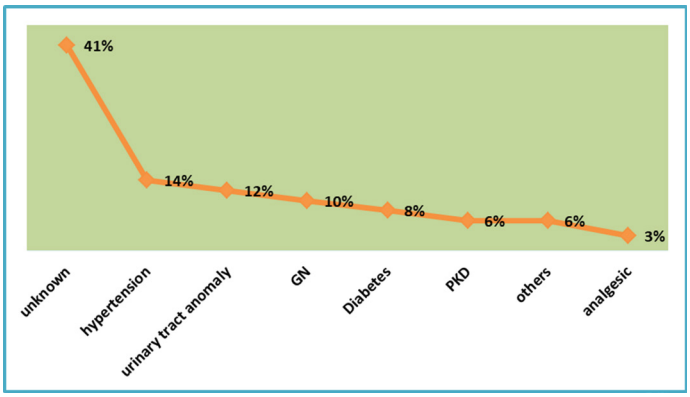

Figure 3: Etiology of end-stage renal disease among kidney transplant patients at Al-Assad University Hospital (single center) between 2020-2021

Short term graft and patient survival

Among the total number of patients, 81 (93%) patients had a functioning graft after 1 year post transplantation and were dialysis free; 6 patients lost grafts, 2 (2.3%) of them due to rejection, 1 (1.2%) had recurrent disease, 2 (2.3%) patients lost grafts during acute phase after surgery due to renal vein thrombosis and 1 (1.2%) patient had a kidney infarction due to massive bleeding after surgery. Patient survival post KT (after 1 year) was found to be 98% where one patient died with a functioning graft due to myocardial infarction and one patient died with a massive bleeding.

Medical and surgical complications

Overall, 69 (79.31%) patients were non-complicated, 3 (3.4%) patients developed lymphoceles, 2 (2.2%) patients had acute rejection (one patient was antibody mediated rejection and the other was T-cell mediated rejection), 1 (1.1%) patient developed Delayed Graft Function (DGF) due to acute tubular necrosis, 9 (10.3%) patients developed infections (viral pneumonia, urinary tract infection), 3 (3.4%) patients had surgical complications leading to early graft failure (2 patients had renal vein thrombosis and 1 patient had renal artery thrombosis).

Preemptive vs. post-dialysis transplantation

77 (89%) patients were on hemodialysis before transplantation and 10 (11%) patients received preemptive transplantation (*Table 2*). Pearson correlation coefficient were calculated to measure the statistical relationship between the total duration of dialysis (in months) before transplantation and graft survival at 1 year post KT and $p \leq 0.050$ was considered significant. Pearson's correlation coefficient of 0.020 ($p=0.851>0.05$), denoted no linear relationship between the total duration of dialysis (in months) before transplantation and graft survival at 1 year post KT.

Table 2: Difference between mean data and standard deviations on the total score of the data of the sample members who underwent kidney transplants during (2020-2021) at Al-Assad University Hospital (single center) according to the age variable

Standard deviation	Mean	Number (%)	Age
0	1	10 (11.4%)	<20 years
0.4	1.14	50 (57.5%)	20-40 years
0.32	1.11	27 (31.1%)	>40 years
0.32	1.11	87	Total

Chronic Kidney Disease (CKD) is becoming a major public health issue, disproportionately burdening low- to middle-income countries, where detection rates remain low. The global increase in the incidence and prevalence of CKD is mainly driven by the rise in the prevalence of Type 2 Diabetes (T2D), hypertension, obesity and ageing. ESRD requires Renal Replacement Therapy (RRT) or kidney transplant, both of which are costly to the individual and the society, imposing a major burden on health systems (George C, *et al.*, 2017). This is the 1st study reviewing the character-

istics of kidney transplant in our center (Al-Assad University Hospital, Damascus) in a very hard period after the war in Syria and in a low resource country with the burden of global economic sanctions (*Figure 2*).

The 1st challenge we faced was that the primary renal disease remained unknown because most people in our country have no health insurance and limited access to healthcare and generally, there is a lack of specialized centers for kidney disease consultants. The 2nd challenge was the difficulty of securing the immunosuppression which is provided by the Syrian Ministry of Health from the governmental budget through a very long period and many routine procedures that may delay their arrival at our hospital. We used a triple regimen (Tacrolimus, MMF and steroids) for all patients as a maintenance therapy. Preemptive transplantation, defined as the transplantation performed before any dialysis intervention or beginning of maintenance dialysis, is associated with better postoperative graft functions and longer survivals of the transplanted kidney (Aytekin S, *et al.*, 2020). Our center is trending towards more preemptive transplantation to reduce the costs of hemodialysis and to reduce its related vascular complication.

Based on the study of age and gender groups, we found that the middle-aged group was more likely to have a kidney transplant and more males than females. Globally, chronic kidney disease is more prevalent among women, but the prevalence of end-stage kidney failure, and especially receipt of kidney replacement therapy, is higher in men. These differences likely reflect a combination of physiological and social/structural risk factors that independently modulate kidney disease and/or its progression. Social and structural gender-related inequities remain stark across the globe (García GG, *et al.*, 2022).

Complications of renal transplantation can be classified as pathological or surgical. Pathological complications include rejection, infection, and cardiovascular events, while surgical complications involve vascular and urological complications, lymphocele, wound infection, and herniation (Reyna-Sepúlveda F, *et al.*, 2018). Despite all advances, graft-endangering complications are primarily of vascular etiology. Vascular complications account for 3%-15% of all patients (Kobayashi K, *et al.*, 2007). These include thrombosis or stenosis of the renal arteries or veins. The renal vein thrombosis is a dramatic early vascular complication of renal transplantation, with a reported prevalence between 0.5% and 4%. Despite its low incidence, it is one of the most important causes of graft loss in the 1st month after transplantation (Giustacchini P, *et al.*, 2002). Low surgical complications in our center compared to literature may be due to the low number of transplant per year which allows the surgical team to gain time to approach each case closely pre- and postoperative (Lempinen M, *et al.*, 2015).

CONCLUSION

We hope that our current study will be a start for other more comprehensive studies to improve our expertise in the field of kidney transplantation. The practice of kidney transplantation in low-resource countries poses financial, ethical and surgical challenges to the patient and doctor, but it may provide good results comparable to global outcomes. However, a comprehensive national registry should be formulated to preserve patients' data and follow them more broadly.

REFERENCES

1. Eknoyan G, Lameire N, Eckardt K, Kasiske B, Wheeler D, Levin A, *et al.* KDIGO 2012 clinical practice guideline for the evaluation and management of chronic kidney disease. Kidney Int. 2013; 3(1): 5-14.
2. Simforoosh N, Shemshaki H, Nadjafi-Semnani M, Sotoudeh M. Living related and living unrelated kidney transplantations: A systematic review and meta-analysis. World J Transplant. 2017; 7(2): 152.
3. Babloyan S, Voskanyan M, Shekherdimian S, Nazaryan H, Arakelyan S, Kurkchyan K, *et al.* Kidney transplantation in low-to middle-income countries: Outcomes and lessons learned from Armenia. Ann Transplant. 2021; 26: e930943.
4. Schnuelle P, Lorenz D, Trede M, van Woude FJ. Impact of renal cadaveric transplantation on survival in end-stage renal failure: Evidence for reduced mortality risk compared with hemodialysis during long-term follow-up. J Am Soc Nephrol. 1998; 9(11): 2135-2141.
5. Parameswaran S, Geda SG, Rathi M, Kohli HS, Gupta KL, Sakhuja V, *et al.* Referral pattern of patients with end-stage renal disease at a public sector hospital and its impact on outcome. Natl Med J India. 2011; 24(4): 208.
6. Saeed B. Deceased organ donation in Syria: Challenges and solutions. Exp Clin Transplant. 2020; 104(S3): S228.
7. Saeed B, Derani R, Hajibrahim M, Roumani J, Al-Shaer MB, Saeed R, *et al.* Organ failure in Syria: Initiating a national deceased donation program. Saudi J Kidney Dis Transpl. 2007; 18(2): 270-276.
8. Saeed B. Development of solid organ transplantation in Syria. Int J Organ Transplant Med. 2011; 2(1): 40-46.
9. George C, Mogueo A, Okpechi I, Echouffo-Tcheugui JB, Kengne AP. Chronic kidney disease in low-income to middle-income countries: The case for increased screening. BMJ Glob Health. 2017; 2(2): e000256.
10. Aytekin S, Dinç B, Ertuğ Z, Hadimioğlu N, Aytekin EC. Perioperative comparison of preemptive and non-preemptive renal transplant recipients. Turk J Anaesthesiol Reanim. 2020; 48(2): 102.
11. García GG, Iyengar A, Kaze F, Kierans C, Padilla-Altamira C, Luyckx VA. Sex and gender differences in chronic kidney disease and access to care around the globe. Semin Nephrol 2022; 42(2): 101-113.
12. Reyna-Sepúlveda F, Ponce-Escobedo A, Guevara-Charles A, Escobedo-Villarreal M, Pérez-Rodríguez E, Muñoz-Maldonado G, *et al.* Outcomes and surgical complications in kidney transplantation. Rev Mex Traspl. 2018; 6(3): 85-90.
13. Kobayashi K, Censullo ML, Rossman LL, Kyriakides PN, Kahan BD, Cohen AM. Interventional radiologic management of renal transplant dysfunction: Indications, limitations, and technical considerations. Radiographics. 2007; 27(4): 1109-1130.
14. Giustacchini P, Pisanti F, Citterio F, de Gaetano AM, Castagneto M, Nanni G. Renal vein thrombosis after renal transplantation: An important cause of graft loss. Transplant Proc. 2002; 34(6): 2126-2127.
15. Lempinen M, Stenman J, Kyllönen L, Salmela K. Surgical complications following 1670 consecutive adult renal transplantations: A single center study. Scand J Surg. 2015; 104(4): 254-259.