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ORIGINAL ARTICLE

SURGICAL COMPLICATIONS AND OUTCOMES OF LIVING KIDNEY RECIPIENTS IN A NOVICE TRANSPLANT CENTER IN ETHIOPIA

Tekleberhan Berhe, MD[1*], Mahteme Bekele, MD[1], Mekdim Tadesse, MD[1], Kenneth J. Woodside , MD[3], Momina Ahmed, MD[2], Alan B. Leichtman, MD[3], Fasika Tedla, MD[4], Mersema Abate, MD[5], Berhanu Worku, MD[2] , Seyfemichael Getachew, MD[2], Leja Hamza, MD[2] , Lina Mohamed, MD[2], Wubishet Jote, MD[2], Seyum Assefa, MD[6]. Zerihun Abebe, MD[7], Wendimagegn Gezahegn, MD[7], Berhane Redae, MD[7], Aklilu Yishak , MD[8]Jeffery D. Punch, MD[3] , Engida Abebe, MD[1]

ABSTRACT

Introduction: *End stage renal disease is emerging as a major public health problem worldwide. Kidney transplantation is the treatment of choice for patients with ESRD, but its attendant surgical complications pose significant concern to the outcome of kidney transplantation surgery.*

Objective*: To review surgical complications and outcomes of live donor kidney transplant recipients in a novice transplant centre.*

Methods: *We analyzed a retrospectively collected data on all surgical complications among kidney transplant recipients performed from September 2015 to August 2017.*

Results*: A total of 52 live related kidney transplant surgeries were performed during the study period. The male to female ratio was 3.3:1. Patients' age ranged from 16 to 60 years with mean (SD) age of 34.5 (±10.4) years. The Body Mass Index of patients ranged from 15.3 to 30.6kg/m^2 with mean (SD) of 20.1(±3.5). Nearly one-half (24 (46.2%) of the patients received kidney from their siblings. The etiology of end stage renal disease was unknown in 33(63.5%) of the cases, whereas chronic glomerulonephritis, diabetes mellitus and hypertension accounted for 13.5%, 7.7% and 3.8%, respectively. Post-surgical complications occurred in eight (15.3%) of the patients and most (9.6) of complications were related to surgical wound. There was one (1.9%) urologic complication due to ureteric kink. Lymphocele occurred in one (1.9%) of the patients.*

Conclusion: *With proper planning and support, kidney transplant surgery can be a safe treatment modality for patients with end stage renal disease even in a resource limited facility. Our rates of surgical complications were within those reported by other series.*

Key words: *End stage renal disease, kidney transplantation, surgical complications*

INTRODUCTION

End stage renal disease (ESRD) is one of the most common causes of death among non- communicable disease. It is increasing to epidemic proportions worldwide, including in sub-Saharan region. In this region, the cause of ESRD is unknown in majority of patients due to late presentation and lack of diagnostics like renal biopsy. Among patients whose cause of ESRD is known, hypertension and glomerular disease tops the table, while DM and hypertension are the main causes in the developed world (1).

Chronic renal failure is a devastating medical, social, and economic problem for patients and their families. Its effect is worse in economically underprivileged African societies, where renal replacement therapy is not available, scarce, or unaffordable for most patients and families.

Provision of renal replacement therapy is very challenging in sub-Saharan Africa because of high cost and lack of human and material resources and only few countries run kidney transplantation program in the region. Moreover, the rate of transplantation is quite low, necessitating referral abroad for transplantation.

In Ethiopia, the management of chronic kidney disease is still evolving. A successful kidney transplantation service was started in Ethiopia, at St. Paul's Hospital Millennium Medical College (SPHMMC) in September 2015 and a regular service is being provided at the center. Kidney transplantation has become the treatment of choice for most patients with end stage renal disease and is accepted as conferring a durable survival benefit

[1] Kidney transplant surgeons, St. Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia[2] Nephrologist, St. Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia [3]University of Michigan, Ann Arbor, Michigan, USA.[4]SUNY Downstate Medical Center, Brooklyn, New York, USA [5]Stony Brook University Hospital, Stony Brook, New York, USA [6] Anesthesiologist, St. Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia[7] Provosts, St. Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia
[8] Nephrologist, Tyson corner medical center. *Corresponding Author E-mail: tekberr@yahoo.com

and improved quality of life over dialysis (2,3). Kidney transplantation is also considered the most cost-effective therapy for end-stage renal disease (4-8).

Sixty years after the first human kidney transplantation by Joseph Murray in 1954 (9), refinements in surgical technique, peri-operative management, and immunosuppressive regimens have made kidney transplantation a safe surgery with improvements in morbidity and mortality. Neverthless, surgical complications still pose significant challenge that may increase morbidity and hospitalization costs (10).
Surgical complications following renal transplantation can occur at any time, and may affect the transplant wound, vascular anastomoses, or related to urologic problems. Surgical complications continue to occur in about 10–20% of transplant recipients.

Vascular complications account for 3%–15% of all cases and are usually associated with graft loss (11). These include thrombosis or stenosis of the renal artery or vein. Some risk factors include poor surgical technique, torsion or compression of vessels, the presence of multiple renal vessels or a renal artery atheroma. The most common variant, which is found in 8%–30% of all potential kidney donors, is the presence of multiple renal arteries (12). Urological complications are the most common complications in the late period after kidney transplantation, presenting an incidence ranging from 2.5% to 12.5% (13). These complications include urinary leak, ureteric stenosis, ureteric kink and vesicouretric reflux.

Transplant wound complications are commonly seen in patients with diabetes and obesity and most important risk factor is the use of immunosuppressant medications. Meticulous attention to the recipient operation, anticipation of these problems and prompt treatment when they occur reduces morbidity.
Lymphatic collections usually occur 4-8 weeks after surgery and affect up to 15% of patients (14). The lymphatic collection arises from the lymphatics surrounding the iliac vessels that are divided during mobilization. The incidence of lymphoceles can be reduced by minimizing the pelvic dissection and ligating lymphatics. Definitive repair involves the creation of a window in the peritoneum. The purpose of our study was to review and present our experience of surgical complications of live related donor kidney transplantations performed during the first 2 years of service.

PATIENTS AND METHODS

Across-sectional descriptive study was conducted for patients who underwent live related kidney transplant surgery from September 2015 to August 2017 at national kidney transplant center. The center is located at SPHMMC in Addis Ababa.

Ethiopian organ donation law restricts living organ donation to happen only between blood or marriage related individuals, hence all donors were related to recipients. Transplant surgeons from University of Michigan and four transplant fellows (01 urologist and 03 general surgeons) from SPHMCC were involved in the surgery.

Individual patients' medical records from outpatient department (OPD), ward registration books and the Operation Theater logbook were used as sources of data. Data was collected in a pretested data collection format by trained final year surgical residents. The data was checked for completeness, and then coded, entered and analyzed with SPSS version 20. A written ethical clearance was obtained from SPHMMC Institution Review Board (IRB) and data obtained is used only for research purpose.

Regarding the transplant procedure, all kidneys were transplanted extraperitoneally in the left or right iliac fossa. The renal vessels were anastomosed using end to side anastomoses of the renal vein and artery to external iliac vessels. Lich - Gregoir anti-reflux ureteroneocystostomy technique was used in all cases with a temporary double J stenting, which is removed after four weeks. We avoided placing drains in all cases. Surgical complications were divided into vascular, urologic, lymphatic, wound related or other types. Tacrolimus, mycophenolate and prednisolone were most frequently used immunosuppressive combination.

RESULTS

During the two years, 52 living related kidney transplants were done. Males constituted 40 (76.9%) of the patients making a male to female ratio 3.3:1. Patients' age range from 16 to 60 years with mean (SD) age of 34.5 years (±10.4). As shown in Table 1 most 33 (63%) of the patients were in their third and fourth decades of life. Patients came from all corners of the country, but a majority 37 (71.2%) of them were from the capital city, Addis Ababa. Patients had various levels of education with those who completed high school and college education constituting 21 (40%) and 14 (27%) of them, respectively.

The weight of patients ranged from 39 to 92kg with a mean (SD) of 57kg (±12.8), while BMI of patients ranged from 15.3 to 30.6kg/m^2 with mean (SD) of 20.1(±3.5)kg/m^2.

The cause of ESRD was unknown in most of the cases 33 (63.5%). Among those who have known cause chronic glomerulonephritis, diabetes and hypertension were common in decreasing order (Table 2).

Nearly one-half, 24 (46.2%) of the patients received kidneys from their siblings, while six patients each received kidneys from parents or off springs (Figure 1).

Table 1: Socio-demographic characteristics of living kidney recipient patients, St. Paul's Hospital Millennium Medical College, Addis Ababa, Sept. 2015 – Aug. 2017.

Variable		Number	Percent
Sex	Female	12	23.1
	Male	40	76.9
	Total	52	100.0
Age group (years	<20	5	9.6
	21-30	16	30.8
	31-40	17	32.7
	41-50	9	17.3
	51-60	5	9.6
	Total	52	100.0
BMI	<18	12	23.1
	18.1-25	35	67.3
	>25	5	9.6
	Total	52	100
Residence	Addis Ababa	40	76.9
	Oromia	6	11.5
	Amhara	2	3.8
	SNNPR*	2	3.8
	Tigray	1	1.9
	Dire Dawa	1	1.9
	Total	52	100.0
Marital status	Married	27	51.9
	Single	22	42.3
	Divorced	3	5.8
	Total	52	100.0
Occupation	Government employee	16	30.8
	owns small business	22	42.3
	housewife	2	3.8
	None	4	7.7
	Student	8	15.4
	Total	52	100.0
Literacy status	Illiterate	1	1.9
	Read and write	3	5.7
	elementary completed	13	25
	high school completed	21	40.4
	college graduate	14	27
	Total	52	100
Religion	orthodox Christian	36	69.2
	Muslim	9	17.3
	Protestant	7	13.5
	Total	52	100

Table 2: Causes of end stage renal disease, St. Paul's Hospital Millennium Medical College, Addis Ababa, Sept. 2015 – Aug. 2017

	Number	%
Unknown	33	63.5
Chronic glomerulonephritis	7	13.5
Diabetes mellitus	4	7.7
Hypertension	2	3.8
Adult polycystic kidney disease	1	1.9
Urinary stone disease	1	1.9
Vesic-uretral reflux	1	1.9
interstitial nephritis	1	1.9
Genitourinary TB (chronic interstitial nephritis)	1	1.9
Nonsteroidal anti-inflammatory drugs	1	1.9

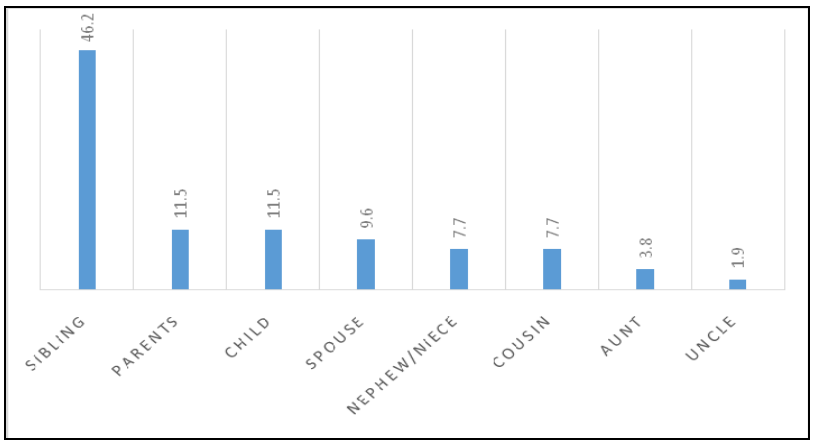

Figure 1: Kidney donation, St. Paul's Hospital Millennium Medical College, Addis Ababa, Sept. 2015 – Aug. 2017

Kidneys were transplanted on the left side in 46 (88.5%) of patients with the remaining transplanted on the right side. Forty eight (92.3%) of the patients received kidneys with single arteries, while four (7.7%) had two arteries. Operation time ranged from 110-220 minutes, with mean (SD) of 148 (±25.9) minutes. Operative blood lost ranged from 100 to 350 ml, with a mean of 120ml.

Post-operative hospital stay ranged four to 20 days with a mean (SD) of 8.1 (±4.1) days. There was a total of eight surgical complications (six early and two late) documented. Most (9.6%) surgical complications in our series were related to surgical wound.

Three patients developed superficial site infection; one patient had deep surgical site infection and one patient with surgical site hematoma. The infections were conservatively managed whereas the hematoma needed immediate evacuation. The source of surgical hematoma was not identified as the bleeding had stopped at the time of exploration. No patient died due to surgical complications. There was one early graft loss from unknown cause. The kidney was lost on postop day two and may have been due to hyper acute rejection, disease recurrence, or technical error.

Table 3: Surgical complications, St. Paul's Hospital Millennium Medical College, Addis Ababa, Sept. 2015 – Aug. 2017

Type of post op complications	Frequency	%
Early		
Superficial surgical site infection	3	5.7
Deep surgical site infection	1	1.9
Surgical site hematoma	1	1.9
Early graft loss due to unknown cause	1	1.9
Late		
Lymphocele	1	1.9
Ureteral kink	1	1.9

DISCUSSION

In our study, we found that male patients dominated as kidney transplant recipients (76.9%). This trend was observed in many other studies as well. A study from Nigeria showed 76.6% of their patients were males. The reason why this happened needs to be investigated but the Nigerian study attributed to the various socio-cultural peculiarities of the Nigerian population where the male sex is socially dominant. (15).

Most of our patients were also in their third and fourth decade of life, which is again consistent with other studies from developing world (1, 15-17).

The cause of ESRD in our series was unknown for most of the patients. Most of our patients presented for the first time with complication of ESRD at which time biopsy diagnosis would be inaccurate. Additionally, the biopsy service is also very limited in our set up.

Chronic glomerulonephritis, diabetes and hypertension were the major causes among those with known cause of ESRD. Studies from the region showed essential hypertension and chronic glomerulonephritis (CGN) as the predominant causes of ESRD in Africa (1, 16, 17).

Regarding surgical complications we have reported an incidence of 15.3% comparable to the 12.7% and 15.9% reported in the literature (18-20). The overall rate of surgical complications reported ranges widely. Surgical site infection (SSI) can be as low as 3% and as high as 15%. An SSI rate of 15% is reported by Anthony, who also identified higher BMI as a risk factor (21).

As the follow up of our patients ranged only 9- 33 months, late vascular complication was not documented. One of our patients had no urine following uneventful transplant surgery and color Doppler study reported as arterial thrombosis and immediate exploration carried out which revealed no thrombosis, but the kidney was completely dark, and nephrectomy performed. Biopsy result done at three institutions abroad was conflicting. The kidney was lost on postop day 2 and may have been due to hyper acute rejection, disease recurrence, or technical error.

Urological complications are the most common complications in the late period after kidney transplantation, with an incidence ranging from 2.5% to 12.5% (13) and may be responsible for poor graft outcome. Poor surgical technique and ischemia of the donor ureter are the most common causes of ureteric complications. Early recognition and effective management are critical for kidney transplant surgeons to effectively reduce their deleterious effect on long term graft survival.

We had one patient who developed severe hydronephrosis about 2 years after surgery. He had gradually rising creatinine level. Percutaneous Nephrostomy followed by antegrade pyelography study showed distal Ureteric stricture. Balloon dilation performed and showed no stricture but Ureteric kink. Double JJ stent was placed and exchanged regularly, and he is alive with functioning kidney.

A lymphocele is caused by lymphatic leakage from the perihilar renal lymphatics or the allograft bed and may occur in up to 15% of cases (14). Care in recipient lymphatics during preparation of the iliac fossa is important in minimizing such fluid collections. In our serious we had one patient who presented with worsening of abdominal pain and swelling around 3 months after kidney transplantation.

Her kidney was functioning and abdominal sonography showed big lymphocele with minimal hydronephrosis. Although most lymphocele are too small to require treatment, we resorted to peritoneal window creation and patient improved remarkably.

Surgical complications of kidney transplantation can occur at any time and can be source of significant morbidity. Strict adherence to standard surgical techniques, early recognition and prompt treatment of surgical complications reduce morbidity of transplant patients.

Conclusion

The cause of ESRD in our series is unknown in most cases. Most of our recipients were in their third and fourth decades of life. Our rates of surgical complications were within those reported by other series. Kidney transplantation (KT) should be promoted and there is a need for concerted effort to expand and establish sustainable KT service in the country.

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Competing Interest:

The authors declare that this manuscript was approved by all authors in its current form and that no competing interest exists.

REFERENCES

1. Okunola O Akinsola A, Ayodele O. Kidney diseases in Africa: aetiological considerations, peculiarities and burden. Afr J Med Med Sci 2012; 41(2):119-33.
2. Wolfe RA, Ashby VB, Milford EL, et al. Comparison of mortality in all patients on dialysis, patients on dialysis awaiting transplantation, and recipients of a first cadaveric transplant. NEJM 1999;341(23):1725–1730
3. Meier-Kriesche HU, Schold JD, Srinivas TR, Reed A, Kaplan B. Kidney transplantation halts cardiovascular disease progression in patients with end-stage renal disease. Am J Transplant 2004;4(10):1662–1668.
4. Davis CL, Delmonico FL. Living-donor kidney transplantation: A review of the current practices for the live donor. J Am Soc Nephrol 2005;16:2098-110.
5. Garcia-Garcia G, Harden P, Chapman J; World Kidney Day Steering Committee 2012. The global role of kidney transplantation Nephrology (Carlton) 2012;17:199-203.
6. McDonald S, Russ G. Survival of recipients of cadaveric kidney transplants compared with those receiving dialysis treatment in Australia and New Zealand, 1991-2001. Nephrol Dial Transplant 2002;17:2212-9
7. Haller M, Gutjahr G, Kramar R, et al. Cost-effectiveness analysis of renal replacement therapy in Austria. Nephrol Dial Transplant. 2011;26:2988–2995. [PubMed]
8. Domínguez J, Harrison R, Atal R. Cost-benefit estimation of cadaveric kidney transplantation: the case of a developing country. Transplant Proc 2011;43:2300–2304. [PubMed].
9. Merrill JP, Murray JE, Harrison JH. Successful homotransplantations of the human kidney between identical twins. JAMA 1956;160:277.
10. Humar A Matas AJ. Surgical complications after kidney transplantation. Semin Dial 2005;18 :505–510.
11. Kobayashi K, Censullo ML, Rossman LL. Interventional radiologic management of renal transplant dysfunction: indications, limitations, and technical considerations. Radiographics. 2007;27:1109. [PubMed]
12. Sampaio FJ, Passos MA. Renal arteries. Anatomic study for surgical and radiological practice. Surg Radiol Anat 1992: 14: 113-7.
13. Emiroglu R, Karakayali H, Seumis S, et al. Urologic complications in 1275 consecutive renal transplantations. Transplant Proc 2001;33:2016–7.
14. Brown ED, Chen MYM, Wolfman NT. Complications of renal transplantation: evaluation with US and radionuclide imaging. Radiographics 2000;20:607e22.
15. Okafor UH. Kidney transplant in Nigeria: a single centre experience. *The Pan African Medical Journal*. 2016;25:112. doi:10.11604/pamj.2016.25.112.7930.
16. Naicker S. Burden of end-stage renal disease in sub-Saharan Africa. Clin Nephrol. 2010;74 (Suppl 1:S13–S16. [PubMed]
17. Diouf B, Ka EF, Niang A, et al. Etiologies of chronic renal insufficiency in adult internal medicine services in Dakar. Dakar Med. 2000;45:62–65. [PubMed]
18. Eufrásio P, Parada B, Moreira P, et al. Surgical complications in 2000 renal transplants. Transplant Proc. 2011;43:142–4. doi: 10.1016/j.transproceed.2010.12.009. [PubMed]
19. Guedea, M. Outcomes and Surgical Complications in Kidney Transplantation. *International Journal of Organ Transplantation Medicine* 2017;*8*(2):78–84.
20. Kocak T Urological and surgical complications in 362 consecutive living related donor kidney transplantations. Urol Int 2004;72(3):252-6.
21. Anthony D. Harris1, Brandon Fleming2, Jonathan S. Bromberg3, Peter Rock4, Grace Nkonge5, Michele Emerick5, Michelle Harris-Williams5, and Kerri A. Thom. Surgical Site Infection after Renal Transplantation. Infect Control Hosp Epidemiol. 2015 April ; 36(4): 417–423. doi:10.1017/ice.2014.77.