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Outcome of Renal Transplantation at Ahmed Gasim Cardiac and Renal Transplant Centre in Sudan-2014

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Abstract

Background: Although not life-saving procedures like liver or heart transplantation, renal transplantation is the preferred treatment for many patients with end-stage renal disease because it improves patients' quality of life, while other forms of renal replacement therapy (RRT) such as haemodialysis (HDX) shown to regain only 10% of the patient's renal function [1]. Transplantation releases patients from the dietary and fluid restrictions and the physical constraints imposed by other forms of (RRT), patients become able to return to their normal activities. Patient's 5-year survival is higher post transplant. Patients and methods: This is Descriptive, retro-prospective, cross sectional analytic and multicentre study done in Ahmed Gasim Cardiac and Renal Transplant Centre including 105 patients. After meeting the Inclusion Criteria and exclusion Criteria, then cases were selected and written in constructed questionnaire. The aim of the study was to evaluate the outcome of renal transplantation in Sudan. Results: 105 cases were used with male predominate and ratio male to female ratio 3:1, the main age of presentation between 31 - 45 years, most of the patients discharge uneventful with good outcome. During one-year follow-up following renal transplantation. Patient survival 95.2 % graft survival 82.4%. Overall morbidity shows 70.5%. Conclusion: this study showed that the one-year patient survival of 95.2%. Actuarial one-year graft survival of 92.4%. Renal transplantation complications can be reduced by meticulous preoperative workup including good cardiovascular assessment, tissue mismatch and BMI good postoperative follow up for early detection of graft rejection and long-term complications and finally patient education.

Keywords

Kidney Transplant, Patient Survival, Graft Survival, Graft Rejection

1. Introduction

Since early times the idea of tissue and organ transplantation has captured the imagination of successive generations, and over the centuries, numerous fanciful descriptions of successful transplants recorded, Early Christian legends attest to the attempts to replace diseased or destroyed organs or tissues by the transfer from another individual. The father of modern surgery, John Hunter, carried out extensive experiments on the transposition of tissues and concluded what he thought were successful experiments on the transposition of teeth [2]. The first successful kidney transplant was a living donor transplant performed between identical twins in 1954 at the Brigham Hospital in Boston by Joseph Murray and colleagues. This and other kidney transplants between identical twins demonstrated the technical feasibility of kidney transplantation [2]. Until 1995, 30 transplants were performed in Sudan, and there were about 200 kidney transplant recipients in the country. The majority had their operation done in Saudi Arabia (KSA), the rest done in Egypt, Kuwait, Jordan, India and European countries [3]. First kidney transplant was done at center in Dec 2000 by Dr. George Abouna, Iraqi/American Surgeon. Continued by visiting Sudanese surgeon until 2003, who also invited British experts (immun, neph) to oversea the application of protocols. From 2004 resumed on a regular basis by a local team of surgeons. Since 2004 transplants were undertaken twice weekly & 2013 three operations reaching a max of 105 in 2013. Since Dec 2000 to Dec 2013 a total of 660 kidney transplants were done at Ahmed Gasim, with 485 of them alive and well & on regular follow-up at AG in Sudan. (No. verified from Central pharmacy records for KTx patients). Organ transplantation however entails efficient preoperative preparation of patients with very morbid conditions e.g., cardiomyopathy, liver cirrhosis and end stage renal disease where prolongation of life maintained by lifelong artificial organ therapy e.g., haemodialysis, nowadays transplant activity is limited only by the shortage of cadaveric organs.

2. Methodology

Study design:

This is a prospective observational hospital based study.

Study area:

The study is conducted at Ahmed Gasim cardiac surgery and renal transplant centre, Khartoum North, Sudan.

Study duration:

The study is carried out from January 2014- to January 2015.

Study population:

Patients who had a kidney transplant and came for follow up at Ahmed Gasim

cardiac and renal transplantation center's in referred clinic.

Inclusion criteria:

Only patients who underwent renal transplantation in Ahmed Gasim cardiac and renal transplantation centre during the year 2014.

Exclusion criteria:

Patients who underwent transplantation abroad, or at other Sudanese centre.

Sampling:

Convenience, Non-probability sampling technique.

Sample size:

All patients who met the inclusion criteria from January 2014 to January 2015 (N = 105).

Data collection:

Data was collected by means of operation notes, follow up notes and basic questionnaire filled for the patients who had been transplanted after full workup. The questionnaire had been designed according to protocol criteria of (Best European Practice Guidelines) the data variables include:

Socio-demographic variables: Age, Gender, Marital status.

dependent variables: Medical history, Obstetrical history, Relation to living donor, Etiology of end stage renal disease, Blood transfusion, Vascular access, Tissue mismatch, Time of graft preservation, Time of removal of drain, catheter and JJ-stent, Complication of transplant.

Data collection tools and methods:

The data was collected by a pre-designed questionnaire.

Data analysis:

The data was analyzed through software program Statistical Package for Social Sciences (SPSS), the results were presented in tables and figures in the appendix, the test of significance is if P. value of < 0.05. The methods used were frequency tables for percentages and qui-square test also was used for comparison between variables.

Ethical consideration:

Permission was obtained from hospital administration, and no interference with management protocols.

3. Results

During the study period, 105 patients underwent renal transplantation at Ahmed Gasim Cardiac and Renal transplant Centre, who satisfied the inclusion criteria.

Demographic distribution of recipient gender was as follows; male were 75.2% while 24.8% were females with male to female ratio of 3:1. In the other hand, gender distribution of donors showed 62% of donors were males and 38% of donors were female with male to female ratio 1.6:1. Age distribution was 18 - 25 years in 19%, 26 - 35 in 37%, 36 - 45 in 21%, 46 - 55 in 22%, and 55 - 65 in 6% of patients.

Married patients were 67.6%, and seventeen percent of the females of the study were married. Of those married females 5.7% were nulliparous, one preg-

nancy in 2.9%, and more than one pregnancy in 8.6%. Patients who received blood transfusion in the period before they underwent renal transplantation were 61.9%. Family history of ESRD was 6.7%.

As to the etiology of ESRD, 55.2% developed ESRD due to un-known cause, 13.3% due to CGN, 11.4% due to HTN, 8.6% due to diabetic nephropathy, 8.6% due to urological (renal stone) disease, 1.9%, patient developed ESRD due to PIH, and 1% was caused by non-steroidal anti-inflammatory drugs.

Past history of IHD occurred in 1.9%, 3.8% had past history of HHD and 7.6 treated successfully from TB before KTX and 86.7% had no significant history of risk factors.

All patients were ABO compatible, and all had negative blood cross match.

As to the donor and recipient relationship to each other, 85.7% received kidneys from first-degree relative, 12.4% from second degree relative and 1.9% from unrelated donor by paired kidney exchange (swap) as shown in figure [4]. The tissue typing match is divided into four groups which are < 25%, (25% - 50%), (50% - 75%) and >75% as those groups were divided as such 6.7%, 63.8%, 13.3%, and 16.2% respectively.

We found in our study that 51.4% of transplanted patients were on regular HD for more than one year, 40% were on regular HD for less than one year and 8.6% of patients underwent transplantation pre-emptively.

The vascular access was variable with 71.4% of them having surgically created AVF, 19% underwent dialysis through permanent central line, and 3.8% had temporary central line before they underwent transplantation and 5.7% who were of the pre-emptively transplanted patients and had no vascular access.

In relation to some operative details, the warm ischemic time was up to one minute in 79% of patients, up to two minutes in 19% and two percent have duration more than two minutes. The cold ischemic time was one hour in 8.6% patients, ranged from one to two hours in 81.9% of patients, and more than two hours in 9.5% of patients. Voiding time categorized in four groups, voiding within two minutes occurred in 82.9%, more than two to five minutes in 7.6%, more than five to ten minutes in 4.8%, and more than ten minutes in 4.8%.

Regarding the postoperative follow up, urinary catheter, suction drain and double-j (JJ) stent inserted to all patients intra-operatively, were removed within a varying period of days following transplantation, drains removed from fourth to eighth postoperative day in 83.8%, more than eighth to tenth post operative day in 7.6%, and after the tenth post operative day in 8.6%. Urinary catheter removed in the first six days in 57.1%, from the seventh to fourteenth post operative day in 41%, and in 1.9% of patients the urinary catheter removed after more than fourteen days. Double-J stent removed after one week together with the catheter (anchored to urinary catheter) in 48.6%, after three weeks post operatively in 15.2%, and after six weeks in 36.2%.

Outcome of most of the patients was uneventful and good. However, some complications occurred during one-year follow-up following renal transplantation. Patient survival 95.2% graft survival 92.4%. Overall morbidity shows 70.5%.

One percent died of pseudo-tumor cerebri after seven months, one percent died because of intractable diarrhea following severe GE two months following KTX, one percent died of unknown cause. MI occurred in 4.8% of patients, one percent died in immediate post-operative period, one percent died after one month, and 2.8% have survived the event and were well after one year follow-up.

Some patients developed rising renal profiles, acute graft rejection approved by renal biopsy occurred in 12.4%, graft recovered in 9.5% after receiving treatment according to the protocol, in 2.9% grafts not recovered and returned to dialysis.

Chronic graft rejection approved by renal biopsy occurred in 3.8%. Recurrence of microangiopathic nephropathy in a diabetic patient also approved by renal biopsy occurred in 1%, No patient developed hyper acute rejection.

During the first year, post KTX 8.6% of patients developed one-episode of urinary tract infection and were successfully treated, 3.8% developed superficial wound infection which resolved after wound dressing and antibiotics according to wound swab culture. In addition, 3.8% developed TB of which 1.9% were relapse after transplantation and 1.9% were de novo, 2.9% patients developed chest infection which treated with simple antibiotics. HBV, CMV and brain abscess occurred in 1% for each disease.

During the first year of follow-up 16.2% of patients developed new onset diabetes mellitus after kidney transplant (NODAT), 1% of patients developed goiter diagnosed as simple multi-nodular goiter and treated conservatively. Polycythemia occurred in 17.1% of patients. Thrombocytopenia occurred in one percent.

Leak at the VUJ occurred in one percent of patients, which was treated with re-implantation and insertion of JJ stent successfully. Obstructive uropathy (due to BOO) occurred in 1.9% of patients. Post operative peri-graft bleeding occurred in 1.9% and needed exploration, perinephric hematoma occurred in 1% of patients, ultrasound guided aspiration was done. Lymphocele occurred in 1.9% and treated conservatively. Incisional hernia occurred in 2.8% that was followed up and needed no surgical intervention.

4. Discussion

Renal transplantation (RT) is the best form of treatment for end-stage renal disease (ESRD), because this improves the quality of life and patient survival and is cost-effective [4]. The National center for Kidney Disease & transplantation database recorded 2248 patients of KTx in Sudan, 995 of them transplanted in Sudan, and 1253 abroad. Later on, the number of ESRD patients with a functioning kidney allograft in June 2009 was 1168 patient. The proportion of kidney transplants performed inside Sudan was only 33.1%. Transplants performed outside the country most commonly took place in Egypt (20.7%), KSA (18.2%), Jordan (14.8%) and Pakistan (8.4%). All grafts were obtained from live donors [3]. The number of patients transplanted at Ahmed Gasim represented 66.3% of the total done in Sudan. Database that identified the relative risk (RR) of GF and technic-

al failure is significantly lower among centers performing > 30 LDKT annually. Rate of GF (1.8% vs. 1.1%) and technical failure (1.5% vs. 0.84%) were significantly lower among experienced centres (high volume centre defined as doing > 100 KTx/year). RR of GF and technical failure decreased as annual centre volume increased [5]. In our study, 105 patients operated at one year (2013) following establishment of the centre.

There is male preponderance 79 (75.2%) while females were 26 (24.8%) with Male to female ratio of 3:1. American study of female/male transplantation and donation rate ratios. Overall, women were 10% less likely to receive a LR transplant than men were. This gender difference increased over time from 1991 (Female/Male RR = 0.95) to 1993 (RR = 0.85). In contrast, women were significantly more likely to donate a kidney than men were [6], another study with overall, women had 11% less access to transplant (ATT) than men. When the model stratified by age, 18- to 45-yr-old women had equivalent ATT to men (RR 1.01), but with increasing age, ATT for women declined dramatically, reaching a RR of 0.41 for those who were older than 75 yr, despite equivalent survival benefits from transplantation between men and women in all age subgroups [7].

Advanced age is a significant risk factor, (age > 50 years) is classified as moderate coronary risk patients. Generally, patients over the age of 60 have done less well in comparison to younger patients, extremes of age (less than 1 year and generally over 70 years) are unlikely to benefit from transplantation. It has generally been reported that the function of older grafts, e.g. grafts from donors over 55 to 65 yr of age, is reduced compared with the function kidneys from younger donors, but is, nevertheless, stable [8]. Most of the patients 41 (39%) were in the age group 31 - 45 years; whereas those in the age group 18 - 30 were 37 (35.2%); those from 46 - 55 were 19 (18.1%) and those above 55 years were only 8 (7.6%). A comparative study showed that their majority of the patients belonged to 16 - 30 years age [9]. The incidence of projected life years were compared between transplantation and dialysis, a greater mortality benefit was estimated for younger transplant recipients than older recipients (17 additional years of life with transplant for patients aged 20 - 39, and 11 years for patients aged 40 - 59 compared with 4 years for patients older than age 60) [10].

The majority of patients included in our study 55.2% develop ESRD of unknown cause, 13.3% because of CGN, 11.4% caused by HTN, 8.6% their RF caused by diabetic nephropathy. 8.6% the cause was urological (renal stone disease), in 1.9% ESRD caused by PIH, and one develop ESRD because of drugs (NSAIDs).

The commonest reported cause of kidney failure was hypertension (26.1%), followed by diabetes mellitus (DM) (10.4%), obstructive uropathy (7.6%), glomerulonephritis (GN) (5.5%), polycystic kidney disease (2.6%), and pyelonephritis (1.1%) [3].

In a local Sudanese study in 2009, more than 40% of surveyed patients had no

identified cause for their renal impairment. This expected as most patients present with established kidney failure. Hypertension was the most commonly reported cause of ESRD (26.1%) [3]. Glomerulonephritis (GN) was the reported cause in a relatively small proportion of patients, and is probably the true underlying aetiology in many of cases currently labeled as "uncertain aetiology" [3].

Of the 105 patients who underwent renal transplantation during the year 2013, 90 (85.7%), receive kidneys from first-degree relative, 13 (12.4%) from second degree relative and only two (1.9%) from unrelated donor (swap). The tissue mismatch divided in groups for study with the majority 67 (63.8%) of the tissue mismatch felled in the group (25% - 50%), the others were 17 (16.2%), 14 (13.3%) and seven (6.7%) found in the groups (>75% - 100%), (>50% - 75%) and (<25%) respectively. A Canadian study summarize, the HLA-locus has a qualitative effect on acute and a quantitative effect on chronic rejection. The qualitative effect is to make acute rejection benign, and the quantitative effect is to prevent chronic rejection [11].

We found in our study that 54 (51.4%) of transplanted patients were on regular HD for more than one year, 42 (40%) were on regular HD for less than one year and just nine (8.6%) of them underwent transplantation pre-emptively. A study showed that PKT was associated with a 43% reduction in the hazard of graft failure when compared with patients who treated by dialysis before KT. Another study showed that Patients with pre transplant dialysis were three times more likely to have delayed graft function than pre-emptive transplant patients were, and were 10 times more likely to receive post-transplant dialysis. Five-year patient survival was 92.9%. Five-year graft survival was 89.0% [12]. Another study concluded that all subjects derived a survival benefit from transplantation with waiting times up to 3 years [13].

Study for 10-year graft survival for living and cadaveric was 75% - 69%, for pre-emptive transplants versus 49% - 39% for living transplants after 24 month on dialysis respectively [14]. Increased waiting times from one to 3 years only moderately decreased the overall survival benefit of transplantation from 7.1 to 5.6 years. Transplant recipients had a lower long-term RR of death that increase parallel with waiting time [13]. In comparison with our findings, about half 48.6% of the patients in less than one year from time they develop ESRD. Another study showed more advantage for early transplant that a cadaveric renal transplant recipient with an ESRD time less than 6 months has the equivalent graft survival of living donor transplant recipients who wait on dialysis for more than 2 years [14].

The vascular access was different with 75 (71.4%) of them have surgically created AVF, 20 (19%) underwent dialysis through permanent central line, only 4 (3.8%) had temporal central line before they underwent transplantation and (5.7%) had no vascular access. This matched with the NKF/KDOQI vascular access guidelines, which recommend that greater than 65% of prevalent HD patients have a functional AV fistula. In a regional study, 80% started dialysis via catheter and less than 20% had a permanent vascular access (atrio-venous fistula) [15]. Other

international study of the HD patients, 79% had autologous arteriovenous fistula [16]. Moreover, a third data reported that of total patients on HD, 83.6% had a functioning arterio-venous (AV) fistula, 7.3% had a tunnelled HD catheter and 9.1% had a non-tunnelled catheter [3].

Most of the patients were discharge uneventful with good outcome. During one-year follow-up following renal transplantation, five (4.8%) patients died. Causes and period between the time of transplantation and death for each patient discussed. The average increase in life expectancy in transplant recipients was 9.8 years and was lower in older recipients and recipients with co-morbid conditions [13].

Other complications include 17.1% patients develop graft loss, two of them died of other causes.

Similar study showed One-year patient survival of 94% (compared to 95.2% in our study) for the 1980s. Actuarial one year graft survival of 86% (compared to 92.4% in our study) in 1980s [17]. A regional study in Africa showed Patient survival at one year was 97.8% while allograft survival was 88.9% [18]. In compare to one-year survival of living related renal transplants in the KSA 98.4% and One year allograft survival of LRT in KSA (96.7%) [18].

Improvement in graft survival due to the two leading causes, chronic rejection and cardiovascular causes of death was relatively small, if any. These data indicate that future kidney transplantation research should emphasize prevention of chronic rejection and cardiovascular death [17].

Chronic graft rejection occurred in 3.8% of patients. In a similar study, it found to be responsible of 24% of graft loss during the first year [17], compared with 50% in our study. Another study showed 2.2% biopsy-proven chronic allograft nephropathy (CAN) [18].

Acute graft rejection occurred in 12.4%, of them 2.9% return to dialysis and the rest recovered after receiving treatment.

In one 1% diabetic patient, the renal biopsy showed recurrence of the etiological disease (microangiopathic nephropathy) without evidence of graft rejection.

In a regional study in Africa in which 20% had biopsy proven acute rejections, which recovered, in 2.2% of patients the graft was lost [18]. An Indian study assigned to that introduction of modern immunosuppressant protocol, the incidence of acute graft rejection has come down to less than 1% [9].

One patient 1% developed leak at the VUJ, re-implantation with insertion of JJ stent done successfully, at lower data reported incidence of 1% to 4.3% risk. Obstructive uropathy (BOO) in 1.9% of patients. Postoperative bleeding needed exploration in 1.9% of patients, one 1% patient developed perinephric hematoma with ultrasound-guided aspiration successfully done.

Cardiovascular complications occurred in 4.8% patients who developed MI one 1% of them died intra-operative period and 1% died after one month. Similar study shoed less percentage (18% of death) cardiovascular causes with function graft [17], compared with 40% in our study.

One 1% died of pseudo-tumour cerebri (known complication of steroid use)

after seven months. It is close to an Indian study with mortality due to intracranial complications (intracranial haemorrhage) in 0.91% [9]. Another patient died due to GE presented with intractable diarrhoea that cause gastro-enteritis, that constitute 20% of causes of death with function, a comparative study has less finding of 13% to infectious causes of death with function [17]. Death due to unrelated causes occurred in one patient account of 20% of death with function; comparative study finding was 17% for other causes of death [17].

Lymphocele occurred in 1.9% of patients, within the clinical incidence which is uncertain in large series and varying from 0.6% to 18.1%, however, the actual rate of occurrence is unexpected high up to approximately 50% [12]. An Indian study showed the same finding of 7.1% symptomatic lymphocele [19]. Another study in asymptomatic patients, ultra sound screening showed (23%) of the transplant patients, that is less than the known incidence [20].

During the first year post KTx, 8.6% patients developed urinary tract infection and treated successfully. UTI is the commonest bacterial infection occurring in renal transplant recipients, and it is associated with significant morbidity [21]. The commonest causative agent was E. coli, and ciprofloxacin was the most commonly used drug [21]. our data were less than the known incidence of 30% - 40% of recipients during the first four months after transplantation [21], and also less than a regional study in Nigeria, urinary tract infection (UTI) occurred in (20%) of patients [18]. Moreover, another study in Lybia where UTI was diagnosed in 29.5% of patients in the first year [21].

Superficial wound infection developed in 3.8%. Close to an Indian study where wound, infection occurred in 3.3% of patients [19]. In addition, less than another study with wound infection in 4.58% [9]. And an African study where it was 8.8% Patients [18].

Tuberculosis occurred in 3.8%, half of them were relapse (of eight patients treated from TB before they underwent TRx relapse is 25%). The incidence of TB among KTRx varies according to geographic locations, with rates of 0.5% - 1.0% reported in North America, 0.7% - 5% in Europe and 5% - 15% in India and Pakistan.

Chest infection in 2.9% of patients, one patient developed each of the following (HBV, and brain abscess). cytomegalovirus (CMV) in one patient during the one year follow-up and treated successfully compared to 13.3% of patients in a regional African study [18].

Polycythemia found to be developed in 17.1% of patients, but only one of them was symptomatic and needed treatment, which is comparable to 8% to 22% among reports identified from earlier clinical practice guideline publications. More recent studies document that erythrocytosis still occurs in KTRs [22]. One % patient developed thrombocytopenia.

Study Limitations:

The limitations of this study include that: patients from rural areas who undergone renal transplantation in khartoum state travel to their areas after trans-

plantation and find it diffecult to return for regular follow up.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Appendix

Table A1. Shows distribution of patients according to age (N = 105).

Age group	Frequency	Percent %
18 - 25 years	19	18.10%
26 - 35 years	37	35.20%
36 - 45 years	21	20%
46 - 55 years	22	21%
55 - 65 years	6	5.70%
Total	105	100

Table A2. Distribution of Patients according to relation of donor to recipient in correlation with graft dysfunction (N = 18).

Graft dysfunction	Relation			Total
	First degree relative	Second degree relative	Un related	
Recurrence	1	0	0	1
Acute rejection recovered	9	1	0	10
Chronic rejection	3	1	0	4
Acute rejection not recovered	3	0	0	
Total	16	2	0	18

Table A3. Shows Distribution of Patients According to Match in correlation with Graft Dysfunction (N = 18).

Graft dysfunction	Tissue match			Total
	<25%	25% - 50%	>50% - 75%	
Recurrence	1	0	0	1
Acute rejection recovered	1	8	1	10
Chronic rejection	0	3	1	4
Acute rejection not recovered	0	3	0	3
Total	2	14	2	18

Table A4. Distribution of patients according to type of vascular access to HD (N = 105).

Vascular access	Frequency	Percent %
Had no vascular access	6	5.7
Temporal central line	4	3.8
Permanent central line	20	19
Surgically created AVF	75	71.4
Total	105	100

Table A5. Shows distribution of patients according to duration of warm ischemia in correlation with graft dysfunction (N = 105).

Graft dysfunction	Duration of Warm Ischemia		Total
	Up to one minute	1 - 2 minutes	
Recurrence	1	0	1
Acute rejection recovered	8	2	10
Chronic rejection	4	0	4
Acute rejection not recovered	3	0	3
Total	16	2	18

Table A6. Shows distribution of patients according to duration of cold ischemia in correlation with graft dysfunction (N = 105).

Graft dysfunction	Duration of Cold Ischemia			Total
	Up to 1 hours	>1 - 2 hours:2hr	2 - 3 hours	
Recurrence	1	0	0	1
Acute rejection recovered	0	9	1	10
Chronic rejection	0	4	0	4
Acute rejection not recovered	0	3	0	3
Total	1	16	1	18

Table A7. Shows distribution of patients those developed UTI in correlation with time of urinary catheter and JJ- stents removal (N = 9).

UTI	Time of catheter			Time of JJ-stent removal		
	Up to 6 days P.O	7 - 14 day P.O	>14 days P.O	After one week	After three weeks	After six weeks
occurred	5	3	1	5	1	3
Total		9			9	

Table A8. Shows mortality age groups, causes, time to event, and graft status (N = 5).

Age groups	Death	Cause of death	Time to event	Graft status
18 - 25	0	0	-	-
26 - 35	1	Gastro enteritis	Two months	Death with function
36 - 45	1	Pseudo tumour cerebri	Seven months	Death with function Recovered acute rejection
46 - 55	2	MI	One month	Death with function
		Un related casue	Four months	Graft lost-returned to dialysis
56 - 65	2	MI	Early post operative	Death with function
Total	5	-	-	80% death with function

Table A9. Shows distribution of graft dysfunction according to age groups (N = 105).

Age groups	Acute rejection recovered	Acute rejection not recovered	Chronic rejection	Recurrence	Total
18 - 25	1	0	0	0	1
26 - 35	5	0	3	0	5
36 - 45	0	2	1	1	2
46 - 55	4	1	0	0	5
56 - 65	0	0	0	0	0
Total	10	3	4	1	13

Table A10. Shows graft dysfunction time to event (N = 18).

Time of rejection after transplant	Graft Dysfunction				total
	Acute rejection recovered	Acute rejection not recovered	Chronic rejection	Recurrence	
1 month	9	1	0	1	11
3 month	1	1	0	0	2
6 months	0	1	4	0	5
Total	10	3	4	1	18

Table A11. Shows distribution of surgical complications according to age groups (N = 105).

Age groups	Obstr. Uropathy	Incisional hernia	Perinephric haematoma	Lymphocele	Superficial wound infection
18 - 25	1	0	0	0	0
26 - 35	1	1	2	1	1
36 - 45	0	0	0	0	1
46 - 55	0	0	0	0	2
55 - 65	0	2	0	1	0
Total	2	3	2	2	4

Table A12. Shows distribution of medical complications according to age groups (N = 105).

Age groups	NODAT	Goitre	GE	Chest Infection	UTI	TB	MI	CMV	PTE
18 - 25	6	1	0	1	1	1	2	0	5
26 - 35	5	0	1	1	4	2	0	0	8
36 - 45	4	0	0	1	1	1	0	1	4
46 - 55	2	0	0	0	2	0	1	0	1
55 - 65	0	0	0	0	1	0	2	0	0
Total	17	1	1	3	9	4	5	1	18

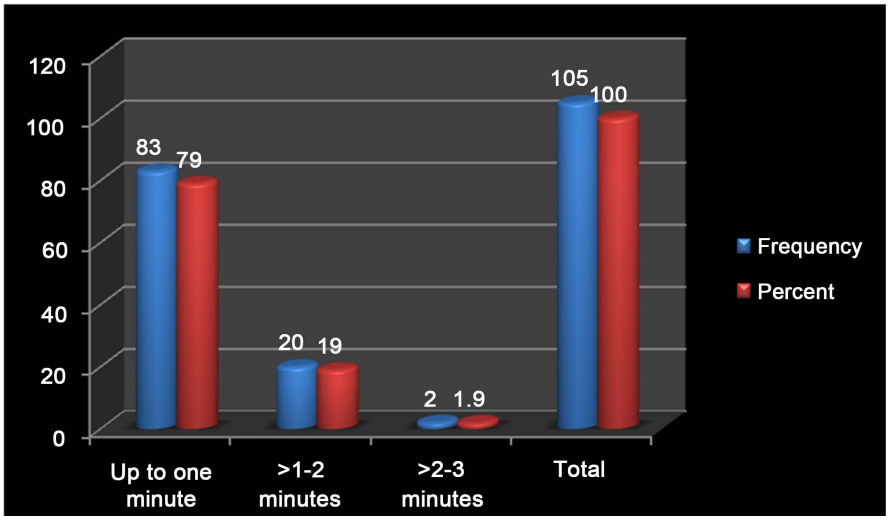

Figure A1. Shows distribution of patients according to warm ischemic time (N = 105).

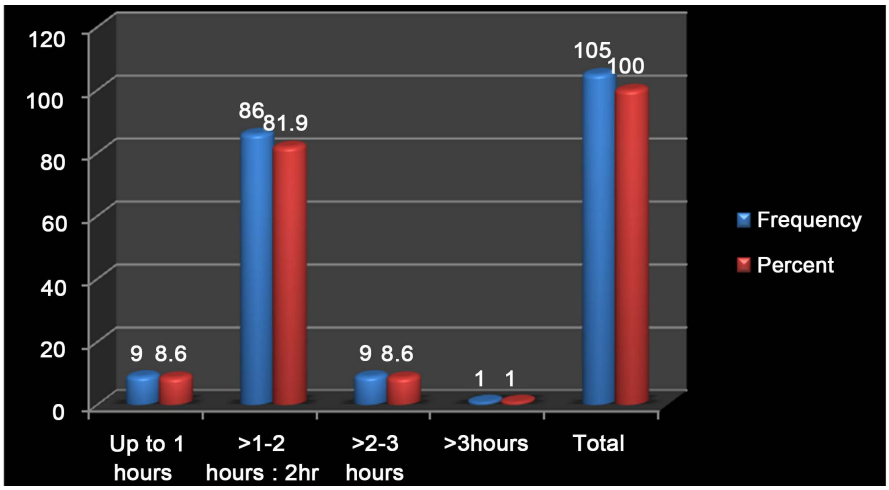

Figure A2. Shows distribution of patients according to cold ischemic time (N = 105).

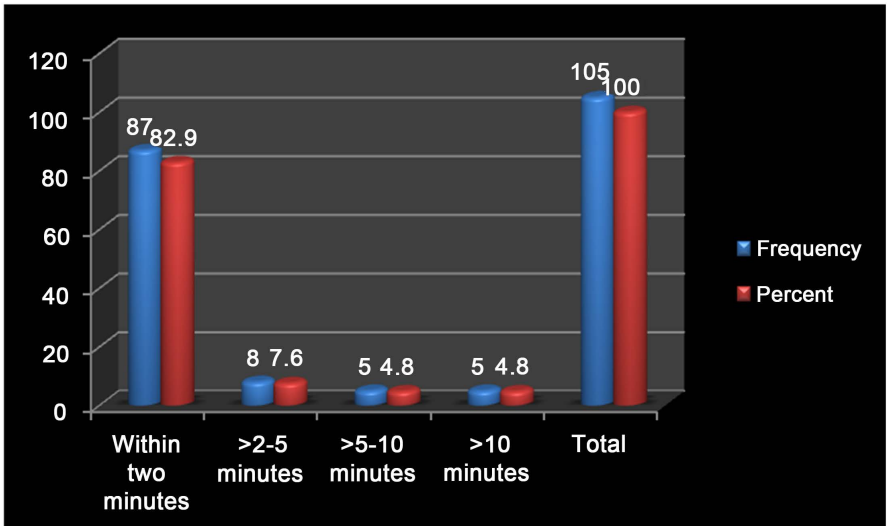

Figure A3. Shows distribution of patients according to time of voiding (N = 105).

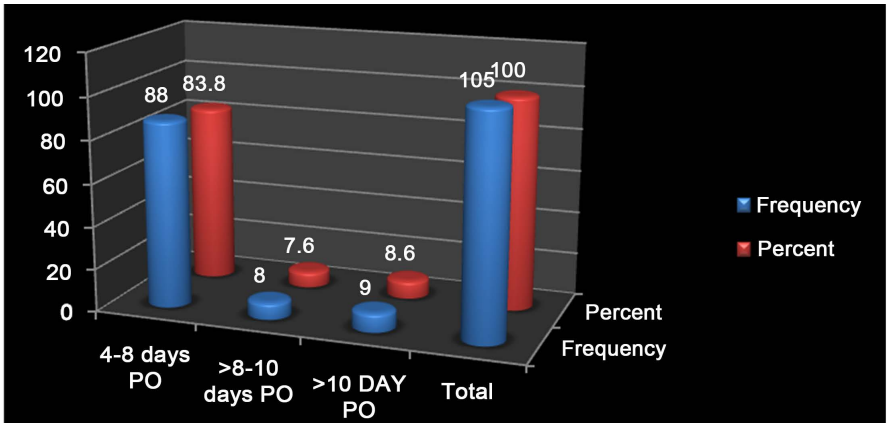

Figure A4. Shows distribution of patients according to time of drain removal P.O (N = 105).

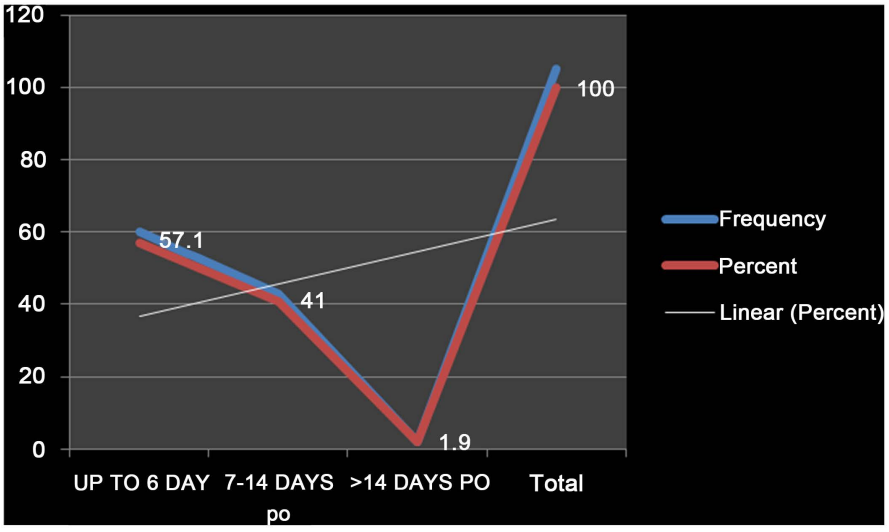

Figure A5. Shows distribution of patients according to time of catheter removal P.O (N = 105).

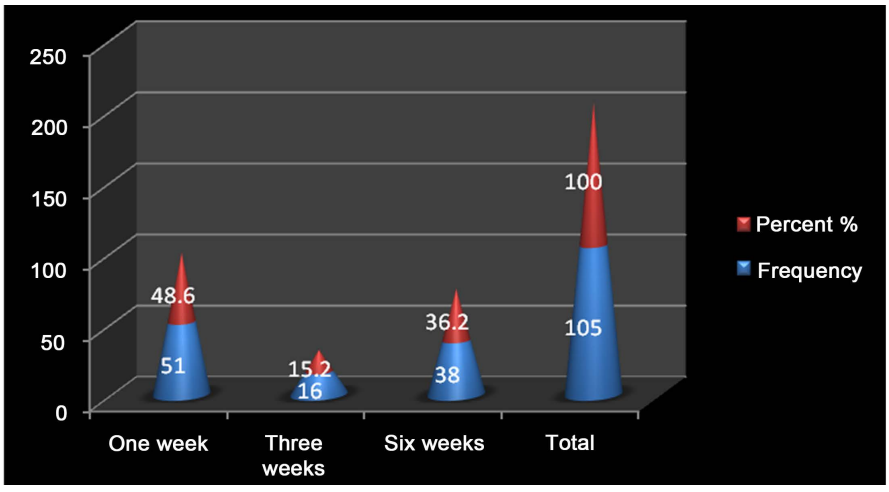

Figure A6. Shows distribution of patients according to time of JJ-stent removal P.O (N = 105).

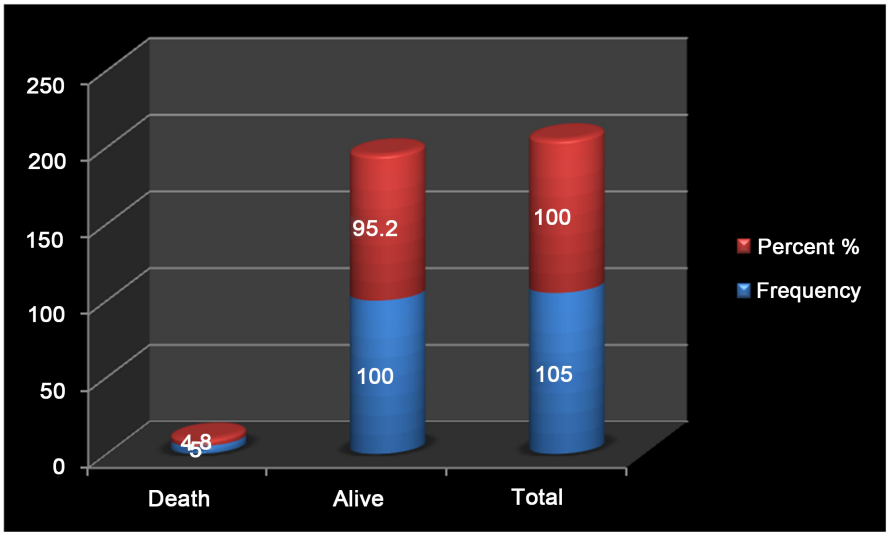

Figure A7. Shows distribution of patients according to mortality (N = 105).

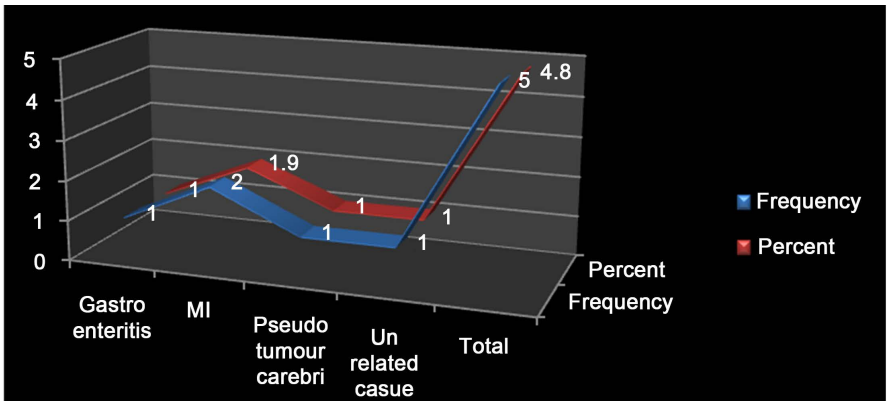

Figure A8. Shows distribution of patients according to cause of death (N = 105).

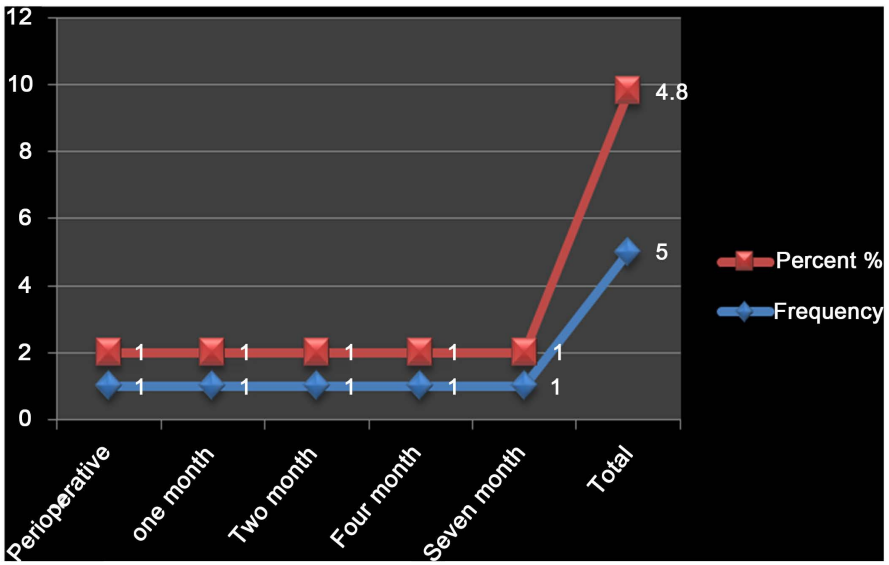

Figure A9. Shows distribution of patients according to period from time of operation to time of death (N = 105).

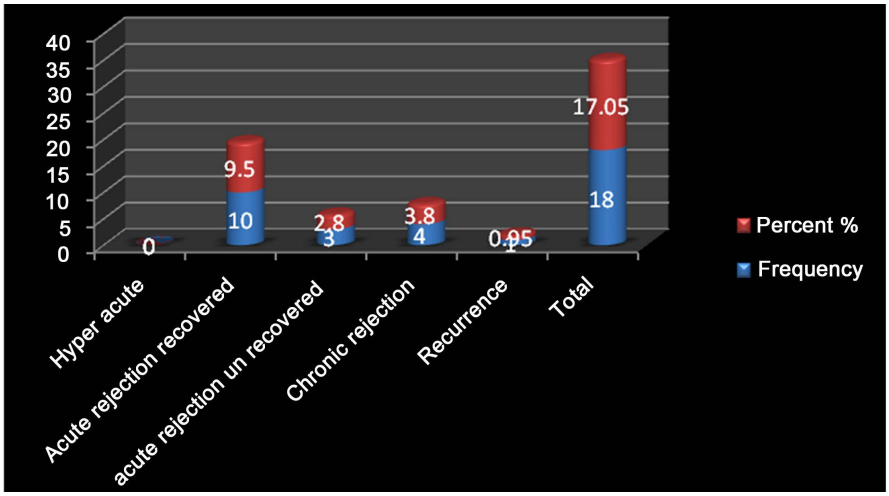

Figure A10. Shows distribution of patients according to graft survival (N = 105).

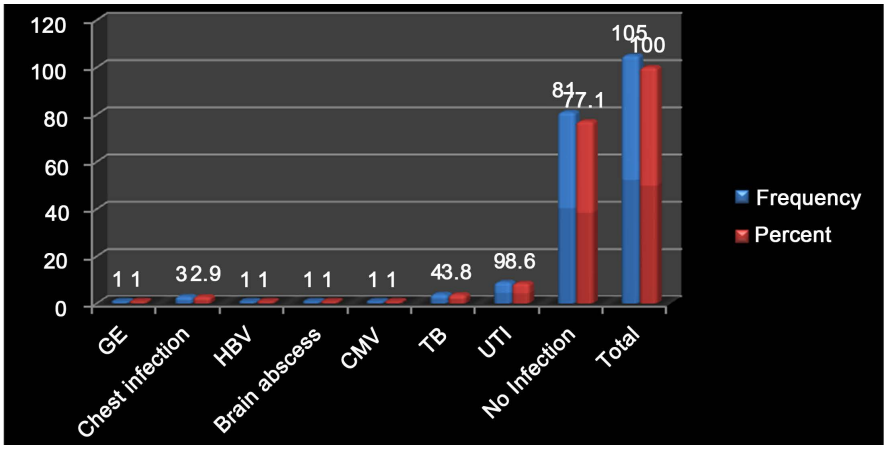

Figure A11. Shows distribution of patients according to post KT infection (N = 105).