Characteristics of kidney transplant recipients (Table 1 a)

Table (1a) shows that the mean age of our cases was 8.9 ±2.4 years, their mean body weight was 20.5 ± 3 kilogram, the majority of them were boys 71.4% and the majority were maintained on hemodialysis 71.4%.

	Number	**Percentage**
Age :-		
Mean (years) ± SD (8.9 ±2.4)		
• 5 – 7 years	20	(31.7 %)
• 8 – 10 years	22	(34.9 %)
• More than 10 years	21	(33.3 %)
Sex :-		
• Male	45	(71.4 %)
• Female	18	(28.6 %)
Dialysis :-		
• Preemptive	9	(14.3 %)
• Haemodialysis	45	(71.4 %)
• Peritoneal dialysis	9	(14.3 %)
Pre-transplant body weight :-		
Mean (kgm) ± SD	(20.5 ± 3)	
• 15 – 20 kgm	24	(39.7 %)
• 20 – 25 kgm	39	(60.3 %)

Original kidney disease (Table 1b)

Table (1b) shows that the commonest cause of renal failure among our cases was reflux nephropathy 20.6 %, while glomerular causes were 15.9 %.

Original kidney disease	**Number**	**Percentage**
Hypoplasia, dysplasia	3	(4.8%)
Hereditary nephritis	2	(3.2 %)
Cystic kidney disease	3	(4.8 %)
Oxalosis	2	(3.2 %)
Mesangiocapillary glomerulonephritis	3	(4.8 %)
Focal segmental glomerulosclerosis	6	(9.5 %)
Crescetic glomerulonephritis	1	(1.6 %)
Chronic tubulo-interstitial disease	2	(3.2 %)
Chronic pyelonephritis	9	(14.3%)
Stone kidney disease	1	(1.6 %)
Reflux nephropathy	13	(20.6 %)
Unknown	18	(28.6 %)

Characteristics of kidney donors (Table 2)

Table (2) shows that the mean age of the donors was 34.2±6.2 years. The majority of them were females 71.4%, parents 84.1%, and had the same blood group of the recipient 71.4 %.

	Number	Percentage
Age :-		
• Mean (years) ± SD : 34.2 ± 6.2		
• Range : 21-45		
Sex :-		
• Male	18	(28.6 %)
• Female	45	(71.4 %)
Relation :-		
• Related		
1. parents	53	(84.1 %)
2. other related	4	(6.3 %)
• unrelated	6	(9.5 %)
Blood group :-		
• The same	45	(71.4 %)
• Different but compatible	18	(28.6 %)

Percentage of HLA matching (Table 3)

Table (3) shows that the majority of cases had 50% matching.

	Number	Percentage
HLA matching :-		
• Zero match	2	(3.2 %)
• One match	5	(7.9 %)
• Two match	40	(63.5 %)
• Three match	6	(9.5 %)
• Four match	1	(1.6 %)
• Missing	9	(14.3 %)
DR matching:-		
• One match	60	(95.2 %)
• Two match	3	(4.8 %)

Surgical Aspects (Table 4)

Table (4) shows that the mean ischemia time was 57.3±16.1 minutes, the majority of cases had immediate diuresis (63.5%), the majority of arterial anastomosis were to the common iliac artery (44.4%), and the venous anastomosis to the inferior vena cava (95.2%). The primary urinary recontinuities were mainly through Leich Grigoir uretero-vesical anastomosis (88.9%) and secondary urinary recontinuity was performed for 4 cases through uretero-ureteral anastomosis.

	Number	Percentage
Ischemia time:-		
Mean (minutes) ± SD : 57.3 ±16.1		
Range : (30 – 104)		
Diuresis :-		
• Immediate	40	(63.5%)
• Delayed	23	(36.5%)
Vascular anastmosis :-		
• Number of renal arteries:-		
▪ Single	56	(88.9%)
▪ Double	7	(11.1%)
• Main renal artery to :-		
▪ Internal iliac artery	16	(25.4%)
▪ Common iliac artery	28	(44.4%)
▪ Aorta	19	(30.2%)

	Number	Percentage
• Second renal artery:-		
▪ Internal iliac artery	2	(3.2%)
▪ Common iliac artery	3	(4.8%)
▪ Aorta	2	(3.2%)
• Renal vein to:-		
▪ External iliac vein	3	(4.8%)
▪ Inferior vena cava	60	(95.2%)
Primary urinary recontinuity:-		
• Uretero-vesical (lead better)	2	(3.2%)
• Uretero-vesical (Leich-Grigoir)	56	(88.9%)
• Uretero-ureteral	4	(6.3%)
• Pyelo-ureteral	1	(1.6%)
Secondary urinary recontinuity:-		
• uretero-ureteral	4	(6.3%)

Immunosuppressive Therapy (Table 5)

Table (5) shows that the commonest primary immunosuppressive therapy used was the triple therapy (steroid, cyclosporine and azathioprine) (42.9 %), the secondary immunosuppressives were needed for 50.8 % of cases mainly due to resistant rejection (30.2 %). The type of secondary immunosuppression was mainly based on FK 506, MMF or both.

	Number	Percentage
Primary immunosuppressive therapy :-		
• Steroid + Cyclosporine A	11	(17.5 %)
• Steroid + Cyclosporine A + Azathioprine	27	(42.9 %)
• Basiliximab + Steroid + FK 506 + Mycophenolate mofetil	5	(8 %)
• Basiliximab + FK 506 + Mycophenolate mofetil	20	(31.8 %)
Secondary immunosuppressive therapy :-		
• Need :-	32	(50.8 %)
• Indications :-		
▪ Resistant rejection	19	(30.2 %)
▪ Elective	6	(9.5 %)
▪ Chronic tubulo-interstitial fibrosis	4	(6.3 %)
▪ Hepatic impairment	2	(3.2 %)
▪ Cosmotic	1	(1.6 %)
• Types :-		
Steroid + Cyclosporine A + Azathioprine	5	(7.9 %)
Steroid + Azathioprine	1	(1.6 %)
Steroid + Cyclosporine A	1	(1.6 %)
Steroid + FK 506 + Azathioprine	7	(11.1 %)
Steroid + Cyclosporine A + Mycophenolate mofetil	10	(15.9 %)
Steroid + FK 506 + Mycophenolate mofetil	5	(7.9 %)
Rapamycin + Mycophenolate mofetil	2	(3.2 %)

Acute rejection episodes (Table 6)

Table (6) shows that nearly half of cases experienced acute rejection episodes and the majority of them had one rejection episode.

	Number	Percentage
Patients with rejection:	29	(46 %)
Rejection -free patients:	34	(54 %)
Frequencies of acute rejection episodes per patient:-		
• One rejection	11	(17.5 %)
• Two rejections	9	(14.3%)
• Three rejections	6	(9.5 %)
• Four rejections	3	(4.8 %)

"Of a total number of 59 acute rejection episodes, 35 are graft biopsy based, while the rest are fine needle aspiration cytology (F.N.A.C) based"

Impact of Primary immunosuppressive regimen on incidence of acute rejection episodes (Table 7)

Table (7) shows that the type of primary immunosuppressive regimen has a significant impact on incidence of acute rejection.

	Acute rejection		P.value
	No	Yes	
Primary immunosuppressive regimen:			
• Steroid + Cyclosporine A	5	6	
• Steroid + Cyclosporine A + Azathioprine	9	18	
• Basiliximab + Steroid + FK 506 + Mycophenolate mofetil	4	1	
• Basiliximab + FK 506 + Mycophenolate mofetil	16	4	0.008

Histopathological findings (Table 8)

Table (8) shows that the commonest pathological findings were acute cellular rejection (35.6 %), chronic rejection (42.6 %).

Findings:	**Number**	**Percentage**
▪ Acute cellular rejection	31	(35.6 %)
▪ Acute vascular rejection	4	(4.5 %)
▪ Chronic rejection	37	(42.6 %)
▪ Cyclosporine A toxicity	3	(3.4 %)
▪ FK506 toxicity	3	(3.4 %)
▪ Transplant glomerulopathy	2	(2.3 %)
▪ Recurrence of original kidney disease	2	(2.3 %)
▪ Acute tubular necrosis	1	(1.1 %)
▪ Cortical necrosis	2	(2.3 %)
▪ Insufficient	2	(2.3 %)

Post-transplant complications (Table 9a)

Table (9a) shows that the commonest medical problems were Bacterial infections (63.5%), and post-transplant hypertension (58.7%), while the commonest surgical problems were graft obstruction (6.3%) and Lymphocele (4.8%).

	Number	Percentage
Medical problems:-		
• Hypertension	37	(58.7 %)
• Diabetes mellitus	0	(0 %)
• Hepatic impairment	3	(4.8 %)
• Bacterial infections	40	(63.5 %)
• Viral infections	9	(13.2 %)
• Acute tubular necrosis	1	(1.6 %)
• Cerebral hemorrhage	1	(1.6 %)
• Heart failure	1	(1.6 %)
• Gum hypertrophy	1	(1.6 %)
Surgical problems:-		
• Graft obstruction	4	(6.3 %)
• Lymphocele	3	(4.8 %)
• Urinary leakage	1	(1.6 %)
• Hematoma	1	(1.6 %)

The infectious complications (Table 9b)

Table (9b) shows that the commonest bacterial infections was respiratory tract infections (50.8%) while viral infections occur in 14.3% of cases.

	Number	Percentage
Bacterial infections :-		
• Respiratory tract infections	32	(50.8 %)
• Urinary tract infections	4	(6.3 %)
• Muco-cutanous infections	4	(6.3 %)
Viral infections :-		
• Cytomegalo virus	3	(4.8 %)
• Herpes Zoster	2	(3.2 %)
• Chicken pox	3	(4.8 %)
• Epstien Bar virus	1	(1.6 %)

The condition at last follow up (Table 10)

Table (10) shows that at last follow up (march 2009) with a mean duration after transplantation of 74.2±52.8 months, 54% of cases were living with functioning graft, 34.9% were living on dialysis, and 3 cases (4.8%) died with functioning graft .

Post transplant follow up period		
• Range (months)	1.1 – 231.5	
• Mean (months) ± SD	74.2 ± 52.8	
The condition at last follow up (March 2009)	**Number**	**Percentage**
• Living with functioning graft	34	(54 %)
• Living on dialysis	22	(34.9 %)
• Died with functioning graft	3	(4.8 %)
• Lost follow up	4	(6.3 %)

lmpact of demographic variables on graft survival (Table 11)

Table (11) shows that by univariate analysis none of the demographic data was significant as a risk factor for graft failure except for unrelated donors who were associated with lower graft survival but this did not reach statistical significance.

	Functioning grafts No (34)	**Failed grafts No (25)**	**P. value**
Recipient age:	8.7 ± 2.9	9 ± 2.1	0.647
Donor age:	34.2 ± 3	34 ± 2	0.975
Recipient sex:			
• Male	27	15	
• Female	7	10	0.104
Donor sex:			
• Male	8	8	
• Female	26	17	0.470
Donor relationship:			
• Related	33	21	
• Unrelated	1	4	0.075
Pre-transplant weight:			
• 15 - 20 kgm	14	9	
• 20 - 25 kgm	20	16	0.687

Impact of pre-transplant variables on graft survival (Table 12a)

Table (12a) shows that by univariate analysis the glomerular kidney disease, pre-transplant blood transfusion, pre-transplant dialysis, and pre-transplant hypertension were significant risk factors for graft failure.

	Functioning grafts No (34)	Failed grafts No (25)	P.value
Original kidney disease:			
• Glomerular	1	7	
• Non glomerular	33	18	0.005
Blood group:			
• Same	23	18	
• Different compatible	11	7	0.720
Pre-transplant blood transfusion:			
• Yes	5	15	
• No	29	10	0.001
Pre-transplant dialysis:			
• Yes	26	24	
• No	8	1	0.039
Type of dialysis:			
• Hemodialysis	23	19	
• Peritoneal dialysis	3	5	0.113
Pre-transplant hypertension:			
• Yes	9	18	
• No	25	7	0.001
Recipient HCV infection:			
• Yes	23	2	
• No	6	3	0.066

Impact of HLA and DR matching on graft survival (Table 12b)

Table (12b) shows that HLA and DR matching had no significant impact on graft survival.

	Functioning grafts No (34)	Failed grafts No (25)	P. value
HLA matching:			
• zero match	2	0	
• one match	1	3	
• two match	17	21	
• three match	4	1	
• four match	1	0	0.183
DR matching:			
• one match	31	25	
• two match	3	0	0.127

Impact of intra-operative finding on graft survival (Table 13)

Table (13) shows that by univariate analysis only the site of vascular anastmosis of main renal artery was the significant intra-operative findings as risk factors for graft failure.

	Functioning grafts No (34)	Failed grafts No (25)	P .value
Number of renal arteries:			
• Single	30	23	
• Double	4	2	0.636
Time to diuresis:			
• Immediate	24	14	
• Delayed	10	11	0.247
Site of vascular anastmosis of main renal artery:			
• Aorta	17	1	
• Common iliac artery	15	11	
• Internal iliac artery	2	13	0.002
1ry urinary recontinuity:			
• Ureterovesical(leadbetter)	0	2	
• Ureterovesical(leichgrigoir)	33	19	
• Ureteroureteral	1	3	
• Pyelo-ureteral	0	1	0.088

Impact of post-transplant medical variables on graft survival (Table 14a)

Table (14a) shows that by univariate analysis acute rejection, chronic rejection and post-transplant hypertension were highly significant risk factors for graft failure.

	Functioning grafts No (34)	Failed grafts No (25)	P.value
ATN:			
• Yes	0	1	
• No	34	24	0.240
Acute rejection:			
• Yes	9	19	
• No	25	6	< 0.001
Type of acute rejection:			
• Acute cellular rejection	5	14	
• Acute vascular rejection	4	5	0.337
Chronic rejection:			
• Yes	5	19	
• No	29	6	< 0.001
Hypertension:			
• Yes	13	21	
• No	21	4	< 0.001
Bacterial infections:			
• Yes	20	18	
• No	14	7	0.296

Impact of post-transplant surgical variables on graft survival (Table 14b)

Table (14b) shows that by univariate analysis graft obstruction was a significant risk factors for graft failure.

	Functioning grafts No (34)	Failed grafts No (25)	P.value
Renal artery thrombosis:			
• Yes	1	0	
• No	33	25	0.387
Lymphocele:			
• Yes	0	2	
• No	34	23	0.093
Graft obstruction:			
• Yes	0	4	
• No	34	21	0.016

Factors affecting graft survival by multivariate analysis (Table 15)

Table (15) shows that by multivariate analysis only the incidence of acute rejection and chronic rejection were significant risk factors on graft survival.

Variable	Regression estimate (B)	SE	Relative Risk Exp (B)	P.value
Acute rejection:	1.789	0.718	5.981	0.013
Chronic rejection:	2.626	0.721	13.818	<0.001

Standard deviation score for height and weight (Table 16)

Table (16) shows that the mean standard deviation score **(**SDS) for height at transplantation was (- 2.84 ±1.15), and this improved at the last follow up after transplantation to (- 2.1± 1.36). The mean SDS for weight at transplantation was (- 0.52 ± 1.62), and this improved at last follow up after transplantation to (+ 0.14 ± 1).

	Mean ± SD
SDS for height at transplantation:	- 2.84 ± 1.15
SDS for height at last follow up:	- 2.1 ± 1.36
SDS for weight at transplantation:	- 0.52 ± 1.62
SDS for weight at last follow up:	+ 0.14 ± 1
BMI at transplantation (kg/m2):	15.9 ± 2
BMI at last follow up (kg/m2):	20.4 ± 4.1

Effects of pre-transplant variables on final height (Table 17)

Table (17) shows that the higher age and female sex of recipient and the impaired pre-transplantation height were the significant pre-transplantation risk factors for impaired final height.

	SDS for final height (– 2 or better) (No = 24)	**SDS for final height (worse than – 2) (No = 28)**	**P .value**
Age of recipient:			
• Mean (years) ± SD	7.88 ± 2.5	9.5 ± 2.4	0.019
Sex of recipient:			
• Male	22	17	
• Female	2	11	0.010
Original kidney disease:			
• Tubulo-interstitial	8	3	
• V.U.reflux	6	6	
• Hereditary	3	5	
• Glomerular	1	4	
• Unknown	6	10	0.258
Height SDS at transplantation:			
• - 2 or more	7	1	
• Less than - 2	17	27	0.011
Pretransplant dialysis:			
• Yes	19	25	
• No	5	3	0.313
Age of starting dialysis:			
• Mean (years) ± SD	6.88 ± 2.6	7.7 ± 2.5	0.258
Dialysis duration:			
• Mean (months) ± SD	11.9 ± 16.2	21.9 ± 26.6	0.114

Effects of post-transplant variables on final height (Table 18)

Table (18) shows that chronic rejection is a significant risk factor for impaired final height.

	SDS for final height (– 2 or better) (No = 24)	**SDS for final height (worse than – 2) (No = 28)**	**P. value**
Immunosuppressive regimen:			
• Steroid + Cyclosporine A	2	4	
• Steroid + Cyclosporine A + Azathioprine	7	14	
• Basiliximab + Steroid + FK506 + Mycophenolate mofetil	2	3	
• Basiliximab + FK 506 + Mycophenolate mofetil	13	7	0.193
Acute rejection episodes:			
• Yes	9	13	
• No	15	15	0.516
Chronic rejection:			
• Yes	4	14	
• No	20	14	0.012

Effect of steroid therapy on final height (Table19)

Table (19) shows that the steroid free immunosuppressive regimen and the low cumulative steroid dose (in the first year) had a significant impact on improved final height.

	SDS for final height (– 2 or better) (No = 24)	**SDS for final height (worse than – 2) (No = 28)**	**P. value**
Immunosuppressive regimen:			
• Steroid free	13	7	
• Steroid based	11	21	0.031
Cumulative steroid dose in the 1st year:			
• Mean (grams) ± SD	2.38 ± 1.3	3.64 ± 2	0.013
Total cumulative steroid dose:			
• Mean (grams) ± SD	7 ± 7	10.6 ± 7.2	0.082

Effects of graft function on final height (Table 20)

Table (20) shows that graft function had a significant impact on final height.

	SDS for final height (– 2 or better)	SDS for final height (worse than – 2)	P.value
S.cr (mg/dL) (mean ± SD):			
• First year	0.8 ± 0.2	1.1 ± 0.8	0.076
• Second year	0.85 ± 0.2	1.1 ± 0.5	0.021
• Last follow up	1.3 ± 1.1	2.8 ± 2	0.002
GFR (ml/min) (mean ±SD): Last follow up	65.2 ± 24.3	46.2 ± 33.6	0.026
Graft function:			
• Functioning grafts	21	13	
• Failed grafts	2	13	0.002

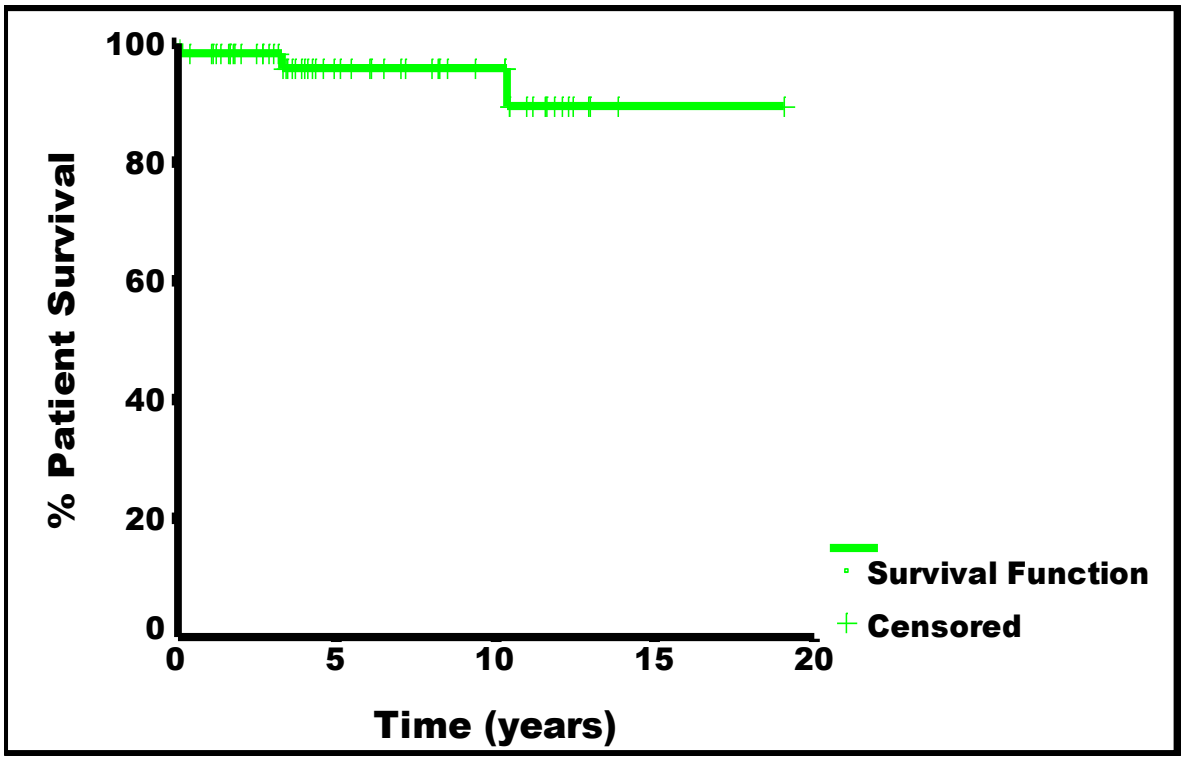
Factors affecting final height by multivariate analysis (Table 21)

Table (21) shows that by multivariate analysis only the pre-transplant height and the graft function were significant risk factors on final height.

Variable	Regression estimate (B)	SE	Relative Risk Exp (B)	P.value
Pre-transplant height	**3.156**	**1.434**	**23.475**	**0.028**
Graft function	**2.908**	**1.109**	**18.313**	**0.009**

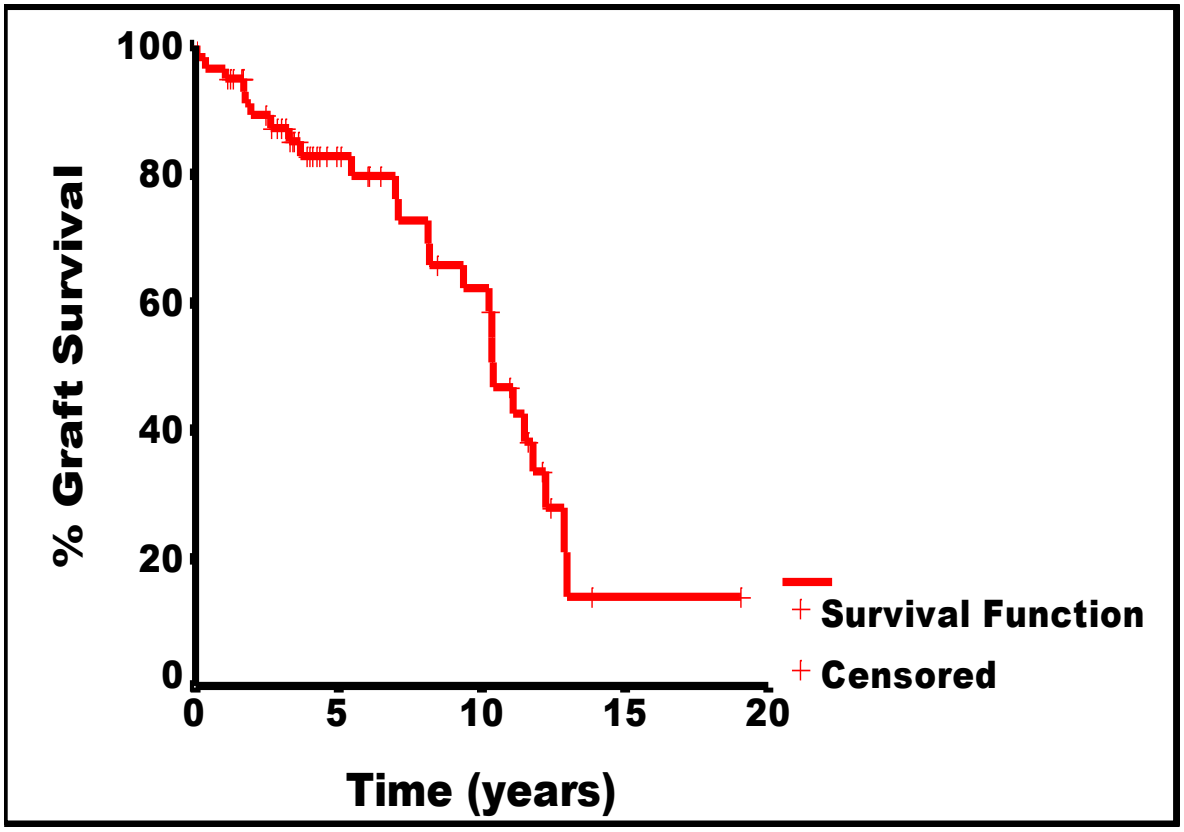
Patient survival (Figure 1)

Figure (1) shows that the patient survival was 98.4% ,96.8%, 96.8%.at 1, 5, and 10 years, respectively.



Graft survival (Figure 2)

Figure (2) shows that 1 year graft survival was 94.9%, 5 years graft survival was 82.6%, and 10 years graft survival was 58.4%.



Impact of primary immunosuppressive regimen on graft survival (Figure 3)

Figure (3) shows that FK506 based primary immunosuppressive regimens had a better graft outcome than Cyclosporine based primary immunosuppressive regimens. However, this did not rank to statistical significance.