Demographic and pre-transplant characteristics of the 2000 renal transplants

A- Personal data of the recipients

Recipients suffered post transplant GN were younger than the recipients who did not suffer from GN. Recipients aged less than 20 years were more frequent in the PTGN group. No significant differences observed between the two groups regarding the gender (table 3A).

	No GN (n=1897)	PTGN (n=103)	p-value
Age (years),			
Mean (SD)	29.84 (10.62)	27.56 (10.55)	0.034
Range (years), n (%)			
<20	363 (19.1)	30 (29.1)	
20-30	595 (31.4)	31 (30.1)	
30-40	572 (30.2)	28 (27.2)	
40-50	295 (15.6)	11 (10.7)	
>50	72 (3.8)	3 (2.9)	
Gender, n (%)			
Male	1413 (74.5)	78 (75.7)	
Female	484 (25.5)	25 (24.3)	0.778

Table 3 A: Demographic personal data of the recipients.

B- Causes of ESKD in the 2000 recipients

Focal Segmental Glomerulosclerosis was the most common identified cause of ESKD among the recipient who developed post transplant GN whereas in the group of patient who did not suffer post transplant GN chronic pyelonephritis was the most common

identified cause. Nephrosclerosis represent the most common finding of renal biopsy at the time of presentation of the patient at the nephrology follow up clinic (table 3B).

Original kidney disease	No GN (n=1897) n (%)	PTGN (n=103) n (%)	P value
Mesangio-proliferative	31 (1.6)	4 (3.9)	
Membranous nephropathy	20 (1.1)	2 (1.9)	
F.S.G.S.	57 (3)	14 (**13.6**)	
Membrano-proliferative	20 (1.1)	5 (4.9)	
Crescentic GN	14 (0.7)	2 (1.9)	
Hereditary nephritis	44 (2.3)	4 (3.9)	
Amyloidosis	29 (1.5)	4 (3.9)	
Polycystic kidney	50 (2.6)	2 (1.9)	
Hypoplasia	16 (0.8)	2 (1.9)	
Chronic pyelonephritis	254 (**13.4**)	7 (6.8)	
Nephrosclerosis	639 (33.7)	32 (31.1)	
Congenital	13 (0.7)	1 (0.97)	
Obstructive uropathy	57 (3)	1 (0.97)	
Others	114 (6)	10 (9.7)	
Inapplicable	539 (28.4)	13 (12.6)	**<0.001**

Table 3B: Causes of ESKD in the 2000 recipients.

C- Pre transplant infections

The percentage of recipients with schistosomal infection was higher among the PTGN group compared to the PTGN free group. The percentage of recipients with HCV positive antibodies was higher among the PTGN group while the percentage of recipient with HBs antigen positive was significantly higher among the PTGN free group (table 3C).

	No GN (n=1897)	PTGN (n=103)	p-value
Schistosomiasis, n(%)			
No	1412 (74.4)	68 (66)	
Yes	485 (25.6)	35 (34)	0.058
HCV antibodies, n(%)			
No	1542 (81.3)	79 (76.7)	
Yes	355 (18.7)	24 (23.3)	0.361
HCV PCR, n(%)			
No	1748 (92.2)	96 (93.2)	
Yes	149 (7.9)	7 (6.8)	0.877
HBs Ag, n (%)			
No	1772 (93.4)	100 (97.1)	
Yes	125 (6.6)	3 (2.9)	**0.023**

Table 3C: Pre transplant infections in both groups.

D- Pre transplant hypertension and dialysis

The percentage of pre-transplant hypertension and pre-transplant blood transfusion were comparable between both groups. All patients who developed PTGN received heamodialysis therapy except one patient who was pre-emptive. Ninety five percent of the patient who did not suffer from post transplant GN received dialysis therapy (94.7% haemodialysis and 1.1% received peritoneal dialysis) while 4.9% were pre-emptive (table 3D).

	No GN (n=1897)	PTGN (n=103)	p-value
Pre-transplant hypertension, n (%):			
No	799 (42.1)	42 (40.7)	
Yes	1098 (57.9)	61 (59.3)	0.788
Type of blood transfusion, n (%)			
Donor specific	11 (0.6)	1 (0.97)	
Third party	852 (44.9)	54 (52.4)	
No transfusion	1034 (54.5)	48 (46.6)	0.273
Type of Dialysis, n (%)			
Hemodialysis	1797 (94.7)	102 (99.1)	
Peritoneal	21 (1.1)	---	
Pre-emptive	79 (4.2)	1(0.9)	0.280

Table 3D: Pre transplant hypertension and dialysis.

E- Demographic personal data of the donors

The percentage of donors aged more than 50 years was higher in the post transplant GN group than in recipients who did not suffer from post transplant GN. The donors' sex was comparable in both groups. The percentage of parent donors were higher in PTGN group than in PTGN free group, while the percentage of sibling donors and emotionally related donors were higher in PTGN free group than in PTGN group (table 3E).

	No GN (n=1897)n (%)	**PTGN (n=103)n (%)**	**p-value**
Age (years),			
Mean (SD)	35.47(10.1)	36(10.7)	0.605
Range (years), n(%)			
<30	745 (39.3)	37 (35.9)	
30-40	604 (31.8)	33 (32)	
40-50	379 (20)	20 (19.4)	
>50	169 (8.9)	13(12.6)	
Gender, n (%)			
Male	903 (47.6)	50 (48.5)	
Female	994 (52.4)	53 (51.5)	0.881
Consanguinity, n (%)			
Parents	542 (28.6)	35 (34)	0.238
Sibling	890 (46.9)	46 (44.7)	0.655
Off springs	29 (1.5)	1 (0.97)	0.650
Emotionally related	116 (6.1)	6 (5.8)	0.905
Other relatives	101 (5.3)	4 (3.9)	0.523
Unrelated	219 (11.5)	11 (10.7)	0.789

Table 3E: Demographic personal data of the donors.

F- Recipient / donor blood group characteristics

The percentage of couples with the same blood group was higher than those with different blood group but was comparable in both groups (table 3F).

	No GN (n=1897)	PTGN (n=103)	p-value
Blood group (recipient/donor), n (%)			
Same	1527 (80.5)	80 (77.7)	
Different	370 (19.5)	23 (22.3)	0.482

Table 3F: blood group characteristics of the 2000 transplant couples

G- Immunological workup of the 2000 transplant couples

No statistical significance was found between immunological work up of both groups (table 1G).

	No GN (n=1897) n(%)	PTGN (n=103) n(%)	p-value
HLA mismatch			
Zero mismatch	148 (7.8)	6 (5.8)	
One mismatch	215 (11.3)	16 (15.5)	
Two mismatch	952 (50)	58 (56.3)	
Three mismatch	294 (15.5)	16 (15.5)	
Four mismatch	129 (6.8)	4 (3.9)	
Undetermined	159 (8.4)	3 (2.9)	0.181
DR mismatch			
Zero mismatch	195 (10.3)	10 (9.7)	
One mismatch	1656 (87.3)	93 (90.3)	
Two mismatch	2 (0.1)	---	
Undetermined	44 (2.3)	---	0.452

Table 3G: Results of immunological workup of the 2000 transplant couples.

Surgical characteristics of 2000 transplantation operation

The average ischemia time was less than 60 minutes, immediate diuresis predominates and there was no significant difference between both groups regarding ischemia time, time to diuresis and number of renal arteries (table 4).

	No GN (n=1897)n(%)	PTGN (n=103)n(%)	p-value
Transplant received			
First	1821 (96)	101 (98.1)	
Second	73 (3.8)	2 (1.9)	
Third	3 (0.2)	---	0.562
Iscaemia time			
<30	217 (11.4)	9 (8.7)	
30-60	1378 (72.6)	76 (73.8)	
>60	302 (15.9)	18 (17.5)	0.672
Time to diuresis			
Immediate	1745 (92)	94 (91.3)	
Delayed	152 (8)	9 (8.7)	0.792
Number of renal arteries			
1	1681 (88.6)	95 (92.2)	
2	193 (10.2)	8 (7.8)	
3	21 (1.1)	---	
4	1 (0.05)	---	
5	1 (0.05)	---	0.975

Table 4: Surgical characteristics of 2000 transplantation operation.

Immunosuppression protocol

A- Induction therapy

The percentage of recipient who did not had an induction therapy in both groups was higher those who had, an induction therapy (table 5A).

Induction IS	No GN (n=1897) n(%)	PTGN (n=103)n(%)	p-value
Polyclonal	157 (8.2)	8 (7.7)	
Monoclonal	611 (32.2)	23 (22.3)	
OKT3	17 (0.9)	---	
Basiliximab	574 (30.2)	22 (21.3)	
Daclizumab	20 (1)	1 (0.97)	
Alemtuzumab	41 (2.2)	1 (0.97)	
No induction	1088 (57.3)	71 (**68.9**)	0.073

Table 5A: Induction immunosuppressant.

B- Maintenance immunosuppression protocols

No significant difference was found regarding the type of primary immunosuppression protocols used in both groups (table5B).

Primary IS	No GN (n=1897)n(%)	PTGN (n=103)n(%)	p-value
Conventional based	456 (24)	26 (25.2)	
Triple based	1069 (56.4)	61 (59.2)	
Tacrolimus based	123 (6.5)	1 (0.97)	
Sirolimus based	127 (6.7)	12 (11.7)	
Steroid avoidance	81 (4.3)	2 (1.9)	
Alemtuzumab	41 (2.2)	1 (0.97)	0.065

Table 5B: Maintenance immunosuppression protocols.

C- Secondary immunosuppression protocols

The percentage of recipients who shifted from 1ry to 2ry immunosuppressant was comparable in both groups, but the elective cause of shifting and drug toxicity were significantly higher in the group of PTGN than in the group of PTGN free (table5C).

	No GN (n=1897)n(%)	PTGN (n=103)n(%)	p-value
Secondary IS			
Conventional based	238 (12.5)	25 (24.3)	
Triple based	394 (20.8)	22 (21.4)	
Tacrolimus based	194 (10.2)	13 (12.6)	
Sirolimus based	31 (1.6)	3 (2.9)	
Steroid avoidance	2 (0.1)	---	0.291
Causes of shifting to 2ry IS			
Elective	65 (3.4)	11 (**10.7**)	
Cosmotic	3 (0.16)	---	
Leukopenia	21 (1.1)	6 (**5.8**)	
Infection	36 (1.9)	2 (1.9)	
Resistant rejection	462 (24.4)	22 (21.4)	
Liver impairment	179(9.4)	9 (8.7)	
Malignancy	8 (0.42)	---	
Drug toxicity	87 (4.6)	11 (**10.7**)	
GIT upset	2 (0.1)	---	**0.001**

Table 5C: Secondary immunosuppression protocols and causes of shifting.

D- Tertiary immunosuppression protocols

The percentage of recipients shifting to 3ry immunosuppressant was comparable in both groups, but the percentage of recipients shifting for rejection causes were significantly higher in the group of PTGN than in the group of PTGN free (table 5D).

	No GN (n=1897)n(%)	PTGN (n=103)n(%)	p-value
Tertiary IS			
Conventional based	65 (3.4)	5 (4.8)	
Triple based	90 (4.7)	7 (6.8)	
Tacrolimus based	122 (6.4)	13 (12.6)	
Sirolimus based	11 (0.58)	1 (0.97)	0.899
Causes of shifting to 3ry IS			
Elective	19 (1)	2 (1.9)	
Leukopenia	9 (0.47)	---	
Infection	16 (0.84)	---	
Rejection	170 (9)	15(**14.6**)	
Liver impairment	25 (1.3)	2 (1.9)	
Malignancy	5 (0.26)	1 (0.97)	
Drug toxicity	26 (1.4)	5 (4.9)	**0.038**

Table 5D: Causes of shifting from secondary to tertiary immunosuppression protocols in both groups:

Post transplant complications

Significant higher percentage of recipients suffered from hypertension in the group of PTGN compared to the group of PTGN free. The percentage of the other medical complications was comparable in both groups (table 6).

	No GN (n=1897) n(%)	PTGN (n=103) n(%)	p-value
ATN			
No	1801 (94.9)	98 (95.1)	
Yes	96 (5)	5 (4.9)	0.926
HTN			
No	717 (37.8)	21 (20.4)	
Yes	1180 (62.2)	82 (**79.6**)	**<0.001**
DM			
No	1754 (92.5)	96 (93.2)	
Yes	143 (7.5)	7 (6.8)	0.781
Hepatic impairment			
No	1673 (88.2)	91 (88.4)	
Yes	224 (11.8)	12 (11.7)	0.961
Medical infections			
No	1506 (79.4)	74 (71.8)	
Yes	391 (20.6)	29 (28.2)	0.067
Renal artery stenosis			
No	1890 (99.6)	101 (98.1)	
Yes	7 (0.4)	2 (1.9)	0.021
Renal vein thrombosis			
No	1892 (99.7)	103 (100)	
Yes	5 (0.26)	---	0.602
Acute rejection			
No acute rejection	1082 (57)	55 (53.4)	
Acute cellular rejection	733 (38.6)	45 (43.7)	
Acute vascular rejection	82 (4.3)	3 (2.9)	0.516
Chronic rejection			
No	1533 (80.8)	66 (64.1)	
Yes	364 (19.1)	37 (35.9)	**<0.001**
Malignancy			
No	1818 (95.8)	98 (95.1)	
Yes	79 (4.2)	5 (4.9)	0.734

Table 6: Post transplant complications in both groups

Original kidney disease of patients who developed PTGN

A- Patients with pre-transplant glomerulonephritis

Patients, who had FSGS as their original kidney disease, had a significant recurrence rate then those who had MPGN (table 7A).

	Recurrent (n=18)n(%)	De novo (n=15)n(%)	Transplant glomerulopathy (n=70) n(%)	p-value
Mesangio-proliferative	1(5.6)	---	---	
Membranous nephropathy	1(5.6)	---	1(1.4)	
F.S.G.S.	8(**44.4**)	1(6.7)	5(7.1)	
Membrano-proliferative	4(**22.2**)	2(13.3)	2(2.8)	
Crescentic	1(5.6)	1(6.7)	---	
Hereditary nephritis	---	2(13.3)	2(2.8)	
Amyloidosis	2(**11.1**)	---	2(2.8)	
SLE	1(5.6)	1(6.7)	8(**11.4**)	**<0.001**

Table 7A: patients with glomerulonephritis as original kidney disease that developed PTGN

B- Patients without glomerulonephritis

Patients with unidentified original kidney disease develop Post Transplant (PTGN) either De Novo or Transplant Glomerulopathy most commonly and this was statistically significant (table 7B).

	De novo (n=15) n(%)	Transplant glomerulopathy (n=70) n (%)	p-value
Polycystic kidney	1(6.7)	1(1.4)	
Hypoplasia	---	2(2.8)	
Chronic pyelonephritis	1(6.7)	6(8.6)	
Nephrosclerosis	---	2(2.8)	
End stage	3(20)	27(38.6)	
Congenital	---	1(1.4)	
Obstructive uropathy	---	1(1.4)	
Inapplicable	3(20)	10(14.3)	**<0.001**

Table 7B: patients with original kidney disease other than glomerulonephritis who developed PTGN

Histo-pathological types of PTGN

Focal Segmental Glomerulo-Sclerosis (FSGS) was the most common histo-pathological type of post transplantation GN being

50% of recurrent GN and 33.3% of de novo GN, followed by MPGN and this was statistically significant (table 8).

Histo-pathological type	Recurrent (n=18)n (%)	De novo (n=15)n (%)	p-value
FSGS	9(50)	5(33.3)	
MPGN	5(27.8)	5(33.3)	
Mesangio-proliferative	1(5.6)	---	
Membranous Nephropathy	1(5.6)	2(13.3)	
Crescentic	1(5.6)	1(6.7)	
Amyloidosis	2(11.1)	---	
SLE	1(5.6)	---	**<0.001**

Table 8: Histo-pathological types of PTGN

Post transplant medical complication in patients with PTGN

Medical complication occurrence in recipients with PTGN was statistically insignificant. Acute cellular rejection episodes were higher among patients who developed De novo GN. Chronic rejection was significantly higher among patients who developed transplant glomerulopathy (table 9).

	Recurrent (n=18)	De novo (n=15)	Transplant glomerulopathy(n=70)	p-value
ATN, n (%)				
No	16(88.9)	15(100)	67(95.7)	
Yes	2(11.1)	0	3(4.3)	0.310
HTN, n (%)				
No	6(33.3)	2(13.3)	18(25.7)	
Yes	12(66.7)	13(86.7)	52(74.3)	0.415
PTDM, n (%)				
No	16(88.9)	9(60)	56(80)	
Yes	2(11.1)	6(40)	14(20)	0.116
Medical infection, n (%)				
No	14(77.8)	13(86.7)	47(67.1)	
Yes	4 (22.2)	2 (13.3)	23 (32.9)	0.258
Hepatic impairment, n(%)				
No	17(94.4)	13(86.7)	64(91.4)	
Yes	1(5.6)	2(13.3)	6(8.6)	0.730

Acute rejection, n(%)				
No acute rejection	12 (**66.7**)	7 (46.7)	36 (51.4)	
Acute cellular rejection	6 (33.3)	8 (**53.3**)	31 (44.3)	
Acute vascular rejection	---	---	3 (4.3)	0.566
Chronic rejection,n (%)				
No	16 (88.9)	14 (**93.3**)	36 (51.4)	
Yes	2 (11.1)	1 (6.7)	34 (**48.6**)	**<0.001**
Malignancy, n(%)				
No	17(94.4)	13(86.7)	68(97.1)	
Yes	1(5.6)	2(13.3)	2(2.9)	0.228

Table 9: Post transplant medical complication in patients with PTGN

Immunosuppression protocols for recipients with PTGN:

A- Induction immunosuppression

There was no significant difference in induction immunosuppression in patients who had PTGN (table 10A).

	Recurrent (n=18) n(%)	**De novo (n=15) n(%)**	**Transplant glomerulopathy (n=70) n(%)**	**p-value**
Polyclonal Ab	2(11.1)	3(20)	8(11.4)	
Monoclonal Ab	5(27.8)	4(26.7)	15(21.5)	
No induction	11(61.1)	8(53.3)	47(67.1)	0.881

Table 10A: induction immunosuppression

B- *Primary immunosuppression protocol*

There was no significant difference in primary immunosuppression protocols in recipients with PTGN (table 10B).

	Recurrent (n=18)n(%)	De novo (n=15)n(%)	Transplant glomerulopathy (n=70)n(%)	p-value
Conventional based	2(11.1)	2(13.3)	22(31.4)	
Triple based	14(77.7)	9(60)	38(54.4)	
Tacrolimus based	1(5.6)	---	---	
Sirolimus based	1(5.6)	3(20)	8(11.4)	
Steroid avoidance	---	1(6.7)	1(1.4)	
Alemtuzumab	---	---	1(11.4)	0.197

Table 10B: Primary immunosuppression protocol

C- *Secondary immunosuppression*

Shifting to secondary immunosuppression protocols was comparable in patients with PTGN also the secondary immunosuppression protocols were comparable (table 10C).

	Recurrent (n=18)n(%)	De novo (n=15)n(%)	Transplant glomerulopathy (n=70)n(%)	p-value
Secondary IS				
Conventional based	5(27.8)	2(13.3)	18(25.7)	
Triple based	5(27.8)	2(13.3)	15(21.4)	
Tacrolimus based	1(5.6)	5(33.3)	7(10)	
Sirolimus based	---	1(6.7)	2(2.9)	0.205
Cause of shifting to 2ry IS				
Elective	2(11.1)	---	9(12.9)	
Leukopenia	1(5.6)	---	5(7.1)	
Infection	---	---	2(2.9)	
Resistant rejection	1(5.6)	5(33.3)	16(22.9)	
Liver impairment	3(16.7)	1(6.7)	5(7.1)	
Malignancy	---	1(6.7)	---	
Drug toxicity	4(22.2)	3(20)	4(5.7)	
GIT upset	---	---	1(1.4)	0.209

Table 10C: Secondary immunosuppression and causes of shifting

D- Tertiary immunosuppression

Tertiary immunosuppression protocols and causes of shifting were comparable in patients with PTGN (table10 D).

	Recurrent (n=18)n(%)	De novo (n=15)n(%)	Transplant glomerulopathy (n=70)n(%)	p-value
Tertiary IS				
Conventional based	1(5.6)	1(1)	3(4.3)	
Triple based	---	1(1)	6(8.6)	
Tacrolimus based	3(16.7)	1(1)	9(12.9)	
Sirolimus based	1(5.6)	---	---	0.369
Cause of shifting to 3ry IS				
Elective	---	---	2(2.9)	
Rejection	2(11.1)	2(13.3)	11(**15.7**)	
Liver impairment	---	1(6.7)	1(1.4)	
Malignancy	---	---	1(1.4)	
drug toxicity	2(11.1)	---	3(4.3)	
GIT upset	1(5.6)	---	---	0.543

Table 10D: Tertiary immunosuppression protocols

Incidence of post transplant GN

Recurrent GN occurred early in the first 3 months post transplant compared to De novo GN and transplant glomerulopathy, while transplant glomerulopathy incidence was higher than recurrent and De novo GN after 5 years post transplant (table11).

Post transplant time	Recurrent (n=18)n (%)	De novo (n=15)n (%)	Transplant glomerulopathy (n=70)n (%)
1st Week	1 (**5.5**)	---	---
3rd month	4(**27.8**)	3 (20)	5 (7.1)
6th month	1 (5.5)	1 (6.7)	2 (2.8)
1st year	1 (5.5)	1 (6.7)	4 (5.7)
5th year	8 (44.4)	7 (46.7)	37 (52.8)
10th year	2 (11.1)	2 (13.3)	20 (**28.5**)
12th year	1 (5.5)	1 (6.7)	50 (**71.4**)

Table 11: Incidence of post transplant GN.

Risk factors of post transplant GN

Multivariate analysis for the identification of the possible independent risk factors for the development of post transplant glomerulonephritis showed that middle age donors (31-40 years old) carry 1.76 more risk than donor grafts. Sirolimus based immunosuppression protocol was associated with 4.6 more risk for the development of glomerulonephritis post transplant. The difference in blood grouping between the donor and recipient carried a favorable significant delay in the development of post transplant GN (table12).

	B	HR (95% CI)	P value
Recipient age:			
<20	---	1	
20-30	-0.929	0.40 (0.152-1.03)	0.057
31-40	-0.512	0.60 (0.26-1.39)	0.231
41-50	-0.330	0.72 (0.25-2.1)	0.540
>50	0.793	0.45 (0.039-5.23)	0.525
Original kidney disease:			
No GN	---	1	
GN	0.015	1.01 (0.566-1.821)	0.959

Donor age:			
<30	---	1	
31-40	0.570	**1.76 (1.04-3)**	**0.035**
41-50	0.602	1.82 (0.977-3.41)	0.059
>50	0.289	1.33 (0.657-2.71)	0.424
Donor/Recipient sex :			
Male to male	---	1	
Male to female	-0.228	0.796 (0.319-1.98)	0.625
Female to male	0.397	1.48 (0.743-2.97)	0.263
Female to female	0.451	1.57 (0.576-4.27)	0.378
Consanguinity:			
Parents	---	1	
Sibiling	0.518	1.67 (0.47-5.97)	0.424
Off spring	1.261	3.52 (0.1-125)	0.489
Other relatives	0.898	2.45 (0.57-10.6)	0.231
Unrelated	1.220	3.38 (0.82-14.1)	0.093
Donor/Recipient Blood group:			
Same	---	1	
Different	-0.869	**0.42 (0.23-0.77)**	**0.005**
Blood transfusion:			
No	---	1	
Yes	-0.451	0.64 (0.39-1.05)	0.075
Ischemia time:			
<30	---	1	
30-60	-0.711	0.491 (0.194-1.27)	0.134
>60	-0.437	0.65 (0.196-2.13)	0.473
Time to diuresis:			
Immediate	---	1	
Delayed	0.473	1.60 (0.58-4.47)	0.366
Induction therapy:			
No	---	1	
Polyclonal	0.217	1.24 (0.361-4.28)	0.731
Monoclonal	-0.271	0.763 (0.262-2.22)	0.619
Maintenance IS:			
Conventional	---	1	
CsA based	0.278	1.32 (0.74-2.34)	0.343
Tacrolimus	1.855	6.39 (0.76-54)	0.089
Sirolimus	1.536	**4.64 (2.14-10)**	**<0.001**
Steroid avoidance	0.589	1.80 (0.386-8.4)	0.454
Total steroids in 1st 3 months:			
<5gm	---	1	
5-10gm	-0.088	0.92 (0.45-1.89)	0.812
>10gm	0.631	1.87 (0.78-4.5)	0.158

Table 12: Multivariate analysis of the risk factors of PTGN.

Risk factors of graft survival for patients with Post Transplant Glomerulo-Nephritis (PTGN)

Multivariate analysis for risk factors of graft loss of patients with PTGN revealed that transplant recipient age between 40 and 50 years face 1.8 more risk (HR 1.82) to lose their graft after 10 years than the other transplant recipients. Middle aged donor grafts carried a favorable significant effect on graft survival (HR 0.77). Patients received their grafts from their off springs have less risk to lose their grafts after 10 years (HR 0.74). Different blood group has a favorable effect on graft survival (HR 0.75). Induction therapy with polyclonal antibody (ATG) doubles the risk of graft loss than induction therapy with monoclonal antibodies (HR 1.99). Acute rejection episodes carry an independent negative impact on long term graft survival. One episode of acute rejection has 1.35 risk of graft loss. Two or more acute rejection episodes increase the risk of graft loss 1.97 times. Development of chronic rejection increases the risk to 2.41 times of long term graft loss. De novo GN has an independent negative risk on long term graft loss 3.33 times than the other Post Transplant Glomerulo-Nephritis types (table13).

	B	HR (95% CI)	P value
Recipient age:			
<20	---	1	
20-30	0.070	1.07 (0.80-1.44)	0.640
31-40	0.262	1.30 (0.93-1.81)	0.120
41-50	0.601	**1.82 (1.24-2.67)**	**0.002**
>50	0.562	1.75 (0.95-3.22)	0.070
Original kidney disease:			
No GN	---	1	
GN	-0.071	0.93 (0.68-1.27)	0.652
Donor age:			
<30	---	1	
31-40	-0.257	**0.77 (0.61-0.99)**	**0.038**
41-50	0.245	1.27 (0.94-1.74)	0.118
>50	0.109	1.12 (0.73-1.71)	0.615
Donor/Recipient sex :			
Male to male	---	1	
Male to female	0.127	1.14 (0.82-1.56)	0.439
Female to male	0.018	1.02 (0.67-1.54)	0.931
Female to female	0.059	1.06 (0.78-1.44)	0.705.
Consanguinity:			
Parents	---	1	
Sibling	-0.036	0.97 (0.65-1.43)	0.858
Off spring	-0.303	**0.74 (0.56-0.97)**	**0.028**
Other relatives	0.771	2.16 (0.95-4.92)	0.066
Unrelated	0.249	1.28 (0.83-1.99)	0.266
Donor/Recipient Blood group :			
Same	---	1	
Different	-0.294	0.75 (0.59-0.95)	**0.016**
Blood transfusion			
No	---	1	
Donor specific	-0.027	0.97 (0.79-1.2)	0.800
Third party	-0.077	0.93 (0.36-2.4)	0.873
Ischemia time:			
<30	---	1	
30-60	0.205	1.23 (0.97-1.5)	0.089
>60	0.327	1.39 (0.94-2.05)	0.103
Time to diuresis:			
Immediate	---	1	
Delayed	0.140	1.15 (0.83-1.6)	0.395
Induction therapy:			
No	---	1	
Polyclonal	0.688	**1.99 (1.53-2.6)**	**<0.001**
Monoclonal	-0.448	0.64 (0.35-1.18)	0.151

Maintenance IS:			
Conventional	---	1	
CsA based	0.116	1.12 (0.27-4.6)	0.872
Tacrolimus	-0.142	0.87 (0.21-3.5)	0.843
Total dose of steroids first 3 months:	---	1	
<5gm	-0.149	0.86 (0.68-1.1)	0.216
5-10gm	-0.044	0.96 (0.69-1.3)	0.786
>10gm			
Rejection			
No	---	1	
One acute rejection	0.301	**1.35 (1-1.8)**	**0.049**
≥two acute rejections	0.681	**1.97 (1.45-2.7)**	**<0.001**
Chronic rejection	0.878	**2.41 (1.9-3)**	**<0.001**
Post transplant GN			
No	---	1	
Recurrent GN	-0.226	0.79 (0.56-1.13)	0.207
De novo GN	1.205	**3.33 (1.5-7.4)**	**0.003**
Transplant GN	0.530	1.69 (0.77-3.76)	0.191

Table 13: Multivariate analysis of the risk factors of graft survival.

Incidence of Glomerulonephritis Post Transplant

Recurrent and De novo GN develop earlier post transplantation compared with Transplant Glomerulopathy. This difference in the incidence of different types of post transplant GN was statistically significant (figure 7).

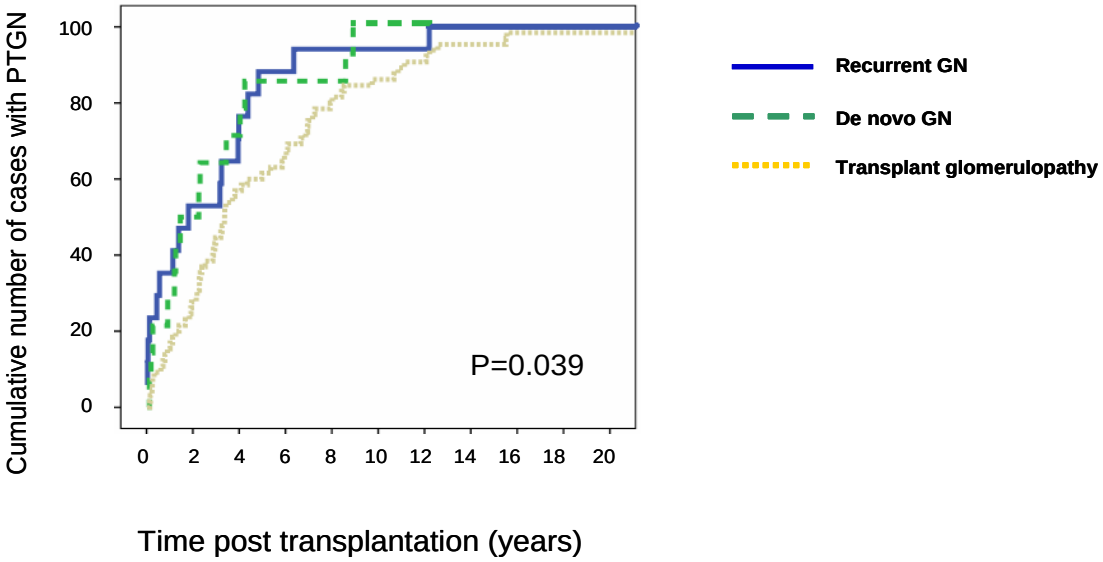

Figure 7: Incidence of glomerulonephritis post transplant

Graft survival of the recipients who did not develop GN versus recipients who developed post transplant GN (PTGN)

Graft survival in the recipients who developed Post Transplant GN was comparable to those who did not develop post transplant GN in the first two years. Thereafter, significant drop of graft survival was observed in the group of recipients who suffered from post transplant GN compared to transplant recipients who did not develop post transplant GN (figure 8).

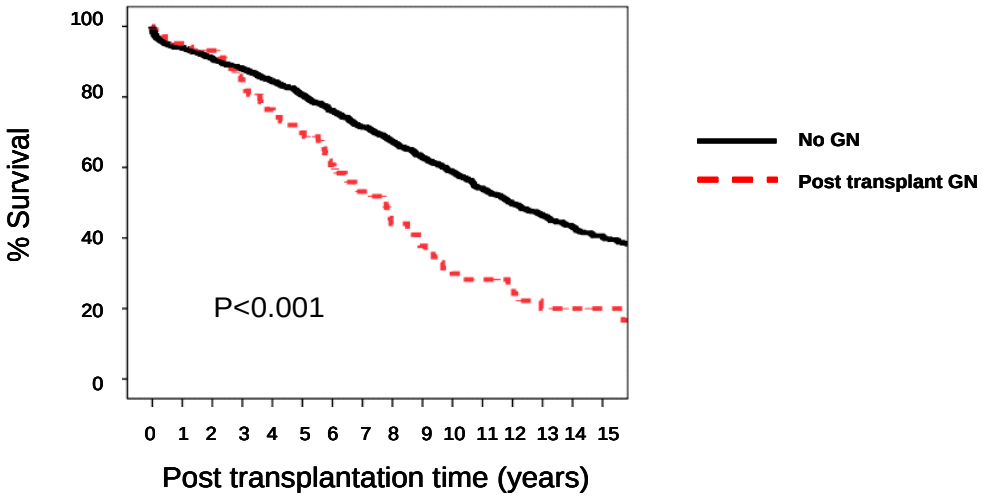

Figure 8: Graft survival of the recipients who did not develop GN versus recipients who developed post transplant GN (PTGN).

Graft survival of the recipients who did not develop GN versus recipients who developed recurrent GN, De novo GN and transplant glomerulopathy

Graft survival in the recipients who developed De novo GN and Transplant Glomerulopathy was comparable to those who did not develop post transplant GN in the first two years. While a significant drop of graft survival in recipients with recurrent GN compared with other groups was observed in the first two years. Thereafter, significant drop of graft survival was observed in the group of recipients who suffered from post transplant GN (whatever the type) compared to transplant recipients who did not develop post transplant GN (figure9).

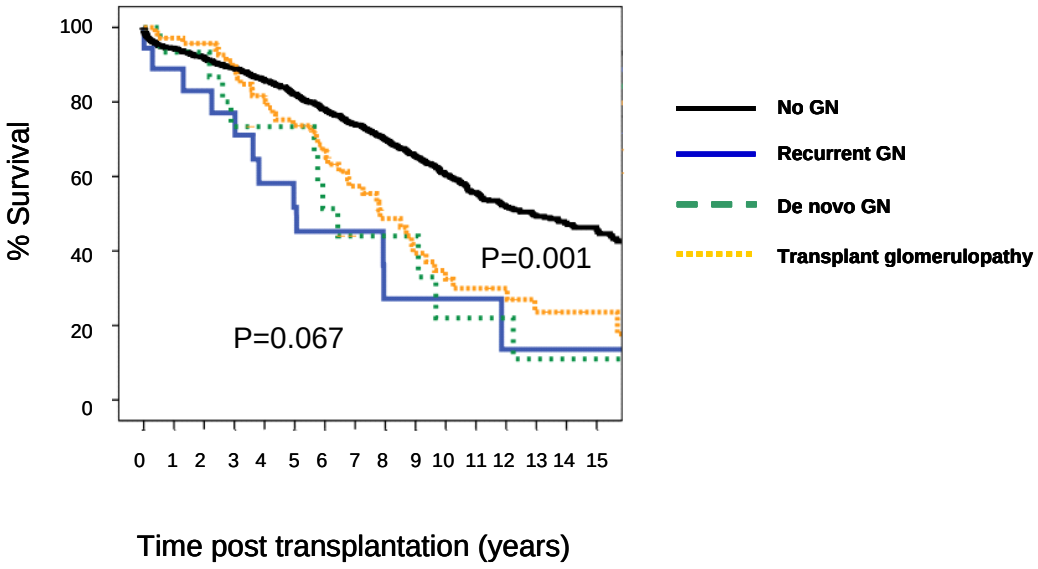

Figure 9: Graft survival of the recipients who did not develop GN versus recipients who developed recurrent GN, De novo GN and transplant glomerulopathy

Patient survival of the recipients who did not develop GN versus recipients who developed post transplant GN (PTGN)

Patient survival in the recipients who developed post transplant GN was comparable to those who did not develop post transplant GN in the first 5 years. Thereafter, significant drop of patient survival was observed in the group of recipients who suffered from post transplant GN compared to transplant recipients who did not develop post transplant GN (figure10).

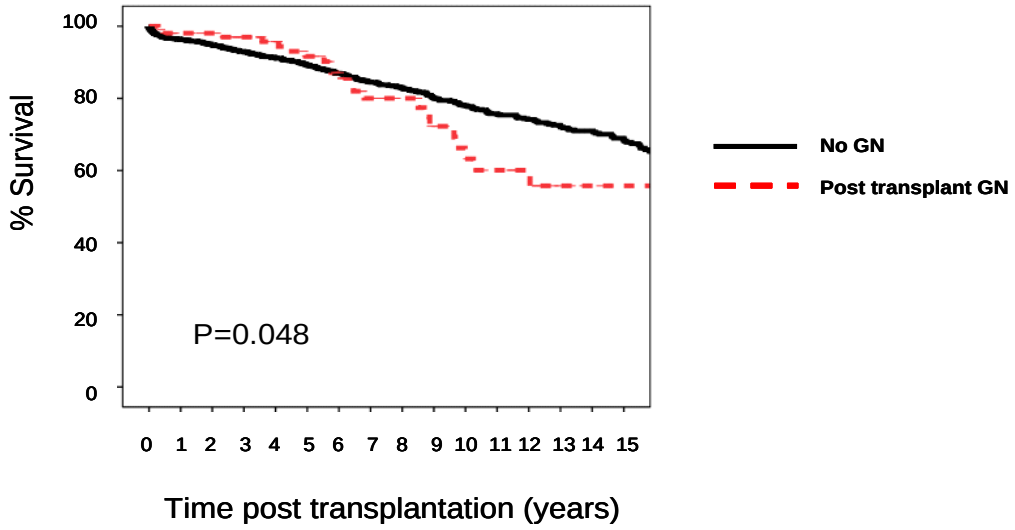

Figure 10: Patient survival of the recipients who did not develop GN versus recipients who developed post transplant GN (PTGN).

Patient survival of the recipients who did not develop GN versus recipients who developed recurrent GN, De novo GN and transplant glomerulopathy.

Patient survival in the recipients who developed post transplant GN (whatever the cause) was comparable to those who did not develop post transplant GN in the first five years. Thereafter, significant drop of patient survival was observed in the group of recipients who suffered from De novo GN and transplant glomerulopathy compared to transplant recipients who did not develop post transplant GN (figure 11).

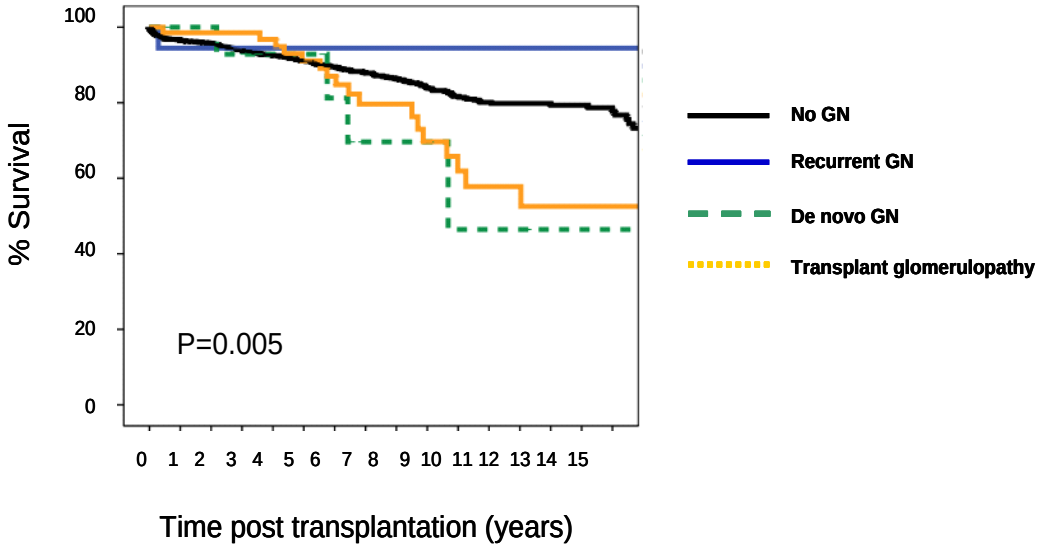

Figure 11: patient survival of the recipients who did not develop GN versus recipients who developed recurrent GN, De novo GN and transplant glomerulopathy.