

SUPPLEMENTARY MATERIAL

Supplemental Table 1. Proportion of missing data.

		From 1990 to 2018		From 2002 to 2018	
		Number of missing values	% Missing	Number of missing values	% Missing
Donor	Donor type (DBD/DCD)	0	0	0	0
	Age	0	0	0	0
	Sex	0	0	0	0
	Height	558	6.6	0	0
	Weight	537	6.3	2	<0.01
	BMI	567	6.7	2	<0.01
	Last creatinine	193	2.3	84	1.7
	Cause of death	0	0	0	0
	Hypertension	2317	27.2	425	8.5
	Diabetes	3958	46.5	443	8.9
	Smoking	2362	27.8	311	6.2
	Cardiac arrest	1665	19.6	374	7.5
Recipient	Age	0	0	0	0
	Sex	0	0	0	0
	Height	1713	20.1	208	4.2
	Weight	1677	19.7	225	4.5
	BMI	1903	22.4	321	6.4
	Cause of renal failure	370	4.3	279	5.6
	Pre-emptive	12	<0.01	0	0
	Time on dialysis ¹	2968	35.9	55	1.1
	PRA	2	<0.01	0	0
	Mismatch HLA-DR	29	<0.01	29	<0.01
	Mismatch HLA-A	17	<0.01	17	<0.01
	Mismatch HLA-B	17	<0.01	17	<0.01
Transplant	First warm ischemic time ²	118	4.5	106	4.5
	Cold ischemic time	509	6.0	405	8.1
	Graft anastomosis time	593	7.0	473	9.5

BMI, body mass index; DBD, donation after brain death, DCD, donation after circulatory death; HLA, human leukocyte antigen; PRA, panel reactive antibodies.

¹ Only applicable to non-pre-emptive recipients.

² Only applicable to DCD kidneys.

Supplemental Table 2A. Multivariate sensitivity analysis including data from 2002 to 2018 (Odds Ratio (95% CI)): risk factors associated with early graft loss after a first DCD transplant procedure.

		DCD
Donor	Age (years)	1.014 (0.999 – 1.030)
	BMI (kg/m ²)	1.009 (0.973 – 1.046)
	Hypertension	1.136 (0.731 – 1.765)
	Diabetes	2.567 (1.345 – 4.899)**
	Smoking	1.400 (0.958 – 2.046)
	Cause of death	
	- Trauma	Reference
	- Stroke	1.530 (0.936 – 2.500)
	- Cardiac arrest	0.738 (0.357 – 1.529)
	- Other	1.972 (1.113 – 3.494)*
Recipient	Cause of renal failure	
	- (Poly)cystic kidney disease	Reference
	- Diabetes	0.967 (0.479 – 1.951)
	- Hypertension	1.133 (0.571 – 2.247)
	- Glomerulonephritis	1.090 (0.495 – 2.401)
	- Pyelonephritis	1.115 (0.465 – 2.673)
	- IgA nephropathy	0.450 (0.129 – 1.570)
	- Chronic renal failure, etiology unknown	0.939 (0.494 – 1.783)
	- Other	1.316 (0.735 – 2.357)
Transplant	PRA \geq 6%	1.553 (0.670 – 3.595)
	First warm ischemic time (min.)	1.050 (1.024 – 1.077)**
	Cold ischemic time (hours)	1.058 (1.023 – 1.094)**
	Graft anastomosis time (min.)	1.027 (1.015 – 1.040)**
	Year of transplant procedure	0.960 (0.913 – 1.011)

BMI, body mass index; DCD, donation after circulatory death; IgA, immunoglobulin A; min., minutes; PRA, panel reactive antibodies. Variables with a $p < 0.1$ in the univariate analysis were entered. * $p < 0.05$; ** $p < 0.005$

Supplemental Table 2B. Multivariate sensitivity analysis including data from 2002 to 2018 (Odds Ratio (95% CI)): risk factors associated with early graft loss after a first DBD transplant procedure.

		DBD
Donor	Age (years)	1.042 (1.022 – 1.062)**
	BMI (kg/m ²)	1.004 (0.959 – 1.051)
	Last creatinine (μmol/L)	1.003 (1.003 – 1.010)**
	Cause of death:	
	- Trauma	Reference
	- Stroke	2.043 (1.080 – 3.866)*
	- Cardiac arrest	1.813 (0.635 – 5.178)
	- Other	1.465 (0.625 – 3.435)
Recipient	Weight (kg)	0.993 (0.972 – 1.015)
	BMI (kg/m ²)	1.077 (1.004 – 1.156)
	Time on dialysis (years)	1.146 (1.059 – 1.242)**
	PRA ≥6%	2.053 (1.112 – 3.791)*
Transplant	Mismatch HLA-DR	
	0	Reference
	1	1.598 (0.986 – 2.589)
	2	1.387 (0.670 – 2.873)
	Mismatch HLA-A	
	0	Reference
	1	1.051 (0.655 – 1.686)
	2	1.306 (0.707 – 2.413)
	Mismatch HLA-B	
	0	Reference
	1	1.291 (0.704 – 2.365)
	2	1.341 (0.691 – 2.602)
	Cold ischemic time (hours)	1.015 (0.987 – 1.044)
	Graft anastomosis time (min.)	1.023 (1.011 – 1.035)**

BMI, body mass index; DBD, donation after brain death; HLA, human leukocyte antigen; min., minutes; PRA, panel reactive antibodies.

Variables with a $p < 0.1$ in the univariate analysis were entered. * $p < 0.05$; ** $p < 0.005$

Supplemental Table 3. Time-related changes in incidence and consequences of early graft loss.

Early graft loss and consequences	1990-2018 (full dataset)	1990-2004 (period 1)	2004-2018 (period 2)
% Early graft loss	8.2%	10.0%	6.6% ¹
% Recurrent early graft loss	16.8%	19.0%	12.8% ^{ns}
Short-term patient survival²			
- Crude HR	7.06 (5.37 – 9.29)	5.77 (4.04 – 8.23)	8.80 (5.73 – 13.5)
- Adjusted HR	8.23 (5.09 – 13.2)	6.25 (1.36 – 28.68)	8.76 (5.22 – 14.70)
Long-term patient survival³			
- Crude HR	1.84 (1.63 – 2.09)	1.84 (1.57 – 2.15)	1.88 (1.53 – 2.31)
- Adjusted HR	1.68 (1.33 – 2.13)	2.53 (1.33 – 4.81)	1.68 (1.30 – 2.18)
Long-term graft survival successfully re-transplanted patients⁴			
- Crude HR	1.47 (1.11 – 1.94)	1.42 (0.99 – 2.03)	1.53 (0.97 – 2.43)
- Adjusted HR	1.06 (0.62 – 1.81)	0.56 (0.13 – 2.41)	1.22 (0.68 – 2.16)

EGL, early graft loss; HR, hazard ratio; ns, not significant.

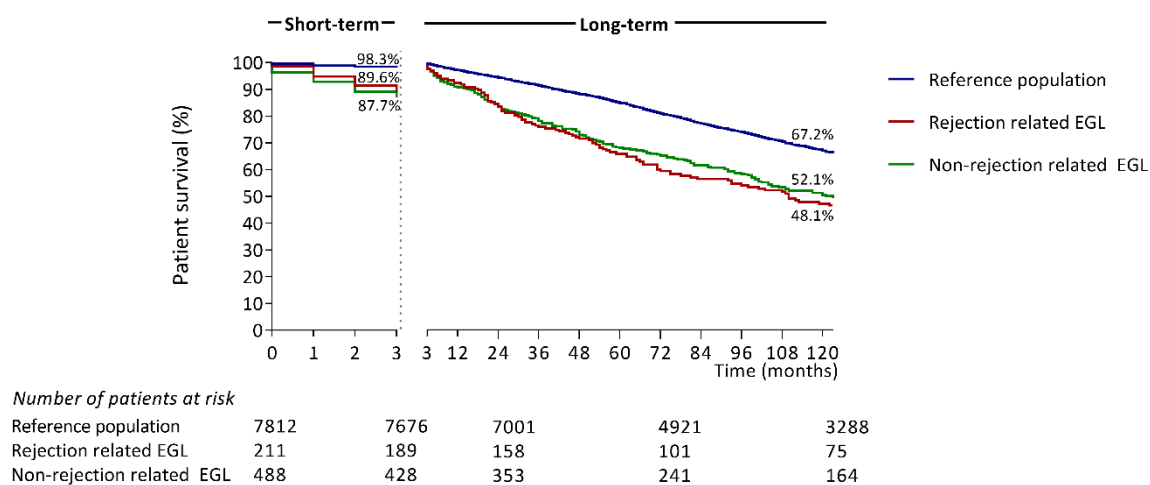
¹ $p < 0.001$

² EGL versus non-EGL recipients after a primary transplant procedure. Factors adjusted for are provided in the legend to Figure 2.

³ EGL versus non-EGL recipients after a primary transplant procedure. Factors adjusted for are provided in the legend to Figure 2.

⁴ Successfully re-transplanted recipients after a primary EGL transplant procedure versus non-EGL versus primary non-EGL recipients. Factors adjusted for are provided in the legend to Figure 3.

Supplemental Figure 1. Landmark analysis of short-term and long-term patient survival following rejection resp. non-rejection related EGL.



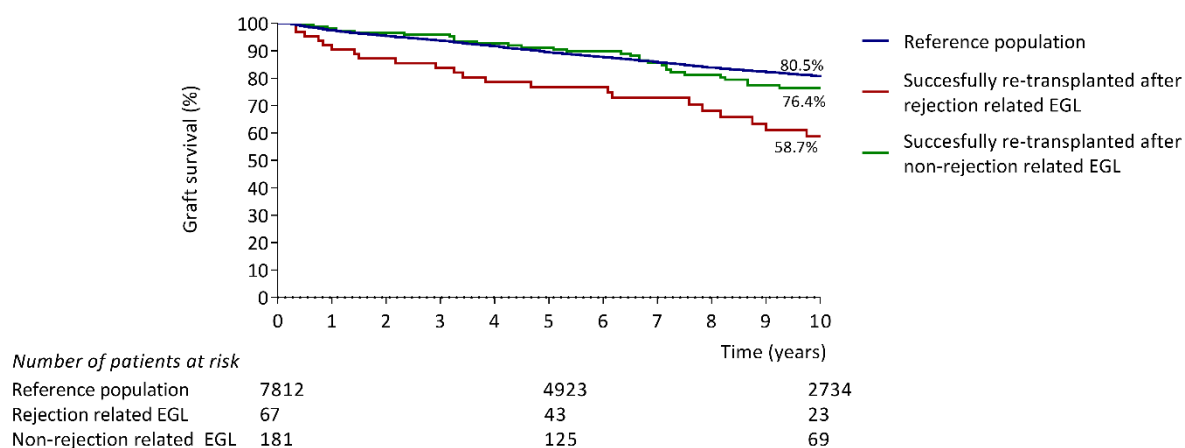
EGL, early graft loss.

Reference population: recipients without EGL after a first kidney transplant procedure.

Rejection related EGL: recipients with rejection related EGL after a first kidney transplant procedure.

Non-rejection related EGL: recipients with non-rejection related EGL after a first kidney transplant procedure.

Supplemental Figure 2. Death censored 10-year graft survival following successful re-transplantation after primary rejection resp. non-rejection related EGL.



EGL, early graft loss; HR, hazard ratio.

Reference population: recipients without EGL after a first kidney transplant procedure.

Crude HRs (95% CI) rejection related and non-rejection related EGL versus reference population: 2.42 (1.59-3.70) and 1.15 (0.80-1.64), respectively.

Adjusted HRs (95% CI) rejection related and non-rejection related EGL versus reference population: 1.71 (0.67-4.33) and 0.85 (0.45-1.62), respectively.