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ORIGINAL PAPER

Survival and Access to Kidney Transplantation of High-Urgent Patients Due to Vascular Access Failure

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ABSTRACT

Introduction: Total and permanent lack of access to dialysis was considered a high-urgency (HU) candidate for transplant, as established by the Brazilian kidney allocation system. This procedure allows them to receive the first ABO-compatible and negative T and B-cell CDC-CM kidney. We aimed to compare the survival on the WL and the access to transplant between HU patients and non-HU candidates. **Methods:** This observational, retrospective study included 22,545 adult kidney transplant candidates listed in the state of São Paulo, from January 2010 to December 2018, and analyzed until December 2019; follow-up time was 27 months. Seven hundred and eighty-eight (3.5%) patients were considered HU. **Results:** Most of the WL were male (59%), mean age of 51 years (± 20), and non-sensitized (70%); 1,301 (5.8%) were previously transplanted. Compared to the non-HU, the HU group was younger, mostly female, more previously transplanted, and more sensitized: panel reactive antibody (PRA) 11-85% (24% vs. 17%; $p < 0.001$) and PRA > 85% (14% vs. 7.8%; $p < 0.001$). Diabetes (odds ratio [OR] 1.988; $p = 0.000$) and PRA > 85% (OR 1.9; $p = 0.000$) were risk factors for death, mainly in HU patients (diabetes: OR 2.39; $p = 0.045$/PRA > 85%: OR 15.06; $p = 0.000$). Age was a risk factor for death in non-HU, with worse outcomes in the 51-60 years group (OR 2.72; $p = 0.000$) and the > 60 years group (OR 4.3; $p = 0.000$). Patients with chronic glomerulonephritis were transplanted more frequently in both groups (OR 3.8 vs. 1.8; $p = 0.000$). The HU group received more transplants (88% vs. 40%, $p = 0.000$), had lower mortality (7% vs. 19%; $p = 0.000$), and spent less time on the list (5% vs. 41%; $p = 0.000$). Sensitized were more difficult to transplant, even in the HU group (PRA 51-85%: OR NP 0.54 vs. P 0.43; $p = 0.008$/PRA > 85%: OR NP 0.19 vs. P 0.06; $p = 0.000$). **Conclusion:** Elderly, diabetic, and sensitized patients had worse results on the list. Giving urgency to patients with dialysis access failure allowed better survival, greater and faster access to transplantation, except if PRA > 50%.

Descriptors: Kidney Transplantation; Dialysis; Survival Analysis; Vascular Access Devices; Immunologic Sensitization.

Sobrevida e Acesso ao Transplante Renal de Pacientes Priorizados por Falência de Acesso Vascular

RESUMO

Introdução: Pacientes com ausência total e permanente de acesso para diálise podem ser priorizados em lista, segundo o sistema brasileiro de alocação, com direito a receber o primeiro enxerto renal com compatibilidade ABO e prova cruzada por CDC T/B negativa. **Objetivo:** Comparar a sobrevida em lista e o acesso ao transplante entre os pacientes priorizados (P) por falência de acesso e os não priorizados (NP). **Métodos:** Estudo observacional e retrospectivo com 22.545 candidatos ao transplante renal de doador falecido em São Paulo de janeiro de 2010 a dezembro de 2018, com análise até dezembro de 2019, dentre esses, 788 (3,5%) priorizados por falência de acesso. O tempo médio de seguimento foi de 27 meses. **Resultados:** Predominaram homens (59%) com 51 anos em média, não sensibilizados (70%), sendo 1.301 transplantados prévios (5,8%). Comparativamente aos NP, os P eram mais jovens, de maioria feminina, com menor prevalência de diabetes ou hipertensão, mais transplantados previamente e mais sensibilizados. Diabetes [*odds ratio* (OR) 1,988; $p = 0,000$] e painel de reatividade contra anticorpos (PRA) > 85% (OR 1,9; $p = 0,000$) foram fatores de risco para óbito em lista, principalmente entre os P (diabetes: 2,39; $p = 0,045$/PRA > 85%: 15,06; $p = 0,000$). Idade foi fator de risco para óbito entre os NP, principalmente na faixa etária de 50 a 60 anos (OR 2,72; $p = 0,000$) e > 60 anos (OR 4,3; $p = 0,000$). Pacientes com glomerulonefrite crônica transplantaram mais em ambos os grupos (OR NP 1,85 vs. P 6,40; $p = 0,012$).

Os P permaneceram menos (5% *vs*. 41%; *p* = 0,000), com menor mortalidade em lista (7% *vs*. 19%; *p* = 0,000), apresentando mais acesso ao transplante (88% *vs*. 40%; *p* = 0,000). Os sensibilizados (PRA > 50%) transplantaram menos, mesmo se priorizados (PRA 51-85%: NP 0,54 *vs*. P 0,43; *p* = 0,008/PRA > 85%: NP 0,19 *vs*. P 0,06; *p* = 0,000). **Conclusão:** Diabéticos, idosos e sensibilizados tiveram pior resultado na lista de espera. Ao priorizar aqueles com falência de acesso, houve melhor sobrevida em lista e maior acesso ao transplante, principalmente se PRA < 50%.

Descritores: Transplante de Rim; Diálise; Análise de Sobrevida; Acesso Vascular; Sensibilização Imunológica.

INTRODUCTION

According to the Brazilian allocation system, chronic kidney patients on the waiting list for deceased donor kidney transplants are entitled to prioritization when they are in one of the following situations: imminent total and permanent technical impossibility of obtaining access to any dialysis (the most common reason for prioritization), if they have previously received a transplant of another solid organ, and if they have previously been kidney graft donors. State transplant technical boards may individually evaluate other exceptional cases.

Patients with severe dialysis access problems generally have been on dialysis for longer, which entails a greater immunological risk due to multiple transfusions and an increase in clinical complications, with high rates of bloodstream infections, cardiovascular disease, thrombosis, and vascular calcifications[1]. This group, therefore, has a higher mortality rate. It is well established that infections are the second leading cause of death among dialysis patients (12-22% per year), and that the risk varies according to vascular access: patients with arteriovenous fistulas (AVFs) have the lowest infectious risk (1-4% per year) compared to those with arteriovenous grafts (10-20% per year), and these, in turn, have a lower risk compared to those dialyzing through a catheter (tunneled or not)[2].

Despite the progressive increase in the number of prioritized patients in Brazil, data on this population are still scarce. Our objective was to quantify, identify the main clinical characteristics, and analyze survival rates among prioritized patients (P) who were excluded from dialysis access, compared to those not prioritized (NP). We also examined the risk factors for death on the list and the factors related to access to kidney transplantation in the state of São Paulo for these two groups of patients.

METHODS

We conducted an observational, retrospective study of 22,545 patients enrolled on the waiting list for isolated deceased-donor kidney transplantation in the state of São Paulo from January 2010 to December 2018, with follow-up until December 2019. Data was obtained from the São Paulo State Transplant Center after authorization. The following were excluded from this analysis: patients under 18 years of age (1,515), patients transplanted with a living donor during the period (3,349), those prioritized for other causes (270), patients without information on the panel reactivity against antibodies (PRA) in the system (1,280), and those with incomplete data (851).

During this period, we identified 788 P patients with dialysis access failure (3.5% of the total sample). The mean follow-up time was 27 months (median: 19 months).

Our primary objective was to compare access to kidney transplantation and on-list mortality between NP and P due to dialysis access failure. Secondary objectives included assessing the outcome of patients on the list during this period (death, transplant, or permanence on the list), risk factors for death on the list, and factors impacting transplant access.

The sample population profile was divided according to the following criteria, based on data available from the São Paulo State Transplant Center: age (18-50 years/51-65 years/>65 years); sex; race; underlying disease (hypertension, diabetes mellitus, glomerulonephritis, interstitial nephritis, and others); waiting list time; occurrence of pregnancies, blood transfusions, previous transplants; and immunological profile according to PRA class I (0%; 1-10%; 11-85%; >85%).

Analytical methods used included the Kruskal-Wallis test and Cox regression for univariate and multivariate analysis. A value of 0.05 was accepted as the level of statistical significance. Because this was an observational study without interventional procedures, ethics committee approval was not required; however, the prerequisites of the Declaration of Helsinki were followed.

RESULTS

Among the candidates on the waiting list, the majority were men (13.513, 59%), with a mean age of 51 years, patients with nephropathy secondary to hypertension (5.318; 24%) or diabetes (4.894; 22%), non-sensitized (15.828; 70%); 1.301 of whom had previously received transplants (5.8%) and 40% were exposed to blood transfusions.

The 788 P due to lack of dialysis access (3.5% of the total) had a mean age of 46 years (18-79 years) and were predominantly women (446; 56.6%). The comparative demographic data between P and NP are shown in Table 1.

Table 1. Clinical data of Prioritized (P) and Non Prioritized (NP) groups.

	P (n=788 – 3.5%)	NP (n=21.757 – 96.5%)	*p*-value
Age (years)	46 years (18-79)	51 years(18-90)	0.000
18-50	490 (62.2)	10.377 (47.7)	
51-65	237 (30.1)	8.924 (41.0)	
> 65	61 (7.7)	2.456 (11.3)	
Gender			0.000
Male (ref)	342 (43.4)	13.005 (59.8)	
Female	446 (56.6)	8.752 (40.2)	
Color			0.380
White	531 (67.4)	14.982 (68.9)	
Non-white	257 (32.6)	6.775 (31.1)	
Underlying disease			0.000
High blood pressure (ref)	137 (17.4)	5181 (23.8)	
Diabetes mellitus	136 (17.3)	4758 (21.9)	0.002
Glomerulonephritis	88 (11.2)	2529 (11.6)	
Interstitial nephritis	20 (2.5)	379 (1.7)	
Others	407 (51.6)	8.910 (41)	
Blood transfusions			0.000
0	308 (39.1)	13.516 (62.1)	
1-5	342 (43.4)	7.160 (32.9)	
6-10	78 (9.9)	722 (3.3)	
> 10	60 (7.6)	359 (1.7)	
Previous pregnancy	304 (68.2)	6.132 (70.1)	0.393
PRA (Class I) (%)			0.000
0	442 (56.1)	15.386 (70.7)	
1-10	40 (5.1)	937 (4.3)	
11-85	193 (24.5)	3.744 (17.2)	
> 85	113 (14.3)	1.690 (7.8)	
Previous transplant	112 (14.2)	1.189 (5.5)	0.000

Source: Elaborated by the authors.

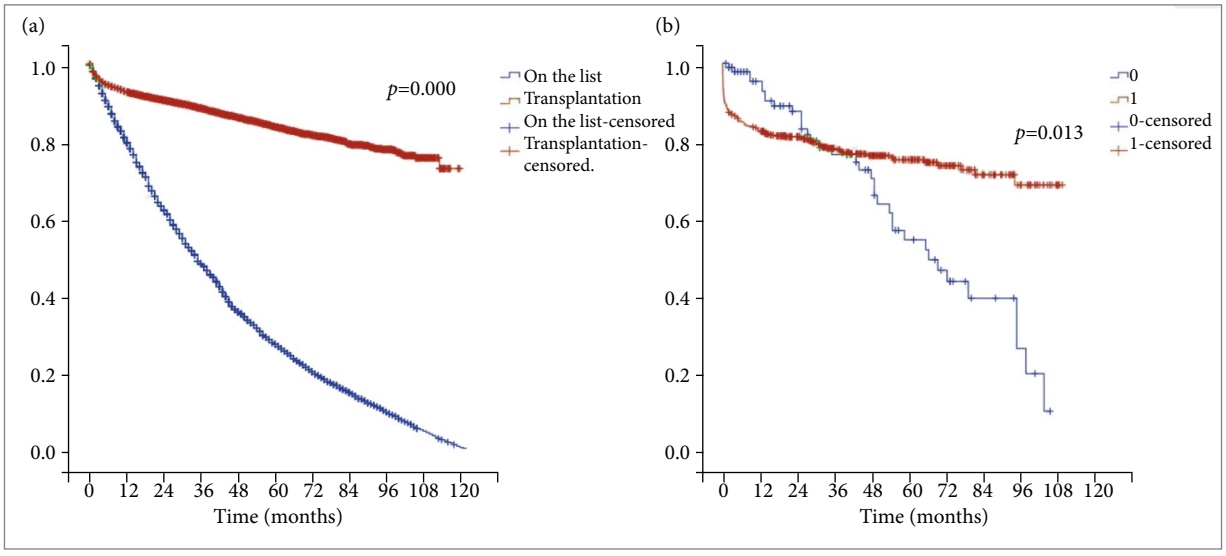
Compared to NP, P were younger, with the majority between 18 and 50 years old (62.2% vs. 47.7%; $p = 0.00$); female (56.6% vs. 40.2%; $p = 0.00$); more transfused, highlighting those who underwent 6-10 transfusions (9.9% vs. 3.3%; $p = 0.00$) and more than 10 transfusions (7.6% vs. 1.7%; $p = 0.00$). P were also more exposed to previous transplants (14.2% vs. 5.5%; $p = 0.00$) and more sensitized against the HLA system, both in the group with PRA 11-85% (24.5% vs. 17.2%; $p = 0.00$) and in the group with PRA > 85% (14.3% vs. 7.8%; $p = 0.00$).

We found fewer patients with diabetic nephropathy among those prioritized (17.3% vs. 21.9%; $p = 0.002$). There was no significant difference between women with and without prior pregnancy, nor was there any impact on patient race.

When we evaluated the fate of all candidates on the waiting list over the analyzed period, we observed that 9.417 (41.8%) were transplanted, 4.208 (19%) died on the waiting list, and 8.920 (39%) remained on the waiting list.

Among the P, 88% (694) were able to undergo transplantation during the period, which occurred in only 40% of the NP (8.724). A lower mortality rate was observed in the P group, with 7% (58) deaths, compared to 19% (4,150) among the NP ($p = 0.00$). However, when comparing the survival of P and NP on the list and after transplant, it is observed that both groups have greater survival after transplantation ($p = 0.000$ – P; $p = 0.013$ – NP); however, in the P group, this benefit only occurs after approximately 36 months, as illustrated in Fig. 1.

Table 2 shows the risk factors for death. Among the NP, the main risk factors for death found were anti-HLA sensitization [odds ratio (OR) PRA 1-10%: 1.65/PRA 11-85%: 1.34/PRA > 85%: 1.90], age over 40 years (OR 41-50 years: 1.66/51-60 years: 2.71/> 60 years: 4.27), multiple transfusions (> 5 OR 1.56) and diabetes as the underlying disease (OR 1.98). In group P, the main risk factors for death found were diabetic nephropathy as the underlying disease (OR 2.39 vs. 1.98; $p = 0.045$) and PRA > 85% (OR 15.06 vs. 1.90; $p = 0.000$).



Source: Elaborated by the authors.

Figure 1. NP (a) vs. P (b) survival.

Table 2. Risk factors for death in the Non Prioritized (NP) and Prioritized (P) groups

	NP		P	
	OR (IC95%)	***p*-value**	**OR (IC95%)**	***p*-value**
Underlying disease				
Diabetes mellitus	1.988 (1.74-2.26)	0.000	2.398 (1.02-5.64)	0.045
Transfusions (n)				
1-5	1.123 (0.99-1.27)	0.059		
> 5	1.557 (1.23-1.93)	0.000		
Retransplantation	0.834 (0.64-1.09)	0.195		
Previous pregnancy	0.797 (0.70-0.91)	0.001		
PRA (%)				
0% (ref)		0.000		0.000
1-10	1.653 (1.28-2.09)	0.000	1.669 (0.19-14.74)	0.645
11-85	1.337 (1.17-1.53)	0.000	1.847 (0.60-5.67)	0.284
> 85	1.900 (1.61-2.24)	0.000	15.066 (5.74-39.56)	0.000
Age (years)				
18-30 (ref)		0,000		
31-40	1.159 (0.88-1.53)	0.291		
41-50	1.663 (1.28-2.15)	0.000		
51-60	2.718 (2.12-3.49)	0.000		
> 60	4.269 (3.31-5.51)	0.000		
Color				
Non-white	1.464 (1.30-1.64)	0,000		

Source: Elaborated by the authors.

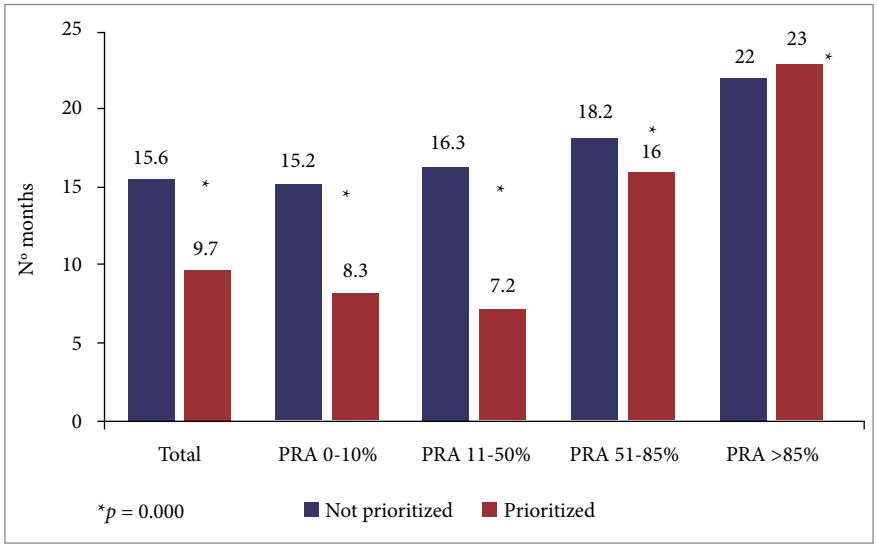
The only factor that led to a higher number of transplants was having glomerulonephritis as the underlying disease, both in the P group (OR 6.40; $p = 0.012$) and in the NP group (OR 1.85; $p = 0.000$). In the P group, the only limitation to transplantation was having a PRA > 85% (OR 0.063; $p = 0.00$).

Among NP, the criteria that hindered access to transplantation were being over 40 years old (41-50y: OR 0.83; $p = 0.04$/51-60y: OR 0.617; $p = 0.00$/> 60y: OR 0.330; $p = 0.00$) and being sensitized with PRA > 10% (11-50%: OR 0.79; $p = 0.001$/51-85%: OR 0.54; $p = 0.000$/> 85%: OR 0.192; $p = 0.000$). Complete data on factors related to access to transplantation are available in Table 3 and Fig. 2.

Table 3. Factors that interfered with access to transplantation in the Non Prioritized (NP) and Prioritized (P) groups.

	NP		P	
	OR (IC95%)	***p*-value**	**OR (IC95%)**	***p*-value**
Underlying disease				
SAH (ref)				
Diabete mellitus	0.678 (0.58-0.79)	0.000	0.736 (0.27-2.04)	0.555
Glomerulonephritis	1.857 (1.58-2.19)	0.000	6.404 (1.51-27.23)	0.012
Interstitial nephritis	1.275 (0.91-1.79)	0.163	0.783 (0.08-7.57)	0.833
Others	0.801 (0.71-0.90)	0.000	1.274 (0.55-2.92)	0.568
Transfusions (n)				
1-5	1.168 (1.06-1.29)	0.002		
> 5	1.051 (0.86-1.28)	0.624		
Retransplantation	0.589 (0.46-0.75)	0.000		
Previous pregnancies	1.587 (1.42-1.77)	0.000		
PRA (%)				
PRA = 0				
PRA > 0	0.724 (0.58-0.89)	0.003		
Age (years)				
18-30 (ref)				
31-40	0.899 (0.75-1.07)	0.244		
41-50	0.832 (0.69-0.99)	0.040		
51-60	0,617 (0,52-0,74)	0,000		
> 60	0,330 (0,27-0,40)	0,000		
PRA (%)				
0 (ref)				
11-50	0.795 (0.69-0.91)	0.001	0.473 (0.15-1.48)	0.197
51-85	0.540 (0.47-0.62)	0.000	0.430 (0.16-1.13)	0.088
> 85	0.192 (0.16-0.23)	0.000	0.063 (0.03-0.14)	0.000

Source: Elaborated by the authors.



Source: Elaborated by the authors.

Figure 2. Time from registration to transplant (months).

Among the patients who underwent transplantation during the period, NP remained on the waiting list for 15.6 months (median 0-116 m) until transplantation, a time that was reduced to 9.75 months (median 0-120 m) in patients who were P (p = 0.00). However, when evaluating patients according to the PRA, a reduction in time to transplantation was observed in P, which was considerably smaller among those with a PRA below 50% (PRA 0-10%: 8.3 m/11-50%: 7.2 m), unlike those sensitized with PRA above 50% (PRA 51-85%: 16 m/> 85%: 23 m), in whom the waiting period until transplantation was similar between P and NP.

The time from prioritization to transplantation for P patients averaged 13.5 days; however, this also varied according to anti-HLA sensitization. P group patients with a PRA between 51% and 85% waited an average of 36 days after prioritization, while those with a PRA greater than 85% waited an average of 138 days. Of the 94 (12%) P patients who failed to receive transplantation during the follow-up period, 48 (51%) had a PRA greater than 85%.

DISCUSSION

We conducted an observational, retrospective analysis of 22.545 adult patients on the waiting list for deceased-donor kidney transplantation in São Paulo state from January 2010 to December 2018, focusing on patients with dialysis access failure, totaling 788 patients (3.5% of the waiting list). Follow-up was conducted until December 2019 to prevent the adverse outcomes of the coronavirus disease 2019 (COVID-19) pandemic from biasing the analysis of waiting list mortality.

The population profile of patients on the list was composed primarily of men, with a mean age of 51 years, non-sensitized, and with nephropathy secondary to hypertension or diabetes. Among the P, however, we observed that the majority were women (56.6%), younger (62.2% aged 18 to 50 years), with more sensitized patients and more previous transplants (14.2% P vs. 5.5% NP), in addition to a lower prevalence of diabetes or hypertension as the cause of kidney loss.

Assfalg et al.[3] analyzed data from 1996 to 2010 from 61 European centers involved in Eurotransplant, in which 937 P patients were transplanted for various reasons, equivalent to 2.1% of the total number of kidney transplants performed with deceased donors (44,461). The P group was similarly composed of young patients (mean 43 years), with a higher prevalence of previous transplant recipients (37.5%), and the reasons for prioritization were access failure (55.7%), uremic polyneuropathy (3.3%), high suicide risk (12.1%), and the presence of bladder alterations in double kidney-pancreas transplants. In contrast, in Turkey, Celebi et al.[4] evaluated, from 2010 to 2014, 47 P due to access failure, equivalent to 0.019% of the 2.467 kidney transplants with deceased donors, and found a different demographic profile, as there was no difference in age (41 P vs. 41 NP – $p = 0.91$) or anti-HLA-PRA class I (P 11.9% vs. NP 11.1% – $p = 0.87$) and II (P 6.8% vs. NP 11.1% – $p = 0.52$) sensitization. Similarly, in Portugal, Costa et al.[5] described 11 P among 374 transplant recipients (2.9%) in the period from 2006 to 2017, with no significant difference in age (41 P vs. 49 NP – $p = 0.031$), HLA sensitization (14% P vs. 13.5% NP – $p = 0.93$), retransplantation rate (9.1% P vs. 7.2% NP – $p = 0.80$) and gender (men 45% P vs. 56% NP – p = 0.07).

We observed a high prevalence of P due to access failure in Brazil, when compared to other countries[4,5]. The reasons, which were not the objective of our study, may be associated, among other causes, with the fact that we have in the country a progressive reduction of dialysis patients using prostheses or fistulas related to an increase in patients with long-term catheters, as reported by Neves et al.[6] when describing the profile of dialysis patients in Brazil.

We recognize marked variability among transplant centers in prioritization recommendations, mainly due to limited access. Some centers only request prioritization after femoral venous access has been established. This, in addition to significantly increasing the risk of vascular and infectious complications during dialysis, also interferes with surgical viability for kidney graft implantation. Difficulty finding a suitable site for kidney graft placement also occurs in patients who are candidates for retransplantation, who are at higher risk of a shortage of anatomical sites for vascular access. In addition, many of these patients are already sensitized to the anti-HLA system, having previously undergone transplants or received numerous blood transfusions. This means that a considerable number of patients, once prioritized, are unable to undergo transplantation quickly and arrive at the transplant in worse clinical and surgical condition.

Regarding the fate of patients on the list, P had greater access to transplantation (88% P vs. 40% NP – $p = 0.00$), lower mortality on the list (7% P vs. 19% NP – $p = 0.00$), and shorter waiting time until transplantation, meeting the prioritization objective. When the PRA was less than 50%, there was a reduction from 15.6 to 9.75 months in waiting time. However, patients with a PRA greater than 50% did not benefit from prioritization to the same extent. Similarly, Leirias et al.[7] evaluated the transplant list in the state of Rio Grande do Sul from 2002 to 2005, composed of 31 P group patients, the majority female and with a mean age of 47.5 years. Of these, 26 were transplanted (83%), two (6.4%) remained on the list due to PRA > 40%, two (6.4%) were removed due to lack of clinical conditions, and one (3.2%) died while still on the list.

Our analysis highlights the difficulty in accessing transplants among patients with a PRA greater than 50%, even after prioritization. In an attempt to overcome this limitation, and in the absence of well-established programs that equalize access to transplants for highly sensitized patients with low transplantability in Brazil, as has long been the case in other countries[8], there are desensitization protocols with human immunoglobulin and/or human anti-CD20 antibody (rituximab) and ongoing plasma exchanges.

Another way to expand the supply for sensitized recipients is transplantation with a living donor with ABO incompatibility, which presents excellent results[9-11]. Another possibility is the matched donation program, as described by Machado et al.[12] and

Kute et al.[13], which has yielded very positive results. These programs, while not eliminating prioritization due to lack of access, help care for patients who frequently find themselves in this sad situation in our country, under challenging clinical conditions.

It is important to highlight another difficulty we have in Brazil: the disparity in access to lists and transplants in different Brazilian regions, as evidenced by Sandes-Freitas et al.[14] In some areas, access is minimal, resulting in prolonged dialysis time and an increased risk of vascular access failure. The Brazilian Transplant Registry (Registro Brasileiro de Transplantes-RBT) in 2018 revealed a stark disparity between the 2.095 kidney transplants performed in São Paulo and the four in Acre and Amazonas that same year.

When evaluating the risk factors for death in our analysis, diabetes, age over 40 years, and anti-HLA sensitization stood out overall. Among P, a PRA greater than 85% was the leading risk factor for death on the waiting list (OR 15.1), because, at this level of anti-HLA sensitization, the waiting time on the waiting list and the consequent risk of loss of clinical/surgical conditions for transplantation and death increase significantly. Similarly, diabetes mellitus and advanced age (56-64 years) were identified as risk factors for death in the Eurotransplant program, associated with retransplantation and prioritization. According to Patrick et al.[15], the survival of patients on the list has been increasing in recent decades, but, on the other hand, cardiovascular diseases, neoplasms, and diabetes superimposed on a high body mass index contribute to adverse outcomes.

Regarding transplantability, the only positive factor found was having glomerulonephritis as the underlying disease. In this case, we infer a correlation with the population profile being predominantly young and with a lower prevalence of diabetes; therefore, this group has a lower risk of death on the waiting list and, consequently, a greater chance of having access to a compatible donor. Conversely, being highly sensitized (PRA > 85%) precluded transplantation among both P (OR 0.063) and NP (OR 0.192).

Our group compared graft outcomes and patient outcomes in the post-transplant period between P due to access failure and PN (data submitted for publication). In the P group, grafts had better characteristics despite greater HLA disparity, as in these cases, the supply does not follow the usual scoring criteria based on HLA similarity. Conversely, prioritized recipients died earlier, with a predominance of infectious and cardiovascular causes. Risk factors for death after transplantation among P were similar to those on the waiting list: age over 50 years and diabetes, as well as Black ethnicity. The trend toward reduced survival among P remained at 1, 2, 5, and 9 years after transplantation.

The negative post-transplant outcome was also present in Sá and Castro's assessment[16,] who classified 290 transplant patients based on cumulative difficulty with vascular access for dialysis as mild (A), moderate (B), severe (C), or access failure (D). In groups C and D, women predominated, with greater anti-HLA sensitization, longer dialysis time, and use of a venous catheter as vascular access. In the 36 months post-transplant, group C had a higher incidence of death and worse renal function, with no difference in infectious events or graft survival. Similar to the risk factors for death listed in our study, diabetics, those with a PRA greater than 80%, those with severe access difficulties, and those who received a graft with expanded criteria also stood out as having higher post-transplant mortality.

Our study was unable to perform an adequate analysis on the impact of anti-HLA class II sensitization, nor could patients be removed from the list due to loss of clinical conditions for transplantation, due to the lack of consistent data in the system.

CONCLUSION

Brazil has a higher number of patients with P due to a lack of vascular access than other countries. The complex causes of this problem involve the more frequent use of catheters as vascular access and the lack of programs to provide permanent, high-quality vascular access for dialysis. We also observed that many patients are referred for prioritization only after using femoral sites and are already highly sensitized, both of which have a clear negative impact on access and transplant outcomes. Our analysis also confirmed that only patients with PRA of up to 50% benefited from prioritization. Thus, the most sensitized, even if prioritized, have much lower chances of transplantation than other patients.

To progress, we must dedicate ourselves to improving vascular, hematologic, and transfusion access care in dialysis, to preserving femoral access for transplantation, and to establishing programs that aim to equalize the transplantability of sensitized patients.

CONFLICT OF INTEREST

Nothing to declare.

AUTHOR'S CONTRIBUTION

Substantive scientific and intellectual contributions to the study: Albuquerque CCC, Gazolla DN, Castro MCR, Monteiro FA; **Conception and design:** Albuquerque CCC, Gazolla DN, Agena F, Castro MCR; **Data analysis and interpretation:** Castro MCR, Albuquerque CCC, Gazolla DN, Agena F, Monteiro FA; **Article writing:** Albuquerque CCC, Castro MCR; **Critical revision:** Albuquerque CCC, Castro MCR. **Revisão crítica:** Castro MCR, David-Neto E; **Final approval:** Albuquerque CCC.

DATA AVAILABILITY STATEMENT

All dataset were generated or analyzed in the current study.

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