The impact of COVID-19 infection on hemodialysis patients vs kidney transplant patients

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AIM: *AS in the whole world, there has been a decrease in the number of both cadaveric and living-donor kidney transplants in our country due to the COVID-19 pandemic. This study aimed at comparing the data of patients who previously underwent a kidney transplant in our clinic and patients on hemodialysis treatment and were diagnosed with COVID-19 during their follow-ups to find answer to the question "Should we postpone kidney transplants during the pandemic or perform transplants as soon as possible?".*
MATERIAL AND METHOD: *Among those diagnosed with COVID-19 during follow-ups between March 2020 and March 2021 and treated on an inpatient or outpatient basis, the data of patients who previously underwent a kidney transplant in Baskent University Faculty of Medicine, Department of Transplantation, Konya Practice and Research Hospital and hemodialysis patients followed up by the Nephrology Clinic were retrospectively analyzed.*
RESULTS: *In our study, intensive care stay (Group 1:48.8%, Group 2: 40.4%, P=.34), intubation requirement (Group 1: 35%, Group 2: 34.6%, P=.96) and mortality (Group 1: 36.3%, Group 2: 34%, P=.84) rate was higher in the hemodialysis group, although no statistically significant difference was found.*
CONCLUSION: *All this literature information and our study suggests that mortality rates were statistically similar or lower for transplant group. So it is unnecessary to delay kidney transplantation in patients with appropriate indications.*

KEY WORDS: COVID-19, Hemodialysis, Kidney transplantation, Mortality

Introduction

The coronavirus disease 2019 (COVID-19), which first emerged in China in December 2019 and then affected the whole world, can cause mild symptoms as well as progress to a life-threatening illness [1,2]. Most of the studies have shown advanced age as the most important factor affecting mortality. Furthermore, comorbidities such as obesity, hypertension, cardiovascular diseases, diabetes mellitus, and chronic lung disease have been found to increase mortality [3]. Immunosuppressive drugs that have to be used by chronic kidney failure (CKF) and kidney transplant patients are also considered among potential risk factors associated with having a more severe form of the disease [3].
Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which causes COVID-19, usually manifests with pneumonia, but it can also affect other organs [4]. Since the kidney is one of these organs, patients who may require renal replacement therapy (dialysis or kidney transplant) are a very high-risk group for COVID-19 [4]. Compared to the general population, dialysis patients have 8.8 and 8.1-fold higher rates of mortality from cardiovascular and non-cardiovascular causes, respectively [5]. It has been observed that life expectancy for transplant patients is 30-50% shorter compared to the general population [4]. It is believed that COVID-19 will have a more fatal course in dialysis patients and kidney transplant recipients due to underlying CKF and other possible comorbidities [4]. However, there is no consensus on how

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immunosuppressive drugs that have to be used by kidney transplant patients affect/will affect the course of COVID-19. In addition to studies suggesting that the immunosuppression-related infection will be more severe in these individuals, there are also publications reporting that the drugs used can slow down the cytokine storm caused by COVID-19, contributing positively to the course of the disease [6,7].

As in the whole world, there has been a decrease in the number of both cadaveric and living-donor kidney transplants in our country due to the COVID-19 pandemic. One of the reasons for this decline was the physical and lack of labor of the hospitals caused by pandemic [8]. Another main reason is the lack of sufficient data on the course of COVID-19 in dialysis patients and kidney transplant recipients who have to use immunosuppressive drugs.

This study aimed at comparing the data of patients who previously underwent a kidney transplant in our clinic and patients on hemodialysis treatment and were diagnosed with COVID-19 during their follow-ups to find answer to the question "Should we postpone kidney transplants during the pandemic or perform transplants as soon as possible?".

Material and Method

This is a retrospective observational study. Turkish Government Ministry of Health applications were used for this study. Ministry of Health of the Republic of Turkey approval number: 2021-12- 26T04_49_57.

Among those diagnosed with COVID-19 during follow-ups between March 2020 and March 2021 and treated on an inpatient or outpatient basis, the data of patients who previously underwent a kidney transplant in Baskent University Faculty of Medicine, Department of Transplantation, Konya Practice and Research Hospital and hemodialysis patients with kidney transplantation candidates followed up by the Nephrology Clinic were retrospectively analyzed.

The study included patients with complaints and/or examination findings and a positive polymerase chain reaction (PCR) test result. All patients underwent posterior-anterior chest X-ray and, if necessary, chest computed tomography (CT). Bilateral peripheral consolidation and/or ground-glass opacity were considered the typical findings of COVID-19 involvement. Patients were divided into two groups. Group 1 included hemodialysis patients, while Group 2 included patients who had undergone a kidney transplant. In our clinic, kidney transplantation is recommended for all chronic renal failure patients with appropriate indication in Covid 19 periods. Those who do not accept the surgery from this patient group and those who do not have appropriate donors were included in the hemodialysis group. The general approach of our transplantation discipline to altering immunosuppressive therapy were as follows:

- Not making any changes in the immunosuppressive therapy regimen of patients with a good clinical status;
- Continuing the same dose of steroids and cyclosporine, one of the calcineurin inhibitors, in all patients using these drugs;
- First reducing the dose of antimetabolite (mycophenolate) in patients with a worsening general condition or discontinuing it if the patient's general condition does not improve;
- Reducing the drug dose in patients using tacrolimus as a calcineurin inhibitor or mTOR inhibitor (everolimus or sirolimus) if the clinical status does not improve despite the revision of the antimetabolite dose given simultaneously or completely discontinuing the drug if necessary;
- Increasing the immunosuppressive drugs of patients with a negative follow-up PCR test result and improved clinical findings to pre-COVID-19 doses.

Patients' demographic data, etiology of renal failure, and comorbidities were recorded. In addition, COVID-19-related admission complaints, laboratory and imaging findings at admission, antiviral agents used, the requirement for immune plasma, other drugs used for the treatment, length of hospital and/or intensive care stay, intubation requirement and duration, and mortality data were evaluated. The analysis included 80 patients in Group 1 and 52 patients in Group 2 who met the study criteria. The follow-ups included physical examination findings, laboratory tests, and follow-up chest X-ray and/or, if necessary, chest CT. The data of both groups were statistically analyzed.

Turkish Government Ministry of Health applications were used for this study. Ministry of Health of the Republic of Turkey approval number: 2021-12- 26T04_49_57.

Statistical Analysis

The analyses of our study were carried out using the SPSS (Statistical Package for the Social Sciences, version 21.0. IBM Corp. Armonk, NY, USA) software package. The level of error was set at $p<0.05$ for all analyses. The normality of data was assessed with the Kolmogorov-Smirnov test.

Frequency table results are given for categorical variables and descriptive measures (mean+/- st. deviation or median (min, max) in non-parametric cases) for numerical variables. Student's t-test or Mann-Whitney U tests were used to compare the two groups. Chi-square analysis was performed to test whether categorical variables were correlated or not.

Results

Of the 80 patients included in the hemodialysis group, 37 (46.3%) were female and 43 (53.8%) were male. Of

the transplant group, 20 (38.5%) were female and 32 (61.5%) were male. There was no statistical difference between the groups in terms of gender variable (p=0.37). The median age was 69.5 (range, 23-89) years in Group 1 and was 49 (range, 19-70) years in Group 2.

The hemodialysis group had a statistically significantly older age (p<0.001). While 4 (5%) patients in the hemodialysis group had no comorbidity, 7 (13.5%) patients in the transplant group had no comorbidity. There was no difference between the groups in terms of having a comorbid disease (p=.086). However, hypertension (p=.003) and coronary artery disease (p=.02), which are the most common comorbidities, were more frequent in Group 1, while the frequencies of diabetes mellitus (p=.15), congestive heart failure (p=.54), chronic obstructive pulmonary disease (p=.7), cerebrovascular disease (p=.7) and malignancy (p=.15) were similar in both groups (Table I). In terms of the etiology of renal failure, the most common cause in Group 1 was hypertension (52.5%), followed by diabetes mellitus (30%), cryptogenic renal failure (8.8%), and other causes (8.8%). The most common cause in the transplant group was hypertension (30.8%), followed by diabetes mellitus (23.1%), cryptogenic kidney failure (11.5%), hereditary causes (5.8%), toxic nephropathy (1.9%), and other causes (26.9%) (Familial Mediterranean Fever, atrophic kidney, etc.). There was a difference between the two groups in terms of the etiology of renal failure (p=.005) (Table II). The median hemodialysis time in the hemodialysis group was 5(0.2-17), while 3 (0.25-19) years in the transplant group before transplantation.Of the patients in Group 2, 19 (36.5%) had a cadaveric transplant and 33 (63.5%) had a living donor transplant. The comparison of the mortality rates by the type of transplant showed no statistical difference between the groups (cadaveric: 36.8%, living-donor: 33.3%, p=.79). In both groups, patients had at least one complaint at admission. Cough was the most frequent complaint (Group 1: 47.8%, Group 2: 51.9%, p=.61), followed by fever (Group 1: 47.5%, Group 2: 50%, P =.77), fatigue (Group 1: 56.3% , Group 2: 42.3%, p=.11), dyspnea (Group 1: 42.5%, Group 2: 25%, p=.04), and diffuse body pain (Group 1: 15%, Group 2: 19.2%, p= .52) (Table III). PCR test was performed on patients who presented with the afore-

TABLE I - *Age, gender and comorbidity datas of Group 1 and Group 2.*

		Group 1 (n=80)	Group 2 (n=52)	P value
Age (year)		69.5 (23-89)	49 (19-70)	<.001
Gender	Female	37 (% 46. 3)	20 (% 38. 5)	.37
	Male	43 (% 53. 8)	32 (% 61. 5)	
Comorbidity	Yes	76 (% 95)	45(% 13. 5)	.86
	No	4 (% 5)	7 (% 86. 5)	
Hypertension	Yes	65 (% 81. 3)	30 (% 57. 7)	.003
	No	15 (% 18. 8)	22 (% 42. 3)	
Diabetes Mellitus	Yes	44 (% 55)	22 (% 42. 3)	.15
	No	36 (% 45)	30 (% 57. 7)	
Coronary Artery Disease	Yes	25 (% 31. 3)	7 (% 13. 5)	.02
	No	55 (% 68. 8)	45 (% 86. 5)	
Congestive Heart Failure	Yes	3 (% 3. 8)	1 (% 1. 9)	.55
	No	77 (% 96. 3)	51 (% 98. 1)	
Chronic obstructive pulmonary disease	Yes	6 (% 7. 5)	3 (% 5. 8)	.7
	No	74 (% 92. 5)	49 (% 94. 2)	
Cerebro Vascular disease	Yes	1 (% 1. 3)	1 (% 1. 9)	.75
	No	79 (% 98. 8)	51 (% 98. 1)	
Malignancy	Yes	3 (% 3. 8)	0 (% 0)	.15
	No	77 (% 96. 3)	52 (% 100)	

TABLE II - *Etiological causes of chronic renal failure of patients in Group 1 and Group 2.*

	Group 1 (n=80)	Group 2 (n=52)	P value
Hypertension	42 (52.5%)	16 (30.8%)	.005
Diabetes Mellitus	24 (30%)	12 (23.1%)	
Toxic Nephropathy	0 (0%)	1 (1.9%)	
Hereditary Causes	0 (0%)	3 (5.8%)	
Cryptogenic	7 (8.8%)	6 (11.5%)	
Other Causes	7 (8.8%)	14 (26.9%)	

Table III - *The complaints of the patients in Group 1 and Group 2 at the time of admission.*

		Group 1 (n=80)	GrouP 2 (n=52)	P value
Fever	Yes	38 (% 47. 5)	26 (% 50)	.77
	No	42 (% 52. 8)	26 (% 50)	
Cough	Yes	38 (% 47. 5)	27 (% 51. 9)	.61
	No	42 (% 52. 8)	26 (% 48. 1)	
Weakness-fatigue	Yes	45 (% 56. 3)	22 (% 42. 3)	.11
	No	35 (% 43. 8)	30 (% 57. 7)	
Shortness of breath	Yes	34 (% 42. 5)	13 (% 25)	.04
	No	46 (% 57. 5)	39 (% 75)	
Widespread body pain	Yes	12 (% 15)	10 (% 19. 2)	.52
	No	68 (% 85)	42 (% 80. 8)	

Table IV - *Imaging and laboratory findings of the patients in Group 1 and Group 2 at the time of admission.*

		Group 1 (n=80)	Group 2 (n=52)	P value
Involvement in tomography	Not applied	7 (% 8. 8)	6 (% 11. 5)	.73
	Yes	66 (% 82. 5)	40 (% 76. 9)	
	No	7 (% 8. 8)	6 (% 11. 5)	
Leukocyte ($x10^3/mm^3$)		6.35(2.27-25. 7)	6.44 (2.09-13. 1)	.92
Neutrophil ($x10^3/mm^3$)		4.41 (1.33-23. 6)	4.60 (1.72-11. 1)	.96
Lymphocyte ($x10^3/mm^3$)		0.85 (0.12-2.35)	1.05 (0.18-2.69)	.12
Nötrofil lenfosit ratio		5.26 (0.96-52.52)	4.54 (0.89-43.04)	.50
C-reactive protein (mg/L)		72.4 (0. 5-375)	46 (0. 5-269)	.11
Fibrinogen (mg/dL)		311 (212-822)	432 (48-683)	.62
D-dimer(µg/mL)		1.39 (0.28-13. 0)	0.83 (0.14-8.34)	.002
Ferritin(ng/mL)		1780 (160-6389)	524 (41-4953)	<.001
Albumin(g/dL)		3.2 (2. 2-4. 1)	3.6 (2. 3-4. 6)	.005

mentioned complaints to confirm the diagnosis of COVID-19. All patients with a confirmed diagnosis of COVID-19 underwent postero-anterior chest X-ray and, if necessary, chest CT. CT was performed on 73 (91.2%) patients in Group 1 and 46 (88.5%) patients in Group 2. Of those who underwent tomography, 66 (90.4%) patients in Group 1 and 40 (86.9%) patients in Group 2 had lung involvement. Although there was no statistical difference between the two groups, the rate of lung involvement was lower in the transplant group (p= .73). The comparison of the admission laboratory analyses of the patients showed similar leukocyte (p= .92), neutrophil (p= .96), lymphocyte (p= .12), neutrophil-lymphocyte ratio (p= .5), C-reactive protein (p= .11), fibrinogen (p=.62), and lactate dehydrogenase (p=.62) values in both groups. The albumin value was higher in the transplant group (p=0.005), while the D-dimer (p=.002), and ferritin (p<.001) values were higher in the hemodialysis group (Table IV).

The analysis of imaging, laboratory, and clinical findings revealed that 27 (33.8%) patients in Group 1 were treated as outpatients 53 (66.3%) patients were treated as inpatients, while in Group 2, 17 (32.7%) patients were treated as outpatients and 35 (67.3%) patients were treated as inpatients, with no difference between the groups in terms of admission rates (p= 0.9). The ICU admission (Group 1: 48.8%, Group 2: 40.4%) and intubation requirement (Group 1: 35%, Group 2: 34.6%) rates were not statistically different (respectively p=. 34, p=.96). The length of hospital and intensive care unit stay, and the number of intubation days were also similar between the groups (p=.39, p=.59, p= .075, respectively). In line with changes in guidelines during the COVID-19 pandemic, antiviral therapy varied over time in both groups. While hydroxychloroquine was preferred in the early period, favipiravir was used later.

With the effect of this change, there was a statistical difference between the two groups in terms of antiviral drug use (p= .006). While the requirement for antibiotic use was statistically higher in the hemodialysis group (Group 1: 97.5%, Group 2: 75%, p <.001), the use of immune plasma was similar in both groups (Group 1: 26.3%, Group 2: 17.3%, p= .23). Antiaggregant/anticoagulant use was also higher in the hemodialysis group (Group 1: 100%, Group 2: 90.4%, p=.005). The comparison of the groups by inotropic drug requirement showed that 26 (32.5%) patients in Group 1 and 18 (34.6%) patients in Group 2 (p=.8) required inotropic drugs (Table V).

Although the comparison of the patients by mortality rates showed no statistically significant difference between the groups, the mortality rates of patients in the hemodialysis group were higher (Group 1: 36.3%, Group 2: 34.6%, p= .84) (Table VI).

TABLE V - *Data related to treatment options of Group 1 and Group 2.*

		Group 1 (n=80)	Group 2 (n=52)	P value
Antiviral	Not used	0 (% 0)	5 (% 9. 6)	.006
	Hydroxychloroquine	6 (% 7. 5)	8 (% 15. 4)	
	Favipiravir	74 (% 92. 5)	38 (% 73. 1)	
	Oseltamivir	0 (% 0)	1 (% 1. 9)	
Plasma therapy	Used	21 (% 26. 3)	9 (%17. 3)	.23
	Not used	59 (% 73. 8)	43 (%82. 7)	
Anti aggregant/Coagulant	Used	80 (% 100)	47 (% 90. 4)	.005
	Not used	0 (% 0)	5 (% 9. 6)	
Antibiotic Requirement	Yes	78 (% 97. 5)	39 (% 75)	<.001
	No	2 (% 2. 5)	13 (% 25)	
Positive inotrope requirement	Yes	26 (% 32. 5)	18 (% 34. 6)	.85
	No	54 (% 37. 5)	34 (% 65. 4)	

TABLE VI - *Data on treatment modality, intensive care requirement, intubation requirement and mortality in Group 1 and Group 2.*

		Group 1 (n=80)	Group 2 (n=52)	P value
Treatment modality	Inpatient	53 (% 66. 3)	35 (% 67. 3)	.90
	Outpatient	27 (% 33. 8)	17 (% 32. 7)	
Hospital stay (day)	10 (3-34)	12(1-86)	.39	
Intensive care requirement	Yes	39 (% 48. 8)	21 (% 40. 4)	.34
	No	41 (% 51. 2)	31 (% 59. 6)	
Intensive care stay (day)	8 (1-27)	8 (2-57)	.59	
Intubation requirement	Yes	28 (% 35)	18 (% 34. 6)	.96
	No	52 (% 65)	34 (% 65. 2)	
Intubation days	4 (1-24)	6 (1-28)	.075	
Mortality	Yes	29 (% 36. 3)	18 (% 34. 6)	.84
	No	51 (% 63. 7)	34 (% 65. 4)	

Discussion

Kidney transplantation is the gold standard treatment for patients with advanced or end-stage renal disease. Transplant patients become susceptible to viral infections due to the immunosuppressive drugs they have to use. In the early periods of COVID-19, there have been a substantial decrease in the number of kidney transplants due to uncertainties regarding the course of the disease and its effects on transplant patients [9]. A study showed a 51.1% decrease in cadaveric kidney transplants and a 71.8% decrease in living-donor kidney transplants as of April 2020 in the United States [10]. In this period, transplant candidates have been determined more selectively. One of the important factors here was concerns about the sensitivity of the PCR test. In order to prevent a possible transmission from the donor to the recipient, the possible risks and possible benefits of kidney transplant have been assessed more sensitively for patient selection and decisions [9]. Another important reason for the decrease in the number of transplantation was the belief that immunosuppressive drugs, which should be used by transplant patients, would increase the risk of infection and negatively affect the course of the disease in case of possible contamination.

It is believed that COVID-19 infection may have a more severe course in newly transplanted patients due to high-dose immunosuppressive drugs use in the early postoperative period, as well as in those with a previous transplant [11]. Another reason for the decrease in the number of transplants was the effort to reduce the patient density in hospitals with a heavy workload due to the pandemic and to establish a treatment environment for individuals diagnosed with COVID-19.

The decrease in organ transplants continued in February 2020 and April 2020, and kidney transplants were primarily postponed due to the possibility of dialysis [12]. Patients with chronic renal failure who were waiting for transplantation and especially those who had to receive hemodialysis treatment were affected by COVID-19 infection more. The majority of these patients have a suppressed immune system. Hypertension, diabetes mellitus, and cardiac disorders are quite common in these patients [13]. Most of them have to come to the hospital for outpatient hemodialysis treatment 3 times a week. Institutions with dialysis units are mostly hospitals with a high patient density. This increased the risk of contact with COVID-19. Although it is believed that home hemodialysis and peritoneal dialysis, one of the main objectives of health authorities in the United States,

reduces the likelihood of contact, but it does not seem possible at this stage [13].

A multicenter study by Ozturk et al. on the effects of COVID-19 on stage 3-5 chronic kidney failure, hemodialysis patients, kidney transplant patients, and individuals without any kidney disease found that the mortality rates of other groups were considerably higher than the group without any kidney disease [3]. Among these groups, the highest mortality and intensive care admission rates were seen in those with end-stage chronic renal failure [3]. Another study showed chronic renal failure and age variables as independent risk factors associated with mortality in patients requiring hospitalization due to COVID19 [14]. Increased production and decreased excretion of proinflammatory cytokines in uremic patients is believed to be associated with high mortality [15]. The study of Ozturk et al. also showed 2 times higher in-hospital mortality rates in hemodialysis patients compared to the control group [3]. The same study has emphasized that hemodialysis centers are risky areas for viral transmission and reported that dialysis centers were the source of infection in 47.8% of hemodialysis patients with COVID-19 [3]. Our study demonstrated that the ICU admission (48.8%, 40.4%, respectively, p=.34), intubation requirement (35%, 34.6%, respectively, p=.96) and mortality (36.3%, 34%, respectively, p=.84) rates were higher in the hemodialysis group, although there was no statistically significant difference between the two groups. The data on how the immunosuppressive therapy used for transplant patients with COVID-19 will affect the course of the disease and how the use of these drugs will be managed is not clear. Although the general view is that the use of immunosuppressive drugs will adversely affect the course of the disease, some studies suggest that these drugs may have a protective effect against increased proinflammatory cells due to COVID-19 and may alleviate the viral cytopathic effect [16]. Previous studies have shown positive effects of especially tacrolimus and cyclosporine on the course of the disease by inhibiting viral replication in other coronavirus types and some other viral diseases [16].

It is not clear whether the more severe course of the disease in transplant patients compared to the general population is due to the immunosuppressive drugs used or the underlying comorbidities. Although there are different views on how to manage immunosuppressive drugs in transplant patients diagnosed with COVID-19, the basic approach should be to prefer treatment alternatives aimed at minimizing both the risk of acute rejection and infections that may develop with bacterial and/or opportunistic pathogens [17]. The general approach of our transplantation discipline to altering immunosuppressive therapy were as follows:

- Not making any changes in the immunosuppressive therapy regimen of patients with a good clinical status;
- Continuing the same dose of steroids and cyclosporine, one of the calcineurin inhibitors, in all patients using these drugs;
- First reducing the dose of antimetabolite (mycophenolate) in patients with a worsening general condition or discontinuing it if the patient's general condition does not improve;
- Reducing the drug dose in patients using tacrolimus as a calcineurin inhibitor or mTOR inhibitor (everolimus or sirolimus) if the clinical status does not improve despite the revision of the antimetabolite dose given simultaneously or completely discontinuing the drug if necessary;
- Increasing the immunosuppressive drugs of patients with a negative follow-up PCR test result and improved clinical findings to pre-COVID-19 doses.

According to the results of the study by Hilbrands et al. on kidney transplant and hemodialysis patients, mortality rates were higher in both hemodialysis and transplant groups than in the general population [1]. The same study reported that hemodialysis patients had the highest mortality rates [1]. Likewise, a multicenter study by Ozturk et al. found that transplant patients diagnosed with COVID-19 had lower mortality rates than both hemodialysis patients and patients with predialysis end-stage renal disease [3]. Contrary to these studies, a study by Jager et al. evaluated patients who received different renal replacement therapies and were diagnosed with COVID-19. The results of this study showed a 1.28 (1.02-1.60) times higher risk of death in transplant recipients compared to dialysis patients [4]. A study comparing patients on the waiting list and kidney transplant patients found that both the hospitalization rates (82% and 65%, respectively) and the mortality rates of the patients on the waiting list were higher compared to the transplant patients (25%, 16%, respectively) [18]. Our study demonstrated that mortality (36.3%, 34%, respectively, p=.84) rates were higher in the hemodialysis group, although there was no statistically significant difference between the two groups.

Limitations of the Study

The collection of data from patient records and the absence of objective examination findings due to the retrospective design, being a single-center study, and the limited number of patients are some of the limitations of the study. Another limitation is that some of the patients who underwent a transplant or received hemodialysis treatment in our hospital were followed up in other hospitals during this period, therefore could not be included in the study because of inaccessible data since our institution has not been serving as a pandemic hospital for a long time.

Conclusion

During the pandemic, there has been a considerable decrease in the number of living-donor and cadaveric transplants. One of the main reasons for this is that the immunosuppressive drugs that have to be used by these

patients would increase the risk of viral transmission, adversely affecting the course of the disease and mortality rates in the case of a possible COVID-19. Studies conducted over time have shown that immunosuppressive drugs do not adversely affect the course of the disease as expected. Furthermore, as in our study, the majority of studies have shown that COVID-19 is more fatal in patients with end-stage renal disease and dialysis patients than in those who underwent a kidney transplant. All this literature information and our study suggests that mortality rates were statistically similar or lower for transplant group. So it is unnecessary to delay kidney transplantation in patients with appropriate indications.

Riassunto

Scopo: Come in tutto il mondo, con la pandemia di COVID-19, anche nel nostro paese si è registrata una diminuzione del numero di trapianti di rene da donatore sia da cadaverico sia da vivente. Lo scopo di questo studio è confrontare i dati dei pazienti a cui sono stati diagnosticati il COVID-19 durante il loro monitoraggio e i pazienti che hanno avuto un precedente trapianto di rene nella nostra clinica e i pazienti in emodialisi, in modo da trovare una risposta alla domanda di "in pandemia, dobbiamo rimandare il loro trapianto di rene; o dobbiamo farlo il prima possibile?"

Materiale e Metodo: TRA marzo 2020 e maggio 2021, sono stati analizzati retrospettivamente i dati dei pazienti che sono stati diagnosticati il COVID-19 durante loro visita e monitoraggio che hanno avuto un precedente trapianto di rene presso la Facoltà di Medicina dell'Università di Baskent e il Dipartimento di Scienza Madre di Trapianti dell'Ospedale di Pratica e Ricerca di Konya con diagnosi di insufficienza renale cronica e che sono stati trattati con emodialisi dalla clinica di nefrologia con la stessa diagnosi, che sono stati trattati in regime di ricovero in piene o in ambulatorio.

Risultati: Nel nostro studio, durata della degenza in terapia intensiva (Gruppo 1: 48,8%, Gruppo 2: 40,4%, P=,34), necessità di intubazione (Gruppo 1: 35%, Gruppo 2: 34,6%, P=,96) e mortalità (Gruppo 1: 36,3%, Gruppo 2: 34%, P=,84) era più alto nel gruppo emodializzato, sebbene non sia stata trovata alcuna differenza statisticamente significativa.

Conclusione: Tutte queste informazioni della letteratura e i risultati del nostro studio ci mostrano che i tassi di mortalità sono statisticamente simili o inferiori nel gruppo del trapianto rispetto al gruppo dell'emodialisi. Pertanto, non è necessario rimandare il trapianto di rene nei pazienti con indicazioni appropriate.

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