Trends in COVID-19 Outcomes in Kidney Transplant Recipients During the Period of Omicron Variant Predominance

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Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) Omicron variant has spread rapidly worldwide.[1] In Spain, it became predominant as of December 2021. Greater transmissibility and less severity have been described in the general population.[2] However, no data have been reported on kidney transplant (KT) patients during the Omicron-predominant period. In addition, KT recipients have received a third dose of the mRNA vaccine after its approval in Spain in September 2021.

We performed a multicenter retrospective cohort study to analyze coronavirus disease-19 outcomes among our KT population throughout 2 successive epidemic waves in a period with changes in the viral variants and in the vaccination schedule: Spanish fifth wave (June–November 2021; Delta predominance, n = 27) and sixth wave (December 2021–February 2022; Omicron predominance, n = 117).

The incidence of SARS-CoV-2 infection in our cohort of KT patients was 4.3-fold higher during the last sixth wave (Table 1). The percentage of vaccination was very high and similar in both periods, but as expected, more patients had received a third dose in the last wave (11.5% versus 93.8%; $P < 0.001$). Fortunately, clinical picture has changed with less presence of fever and prevailing upper respiratory tract symptoms. There is a trend to a lower pneumonia and hospitalization incidence but without statistical differences. Additionally, critical patients, defined by intensive care unit admissions (22.2% versus 2.6%; $P < 0.001$), need for ventilatory support (18.5% versus 2.6%; $P = 0.001$), and mortality (29.6% versus 4.2%; $P < 0.001$) have significantly reduced. Recipient age, fever, and infection during the fifth wave were risk factors for death.

SAR-CoV-2 Omicron variant presents 15 mutations in the spike protein, conferring greater affinity toward the angiotensin-converting enzyme 2 receptor, which could explain the increased transmission rate observed.[1] In addition, vaccines are less effective, although a milder clinical picture is described in fully vaccinated people.[1] We also observed that infection rate is high and severity is lower in KT recipients compared with previous periods.[3,4] However, mortality is much higher than in the general population (mortality rate in Spain: 0.9%).[2] As previously reported, a significant number of KT patients do not develop a humoral immune response after vaccination, even receiving a third dose, which could explain these results.[5]

Our study has some limitations. Despite most cases have been reported, some outpatients might not have informed to their transplant centers, and the number of cases could have been underestimated in both periods. Furthermore, there is some overlap between the 2 variants, because in the last period some patients certainly would have caught delta. On the other hand, although peak incidence has already been reached, the epidemic wave is not over yet. These data should be taken as a trend at this time of higher rate of infections.

In conclusion, the incidence of SARS-CoV-2 infection in KT has increased, coinciding with the appearance of the Omicron variant. Although widespread vaccination with third dose has probably been able to reduce the consequences associated with this contagious new variant, the severity and mortality are still higher than in the general population, highlighting the need for new therapeutic and preventive strategies.

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TABLE 1.

Characteristics of all kidney transplant patients included in the study

	June–November 2021	December 2021–February 2022	*P*
KT infected/KT population, n (%)	27/952 (2.8)	117/961 (12.1)	<0.001
Males, n (%)	17 (63)	73 (62.4)	0.95
Recipient age, median [IQR], y	57 [47–65]	58 [47–67]	0.56
Time post-KT to COVID-19, median [IQR], mo	88 [44–123]	83 [30–184]	0.95
Vaccination, n (%)	26 (96.3)	112 (96.6)	0.94
Two doses of vaccine, n (%)	23 (88.5)	7 (6.2)	<0.001
Three doses of vaccine, n (%)	3 (11.5)	105 (93.8)	<0.001
Type of third dose of vaccine			
mRNA-1273 Moderna, n (%)	3 (100)	74 (70.5)	0.15
BNT162b2 Pfizer-BioNTech, n (%)	0	30 (29.4)	0.15
Immunosuppressive therapy at COVID-19 diagnosis			
Prednisone, n (%)	25 (92.6)	110 (94)	0.78
Tacrolimus, n (%)	25 (92.6)	108 (92.3)	0.96
Mycophenolate, n (%)	22 (81.5)	95 (81.2)	0.97
mTOR inhibitors, n (%)	4 (14.8)	12 (10.3)	0.49
Cyclosporine, n (%)	1 (3.7)	7 (6)	0.64
Immunosuppressive therapy within 2 y pre-COVID-19 diagnosis			
Thymoglobulin, n (%)	4 (14.8)	11 (9.4)	0.41
Basiliximab, n (%)	1 (3.7)	6 (5.2)	0.75
Rituximab, n (%)	0	1 (0.7)	0.62
Clinical features			
Asymptomatic, n (%)	3 (11.1)	26 (22.2)	0.19
Fever, n (%)	15 (55.6)	43 (36.8)	0.07
Upper respiratory tract symptoms, n (%)	16 (59.3)	85 (72.6)	0.17
Gastrointestinal symptoms, n (%)	8 (29.6)	8 (6.8)	0.001
Pneumonia, n (%)	8 (29.6)	19 (16.2)	0.11
COVID-19 management			
Hospitalized, n (%)	10 (37)	25 (21.4)	0.08
Ventilator support, n (%)	5 (18.5)	3 (2.6)	0.001
ICU admission, n (%)	6 (22.2)	3 (2.6)	<0.001
ICU admissions in hospitalized patients, n (%)	6 (60)	3 (12)	0.02
COVID-19 outcomes			
Dead, n (%)	8 (29.6)	4 (3.3)	<0.001
Dead in hospitalized patients, n (%)	6 (60)	4 (16)	0.01
Multiple logistic regression analysis for COVID-19-related death			
	OR (95% CI)		*P*
Males	0.77 (0.16-3.69)		0.747
Recipient age	1.13 (1.03-1.24)		0.008
Time from KT to COVID-19	0.99 (0.99-1.01)		0.783
Fever	14.39 (2.22-93.20)		0.005
Fifth wave	12.97 (2.33-72.12)		0.003

Comparison between those infected in June to November 2021 and December 2021 to February 2022.

CI, confidence interval; COVID-19, coronavirus disease 2019; ICU, intensive care unit; IQR, interquartile range; KT, kidney transplantation; mRNA, messenger RNA; mTOR, mammalian target of rapamycin; OR, odds ratio.

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