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COVID-19 after two doses of mRNA vaccines in kidney transplant recipients

To the Editor:

Mortality due to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection and the resulting coronavirus disease 2019 (COVID-19) among transplant recipients is high.[1] In December 2020 the BNT162b2 (Pfizer-BioNTech) and the mRNA-1273 (Moderna) vaccines received emergency use authorization in the United States. These mRNA vaccines administered in a two-dose series were more than 94% effective in preventing COVID-19 in clinical trials, without safety concerns identified.[2,3] Transplant recipients were excluded from the clinical trials. Although decreased efficacy and immunogenicity were expected for transplant recipients, transplant recipients were included in the early vaccination prioritization groups and transplant societies, including the American Society of Transplantation, urged transplant recipients to get vaccinated as soon as vaccine was available.

Recently, a study showed that only 54% of organ transplant recipients developed a positive antibody response after two doses of SARS-CoV-2 mRNA vaccine and, among kidney transplant recipients, only 48% had an antibody response.[4] At our center the seropositivity rate in organ transplant recipients was 37.2%.[5] This suggests that a significant proportion of transplant recipients remain at risk for COVID-19 despite completing the vaccination series.

Our center encourages COVID-19 vaccination for all transplant recipients. We estimate an active follow-up of approximately 1680 fully vaccinated kidney transplant recipients. We had eight kidney transplant recipients who developed COVID-19 more than 14 days after receipt of two doses of SARS-CoV-2 mRNA vaccine, administered at the recommended dosing interval (Table 1). All patients were symptomatic, most commonly with fatigue and cough. The median age was 65 years old (range 36–73), 50% had received a previous transplant, the median time from the most recent transplant to the first dose of mRNA vaccine was 31 months (range 3–248), and three of eight patients had received thymoglobulin for induction in the 6 months preceding vaccination. All patients were on calcineurin inhibitor (CNI)-based immunosuppression and seven of the eight were on mycophenolate mofetil. CNI level goals were not changed during illness, anti-metabolite doses were reduced or held based on symptoms and severity, at the discretion of the nephrologist. Symptom onset and SARS-CoV-2 testing occurred at a median of 56 days (range 18–77) and 59 days (range 20–77) after the second dose of the vaccine respectively. Three patients received casirivimab/imdevimab as outpatient and did not require hospital admission. Three patients were hospitalized and had a length of stay of 3–5 days, without requiring ICU admission or mechanical ventilation. All were discharged to home without oxygen. None of the patients had anti-SARS-CoV-2 spike protein antibody checked after vaccination or disease and the viruses were not sequenced.

Data on the COVID-19 vaccine effectiveness is emerging, however, vaccine effectiveness in the immunocompromised population is lacking. It is encouraging that our breakthrough cases of COVID-19 after vaccination were mild and associated with good outcomes. However, we should continue to encourage our patients to be vaccinated and also encourage vaccination of household members and close contacts. Recent guidance allowing fully vaccinated individuals to resume pre-pandemic activities probably should not apply to transplant recipients.

KEYWORDS

clinical research/practice, infection and infectious agents - viral, infectious disease, kidney transplantation/nephrology, vaccine

DISCLOSURE

The authors of this manuscript have no conflicts of interest to disclose as described by the *American Journal of Transplantation*.

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TABLE 1 Characteristics of eight kidney transplant recipients who developed COVID-19 after two doses of mRNA vaccines

	Age	Gender	Time from transplant to first vaccine dose, months	Type of vaccine	Thymoglobulin 6 months prior to first vaccine dose	Maintenance IS	MMF/ Aza stopped or reduced	Symptoms	Days from second dose to symptoms	Days from second dose to SARS-COV–2 test	Casirivimab and imdevimab	Hospitalization	ICU	Mechanical ventilation	Disposition	Length of stay, d	O2 supplement on discharge	Previous transplant	Duration of follow-up, d	Status at last f/u
1	69	M	3	mRNA–1273	Yes	Tacrolimus, MMF, pred	Yes	Loss of taste	54	55	Yes	No						No	56	Alive
2	66	M	28	mRNA–1273	No	CsA, MMF	No	Shortness of breath, fatigue	62	63	Yes[a]	Yes	No	No	Home	5	No	No	30	Dead[b]
3	42	F	34	mRNA–1273	No	Tacrolimus, MMF, pred	No	Cough, fatigue	34	37	No	No						Yes	100	Alive
4	36	M	3	BNT162b2	Yes	Tacrolimus, MMF, pred	No	Fatigue, cough	29	37	Yes	No						Yes	71	Alive
5	71	M	248	BNT162b2	No	Tacrolimus, pred	No	Weakness, cough	58	62	No	Yes	No	No	Home	4	No	Yes	79	Alive
6	73	F	3	BNT162b2	Yes	Tacrolimus, Aza	Yes	Dyspnea, weakness, fatigue, cough	18	20	No	Yes	No	No	Home	3	No	Yes	70	Alive
7	63	F	87	mRNA–1273	No	Tacrolimus, MMF	Yes	Sinus pressure, throat irritation	77	77	Yes	No						No	63	Alive
8	57	M	151	BNT162b2	No	Tacrolimus, MMF, pred	No	Cough, congestion, fever	60	62	No	No						No	56	Alive

Abbreviations: Aza, azathioprine, pred, prednisone, IS, immunosuppression; MMF, mycophenolate mofetil.

[a]Administered during hospitalization.

[b]Patient recovered from COVID-19, death unrelated.

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