Immediate Impact of Induction Treatment on Postvaccination SARS-CoV-2 Serology in Kidney Transplant Recipients

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Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection has had a severe impact on kidney transplantation (KT) programs worldwide.[1] Since November 30, 2020, solid organ transplant recipients (SOTRs) and patients with end-stage renal disease have been prioritized for SARS-CoV-2 vaccination in France, using the BNT162b2 mRNA vaccine (Pfizer/BioNTech). Grupper et al[2] found that 96% of 56 dialyzed patients developed anti-spike protein (anti-S) antibodies. In SOTRs, the seroconversion after 1 dose of mRNA vaccine is very low, varying between 3.8% and 15%.[3-5] Boyarsky et al[3] reported a better result after 2 doses of mRNA vaccine among a population of 658 SOTRs, in which 54% of patients developed anti-S antibodies. We decided to investigate the immediate effect of the induction treatment for KT on SARS-CoV-2 antibodies in vaccinated patients.

We report the evolution of anti-S antibody titers, quantified by the Alinity SARS-CoV-2 IgG II Quant assay (Abbott), in 9 KT recipients who were vaccinated before KT with the BNT162b2 mRNA vaccine (Pfizer/BioNTech). All patients provided informed consent to participate in this study. Seven patients had received 2 doses of vaccine, and 2 patients had received 1 dose. The mean age was 53.7 ± 11.7 y and 8 patients (89%) were male individuals. The mean delay between the last vaccine injection and transplantation was 20.1 ± 11.1 d. All patients received an induction treatment associating 500 mg of methylprednisolone and either antithymocyte globulin for 5 d (8 recipients of a cadaveric kidney) or basiliximab (1 recipient of a kidney from a living-donor). All patients received prednisone, mycophenolate mofetil, and tacrolimus during the entire duration of the study, except 1 patient who received 1 dose of belatacept before the second serology.

On the day of transplantation, no patients had SARS-CoV-2 antinucleocapsid antibody. All the patients who had received 2 vaccine doses had above 3.0 log (UA/mL) of anti-S antibodies (mean 3.6 ± 0.8 log [UA/mL]). In contrast, the 2 patients who had received only 1 dose of vaccine had lower antibody titers: 2.3 and 2.5 log (UA/

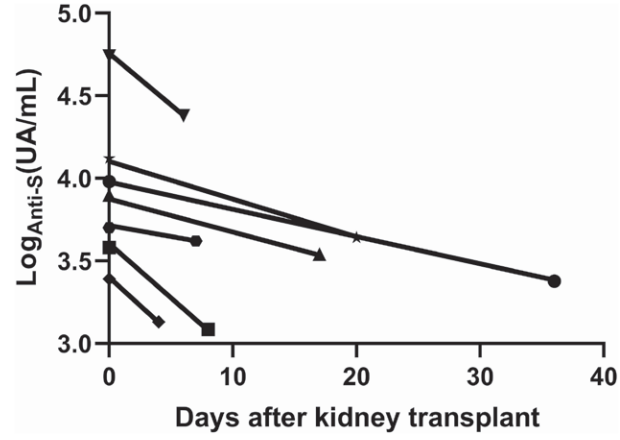

FIGURE 1. Evolution of anti-S antibodies after induction therapy in patients who received 2 vaccine doses before transplantation. anti-S, anti-spike protein.

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mL), 18 and 22 d after vaccination, respectively. The evolution of anti-S levels after transplantation is shown in Figure 1. All patients who had received 2 doses of vaccine experienced a decrease in anti-S IgG titers. The mean decrease between the first and the second serology ([titer 1 − titer 2]/titer 1 × 100) was 55.0% ± 19.6% ($P = 0.02$ for the comparison of titers 1 with titers 2 by the Wilcoxon matched-pairs signed-rank test). The mean delay between the first and the second serology was 14.1 ± 11.7 d. The protective level of anti-S antibodies remains uncertain. However, none of the 7 patients who had received 2 doses of vaccine experienced a decrease below 3 log (UA/mL). As a comparison, hepatitis B virus anti-HbS antibodies measured on the same sera did not vary significantly ($P = 0.2$) and anti–varicella zoster virus antibodies decreased by 37.0% ± 47.4% ($P = 0.05$).

We did not explore the cellular response against SARS-CoV-2, which is also probably affected by the induction treatment. Our results tend to indicate that it is probably worth vaccinating waitlisted patients before KT with 2 doses of BNT162b2 mRNA vaccine.

REFERENCES

1. Ahn C, Amer H, Anglicheau D, et al. Global transplantation COVID report March 2020. *Transplantation.* 2020;104:1974–1983.
2. Grupper A, Sharon N, Finn T, et al. Humoral response to the Pfizer BNT162b2 vaccine in patients undergoing maintenance hemodialysis. *Clin J Am Soc Nephrol.* 2021;16:CJN.03500321.
3. Boyarsky BJ, Werbel WA, Avery RK, et al. Antibody response to 2-dose SARS-CoV-2 mRNA vaccine series in solid organ transplant recipients. *JAMA.* 2021;325:2204–2206.
4. Georgery H, Devresse A, Yombi J-C, et al. Very low immunization rate in kidney transplant recipients after one dose of the BNT162b2 vaccine: beware not to lower the guard! *Transplantation.* [Epub ahead of print. May 12, 2021]. doi:10.1097/TP.0000000000003818
5. Yi SG, Knight RJ, Graviss EA, et al. Kidney transplant recipients rarely show an early antibody response following the first COVID-19 vaccine administration. *Transplantation.* 2021;105:e72–e73.