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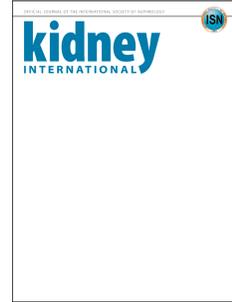
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PII: S0085-2538(20)31079-6

DOI: <https://doi.org/10.1016/j.kint.2020.09.004>

Reference: KINT 2303

To appear in: *Kidney International*

Received Date: 26 August 2020

Accepted Date: 3 September 2020

Please cite this article as: Singh N, Tandukar S, Zibari G, Naseer MS, Amiri HS, Samaniego M, Successful Simultaneous Pancreas and Kidney Transplant in a Patient Post-COVID-19 Infection, *Kidney International* (2020), doi: <https://doi.org/10.1016/j.kint.2020.09.004>.

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Successful Simultaneous Pancreas and Kidney Transplant in a Patient Post-COVID-19 Infection

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Word Count: 710

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Funding: The authors have no funding sources to disclose.

Disclosure: The authors have no conflict of interest.

Dear Editor, The Coronavirus Disease-2019 (COVID-19) pandemic has slowed down the solid organ transplantation worldwide. Although, we have heard of few solid organ transplants having been performed in patients recovered from COVID-19 infection, none has been reported yet. We present a patient who underwent a simultaneous pancreas and kidney transplantation (SPK) after recovering from COVID-19 and is doing well close to 2 months post-transplantation. A 66-year-old Caucasian female with end-stage renal disease (ESRD) secondary to insulin dependent type 2 diabetes mellitus was called in to undergo SPK. On admission, we found that three months prior, she had been diagnosed with COVID-19 with fever and cough but had recovered completely while in self-quarantine at home. On her admission, she had stable vitals and physical exam was unremarkable. A COVID-19 antibody test was positive for IgG and COVID-19 rapid PCR test was negative on two occasions a day apart (Table 1). Other laboratory parameters were unremarkable. The chest x-ray (CXR) and computed tomography (CT) scan of lungs showed no lung abnormalities. Patient underwent SPK successfully from a COVID-19 negative donor and had an uneventful post-transplant course. Her serum creatinine trended down to 0.8 mg/dL, and she came off insulin by day 4 post-transplant. She received three reduced doses of Thymoglobulin® (rATG; Sanofi-Genzyme, Cambridge, MA) 1 mg/kg/day for induction along with intravenous methylprednisolone taper. She was discharged on post-operative day 5 on mycophenolate mofetil 500 mg twice a day, extended release tacrolimus (Envarsus XR) 6 mg once a day (Target Tacrolimus level 7-9 ng/ml), and oral prednisone taper. Patient has remained asymptomatic with no signs of repeat COVID-19 infection 7 weeks after her transplant.

There were several considerations prior to proceeding with her transplantation. First, had she successfully cleared the SARS-CoV-2 infection? The detection of COVID-19 by RT-PCR may yield false negative tests.^{1,2} This uncertainty in test results is further complicated by reports of confirmed RT-PCR positive COVID-19 cases who recovered from the illness, tested negative on repeat RT-PCR but again tested positive afterwards, bringing into question if this was a repeat infection or if the preceding test results were in fact, falsely negative.^{3,4} Our patient had no symptoms or signs of infection, COVID 19 PCR was negative

on two occasions a day apart, and a COVID-19 antibody test was positive. Second, could she have developed a chronic COVID-19 carrier state, and if infection would relapse post-transplant? Many (non-retrovirus) RNA viruses like hepatitis C can establish “within host” persistent infections that occasionally lead to chronic or reactivated disease.⁵ Chronic COVID-19 carrier state has not been reported yet. Our patient exhibited no symptoms or signs of chronic organ dysfunction and since her transplant, multiple SARS CoV-2 PCR have stayed negative. Third, will positive SARS-CoV-2 antibodies protect her from repeat infection? There have been reports of prolonged co-existence of anti-SARS-CoV-2 IgG along with the positive RT-PCR for SARS-CoV-2 raising the possibility of variable level of immunity provided by the antibodies.⁶ In a smaller study done by Zhang et al, both IgM and IgG antibodies were detected in all 39 patients infected with SARS-CoV-2 after 5 days of disease onset.⁷ In a report of 149 COVID-19 convalescent individuals who recovered from COVID-19, authors found that most convalescent plasmas collected an average of 39 days after the onset of symptoms do not contain high levels of neutralizing activity.⁸ Transplant patients who are on long term immunosuppression may have attenuated immunity putting them at risk of atypical presentations, delayed or missed diagnoses, and higher morbidity and possible higher mortality with COVID-19 compared to the general population.^{9,10} We lowered the dose of induction and maintenance immunosuppression in our patient to retain the positive anti-SARS-CoV-2 antibodies. Although, her total antibodies (IgG and IgM) have persisted till the time of last follow-up, IgG antibodies became negative at 1-week follow-up post-transplant.

In conclusion, this case study suggests that it may be reasonable to proceed with solid organ transplant in wait-list candidates if they have recovered completely from COVID-19 with no evidence of active infection, after confirming two consecutively negative PCR tests, and with positive SARS-CoV-2 antibody levels. The role of SARS- CoV-2 antibodies in providing protection is unclear and levels may fall off rapidly post-transplant probably due to immunosuppression. Patients must be advised to continue to take safety precautions post-transplant.

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Table 1. COVID-19 PCR and antibody test results

	4/19/2020	7/2/2020	7/3/2020	7/9/2020	7/13/2020	7/16/2020	7/23/2020	7/30/2020
SARS CoV-2 RNA by RT PCR	Positive	Negative	Negative	Negative	Negative	Negative	Negative	
CoV-2, Total Index (Reference Range < 1.0 S/C†)		19.3				22.7	31.4	26.3
CoV-2, Total Ab (IgG and/or IgM)		Reactive				Reactive	Reactive	Reactive
SARS CoV IgG Ab		Reactive		Non-reactive	Non-reactive	Non-reactive	Non-reactive	Non-reactive
SARS CoV IgG Index (< 1.0 S/C†)		1.09		0.35	0.31	0.36	0.42	0.31

†S/C: Signal for test sample/Signal at cutoff value, VITROS Immunodiagnostic Products Anti-SARS-CoV-2 Total Reagent

Pack¹¹