DOI: 10.1111/ajt.16956

Successful kidney transplantation from a deceased donor with severe COVID-19 respiratory illness with undetectable SARS-CoV-2 in donor kidney and aorta

To the Editor:

Kidney transplantation (KT) from coronavirus disease 2019 (COVID-19) donors were avoided due to concerns for donor-derived transmission.[1,2] There have been no data on the long-term safety, and sensitive molecular testing for SARS-CoV-2 in donor kidney is not routinely performed. We report a successful KT from a deceased donor who died with severe COVID-19 respiratory failure with a detailed investigation of the donor kidney and aorta tissue for SARS-CoV-2.

A 30-year-old female was admitted to a hospital due to severe COVID-19 pneumonia with a positive nasopharyngeal RT-PCR for SARS-CoV-2. With clinical worsening, she was placed on extracorporeal membrane oxygenation, but developed hypoxic brain injury and progressed to brain death. Renal function was stable during her hospital course with a serum creatinine concentration of 0.7 mg/dl. SARS-CoV-2 PCR for bronchoalveolar lavage and nasopharyngeal swab re-tested 3 days prior to donation was negative. A 55-year-old male recipient with an end-stage renal disease secondary to hypertension underwent a transplant with the left kidney from this donor. The donor kidney was studied using pre-implantation surgical biopsy samples to investigate the presence of SARS-CoV-2 RNA using in situ hybridization (ISH) and quantitative RT-PCR (qRT-PCR). Aorta tissue dissected with the kidney during the organ procurement was also studied given high expression of angiotensin-converting enzyme 2 receptors in vasculature.

Kidney hematoxylin and eosin staining showed acute tubular injury without any glomerular damage or inflammation (Figure 1A). ISH analyses lacked a positive signal for SARS-CoV-2 RNA in the donor kidney sample (Figure 1B) compared to the SARS-CoV-2 positive lung control (Figure 1C). All samples for qRT-PCR were negative for SARS-CoV-2. We found no evidence of SARS-CoV-2 in donor tissues. The recipient has tested negative for SARS-CoV-2 by nasopharyngeal swab RT-PCR on days 20, 30, and 90 following transplantation, and there have been no signs or symptoms of COVID-19. After an initial period of delayed graft function requiring hemodialysis, the recipient now has excellent renal recovery over 9 months following the transplant, and the most recent creatinine is 1.3 mg/dl.

Evidence supporting the use of deceased donors who died due to catastrophic COVID-19-related respiratory illness is limited, and these cases do not fit in any categories of the most up-to-date guideline for COVID-19 donors.[3] As such, the decision of whether to accept nonlung organs from those donors has been decided on a case-by-case basis. Based on recent observations of successful KT outcomes from mild or asymptomatic SARS-CoV-2 positive donors,[4] and a short-term safety report of KT from a donor similar to this case,[5] the transmission risk of SARS-CoV-2 through KT is likely very low. In conclusion, the use of deceased donors who died after severe COVID-19 can be individually considered for KT, and these organs should not be routinely discarded. We acknowledge that our case may not be representative of many possible COVID-19 donors since the donor was negative for SARS-CoV-2 PCR at the time of transplantation. Larger scale studies are warranted to confirm our findings, and long-term graft outcomes from COVID-19 donors should be studied.

FUNDING INFORMATION

These studies were supported through the generosity of the collective community of donors to the Johns Hopkins University School of Medicine for COVID research (J.L.M.), HHSN272201400007C (A.P.), and T32 AI007417 (J.R.).

ACKNOWLEDGMENTS

We thank all the JH kidney transplant and COVID-19 research team members.

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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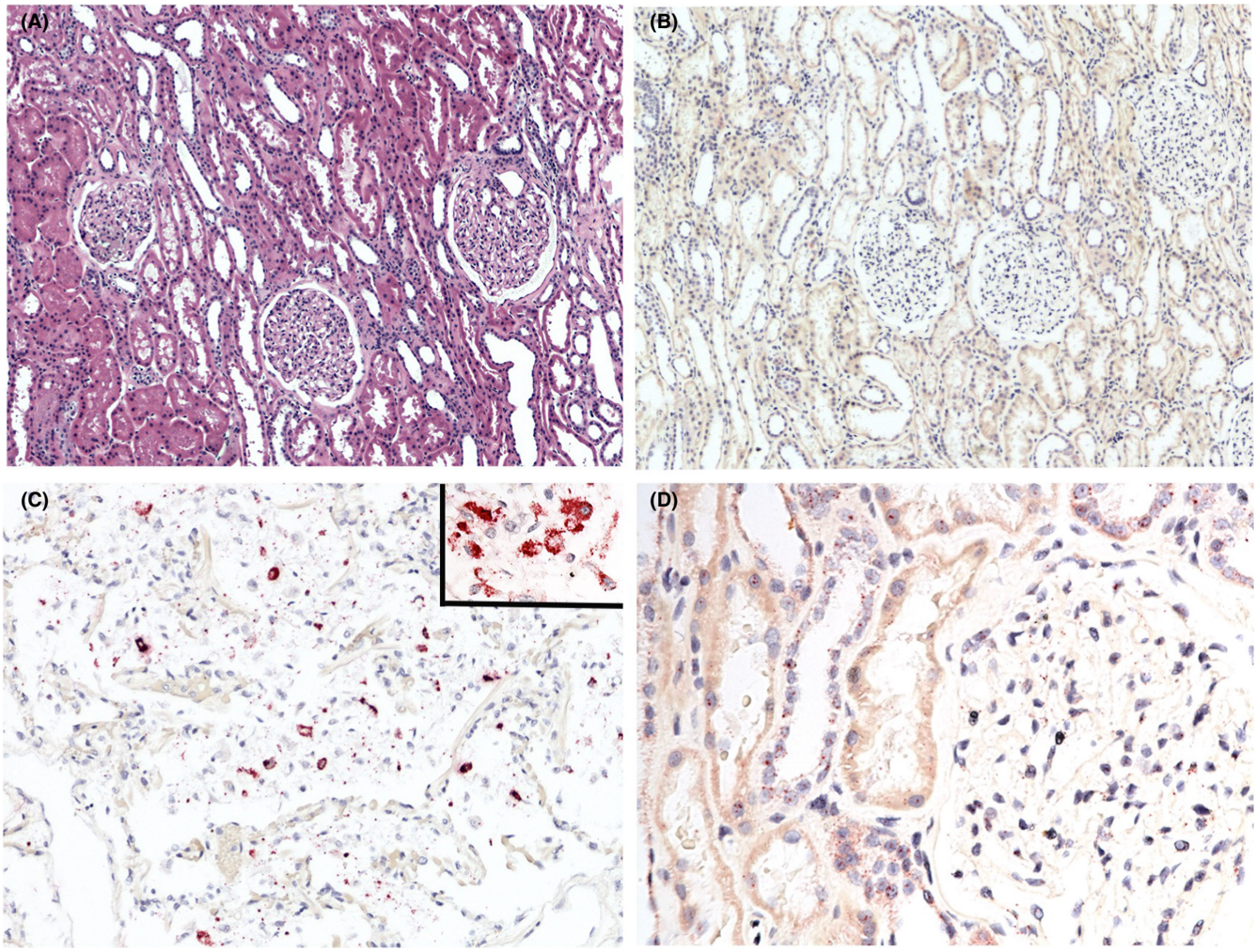

FIGURE 1 Representative kidney biopsy findings with in situ hybridization (ISH) for SARS-CoV-2 from the donor kidney. (A) Hematoxylin and eosin staining of the donor kidney with moderate acute tubular injury, but no evidence of glomerular damage or inflammation (×100). (B) ISH for SARS-CoV-2 RNA in the donor kidney showed negative staining (×100). (C) Positive coronavirus disease 2019 (COVID-19) lung control demonstrates staining for SARS-CoV-2 RNA by ISH in alveolar pneumocytes (×200; ×400 for inset). (D) RNA control for the donor kidney using RNA pol2 probe for ISH (red) (×400)

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