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Bilateral Lung Transplantation With Donor Positive for COVID-19 Infection on Bronchoalveolar Lavage: A Case Report

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ABSTRACT

Initial experience with lung transplant of COVID-19−positive donors was marked by disappointing results, including a reported case of mortality through donor to recipient transmission of infection. However, since that time a number of improvements in preventative and therapeutic measures against COVID-19 have been developed. We present the case of a 51-year-old woman with scleroderma-associated interstitial lung disease who was awaiting lung transplant. A potential donor with excellent lung physiology was located; however, initial testing on bronchoalveolar lavage (BAL) was positive for COVID-19. The donor had tested positive 2 weeks prior and had symptomatically recovered. Our patient had been fully vaccinated but not seroconverted. Given the history of a donor with recovering COVID infection and a fully immunized recipient, our multidisciplinary team elected to proceed with the transplant. The patient successfully underwent bilateral lung transplant with standard induction immunosuppression. Bebtelovimab was given post-transplant day 1 because the recipient remained seronegative to COVID-19. Serial bronchoalveolar lavages post transplant have been negative for COVID-19. The patient has done well after transplant. She was seen in the clinic 2 months post transplant and is ambulatory without supplemental oxygen requirements. To our knowledge, this represents the first reported successful case of lung transplant with a donor positive for COVID-19 on lower respiratory tract sampling.

CASE DESCRIPTION

We describe a successful case of bilateral lung transplant of donor lungs that tested positive for COVID-19 on bronchoalveolar lavage (BAL). Our patient is a 51 year-old woman who presented for lung transplant evaluation for scleroderma-associated interstitial lung disease. Prior to transplant, the patient was receiving azathioprine and rituximab infusions. A potential donor was found, with excellent lung physiology (arterial partial oxygen pressure to the fraction of inspired oxygen 521 on 100% fraction of inspired oxygen). However, despite other measures seemingly indicating a favorable donor, the patient’s BAL was positive for COVID-19, with an initial cycle threshold of 37.85 and a subsequent negative result 24 hours later. Next of kin reported to the local organ procurement organization (OPO) that the donor had been diagnosed with SARS-CoV2 two weeks prior but had symptomatically recovered. Our patient had been fully vaccinated for COVID-19 with a total of 4 doses and received tixagevimab/cilgavimab (EVUSHELD) 6 months prior. A multidisciplinary discussion was undertaken between transplant pulmonology, transplant infectious diseases, and cardiothoracic transplant surgery. Ultimately a decision was made to proceed with the transplant. The patient successfully underwent...
bilateral lung transplant with the COVID-19—positive donor lungs, using typical immunosuppression with high-dose steroids, tacrolimus, mycophenolate mofetil, and basiliximab. The patient received bebtelovimab on post-transplant day 1 as predetermined by multidisciplinary discussion after review of negative SARS-CoV2 serostatus of recipient. Serial bronchoscopy with BAL was performed in the days after transplant with no evidence of COVID-19 infection. The patient’s postoperative course was notable for grade 1 primary graft dysfunction at 24 and 72 hours with arterial partial oxygen pressure to the fraction of inspired oxygen 353 and 302 respectively. The patient was seen in outpatient clinic 1 month post transplant and is ambulatory with no supplemental oxygen requirements.

**DISCUSSION**

After an initial report of donor to recipient COVID-19 transmission has led to much hesitancy in the practice of lung transplant of COVID-19—positive donors; with United Network for Organ Sharing guidance mandating lower respiratory tract testing of all donors for SARS-CoV2 [1–3]. However, since that initial report, multiple therapeutic and preventative modalities have been developed for COVID-19 infection, including remdesivir, vaccination, and monoclonal antibodies targeted to COVID-19 proteins [4]. The case mortality of COVID-19 infection has also significantly improved [5]. The practice of abdominal solid-organ transplant from SARS-CoV2—positive donors has been adopted by several centers [6]. With respect to utilization of SARS-CoV2—positive donor organs for cardiothoracic transplant, the Duke University thoracic transplant program recently published a series of 14 successful thoracic organ transplant cases with positive donor nasopharyngeal swabs (their group did require this to be first positive > 20 days prior) but with negative lower respiratory tract samples (ie, BAL); this report included 2 lung transplants [7]. Table 1 details the previous reports of COVID-19—positive donors for lung transplant. To our knowledge, ours represents the first reported case of successful lung transplant with a COVID-19—positive donor on BAL.

Notably, our case differed from prior reports of donor-recipient COVID-19 transmission based on several donor and recipient factors. First, our donor was recovering from infection and had tested positive 2 weeks prior. Next, our donor had a high cycle threshold of 37.85 on BAL. We note that use of SARS-CoV2 cycle threshold values is not recommended for clinical decision making because the majority of tests are approved for qualitative use only. [8] Donor history taking by OPO was key to our determination that initial positive testing was more consistent with recovering infection. Next, we took steps to ensure our recipient was optimally protected against COVID-19; our patient was appropriately vaccinated and had received tixagevimab/cilgavimab 6 months prior. Because of concerns related to poor seroconversion after vaccination, we administered bebtelovimab post transplant day 1. This practice is similar to what has been described by the Duke report but is not considered standard of care.

| Report                  | Institution                  | Symptomatic | Cycle Threshold | NP COVID test | BAL COVID Test | NP COVID test | Therapies                        | Outcome                        |
|-------------------------|-------------------------------|-------------|-----------------|---------------|----------------|---------------|----------------------------------|---------------------------------|
| Eichenberger et al [7]  | Duke University               | Asymptomatic| 58.5            | Positive      | None           | None          | Remdesivir                      | Successful transplant, no rejection |
| Eichenberger et al [7]  | Duke University               | Asymptomatic| 34.4            | Positive      | None           | None          | Remdesivir                      | Successful transplant, no rejection |
| Kaul et al [1]          | University of Michigan        | Asymptomatic| 8.5             | Negative      | Negative       | Negative       | Remdesivir                      | Donor to recipient transmission and recipient death |
| Kumar et al [3]         | University of Toronto         | Unknown     | 37.9            | Negative      | Negative       | Positive       | Bebtelovimab prophylaxis         | Successful transplant, no rejection |
| Goetz 2022              | University of Alabama         | 14 d after symptom onset, no longer symptomatic | 37.9 | Negative | Negative | Positive | Bebtelovimab prophylaxis | Successful transplant, no rejection |
CONCLUSIONS

Our case is significant given that successful procurement and transplant of donor lungs with incidentally positive COVID-19 results. To our knowledge this represents the first successful case of lung transplant of donor lungs positive for COVID-19 on lower respiratory tract sampling. We suggest that excellent outcomes in lung transplant of COVID-19—positive lungs are possible if accompanied by excellent history taking from donor OPOs in the appropriate patient while taking sensible precautions.

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