Impact of COVID-19 on Lung Transplant Activity in Germany—A Cross-Sectional Survey

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Thorac Cardiovasc Surg 2021;69:92–94.

Abstract

The current COVID-19 pandemia affects health care systems worldwide, however, to a variable extent depending on the caseload in each country. We aimed to provide a cross-sectional overview of current limitations or adaptions in lung transplant programs in Germany in April 2020 due to the COVID-19 pandemia caused by severe acute respiratory syndrome coronavirus 2. A cross-sectional survey assessing various aspects of lung transplant activity was sent to all active lung transplant programs ($n = 12$) in Germany. Eight centers (66%) responded to the survey within the requested time frame. Four centers (50%) reported their activity is not restricted at all and four centers (50%) reported on moderate general limitations. The overall lung transplant activity in Germany April 2020 contains 128 bilateral and 11 single lung transplantations, which is similar to the same period in the year 2019 (126 bilateral transplantations and 12 single lung transplantations). The results suggest that the influence of the COVID-19 pandemia on lung transplantation activity in Germany has been moderate so far. Nevertheless, adaptions such as extensive testing of donors and recipients were introduced to reduce the likelihood of infections and increase patient safety. Alertness to changes in COVID-19 reproduction rates might be required until effective antiviral therapy or vaccination is available.

Keywords
- transplantation
- lung
- infection
- intensive care

Introduction

The current COVID-19 pandemic affects health care systems in all countries worldwide, however, to a variable extent depending on the caseload in each country. In Germany, a pre-emptive strategy was chosen, and hospital capacities and particularly intensive care unit (ICU) beds were reserved for patients with COVID-19. Simultaneously, elective outpatient visits as well as elective hospital stays and surgeries were postponed. So far, the number of COVID-19 patients did not reach the capacity limits of the health care system. Lung transplantation in patients with end-stage pulmonary disease is not elective surgery, yet it requires substantial resources in the ICU for donor as well as for recipient management and carries the potential risk for viral spread both via the transplanted organ as well as by procurement teams during travel. Lung transplantation might lead to an increased risk for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection due to the highly immunosuppressed state and the lung as the primary affected organ. No clear recommendations for lung transplantation and treatment of COVID-19 infections in transplanted patients exist. Thus, we aimed to provide a

received
May 19, 2020
accepted after revision
June 15, 2020
published online
September 8, 2020

Georg Thieme Verlag KG,
Rüdigerstraße 14,
70469 Stuttgart, Germany

DOI https://doi.org/10.1055/s-0040-1715436.
ISSN 0171-6425.

cross-sectional overview of current limitations and adaptions in lung transplant programs in Germany due to the COVID-19 pandemia caused by SARS-CoV-2 in April 2020.

Methods

A cross-sectional survey assessing various aspects of lung transplant activity was sent out to all active lung transplant programs ($n = 12$) in Germany by the lung transplant working group of the German Transplantation Society on April 1, 2020. All responses until April 30, 2020, were anonymized and taken into account. Seven multiple choice questions addressing the program volume, precautions in donor and recipient selection and testing, procurement activity within the Eurotransplant region, changes in immunosuppression, and limitations in ICU capacity were posed. A possibility for comments was provided for each question.

Results

Eight centers responded to the survey within the requested time frame. Four centers (50%) reported that their activity is not restricted, but four centers (50%) reported about moderate general limitations. One center (13%) reported limitations of transplantation activity due to shortage of ICU capacities, whereas seven centers (88%) were not limited by ICU beds. As additional safety measure, mandatory donor SARS-CoV-2 testing has been implemented in the entire Eurotransplant region. All eight centers require negative SARS-CoV-2 testing either by nasopharyngeal swab or bronchoalveolar lavage. One center (13%) requested a negative chest computed tomography scan additionally. Seven centers (88%) did not report any difficulties during organ procurement procedures within the Eurotransplant region, whereas one center (13%) mentioned problems with SARS-CoV-2 testing.

Recipient selection was unchanged independent of Lung Allocation Score (LAS) status and urgency in six centers (75%). Two centers (25%) restricted their activity to patients with high LAS only. In five centers (63%), mandatory SARS-CoV-2 testing in recipients by nasopharyngeal swab and/or bronchoalveolar lavage is performed prior to transplantation. In three centers (38%), recipients are not tested prior to the transplant procedure. Recipient immunosuppression remained unchanged in all centers.

According to Eurotransplant data, 128 bilateral and 11 single lung transplant procedures were performed in Germany from January to April 2020. In 2019, 126 bilateral and 12 single lung transplantations were performed during the same time frame (www.eurotransplant.org). On a national level, the number of patients on the lung transplant waiting list, the number of overall organ donors, as well as mortality on the lung transplant waiting list showed no significant changes within the first 5 months of 2020 (►**Fig. 1**). The number of new registrations on the lung transplant waiting list decreased from 43 in February and March 2020 to 26 in April and 16 in May 2020.

Discussion

These data reflect the situation analyzed by our cross-sectional survey in Germany in April 2020. The trend remains unchanged in May 2020 based on Eurotransplant data. Germany has a health care system which in the past was frequently criticized for having too many hospital and ICU beds. The number of ICU beds is highest in Europe (33.9 beds per million inhabitants) followed by Austria (28.9).[1] The Organisation for Economic Co-operation and Development average is 15.9 beds per million inhabitants (www.oecd.org). Due to acute recruitment of resources stimulated by developments of the COVID-19 situation in

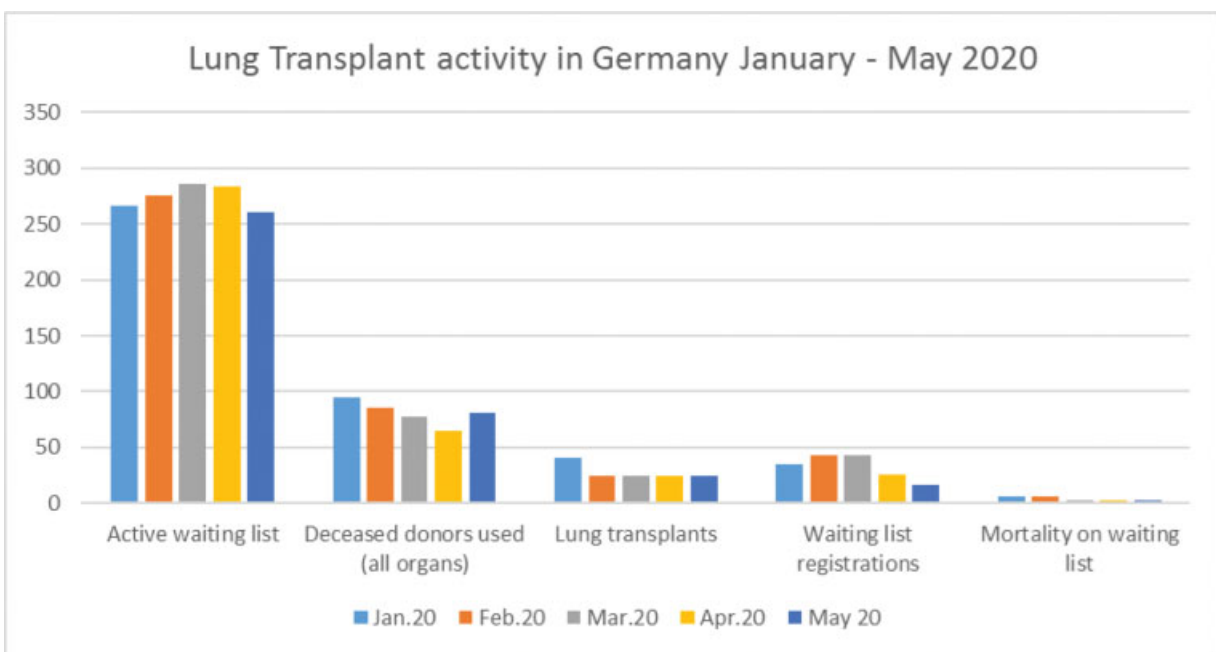

Fig. 1 Lung transplant activity in Germany, January to May 2020.

other countries, this capacity was increased to 40 ICU beds per million inhabitants. According to the register of the German Interdisciplinary Association for Intensive Care and Emergency Medicine (DIVI), more than 32,000 ICU beds are currently available.[2] The number of patients with COVID-19 requiring hospitalization and ICU treatment was so far relatively moderate and did by far not reach capacity limits. Thus, while elective patients were postponed, the need for triage in acute or urgent situations was not given in most hospitals. Therefore, limitations in lung transplantation were moderate so far. The disease exhibits a high variability in reproduction rate and local clusters of disease develop easily if adequate precautions are not taken. Neither antiviral drugs with proven benefit nor vaccination against COVID-19 is currently available. Until then restrictions in transplantation activity might be required due to local hospital resources as well as external factors such as travel restrictions. Systematic data collection is encouraged to gain knowledge and advance therapeutic options as fast as possible. The Lean European Open Survey for SARS-CoV-2 Infected Patients (LEOSS) registry has been created to register data on all patients with SARS-CoV-2 infection and includes patients after solid organ transplantation as well.

COVID-19 in patients after lung transplantation has been reported in a limited number of cases.[3,4] So far no definite conclusions on optimal management of SARS-CoV-2 patients after lung transplantation can be drawn. In contrast to the first report in solid organ transplant recipients which suggested a similar disease presentation compared with the general population,[3–6] a recent experience in 36 infected kidney transplant recipients suggests a more rapid progression and a higher mortality of 28% compared with the general population.[7] However, experimental data suggest a potential inhibition of coronavirus replication by calcineurin inhibitors.[8] Several uncertainties remain on the role of immunosuppression in virus replication and susceptibility to COVID-19. The trend toward a reduction of new waiting list registrations in April and May 2020 might be a temporary COVID-19-induced effect and needs to be closely observed.

Conclusion

Although COVID-19 has a significant impact on transplant activities in other countries,[9,10] its influence on lung transplantation activity in Germany has been moderate so far. Rapid adaption to changes in COVID-19 reproduction rates might be required until effective antiviral therapy or vaccination is available.

Conflict of Interest

Dr. Gottlieb reports grants from Breath Therapeutics, Gilead, Deutsche Forschungsgemeinschaft, and personal fees from Breath Therapeutics, outside the submitted work. All the other authors report no conflict of interest.

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