



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.

Finally, lung transplant for COVID-19-related pulmonary failure is gaining support and has been reported by several centers across the United States, including our group.³ There are several important considerations, including viral clearance, extracorporeal membrane oxygenation support, and COVID-19-related coagulopathy in addition to complex patient selection.⁴ The authors report reduced induction immunosuppression protocols, with a high rate of rejection (25% of perioperative survivors). Altering induction regimens for patients with COVID-19 should be cautiously considered, although tailoring subsequent immunosuppression regimens should be performed as usual for complex transplant patients. It is unclear how late death from sepsis on postoperative day 71 relates to their immunosuppression regimen. As we head into the

second winter of this pandemic, lung transplant will be another tool in the treatment of COVID-19. This will require a multidisciplinary collaborative approach to be successful.

References

1. Wu B, Huang M, Jiao G, Hu C, Yang Y, Jingyu C. Lung transplantation during the outbreak of Coronavirus Disease 2019 in China. *J Thorac Cardiovasc Surg*. 2022; 163:326-35.e6.
2. Chan EG, Chan PG, Harano T, Ryan JP, Morrell MR, Sanchez PG. Trends in lung transplantation practices across the United States during the COVID-19 pandemic. *Transplantation*. 2021;105:187-92.
3. Bharat A, Querrey M, Markov NS, Kim S, Kurihara C, Garza-Castillon R, et al. Lung transplantation for pulmonary fibrosis secondary to severe COVID-19. *medRxiv*. October 27, 2020 [Epub ahead of print].
4. Cypel M, Keshavjee S. When to consider lung transplantation for COVID-19. *Lancet Respir Med*. 2020;8:944-6.

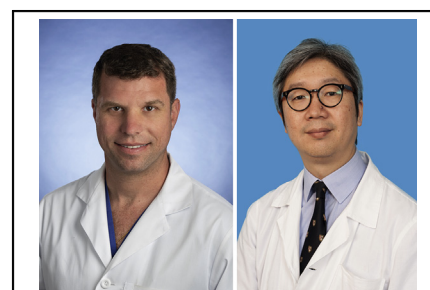
See Article page 326.



Commentary: Gift of life in the time of COVID-19

Michael Hsin, MD, FRCS, CTh (Eng),^a and
Marcelo Cypel, MD, MSc, FRCSC^b

The COVID-19 pandemic has placed unprecedented pressure on health care systems and has drained hospital resources, such as intensive care unit beds and extracorporeal membrane oxygenation (ECMO) pumps. Reports from the United States and France show that lung transplantation (LTx) activity is severely reduced.^{1,2} Extreme demands on intensivists, the responsible use of limited hospital resources, and the risks of COVID infection to health care workers (HCWs) and LTx recipients represent challenges that need to be balanced against waitlist mortality.



Marcelo Cypel, MD, MSc, FRCSC, and Michael Hsin, MD, FRCS, CTh (Eng)

CENTRAL MESSAGE

Lung transplant during the COVID-19 pandemic poses special challenges, including ensuring the safety of health care workers and recipients. Transplant candidacy for COVID fibrosis requires careful consideration.

In this issue of the *Journal*, Wu and colleagues³ report a retrospective study evaluating the feasibility and safety of performing LTx during the COVID-19 pandemic using data from the China Lung Transplant Registry from January 23 to March 23, 2020, benchmarked against a cohort from a

From the ^aDepartment of Cardiothoracic Surgery, Queen Mary Hospital, Hong Kong, China; and ^bDivision of Thoracic Surgery, University of Toronto, Toronto, Ontario, Canada.

Disclosures: The authors reported no conflicts of interest.

The *Journal* policy requires editors and reviewers to disclose conflicts of interest and to decline handling or reviewing manuscripts for which they may have a conflict of interest. The editors and reviewers of this article have no conflicts of interest.

Received for publication Nov 16, 2020; revisions received Nov 16, 2020; accepted for publication Nov 17, 2020; available ahead of print Nov 28, 2020.

Address for reprints: Michael Hsin, MD, FRCS, CTh (Eng), Department of Cardiothoracic Surgery, Room 308, 3/F, New Clinical Building, Queen Mary Hospital, Pok Fu Lam Road, Hong Kong (E-mail: mkhsin@hotmail.com).

J Thorac Cardiovasc Surg 2022;163:337-8

0022-5223/\$36.00

Copyright © 2020 by The American Association for Thoracic Surgery

<https://doi.org/10.1016/j.jtcvs.2020.11.081>

similar period in 2019.³ They implemented special measures that addressed the safety of organ donation, organ transport, selection of recipients, and the clustering of LTx surgery in designated centers, all to minimize the risk of COVID exposure to recipients and HCWs.

Their 2020 cohort consisted of 28 cases, 5 of which were COVID-related acute respiratory distress syndrome (ARDS). In 2020, 25% of LTx recipients required preoperative ventilation and/or ECMO. The 30- and 90-day mortality rates were 10.7% and 14.3%, respectively (20% and 28.3% for the 2019 cohort). The primary graft dysfunction 2/3 rates were similar, although the preoperative gas exchange was worse in the 2020 cohort. Intensive care unit stays and infection episodes were better in 2020. No infections were reported in HCWs involved in donation or transplantation. Although these results are encouraging, there are limitations. These LTxs were performed during the decline of the pandemic in China, whereas in the West the pandemic is not yet waning. Relocating LTx surgery to designated centers is not readily replicable elsewhere.

LTx for COVID-ARDS is controversial, but experience is accumulating in support of this therapy for very select patients.⁴⁻⁶ This series from China included 5 COVID-ARDS patients who underwent LTx, with 2 deaths. One of these reported deaths involved uncontrolled intraoperative bleeding,⁵ and the other involved severe sepsis. Especially with the current high incidence of COVID-19 in parts of the world such as Europe and United States, even a small selected subset of severely affected patients may represent a very large number. With the predicted significant increase in demand, now more than ever, strategies to optimize donor organ utilization, such as extended criteria donor, donation after cardiac death, and ex vivo lung perfusion are critical to avoid high wait-list mortality.

In the Chinese series, 9 more patients with COVID-ARDS were referred for LTx but were not accepted. Six

died, but 3 were successfully weaned off ECMO and ventilation. ARDS patients with complete absence of organ function from influenza or bacterial pneumonia can recover after weeks on ECMO,^{7,8} and the recovery rate of patients with COVID-ARDS on ECMO may be similar to that of patients with ARDS from other causes.⁹ It is prudent to allow a period of at least 4 to 6 weeks to allow for lung recovery before considering LTx.⁷ More information regarding the clinical outcomes of a post-COVID-ARDS subset of patients, both those who underwent LTx and survivors without LTx, would be of very high interest.

References

1. Cholanteril G, Podboy A, Alshuwaykh OS, Kim D, Kanwal F, Esquivel CO, et al. Early impact of COVID-19 on solid organ transplantation in the United States. *Transplantation*. 2020;104:2221-4.
2. Picard C, Le Pavée J, Tissot A, Groupe Transplantation Pulmonaire de la Société de Pneumologie de Langue Française SPLF. Impact of the Covid-19 pandemic and lung transplantation program in France. *Respir Med Res*. 2020; 78:100758.
3. Wu B, Huang M, Jiao G, Hu C, Yang Y, Chen J. Lung transplantation during the outbreak of Coronavirus Disease 2019 in China. *J Thorac Cardiovasc Surg*. 2022; 163:326-35.e6.
4. Han W, Zhu M, Chen J, Zhang J, Zhu S, Li T, et al. Lung transplantation for elderly patients with end-stage COVID-19 pneumonia. *Ann Surg*. 2020;272: e33-4.
5. Chen JY, Qiao K, Liu F, Wu B, Xu X, Jiao GQ, et al. Lung transplantation as therapeutic option in acute respiratory distress syndrome for coronavirus disease 2019-related pulmonary fibrosis. *Chin Med J (Engl)*. 2020;133: 1390-6.
6. Lang C, Jaksch P, Hoda MA, Lang G, Staudinger T, Tschernko E, et al. Lung transplantation for COVID-19-associated acute respiratory distress syndrome in a PCR-positive patient. *Lancet Respir Med*. 2020;8:1057-60.
7. Cypel M, Keshavjee S. When to consider lung transplantation for COVID-19. *Lancet Respir Med*. 2020;8:944-6.
8. Luyt CE, Combes A, Becquemin MH, Beigelman-Aubry C, Hatem S, Brun AL, et al. Long-term outcomes of pandemic 2009 influenza A(H1N1)-associated severe ARDS. *Chest*. 2012;142:583-92.
9. Schmidt M, Hajage D, Lebreton G, Monsel A, Voiriot G, Levy D, et al. Extracorporeal membrane oxygenation for severe acute respiratory distress syndrome associated with COVID-19: a retrospective cohort study. *Lancet Respir Med*. 2020;8: 1121-31.