



Heart-lung transplantation: a necessity

Paulo Manuel Pêgo-Fernandes¹ 

TO THE EDITOR:

Heart-lung transplantation (HLT) is a treatment option for patients with end-stage heart and lung failure. The first HLT was performed by Cooley on a child with an atrioventricular septal defect and pulmonary hypertension in the late 1960s in Houston, Texas; however, survival was only 14 h.⁽¹⁾

In March of 1981, after laboratory tests and shortly after approval of cyclosporine for use in heart transplantation in December of 1980, the first successful HLT was performed in Stanford, California. The patient was a 45-year-old woman with Eisenmenger syndrome who survived for 5 years after the HLT.⁽²⁾

The International Society for Heart and Lung Transplantation (ISHLT) has records of more than 4,054 HLTs performed as of 2017. The procedure was most popular in the late 1980s and early 1990s, when it peaked at 284 HLTs performed worldwide.⁽³⁾

In 2016, 58 HLTs were performed. That decline reflects advances in other treatments for pulmonary hypertension and heart failure, as well as the use of heart or lung transplantation alone^(4,5); for example, patients with severe pulmonary hypertension and poor right ventricular function usually undergo bilateral lung transplantation and not HLT, because the right ventricle generally improves rapidly following lung transplantation.⁽⁶⁾ There are several tests to determine when right ventricular dysfunction becomes irreversible, a condition that is an indication for HLT.⁽⁷⁾

Given the progressive improvement in bilateral lung transplant outcomes, and especially the use of extracorporeal membrane oxygenation in select cases, there is much debate in the international literature about the need and indication for HLT or for heart or lung transplantation alone.⁽⁸⁾ For decision-making purposes, certain aspects—*anatomy; exacerbation of ventricular failure; hypertension; the clinical and hemodynamic status of the patient; worsening of quality of life; cardiac index; and renal dysfunction*—should be taken into consideration.⁽⁸⁾

There are some specialists who contend that HLT is impractical, arguing that the heart could be used for another patient. Nevertheless, despite the decrease, the number of HLTs performed has remained stable, even at centers and in countries where there is access to all other types of technology. The long-term outcomes of HLT are essentially identical to those of lung transplantation.

The postoperative follow-up of HLT recipients should be more similar to that of lung transplant recipients than

that of heart transplant recipients.⁽⁷⁾ Common causes of death within the first 30 days include graft failure, technical complications, and infection. Bronchiolitis obliterans syndrome and pulmonary allograft dysfunction continue to be the leading causes of death within the first year.⁽⁸⁾

As presented in the 2018 ISHLT report,^(3,4) the mean survival following HLT has progressively increased from the early 1980s to the present day, from 2.1 years in the 1982-1993 period to 3.7 years in the 1994-2003 period and 5.8 years in the 2004-2016 period.

The improvement in survival of patients undergoing HLT can be attributed to several factors⁽⁸⁾: the evolution of the surgical technique; advances in organ preservation solutions and in immunosuppression regimens; and a trend toward the preoperative and postoperative use of temporary mechanical circulatory assist devices. In addition, a multidisciplinary approach to patient care and management at all stages is of fundamental importance; integration among the surgical team, the intensive care team, pulmonologists, cardiologists, and pharmacists, as well as the nursing, physical therapy, and nutrition teams, is of fundamental importance for HLT success and for patient rehabilitation.⁽⁷⁾

Although thoracic organ transplantation in Brazil is consolidated, the absolute numbers are far below those estimated to be needed for a population of 210 million people. The latest data from the Brazilian Organ Transplant Association indicate that approximately 400 heart transplants and 100 lung transplants are performed annually. The estimated need is approximately 1,600 for each.⁽⁹⁾

Therefore, we have to continue working on improving these numbers. Over the years that we have worked in the field of heart and lung transplantation, HLT has proved to be a necessity. There are many patients in Brazil who could benefit from HLT for congenital heart disease or pulmonary arterial hypertension of any etiology, which are conditions that cause severe, irreversible impairment.

In Brazil, we have been performing lung transplantation since 1990 and have often encountered patients who could benefit from HLT. However, because that was not an option, those patients died. Certainly, those of us who perform heart transplantation also face this ethical dilemma. In recent years, we have felt that we owe it to Brazilian society to make HLT a treatment option. We have conducted training sessions for a multidisciplinary team, in collaboration with the University of Pennsylvania, all of which were funded by the Brazilian National Ministry of Health through the Unified Health Care System Program to Support Institutional Development (Reference no.

1. Departamento de Cardiopneumologia, Disciplina de Cirurgia Torácica, Instituto do Coração – InCor – Hospital das Clínicas, Faculdade de Medicina, Universidade de São Paulo, São Paulo (SP) Brasil.

25000.014875/2015-12, linked to Adjustment Term no. 01/2014, published in the Official Gazette of the Federal Republic of Brazil on May 29, 2015), and we have initiated an HLT program to serve the portion of

the population that could benefit from the procedure. The initial results are quite promising, and we believe that a new treatment possibility has opened up for these patients in our country.

REFERENCES

1. WEBB WR, HOWARD HS. Cardio-pulmonary transplantation. *Surg Forum*. 1957;8:313-317.
2. Reitz BA, Wallwork JL, Hunt SA, Penncock JL, Billingham ME, Oyer PE, et al. Heart-lung transplantation: successful therapy for patients with pulmonary vascular disease. *N Engl J Med*. 1982;306(10):557-564. <https://doi.org/10.1056/NEJM198203113061001>
3. Khush KK, Cherikh WS, Chambers DC, Goldfarb S, Hayes Jr D, Kucheryavaya AY, et al. The International Thoracic Organ Transplant Registry of the International Society for Heart and Lung Transplantation: Thirty-fifth Adult Heart Transplantation Report-2018; Focus Theme: Multiorgan Transplantation. *J Heart Lung Transplant*. 2018;37(10):1155-1168. <https://doi.org/10.1016/j.healun.2018.07.022>
4. Goldfarb SB, Hayes D Jr, Levvey BJ, Cherikh WS, Chambers DC, Khush KK, et al. The International Thoracic Organ Transplant Registry of the International Society for Heart and Lung Transplantation: Thirty-fifth adult lung and heart-lung transplant report-2018; Focus theme: Multiorgan Transplantation. *J Heart Lung Transplant*. 2018;37(10):1169-1183. <https://doi.org/10.1016/j.healun.2018.07.021>
5. Brouckaert J, Verleden SE, Verbelen T, Coosemans W, Decaluwé H, De Leyn P, et al. Double-lung versus heart-lung transplantation for precapillary pulmonary arterial hypertension: a 24-year single-center retrospective study. *Transpl Int*. 2019;32(7):717-729. <https://doi.org/10.1111/tri.13409>
6. Toyoda Y, Toyoda Y. Heart-lung transplantation: adult indications and outcomes. *J Thorac Dis*. 2014;6(8):1138-1142.
7. Idrees JJ, Pettersson GB. State of the Art of Combined Heart-Lung Transplantation for Advanced Cardiac and Pulmonary Dysfunction. *Curr Cardiol Rep*. 2016;18(4):36. <https://doi.org/10.1007/s11886-016-0713-1>
8. Le Pavec J, Hascoët S, Fadel E. Heart-lung transplantation: current indications, prognosis and specific considerations. *J Thorac Dis*. 2018;10(10):5946-5952. <https://doi.org/10.21037/td.2018.09.115>
9. Associação Brasileira de Transplante de Órgãos [homepage on the Internet]. São Paulo: Associação Brasileira de Transplante de Órgãos. [cited 2019 Aug 01]. Registro Nacional de Transplantes. Dimensionamento dos Transplantes no Brasil e em cada estado, 2018. Ano XXIV, no. 4. [Adobe Acrobat document, 89p.]. Available from: http://www.abto.org.br/abtov03/Upload/file/RBT/2018/Lv_RBT-2018.pdf