Commentary: Donation after circulatory death—a remarkable opportunity yet to cross the pond

Jason J. Han, MD, and Pavan Atluri, MD

From the Division of Cardiovascular Surgery, Department of Surgery, University of Pennsylvania, Philadelphia, Pa.

Disclosures: Authors have nothing to disclose with regard to commercial support.

Received for publication Sept 24, 2019; revisions received Sept 24, 2019; accepted for publication Sept 25, 2019; available ahead of print Oct 25, 2019.

Address for reprints: Pavan Atluri, MD, Division of Cardiovascular Surgery, Hospital of the University of Pennsylvania, 3400 Spruce St, 6 Silverstein Pavilion, Philadelphia, PA (E-mail: Pavan.Atluri@uphs.upenn.edu).

J Thorac Cardiovasc Surg 2020;159:e311-2

0022-5223/\$36.00

Copyright © 2019 by The American Association for Thoracic Surgery

<https://doi.org/10.1016/j.jtcvs.2019.09.118>

Pavan Atluri, MD (left), and Jason J. Han, MD (right)

Central Message

Donation after circulatory death has been shown to be a viable strategy to expand the donor pool in heart transplantation in select countries and may be rewarding to pursue within the United States.

See Article page e307.

The development of the field of thoracic organ transplantation since Christiaan Barnard performed the world's first heart transplant in 1967 has been a boon to innumerable patients with irreversible, terminal heart failure. However, although several surgical and medical breakthroughs, including myocardial biopsy methods and the use of cyclosporine for immunosuppression, have led to significant improvement in outcomes—the median survival now nearing 13 years—the field has continually faced a widening gap between demand and supply, especially with a growing pool of patients successfully managed with ventricular assist device support as bridge to transplant.¹ The pool of available organ donors has remained stagnant over the last 3 decades, the contemporary exception being the recent rise due to the opioid epidemic, whereas the waiting list has significantly expanded.² This has compelled physicians to seek alternative options, both legally and surgically, leading to the development of durable mechanical circulatory support platforms as well as the recently renewed consideration of donation after circulatory death (DCD) donors.

Unlike donation after brain death donors, DCD donors are not legally brain dead but have sustained significant neurologic injury. A decision is made according to the principle of autonomy to withdraw life support, soon after resulting in cardiac arrest, allowing for organ harvesting.³ Although the practice of accepting hearts from DCD donors with careful selection criteria has begun in Europe and Australia with excellent short and midterm prognosis, it has not yet been implemented in the United States, given the fear that these organs may be injured and inferior, with limited outcomes as compared with contemporary practice.^{4,5} This fear is further confounded by the tight scrutiny that is present among the transplant community on outcomes.

It is at this critical juncture in this issue of the *Journal* that Jawitz and colleagues⁶ report their analysis on how many DCD donors would have in retrospect been eligible for heart

transplantation. Using rigorous criteria by Messer and colleagues⁴ from Papworth Hospital and a 30-minute limit for warm ischemia, they identified more than 4000 potential donors between 2005 and 2014, quantifying what could have been a substantial and practical expansion to the heart transplant donor pool.

As the authors note, their calculation is likely an overestimation, given the lack of functional assessment and other unforeseeable contraindications. Solemnly implicit in their analysis is the inference that unused organs had likely resulted in waiting list demises. Interestingly, the number of potential DCD donors increased over the duration of the study from as low as one in 2005 for reasons that are unclear in the study. We surmise that this is likely due to the increase in volume of kidney, liver, and lung transplantation from DCD donors, which is necessary for inclusion in the United Network for Organ Sharing database and aforementioned analysis. We project that these numbers will only continue to increase and that 4000 is likely a mere fraction of the potential denominator if this practice were to be formally instituted. Notably, owing to precedence in other-organ transplantation, it appears the ethical and legal considerations in proceeding with DCD donation will not pose as deterrents to the use of DCD organs for heart transplants.

Ultimately, these authors deserve our congratulations on their analytical contribution with far-reaching ethical and policy implications. Although this article is a study, it is

de facto a proposal. Heart transplantation from DCD donors may become a reality soon in the United States, especially given the concomitant advances made in the fields of ex vivo perfusion.^{7,8} The potential impact of a 30% increase in the heart transplant donor pool, which will only continue to expand in the future, is welcome to patients with advanced heart failure, providers, and caregivers. As these authors have undertaken, investigations into unique strategies to expand our donor pool and continue to save patients dying on the wait list are sorely needed.

References

1. Kormos RL, Cowger J, Pagani FD, Teuteberg JJ, Goldstein DJ, Jacobs JP, et al. The Society of Thoracic Surgeons Intermacs database annual report: evolving indications, outcomes, and scientific partnerships. *Ann Thorac Surg*. 2019;107:341-53.
2. Goldberg DS, Blumberg E, McCauley M, Abt P, Levine M. Improving organ utilization to help overcome the tragedies of the opioid epidemic. *Am J Transplant*. 2016;16:2836-41.
3. Sade RM. Brain death, cardiac death, and the dead donor rule. *J S C Med Assoc*. 2011;107:146-9.
4. Messer S, Page A, Axell R, Berman M, Hernández-Sánchez J, Colah S, et al. Outcome after heart transplantation from donation after circulatory-determined death donors. *J Heart Lung Transplant*. 2017;36:1311-8.
5. Chew HC, Iyer A, Connellan M, Scheuer S, Villanueva J, Gao L, et al. Outcomes of donation after circulatory death heart transplantation in Australia. *J Am Coll Cardiol*. 2019;73:1447-59.
6. Jawitz OK, Raman V, DeVore AD, Mentz RJ, Patel CB, Rogers J, Milano C. Increasing the United States heart transplant donor pool with donation after circulatory death. *J Thorac Cardiovasc Surg*. 2020;159:e307-9.
7. Fukushima N. Current status and future aspects of ex vivo allograft perfusion for heart transplantation. *J Heart Lung Transplant*. 2017;36:247-9.
8. Smail H, Garcia-Saez D, Stock U, Ahmed-Hassan H, Bowles C, Zych B, et al. Direct heart procurement after donation after circulatory death with ex situ reperfusion. *Ann Thorac Surg*. 2018;106:e211-4.