the donor pool by avoiding unnecessarily discarding lungs after slow donor progression to asystole.

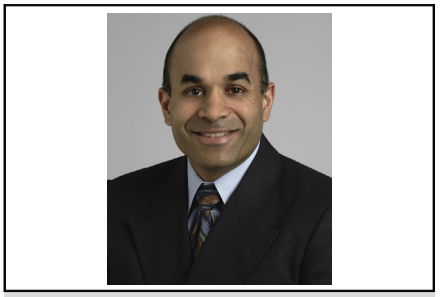
References

1. Qaqish R, Watanabe Y, Hoetzenecker K, Yeung J, Chen M, Pierre A, et al. Impact of donor time to cardiac arrest in lung donation after circulatory death. *J Thorac Cardiovasc Surg*. 2021;161:1546-55.e1.
2. US National Library of Medicine Clinical Trials Registry. Donors after Circulatory Death Heart trial. Available at: https://clinicaltrials.gov/ct2/show/NCT03831048. Accessed May 18, 2020.
3. Cypel M, Levvey B, Van Raemdonck D, Erasmus M, Dark J, Love R. International Society for Heart and Lung Transplantation Donation after Circulatory Death Registry Report. *J Heart Lung Transplant*. 2015;4:1278-82.

See Article page 1546.

Commentary: Adding sand to the hourglass

Sudish C. Murthy, MD, PhD, FACS, FCCP



Sudish C. Murthy, MD, PhD, FACS, FCCP

CENTRAL MESSAGE

Not every DCDD organ can be pushed out beyond 60 minutes, and risks for organ demise after extended asystole are still undetermined.

When considering valuable medical commodities, donor lungs are near the top of the list. Demand is often the principal driver of value, but resource scarcity is definitely a co-conspirator. The value of a lung allograft is seemingly driven up daily by both, and Qaqish and colleagues[1] now suggest possible relief on the supply side of the equation.

The problem is not that complex: The number of lung transplant candidates being listed exceeds the number of organs available. Because of this, listed candidates die while waiting for organs. Of eligible organ donors, a mere 20% prove suitable for lung donation (in contrast to triple that for kidney and liver transplants), which perpetuates the problem.

Ever the pioneers, lung transplant practitioners have not sat idly on the sidelines accepting this shortfall. Among recent novel strategies, use of donors from circulatory determination of death (DCDD) provides a previously untapped source of organs in addition to the classic donors from neurologic death. DCDD represents a different paradigm in organ procurement with far less control of timing of procurement, warm ischemia, and aspiration protection. Yet this new cache of organs, despite liabilities, performs admirably, with outcomes virtually indistinguishable from donors with neurologic determination of death.[2]

An impediment to broad dissemination of DCDD organs is uncertainty about which DCDD designates will actually donate! In other words, prospective donors become actual donors when they die within 60 minutes of separation from mechanical ventilation.

Why 60 minutes and not 30, 90, or 120? There is some science, but I suspect the answer is more of a theoretical concern about protracted hypoperfusion occurring while the harvesting team is waiting for cardiac standstill (asystole) after ventilator separation somehow deleteriously affecting the allograft. These patients, unlike donors dying from neurologic causes, do have some brainstem activity, and a respiratory drive is often apparent even after ventilator separation. The heart can continue beating for a surprisingly lengthy period in the presence of hypoxia, hypercardia, and hypotension. Once the hour-bell tolls, if asystole has not occurred, respiratory support is reinstituted, the potential

From the Department of Thoracic and Cardiovascular Surgery, Heart, Vascular, and Thoracic Institute, Cleveland Clinic, Cleveland, Ohio.

Supported by the Cleveland Clinic and in part by the Daniel and Karen Lee Endowed Chair in Thoracic Surgery.

Disclosures: The author 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 July 7, 2020; revisions received July 7, 2020; accepted for publication July 10, 2020; available ahead of print July 15, 2020.

Address for reprints: Sudish C. Murthy, MD, PhD, FACS, FCCP, Department of Thoracic and Cardiovascular Surgery, Cleveland Clinic, 9500 Euclid Ave, Desk J4-1, Cleveland, OH 44195 (E-mail: murthys1@ccf.org).

J Thorac Cardiovasc Surg 2021;161:1560-1
0022-5223/$36.00

https://doi.org/10.1016/j.jtcvs.2020.07.033

donor is transported back to the intensive care unit, and procurement teams head back home without organs, and sadly, the putative recipient is stood down. Enter Qaqish and colleagues.[1]

This very experienced group once again helps us navigate the darkness. They asked the question, Why not >60 minutes? And they have fortunately answered, No good reason! They leveraged their extensive experience with DCDD recipients and extended DCDD asystole wait times to >60 minutes for about 14% of recipients (out to 154 minutes for 1 patient!). It turns out there is no difference in transplant outcome regardless of asystole time!

Readers need to understand that this is a very slick group with access to extracorporeal organ rehabilitation and supreme experience. As to how (and why) those 14% of patients became the 14%? That remains somewhat unclear to me, but the story and findings are so compelling that I am okay looking the other way for now and ignoring the potential bias. The field needs to jump at any possibility of a supply-side increase, and transplant teams need to be aware of this emerging clutch of organs.

I suspect that not every DCDD organ can be pushed out beyond 60 minutes, and how to identify risks for organ demise after extended asystole is still to be determined, but I think we will soon be looking at an hourglass with 2 to 3 hours' worth of sand, and that will be a very good thing for those desperately ill waitlist patients.

References

1. Qaqish R, Watanabe Y, Hoetzenecker K, Yeung J, Chen M, Pierre A, et al. Impact of donor time to cardiac arrest in lung donation after circulatory death. *J Thorac Cardiovasc Surg*. 2021;161:1546-55.e1.
2. Mason DP, Brown CR, Murthy SC, Vakil N, Lyon C, Budev MM, et al. Growing single-center experience with lung transplantation using donation after cardiac death. *Ann Thorac Surg*. 2012;94:406-12.