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Commentary: The fate of pediatric cardiac palliations: Beyond the convergence

Kyle D. Hope, MD,^a Mohan M. John, MBBS,^b and Iki Adachi, MD^b

*...Two roads diverged in a wood, and I—
I took the one less traveled by,
And that has made all the difference.*

—Robert Frost, “The Road Not Taken”

In this issue, Lin and colleagues¹ report on long-term outcomes of neonatal heart transplantation at their center. Their work is a welcome addition, as there are limited center-level data on neonatal heart transplantation, and most published data arise from a single center that has been pioneering in this topic (Loma Linda University).² The current work by Lin and colleagues reinforces the message championed by the Loma Linda group that neonatal heart transplantation represents an acceptable palliation for congenital heart disease and cardiomyopathy, with Lin and colleagues¹ reporting a 20-year post-transplant survival rate of 60%, mirroring the results of the Loma Linda cohort.² This additional report, while reinforcing the larger datasets of Loma Linda and the International Society for Heart and Lung Transplantation Registry,³ further emphasizes the fact that neonates undergoing heart transplantation have among the best long-term outcomes of any solid-organ transplant population.

This study, however, also begs the question: with improving survival after single-ventricle palliation in the setting of a severely limited neonatal donor pool, what is the role of neonatal heart transplant in the current era?

From the ^aLille Frank Abercrombie Section of Cardiology, Department of Pediatrics, and ^bCongenital Heart Surgery, Michael E. DeBakey Department of Surgery, Texas Children's Hospital, Baylor College of Medicine, Houston, Tex.

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Address for reprints: Iki Adachi, MD, Congenital Heart Surgery, Michael E. DeBakey Department of Surgery, Texas Children's Hospital, Baylor College of Medicine, 6651 Main St, Houston, TX 77030 (E-mail: iadachi@bcm.edu).

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Mohan M. John, MBBS, Kyle D. Hope, MD, and Iki Adachi, MD

CENTRAL MESSAGE

Neonatal heart transplantation is associated with acceptable long-term survival. Pursuing transplantation in poor candidates for single-ventricle palliation may enhance survival in at-risk neonates.

Both this study¹ and the data from Loma Linda² illustrate decreasing numbers of neonates undergoing primary transplantation with the refinement of single-ventricle palliations. The authors also describe a significant number of patients who were listed as neonates but received their transplant as infants, reflecting the increased waitlist times. The “road was less traveled” even in the previous era, where there was less shortage in organ supply. The challenge remains to identify when is the appropriate time to choose the primary transplant pathway. The boundary between the standard surgical and the selective transplant approaches is not a fixed but rather a moving target, as the environment (eg, surgical outcomes and organ supply) likely keeps changing. One thing that is certain: there is a subset of neonates that definitely requires primary transplant pathway but is unlikely to tolerate the expected longer waitlist time. The recent trend in the uses of mechanical circulatory assistance^{4,5} would play an important role for such patients.

It would be worth extending the discussion beyond the selection at the first divergence. Regardless of the road chosen initially, both paths will eventually converge to form a common route leading to circulatory failure, whether the mode of failure is cardiac graft dysfunction, Fontan failure, or something else. Repeat transplantation can be considered in the case of graft failure but only with limited durability.⁶ To address the current limitation in the life expectancy of

these patients, it would be critical to develop a strategy to lengthen the life beyond what is expected with transplant-related options. We believe that the use of durable mechanical circulatory support as a “permanent” therapy will be the ultimate solution.⁷ If such an approach becomes the final common pathway of any pediatric heart disease, then the role of heart transplant will be seen reversely as a “bridge” to a permanent device, which would be a paradigm shift. Given the maturation of pediatric heart failure management over the last several decades, attention should be given not only just to the initial selection but to the entire journey the child will experience. We hope that this commentary will stimulate further discussion on this matter.

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