transplant-level survival, and total implantable systems poised to enter clinical trials, is now the time for a clinical trial comparing LVAD and heart transplantation?

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Commentary: Managing the native heart in patients supported with durable left ventricular assist devices

Carmelo A. Milano, MD

In the current issue of the *Journal*, Schaffer and colleagues¹ provide a review entitled “Future Developments in LVAD Therapy.” The authors describe the clinical progress in durable left ventricular assist devices (LVADs), which has in large part resulted from the use of newer centrifugal designs. Unfortunately, device-related infections remain an important adverse event for patients supported on these durable LVADs. The authors suggest that a totally implantable system will be an important solution to this complication. Indeed, multiple companies are working on designs that would use transcutaneous powering and avoid a percutaneous driveline. Such designs would eliminate power cord and more serious device infections, which afflict up to one-third of patients with durable LVAD.

While infectious complications following LVAD support remain an important consideration, a review of the causes of

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CENTRAL MESSAGE

Despite device development, cardiac-related deaths remain important for patients supported on durable LVADs. Better management of the native heart may substantially improve clinical outcomes.

death in the ENDURANCE and MOMENTUM trials shows that heart- or circulatory-related mortalities remain the most important cause of death.^{2,3} These cardiac-related deaths include ventricular dysrhythmias and most importantly right heart failure and complications of right heart failure. Compared with the HeartMate II device, neither the HVAD nor the HeartMate 3 achieved improvement in the adverse event of right heart failure. As many as one-third of patients continued to experience right heart failure, necessitating prolonged intravenous inotropic therapy. The magnitude of the problem may be even greater, since these trials excluded patients who had preoperative characteristics predictive of right heart failure.

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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 Aug 25, 2020; revisions received Aug 25, 2020; accepted for publication Aug 26, 2020; available ahead of print Aug 31, 2020.

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J Thorac Cardiovasc Surg 2021;162:613-4

0022-5223/\$36.00

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<https://doi.org/10.1016/j.jtcvs.2020.08.088>

There are several areas related to native heart management in patients with LVADs that warrant further investigation. First, concurrent management of surgical valvular heart disease in patients undergoing durable LVAD implantation requires more study and understanding. Aortic valve insufficiency is known to progress more rapidly in LVAD-supported patients; as many as 25% of patients who have been supported for multiple years will manifest significant aortic valve insufficiency.⁴ This progression of aortic insufficiency is clinically important and may limit functional outcomes. A variety of surgical treatment options have been used, either at the time of the LVAD implant or after, but consensus on when and how to intervene on the aortic valve is not well defined and requires more study. Furthermore, these patients with advanced heart failure exhibit significant functional insufficiency of the mitral and tricuspid valves. While remodeling following LVAD support may eliminate some of the insufficiency, there are important subsets of patients who remain with significant mitral and tricuspid insufficiency. A better understanding of when and how to intervene on mitral and tricuspid insufficiency could potentially reduce right dysfunction and improve functional outcomes. There are no randomized studies in this area.

Medical management of right heart dysfunction in patients with LVADs is also an important frontier. Long-

term oral pulmonary vasodilators may be beneficial, but studies that define these benefits are lacking. Simple questions such as whether beta-blockers remain beneficial in retarding progression of RV failure are unanswered.

Finally, LVAD support does not eliminate the ventricular dysrhythmia problems. Proper application of medical therapy for ventricular dysrhythmias as well as catheter ablative therapies remains ill defined.⁵ Even indications and settings for internal defibrillators are not well understood. Therefore, better knowledge regarding prevention and management of ventricular dysrhythmias during LVAD support could help improve survival.

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Commentary: Left ventricular assist device therapy: The time is now

Arman Kilic, MD

In this issue of the *Journal*, Shaffer and colleagues¹ present a concise overview of left ventricular assist device (LVAD)

Arman Kilic, MD

CENTRAL MESSAGE

The time is now for a randomized trial to prove that LVADs can provide survival and quality of life benefit to patients with preinotrope ambulatory advanced heart failure.

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Disclosures: Dr Kilic: Medical Advisory Board, Medtronic, Inc.

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 30, 2020; revisions received July 30, 2020; accepted for publication July 31, 2020; available ahead of print Aug 3, 2020.

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J Thorac Cardiovasc Surg 2021;162:614-5

0022-5223/\$36.00

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<https://doi.org/10.1016/j.jtcvs.2020.07.087>