Commentary: Ventricular assist devices in patients with major kidney compromise—A paradigm shift?

James K. Kirklin, MD

From the Division of Cardiothoracic Surgery, Kirklin Institute for Research in Surgical Outcomes (KIRSO), Department of Surgery, The University of Alabama at Birmingham, Birmingham, Ala.

Disclosures: Author has received a one-time \$2500 payment from Xeltis and serves as chair of the DSMB Clinical Trial of Pediatric Valved Conduit. He receives support from the Society of Thoracic Surgeons (noncommercial), receives partial salary support paid to his institution, and serves as director of the InterMACS MCS Registry Data Center.

Received for publication March 27, 2019; accepted for publication March 28, 2019; available ahead of print May 23, 2019.

Address for reprints: James K. Kirklin, MD, Division of Cardiothoracic Surgery, Department of Surgery, Kirklin Institute for Research in Surgical Outcomes (KIRSO), UAB, The University of Alabama at Birmingham, ZRB 721, 1900 University Blvd, Birmingham, AL 35294 (E-mail: jkirklin@uabmc.edu).

J Thorac Cardiovasc Surg 2020;159:1320-1

0022-5223/\$36.00

Copyright © 2019 by The American Association for Thoracic Surgery

<https://doi.org/10.1016/j.jtcvs.2019.03.112>

James K. Kirklin, MD

Central Message

Patients with advanced renal dysfunction may be suitable for durable mechanical circulatory support without major increased risk.

See Article page 1307.

As mechanical circulatory support (MCS) soon evolves into an accepted therapy for ambulatory advanced heart failure, the same scrutiny for risk-adjusted survival expectations will be applied as in other cardiac surgical domains. As has occurred in heart transplantation, as well as pediatric and adult cardiac surgery, a struggle will ensue to balance quality assurance with the opportunity for “disruptive innovation.” In this issue of the *Journal*, Pasirja and colleagues¹ have challenged the norm of avoiding patients with severe renal dysfunction in ventricular assist device therapy. With their finding of equivalent 1-year survival among groups with and without major renal compromise, Pasirja and colleagues¹ have disrupted the traditional calculus of the incremental risk effect of major renal dysfunction. As cited in the article,¹ several previous publications²⁻⁵ have identified and quantified the impact of major renal dysfunction on postimplant survival. In an analysis of the US MCS experience between 2006 and 2012, my group quantified the adverse impact of severe renal dysfunction on 1- and 2-year survivals.²

Before discarding major renal dysfunction as a marker for less good outcomes, however, some caution is advisable. Considerable uncertainty remains about the actual selection process of these patients; Pasirja and colleagues¹ themselves refer to “carefully selected patients” with renal dysfunction, and they must effectively communicate this process to other centers as the paradigm for patient selection shifts. Nevertheless, they are clearly onto something important: initiating aggressive renal protective maneuvers, such as minimizing central venous hypertension, extracorporeal membrane oxygenation, and temporary MCS to augment renal blood flow, and preemptive renal replacement therapy. Probably equally importantly, they have focused on avoiding renal venous hypertension in the early days after implantation. Other institutions will surely now initiate

similar renal protective strategies as they re-evaluate whether major renal dysfunction should be removed as a contraindication to ventricular assist device implantation.

What new questions are generated? We must remember that not only survival, but also quality of life during support will ultimately determine the role of MCS and the willingness of practitioners and payors to embrace this expensive therapy for ambulatory patients with advanced heart failure. Several studies indicate that preimplant depressed renal function usually does not return to normal levels after implant.⁶ If the combination of major underlying renal disease and minimally pulsatile flow with current devices leads to an important incidence of chronic dialysis by year 2 or 3, we will need to understand better the impact of chronic dialysis plus MCS not only on survival but also on quality of life. Ultimately, as in heart transplantation, expanding the window of ventricular assist device opportunity for patients with chronic renal disease will not be judged by 1-year outcomes, but rather by 3- and 5-year survivals and quality of life.

Pasirja and colleagues¹ are to be congratulated on this “disruptive” concept of “safe” MCS in the face of major renal dysfunction, but verification with other experiences and longer term follow-up will define the ultimate role of longer term MCS for this patient population.

References

1. Pasirja C, Tran D, George P, Sorensen E, Kaczorowski DJ, Ton VK, et al; LVAD in Renal Failure Group. Left ventricular assist device implantation may be feasible in

- appropriately selected patients with severe renal insufficiency. *J Thorac Cardiovasc Surg*. 2020;159:1307-19.e2.
2. Kirklin JK, Naftel DC, Kormos RL, Pagani FD, Myers SL, Stevenson LW, et al. Quantifying the effect of cardiorenal syndrome on mortality after left ventricular assist device implant. *J Heart Lung Transplant*. 2013;32:1205-13.
 3. Cowger J, Sundareswaran K, Rogers JG, Park SJ, Pagani FD, Bhat G, et al. Predicting survival in patients receiving continuous flow left ventricular assist devices: the HeartMate II risk score. *J Am Coll Cardiol*. 2013;61:313-21.
 4. Muslem R, Caliskan K, Akin S, Sharma K, Gilotra NA, Constantinescu AA, et al. Acute kidney injury and 1-year mortality after left ventricular assist device implantation. *J Heart Lung Transplant*. 2018;37:116-23.
 5. Kirklin JK, Pagani FD, Kormos RL, Stevenson LW, Blume ED, Myers SL, et al. Eighth annual INTERMACS report: special focus on framing the impact of adverse events. *J Heart Lung Transplant*. 2017;36:1080-6.
 6. Bansal N, Hailpern SM, Katz R, Hall YN, Kurella Tamura M, Kreuter W, et al. Outcomes associated with left ventricular assist devices among recipients with and without end-stage renal disease. *JAMA Intern Med*. 2018;178:204-9.