Right ventricular failure after cardiac surgery: Why can't right ventricular assist device support fix the problem?

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RV failure requiring RVAD support after cardiac surgery is associated with poor outcomes.

Central Message

RV failure requiring RVAD support after cardiac surgery remains a formidable problem characterized by limited device options, delays in instituting support, and poor survival.

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Right ventricular (RV) failure requiring mechanical circulatory support after cardiac surgery is a formidable problem. Poor outcomes and the lack of a similar array of device options available for left ventricular failure have often discouraged surgeons from appropriately applying right ventricular assist device (RVAD) therapy in a timely fashion. In this issue of the *Journal*, Bhama and colleagues,¹ from the University of Pittsburgh, report on a single-center, retrospective, observational experience of 80 patients receiving RVAD support for RV failure after cardiac surgical procedures. In this study, RVAD support was performed in the setting of RV failure after cardiac transplantation, durable left ventricle assist device implantation, and postcardiotomy failure after other types of cardiac surgical procedures. Outcomes were markedly worse in those patients with postcardiotomy failure with lower survival and rates of weaning from RVAD support compared with patients with RV failure in the setting of cardiac transplant or durable LVAD implant. Of note, survival was particularly worse in patients receiving delayed versus immediate institution of RVAD support. Last, the investigators observed that outcomes with RVAD support appeared similar across eras with no apparent improvement over time.

This study by Bhama and colleagues¹ has made a number of pertinent observations that highlight important issues in the field. Mechanical circulatory support device options specific for RV applications that can be easily applied at the time of surgery allowing for patient mobility in the intensive care unit for variable periods of time (days to weeks) and permitting removal without repeat operative intervention are lacking. Newer device options with demonstrated efficacy and specific to the RV are available but do not necessarily encompass all the ideal traits noted.² Despite the well-known effects of delayed treatment of cardiogenic shock, the institution of RVAD support is often delayed because surgeons frequently underestimate the degree of severity of the

RV failure, believe that medical therapy can be effective, or are discouraged from proceeding with RVAD support because of the lack of suitable mechanical circulatory support options.³ Last, despite the increasing awareness of the impact of RV failure on surgical outcomes, the study by Bhama and colleagues¹ did not demonstrate improvement in outcomes over time, supporting previous observations from the Interagency Registry of Mechanically Assisted Circulatory Support.⁴ However, this last observation may have been a reflection of the limitations of statistical analyses in a small patient cohort because the trend in survival for the most recent era in the study by Bhama and colleagues¹ did demonstrate evidence of clinical relevance.

The study by Bhama and colleagues¹ is continuing evidence of the importance of RV failure after cardiac surgery and the limitations in our continued approach to the problem. Thoughtful solutions rely on the ability to develop new technology and of surgeons to apply the technology in an appropriate and timely fashion.

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