Commentary: What do current trends with the total artificial heart portend? A better or worse future?

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The SynCardia Total Artificial Heart (TAH) is a pneumatically driven pulsatile pump used in biventricular failure. It is the only device to receive US Food and Drug Administration approval and the European Union CE mark for a bridge to transplantation. Overall survival rates to transplantation range from approximately 50% to 75%, depending on clinical experience, patient selection, and perioperative management.1 Given the rarity of TAH use, further research is needed to define patient-specific and center-specific factors associated with variable outcomes. In this issue of the Journal, Itagaki and colleagues2 provide important insight into trends and outcomes of TAH.

In a registry-based retrospective analysis of patients with TAH as a bridge to transplantation, Itagaki and colleagues2 demonstrate better outcomes in patients at high-volume centers compared with low-volume centers. The cumulative incidences of mortality at 6 months and 1 year while on TAH support were 19% and 20%, respectively, at high-volume centers and 30% and 34% at low-volume centers. The cumulative incidences of heart transplantation on TAH support at 6 months and 1 year were 51% and 47%, respectively, at high-volume centers and 47% and 58% at low-volume centers. Finally, posttransplant mortality at 1 year and 2 years following TAH bridge was 15% and 21%, respectively, at high-volume centers and 25% and 31% at low-volume centers. These findings are concordant with previously published data.3

Of note is that the overall rate of TAH implantation peaked in 2013 and has steadily declined since then. Yet most interesting and alarming, implantation after 2013 was associated with increased mortality. These findings raise several important questions and concerns about the fate of TAH: What accounts for decline in TAH use? Is it related to disappointing outcomes associated with a steep learning curve? Is it related to the advent of temporary biventricular support devices?4,5 How do biventricular assist devices, both implantable and paracorporeal, compare with TAH? How will the recent changes in United Network for Organ Sharing allocation policy affect TAH use and its indications? Finally, how will the recent landmark achievement in xenotransplantation alter the bridge-to-transplantation approach? Further studies are needed to answer these questions. However, will these studies be conducted? As with case numbers, the proportion of high-volume centers implanting an acceptable volume of cases is likely to decline. Is it possible that we may be heading toward the loss of another device from the mechanical circulatory support space, as seen with the recent withdrawal of the HeartWare LVAD?

With the development of new durable and temporary mechanical circulatory support devices, the role of TAH in heart failure management will continue to evolve and continue to be challenged. Although TAH trends may

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Trends in TAH utility and outcomes raise questions about the fate of TAH as a bridge-to transplantation strategy. Refinement in patient selection, device technology, and management will be crucial.
be alarming, ongoing efforts to refine patient selection, indications, and management will maintain TAH firmly in the armamentarium of cardiac transplantation. However, Is the future of TAH better or worse? Only time will tell.

References


