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Commentary: Aortic valve disease: Getting in the way of mechanical circulatory support

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Cardiogenic shock from advanced heart failure is associated with a high mortality rate and can be temporized and managed with mechanical circulatory support (MCS). MCS options include destination therapy or bridge-to-transplantation strategy with a durable ventricular assist device (VAD) or a bridge-to-decision strategy that seeks to stabilize critically ill patients with life-threatening hypotension before implanting a durable VAD. Historically, temporary MCS options have included venoarterial extracorporeal membrane oxygenation (ECMO) and percutaneous VADs, such as the Impella (Abiomed, Danvers, Mass). In this issue of *JTCVS Techniques*, Goodwin and colleagues¹ present an innovative approach in which they employed a transapical approach with a ProtekDuo (TandemLife, Pittsburgh, Pa) cannula for temporary MCS.

In this case report, a 51-year-old man with a history of 2 previous coronary artery bypass graft operations and New York Heart Association class IV heart failure presented with severe cardiogenic shock. In the setting of life-threatening hypotension refractory to inotropic therapy, temporary MCS was initiated to resuscitate this patient as a bridge to durable VAD implantation. Given the patient's previous sternotomies, central ECMO was not an ideal option. Since the patient also

CENTRAL MESSAGE

In the setting of significant aortic valve disease, transapical cannulation for temporary mechanical circulatory support may be technically more appropriate than peripheral approaches.

had moderate-to-severe aortic regurgitation with moderate aortic stenosis, peripheral ECMO and Impella were suboptimal choices. For these reasons, the authors employed a transapical approach to place the ProtekDuo cannula.

The technique described in this case report can be considered a technical success because the left ventricle (LV) was adequately decompressed and the patient was able to subsequently engage in physical therapy. However, a few questions remain. Given the patient's INTERMACS (Interagency Registry for Mechanically Assisted Circulatory Support) profile, the authors opted for a temporary MCS strategy to improve hemodynamics and end-organ perfusion, in view of (hopefully) reducing immediate morbidity and mortality. To be clear, the decision to initiate temporary MCS, as opposed to immediately implanting a durable VAD, is logically independent of the decision whether to use a transapical or an axillary approach for temporary MCS. While logic and clinical judgment support the strategy of temporary MCS as bridge to decision or durable VAD, the long-term data to support this strategy are rather limited.²⁻⁵ Admittedly, these divergent results may be due to differing times from initiation of temporary MCS to durable VAD implantation in each of the studies. The authors are to be congratulated for a safe technical outcome. However, it is unlikely that a universal transapical approach is likely to be safe in all patients. Older patients with dilated and thin-walled LVs, inability to safely manage

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the LV apex, and complications from a thoracotomy approach can all be challenging scenarios in these critically ill patients.^{2-4,6}

Aortic valve disease can significantly complicate the use of MCS for managing patients with advanced heart failure. Aortic valve pathology, particularly aortic regurgitation in the setting of MCS, will cause the LV to distend with retrograde flow. This, in addition to concomitant aortic stenosis, would be the primary reason for attempting a transapical approach as opposed to an axillary Impella. Moreover, as the authors argue, the CentriMag pump connected to the ProtekDuo cannula may provide superior offloading of the LV as well as minimal anticoagulation requirements and negligible hemolysis, as compared with an axillary Impella approach. Whether temporary MCS before durable VAD is the commendable strategy for patients who are INTERMACS level 1, the authors should be congratulated for their innovative use of the transapical approach for their patient

with acute decompensated heart failure and concomitant aortic valve pathology.

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