Keep pumping for life...

Can Yerebakan, MD

From the Division of Cardiovascular Surgery, Children's National Heart Institute, Children's National Health System, The George Washington University School of Medicine, Washington, DC.

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Address for reprints: Can Yerebakan, MD, Staff Surgeon, Associate Professor, Cardiovascular Surgery, Children's National Heart Institute, Children's National Health System, The George Washington University School of Medicine, 111 Michigan Ave NW, Washington, DC 20010 (E-mail: cyerebakan@childrensnational.org).

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Mechanical circulatory support (MCS) for intractable acute and chronic cardiac failure of various etiologies has become a well-established management strategy in specialized centers. Various modes of MCS are suitable, according to the patient, stage, and severity of the cardiac functional compromise, and should optimally be used in specific response to the type of indication. Whereas a simple intra-aortic balloon pump provides a short-term limited cardiac support, extracorporeal membrane oxygenation (ECMO) is available for more effective but still mostly short-term circulatory or pulmonary assistance, with the goal of potential recovery of cardiac and end-organ function in a wide age spectrum. Sophisticated pulsatile or newer-generation durable continuous-flow devices readily enable the bridging patients to recovery or to cardiac transplantability/transplantation of patients and may serve as a destination therapy in selected cases.^{1,2}

In this issue of the *Journal*, Dimarakis and colleagues³ present the successful management of a potential disastrous complication of MCS. Their patient had survived a refractory cardiogenic shock with severe impairment of the left ventricular function through the combination of medical management and intra-aortic balloon pump assistance. Multi-organ failure ensued, however, and central ECMO cannulation had to be instituted with sufficient hemodynamic stabilization of the patient for the use of biventricular assistance with the CentriMag device (Levitronix LLC, Waltham, Mass). Six weeks of support led to complete recovery of cardiac function so that the device could be weaned and removed. A dissecting intramyocardial hematoma was detected with transesophageal echocardiography immediately after surgical device explantation, leading to a severe impairment of cardiac function. A new-generation HeartWare (HeartWare Inc, Framingham, Mass) left ventricular assist device had to be implanted unexpectedly, but this saved the patient's life with 16 months of support. After elective removal of the second device with recovery of cardiac function and resolution of the intramyocardial hematoma, the patient returned to full-time employment. A dissecting hematoma

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Central Message

Team, type, timing: a dedicated team, suitable type of support for each stage of evolving circulatory failure, and timely assistance are needed to improve the outcome of mechanical circulatory support.

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of the left ventricle or similar complications have been described in the literature in different types of disruption of myocardial integrity, mostly within a postinfarction period.⁴⁻⁷ The combination of the mechanical manipulation during or after apical cannula removal with depressed coagulation state of the patient may have generated an intramyocardial bleeding event, with subsequent dissecting hemorrhage of the left ventricle. In such patients, meticulous surgical technique is therefore essential.

Dimarakis and colleagues³ demonstrate an immaculate serial decision-making process in different stages of evolving cardiac and circulatory failure. The presented sequence of action requires a high level of expertise, with the ability of timely and critical decision making to salvage cardiac and organ function as well as to prevent MCS-related complications. In this case, intra-aortic balloon pump enabled a bridge to decision making, with ECMO support serving as a bridge to *assistability* with a biventricular device and left ventricular assist device enabling a bridge to recovery from an unexpected dreadful complication. The critical message that may be extracted from this article with regard to the use of MCS in acute and chronic heart failure can be summarized in 3 critical aspects for potentially better survival and outcome: team, type, and timing. It is essential to note that an initiation of primary support (ie, ECMO) in refractory cardiogenic shock requires availability with a wide coverage of centers to enable—if needed—advanced MCS initiation in resolved shock optimally to be performed in specialized centers.

In the era of worldwide use of safe, small, and durable MCS devices for cardiac failure, the article of Dimarakis and colleagues³ demonstrates the importance of timely and specific deployment of different types of MCS, excellent early diagnosis and effective management of a potentially fatal unexpected complication, with the evidence of possible recovery even in severe cases. I congratulate Dimarakis and colleagues³ on the excellent outcome and thank them for sharing their experience.

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