Medical and electrical therapies for systolic heart failure have improved patients’ outcome and the altered natural history of the disease. Although heart transplantation remains the most successful treatment option for patients with advanced heart failure refractory in terms of medical and electrical treatments, cardiac transplantation is available for only a minority of patients because of a lack of suitable donor hearts. As a consequence of limited donor availability, left ventricular assist device (LVAD) therapy has become an established treatment for patients with advanced heart failure as either a bridge to transplantation or as a permanent support as an alternative to transplantation.

In Japan, however, the donor availability is severely limited because of social and ethical situations. In these limited circumstances, many aspects including the indication, device selection, surgical procedures, and postoperative management for mechanical circulatory support have been somewhat different from that of Western countries. In this issue of the Journal, Saito et al publish the results of a study on long-term support with a LVAD and risk analysis for mortality and severe adverse events in this country. This is a retrospective study and has a limitation with its own nature. Nevertheless, this study from one of the leading institutes of heart failure surgery in the country, has demonstrated a fundamental issue regarding mechanical circulatory support treatment.

A critical factor in LVAD outcomes is optimal patient selection. This is an evolving field, with many factors warranting consideration. Recent investigations have demonstrated that preoperative hemodynamic variables are not optimal predictors of death after implantation, and patient selection now focuses largely on measurements of end-organ function. Efforts to risk stratify preoperative LVAD patients have used available scores as well as developed novel scoring systems. The Acute Physiology and Chronic Health Evaluation II (APACHE II) and the Seattle Heart Failure Model (SHFM) scores were derived and validated in cohorts of critically ill non-LVAD patients and then applied to LVAD populations. Alternatively, the Columbia (COL), Leitz–Miller (LM), and Interagency Registry for Mechanically Assisted Circulatory Support (INTERMACS) scores were generated from cohorts of LVAD patients to assess the risk of death after device implantation. However, it is unknown if these scores are applicable to patients in our country where many aspects of mechanical circulatory support are different from that of Western countries.

Right ventricular (RV) failure is a major cause of morbidity and mortality in patients who have undergone LVAD surgery. RV failure results in poor filling of the left ventricle (LV) and poor LVAD output, which often necessitates additional RV support in the form of inotropes or a right-sided mechanical device. When RV failure occurs, the perioperative mortality of LVAD surgery increases to 19% to 43%, and patients tend to have worse survival after a cardiac transplant. Likewise, RV failure leads to increased morbidity, including delayed rehabilitation, increased transfusion requirements, and delayed or failed restoration of end-organ function. Thus, a preoperative tool for identifying LVAD candidates at high risk for RV failure would be valuable. The complex pathophysiology of postoperative RV failure—RV myocardial dysfunction, ventricular interdependence, and elevated RV afterload—makes it difficult to predict. Previously identified univariable predictors of RV failure have been prognostically inconsistent when evaluated in independent samples. Authors in this issue of the Journal demonstrated the need for circulatory support, and end-organ dysfunctions were the most significant predictors for RVAD use after LVAD insertion, which are comparable with previous reports. This information might lead to better patient selection for isolated LVAD implantation.

As the authors pointed out, a limitation of device selection is a significant disadvantage in mechanical circulatory support in Japan. A ToyoBo LVAS is the only available device for every patient waiting for a transplant for almost longer than 2 years. Recently, Slaughter et al reported that new small continuous flow devices had been proven to improve the probability of survival and were free from device failure at 2 years as compared with a larger pulsatile flow device. A small rotary blood pump, developed in Japan, has already been used in a clinical trial and is waiting for approval for use on a larger scale. Considering the longest waiting period for cardiac transplantation in the country, the ideal device for Japanese patients should be smaller, durable, and user-friendly. With these devices, Japanese patients could survive longer with an improved quality of life, and they also could reduce the frequency of adverse events in the relatively near future.
References