

Editorial



To Take or Not to Take: The Dilemma With Marginal Donor Heart?

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Finding something special for your loved ones is not easy. Choosing the perfect present, flower, or wine from thousands of options in this diverse world of overproduction is a real challenge. By contrast, finding the perfect heart for your loved one is extremely difficult. The mismatch between the short supply and the huge demand, the time constraints, the hope, and disappointments force you to make a concession rather than a compromise. Often, you have to take what is left: the marginal donor (MD) heart. The fundamental question is: is the MD heart good enough?

In this issue of the *Korean Circulation Journal*, Lee et al.¹⁾ addressed this question by analyzing the results of their single center experience with MD heart transplantations. An MD heart does not meet all the standard criteria for heart donation but may still be considered for transplantation and are expected to have poor clinical outcomes.²⁾ The definition of MD varies among the authors, and Lee and colleagues defined MD based on the following criteria: donor age >55 years, left ventricular ejection fraction (LVEF) <50% on preoperative echocardiography, cold ischemic time >240 minutes, or significant cardiac structural problems on any imaging study. They investigated the outcomes of 73 patients who underwent heart transplantation of whom 43.8% received MD heart. Interestingly, there was no difference in primary graft dysfunction, 30-day and 1-year survivals between patients who received MD and those who received non-MD heart. Nonetheless, not all patients seem to deal with MD equally. In a subgroup analysis the patients were stratified according to the recipient's risk status and recipients with lower risk, defined as IMPACT score <10, tolerated both MD and non-MD heart equally and showed an excellent outcome, whereas those with higher risk, i.e., IMPACT score ≥10, showed greater mortality which is mostly attributed to the higher perioperative mortality.

Although the results appear promising, it is important to note that there are limitations to generalizing the positive outcomes observed in this study. Given that the excess mortality associated with MD heart transplantation primarily occurs in the perioperative period, the proficiency of the surgical team and quality of care provided by critical care specialists are of paramount importance. Hence, it remains unclear whether centers with lower case volumes and less experience can replicate similar outcomes. Recently, Bifulco et al.³⁾ reported their experience with MD heart transplantations. Between 2012 and 2020, 238 patients underwent heart transplantation and 64 (26.9%) received an organ from an MD. These

original data are generated/provided in this manuscript.

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patients had an in-hospital mortality rate of 23%, and an estimated 1- and 5-year survival of 70% (59.2–82.7) and 68.1% (57.1–81), respectively. The 5-year survival of standard donor heart transplantation was 83.8%. Bifulco et al.³⁾ used the Italian guideline and defined MD as age over 60 years; reduced LVEF (40–50%); left ventricular hypertrophy (septal thickness >14 mm on echocardiographic evaluation); focal lesion of the coronary artery; significant valvular heart disease. While the perioperative mortality is often the primary factor contributing to the higher mortality rate observed in the MD heart transplantation group, there appears to be no significant difference in long-term mortality between MD and non-MD heart transplant recipients. Similarly, Galeone et al.⁴⁾ reported that 412 patients with MD heart transplantation had higher primary graft dysfunction (38% vs .25%) and lower 1-year survival (71.1% vs. 79.5%) than those with optimal donors. MD was defined as age >55 years, high-dose inotropic support, LVEF <45%, left ventricular hypertrophy, donor to recipient predicted heart mass ratio <0.86, and ischemic time >4 hours.

While it is undoubtedly ideal to use a human heart from an optimal donor, recent advancements in genetic engineering have enabled scientists to remove xenoantigens in pigs, which could potentially overcome immunologic rejection in pig-to-human transplantation. In 2022, a genetically modified pig heart was successfully transplanted into a 57-year-old man in the end stage of heart failure, marking the first porcine-to-heart transplantation. Unfortunately, the patient passed away a few weeks later.⁵⁾

With development of effective medical therapy^{6,7)} the life expectancy of end-stage heart failure patients increases, and the demand for heart transplantation continues to rise.^{8,9)} Even the best medical therapy has limited effect in these patients. However, the shortage of donors remains a significant challenge. This leaves patients and healthcare providers with a difficult decision to make: wait for an optimal donor heart or consider a heart from an MD. Lee et al.'s study¹⁾ provides hope that MD heart transplantation can be a viable alternative, especially for low-risk recipients.

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