

Editorial



Use of Organ from Marginal Donor in Cardiac Transplantation: Is It Ready for Us?

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Conflict of Interest

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Heart transplantation (HTx) is well-established treatment for the patients with end-stage heart failure (ESHF).¹⁾ Since adoption of endomyocardial biopsy for surveillance of acute rejection and immunosuppressive agent of cyclosporine, outcomes of patients who underwent HTx improved dramatically and annual number of HTx was increased.²⁾ However after the peak in 1990s, case numbers reached a plateau and could not increase according to database from the international society of heart and lung transplantation. Limited donor organ and therefore long waiting list is major limitation of HTx to be an ideal treatment for the management of ESHF. To overcome this hurdle, increasing donor pool via increasing voluntary donation after brain death by publicizing the needs of organ donation is most important and ideal. However, this kind of approach is not enough and increasing donor pools by using marginal donor organ such as organs from relatively elderly donors.

In Korea, since first HTx case was performed in 1992, its annual number has been increasing especially after the establishment and successful management of the Korean Network for Organ Sharing and the Korea Organ Donation Agency (KODA). Currently more than 170 cases per year were performed.³⁾ However, like the trends from international registries, time duration on the waiting list for HTx in Korea is getting longer and patients on status 1 need to wait more than a year to get a donor organ matched especially in the cases of blood type O. Therefore more efficient donor organ allocation system and its updates are definitely required.

In the current issue of international journal of heart failure, Kim et al.⁴⁾ evaluated utilization rate of donor heart and the reason for non-utilization in Korea donor heart utilization in Korea. This study included very important information about the current status of HTx in Korea and it is the first data regarding HTx donor organ utilization in Korea. Actually, only about 30% of donated heart was transplanted to the patients with ESHF, although it was increased up to 42.9% in 2019. Major reason for non-utilization was medical condition (34.4%) and old age of the donor (31.8%). As the old age of donor and relatively small donor body size compared to that of recipient are related to the clinical outcome after HTx, this data seems to be reasonable.²⁾

As shown from the study, donor utilization rate is increasing in more recent era. This might be due to recent trend of using marginal donor organ. It can be explained by the fact that the increasing number of candidates are desperately sick and waiting longer on the list. So they would like to use more marginal donor otherwise they cannot survive the period

on the waiting list. Considering this, it is obvious that reported rates of non-utilization of donor heart (68.6%) are considerable. But when we look into the data more thoroughly, we can easily find out that there are several pitfalls in the current data. It seems that they calculated organ acceptance rate in the current study as follows: number of donor heart used (numerator) divided by number of brain death donor who donated any organ (denominator). The reasons of non-utilization were categorized as unacceptable due to medical condition (34.4%), unacceptable due to old age (31.8%), refuse to donate (11.0%) or refused by all candidate (22.5%).

The decision of non-utilization of donor heart from the first 3 reasons usually might be made by the donor management team, KODA, donor or family members of donor. And the other reason of 'refused by all candidate' is the decision usually made by the medical teams who cares the candidates on top priorities. In this context, donor heart refused by all candidate might be a category considered as a marginal donor in the real clinical situation. Importantly, unacceptable donor hearts decided by donor management team and those refused by recipient side need to be compared carefully. Considering suggested criteria for favorable donor (**Table 1**), mean age (50.5-year-old) and mean ejection fraction (57%) cannot be justifiable as a reason of not-to-use. If acceptable donor criteria from organ management team is stricter than those from recipient side, there may be rooms for increasing donor pool by promote communication between transplant centers and the donor management team or KODA.

Lastly, to increase donor pool and maximize use of expanded criteria donor, it is needed to refine the matching processes of high risk recipient and high risk donor. As suggested in the previous review, high risk recipients such as those with age >65 years, renal insufficiency, peripheral arterial disease, or poorly controlled diabetes, need to be matched with expanded criteria donor.³⁾ And although it requires to change the law about the organ donation, we need to adopt the concept of the donation after circulatory death using ex vivo heart perfusion platform as an alternative way to expand donor pool.³⁾

Table 1. Favorable donor characteristics

Criteria for favorable donor for heart transplantation

Age (<55 years)

Absence of significant structural abnormalities such as:

- LV hypertrophy (wall thickness >13 mm by echocardiography)
- Significant valvular dysfunction
- Significant congenital cardiac abnormality
- Significant coronary artery disease

Adequate physiologic function of donor heart

- LVEF ≥45% or
- Achievement of target hemodynamic criteria after hormonal resuscitation and hemodynamic management
- MAP >60 mmHg
- PCWP 8–12 mmHg
- Cardiac index >2.4 L/min·m²
- CVP 4–12 mmHg
- SVR 800–1,200 dyne/s·cm⁵

No inotrope dependence

Donor-recipient body size match (usually within 20–30% of height and weight)

Negative hepatitis C antibody, hepatitis B surface antigen, and HIV serologies absence of active malignancy (except non-melanoma skin cancers and certain primary brain tumors) or overwhelming infection

Adopted from reference 3.

CVP = central venous pressure; HIV = human immunodeficiency virus; LV = left ventricle; LVEF = left ventricle ejection fraction; MAP = mean arterial pressure; PCWP = pulmonary capillary wedge pressure; SVR = systemic vascular resistance.

Considering increasing needs of HTx for ESHF, it may takes more than a year to get a donor heart matched and one might have more difficulties to survive until acceptable donor heart matched. To avoid mortality and organ damages while awaiting HTx on the list, more and more patients with ESHF undergo left ventricular assist devices implantation for the purpose of bridge-to-transplant in Korea as well as worldwide. Since this strategy of bridge-to-transplant would enable patients with ESHF to survive longer on the waiting list, the waiting time on the list for HTx would be further prolonged. In this regard, we need to expand donor pool and improve organ allocation system not to waist donated organs. Otherwise it may take several years to get a donor heart matched and would be related with poor outcome of the patients waiting for HTx.

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