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Commentary: Another variable in the puzzle

Pierre-Emmanuel Noly, MD, and Michel Carrier, MD

The science of heart transplantation is well established, but donor and recipient selection and matching remains an art. On the donor side, age, female donor to male recipient, donor to recipient weight mismatch, predicted heart mass mismatch, cause of donor brain death, and total ischemic time are among the most commonly reported risk factors for primary graft failure and early recipient death.^{1,2} These are usually weighted according to the recipient's characteristics and surgical risk factors in the decision to undergo or withhold heart transplantation in a specific patient.

Tang and colleagues³ studied the effect of the relationship between donor ABO blood type and allograft ischemic time (IT) on recipient survival. Using data from 32,454 heart transplants included in the United Network for Organ Sharing database, the authors compared the incidence of primary graft dysfunction (PGD), chronic rejection, and survival between O and non-O donor blood groups. Patients were stratified according to ischemic time (<4 hours and ≥ 4 hours). A propensity score-match analysis using logistic regression that included 24 variables was performed to compare O and non-O blood type donor hearts. The main findings of this study are: type-O blood group donor hearts in the IT ≥ 4 hours group experienced inferior 15-year survival when compared with non-O blood type donor hearts but not in the IT <4 hours group, O blood type donor hearts in the IT ≥ 4 hours group had a 16.4% increase in mortality risk compared with non-O blood type donors, and this survival difference was explained by a greater incidence of death from PGD and chronic rejection.

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A blood type O donor and prolonged ischemia might contribute to lower recipient survival.

CENTRAL MESSAGE

Donor blood type O with longer ischemic time might represent an additional risk factor for primary graft dysfunction and death.

This study confirms the findings of Jawitz and colleagues,⁴ who first showed that blood type O donor grafts were associated with decreased survival after heart transplant. Tang and colleagues³ give us a new, important perspective by suggesting the detrimental effect on survival of donor blood type O with prolonged IT in a large cohort. Recipients of O blood type donor hearts may be more susceptible to prolonged warm and cold ischemic preservation damage related to the production of disproportionate amounts of inflammatory mediators. This biological characteristic peculiar to blood type O may explain the greater rates of PGD, chronic allograft vasculopathy, and worse short- and long-term recipient survival. A large number of patients, the long-term follow-up, the transparency, and the quality of the propensity analysis are the strengths of this study.

We should also keep in mind several limitations. Propensity score-matching techniques are only able to balance the known confounders. Another main limitation of this study is the use of IT as a categorical variable instead of a continuous variable. An analysis to determine the cut-point in ischemic time that influence outcomes for the various ABO blood groups would be of great value.

Consistent with previous studies,^{5,6} ABO compatible versus identical matching was not a significant predictor of mortality. Based on the findings offered by Tang and colleagues,³ we may wonder whether we should continue to

use O blood type donors for non-O recipients if IT is expected to last more than 4 hours.

Because blood type O donors represent half of the donor pool and because they are universal donors whose organs can be allocated to recipients with any blood type, these findings might have a tremendous influence on cardiac donor selection. As suggested by the authors, blood type O donors should be used with caution in clinical conditions with an expected prolonged allograft ischemic time. Further studies are needed to confirm these results and we look forward to seeing a complementary analysis using IT as a continuous variable.

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Commentary: Donor selection in heart transplantation: It's a match!

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In the field of heart transplantation, hyperacute rejection, commonly resulting from transplantation between a donor and recipient of different ABO blood groups, is a catastrophic complication and is ideally avoided by careful and deliberate blood group matching. Although blood group O donors are known as universal donors, transplantation of hearts from this blood group has been associated with reduced survival.¹

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Heart transplantation outcomes strongly rely on the algorithm applied to organ selection.

CENTRAL MESSAGE

A more in-depth study of donor-recipient blood group-dependent immune mechanisms in heart transplantation is needed.

In the current issue of the *Journal*, Tang and colleagues² investigated the impact of organ ischemic time on donor-recipient blood group compatibility. In their paper, the authors elegantly analyzed data from the United Network for Organ Sharing database with a propensity score-matching technique, thus accounting for covariates that may otherwise bias the results. Their conclusions showed that transplantation with type O donor hearts and an ischemia time >4 hours may lead to lower survival due to primary