

Kidney from Deceased Cardiac Donor

In one of the previous issue of this journal^[1], Singh *et al.* described their experience of 5 donation after circulatory death (DCD) donors in their centre that previously had never used kidneys from donors after circulatory death.

Over the past 10 years, DCD has increased dramatically. In the UK, 40% of donors are now DCD donors, in Europe, the number of DCD donors has doubled from 6% in 2006 to 12% in 2015 and in the US-DCD donation rates have increased from <5% in 2004 to nearly 20% in 2014.^[2-4]

DCD donors have proved to be a valuable source of organs to expand the donor pool. The number of patients being listed or waiting for a transplant is increasing, but the number of donors after brain death is static or even reducing. Therefore, more “marginal organs” are being accepted to reduce this gap between supply and demand. DCD kidneys are thought of as marginal organs as they are exposed to an extra period of warm ischemia after circulatory arrest.^[5] There have therefore been concerns that use of these organs may lead to increased rates of primary nonfunction (PNF), delayed graft function (DGF) as well as impaired renal function and reduced graft survival.

Recently, Summers *et al.* analyzed the UK outcomes from DCD kidney transplant over an 8-year period and found no significant difference in rates of PNF between DCD and DBD kidneys. Although they did find significantly increased rates of DGF in DCD kidneys (50% vs. 25% in DBD kidneys), this did not lead to a difference in 1- and 3-year graft function as measured by estimated glomerular filtration rate, or a difference in graft survival up to 5-year posttransplant.^[6]

Although we know that organs from DCD donors can provide acceptable outcomes, there are still centers worldwide that do not have DCD programs in place.

DCD donors can be considered as controlled or uncontrolled as per the Maastricht categories.

Controlled DCD (cDCD) programs have become increasingly utilized throughout Europe, as these programs can be set up in almost all hospitals that admit critically unwell patients, and that an organ retrieval team can access.^[7] Once the decision has been made to withdraw treatment on a patient, organ donation can then be discussed with the family. If the family is willing, then steps can be made to identify recipients for the organs and to organize the logistics for the retrieval. Once this has been arranged, the decision of where to withdraw care needs to be decided. As the warm ischemia time needs to be kept to a minimum, most places withdraw somewhere near to theater: Either the ITU if it is nearby, or in the anesthetic room. Once asystole has occurred, there needs to be a “hands-off” or

“no-touch” period. This is a period of observation, with no intervention to confirm circulatory death has occurred, with no spontaneous return of circulation. A period of 5 min is recommended in most countries, although it may vary.^[8] Following this “no-touch” period, the retrieval team can then start their retrieval. Most often this is by rapid laparotomy, cannulation of the aorta and organ perfusion with cooled perfusion solutions, and application of topical ice for surface cooling.

There is growing interest in the use of normothermic regional perfusion (NRP) in cDCD as this technology recirculates oxygenated blood to the abdominal organs before explantation, restoring cellular substrates thus reducing the warm ischemic injury.^[9] A recent UK-based trial by Oniscu *et al.* has shown the benefits of this approach.^[10]

Uncontrolled DCD (uDCD) programs are less common but are running successfully in Spain, Holland, and France. Most uDCD donors are patients that suffer an unexpected and witnessed cardiac arrest, and in whom cardiopulmonary resuscitation (CPR) has been started quickly but has been considered futile.^[11] These patients often have an out of hospital cardiac arrest, and so they need to be transported to hospital with ongoing CPR to maintain perfusion to the organs. The consent for organ donation is gained at any point during this process, and then, once CPR is stopped and asystole occurs, there is a period of “no-touch” as in cDCD. Once death is confirmed the retrieval process continues as it would in cDCD.

uDCD gives good long-term kidney graft survival, but the results following uDCD liver transplantation is less consistent.^[9]

To improve outcomes following transplantation using uDCD organs programs in France and Spain use hypothermic regional perfusion or NRP.^[11]

The ethical considerations for setting up a DCD program are similar for whether it is a cDCD or uDCD. In both, a clear and consistent protocol describing the roles of all members of staff involved needs to be in place. There should be a clear separation between the team treating the patient and the team retrieving the organs to ensure there is no conflict of interest. There needs to be a clear framework for deciding the withdrawal of life support or cessation of CPR, all of which need to take the patients best interests and wishes into consideration.^[12]

Allocation of DCD organs can be on a case-by-case basis. In the UK, patients are put onto one kidney transplant list and may be offered a DBD or DCD organ, and although they are informed of the different donor types, they do

not specifically consent to one or the other. Allocation of DCD organs from donors younger than 60 years of age is done nationally, but when the donor is older than 60, both kidneys are offered locally. It is up to the center to which the kidneys are offered as to whether they wish to accept them for their recipient. Potential recipients are counseled appropriately for the transplant operation, particularly been told that there is a high chance of DGF posttransplant.

As had been demonstrated in this case series by Singh, hospitals that wish to implement a DCD program should start with a controlled donors and start with kidney only. Once the program is established, it may be appropriate to expand to liver and even pancreas donation. There are also series now reporting good outcomes following transplantation of kidneys from elderly DCD donors that would previously have been declined.^[13]

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