



POINT OF VIEW

Reflections upon donation after controlled cardiac death (Maastricht type III donors)[☆]



Reflexiones sobre la donación en asistolia controlada (donantes tipo III de Maastricht)

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Over the last 5 years donation after controlled cardiac death (specifically Maastricht type III donation) has been successfully introduced in Spain as a new option for expanding the number of available organs. It is worth examining the reasons that have favored this tendency, and the particular aspects and future challenges associated to this donation modality.

Limitation of life support

Intensive care medicine has evolved from the enthusiastic use of complex life support technology to the proportionate application of therapeutic measures and concern about correct resource utilization. In this respect, it is now common to consider the limitation of futile treatments in our Intensive Care Units (ICUs). This situation, and the publication of the new Spanish Royal Decree on organ donation and transplantation, contemplating the possibility of donation after

diagnosed cardiac death without the need for applying cardiopulmonary resuscitation (CPR) maneuvers, have favored the development of controlled cardiac death (Maastricht type III) donation programs.

End of life care

One of the premises of the limitation of life support (LLS) is to guarantee patient wellbeing and administer the sedation needed in order to achieve this objective – taking into account that administration is made to end the symptoms, not the life of the patient. It is ethically acceptable to increase sedation in terminal patients in order to ensure the total absence of discomfort, even if this implies accelerating the dying process. In this regard, some authors support pre-emptive sedation in anticipation of possible discomfort associated to terminal extubation.¹

It must be remembered that it is the duty of the physician to afford death with dignity, and this not only includes the absence of pain but also calmness and serenity for the patient and family.

Once LLS has been decided and accepted by the family, the physician must consider donation and offer the family or patient the right to donation is so desired. Patients with catastrophic brain damage, with terminal respiratory and heart disease, in which LLS is decided may act as organ

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donors provided their clinical condition is such that the withdrawal of life support measures is followed by early cardiopulmonary arrest.

Early death prediction

Most international guides on controlled cardiac death (Maastricht type III) donation establish a maximum waiting time until cardiopulmonary arrest of 120 min in order for the donor to be considered valid. Beyond this time limit donation should be suspended. Early death predictors have therefore been investigated as a help in deciding whether or not to launch the complex measures and procedures involved in organ donation and transplantation. The results of studies attempting to predict early death after LLS are inconclusive. The Wisconsin test – one of the most widely used instruments – subjects the patient to 10 min of spontaneous breathing without administered oxygen, followed by the evaluation of respiratory mechanics and SatO₂. This information, together with the age of the patient, body mass index, and the presence or not of vasoactive drugs and of endotracheal intubation or tracheotomy, offer a percentage estimate of the probability of early death. However, this test has not been validated and moreover exposes the patient to possible desaturation which could place the entire process at risk, particularly in the case of lung donation.² Consequently, and apart from the greater or lesser reliability of the predictive test used, the possibility of losing a donor due to guidance by such an instrument should be avoided.

Organ preservation and harvesting

Rapid surgery is currently the most widespread practice. Following the death of the patient, the surgeon must quickly access the abdominal aorta to place a cannula for the perfusion of cold preservation fluid, with a view to minimizing the warm ischemia time. With this measure the long-term

outcomes of renal transplantation are comparable to those obtained with brain-dead organ donors (BD), despite a greater incidence of delayed initial graft function.^{3,4}

Similar considerations apply to lung transplantation, where the outcomes are comparable to or even better than those obtained with BD donation.⁵ The liver is the organ most sensitive to warm ischemia, with ischemic cholangiopathy being the most feared complication. Poorer long-term survival has been recorded referred to both the graft and recipient;⁶ however, careful donor selection could balance the results⁷ and allow us to offer the option of transplantation for patients who have no other treatment option.⁸

Favorable experiences have recently been published with normothermic abdominal perfusion (NAP) using extracorporeal membrane oxygenation (ECMO) as preservation technique for the harvesting of abdominal organs. This approach restores perfusion and oxygenation at 37°C to the abdominal organs after cardiac arrest, improving the metabolic parameters. The technique, which allows organ harvesting through a semi-elective and non-urgent procedure, has demonstrated its efficacy in restoring abdominal organ function after cardiopulmonary arrest – the outcomes of renal, liver and pancreatic transplantation being similar to those obtained with BD donation, and better than those afforded by rapid surgery.⁹ The use of this method could increase the number of available livers and lessen the incidence of delayed initial renal graft function.¹⁰

Conclusions

In only a few years, controlled cardiac death (Maastricht type III) donation has made an important contribution to increase the number of organs available for transplantation in Spain. In order to correctly implement a program involving donation of this kind, it is essential to consolidate an adequate culture regarding what end of life care should be

Table 1 Key points in controlled cardiac death (Maastricht type III) donation.

Limitation of life support	The decision to suspend life support must always be transmitted to the family before requesting donation
Early death prediction	Early death predictor tests are simply orientative, and a potential donor should not be lost based only on a scanty favorable result
End of life sedation	Sedation should be that required to guarantee patient wellbeing and death with dignity, and should be administered by a professional unrelated to the transplant program, in order to avoid conflicts of interest
Organ preservation and harvesting	Rapid surgery is currently the most widely used harvesting technique, and is the strategy with which the greatest experience has been gained to date. The use of normothermic abdominal preservation should be encouraged, in view of the first results obtained
Renal transplant	Despite the greater incidence of delayed initial graft function, the long-term outcomes are comparable to those obtained with kidneys from brain-dead donors
Liver transplant	The outcomes of liver transplantation in cardiac death (Maastricht type III) donation may be poorer than in the case of livers from brain-dead donors if careful donor selection is not made – ischemic cholangiopathy being the most serious complication
Lung transplant	Lung transplantation in cardiac death (Maastricht type III) donation should be encouraged in view of the scarcity of these organs and the good outcomes obtained when compared with lung transplantation from brain-dead donors

provided in terminal patients, and when and how LLS is to be carried out.

The long-term outcomes of renal and lung transplantation are comparable to those obtained with BD organ donation, while in the case of liver transplantation the possibility of ischemic cholangiopathy makes it necessary to carefully select both the donor and the recipient.

Correct organ preservation and harvesting can exert a positive influence upon the evolution of the transplanted organ, and in this regard NAP promises to be a good way to improve the results and even increase the number of organs available for transplantation (Table 1). The technique is complex, however, and is not accessible to all hospitals. Hospitals with support teams therefore should be able to displace such teams to centers where donors of this kind are found.

Conflicts of interest

The authors declare that they have no conflicts of interest.

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