

ASTS Statement on Thoracoabdominal Normothermic Regional Perfusion Donation after Circulatory Determination of Death

Definition of the problem

Thoracoabdominal normothermic regional perfusion for donation after circulatory determination of death (TA-NRP DCD) utilizes oxygenated machine perfusion for the preservation of abdominal and thoracic organs rather than standard cold perfusion. After the donor has been pronounced and confirmed dead, and after waiting 2 to 5 minutes after the determination of circulatory death to ensure the decedent does not spontaneously resuscitate, the TA-NRP DCD procedure involves opening the chest, central cannulation, clamping of the brachiocephalic vessels and initiation of normothermic oxygenated perfusion to the organs that will be used for transplantation. The procurement proceeds in the same fashion as a brain-dead donor.

ASTS principles regarding the ethical acceptability of NRP-DCD procurement procedures

- The ethical acceptability of DCD donation is based on 3 fundamental principles: respect for autonomy, nonmaleficence and beneficence.
- Respect for autonomy requires that authorization is obtained for DCD donation as well as for any procedures done or medications administered for organ evaluation or preservation. In addition, the discussion about organ donation in the setting of DCD donation must occur after the decision to withdraw life-sustaining treatments has been made. Further, as is always the case, medical professionals attending to the patient and working with the family through end-of-life care and decisions must be separate and apart from those medical professionals who are part of the organ recovery or transplant team and process.
- Nonmaleficence requires that harm to the donor is avoided. First and foremost, this requires that potential DCD donors are provided with the same level of comfort care measures as individuals who undergo withdrawal of life-sustaining treatments without consideration for organ donation. Second, it requires that the organ procurement procedure commences after the donor is dead so that the procedure itself does not cause death (i.e., the dead donor rule).
- Death in DCD donation is determined by circulatory and respiratory criteria consistent with the legal definition of death in the Uniform Determination of Death Act, which has been adopted in all material respects by almost all states in the US. The UDDA states: "An individual who has sustained either (1) irreversible cessation of circulatory and respiratory functions, or (2) irreversible cessation of all functions of the entire brain, including the brain stem, is dead". DCD donors are declared dead in accordance with the UDDA and following accepted medical standards by a medical provider who is not a part of the organ procurement team and using the hospital's criteria for cardio-pulmonary death.

- After the cessation of circulatory and respiratory function, a hands-off period is observed for irreversibility of circulatory death, during which there is an absence of auto-resuscitation and death is confirmed at the end of that period.
- Circulatory death *occurs* when the heart and lungs have lost their ability to function within the organism and cannot contribute to the operation of the organism as a whole. Circulatory death is *confirmed* in a DCD donor after a hands-off period in which autoresuscitation does not occur. At that point, the donor is dead and the procurement team is allowed to proceed with organ procurement.
- Ensuring that the donor is dead is essential to DCD donation because the procurement procedure occurs directly following confirmation of death.
- Beneficence requires that risks are minimized and benefits are maximized in medical procedures. Because DCD donors are dead at the time of donation, they do not benefit from the procedure, but there is benefit to family members who hope that their loved one can help as many others as possible through organ donation. Moreover, increasing the likelihood of benefit to organ transplant recipients is an element of beneficence considering the donor-recipient dyad.
- The ethical acceptability of TA-NRP DCD has been questioned because (1) the heart is re-perfused in the body, which some allege brings into question irreversibility, and (2) the brachiocephalic vessels are clamped before the initiation of NRP, which prevents reestablishment of flow to the brain but which some allege is a contributing cause to the death itself.
- The ASTS supports the ethical acceptability of TA-NRP DCD because this procedure meets the ethical baseline for DCD organ donation as follows: following a family's decision to cease all life-sustaining therapies for their loved one, authorization is obtained for TA-NRP donation as well as consent for ante-mortem interventions and medications in the same way as it is done for a standard DCD donor; nonmaleficence is fulfilled because the NRP procurement procedure does not start until the donor has been confirmed dead. Our analysis of the specific ethical concerns about TA-NRP DCD are as follows:
 - **Perfusion of the organs in the body:** This is not autoresuscitation or resuscitation of the donor. The donor is dead before the initiation of NRP. NRP is mechanically assisted regional perfusion and oxygenation of organs for transplantation.
 - **Clamping the brachiocephalic vessels** before the initiation of TA-NRP ensures that the brain is not reperfused. Circulatory death has already been determined under the UDDA and in accordance with accepted medical standards when the brachiocephalic vessels are clamped.
 - **Reperfusing the heart** in the body on NRP is no different than restarting the heart outside of the body with machine perfusion. While this is optically different, in both cases, the heart is restarted with artificial machine assistance for the purpose of organ donation in a person who died intending to donate their organs. The heart would not continue to function within the donor without

ventilatory support so it is functioning only with mechanical assistance for the purposes of organ donation.

The ASTS hopes to engage the medical and lay community in open, transparent dialogue about TA-NRP DCD donation to maintain trust in organ donation and demonstrate our commitment to the organ donors who make transplantation possible and save the lives of our patients.

References

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