

Donating Hearts after Cardiac Death — Reversing the Irreversible

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Once, all transplantable organs were procured after a donor's heart had stopped irreversibly. Assuming that one accepted the dead donor rule, irreversible heart stoppage triggered organ procurement. Around 1970, the law gradually began to accept the declaration of death on the basis of irreversible loss of brain function. Today, physicians in all U.S. states may pronounce death and procure organs when brain function is determined to be permanently lost. Nevertheless, the more traditional heart-based pronouncement is accepted as an alternative.

The application of either brain- or heart-based criteria for pronouncing death is somewhat more complicated for infants and small children. There is substantial agreement about the measurement of irreversible loss of brain function, so most pediatric organs are obtained after a brain-based pronouncement of death. However, pediatric organs can also be procured after "cardiac death."

Virtually all observers have assumed that donation after cardiac death could, in principle, provide any vital organs except hearts. If someone is pronounced dead on the basis of irreversible loss of heart function, after all, it would not be possible for heart function to be restored in another body. Some have suggested defining death as the impossibility of auto-resuscitation, which means that the heart cannot restart sponta-

neously even if it could be started by means of external stimulation. Calling such a heart "irreversibly stopped" may be defensible if no attempt will be made to restart the heart. However, one cannot say a heart is irreversibly stopped if, in fact, it will be restarted.

In this issue of the *Journal*, Boucek et al. (pages 709–714) report findings that may seem to address the shortage of hearts for pediatric transplantation. Successful transplantation was performed in three infants with the use of hearts obtained after other, hopelessly ill infants had been pronounced dead according to cardiac criteria. These results appear to open the door to heart transplantation after cardiac death.

A potentially serious question arises, however: when can death be pronounced on the basis of loss of heart function? Death must be permanent. Clinicians sometimes carelessly speak about patients who experience "clinical death" only to be "brought back to life" by means of cardiopulmonary resuscitation. This is, however, an incorrect way of speaking. Death requires the irreversible loss of critical function. For brain death, the irreversible loss of all brain functions is required. There are cases involving hypothermia or depression of the central nervous system in which a patient temporarily experiences a loss of all brain function, only to have that function return. Neurologists in-

sist that such reversible loss be excluded from any definition of death so that death is pronounced only when there is great certainty about the irreversibility of function.

Cardiac death also requires irreversibility. Since procurers of organs cannot legally remove them before the donor's death, they strive to minimize the time between asystole and pronouncement of death. The Pittsburgh protocol for the procurement of organs from adults after cardiac death, published in 1993, specified that asystole last 120 seconds, on the basis of the claim that auto-resuscitation had never occurred after that period.¹

Physiologically, however, a heart could be restarted after a period of 120 seconds by means of external stimulation — a fact that has led to extensive debate over the meaning of "irreversible loss of function." Some experts have insisted that one wait until the heart cannot be restarted to pronounce death, a number of them pressing for waiting times of 10 minutes or longer. The Institute of Medicine has proposed waiting for 5 minutes.²

Other experts have argued for shorter times — as short as the 120 seconds of the Pittsburgh protocol for adults. They have argued that in cases in which a withdrawal of life support has been planned, no one will intervene to restart the heart, and therefore the stoppage

is “irreversible”; a heart cannot legally be restarted if resuscitation has been refused, so its loss of function, these observers claim, meets one definition of irreversibility. Clearly, the requirement that the heart will not be restarted in such cases is crucial to this argument. Otherwise, anyone who had had a cardiac arrest lasting beyond the time at which auto-resuscitation was possible would be legally deceased, even if the heart had been successfully restarted through external stimulation.

The practice of donation after cardiac death has gained some acceptance, but only for organs other than hearts. There are controversial implications, however, if the goal is to transplant a heart after cardiac death. It is impossible to transplant a heart successfully after irreversible stoppage: if a heart is restarted, the person from whom it was taken cannot have been dead according to cardiac criteria. Removing organs from a patient whose heart not only can be restarted, but also has been or will be restarted in another body, is ending a life by organ removal. Of course, it would still be possible to pronounce such patients dead if they met the criteria for brain death, but according to this logic, it would simply not be possible to perform successful heart transplantation in a manner consistent with the dead donor rule after death pronounced on the basis of cardiac criteria.

This means that under current law, it is not possible to procure a transplantable heart after cardiac death. There are two possible ways

out of this dilemma. Both involve legal changes.

First, we could change the law to permit the removal of vital organs while a donor was still alive — a solution that has essentially been proposed by some theorists, including Truog and Miller (pages 674–675).^{3,4} Such removals would have to be limited. Presumably, they could occur in terminally ill patients who were dying rapidly, and probably only in those who had consented to having their lives end through organ removal.

I believe that such proposals for exceptions to the dead donor rule are practically and morally implausible. Practically speaking, it seems unlikely that sufficient political support will ever exist for removing vital organs from living people, even those who are near death. Many would argue that the very meaning of being alive in a moral community entails certain individual rights, arguably including the right not to have one's life ended by organ removal.

This implausibility of creating exceptions to the dead donor rule suggests a second possible approach. We could further amend the definition of death so that the total loss of those brain functions that are responsible for consciousness would be the basis for pronouncing death. This proposal, sometimes called the higher-brain definition and first put forth in 1971, would permit limited use of a brain-based pronouncement of death and heart procurement in the absence of irreversible heart stoppage.

It is not clear whether further redefinition is in order. Surely,

definitions should not be changed simply to make hearts available, but many Americans — perhaps as many as a third of the population — already support this higher-brain, or consciousness-based, definition on religious and philosophical grounds. A good case can be made for letting those whose values support such a definition choose to have it applied to them.⁵ Perhaps we could also give parents and other surrogates the option to choose this higher-brain definition for their wards.

It may ultimately be deemed acceptable to amend either the dead donor rule or the brain-based definition of death. But whether or not any such legal changes come to pass, any successfully transplanted heart cannot have come from a person who was declared dead on the basis of irreversible stoppage of the heart.

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