When Does Life Stop? A New Way of Harvesting Organs Divides Doctors.

The technique restarts circulation after an organ donor is declared dead. But first surgeons cut off blood flow to the brain. One surgeon called it “creepy.”

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A new method for retrieving hearts from organ donors has ignited a debate over the surprisingly blurry line between life and death in a hospital — and whether there is any possibility that donors might still experience some trace of consciousness or pain as their organs are harvested.

The new method has divided major hospitals in New York City and beyond. It has been championed by NYU Langone Health in Manhattan, which says it became the first hospital in the United States in 2020 to try the new method. But NewYork-Presbyterian Hospital, which has the city’s largest organ transplant program, has rejected the technique after an ethics committee there examined the issue.

If adopted more widely, the method will significantly increase the number of hearts available for transplantation, saving lives.

The reason is that most heart donors currently come from a small category of deaths: donors who have been declared brain dead often after a traumatic incident like a car accident. But they remain on life support — their heart beats, and their blood circulates, bringing oxygen to their organs — until a transplant team recovers their organs.

The new technique, transplant surgeons say, significantly expands the potential pool to patients who are comatose but not brain dead, and whose families have withdrawn life support because there is little chance of recovery. After these patients’ hearts stop, they are declared dead. But hearts are almost never recovered from these donors because they are often damaged by oxygen depletion during the dying process.

Surgeons have discovered that returning blood flow to the heart restores it to a remarkable degree, leaving it suitable for transplant.

But two aspects of the procedure have left some surgeons and bioethicists uncomfortable.

The first problem, some ethicists and surgeons say, stems from the way death has traditionally been defined: The heart has stopped and circulation of blood has irreversibly ceased. Because the new procedure involves restarting blood flow, critics say it essentially invalidates the earlier declaration of death.

But that may be a minor problem compared to an additional step surgeons take: They use metal clamps to cut blood flow from the revived heart to the donor’s head, to limit blood flow to the brain to prevent the possibility that any brain activity is restored. Some physicians and ethicists say that is a tacit admission that the donor might not be legally dead.

“It’s kind of a creepy thing to be doing,” a longtime heart surgeon and transplant specialist, Dr. V. Eric Thompson, said at a recent panel discussion about the procedure at the Yale School of Medicine.

As a legal matter, there are two different ways to determine whether someone has died. In addition to circulatory death, there is brain death: when a person whose brain no longer functions at all can also be declared dead though their heart still beats.

The new set of donors, by contrast, come from the first category and are not brain dead. They might still blink if their eyeball is touched. If their breathing tube is removed, they might gasp.

For them, death is not immediate: Five minutes or 50 might pass after life support has been removed and a doctor declares that circulation has stopped.

NYU Langone has used the new procedure, which uses a cardiopulmonary bypass machine, to recover nearly 30 hearts from such patients that would not otherwise have been transplanted, according to Dr. Nader Moazami, a transplant surgeon who oversaw the first procedure at the facility. Vanderbilt Medical Center in Nashville has embraced the procedure, starting shortly after NYU Langone, and has since performed more.

But some medical groups have flat-out opposed it. The American College of Physicians has said clamping the arteries to the brain to ensure brain death while restarting circulation appears to violate “the dead donor rule” — a foundational tenet of organ transplantation in the United States to ensure organ procurement is not the cause of a donor’s death.

Dr. Robert Truog, a bioethicist at Harvard Medical School who appeared at the Yale panel discussion, said that the new technique held great promise for expanding the number of available donor hearts. But he felt proponents were minimizing the ethical and legal quandaries.

“I worry a little bit that among some transplant professionals there is a little bit of gaslighting going on here with the public,” Dr. Truog said at the panel last month.

Dr. Moazami, the NYU Langone surgeon, said much of the criticism comes from ethicists who spend little time with patients stuck on organ transplant waiting lists.

“You guys can sit in your offices worried about the ethics of something, but you’ve never had to walk into a room where you were facing a patient with a family who’s dying, who’s been waiting for an organ, and who is not going to get an organ, and that patient is going to die,” Dr. Moazami said in an interview. “If you’ve ever experienced that in your life, you will never tell me that what I’m doing is unethical.”

The debate over the procedure — sometimes called N.R.P., for normothermic regional perfusion — echoes earlier medical and legal debates that touched on how to define death, where to mark the moment that divides dying from dead, and what physicians are permitted to do in those final minutes.

Some experts are even raising the specter of prosecution.

“An ambitious district attorney might convincingly argue that physicians following the N.R.P. protocol also intended to render irreversible any brain functions that had not permanently

ceased, thus ensuring the patient's death," two transplantation experts — Alexandra Glazier, a lawyer who runs an organ donation network across New England, and Alexander Capron, a bioethicist and professor at the University of Southern California — wrote in an opinion piece in the American Journal of Transplantation last year.

There are presently 103,327 people on the national transplant waiting list and some 17 people die each day waiting. Most are awaiting a kidney or liver.

Heart transplants are rare, with only some 3,500 performed annually. Each year, about 20 percent of those on the list awaiting a new heart either die or are removed from the list because they become too sick.

Scientific advances may someday ease the shortage of organs available for transplant. The solution may be organs from genetically-modified pigs or human organs grown inside animals. Or perhaps organs grown from scratch in a lab.

But until then, expanding the number of heart transplants will require using donor hearts.

One Massachusetts company, TransMedics, sells a machine to provide oxygenated blood to the heart outside of the body — which avoids the ethical debate. Removed from the donor, the heart goes into what looks like a Tupperware container, where blood circulates through it. But the devices can be expensive to use.

The N.R.P. procedure is cheaper. Dr. Moazami's team first performed it on Jan. 20, 2020, on a 43-year-old donor suffering from end-stage liver disease.

The buildup of toxins in his body had left him comatose. With the family's permission, life support was withdrawn. After five minutes, the man's breathing grew labored. At 14 minutes his heart had stopped. Ten minutes later, Dr. Moazami's team cut open his chest, clamped off the arteries to his brain, and began pumping blood through his body using a bypass machine — the same device routinely used in open-heart surgeries.

Eventually, the heart resumed beating on its own. After about half an hour, surgeons removed it, and then transplanted it.

Dr. Moazami had learned about the procedure from cases in England, where surgeons in Cambridge started trying it in 2015.

Dr. Moazami is not dismissive of his critics' ethical concerns. He noted that new scientific research has raised complex questions about what happens to the brain after death. He points to experiments at Yale that had restored some cellular activity in the brains of dead pigs.

He said it was necessary to clamp the arteries to the brain as a just-in-case measure to reduce the possibility, however remote, of sensation or traces of consciousness when circulation in the donor is restarted.

"The brain remains a 'black box,'" a group of ethicists and surgeons at NYU Langone, including Dr. Moazami, wrote last year.

Joseph Goldstein covers health care in New York, following years of criminal justice and police reporting for the Metro desk. He also spent a year reporting on Afghanistan from The Times's Kabul bureau. More about Joseph Goldstein