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# A Tiny Heart Pump Saves Its First Life, Researchers Report

By LAWRENCE K. ALTMAN

An experimental pump about the size of a pencil eraser that is inserted into the heart through an artery in the leg has helped save the life of the first patient to receive it, doctors at a hospital in Houston said yesterday.

The pump has a turbine blade that spins 25,000 times a minute as it draws oxygenated blood through a short tube from the heart to the aorta, the main artery supplying oxygenated blood to the body. The heart continues to beat in its normal rhythm while the pump, which is powered by a motor outside the body, delivers enough blood to sustain the body's vital needs.

The device is intended to temporarily replace the heart's blood-flow function for up to seven days immediately after a heart attack, giving the damaged heart muscle a chance to rest, according to Dr. Richard K. Wampler, the inventor, who is an official of the manufacturer, Nimbus Medical Inc. of Rancho Cordova, Calif. **A 20-Minute Procedure**

Dr. O. H. Frazier, a nationally known heart surgeon with the Texas Heart Institute in Houston who has also experimented with artificial hearts, was the first doctor to use it on a patient. He said, "A device this small to take over the function of the human heart is astonishing."

Dr. Frazier, speaking by telephone yesterday soon after presenting data on the patients in a scientific panel discussion in Reno, said:

"It is small, safe and effective and can be put in a patient in 20 minutes or less. That is something we have never had before, and unless some complications ensue or problems are brought out in the trial with the device that are not apparent now, it will have an important impact in the treatment of all patients with reversible heart failure."

Dr. Frazier and Dr. Wampler both speculated that if the promise holds and no negative side effects are discovered, the pump might be used temporarily in perhaps 150,000 patients a year, including heart attack victims who suffer from such complications as acute heart failure and a sharp drop in blood pressure resulting from shock. The device, however, is not expected to reach the market for several years.

Dr. Frazier said that in its first human application, the temporary device, the Nimbus Hemopump, was inserted into the heart of a 62-year-old Colorado man on April 26. The patient, whose name was not disclosed, underwent a heart transplant a month ago but was suffering from rejection and faced certain death if the pump had not been used, Dr. Frazier said. Patient Is Doing Well

"The only reason he's back in the game is because of the device," Dr. Frazier said. "I say that with absolute certainty." He said the pump was removed after two days and the patient was recovering well.

A second patient was given the pump last week but died because he suffered from an irreversible heart problem and complications not related to the pump, Dr. Frazier said. The pump functioned well but was removed because his heart lacked the ability to recover, Dr. Frazier said.

Dr. Frazier said the procedure would be used only for patients who were near death, such as patients having open heart surgery who cannot be weaned from the heart-lung machine or patients who suffer disastrous complications in diagnostic cardiac catheterization. Patients with an acute heart attack and congestive heart failure would also be eligible for the procedure, he said.

In the two procedures Dr. Frazier has performed so far, he discussed the experimental method with the patients' families and obtained their permission. In the future he would follow the same course, he said, unless patients were alert enough to participate in the decision. Cost of \$3,000

Nimbus said it expected to sell the pump mechanisms, which are disposable, for about \$3,000 each.

Dr. Wampler, the inventor, said he began working on the device about five years ago. In March, Nimbus received approval from the Federal Food and Drug Administration to allow testing on a total of 12 patients for up to seven days each at three hospitals: the Texas Heart Institute, Humana Hospital in Louisville, Ky., and Mercy Hospital in Des Moines.

Dr. Frazier said he expressed skepticism about the potential success of the pump when he first saw it two years ago and Dr. Wampler asked for his cooperation. "For most devices I have some optimism, but for this one I didn't think it would work," Dr. Frazier said.

Dr. Frazier said he had expected that the pump would work like a blender to break up the red cells in the blood or cause clots. But, he went on, Dr. Wampler "prevailed on me to do the studies" that showed the pump did not have such adverse effects in experiments on animals and in the first two cases. 'A Real Coup'

Dr. Claude J. Lenfant, who heads the Federal National Heart, Lung and Blood Institute in Bethesda, Md., said that although he did not have direct knowledge of the pump, "If it is as described, it would be a major advance, a real coup."

The pump is classified as a ventricular assist device, but it differs from the others in its size and also in that it does not require the opening of the chest and major surgery, Dr. Frazier said. "This is placed in a simple incision" in the upper leg, Dr. Frazier said.

It is inserted by cardiac catheterization, in which a tube is inserted through a blood vessel and threaded to the heart. Doctors often use X-rays to follow the course of the tube until it is in place.

The Houston heart surgeon said that the Nimbus pump seemed to be more effective than another assist device, the intra-aortic balloon pump, which is used in many hospitals. If further tests prove the value of the Nimbus pump, Dr. Frazier said he believed it would be commonly used in many emergency rooms.

The Nimbus device is able to pump up to four liters of blood a minute, more than enough to meet the body's basic demands, Dr. Frazier and Dr. Wampler said. The heart of a healthy person pumps about five liters a minute. Based on Ancient Idea

The pump works on a principle similar to that of the Archimedes screw, which is named after the Greek scientist who invented it in the 3d century B.C. as a means of raising water from ditches or wells for irrigation. Known technically as a helically inclined plane, the Archimedes screw traps liquid in its spiral vanes as it turns inside a close-fitting tube. Further rotation forces the fluid to rise with the spiraling grooves of the device.

The Nimbus pump supported a sustained blood pressure of about 100 millimeters of mercury in the two patients in which it was used, Dr. Wampler said.

One of the major unanswered questions of physiology is how the body would respond to a steady blood pressure rather than to the waxing and waning that comes from a beating heart. Asked what effect the Nimbus pump, which produces no rhythmic pulsing, would have on patients, Dr. Frazier said, "Nobody knows because no one has had a device to study that effect long-term."

Diagram showing how the pump assists an ailing heart (source: Nimbus Medical Inc.) (NYT) (pg. B13)