Artificial pump effectively backs up failing hearts

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Patients with severe heart failure can be bridged to eventual transplant by a new, smaller and lighter implantable heart pump, according to a just-completed study of the device. Results of this third-generation heart assist device were reported at the 58th annual meeting of the American College of Cardiology on March 30.

The device, called a left ventricular assist device (LVAD), is the latest generation of heart assist devices. The LVAD was tested at five main sites: Washington University School of Medicine in St. Louis, the University of Minnesota, Mt. Sinai School of Medicine, Inova Fairfax Hospital and the University of Pittsburgh.

"LVADs have allowed us to support patients until they can receive a heart transplant, so they are called a bridge to transplant," says Gregory Ewald, M.D., a Washington University cardiologist at Barnes-Jewish Hospital and medical director of the Heart Failure, Cardiac Transplantation and Total Artificial Heart Program. "For patients whose hearts are failing and are awaiting transplantation, these devices can be lifesavers. Washington University is the only medical center in the region where patients can receive these devices at this time."

In addition to Ewald, associate professor of medicine, lead investigators in the trial included Nader Moazami, M.D., associate professor of surgery and surgical director of the Cardiac Transplantation and Total Artificial Heart Program at Washington University, and Andrew Boyle, M.D., associate professor of medicine at the University of Minnesota and medical director of Heart Failure, Cardiac Transplantation and Mechanical Circulatory Support. Boyle presented the findings at the ACC meeting.

An LVAD is implanted inside the chest cavity near the heart and is connected to the heart's left ventricle (pumping chamber). It assists the patient's weakened or damaged ventricle in pumping blood through the body. By restoring a normal blood flow, the device improves patients' health. Because it is powered by portable battery packs, patients usually go home while they wait for a heart transplant.

The LVAD used in this study, the VentrAssist, is termed a third-generation heart assist device. Measuring 2.5-inches across and weighing 10 ounces, the pump is considered an improvement over earlier devices because its size and light weight make it suitable for small adults and children. In addition, its pumping mechanism has no contacting parts for improved durability.

Patients who received the LVAD in the study were approved and listed for cardiac transplantation. The study considered the device successful if a patient survived until heart transplantation or survived at least 180 days after the device was implanted and remained qualified for heart transplantation. Eighty-five percent of patients met this measure of success.

Out of 98 patients who received the device, 60 were transplanted, 19 continued to be supported with the device and 19 died. The median time on LVAD support was 131 days. Adverse events reported during the trial included stroke and bleeding, and the number and type of adverse events was similar to other LVADs but better than that of first-generation VAD devices.

Answering standardized questionnaires for patients with heart failure, they reported a significantly improved quality of life after receiving the device, indicating that their heart failure was less apt to interfere with everyday activities such as housework, hobbies or sleeping or to affect their mood, ability to concentrate or energy level.

"Before implantation of the device, 80 percent of these patients were rated class four on the New

York Heart Association scale — they were short of breath at rest," Ewald says. "But by six months, 84 percent were in class one or two, meaning their heart failure symptoms were minimal or mild. All of them were able to go home with the device, and that allowed them to rehabilitate themselves — their nutrition improved and they were in better shape, making them better candidates for heart transplantation."

The VentrAssist device pumps blood in a continuous flow in contrast to earlier heart assist pumps that pumped blood in pulses. It contains a spinning rotor that is suspended by blood within the pump housing and magnetically rotated. Since the impeller blades don't touch any part of the pump, the chance of damage to blood cells is lessened. With only one moving part, the pump is resistant to wear.

The positive results from this clinical study mean the VentrAssist will be submitted to the U.S. Food and Drug Administration for approval for use as a bridge to heart transplant. In the interim, Washington University School of Medicine will continue to provide the device to patients as part of a clinical trial.

Source: Washington University School of Medicine (news : web)