

First Total Artificial Heart Implanted in California at UC San Diego Medical Center

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On January 7, 2011, UC San Diego Medical Center performed the West Coast's first implant of the world's only FDA-approved total artificial heart. During the four-hour procedure, the patient's diseased heart was completely removed and replaced by a lifesaving device that rapidly restored blood flow to his entire body. The patient, who suffered from a near-fatal heart virus in his 20s, recently underwent heart transplant surgery and is now recovering.

"The total artificial heart is a good device for people who are just beginning to lose the function of their kidneys, liver, intestines, lungs and brain. Patients may be near the point of organ failure but the damage is still reversible," said Jack Copeland, MD, professor of surgery and director of cardiac transplantation and mechanical circulatory support at UC San Diego Health System. "The total artificial heart goes in and, in most cases, the patients can recover from metabolic disaster, provided they are not too advanced in age, weak, or suffering from other chronic organ disease."

For patients who receive the total artificial heart, and stay in the hospital, approximately 80 percent are transplanted in six months. Almost all are transplanted at the one-year mark.

During total artificial heart surgery, the patient's chest wall is opened. Medicines are used to stop the heart to allow the team to operate while the heart is not beating. A heart-lung machine keeps oxygen-rich blood moving through the body. Copeland then begins the process of removing the dying heart. Both ventricles are removed, leaving the upper chambers of the heart to connect to the device. When the device is attached, the heart-lung machine is switched off and the total artificial heart starts pumping about eight liters of blood per minute.

"All of a sudden the organs are pinking up and working again. It all happens before your eyes, right in the operating room," said Copeland. "It's amazing to see these patients rescued from death and brought back to life. Within days, many patients are breathing on their own. In less than two weeks, they are out of bed and walking more than 100 feet, and getting re-nourished in preparation for a heart transplant."

Each year, more than 5 million Americans are diagnosed with heart failure. For some, medical therapies such as beta blockers are a lifesaver. For others with end-stage heart disease, the only option for survival is one of 2,500 donated hearts. The total artificial heart extends the life of the patient until a match can be found.

“Heart failure is a slow insidious way to die. Basically the patient suffocates as time passes,” said Copeland. “Some patients have to take small triple breaths just to take in the equivalent of one normal breath. They become malnourished because they cannot exercise. They consume their calories just trying to breathe.”

For more than 30 years, Copeland has pioneered the field of heart transplantation and device therapy. In 1979, he performed Arizona’s first heart transplant and in 1985 became the first surgeon in the world to successfully use the total artificial heart as a bridge to transplant. During his career, Copeland has performed more than 850 heart transplants and 100 implants of the total artificial heart, which is manufactured by SynCardia. Copeland helped found Syncardia in 2002 and serves on their board with no compensation.

Implanting the total artificial heart is not without risks. The two major complications which may arise are clotting and slow healing of the chest.

Copeland says that in the next year Americans may begin pushing for the total artificial heart as a permanent replacement and that more studies need to be done to prove the viability of this assertion. To date, the longest anyone has ever been on the total artificial heart is more than 1,100 days.

Under the leadership of Dr. Stuart Jamieson, chief of heart surgery, the surgery team includes Jack Copeland, MD, Victor Pretorius, MD, Michael Madani, MD, David Garcia, NP, and Amanda Topik, NP.

In April 2011, UC San Diego Health System will open the doors to the Sulpizio Cardiovascular Center. This new 128,000-square-foot facility will unify UC San Diego Health System’s ambulatory, clinical, and inpatient heart and stroke care in one convenient location.

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