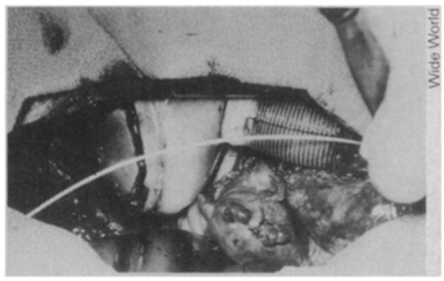
Artificial Heart Makes Medical History



Surgeon DeVries with patient Clark (left). The artificial heart in the chest of Clark, who received it Dec. 2.

On Dec. 2, for the first time in medical history, surgeons implanted a permanent artificial heart into a human. The operation was performed by William C. DeVries, chief of cardiovascular surgery at the University of Utah Medical Center in Salt Lake City. The patient did relatively well during the first five days following his implant, bringing praise from the scientific community. And while he appeared on Dec. 7 to suffer a major setback—he developed seizures — physicians thought they had nailed the cause to a metabolic disorder, and the patient appeared to be recovering from it.

The person chosen to receive the artificial heart was Barney B. Clark, a 61-year-old retired dentist from the Seattle area. He suffered from idiopathic cardiomyopathy, a disease of heart muscle, which in turn had resulted in heart failure and was threatening his life. Conventional medical treatments could no longer help him. His only chance of survival was with an artificial heart.

The implant of the artificial heart actually started late Dec. 1, because Clark's condition had deteriorated so rapidly it was feared he might die before the morning of Dec. 2, when the implant had been scheduled. For seven and a half hours DeVries and his team proceeded to replace Clark's natural heart with an artificial one, made largely from polyurethane, that consisted of two lower chambers (ventricles) rather than of all four chambers and that was operated by a compressed air-power system outside the body. The heart is called the Jarvik-7 heart, after Robert Jarvik, the University of Utah bioengineer who is the primary designer (SN: 3/7/81, p. 157). During the implant Clark was maintained by a heart-lung machine.

There were some complications during the implant. For instance, one of the ventricles appeared to be defective. As Jarvik explained to SCIENCE NEWS, "There were three different things we thought might be involved, and rather than take time to make sure which of the three things it was, we fixed them all at once. And that involved replacing a ventricle. We have not yet had time to really evaluate that ventricle and find out whether there was anything wrong with it or not." In any event, once the artificial heart was repaired it took over Clark's coronary functions. When the implant ended after dawn on Dec. 2, DeVries declared the operation a success and expressed cautious optimism about Clark's outlook.

A few hours later Clark regained consciousness. He was alert and moved his arms and legs, recognized his wife and indicated to doctors that he wasn't in pain. On Dec. 3 he vigorously shook hands with DeVries and looked healthier than he had before the implant. His vital signs neared the normal range. On Dec. 4 he underwent surgery to correct a lung complication that proved unrelated to the artificial heart. On Dec. 5 his recovery was back on track. He sipped fluids and sat up in bed. On Dec. 6 he rested comfortably while listening to a tape recording of Handel's "Messiah" sung by the Mormon Tabernacle Choir.

On Dec. 7, however, his sixth day with the artificial heart, Clark suffered seizures, which doctors suspected were due to a brain hemorrhage, blood clots in the brain or a metabolic disorder caused by imbalances in salts, sugars or antibiotics. Yet by Dec. 8, the cause appeared to be the least serious of the three possibilities — a metabolic disorder — and Clark's physicians expected to clear up the problem within a day or two. Such disorders are not uncommon in surgery patients.

Yet even though Clark appeared to survive the seizure complication, his condition would remain precarious for an indefinite period. For instance, tubes from the artificial heart emerge from his abdomen to connect with the exterior compressed air-power system. Thus the opening in his abdomen might acquire a life-threatening infection. Another potential danger is the heart itself. No one can say for sure how long it will function. However, a calf lived 268 days on an artificial heart similar to the Jarvik-7 model (SN: 3/7/81, p. 157).

Regardless of the question of Clark's survival, he has helped turn the dream of an artificial heart into a reality. Said Baylor College of Medicine heart surgeon Michael E. DeBakey: "I think it is a significant development." Added Peter Frommer, deputy director of the National Heart, Lung and Blood Institute: "It is a significant step, and we look forward to the scientific data that will be forthcoming — that is, the kinds of observations they will make about the interactions of the device with the patient's body, with blood, with the needs of the circulation, with fighting infection, and so on." Asserted Georgetown University Medical School cardiologist Larry K. Jackson: "It's an incredible accomplishment."

Indeed, its developers say the artificial heart era is just beginning. DeVries has the approval of the Food and Drug Administration to perform six more of the experimental artificial heart implants. Jarvik and his colleagues expect to have a portable artificial heart ready to try in a patient within the next two to two and a half years. In fact, Jarvik says, "It could be a lot sooner if circumstances really allow us to accelerate the development." —*J. A. Treichel*

Jarvik with Jarvik-7.