New use of artificial lung device pioneered at University of Kentucky

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Surgeons at the University of Kentucky on Aug. 3 announced that they were among the first to use artificial-lung technology to demonstrate the feasibility of a lung transplant, using a device invented by two university faculty members, Dr. Joseph Zwischenberger and Dr. Dongfang Wang.

"The device helps patients get oxygen into their blood by transporting blood to a gas exchanger that removes carbon dioxide and oxygenates the blood before returning it to the heart, bypassing the lungs of the patient," said Zwischenberger, chairman of the UK Department of Surgery. "It's meant for patients who are too sick to be maintained on a ventilator and is designed as temporary treatment for severe respiratory failure."

Normally, a patient is sedated while using an extracorporeal membrane oxygenation (ECMO). Consequently, the patient is bedridden, which causes the muscles to become increasingly weak. However, Zwischenberger's device, the bi-caval double lumen catheter, manufactured by Avalon Laboratories, is an advanced form of ECMO, also known as "ambulatory artificial lungs."

Zwischenberger's goal was to allow patients to do normal things, even exercise, while using the device.

That goal was achieved on April 8, when Dr. Charles Hoopes, director of the UK Heart and Lung Transplant Program and the Ventricular Assist Device Program, performed surgery on Ernie Gillispie, of Canada, Ky.,

to allow the use of this artificial lung and double lumen catheter.

With the assistance of the device, Gillispie proved himself to be a candidate for a lung transplant; without it he would not have been strong enough for the surgery, Zwischenberger said.

"This lung technology sets us up to be able to bridge patients to lung transplant, rather than their condition continuing to deteriorate while waiting for a transplant," Zwischenberger said. "Dr. Hoopes is an early adopter of this technique and we are now one of a very few places in the country that uses ambulatory ECMO as a bridge to transplant."

Hoopes says the machine proved that if Gillispie's lungs worked properly, he could live a normal life.

"If a patient cannot exercise after their breathing is 'replaced' with an artificial lung, then transplant will provide little clinical benefit," Hoopes said. "The limited number of donor organs can be used in patients who will most likely benefit. Artificial lung technology allows us to be certain that the patient potentially receiving the organ transplantation is physically well enough to undergo the surgery and recovery."

After only three days using the artificial lung, Gillispie underwent a successful double-lung transplant surgery on April 11.

Provided by University of Kentucky